



WAYNE STATE UNIVERSITY

Gateway Theater Complex

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Project Manual

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HGA

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HISTORIC TREATMENT PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes general protection and treatment procedures for designated historic spaces, areas, rooms, and surfaces in Project.

1.2 DEFINITIONS

- A. Consolidate: To strengthen loose or deteriorated materials in place.
- B. Design Reference Sample: A sample that represents Architect's prebid 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 nonhistoric 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.
- D. Historic: Spaces, areas, rooms, surfaces, materials, finishes, and overall appearance that are important to the successful **[preservation]** **[rehabilitation]** **[restoration]** **[and]** **[reconstruction]** as determined by Architect. Designated historic **[spaces]** **[areas]** **[rooms]** **[and]** **[surfaces]** are **[indicated on Drawings]** **[and]** **[scheduled in Part 3]**.
 - 1. **[Restoration Zones]** **[Grade 1 Areas]** **<Insert designation>**: Areas of greatest architectural importance, integrity, and visibility; to be preserved and restored to the original, circa **<Insert date>**, design and finish as indicated on Drawings.
 - 2. **[Renovation Zones]** **[Grade 2 Areas]** **<Insert designation>**: Areas of significant architectural importance, integrity, and visibility; to be preserved and restored consistent with the remaining historic fabric and to the extent indicated on Drawings.
 - 3. **[Alteration Zones]** **[Grade 3 Areas]** **<Insert designation>**: Areas of slight architectural importance, integrity, and visibility; to leave any remaining original fabric untouched insofar as is consistent with accommodating modern uses for the building as indicated on Drawings.
- E. 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.
- F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.
- G. Reinstall: To protect removed or dismantled item, repair and clean it as indicated for reuse, and re-install it in original position, or where indicated.
- H. Remove: To take down or detach a nonhistoric 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.
- I. 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.
- J. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.
- K. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.
- L. 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.

- M. Restore: To consolidate, replicate, reproduce, repair, and refinish as required to achieve the indicated results.
- N. Retain: To keep existing items that are not to be removed or dismantled.
- O. Reversible: New construction work, treatments, or processes that can be removed or undone in the future without damaging historic materials unless otherwise indicated.
- P. Salvage: To protect removed or dismantled items and deliver them to Owner[**ready for reuse**].
- Q. 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.
- R. Strip: To remove existing finish down to base material unless otherwise indicated.

1.3 COORDINATION

- A. Historic Treatment Subschedule: 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.
- B. Pedestrian and Vehicular Circulation: Coordinate historic treatment work with circulation patterns within Project building(s) and site. Some work is near circulation patterns **[and active railroad track]** **<Insert item of concern>**. Circulation patterns cannot be closed off entirely, and in places can be only temporarily redirected around small areas of work.**[Railroad traffic will not be stopped.]** Plan and execute the Work accordingly.

1.4 PROJECT MEETINGS FOR HISTORIC TREATMENT

- A. Preliminary Historic Treatment Conference: Before starting historic treatment work, **[conduct]** **[Architect will conduct]** **[Construction Manager will conduct]** conference at **[Project site]** **<Insert location>**.
 - 1. Attendees: In addition to representatives of Owner,**[Construction Manager,]** Architect, and Contractor,**[Owner's insurer,]** 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 Subschedule: 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: **[Record]** **[Architect will record]** **[Construction Manager will 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 **[weekly]** **[monthly]** **<Insert appropriate interval>** 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, **[Construction 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 Subschedule: 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 Subschedule 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: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.5 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. Dismantle and salvage each item or object and protect it from damage, then promptly deliver it to Owner where directed **[at Project site]** **<Insert location>**.
 - 2. Coordinate with Owner's **[archaeologist]** **[conservationist]** **[historical adviser]** **<Insert requirement>** who will establish special procedures for dismantling and salvaging.

1.6 INFORMATIONAL SUBMITTALS

- A. Historic Treatment Subschedule:
 - 1. Submit historic treatment subschedule within [seven] [30] <Insert number> days of date established for[**commencement of historic treatment work**] <Insert requirement>.
- 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.
- C. Historic Treatment Program: Submit [30 days] <Insert time> before work begins.
- D. Fire-Prevention Plan: Submit [30 days] <Insert time> before work begins.

1.7 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] <Insert number> recent projects with a record of successful in-service performance that demonstrates the firm's qualifications to perform this work.
 - 1. 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/ASSE A10.6.

1.8 STORAGE AND HANDLING OF HISTORIC MATERIALS

- A. 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 [on-site] [off-site] [designated by Owner] [indicated on Drawings].
 - 5. Protect items from damage during transport and storage.

- B. 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.
- C. 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.
- D. Storage: Catalog and store historic items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.
 - 1. Identify each item with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
 - 2. Secure stored materials to protect from theft.
 - 3. Control humidity so that it does not exceed 85 percent. Maintain temperatures 5 deg F (3 deg C) or more above the dew point.
- E. Storage Space:
 - 1. Owner will arrange for limited on-site location(s) for free storage of historic material. This storage space **[includes] [does not include] security[and climate control]** for stored material.
 - 2. Arrange for off-site locations for storage and protection of historic material that cannot be stored and protected on-site.

1.9 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 (300 mm)] <Insert dimension>** or more.

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 PROTECTION

- A. 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.
- B. 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.
- C. 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.
- D. 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.
- E. 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.
- F. Existing Roofing: Prior to the start of work in an area, install roofing protection[**as indicated on Drawings**].

3.2 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[**except where specifically designated for smoking**].
- 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[**open-flame or**] welding or other high-heat equipment.[**Use of open-flame equipment is not permitted.**] Notify Owner [at least **72 hours**] <Insert requirement> 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]** **<Insert time>** 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]** **[two hours]** **<Insert time>** 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.

3.3 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.

3.4 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. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation **[photographs]** **[or]** **[video recordings]**. Comply with requirements in Section 013233 "Photographic Documentation."
- D. Perform **[regular]** **[daily]** **<Insert requirement>** inspections of Project site as the Work progresses to detect hazards resulting from historic treatment procedures.
- E. 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]** **[or]** **[video recordings]**. Comply with requirements in Section 013233 "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.

3.5 HISTORIC TREATMENT SCHEDULE

- A. Spaces, areas, rooms, and surfaces requiring special care and treatment to ensure successful **[preservation]** **[rehabilitation]** **[restoration]** **[and]** **[reconstruction]** are **[indicated on Drawings]** **[and]** **[generally described below]**.
1. <Insert location, applicable treatment, and zone or area designations>.

END OF SECTION

SECTION 024116 STRUCTURE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of buildings[**and site improvements**].
 - 2. [**Abandoning in-place**] [**Removing**] below-grade construction.
 - 3. Disconnecting, capping or sealing, and [**abandoning in-place**] [**removing**] site utilities.
 - 4. Salvaging items for reuse by Owner.
- B. Related Requirements:

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and [**deliver to Owner ready for reuse**] [**store**]. Include fasteners or brackets needed for reattachment elsewhere.

1.3 MATERIALS OWNERSHIP

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

1.4 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at [**Project site**] <Insert location>.
 - 1. Inspect and discuss condition of construction to be demolished.
 - 2. Review structural load limitations of existing structures.
 - 3. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review and finalize protection requirements.
 - 5. Review procedures for [**noise control**] [**and**] [**dust control**].
 - 6. Review procedures for protection of adjacent buildings.
 - 7. Review items to be salvaged and returned to Owner.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property[, **for environmental protection**] [, **for dust control**] [**and**] [, **for noise control**]. Indicate proposed locations and construction of barriers.
 - 1. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain[**including means of egress from those buildings**].
- D. Schedule of Building Demolition Activities: Indicate the following:
 - 1. Detailed sequence of demolition work, with starting and ending dates for each activity.

2. Temporary interruption of utility services.
 3. Shutoff and capping[**or re-routing**] of utility services.
- E. Predemolition Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before the 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.

1.6 CLOSEOUT SUBMITTALS

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

1.7 QUALITY ASSURANCE

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

1.8 FIELD CONDITIONS

- A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.
- B. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.
1. Provide not less than [72] <Insert number> hours' notice of activities that will affect operations of adjacent occupied buildings.
 2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.
 - a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.
- C. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
1. Before building demolition, Owner will remove the following items:
 - a. <Insert items to be removed by Owner>.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
1. Hazardous materials will be removed by Owner before start of the Work.
 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Hazardous Materials: Present in buildings and structures to be demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 3. Owner will provide material safety data sheets for materials that are known to be present in buildings and structures to be demolished because of building operations or processes performed there.
- F. On-site storage or sale of removed items or materials is not permitted.

1.9 COORDINATION

- A. Arrange demolition schedule so as not to interfere with [Owner's on-site operations] [or] [operations of adjacent occupied buildings].

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

2.2 SOIL MATERIALS

- A. Satisfactory Soils: Comply with requirements in Section 312000 "Earth Moving."

PART 3 EXECUTION

3.1 DEMOLITION CONTRACTOR

- A. Demolition Contractor:
 - 1. <Insert, in separate subparagraphs, name of Contractor prequalified to perform the Work of this Section>.

3.2 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. [Perform] [Engage a professional engineer to 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.
- D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- F. Inventory and record the condition of items to be removed and salvaged.

3.3 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.
- B. Salvaged Items: Comply with the following:
 - 1. Clean salvaged items of dirt and demolition debris.
 - 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 storage area [designated by Owner] [indicated on Drawings].
 - 5. Protect items from damage during transport and storage.

3.4 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Utilities to be Disconnected: Locate, identify, disconnect, and seal or cap off utilities serving buildings and structures to be demolished.
 - 1. Owner will arrange to shut off utilities when requested by Contractor.
 - 2. Arrange to shut off utilities with utility companies.
 - 3. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
 - 4. Cut off pipe or conduit a minimum of **[24 inches]** <Insert depth> below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
 - 5. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.5 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.
- B. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of demolition.
- C. Existing Utilities to Remain: Maintain utility services to remain and protect from damage during demolition operations.
 - 1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
 - 2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.
 - a. Provide at least **[72]** <Insert number> hours' notice to occupants of affected buildings if shutdown of service is required during changeover.
- D. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Section 015000 "Temporary Facilities and Controls."
 - 1. Protect adjacent buildings and facilities from damage due to demolition activities.
 - 2. Protect existing site improvements, appurtenances, and landscaping to remain.
 - 3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
 - 4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
 - 6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
 - 7. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.
- E. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.6 DEMOLITION, GENERAL

- A. General: Demolish indicated buildings[**and site improvements**] completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.

2. Maintain fire watch during and for at least **<Insert number>** hours after flame-cutting operations.
 3. Maintain adequate ventilation when using cutting torches.
 4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed trafficways if required by authorities having jurisdiction.
 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- C. Explosives: Use of explosives is not permitted.

3.7 DEMOLITION BY EXPLOSIVES

- A. Explosives: Perform explosive demolition according to governing regulations.
1. Obtain written permission from authorities having jurisdiction before bringing explosives to, or using explosives on, Project site.
 2. Do not damage adjacent structures, property, or site improvements when using explosives.
- B. Comply with recommendation in specialty explosives consultant's report.

3.8 DEMOLITION BY MECHANICAL MEANS

- A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.
- B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.
- C. Salvage: Items to be removed and salvaged are indicated **[on Drawings.] [below:]**
1. Doors and door hardware.
 2. Windows.
 3. Cabinets.
 4. Mirrors.
 5. Chalkboards.
 6. Tackboards.
 7. Marker boards.
 8. Plumbing fixtures.
 9. **<Insert items to be salvaged>**.
- D. Below-Grade Construction: Abandon foundation walls and other below-grade construction. Cut below-grade construction flush with grade.
- E. Below-Grade Construction: Demolish foundation walls and other below-grade construction that are within footprint of new construction and extending **[5 feet] <Insert dimension>** outside footprint indicated for new construction. Abandon below-grade construction outside this area.
1. Remove below-grade construction, including basements, foundation walls, and footings, **[completely] [to at least 6 inches below grade] [to at least 12 inches below grade] [to depths indicated]**.
- F. Below-Grade Construction: Demolish foundation walls and other below-grade construction.

1. Remove below-grade construction, including basements, foundation walls, and footings, [completely] [to at least **6 inches** below grade] [to at least **12 inches** below grade] [to depths indicated].
- G. Existing Utilities: Abandon existing utilities and below-grade utility structures. Cut utilities flush with grade.
- H. Existing Utilities: Demolish existing utilities and below-grade utility structures that are within **[5 feet]** **<Insert dimension>** outside footprint indicated for new construction. Abandon utilities outside this area.
 1. Fill abandoned utility structures with **[satisfactory soil materials]** **[recycled pulverized concrete]** according to backfill requirements in Section 312000 "Earth Moving."
- I. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.
- J. Hydraulic Elevator Systems: Demolish and remove elevator system, including cylinder, plunger, well assembly, steel well casing and liner, oil supply lines, and tanks.

3.9 SITE RESTORATION

- A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.
- B. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with **[satisfactory soil materials]** **[recycled pulverized concrete]** **[recycled pulverized masonry]** according to backfill requirements in Section 312000 "Earth Moving."
- C. 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.

3.10 REPAIRS

- A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.11 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site [and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.] [and recycle or dispose of them according to Section 017419 "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 and areas.
- B. Do not burn demolished materials.

3.12 CLEANING

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

END OF SECTION

SECTION 024119 SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

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

1.3 MATERIALS OWNERSHIP

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

1.4 PREINSTALLATION MEETINGS

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

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, **[for 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 [building manager's] [and] [other tenants'] on-site operations are uninterrupted.
 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 3. Coordination for shutoff, capping, and continuation of utility services.
 4. Use of elevator and stairs.
 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- E. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 013233 "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.

1.6 CLOSEOUT SUBMITTALS

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

1.7 QUALITY ASSURANCE

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

1.8 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
1. Before selective demolition, Owner will remove the following items:
 - a. <Insert items to be removed by Owner>.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
1. Hazardous materials will be removed by Owner before start of the Work.
 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.

- F. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by **[12 inches (300 mm)] <Insert dimension>** or more.
- G. Storage or sale of removed items or materials on-site is not permitted.
- H. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 WARRANTY

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

1.10 COORDINATION

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

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.
- C. <Double click to insert sustainable design text for building reuse.>

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. **[Perform] [Engage a professional engineer to perform]** an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- 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 **[measured drawings] [preconstruction photographs or video] [and] [templates]**.
1. Comply with requirements specified in Section 013233 "Photographic Documentation."
 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
 3. 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.

3.2 PREPARATION

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

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 2. Arrange to shut off utilities with utility companies.
 3. 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.
 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.

3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain fire watch during and for at least <Insert number> hours after flame-cutting operations.
 - 6. Maintain adequate ventilation when using cutting torches.
 - 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 10. Dispose of demolished items and materials promptly.[Comply with requirements in Section 017419 "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 Section 024296 "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 [on-site] [off-site] [designated by Owner] [indicated on Drawings].
 - 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.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." [**Do not use methods requiring solvent-based adhesive strippers.**]
- F. 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. See Section **<Insert Section number and title>** for new roofing requirements.
 1. Remove existing roof membrane, flashings, copings, and roof accessories.
 2. Remove existing roofing system down to substrate.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site [and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.] [and recycle or dispose of them according to Section 017419 "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 and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.

3.8 CLEANING

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

3.9 SELECTIVE DEMOLITION SCHEDULE

- A. Remove: **<Insert description of items and construction to remove>**.
- B. Remove and Salvage: **<Insert description of items to remove and salvage>**.

- C. Remove and Reinstall: <Insert description of items to remove and reinstall>.
- D. Existing to Remain: <Insert description of items to remain>.
- E. Dismantle: <Insert description of items to be removed>.

END OF SECTION

SECTION 024296 HISTORIC REMOVAL & DISMANTLING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes historic treatment procedures in the form of special types of selective demolition work for designated historic spaces, areas, rooms, and surfaces and the following specific work:
 - 1. Removal and dismantling of indicated portions of building or structure and debris hauling.
 - 2. Removal and dismantling of indicated site elements and debris hauling.
 - 3. Salvage of existing items to be reused or recycled.

1.2 DEFINITIONS

- A. Dismantle: To disassemble or detach a historic item from a surface, or a nonhistoric 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 nonhistoric 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 existing items that are not to be removed or dismantled.
- E. Salvage: To protect removed or dismantled items and deliver them to Owner[**ready for reuse**].

1.3 PRECONSTRUCTION MEETINGS

- A. Preconstruction Conference(s): Conduct conference(s) at **[Project site]** <Insert location>.
 - 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.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For [historic removal and dismantling specialist] [and] [historic removal and dismantling specialist's field supervisors].
- 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 days]** <Insert time> 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 **[15 days]** <Insert time> 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.

1.5 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.
- C. Mockups: 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: Remove typical **[wall area]** **[suspended ceiling assembly]** <Insert description> as shown on Drawings.
 - 2. Typical Dismantling Work: Dismantle typical [fluorescent lighting fixture from ornamental plaster surface] [historic light fixture] <Insert description> as shown on Drawings.
 - 3. Typical Removal Work: Remove an [approximately **50-sq. ft.**] <Insert dimension> area of typical [wall] [suspended ceiling assembly] <Insert description>, but not less than [10] <Insert number> adjacent whole [masonry] [stone] [ceiling tile] <Insert item> units.
 - 4. Typical Dismantling Work: Dismantle an [approximately **50-sq. ft.**] <Insert dimension> area of typical [composition tile from mosaic tile substrate] <Insert description>, but not less than [10] <Insert number> adjacent whole [composition tile] <Insert item> units.
 - 5. Exploratory Dismantling of **[Marble and Travertine Flooring and Setting Bed]** <Insert description>: Perform exploratory dismantling in the presence of Architect.
 - a. Dismantle 1 sq. ft. of the setting bed for each 2500 sq. ft. of stone flooring. At each location, verify the actual thickness and nature of the setting bed.
 - b. If the actual thickness of the setting bed is equal to or more than 1-3/4 inches, continue the dismantling.
 - c. If the actual thickness of the setting bed is less than 1-3/4 inches, notify Architect, who may suspend dismantling for re-evaluation.
 - 6. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- D. 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.

1.6 FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before removal and dismantling, Owner will remove the following items:
 - a. <Insert items to be removed by Owner>.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 1. Hazardous materials [will be removed by Owner before start of the Work] [have been removed by Owner under a separate contract].
 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.
 - a. 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. Reassign workers to continue work in unaffected areas. Resume work in the area of concern after safe working conditions are verified.
- D. Hazardous Materials: It is unknown whether hazardous materials will be encountered in the Work.
 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.
 - a. 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. Reassign workers to continue work in unaffected areas. Resume work in the area of concern after safe working conditions are verified.
- E. Hazardous Materials: Hazardous materials are present in construction affected by removal and dismantling work. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 2. Do not disturb hazardous materials or items suspected of containing hazardous materials, except under procedures specified elsewhere in the Contract Documents.
 3. If unanticipated asbestos is suspected, 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. Reassign workers to continue work in unaffected areas. Resume work in the area of concern after safe working conditions are verified.
- F. Storage or sale of removed or dismantled items on-site is not permitted unless otherwise indicated.

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 HISTORIC TREATMENT SPECIALISTS

- A. Historic Removal and Dismantling Specialist Firms: Subject to compliance with requirements, [have historic removal and dismantling performed by one of the following] [firms that may perform historic removal and dismantling include, but are not limited to, the following]:
 1. <Insert, in separate subparagraphs, names of preapproved historic removal and dismantling specialist firms>.

3.2 HISTORIC REMOVAL AND DISMANTLING EQUIPMENT

- A. Removal Equipment: Use only hand-held tools, except as follows or unless otherwise approved by Architect on a case-by-case basis:
 1. Light jackhammers are allowed subject to Architect's approval.
 2. Large air hammers are not permitted.

- B. Dismantling Equipment: Use manual, hand-held tools, except as follows or otherwise approved by Architect on a case-by-case basis:
 - 1. Hand-held power tools and cutting torches 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 lb are not permitted for dismantling work.

3.3 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 submittal of 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] [and] [preconstruction video recordings] <Insert requirement>**.
 - 1. Comply with requirements specified in Section 013233 "Photographic Documentation."
- C. Perform surveys as the Work progresses to detect hazards resulting from historic removal and dismantling procedures.

3.4 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. 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 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.
- C. 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.
- 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.

- E. Removing and Dismantling Items on or Near Historic Surfaces:
1. Use only dismantling equipment and procedures within **[12 inches]** <Insert dimension> of historic surface. Do not use pry bars. Protect historic surface from contact with or damage by tools.
 2. 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.
- 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, maintain 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.
- 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 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. Loose Plaster: Identify loose, nonhistoric plaster, and separate it from its substrate by tapping with a hammer and prying with a chisel or screwdriver. Do not use pry bars. Leave sound, firmly adhered plaster in place. Do not damage, remove, or dismantle historic plasterwork, except where indicated or where it is an immediate hazard to personnel and as approved by Architect.
- I. Concrete Floor Surface Removal: Remove floor surfaces, fill, and topping to the indicated lower elevations or cleavage planes as indicated on Drawings. Use dismantling methods when removing floor surfaces **[12 inches]** <Insert dimension> or less away from historic walls. Take away material to a uniform surface at the indicated level.
- J. Marble and Travertine Flooring and Setting Bed Dismantling: Dismantle marble, travertine, and setting bed to the depth indicated.
1. Caution: Immediately beneath the setting bed lie structural, clay-tile arches of the rooms below. Use only procedures and techniques that ensure that the setting bed is dismantled without damage to the structural integrity of the tile arches. Do not cut, chip, or otherwise damage the surface of the tile arches for any reason.
 2. Notify Architect **[15]** **[45]** <Insert number> calendar days before performing dismantling operations on the setting bed. [Perform exploratory dismantling mockup specified in "Quality Assurance" Article, and obtain Architect's permission before proceeding with the dismantling.] [Perform this dismantling work only in the presence of Architect.] <Insert requirement.>
 3. Hours of Work: **[12 midnight to 6 a.m.]** <Insert requirement>, or as approved by Architect.
 4. Procedure: Follow dismantling procedure below.
 - a. Saw cut marble and travertine joints with rigid guides to ensure straight, uniform cuts and to prevent over cutting into adjacent stones. Use thin saw blades so that stones can be re-used. Replace with new stone any dismantled stones and adjacent stones if cut irregularly or otherwise damaged, at no additional cost to Owner.
 - b. Gently loosen and pry stone free from setting bed. If a stone unit cannot be separated from the substrate, cut it up as necessary for removal and replace it.

- c. Saw cut setting bed with parallel cuts 3 to 4 inches apart and of a maximum depth that ends 1/4 inch above the bottom of the setting bed (the top of the structural tile arches).
 - d. Using the sawed grooves, carefully chip out material to the limits shown.
 - e. Take away material to a uniform surface at the indicated level.
 - f. Carefully monitor the progress of the saw cutting. If at any point the material being cut changes in nature, as evidenced by observations such as sounds generated by the cutting blade, resistance to cutting, and color of the dust, stop work in the immediate area, immediately notify Architect of the condition, and assign workers to continue work elsewhere until Architect issues instructions.
 - g. Where the actual thickness of the setting bed is more than 1-3/4 inches, continue the dismantling.
 - h. If the actual thickness of the setting bed is less than 1-3/4 inches, immediately notify Architect, who may suspend dismantling for re-evaluation.
 - i. Clean and dry surfaces for inspection by Architect before beginning installation of new work.
5. If any damage to the structural clay tile arches of the rooms below has been caused, or is suspected to have been caused, by the dismantling work, attributable to Contractor's faulty procedure, mishap, or negligence, perform repair or replacement as directed by Architect at no additional cost to Owner.

K. Anchorages:

1. Remove anchorages associated with removed items.
2. Dismantle anchorages associated with dismantled items.
3. In nonhistoric 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.

3.5 HISTORIC REMOVAL AND DISMANTLING SCHEDULE

- A. Existing [Items] [Construction] to Be [Removed] [Dismantled]: <Insert description of items and construction to be removed>.
- B. Existing Items to Be [Removed] [Dismantled] and Salvaged: <Insert description of items to be dismantled and salvaged>.
- C. Existing Items to Be [Removed] [Dismantled] and Reinstalled: <Insert description of items to be removed or dismantled and reinstalled>.
- D. Existing Items to Remain: <Insert description of items to remain>.

END OF SECTION

SECTION 040310 HISTORIC MASONRY CLEANING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes historic treatment work consisting of cleaning historic **[clay brick]** **[terra cotta]** **[and]** **[stone]** masonry surfaces.

1.2 ALLOWANCES

- A. Allowances for cleaning historic masonry are specified in Section 012100 "Allowances."
 - 1. Perform historic masonry cleaning work under quantity allowances and only as authorized. Authorized work includes **[work required by Drawings and the Specifications and]** work as directed in writing by Architect.
 - 2. Notify Architect **[weekly]** **<Insert time interval>** of extent of work performed that is attributable to quantity allowances.
 - 3. Perform work that exceeds quantity allowances only as authorized by Change Orders.
- B. Preconstruction testing is part of testing and inspecting allowance.
- C. Cleaning **[brickwork]** **[terra cotta]** **[and]** **[stone]** [, including preliminary cleaning,] [, including preliminary and final cleaning,] is part of masonry cleaning allowance.

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."
 - 1. Unit prices apply to authorized work covered by **[quantity allowances]** **[estimated quantities]**.
 - 2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.4 DEFINITIONS

- A. Very Low-Pressure Spray: Less than **[100]** **<Insert value>** psi.
- B. Low-Pressure Spray:
 - 1. Pressure: **[100 to 400]** **<Insert value>** psi.
 - 2. Flow Rate: **[4 to 6]** **<Insert value>** gpm.
- C. Medium-Pressure Spray:
 - 1. Pressure: **[400 to 800]** **<Insert value>** psi.
 - 2. Flow Rate: **[4 to 6]** **<Insert value>** gpm.
- D. High-Pressure Spray:
 - 1. Pressure: **[800 to 1200]** **<Insert value>** psi.
 - 2. Flow Rate: **[4 to 6]** **<Insert value>** gpm.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** **<Insert location>**.
 - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to masonry historic treatment and cleaning.
 - 2. Review methods and procedures related to cleaning historic masonry, 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, and sequencing.
 - c. Quality-control program.

- d. Fire-protection plan.
- e. Cleaning program.
- f. Coordination with building occupants.

1.6 SEQUENCING AND SCHEDULING

- A. Work Sequence: Perform historic masonry cleaning work in the following sequence:
 - 1. Remove plant growth.
 - 2. Inspect masonry for open mortar joints. Where repairs are required, delay further cleaning work until after repairs are completed, cured, and dried to prevent intrusion of water and other cleaning materials into the wall.
 - 3. Remove paint.
 - 4. Clean masonry.
 - 5. Where water repellents or graffiti-resistant coatings are to be used on or near masonry work, delay application of these chemicals until after cleaning.
- B. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units according to historic masonry repair Sections. Patch holes in mortar joints according to historic masonry repointing Sections.

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. Qualification Data: For [historic treatment specialists] [including field supervisors and workers] [paint-remover manufacturer] [and] [chemical-cleaner manufacturer].
- B. Preconstruction Test Reports: For cleaning materials and methods.
- C. Quality-control program.
- D. Cleaning program.

1.9 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic masonry cleaning specialist. Experience cleaning new masonry work is insufficient experience for historic treatment work.
- B. Paint-Remover Manufacturer Qualifications: A firm regularly engaged in producing masonry paint removers that have been used for similar applications with successful results, and with factory-authorized service representatives who are available for consultation and Project-site inspection[, **pre-construction product testing,**] and on-site assistance.
- C. 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-authorized service representatives who are available for consultation and Project-site inspection[, **pre-construction product testing,**] and on-site assistance.
- 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 performance and preventing damage.
- E. Cleaning Program: Prepare a written cleaning program that describes cleaning process in detail, including materials, methods, sequence, and equipment to be used; protection of surrounding materials; and control of runoff during operations.

1. If materials and methods other than those indicated are proposed for any phase of cleaning work, add to the quality-control program 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 cleaning on existing surfaces to demonstrate aesthetic effects and to set quality standards for materials and execution.
1. Cleaning: Clean an area [**approximately 25 sq. ft.**] [**as indicated**] <Insert dimension> for each type of masonry and surface condition.
 - a. Test cleaners and methods on samples of adjacent materials for possible adverse reactions. Do not test cleaners and methods known to have deleterious effect.
 - b. Allow a waiting period of not less than [**seven days**] <Insert requirements> after completion of sample cleaning to permit a study of sample panels for negative reactions.
 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.

1.10 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified historic treatment specialist or one or more chemical-cleaner[**and paint-remover**] manufacturers to perform preconstruction testing on masonry surfaces.
1. Use test areas as indicated and representative of proposed materials and existing construction.
 2. Propose changes to materials and methods to suit Project.

1.11 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 is 40 deg F and above and is predicted to remain so for at least seven days after completion of cleaning.

PART 2 PRODUCTS

2.1 PAINT REMOVERS

- A. Alkaline Paste Paint Remover: Manufacturer's standard alkaline paste or gel formulation for removing paint from masonry; containing no methylene chloride.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Covered or Skin-Forming Alkaline Paint Remover: Manufacturer's standard covered or skin-forming, alkaline paste or gel formulation for removing paint from masonry; containing no methylene chloride.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- C. Solvent-Type Paste Paint Remover: Manufacturer's standard water-rinsable, solvent-type paste or gel formulation for removing paint from masonry.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- D. Low-Odor, Solvent-Type Paste Paint Remover: Manufacturer's standard low-odor, water-rinsable, solvent-type paste, gel, or foamed emulsion formulation for removing paint from masonry; containing no methanol or methylene chloride.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- E. Covered, Solvent-Type Paste Paint Remover: Manufacturer's standard, low-odor, covered, water-rinsable, solvent-type paste or gel formulation for removing paint from masonry; containing no methanol or methylene chloride.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2.2 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 of tetrasodium pyrophosphate (TSPP), 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal. of solution required.
- D. Mold, Mildew, and Algae Remover, Job Mixed: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 5 quarts of 5 percent sodium hypochlorite (bleach), and 15 quarts of hot water for every 5 gal. of solution required.
- E. Nonacidic Gel Cleaner: Manufacturer's standard gel formulation, with pH between 6 and 9, that contains detergents with chelating agents and is specifically formulated for cleaning masonry surfaces.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- F. Nonacidic Liquid Cleaner: Manufacturer's standard mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone, brick, aluminum, plastics, and wood.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- G. Mild-Acid Cleaner: Manufacturer's standard mild-acid cleaner based on phosphoric, oxalic, or citric acid; but not containing muriatic (hydrochloric), hydrofluoric, or sulfuric acid; or ammonium bifluoride or chlorine bleaches.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- H. Acidic Cleaner: Manufacturer's standard acidic masonry cleaner composed of hydrofluoric acid or ammonium bifluoride blended with other acids, detergents, wetting agents, and inhibitors.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- I. One-Part Limestone Acidic Cleaner: Manufacturer's standard one-part acidic formulation for cleaning limestone.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- J. Two-Part Chemical Cleaner: Manufacturer's standard system consisting of potassium- or sodium-hydroxide-based, alkaline prewash cleaner and acidic afterwash cleaner that does not contain hydrofluoric acid.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

2.3 ACCESSORY MATERIALS

- A. 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 masonry cleaners.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. 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 CHEMICAL-CLEANING SOLUTIONS

- A. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended in writing by chemical-cleaner manufacturer.
- B. Acidic Cleaner Solution for **[Brick]** **[Brownstone Terra Cotta]** **[and]** **[Unpolished Stone]**: Dilute acidic cleaner with water to produce hydrofluoric acid content of 3 percent or less, but not greater than that recommended in writing by chemical-cleaner manufacturer.
 - 1. Stones: Use only on unpolished granite, unpolished dolomite marble, and siliceous sandstone.
- C. Acidic Cleaner Solution for **[Glazed Terra Cotta]** **[and]** **[Polished Stone]**: Dilute acidic cleaner with water to concentration demonstrated by testing that does not etch or otherwise damage terra cotta surface, but not greater than that recommended in writing by chemical-cleaner manufacturer.
 - 1. Stones: Use only on polished granite and polished dolomite marble.

2.5 POULTICES

- A. Poultice <Insert drawing designation>: <Insert requirement>.

PART 3 EXECUTION

3.1 HISTORIC TREATMENT SPECIALIST

- A. Historic Treatment Specialist Firms: Subject to compliance with requirements, [provide historic masonry cleaning by one of the following] [firms that may provide historic masonry cleaning include, but are not limited to, the following]:
 - 1. <Insert, in separate subparagraphs, names of historic treatment specialist firms>.

3.2 PROTECTION

- A. Remove **[gutters and]** downspouts and associated hardware adjacent to immediate work area and store during masonry cleaning. Reinstall when masonry cleaning is complete.
 - 1. Provide temporary rain drainage during work to direct water away from building.

3.3 CLEANING MASONRY, GENERAL

- A. Have cleaning work performed only by qualified historic treatment specialist.
- B. Cleaning Appearance Standard: Cleaned surfaces are to have a uniform appearance as viewed from **[20 feet]** **[50 feet]** **<Insert distance>** away by Architect.
- C. Proceed with cleaning in an orderly manner; work from **[bottom to top]** **[top to bottom]** of each scaffold width and from one end of each elevation to the other. Ensure that dirty residues and rinse water do not wash over dry, cleaned surfaces.
- D. Use only those cleaning methods indicated for each masonry material and location.
 - 1. Brushes: Do not use wire brushes or brushes that are not resistant to chemical cleaner being used.
 - 2. Spray Equipment: Use spray equipment that provides controlled application at volume and pressure indicated, measured at nozzle. Adjust pressure and volume to ensure that cleaning methods do not damage masonry.
 - a. Equip units with pressure gauges.
 - b. For chemical-cleaner spray application, use low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with nozzle having a cone-shaped spray.
 - c. For water-spray application, use fan-shaped spray that disperses water at an angle of 25 to 50 degrees.
 - d. For high-pressure water-spray application, use fan-shaped spray that disperses water at an angle of at least 40 degrees.

- e. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F at flow rates indicated.
 - f. For steam application, use steam generator capable of delivering live steam at nozzle.
- E. Perform each cleaning method in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.
 - 1. Keep wall wet below area being cleaned to prevent streaking from runoff.
- F. Perform additional general cleaning, paint and stain removal, and spot cleaning of small areas that are noticeably different when viewed according to "Cleaning Appearance Standard" Paragraph, so that cleaned surfaces blend smoothly into surrounding areas.
- G. Water-Spray Application Methods:
 - 1. Water-Soak Application: Soak masonry surfaces by applying water continuously and uniformly to limited area for time indicated. Apply water at low pressures and low volumes in multiple fine sprays using perforated hoses or multiple spray nozzles. Erect a protective enclosure constructed of polyethylene sheeting to cover area being sprayed.
 - 2. Water-Spray Applications: Unless otherwise indicated, hold spray nozzle at least 6 inches from masonry surface, and apply water in horizontal back-and-forth sweeping motion, overlapping previous strokes to produce uniform coverage.
- H. Steam Cleaning: Apply steam to masonry surfaces at very low pressures indicated for each type of masonry. Hold nozzle at least 6 inches from masonry surface, and apply steam in horizontal back-and-forth sweeping motion, overlapping previous strokes to produce uniform coverage.
- I. Chemical-Cleaner Application Methods: Apply chemical cleaners to masonry surfaces according to chemical-cleaner manufacturer's written instructions; use brush[**or spray**] application.[**Do not spray apply at pressures exceeding 50 psi.**] Do not allow chemicals to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.
- J. Rinse off chemical residue and soil by working upward from bottom to top of each treated area at each stage or scaffold setting. Periodically during each rinse, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed.
 - 1. Apply neutralizing agent and repeat rinse if necessary to produce tested pH of between 6.7 and 7.5.
- K. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.4 PRELIMINARY CLEANING

- A. Removing Plant Growth: Completely remove visible plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing remaining growth to dry as long as possible before removal. Remove loose soil and plant debris from open masonry joints to whatever depth they occur.
- 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.
 - 1. Carefully remove heavy accumulations of rigid materials from masonry surface with sharp chisel. Do not scratch or chip masonry surface.
 - 2. Remove paint and caulking with [alkaline paint remover] <Insert requirement>.
 - a. Comply with requirements in "Paint Removal" Article.
 - b. Repeat application up to two times if needed.
 - 3. Remove asphalt and tar with [solvent-type paste paint remover] <Insert requirement>.
 - a. Comply with requirements in "Paint Removal" Article.
 - b. Apply paint remover only to asphalt and tar by brush without prewetting.
 - c. Allow paint remover to remain on surface for 10 to 30 minutes.
 - d. Repeat application if needed.

3.5 PAINT REMOVAL <INSERT DRAWING DESIGNATION>

- A. Paint-Remover Application, General: Apply paint removers according to paint-remover manufacturer's written instructions. Do not allow paint removers to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.
- B. Paint Removal with Alkaline Paste Paint Remover:
1. Remove loose and peeling paint using **[low]** **[medium]** **[high]**-pressure water spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 2. Apply paint remover to dry, painted surface with brushes.
 3. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 4. Rinse with **[cold]** **[hot]** water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and paint residue.
 5. Repeat process if necessary to remove all paint.
 6. Apply acidic cleaner or manufacturer's recommended afterwash to surface, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner or afterwash remain on surface as a neutralizing agent for period recommended in writing by chemical-cleaner or afterwash manufacturer.
 7. Rinse with cold water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and soil.
- C. Paint Removal with Covered or Skin-Forming Alkaline Paint Remover:
1. Remove loose and peeling paint using **[low]** **[medium]** **[high]**-pressure water spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 2. Apply paint remover to dry, painted surface with trowel, spatula, or as recommended in writing by manufacturer.
 3. Apply cover according to manufacturer's written instructions.
 4. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 5. Scrape off paint and remover.
 6. Rinse with **[cold]** **[hot]** water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and paint residue.
 7. Apply acidic cleaner or manufacturer's recommended afterwash to surface, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner or afterwash remain on surface as a neutralizing agent for period recommended in writing by chemical-cleaner or afterwash manufacturer.
 8. Rinse with cold water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and soil.
 9. For spots of remaining paint, apply alkaline paste paint remover according to "Paint Removal with Alkaline Paste Paint Remover" Paragraph.
- D. Paint Removal with Solvent-Type Paste Paint Remover:
1. Remove loose and peeling paint using **[low]** **[medium]** **[high]**-pressure water spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 2. Apply thick coating of paint remover to painted surface with natural-fiber cleaning brush, deep-nap roller, or large paint brush. Apply in one or two coats according to manufacturer's written instructions.
 3. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 4. Rinse with **[cold]** **[hot]** water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and paint residue.
- E. Paint Removal with Covered, Solvent-Type Paste Paint Remover:
1. Remove loose and peeling paint using **[low]** **[medium]** **[high]**-pressure water spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 2. Apply paint remover to dry, painted surface with trowel, spatula, or as recommended in writing by manufacturer.
 3. Apply cover according to manufacturer's written instructions.

4. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
5. Scrape off paint and remover.
6. Rinse with **[cold]** **[hot]** water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and paint residue.

F. Paint Removal with Poultice: **<Insert requirement>**.

3.6 CLEANING BRICKWORK **<INSERT DRAWING DESIGNATION>**

A. Cold-Water Soak:

1. Apply cold water by intermittent spraying to keep surface moist.
2. Use perforated hoses or other means that apply a fine water mist to entire surface being cleaned.
3. Apply water in cycles of **[five minutes]** **<Insert time>** on and **[20 minutes]** **<Insert time>** off.
4. Continue spraying [until surface encrustation has softened enough to permit its removal by water wash, as indicated by cleaning tests] [for 72 hours] **<Insert requirement>**.
5. Remove soil and softened surface encrustation from surface with cold water applied by low-pressure spray.

B. Cold-Water Wash: Use cold water applied by **[low]** **[medium]** **[high]**-pressure spray.

C. Hot-Water Wash: Use hot water applied by **[low]** **[medium]** **[high]**-pressure spray.

D. Steam Cleaning: Apply steam at very low pressures not exceeding **[30 psi]** **[80 psi]** **<Insert value>**. Remove dirt softened by steam with wood scrapers, stiff-nylon or -fiber brushes, or cold-water wash, as indicated by cleaning tests.

E. Detergent Cleaning:

1. Wet surface with **[cold]** **[hot]** 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 **[cold]** **[hot]** water applied by **[low]** **[medium]** **[high]**-pressure spray to remove detergent solution and soil.
4. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup.

F. Mold, Mildew, and Algae Removal:

1. Wet surface with **[cold]** **[hot]** water applied by low-pressure spray.
2. Apply mold, mildew, and algae remover by brush **[or low-pressure spray]**.
3. Scrub surface with medium-soft brushes until mold, mildew, and algae are thoroughly dislodged and can be removed by rinsing. Use small brushes for mortar joints and crevices. Dip brush in mold, mildew, and algae remover often to ensure that adequate fresh cleaner is used and that surface remains wet.
4. Rinse with **[cold]** **[hot]** water applied by **[low]** **[medium]** **[high]**-pressure spray to remove mold, mildew, and algae remover and soil.
5. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup.

G. Nonacidic Gel Chemical Cleaning:

1. Wet surface with **[cold]** **[hot]** water applied by low-pressure spray.
2. Apply gel cleaner in 1/8-inch thickness 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 uniform throughout area being cleaned.
3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] **<Insert requirement>**.
4. Remove bulk of gel cleaner.
5. Rinse with **[cold]** **[hot]** water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and soil.

6. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- H. Nonacidic Liquid Chemical Cleaning:
1. Wet surface with **[cold]** **[hot]** water applied by low-pressure spray.
 2. Apply cleaner to surface[in two applications] by brush[or low-pressure spray].
 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] [of two to three minutes] <Insert requirement>.
 4. Rinse with **[cold]** **[hot]** water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and soil.
 5. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- I. Mild-Acid Chemical Cleaning:
1. Wet surface with cold water applied by low-pressure spray.
 2. Apply cleaner to surface[in two applications] by brush[or low-pressure spray].
 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] [of two to three minutes] <Insert requirement>.
 4. Rinse with cold water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and soil.
 5. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- J. Acidic Chemical Cleaning:
1. Wet surface with cold water applied by low-pressure spray.
 2. Apply cleaner to surface[in two applications] by brush[or low-pressure spray].
 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] [of two to three minutes] <Insert requirement>.
 4. Rinse with cold water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and soil. Rinse until all foaming, if any, stops and suds disappear.
 5. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- K. Cleaning with Poultice: <Insert requirement>.

3.7 CLEANING BROWNSTONE TERRA COTTA <INSERT DRAWING DESIGNATION>

- A. Cold-Water Soak:
1. Apply cold water by intermittent spraying to keep surface moist.
 2. Use perforated hoses or other means that will apply a fine water mist to entire surface being cleaned.
 3. Apply water in cycles of **[five minutes]** <Insert time> on and **[20 minutes]** <Insert time> off.
 4. Continue spraying [until surface encrustation has softened enough to permit its removal by water wash, as indicated by cleaning tests] [for 72 hours] <Insert requirement>.
 5. Remove soil and softened surface encrustation from surface with cold water applied by low-pressure spray.
- B. Cold-Water Wash: Use cold water applied by **[low]** **[medium]** **[high]**-pressure spray.
- C. Hot-Water Wash: Use hot water applied by **[low]** **[medium]** **[high]**-pressure spray.
- D. Steam Cleaning: Apply steam at very low pressures not exceeding **[30 psi]** **[80 psi]** <Insert pressure>. Remove dirt softened by steam with wood scrapers, stiff-nylon or -fiber brushes, or cold-water wash, as indicated by cleaning tests.
- E. Detergent Cleaning:
1. Wet surface with **[cold]** **[hot]** 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 **[cold] [hot]** water applied by **[low] [medium] [high]**-pressure spray to remove detergent solution and soil.
 4. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup.
- F. Mold, Mildew, and Algae Removal:
1. Wet surface with **[cold] [hot]** water applied by low-pressure spray.
 2. Apply mold, mildew, and algae remover by brush **[or low-pressure spray]**.
 3. Scrub surface with medium-soft brushes until mold, mildew, and algae are thoroughly dislodged and can be removed by rinsing. Use small brushes for mortar joints and crevices. Dip brush in mold, mildew, and algae remover often to ensure that adequate fresh cleaner is used and that surface remains wet.
 4. Rinse with **[cold] [hot]** water applied by **[low] [medium] [high]**-pressure spray to remove mold, mildew, and algae remover and soil.
 5. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup.
- G. Nonacidic Gel Chemical Cleaning:
1. Wet surface with **[cold] [hot]** water applied by low-pressure spray.
 2. Apply gel cleaner in 1/8-inch thickness 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 uniform throughout area being cleaned.
 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] <Insert requirement>.
 4. Remove bulk of gel cleaner.
 5. Rinse with **[cold] [hot]** water applied by **[low] [medium] [high]**-pressure spray to remove chemicals and soil.
 6. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- H. Nonacidic Liquid Chemical Cleaning:
1. Wet surface with **[cold] [hot]** water applied by low-pressure spray.
 2. Apply cleaner to surface [in two applications] by brush [or low-pressure spray].
 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] [of two to three minutes] <Insert requirement>.
 4. Rinse with **[cold] [hot]** water applied by **[low] [medium] [high]**-pressure spray to remove chemicals and soil.
 5. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- I. Mild-Acid Chemical Cleaning:
1. Wet surface with cold water applied by low-pressure spray.
 2. Apply cleaner to masonry [in two applications] by brush [or low-pressure spray].
 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] [of two to three minutes] <Insert requirement>.
 4. Rinse with cold water applied by **[low] [medium] [high]**-pressure spray to remove chemicals and soil.
 5. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- J. Acidic Chemical Cleaning:
1. Wet surface with cold water applied by low-pressure spray.
 2. Apply cleaner to surface [in two applications] by brush [or low-pressure spray].
 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] [of two to three minutes] <Insert requirement>.
 4. Rinse with cold water applied by **[low] [medium] [high]**-pressure spray to remove chemicals and soil. Rinse until all foaming, if any, stops and suds disappear.
 5. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- K. Cleaning with Poultice: <Insert requirement>.

3.8 CLEANING GLAZED TERRA COTTA <INSERT DRAWING DESIGNATION>

- A. Hot-Water Wash: Use hot water applied by [low] [medium] [high]-pressure spray.
- B. Steam Cleaning: Apply steam at very low pressures not exceeding [30 psi] [80 psi] <Insert pressure>. Remove dirt softened by steam with wood scrapers, stiff-nylon or -fiber brushes, or cold-water wash, as indicated by cleaning tests.
- C. Detergent Cleaning:
 - 1. Wet surface with [cold] [hot] 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 [cold] [hot] water applied by [low] [medium] [high]-pressure spray to remove detergent solution and soil.
 - 4. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup.
- D. Nonacidic Gel Chemical Cleaning:
 - 1. Wet surface with [cold] [hot] water applied by low-pressure spray.
 - 2. Apply gel cleaner in 1/8-inch thickness 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 uniform throughout area being cleaned.
 - 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] <Insert requirement>.
 - 4. Remove bulk of gel cleaner.
 - 5. Rinse with [cold] [hot] water applied by [low] [medium] [high]-pressure spray to remove chemicals and soil.
 - 6. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- E. Nonacidic Liquid Chemical Cleaning:
 - 1. Wet surface with [cold] [hot] water applied by low-pressure spray.
 - 2. Apply cleaner to terra cotta[**in two applications**].
 - 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] [of two to three minutes] <Insert requirement>.
 - 4. Rinse with [cold] [hot] water applied by [low] [medium] [high]-pressure spray to remove chemicals and soil.
 - 5. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- F. Mild-Acid Chemical Cleaning:
 - 1. Wet surface with cold water applied by low-pressure spray.
 - 2. Apply cleaner to terra cotta[**in two applications**].
 - 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] [of two to three minutes] <Insert requirement>.
 - 4. Rinse with cold water applied by [low] [medium] [high]-pressure spray to remove chemicals and soil.
 - 5. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- G. Two-Part Chemical Cleaning:
 - 1. Wet surface with [cold] [hot] water applied by low-pressure spray.
 - 2. Apply alkaline prewash cleaner to surface by brush or roller.
 - 3. Let cleaner remain on surface for [period recommended in writing by chemical-cleaner manufacturer] <Insert time> unless otherwise indicated.
 - 4. Rinse with [cold] [hot] water applied by medium-pressure spray to remove chemicals and soil.
 - 5. Apply acidic afterwash cleaner to terra cotta[**in two applications**], while surface is still wet, using[**low-pressure spray equipment,**] deep-nap roller or soft-fiber brush.

6. Let neutralizer remain on surface for period recommended in writing by manufacturer unless otherwise indicated.
7. Rinse with cold water applied by medium-pressure spray to remove chemicals and soil.
8. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.

H. Cleaning with Poultice: **<Insert requirement>**.

3.9 CLEANING UNPOLISHED STONWORK **<INSERT DRAWING DESIGNATION>**

A. Cold-Water Soak:

1. Apply cold water by intermittent spraying to keep surface moist.
2. Use perforated hoses or other means that will apply a fine water mist to entire surface being cleaned.
3. Apply water in cycles of **[five minutes]** **<Insert time>** on and **[20 minutes]** **<Insert time>** off.
4. Continue spraying [until surface encrustation has softened enough to permit its removal by water wash, as indicated by cleaning tests] [for 72 hours] **<Insert requirement>**.
5. Remove soil and softened surface encrustation from surface with cold water applied by low-pressure spray.

B. Cold-Water Wash: Use cold water applied by **[low]** **[medium]** **[high]**-pressure spray.

C. Hot-Water Wash: Use hot water applied by **[low]** **[medium]** **[high]**-pressure spray.

D. Steam Cleaning: Apply steam at very low pressures not exceeding **[30 psi]** **[80 psi]** **<Insert pressure>**. Remove dirt softened by steam with wood scrapers, stiff-nylon or -fiber brushes, or cold-water wash, as indicated by cleaning tests.

E. Detergent Cleaning:

1. Wet surface with **[cold]** **[hot]** 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 **[cold]** **[hot]** water applied by **[low]** **[medium]** **[high]**-pressure spray to remove detergent solution and soil.
4. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup.

F. Mold, Mildew, and Algae Removal:

1. Wet surface with **[cold]** **[hot]** water applied by low-pressure spray.
2. Apply mold, mildew, and algae remover by brush **[or low-pressure spray]**.
3. Scrub surface with medium-soft brushes until mold, mildew, and algae are thoroughly dislodged and can be removed by rinsing. Use small brushes for mortar joints and crevices. Dip brush in mold, mildew, and algae remover often to ensure that adequate fresh cleaner is used and that surface remains wet.
4. Rinse with **[cold]** **[hot]** water applied by **[low]** **[medium]** **[high]**-pressure spray to remove mold, mildew, and algae remover and soil.
5. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup.

G. Nonacidic Gel Chemical Cleaning:

1. Wet surface with **[cold]** **[hot]** water applied by low-pressure spray.
2. Apply gel cleaner in 1/8-inch thickness 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 uniform throughout area being cleaned.
3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] **<Insert requirement>**.
4. Remove bulk of gel cleaner.
5. Rinse with **[cold]** **[hot]** water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and soil.

6. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- H. Nonacidic Liquid Chemical Cleaning:
1. Wet surface with **[cold]** **[hot]** water applied by low-pressure spray.
 2. Apply cleaner to surface[in two applications] by brush[or low-pressure spray].
 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] [of two to three minutes] <Insert requirement>.
 4. Rinse with **[cold]** **[hot]** water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and soil.
 5. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- I. Mild-Acid Chemical Cleaning:
1. Wet surface with cold water applied by low-pressure spray.
 2. Apply cleaner to surface[in two applications] by brush[or low-pressure spray].
 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] [of two to three minutes] <Insert requirement>.
 4. Rinse with cold water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and soil.
 5. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- J. Acidic Chemical Cleaning:
1. Wet surface with cold water applied by low-pressure spray.
 2. Apply cleaner to surface[in two applications] by brush[or low-pressure spray].
 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] [of two to three minutes] <Insert requirement>.
 4. Rinse with cold water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and soil. Rinse until all foaming, if any, stops and suds disappear.
 5. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- K. One-Part Limestone Chemical Cleaning:
1. Wet surface with **[cold]** **[hot]** water applied by low-pressure spray.
 2. Apply cleaner to surface by brush[**or low-pressure spray**].
 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] <Insert requirement>.
 4. Immediately repeat application of one-part limestone cleaner as indicated above over the same area.
 5. Rinse with **[cold]** **[hot]** water applied by medium-pressure spray to remove chemicals and soil.
- L. Two-Part Chemical Cleaning:
1. Wet surface with **[cold]** **[hot]** water applied by low-pressure spray.
 2. Apply alkaline prewash cleaner to surface by brush or roller.
 3. Let cleaner remain on surface for [period recommended in writing by chemical-cleaner manufacturer] <Insert time> unless otherwise indicated.
 4. Rinse with **[cold]** **[hot]** water applied by medium-pressure spray to remove chemicals and soil.
 5. Apply acidic afterwash cleaner to terra cotta[**in two applications**], while surface is still wet, using[**low-pressure spray equipment**,] deep-nap roller or soft-fiber brush.
 6. Let neutralizer remain on surface for period recommended in writing by manufacturer unless otherwise indicated.
 7. Rinse with cold water applied by medium-pressure spray to remove chemicals and soil.
 8. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- M. Cleaning with Poultice: **<Insert requirement>**.

3.10 CLEANING POLISHED STONWORK <INSERT DRAWING DESIGNATION>

- A. Cold-Water Soak:

1. Apply cold water by intermittent spraying to keep surface moist.
 2. Use perforated hoses or other means that will apply a fine water mist to entire surface being cleaned.
 3. Apply water in cycles of [**five minutes**] <Insert time> on and [**20 minutes**] <Insert time> off.
 4. Continue spraying [until surface encrustation has softened enough to permit its removal by water wash, as indicated by cleaning tests] [for 72 hours] <Insert requirement>.
 5. Remove soil and softened surface encrustation from surface with cold water applied by low-pressure spray.
- B. Cold-Water Wash: Use cold water applied by [**low**] [**medium**] [**high**]-pressure spray.
- C. Hot-Water Wash: Use hot water applied by [**low**] [**medium**] [**high**]-pressure spray.
- D. Steam Cleaning: Apply steam at very low pressures not exceeding [**30 psi**] [**80 psi**] <Insert pressure>. Remove dirt softened by steam with wood scrapers, stiff-nylon or -fiber brushes, or cold-water wash, as indicated by cleaning tests.
- E. Detergent Cleaning:
1. Wet surface with [**cold**] [**hot**] 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 [**cold**] [**hot**] water applied by [**low**] [**medium**] [**high**]-pressure spray to remove detergent solution and soil.
 4. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup.
- F. Mold, Mildew, and Algae Removal:
1. Wet surface with [**cold**] [**hot**] water applied by low-pressure spray.
 2. Apply mold, mildew, and algae remover by brush[or low-pressure spray].
 3. Scrub surface with medium-soft brushes until mold, mildew, and algae are thoroughly dislodged and can be removed by rinsing. Use small brushes for mortar joints and crevices. Dip brush in mold, mildew, and algae remover often to ensure that adequate fresh cleaner is used and that surface remains wet.
 4. Rinse with [**cold**] [**hot**] water applied by [**low**] [**medium**] [**high**]-pressure spray to remove mold, mildew, and algae remover and soil.
 5. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup.
- G. Nonacidic Gel Chemical Cleaning:
1. Wet surface with [**cold**] [**hot**] water applied by low-pressure spray.
 2. Apply gel cleaner in 1/8-inch thickness 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 uniform throughout area being cleaned.
 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] <Insert requirement>.
 4. Remove bulk of gel cleaner.
 5. Rinse with [**cold**] [**hot**] water applied by [**low**] [**medium**] [**high**]-pressure spray to remove chemicals and soil.
 6. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- H. Nonacidic Liquid Chemical Cleaning:
1. Wet surface with [**cold**] [**hot**] water applied by low-pressure spray.
 2. Apply cleaner to surface[in two applications] by brush[or low-pressure spray].
 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] [of two to three minutes] <Insert requirement>.
 4. Rinse with [**cold**] [**hot**] water applied by [**low**] [**medium**] [**high**]-pressure spray to remove chemicals and soil.
 5. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.

- I. Mild-Acid Chemical Cleaning:
 - 1. Wet surface with cold water applied by low-pressure spray.
 - 2. Apply cleaner to surface[in two applications] by brush[or low-pressure spray].
 - 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] [of two to three minutes] <Insert requirement>.
 - 4. Rinse with cold water applied by [**low**] [**medium**] [**high**]-pressure spray to remove chemicals and soil.
 - 5. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- J. Cleaning with Poultice: <Insert requirement>.

3.11 FINAL CLEANING

- A. Clean adjacent nonmasonry surfaces of spillage and debris. Use detergent and soft brushes or cloths.
- B. Remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
- C. Remove masking materials, leaving no residues that could trap dirt.

3.12 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. 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.
- C. Notify [**inspectors**] [**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 [**inspectors**] [**and**] [**Architect's Project representatives**] have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.
- D. Manufacturer's Field Service: Engage[**paint-remover manufacturer's and**] chemical-cleaner manufacturer's factory-authorized service representatives for consultation and Project-site inspection[, **to perform preconstruction product testing,**] and provide on-site assistance when requested by Architect. Have[**paint-remover manufacturer's and**] chemical-cleaner manufacturer's factory-authorized service representatives visit Project site not less than [**once**] [**twice**] <Insert requirement> to observe progress and quality of the Work.

END OF SECTION

SECTION 040322 HISTORIC BRICK UNIT MASONRY REPAIR

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes historic treatment work consisting of repairing historic clay brick masonry as follows:
 - 1. Repairing unit masonry.
 - 2. Removing abandoned anchors.
 - 3. Painting steel uncovered during the work.
 - 4. Reanchoring veneers.

1.2 ALLOWANCES

- A. Allowances for historic masonry repair are specified in Section 012100 "Allowances."
 - 1. Perform historic masonry repair work under quantity allowances and only as authorized. Authorized work includes **[work required by Drawings and the Specifications and]** work as directed in writing by Architect.
 - 2. Notify Architect **[weekly]** **<Insert time interval>** of extent of work performed that is attributable to quantity allowances.
 - 3. Perform work that exceeds quantity allowances only as authorized by Change Orders.
- B. Preconstruction testing is part of testing and inspecting allowance.
- C. Abandoned anchor removal is part of **<Insert name of allowance>**.
- D. Brick removal and replacement is part of brick removal and replacement allowance.
- E. Reanchoring veneers is part of veneer reanchoring allowance.
- F. Patching brick masonry is part of masonry patching allowance.

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."
 - 1. Unit prices apply to authorized work covered by **[quantity allowances]** **[estimated quantities]**.
 - 2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.4 DEFINITIONS

- A. Low-Pressure Spray:
 - 1. Pressure: **[100 to 400]** **<Insert value>** psi.
 - 2. Flow Rate: **[4 to 6]** **<Insert value>** gpm.
- B. Rebuilding (Setting) Mortar: Mortar used to set and anchor masonry in a structure, distinct from pointing mortar installed after masonry is set in place.
- C. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of bricks to freezing and thawing.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** **<Insert location>**.
 - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to masonry historic treatment and repair.

2. Review methods and procedures related to repairing historic brick masonry, 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. Quality-control program.
 - d. Fire-protection plan.
 - e. Unit masonry historic treatment program.
 - f. Coordination with building occupants.

1.6 SEQUENCING AND SCHEDULING

- A. Order sand[**and gray portland cement**] for colored mortar immediately after approval of [**Samples**] [**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 plant growth.
 2. Inspect masonry for open mortar joints and permanently or temporarily point them before cleaning to prevent intrusion of water and other cleaning materials into the wall.
 3. Remove paint.
 4. Clean masonry.
 5. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
 6. Repair masonry, including replacing existing masonry with new masonry materials.
 7. Rake out mortar from joints to be repointed.
 8. Point mortar and sealant joints.
 9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
 10. Where water repellents are to be used on or near masonry work, delay application of these chemicals until after pointing and cleaning.
- C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in bricks according to "Brick Masonry Patching" Article. Patch holes in mortar joints according to Section 040323 "Historic Brick Unit Masonry Repointing."

1.7 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.
 3. Include test data substantiating that products comply with requirements.
- B. Shop Drawings:
 1. Include plans, elevations, sections, and locations of masonry repair work on the structure.
 2. Show full-size patterns with complete dimensions for new [**molded brick shapes**] [**and**] [**brick arches**] and their jointing, showing relationship of existing units to new units.
 3. Show provisions for expansion joints or other sealant joints.
 4. Show provisions for flashing, lighting fixtures, conduits, and weep holes as required.
 5. Show replacement and repair anchors. Include details of anchors within individual bricks, with locations of anchors and dimensions of holes and recesses in units required for anchors.
 6. Show locations of scaffolding and points of scaffolding in contact with masonry. Include details of each point of contact or anchorage.
- C. 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 [**1/4 inch**] [**1/2 inch**] wide, set in aluminum or plastic channels.

- a. Have each set contain a close color range of at least **[three] [six] <Insert number>** Samples of different mixes of colored sands and cements that produce a mortar matching 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. Sand Types Used for Mortar: Minimum 8 oz. of each in plastic screw-top jars.
 - a. For blended sands, provide Samples of each component and blend. Identify blend ratio.
 - b. Identify sources, both supplier and quarry, of each type of sand.
 3. Patching Compound: Submit sets of patching compound Samples in the form of plugs (patches in drilled holes) in sample units of masonry representative of the range of masonry colors on the building.
 - a. Have each set contain a close color range of at least **[three] [six] <Insert number>** Samples of different mixes of patching compound that match the variations in existing masonry when cured and dry.
 4. Include similar Samples of accessories involving color selection.
- D. Samples for Verification: For the following:
1. Each type of brick to be used for replacing existing units. Include sets of Samples to show the full range of shape, color, and texture to be expected.
 - a. For each brick type, provide straps or panels containing at least four bricks. Include multiple straps for brick with a wide range.
 2. Each type of patching compound in the form of briquettes, at least 3 inches long by 1-1/2 inches wide. Document each Sample with manufacturer and stock number or other information necessary to order additional material.
 3. Accessories: Each type of anchor, accessory, and miscellaneous support.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For [historic treatment specialist] [including field supervisors and workers] [and] [testing service].
- B. Preconstruction Test Reports: For [existing bricks and mortar] [and] [replacement bricks].
- C. Quality-control program.
- D. Unit masonry historic treatment program.

1.9 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic brick masonry repair specialist. Experience installing standard unit masonry is insufficient experience for masonry historic treatment work.
 1. Historic Treatment Worker Qualifications: [When bricks are being patched, assign at least one worker per crew who is trained and certified by manufacturer of patching compound to apply its products] <Insert requirement>.
- B. 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.
- C. Unit Masonry Historic Treatment Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of historic treatment work, including protection of surrounding materials and Project site.
 1. Include methods for keeping exposed mortar damp during curing period.
 2. If materials and methods other than those indicated are proposed for any phase of historic treatment work, add to the quality-control program 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 to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation.
1. Masonry Repair: Prepare sample areas for each type of masonry material indicated to have repair work performed. If not otherwise indicated, size each mockup not smaller than two adjacent whole units or approximately 48 inches 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. Include the following as a minimum:
 - a. Replacement: **[Four]** <Insert number> brick units replaced.
 - b. Reanchoring Veneers: Install three masonry repair anchors in mockup wall assembly of each anchor type required.
 - c. Patching: Three small holes **[at least 1 inch in diameter]** **[as directed]** <Insert size> for each type of brick indicated to be patched, so as to leave no evidence of repair.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: **[Owner will engage]** **[Engage]** a qualified testing agency to perform preconstruction testing on brick masonry as follows:
1. Provide test specimens as indicated and representative of proposed materials and existing construction.
 2. Replacement Brick: Test each proposed type of replacement brick, according to sampling and testing methods in ASTM C67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction).
 3. Existing Brick: Test each type of existing brick indicated for replacement, according to testing methods in ASTM C67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction). Carefully remove **[five]** <Insert number> existing units for testing from locations designated by Architect. Take testing samples from these units.
 4. Existing Mortar: Test according to ASTM C1324, modified as agreed by testing service and Architect for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength. Use X-ray diffraction, infrared spectroscopy, and differential thermal analysis to supplement microscopical methods. Carefully remove existing mortar for testing from within joints at **[five]** <Insert number> locations designated by **[Architect]** **[or]** **[testing service]**.
 5. Temporary Patch: As directed by Architect, provide temporary materials followed by permanent repairs at locations from which existing samples were taken.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Deliver bricks to Project site strapped together in suitable packs or pallets or in heavy-duty cartons and protected against impact and chipping.
- B. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.
- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- D. 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 days.
- E. Store lime putty covered with water in sealed containers.
- F. Store sand where grading and other required characteristics can be maintained and contamination avoided.
- G. Handle bricks to prevent overstressing, chipping, defacement, and other damage.

1.12 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: Repair brick masonry only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.
- C. Cold-Weather Requirements: Comply with the following procedures for masonry repair unless otherwise indicated:
 - 1. When air temperature is below 40 deg F, heat mortar ingredients, masonry repair materials, 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 days after repair.
- D. Hot-Weather Requirements: Protect masonry repairs when temperature and humidity conditions produce excessive evaporation of water from mortar and repair 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.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

2.2 OWNER-FURNISHED MATERIAL

- A. Salvaged brick.

2.3 MASONRY MATERIALS

- A. Face Brick: Units, including molded, ground, cut, or sawed shapes as required to complete masonry repair work.
 - 1. Brick Matching Existing: Units with colors, color variation within units, surface texture, size, and shape that match existing brickwork and with physical properties [**within 10 percent of those determined from preconstruction testing of selected existing units.**] [**as listed below:**]
 - a. Physical Properties: According to ASTM C67 and as follows:
 - 1) Compressive Strength: **<Insert requirement>**.
 - 2) 24-Hour Cold-Water Submersion Absorption: **<Insert requirement>**.
 - 3) Five-Hour Boil Absorption: **<Insert requirement>**.
 - 4) Saturation Coefficient: **<Insert requirement>**.
 - 5) Initial Rate of Absorption: **<Insert requirement>**.
 - b. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.
 - 2. Brick Matching Architect's Sample: Units with colors, color variation within units, surface texture, and physical properties that match Architect's sample. Match existing units in size and shape.
 - a. Physical Properties: According to ASTM C67 and as follows:
 - 1) Compressive Strength: **<Insert requirement>**.
 - 2) 24-Hour Cold-Water Submersion Absorption: **<Insert requirement>**.

- 3) Five-Hour Boil Absorption: **<Insert requirement>**.
- 4) Saturation Coefficient: **<Insert requirement>**.
- 5) Initial Rate of Absorption: **<Insert requirement>**.
- b. For Architect's sample that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range rather than brick that matches an individual color within that range.
3. Special Shapes:
 - a. Provide molded, 100 percent solid shapes for applications where core holes or "frogs" could be exposed to view or weather when in final position, and where shapes produced by sawing would result in sawed surfaces being exposed to view.
 - b. Provide specially ground units, shaped to match patterns, for arches and where indicated.
 - c. Mechanically chopping or breaking brick, or bonding pieces of brick together by adhesive, are unacceptable procedures for fabricating special shapes.
4. Tolerances as Fabricated: [According to tolerance requirements in ASTM C216, Type FBX] [According to tolerance requirements in ASTM C216, Type FBS] **<Insert requirement>**.
5. Date Identification: Emboss in the clay body on a concealed, interior surface of each unit in easily read 1/2-inch- high characters, "MADE **<Insert year>**." Manufacturer's name may also be embossed.
- B. Building Brick: ASTM C62, of same vertical dimension as face brick, for masonry work concealed from view.
 1. Grade SW where in contact with earth.
 2. [Grade SW or Grade MW] [Grade SW, Grade MW, or Grade NW] for concealed backup.
 3. Date Identification: Emboss in the clay body on a concealed, interior surface of each unit in easily read 1/2-inch- high characters, "MADE **<Insert year>**." Manufacturer's name may also be embossed.
- C. Salvaged Brick: Obtain salvaged brick from location indicated on Drawings. Clean off residual mortar.

2.4 MORTAR MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or Type II; white[**or gray or both**] where required for color matching of mortar.
 1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C114.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Factory-Prepared Lime Putty: ASTM C1489.
- D. Quicklime: ASTM C5, pulverized lime.
- E. Mortar Sand: ASTM C144 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: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.
 3. For exposed mortar, provide sand with rounded edges.
- F. Mortar Pigments: ASTM C979/C979M, compounded for use in mortar mixes, and having a record of satisfactory performance in masonry mortars.
 1. **<Double click here to find, evaluate, and insert list of manufacturers and products.>**
- G. Water: ASTM C270, potable.

2.5 MANUFACTURED REPAIR MATERIALS

- A. Brick Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching brick masonry.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Use formulation that is vapor and water permeable (equal to or more than the brick), exhibits low shrinkage, has lower modulus of elasticity than the bricks being repaired, and develops high bond strength to all types of masonry.
3. Use formulation having working qualities and retardation control to permit forming and sculpturing where necessary.
4. Formulate patching compound used for patching brick in colors and textures to match each unit being patched. Provide **[sufficient number of] [not less than three]** **<Insert number>** colors to enable matching the color, texture, and variation of each unit.

2.6 ACCESSORY MATERIALS

- A. Masonry Repair Anchors, Expansion Type: Mechanical fasteners designed for masonry veneer stabilization consisting of 1/4-inch- diameter, **[Type 304] [Type 316]** stainless-steel rod with brass expanding shells at each end and water-shedding washer in the middle. Expanding shells shall be designed to provide positive mechanical anchorage to veneer on one end and backup masonry on the other.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Masonry Repair Anchors, Spiral Type: Driven-in, **[Type 304] [Type 316]** stainless-steel spiral rods designed to be installed in drilled holes and relying on screw effect rather than adhesive to secure them to backup and veneer. Anchors are flexible in plane of veneer but rigid perpendicular to it.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- C. Masonry Repair Anchors, Expanding Grout Sleeve Type: Fabric sleeve system with Type 304 stainless-steel tube through which system manufacturer's grout is pumped to expand the sleeve, fill cavities within wall, and bond mechanically and chemically with interior of wall construction; and complete with other devices required for installation.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- D. Setting Buttons and Shims: Resilient plastic, nonstaining to masonry, sized to suit joint thicknesses and bed depths of bricks, less the required depth of pointing materials unless removed before pointing.
- E. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.
- F. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer according to **[MPI #23 (surface-tolerant, anti-corrosive metal primer)] [or] [SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating]** **<Insert requirement>**.
 1. Surface Preparation: Use coating requiring no better than **[SSPC-SP 2, "Hand Tool Cleaning,"] [SSPC-SP 3, "Power Tool Cleaning,"] [or] [SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning,"]** **<Insert surface-preparation standard>** surface preparation according to manufacturer's literature or certified statement.
 2. VOC Limit: Use coating with a VOC content of **[400]** **<Insert VOC limit>** g/L or less.
- G. 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.

2.7 MORTAR MIXES

- A. Preparing Lime Putty: Slake quicklime and prepare lime putty according to appendix to ASTM C5 and manufacturer's written instructions.
- B. 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.
- C. 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.
- D. Do not use admixtures in mortar unless otherwise indicated.
- E. Mixes: Mix mortar materials in the following proportions:
 - 1. Rebuilding (Setting) Mortar by Volume: ASTM C270, Proportion Specification, [1 part portland cement, 2 parts lime, and 7 parts sand] [1 part portland cement, 4 parts lime, and 12 parts sand] <Insert proportions>.
 - 2. Rebuilding (Setting) Mortar by Type: ASTM C270, Proportion Specification, **[Type N] [Type O]** <Insert type> unless otherwise indicated; with cementitious material limited to portland cement and lime.
 - 3. Rebuilding (Setting) Mortar by Property: ASTM C270, Property Specification, **[Type N] [Type O]** <Insert type> unless otherwise indicated; with cementitious material limited to portland cement and lime.
 - 4. Rebuilding (Setting) Mortar by ASTM C1713 Composition: ASTM C1713, with binder material limited to **[portland cement and lime]** <Insert binder(s)>, and with a volume ratio of **[1 part portland cement, 1 part lime, and 6 parts sand]** <Insert proportions>.
 - 5. Colored Mortar: Add mortar pigments to produce exposed, setting (rebuilding) mortar of colors required.

PART 3 EXECUTION

3.1 HISTORIC TREATMENT SPECIALIST

- A. Historic Treatment Specialist Firms: Subject to compliance with requirements, [provide historic brick repair by one of the following] [firms that may provide historic brick repair include, but are not limited to, the following]:
 - 1. <Insert, in separate subparagraphs, names of historic treatment specialist firms>.

3.2 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 repair 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 repair work. Reinstall when repairs are complete.
 - 1. Provide temporary rain drainage during work to direct water away from building.

3.3 MASONRY REPAIR, GENERAL

- A. Have repair work performed only by qualified historic treatment specialist.
- B. Repair Appearance Standard: Repaired surfaces are to have a uniform appearance as viewed from **[20] [50]** <Insert distance> feet away by Architect.

3.4 ABANDONED ANCHOR REMOVAL <INSERT DRAWING DESIGNATION>

- A. Remove abandoned anchors, brackets, wood nailers, and other extraneous items [**no longer in use unless indicated to remain**] [**indicated to be removed**].
 - 1. Remove items carefully to avoid spalling or cracking masonry.
 - 2. Notify Architect before proceeding if an item cannot be removed without damaging surrounding masonry. Do the following where directed:
 - a. Cut or grind off item approximately **[3/4] <Insert dimension>** inch(es) beneath surface, and core drill a recess of same depth in surrounding masonry as close around item as practicable.
 - b. Immediately paint exposed end of item with two 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 the hole where each item was removed unless directed to remove and replace brick.

3.5 BRICK REMOVAL AND REPLACEMENT <INSERT DRAWING DESIGNATION>

- A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated[**or are to be re-used**]. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
 - 1. When removing single bricks, remove material from center of brick and work toward outside edges.
- B. Support and protect remaining masonry that surrounds removal area.
- C. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.[**Coordinate with new flashing, reinforcement, and lintels, which are specified in other Sections.**]
- D. Notify Architect of unforeseen detrimental conditions, including voids, cracks, bulges, loose masonry units in existing backup, rotted wood, rusted metal, and other deteriorated items.
- E. Remove in an undamaged condition as many whole bricks as possible.
 - 1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
 - 2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
 - 3. Store brick for reuse. Store off ground, on skids, and protected from weather.
 - 4. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.
- F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for brick replacement.
- G. Replace removed damaged brick with other removed brick[**and salvaged brick**] in good condition, where possible, [**or**] [**with new brick**] matching existing brick. Do not use broken units unless they can be cut to usable size.
- H. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
 - 1. Maintain joint width for replacement units to match existing joints.
 - 2. Use setting buttons or shims to set units accurately spaced with uniform joints.
- I. Lay replacement brick with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min.. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.
 - 1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
 - 2. Rake out mortar used for laying brick before mortar sets according to Section 040323 "Historic Brick Unit Masonry Repointing." Point at same time as repointing of surrounding area.
 - 3. When mortar is hard enough to support units, remove shims and other devices interfering with pointing of joints.

- J. 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. Completely remove such mortar and repoint.

3.6 BACKUP MASONRY REMOVAL AND REPLACEMENT <INSERT DRAWING DESIGNATION>

- A. Where backup masonry is fractured or unstable and at locations indicated, remove mortar and masonry units that are broken or deteriorated and rebuild with whole, new brick or whole salvaged backup masonry units. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
- B. Support and protect remaining masonry that surrounds removal area.
- C. Maintain flashing, reinforcement, anchors, lintels, and adjoining construction in an undamaged condition. [**Coordinate with new flashing, reinforcement, and lintels, which are specified in other Sections.**]
- D. Notify Architect of unforeseen detrimental conditions, including voids, cracks, bulges, loose masonry units beyond the removal area, rotted wood, rusted metal, and other deteriorated items.
- E. Remove in an undamaged condition as many whole bricks as possible.
 - 1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
 - 2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
 - 3. Store brick for reuse. Store off ground, on skids, and protected from weather.
 - 4. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.
- F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for brick replacement.
- G. Replace removed damaged brick with salvaged backup brick in good condition, where possible, or with new building brick matching existing backup brick. Do not use broken units unless they can be cut to usable size.
- H. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
- I. Lay replacement brick with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min.. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.
- J. 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. Completely remove such mortar and repoint.

3.7 REANCHORING VENEERS <INSERT DRAWING DESIGNATION>

- A. Install masonry repair anchors in horizontal mortar joints and according to manufacturer's written instructions. Space anchors not more than [**16 inches o.c. vertically and 24 inches o.c. horizontally**] <Insert requirement> apart unless otherwise indicated. Install at locations to avoid penetrating flashing.
- B. Recess anchors 5/8 inch or more from surface of mortar joint, and fill recess with pointing mortar according to Section 040323 "Historic Brick Unit Masonry Repointing."

3.8 PAINTING STEEL UNCOVERED DURING THE WORK <INSERT DRAWING DESIGNATION>

- A. Notify Architect if steel is exposed during masonry removal. Where Architect determines that steel is structural, or for other reasons cannot be totally removed, prepare and paint it as follows:
 - 1. Surface Preparation: Remove paint, rust, and other contaminants according to [SSPC-SP 2, "Hand Tool Cleaning,"] [SSPC-SP 3, "Power Tool Cleaning,"] [or] [SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning,"] <Insert surface-preparation standard,> 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] <Insert dimension> inch(es)**, notify Architect before proceeding.

3.9 BRICK MASONRY PATCHING <INSERT DRAWING DESIGNATION>

- A. Patch the following bricks unless another type of repair or replacement is indicated:
 - 1. Units indicated to be patched.
 - 2. Units with holes.
 - 3. Units with chipped edges or corners.[Patch chipped edges or corners measuring more than **3/4 inch** in least dimension.]
 - 4. Units with small areas of deep deterioration.[Patch deep deteriorations measuring more than **3/4 inch** in least dimension and more than **1/4 inch** deep.]
- B. Remove and replace existing patches [where indicated] [unless otherwise indicated or approved by Architect].
- C. Patching Bricks:
 - 1. Remove loose material from masonry surface. Carefully remove additional material so patch does not have feathered edges but has square or slightly undercut edges on area to be patched and is at least **[1/4] <Insert dimension> inch(es)** thick, but not less than recommended in writing by patching compound manufacturer.
 - 2. Mask adjacent mortar joint or rake out for repointing if patch extends to edge of brick.
 - 3. Mix patching compound in individual batches to match each unit being patched. Combine one or more colors of patching compound, as needed, to produce exact match.
 - 4. Rinse surface to be patched and leave damp, but without standing water.
 - 5. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
 - 6. Place patching compound in layers as recommended in writing by patching compound manufacturer, but not less than 1/4 inch or more than 2 inches thick. Roughen surface of each layer to provide a key for next layer.
 - 7. Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of the brick. Shape and finish surface before or after curing, as determined by testing, to best match existing brick.
 - 8. Keep each layer damp for 72 hours or until patching compound has set.

3.10 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 nonmasonry 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.

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage qualified testing agencies to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.
- B. 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.
- C. Notify **[testing agency] [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 **[inspectors] [and] [Architect's Project representatives]** have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

3.12 MASONRY-WASTE DISPOSAL

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

END OF SECTION

SECTION 040323 HISTORIC BRICK UNIT MASONRY REPOINTING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes historic treatment work consisting of repointing brick masonry as follows:
 - 1. Repointing joints with **[mortar]** **[and]** **[sealant]**.
 - 2. Widening joints.

1.2 ALLOWANCES

- A. Allowances for repointing historic masonry are specified in Section 012100 "Allowances."
 - 1. Perform historic masonry repointing work under quantity allowances and only as authorized. Authorized work includes **[work required by Drawings and the Specifications and]** work as directed in writing by Architect.
 - 2. Notify Architect **[weekly]** **<Insert time interval>** of extent of work performed that is attributable to quantity allowances.
 - 3. Perform work that exceeds quantity allowances only as authorized by Change Orders.
- B. Preconstruction testing is part of testing and inspecting allowance.
- C. Repointing historic brick unit masonry is part of repointing historic masonry allowance.

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."
 - 1. Unit prices apply to authorized work covered by **[quantity allowances]** **[estimated quantities]**.
 - 2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.4 DEFINITIONS

- A. Low-Pressure Spray:
 - 1. Pressure: **[100 to 400]** **<Insert value>** psi.
 - 2. Flow Rate: **[4 to 6]** **<Insert value>** gpm.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** **<Insert location>**.
 - 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 brick masonry, 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. Quality-control program.
 - d. Fire-protection plan.
 - e. Unit masonry historic treatment program.
 - f. Coordination with building occupants.

1.6 SEQUENCING AND SCHEDULING

- A. Order sand **[and gray portland cement]** for pointing mortar immediately after approval of **[Samples]** **[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 plant growth.
 2. Inspect masonry for open mortar joints and permanently or temporarily point them before cleaning to prevent intrusion of water and other cleaning materials into the wall.
 3. Remove paint.
 4. Clean masonry.
 5. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
 6. Repair masonry, including replacing existing masonry with new masonry materials.
 7. Rake out mortar from joints to be repointed.
 8. Point mortar[**and sealant**] joints.
 9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
 10. Where water repellents are to be used on or near masonry work, delay application of these chemicals until after pointing and cleaning.
- C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in bricks according to Section 040322 "Historic Brick Unit Masonry Repair." Patch holes in mortar joints according to "Repointing" Article.

1.7 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.
 3. Include test data substantiating that products comply with requirements.
- B. Shop Drawings:
1. Include plans, elevations, sections, and locations of repointing work on the structure.
 2. Show provisions for expansion joints or other sealant joints.
 3. Show locations of scaffolding and points of scaffolding in contact with masonry. Include details of contact or anchorage.
- C. Samples for Initial Selection: For the following:
1. Pointing Mortar: Submit sets of mortar for pointing in the form of sample mortar strips, 6 inches long by **[1/4 inch] [1/2 inch]** wide, set in aluminum or plastic channels.
 - a. Have each set contain a close color range of at least **[three] [six]** **<Insert number>** Samples of different mixes of colored sands and cements that produce a mortar matching 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. Sand Type Used for Pointing Mortar: Minimum 8 oz. of each in plastic screw-top jars.
 - a. For blended sands, provide Samples of each component and blend. Identify blend ratio.
 - b. Identify sources, both supplier and quarry, of each type of sand.
 3. Sealant materials.
 4. Include similar Samples of accessories involving color selection.
- D. Samples for Verification: For the following:
1. Each type, color, and texture of pointing mortar in the form of sample mortar strips, 6 inches long by **[1/4 inch] [1/2 inch]** wide, set in aluminum or plastic channels.
 - a. Include with each Sample a list of ingredients with proportions of each. Identify sources, both supplier and quarry, of each type of sand and brand names of cementitious materials and pigments if any.
 2. Sealant materials.
 3. Accessories: Each type of anchor, accessory, and miscellaneous support.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For [historic treatment specialist] [including field supervisors and workers] [and] [testing service].
- B. Preconstruction Test Reports: For existing bricks and mortar.
- C. Quality-control program.
- D. Unit masonry historic treatment program.

1.9 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic masonry repointing specialist. Experience in pointing or repointing only new or nonhistoric masonry is insufficient experience for masonry historic treatment work.
- B. 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.
- C. Unit Masonry Historic Treatment Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of historic treatment work, including protection of surrounding materials and Project site.
 - 1. Include methods for keeping pointing mortar damp during curing period.
 - 2. If materials and methods other than those indicated are proposed for any phase of historic treatment work, add to the quality-control program 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[**on existing surfaces**] to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Widening Joints: Widen a joint in two separate locations[, each approximately **12 inches** long] [as directed] <Insert length>.
 - 2. Repointing: Rake out joints in two separate areas[, **each approximately 36 inches high by 48 inches wide**] **[as indicated]** <Insert dimensions> for each type of repointing required, and repoint one of the areas.
 - 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.

1.10 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: **[Owner will engage]** **[Engage]** a qualified testing agency to perform preconstruction testing on brick masonry as follows:
 - 1. Provide test specimens as indicated and representative of proposed materials and existing construction.
 - 2. Existing Brick: Test each type of existing brick indicated for repointing, according to testing methods in ASTM C67 for compressive strength and initial rate of absorption (suction). Carefully remove **[three]** <Insert number> existing units for testing from locations designated by Architect. Take testing samples from these units.
 - 3. Existing Mortar: Test according to ASTM C1324, modified as agreed by testing service and Architect for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength. Use X-ray diffraction, infrared spectroscopy, and differential thermal analysis to supplement microscopical methods. Carefully remove existing mortar for testing from within joints at **[five]** <Insert number> locations designated by **[Architect]** **[or]** **[testing service]**.

4. Temporary Patch: As directed by Architect, provide temporary materials at locations from which existing samples were taken.

1.11 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 days.
- D. Store lime putty covered with water in sealed containers.
- E. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.12 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: Repoint mortar joints only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven 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 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.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- 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 C150/C150M, Type I or Type II; white[**or gray or both**] where required for color matching of mortar.
 1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C114.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Factory-Prepared Lime Putty: ASTM C1489.

- D. Quicklime: ASTM C5, pulverized lime.
- E. Mortar Sand: ASTM C144 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: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.
 - 3. Provide sand with rounded edges.
- F. Mortar Pigments: ASTM C979/C979M, compounded for use in mortar mixes, and having a record of satisfactory performance in masonry mortars.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- G. Water: ASTM C270, potable.

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."
 - a. Type: [Single-component, nonsag urethane sealant] <Insert type>.
 - 2. Colors: Provide colors of exposed sealants to match colors of mortar adjoining installed sealant unless otherwise indicated.
 - 3. Ground-Mortar Aggregate: 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 No. [100] <Insert number> sieve.
- B. Joint-Sealant Backing:
 - 1. Cylindrical Sealant Backings: ASTM C1330, [**Type C (closed-cell material with a surface skin)**] [or] [**Type B (bicellular 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. 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 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

- A. Preparing Lime Putty: Slake quicklime and prepare lime putty according to appendix to ASTM C5 and manufacturer's written instructions.
- B. 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 hour of final mixing; do not retemper or use partially hardened material.
- C. 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.
- D. Do not use admixtures in mortar unless otherwise indicated.
- E. Mixes: Mix mortar materials in the following proportions:
1. Pointing Mortar by Volume: ASTM C270, Proportion Specification, [1 part portland cement, 2 parts lime, and 7 parts sand] [1 part portland cement, 4 parts lime, and 12 parts sand] <Insert proportions>.[Add mortar pigments to produce mortar colors required.]
 2. Pointing Mortar by Type: ASTM C270, Proportion Specification, [Type N] [Type O] <Insert Type> unless otherwise indicated; with cementitious material limited to portland cement and lime.[Add mortar pigments to produce mortar colors required.]
 3. Pointing Mortar by Property: ASTM C270, Property Specification, [Type N] [Type O] <Insert Type> unless otherwise indicated; with cementitious material limited to portland cement and lime.[Add mortar pigments to produce mortar colors required.]
 4. Pointing Mortar by ASTM C1713 Composition: ASTM C1713, with binder material limited to [portland cement and lime] <Insert binder(s)>, and with a volume ratio of [1 part portland cement, 1 part lime, and 6 parts sand] <Insert proportions>.[Add mortar pigments to produce mortar colors required.]

PART 3 EXECUTION

3.1 HISTORIC TREATMENT SPECIALIST

- A. Historic Treatment Specialist Firms: Subject to compliance with requirements, [provide historic masonry repointing by one of the following] [firms that may provide historic masonry repointing include, but are not limited to, the following]:
1. <Insert, in separate subparagraphs, names of historic treatment specialist firms>.

3.2 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.

3.3 MASONRY REPOINTING, GENERAL

- A. Have repointing work performed only by qualified historic treatment specialist.
- B. Appearance Standard: Repointed surfaces are to have a uniform appearance as viewed from [20] [50] <Insert distance>feet away by Architect.

3.4 WIDENING JOINTS <INSERT DRAWING DESIGNATION>

- A. Do not widen a joint, except where indicated or approved by Architect.

- B. Location Guideline: Where an existing brick abuts another or the joint is less than **[1/8] <Insert dimension>** inch(es), widen the joint for length indicated and to depth required for repointing after obtaining Architect's approval.
- C. Carefully perform widening by using cutting, grinding, routing, or filing procedures demonstrated in an approved mockup.
- D. Widen joint to width equal to or less than predominant width of other joints on building. Make sides of widened joint uniform and parallel. Ensure that edges of units along widened joint are in alignment with joint edges at unaltered joints.

3.5 REPOINTING <INSERT DRAWING DESIGNATION>

- A. Rake out and repoint joints to the following extent:
 - 1. All joints in areas indicated.
 - 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 **[1/16] [1/8] <Insert dimension>** inch(es) 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 [joint width plus **1/8 inch**] [2 times joint width] [2-1/2 times joint width] [not less than **1/2 inch**] [not less than **3/4 inch**] [and] [not less than that required to expose sound, unweathered mortar] <Insert requirement>. Do not remove unsound mortar more than **[2] <Insert dimension>** 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 bricks or widen joints. Replace or patch damaged bricks as directed by Architect.
 - a. Cut out mortar by hand with chisel and resilient mallet. Do not use power-operated grinders without Architect's written approval based on approved quality-control program.
 - b. 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.
- D. Notify Architect of unforeseen detrimental conditions, including voids in mortar joints, cracks, loose masonry units, 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] <Insert dimension>** inch(es) until 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 layers not greater than **[3/8] <Insert dimension>** inch(es). Fully compact each layer and allow it to become thumbprint hard before applying next layer. Where existing brick 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 featheredge 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 Section 079200 "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. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

3.6 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 nonmasonry 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.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage qualified testing agencies to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.

- B. 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.
- C. Notify **[testing agency] [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 **[inspectors] [and] [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

SECTION 040342 HISTORIC STONE MASONRY REPAIR

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes historic treatment work consisting of repairing historic stone assemblies as follows:
 - 1. Repairing stone masonry.
 - 2. Removing abandoned anchors.
 - 3. Painting steel uncovered during the Work.

1.2 ALLOWANCES

- A. Allowances for historic masonry repair are specified in Section 012100 "Allowances."
 - 1. Perform historic masonry repair work under quantity allowances and only as authorized. Authorized work includes[**work required by Drawings and Specifications and**] work as directed in writing by Architect.
 - 2. Notify Architect [**weekly**] **<Insert time interval>** of extent of work performed that is attributable to quantity allowances.
 - 3. Perform work that exceeds quantity allowances only as authorized by Change Orders.
- B. Preconstruction testing is part of testing and inspecting allowance.
- C. Abandoned anchor removal is part of **<Insert name of allowance>**.
- D. Stone removal and replacement is part of stone removal and replacement allowance.
- E. Partial stone replacement (dutchman repair) is part of stone removal and replacement allowance.
- F. Crack injection is part of crack-injection allowance.
- G. Patching stone units is part of masonry patching allowance.

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."
 - 1. Unit prices apply to authorized work covered by [**quantity allowances**] [**estimated quantities**].
 - 2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.4 DEFINITIONS

- A. Low-Pressure Spray:
 - 1. Pressure: [**100 to 400**] **<Insert range of values>** psi.
 - 2. Flow Rate: [**4 to 6**] **<Insert range of values>** gpm.
- 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. Rebuilding (Setting) Mortar: Mortar used to set and anchor masonry in a structure, distinct from pointing mortar installed after masonry is set in place.
- D. Rift: The most pronounced direction of splitting or cleavage of a stone.
- E. Stone Terminology: ASTM C119.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference on historic masonry repair and repointing at **[Project site]** <Insert location>.
 - 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. Fire-protection plan.
 - e. Stone historic treatment program.
 - f. Coordination with building occupants.

1.6 SEQUENCING AND SCHEDULING

- A. Order sand[**and gray portland cement**] for colored mortar immediately after approval of **[Samples]** **[mockups]**. Take delivery of and store at Project site a sufficient quantity to complete Project.
- B. Work Sequence: Perform stone historic treatment work in the following sequence, which includes work specified in this and other Sections:
 - 1. Remove plant growth.
 - 2. Inspect stonework for open mortar joints and permanently or temporarily point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
 - 3. Remove paint.
 - 4. Clean stone.
 - 5. Rake out mortar from joints surrounding stone to be replaced and from joints adjacent to stone repairs along joints.
 - 6. Repair stonework, including replacing existing stone with new stone. If required, repair backup masonry.
 - 7. Rake out mortar from joints to be repointed.
 - 8. Point mortar and sealant joints.
 - 9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
 - 10. Where water repellents are to be used on or near stonework, delay application of these chemicals until after pointing and cleaning.
- C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in stone according to Part 3 "Stone Patching" Article. Patch holes in mortar joints according to Section 040343 "Historic Stone Masonry Repointing."

1.7 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.
 - 3. 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. Indicate setting number of each new stone unit and its location on the structure in annotated plans and elevations.
 - 5. Show provisions for expansion joints or other sealant joints.

6. Show provisions for flashing, lighting fixtures, conduits, and weep holes as required.
 7. 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.
 8. Show locations of scaffolding and points of scaffolding in contact with masonry. Include details of each point of contact or anchorage.
- C. 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 **[1/4 inch] [1/2 inch]** wide, set in aluminum or plastic channels.
 - a. Have each set contain a close color range of at least **[three] [six] <Insert number>** Samples of different mixes of colored sands and cements that produce a mortar matching 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. Each type of sand used for mortar; minimum 8 oz. of each in plastic screw-top jars.
 - a. For blended sands, provide Samples of each component and blend. Identify blend ratio.
 - b. Identify sources, both supplier and quarry, of each type of sand.
 3. 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 stone colors on the building.
 - a. Have each set contain a close color range of at least **[three] [six] <Insert number>** Samples of different mixes of patching compound that matches the variations in existing stone when cured and dry.
 4. 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 **[two] [three] <Insert number>** 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 patching compound in form of briquettes, at least 3 inches long by 1-1/2 inches wide. Document each Sample with manufacturer and stock number or other information necessary to order additional material.
 3. Each type of adhesive.
 4. Accessories: Each type of anchor, accessory, and miscellaneous support.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For [historic treatment specialist] [including field supervisors and workers] [and] [testing service].
- B. Preconstruction Test Reports: For [existing stone types and mortar] [and] [replacement stone types].
- C. Quality-control program.
- D. Stone historic treatment program.

1.9 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic stone repair specialist. Experience installing standard unit masonry or new stone masonry is insufficient experience for stone historic treatment work.
 1. Historic Treatment Worker Qualifications: [When stone units are being patched, assign at least one worker per crew who is trained and certified by manufacturer of patching compound to apply its products] <Insert requirement>.

- B. 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.
- C. Stone Historic Treatment Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of the historic treatment work, including protection of surrounding materials and Project site.
 - 1. Include methods for keeping exposed mortar damp during curing period.
 - 2. If materials and methods other than those indicated are proposed for any phase of historic treatment work, add to the quality-control program 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 to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation.
 - 1. Stone Repair: 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 adjacent whole units or approximately 48 inches 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. Include the following as a minimum:
 - a. Replacement: **[Four]** **<Insert number>** stone units replaced.
 - b. Partial Stone Replacement: **[Two]** **<Insert number>** partial stone replacements (dutchman repairs).
 - c. Stone Plug Repair: **[Two]** **<Insert number>** stone plug repairs for each type of stone indicated to be plugged.
 - d. Crack Injection: Apply crack injection in two separate areas[, **each approximately 36 inches long**] **[as directed]** **<Insert length>**.
 - e. Patching: Three small holes **[at least 1 inch in diameter]** **[as directed]** **<Insert size>** for each type of stone indicated to be patched, so as to leave no evidence of repair.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: **[Owner will engage]** **[Engage]** a qualified testing agency to perform preconstruction testing on stone masonry as follows:
 - 1. Provide test specimens as indicated and representative of proposed materials and existing construction.
 - 2. Replacement Stone: Test each proposed type of replacement stone, according to ASTM C170/C170M for compressive strength, wet and dry, perpendicular and parallel to rift; ASTM C99/C99M for modulus of rupture, wet and dry, perpendicular and parallel to rift; and ASTM C97/C97M for absorption and bulk specific gravity.
 - 3. Existing Stone: Test each type of existing stone indicated for replacement, according to ASTM C170/C170M for compressive strength, wet and dry, perpendicular and parallel to rift; ASTM C99/C99M for modulus of rupture, wet and dry, perpendicular and parallel to rift; and ASTM C97/C97M for absorption and bulk specific gravity. Carefully remove **[five]** **<Insert number>** existing stones for testing from locations designated by Architect. Take testing samples from these stones.
 - 4. Existing Mortar: Test according to ASTM C1324, modified as agreed by testing service and Architect for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength. Use x-ray diffraction, infrared spectroscopy, and differential thermal analysis to supplement microscopical methods. Carefully remove existing mortar for testing from within joints at **[five]** **<Insert number>** locations designated by **[Architect]** **[or]** **[testing service]**.
 - 5. Temporary Patch: As directed by Architect, provide temporary materials followed by permanent repairs at locations from which existing samples were taken.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Deliver stone 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 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.

1.12 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: Repair stonework only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven 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 days after repair.
- D. Hot-Weather Requirements: Protect stonework repairs 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.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- 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.

2.2 MASONRY MATERIALS

- A. Stone Matching Existing: Natural building stone of variety, color, texture, grain, veining, finish, size, and shape that match existing stone and with physical properties[**within 10 percent of those determined from preconstruction testing of selected existing stone.**][**as listed below:**]
1. Physical Properties for [Granite] [Limestone] [Marble] [Sandstone] <Insert stone type>:
 - a. Compressive Strength: **<Insert requirement>** according to ASTM C170/C170M.
 - b. Modulus of Rupture: **<Insert requirement>** according to ASTM C99/C99M.
 - c. Absorption: **<Insert requirement>** according to ASTM C97/C97M.
 - d. Bulk Specific Gravity: **<Insert requirement>** according to ASTM C97/C97M.
 2. 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.
 3. Quarry: Subject to compliance with requirements, provide stone from **[the original quarry]** **<Insert quarry name, location, and stone designation>**.
 - a. Original Quarry: **<Insert quarry name, location, and stone designation>**.
- B. Stone Matching Architect's Sample: Natural building stone of variety, color, texture, grain, veining, finish, and physical properties that match Architect's sample. Match existing stone in size and shape.
1. Physical Properties for [Granite] [Limestone] [Marble] [Sandstone] <Insert stone type>:
 - a. Compressive Strength: **<Insert requirement>** according to ASTM C170/C170M.
 - b. Modulus of Rupture: **<Insert requirement>** according to ASTM C99/C99M.
 - c. Absorption: **<Insert requirement>** according to ASTM C97/C97M.
 - d. Bulk Specific Gravity: **<Insert requirement>** according to ASTM C97/C97M.
 2. For Architect's sample 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.
- C. 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.
- D. 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, the rift or natural bedding planes **[match the rift orientation of existing stones]** **[are predominantly horizontal]** **[except for arches, where bedding planes are predominantly radial or vertical, but perpendicular to the wall plane]**.
- E. Date Identification: Stamp with permanent, nonbleeding ink on a concealed, interior surface of each new stone in easily read 1/4-inch- high characters, "MADE **<Insert year>**."
- F. Salvaged Stone: Obtain from location indicated on Drawings. Clean off residual mortar.
- G. Building Brick: Brick having same vertical dimension as existing backup brick, according to ASTM C62[, **Grade SW, MW, or NW.**][**and Section 040322 "Historic Brick Unit Masonry Repair."**]

2.3 MORTAR MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or Type II; white[**or gray, or both,**] where required for color matching of mortar.
1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C114.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Factory-Prepared Lime Putty: ASTM C1489.
- D. Quicklime: ASTM C5, pulverized lime.
- E. Mortar Sand: ASTM C144 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: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.
 3. For exposed mortar, provide sand with rounded edges.
- F. Mortar Pigments: ASTM C979/C979M, compounded for use in mortar mixes, and having a record of satisfactory performance in masonry mortars.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- G. Water: ASTM C270, potable.

2.4 MANUFACTURED REPAIR MATERIALS

- A. Stone-Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching stone.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Use formulation that is vapor and water permeable (equal to or more than the stone), exhibits low shrinkage, has lower modulus of elasticity than the stone units being repaired, and develops high bond strength to all stone types.
 3. Use formulation having working qualities and retardation control to permit forming and sculpturing where necessary.
 4. Formulate patching compound in colors, textures, and grain to match stone being patched. Provide **[sufficient number of] [no fewer than three] <Insert number>** colors to enable matching each piece of stone.
- B. Cementitious Crack Filler: 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. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- 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. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2.5 ACCESSORY MATERIALS

- A. Stone Anchors[**and Pins**]: Type and size indicated or, if not indicated, to match existing anchors in size and type. Fabricate from **[Type 304] [Type 316]** stainless steel.
- 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. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer according to **[MPI #23 (surface-tolerant, anticorrosive metal primer) [or] [SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating] <Insert requirement>**.
1. Surface Preparation: Use coating requiring no better than [SSPC-SP 2, "Hand Tool Cleaning,"] [SSPC-SP 3, "Power Tool Cleaning,"] [or] [SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning,"] <Insert surface-preparation standard> surface preparation according to manufacturer's literature or certified statement.
 2. VOC Limit: Use coating with a VOC content of **[400] <Insert VOC limit>** g/L or less.
- E. 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.

2.6 MORTAR MIXES

- A. Preparing Lime Putty: Slake quicklime and prepare lime putty according to appendix in ASTM C5 and to manufacturer's written instructions.
- B. 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.
- C. 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.
- D. Do not use admixtures in mortar unless otherwise indicated.
- E. Mixes: Mix mortar materials in the following proportions:
 1. Rebuilding (Setting) Mortar by Volume: ASTM C270, Proportion Specification, [1 part portland cement, 2 parts lime, and 7 parts sand] [1 part portland cement, 4 parts lime, and 12 parts sand] <Insert proportions>.
 2. Rebuilding (Setting) Mortar by Type: ASTM C270, Proportion Specification, [**Type N**] [**Type O**] <Insert type> unless otherwise indicated; with cementitious material limited to portland cement and lime.
 3. Rebuilding (Setting) Mortar by Property: ASTM C270, Property Specification, [**Type N**] [**Type O**] <Insert type> unless otherwise indicated; with cementitious material limited to portland cement and lime.
 4. Rebuilding (Setting) Mortar by ASTM C1713 Composition: ASTM C1713, with binder material limited to [**portland cement and lime**] <Insert binder(s)>, and with a volume ratio of [**1 part portland cement, 1 part lime, and 6 parts sand**] <Insert proportions>.
 5. Colored Mortar: Add mortar pigments to produce exposed, setting (rebuilding) mortar of colors required.

PART 3 EXECUTION

3.1 HISTORIC TREATMENT SPECIALIST

- A. Historic Treatment Specialist Firms: Subject to compliance with requirements, [provide historic stone repair by one of the following] [firms that may provide historic stone repair include, but are not limited to, the following]:
 1. <Insert, in separate subparagraphs, names of historic treatment specialist firms>.

3.2 PROTECTION

- A. 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 repair 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 stone repair work. Reinstall when repairs are complete.

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

3.3 STONE REPAIR, GENERAL

- A. Have repair work performed only by qualified historic treatment specialist.
- B. Repair Appearance Standard: Repaired surfaces are to have a uniform appearance as viewed from [20] [50] <Insert dimension> feet away by Architect.

3.4 ABANDONED ANCHOR REMOVAL <INSERT DRAWING DESIGNATION>

- A. Remove abandoned anchors, brackets, wood nailers, and other extraneous items [no longer in use unless indicated to remain] [indicated to be removed].
 1. Remove items carefully to avoid spalling or cracking stone.
 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] <Insert dimension> 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 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] [Plug] the hole where each item was removed unless directed to remove and replace the stone unit.

3.5 STONE REMOVAL AND REPLACEMENT <INSERT DRAWING DESIGNATION>

- A. At locations indicated, remove stone that has deteriorated or is damaged beyond repair [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. Support and protect remaining masonry that was supported by removed stone.
- C. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition. [Coordinate with new flashing, reinforcement, and lintels, which are specified in other Sections.]
- D. Notify Architect of unforeseen detrimental conditions, including voids, cracks, bulges, loose masonry units in existing stone or unit masonry backup, rotted wood, rusted metal, and other deteriorated items.
- E. 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.
- F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for stone replacement.
- G. Replace removed damaged stone with other removed stone [and salvaged stone] in good condition, where possible, [or with new stone] matching existing stone. Do not use broken units unless they can be cut to usable size.
- H. 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.

- I. 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.
- J. 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 **[of size and type indicated]** **[matching existing configuration]**.
 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 Stone Masonry Repointing." Point at same time as repointing of surrounding area.
 3. When mortar is hard enough to support units, remove shims and other devices interfering with pointing of joints.
- K. 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. Completely remove such mortar and repoint.

3.6 BACKUP MASONRY REMOVAL AND REPLACEMENT <INSERT DRAWING DESIGNATION>

- A. Where backup masonry is fractured or unstable and at locations indicated, remove mortar and masonry units that are broken or deteriorated, and rebuild with whole, new brick or whole, salvaged backup masonry units. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
- B. Perform backup masonry removal and replacement according to requirements in Section 040322 "Historic Brick Unit Masonry Repair."
- C. Support and protect remaining masonry that surrounds removal area.
- D. Maintain flashing, reinforcement, anchors, lintels, and adjoining construction in an undamaged condition. **[Coordinate with new flashing, reinforcement, and lintels, which are specified in other Sections.]**
- E. Notify Architect of unforeseen detrimental conditions, including voids, cracks, bulges, loose masonry units beyond the removal area, rotted wood, rusted metal, and other deteriorated items.
- F. Remove in an undamaged condition as many whole bricks as possible.
 1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
 2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
 3. Store brick for reuse. Store off ground, on skids, and protected from weather.
 4. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.
- G. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for brick replacement.
- H. Replace removed damaged brick with salvaged backup brick in good condition, where possible, or with new building brick matching existing backup brick. Do not use broken units unless they can be cut to usable size.
- I. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.

- J. Lay replacement brick with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min.. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.
- K. 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. Completely remove such mortar and repoint.

3.7 PAINTING STEEL UNCOVERED DURING THE WORK <INSERT DRAWING DESIGNATION>

- 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 2, "Hand Tool Cleaning,"] [SSPC-SP 3, "Power Tool Cleaning,"] [or] [SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning,"] <Insert surface-preparation standard>, 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] <Insert dimension>** inch, notify Architect before proceeding.

3.8 PARTIAL STONE REPLACEMENT <INSERT DRAWING DESIGNATION>

- 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] <Insert dimension>** 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, **[plain] [threaded]** 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.
 - 1. 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, **[plain] [threaded]** stainless-steel pins set into 1/4-inch- diameter holes drilled into backing stone and into, but not through, the partial replacement.

1. 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**] as specified in "Stone Patching" Article.

3.9 STONE PLUG REPAIR <INSERT DRAWING DESIGNATION>

- 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.

3.10 STONE-FRAGMENT REPAIR <INSERT DRAWING DESIGNATION>

- A. Carefully remove cracked or fallen stone fragment indicated to be repaired. Reuse only stone fragment that is in sound condition.
- B. Remove soil, loose particles, mortar, and other debris or foreign material from fragment surfaces to be bonded and from parent stone where fragment had broken off, by cleaning with stiff-fiber brush.
- C. Pinning: Before applying adhesive, prepare for mechanical anchorage consisting of 1/4-inch- diameter, **[plain] [threaded]** stainless-steel pins set into 1/4-inch- diameter holes drilled at a 45-degree downward angle through face of fragment and into parent stone.
 1. Center and space pins **3 to 5 inches** apart and at least **2 inches** from any edge. Insert pins at least **2 inches** in parent stone and **2 inches** in fragment, with end countersunk at least **3/4 inch** from exposed face of fragment.
- D. Concealed Pinning: Before applying adhesive, prepare for concealed mechanical anchorage consisting of 1/4-inch- diameter, **[plain] [threaded]** stainless-steel pins set into 1/4-inch- diameter holes drilled into parent stone and into, but not through, the fragment.
 1. Center and space pins **3 to 5 inches** apart and at least **2 inches** from any edge. Insert pins at least **2 inches** in parent stone and **2 inches** in fragment, but no closer than **3/4 inch** from exposed face of fragment.
- E. Apply stone-to-stone adhesive according to adhesive manufacturer's written instructions. Coat bonding surfaces of fragment and parent stone, completely filling all crevices and voids.
- F. Fit stone fragment onto parent stone while adhesive is still tacky, and hold fragment securely in place until adhesive has cured. Use shims, clamps, wedges, or other devices as necessary to align face of fragment with face of parent stone.
- G. Clean adhesive residue from exposed surfaces and patch chipped areas[**and exposed drill holes**] as specified in "Stone Patching" Article.

3.11 CRACK INJECTION <INSERT DRAWING DESIGNATION>

- A. General: Comply with cementitious crack-filler manufacturer's written instructions.
- B. Drill 1/4-inch- diameter injection holes as follows:
 - 1. Transverse Cracks Less Than 3/8 inch Wide: Drill holes through center of crack at 12 to 18 inches o.c.
 - 2. Transverse Cracks More Than 3/8 inch Wide: Drill holes through center of crack at 18 to 36 inches o.c.
 - 3. Delaminations: Drill holes at approximately 18 inches o.c., both vertically and horizontally.
 - 4. Drill holes 2 inches deep.
- C. Clean out drill holes and cracks with compressed air and water. Remove dirt and organic matter, loose material, sealants, and failed crack repair materials.
- D. Place plastic injection ports in drilled holes, and seal face of cracks between injection ports with clay or other nonstaining, removable plugging material. Leave openings at upper ends of cracks for air release.
- E. Inject cementitious crack filler through ports sequentially, beginning at one end of area and working to opposite end; where possible, begin at lower end of injection area and work upward. Inject filler until it extrudes from adjacent ports. After port has been injected, plug with clay or other suitable material, and begin injecting filler at adjacent port, repeating process until all ports have been injected.
- F. Clean cementitious crack filler from face of stone before it sets, by scrubbing with water.
- G. After cementitious crack filler has set, remove injection ports, plugging material, and excess filler. Patch injection holes and surface of cracks as specified in "Stone Patching" Article.

3.12 STONE PATCHING <INSERT DRAWING DESIGNATION>

- 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. Units with chipped edges or corners.[Patch chipped edges or corners measuring more than **3/4 inch** in least dimension.]
 - 4. Units with small areas of deep deterioration.[Patch deep deteriorations measuring more than **3/4 inch** in least dimension and over **1/4 inch** deep.]
- B. Remove and replace existing patches [where indicated] [unless otherwise indicated or approved by Architect].
- C. Remove deteriorated material, and remove adjacent material that has begun to deteriorate. Carefully remove additional material so patch does not have feathered edges but has square or slightly undercut edges on area to be patched and is at least [**1/4**] <Insert dimension> inchthick, but not less than as recommended in writing by patching compound manufacturer.
- D. Mask adjacent mortar joint or rake out for repointing if patch extends to edge of stone unit.
- E. Mix patching compound in individual batches to match each stone unit being patched. Combine one or more colors of patching compound, as needed, to produce exact match.
- F. Brush-coat stone surfaces with slurry coat of patching compound according to manufacturer's written instructions.
- G. Place patching compound in layers as recommended in writing by patching compound manufacturer, but not less than 1/4 inch or more than 2 inches thick. Roughen surface of each layer to provide a key for next layer.

1. Simple Details: Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of the stone. Shape and finish surface before or after curing, as determined by testing, to best match existing stone.
 2. Carved Details: Build patch up 1/4 inch above surrounding stone, and carve surface to match adjoining stone after patching compound has hardened.
- H. Keep each layer damp for 72 hours or until patching compound has set.
- I. Remove and replace patches with hairline cracks or that show separation from stone at edges, and those that do not match adjoining stone in color or texture.

3.13 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 nonstone 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.

3.14 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage qualified testing agencies to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.
- B. 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.
- C. Notify **[testing agency] [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 **[inspectors] [and] [Architect's Project representatives]** have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

3.15 STONE-WASTE DISPOSAL

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

END OF SECTION

SECTION 040343 HISTORIC STONE MASONRY REPOINTING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes historic treatment work consisting of repointing stone masonry joints with **[mortar]** **[and]** **[sealant]**.

1.2 ALLOWANCES

- A. Allowances for repointing historic masonry are specified in Section 012100 "Allowances."
 - 1. Perform historic masonry repointing work under quantity allowances and only as authorized. Authorized work includes **[work required by Drawings and Specifications and]** work as directed in writing by Architect.
 - 2. Notify Architect **[weekly]** **<Insert time interval>** of extent of work performed that is attributable to quantity allowances.
 - 3. Perform work that exceeds quantity allowances only as authorized by Change Orders.
- B. Preconstruction testing is part of testing and inspecting allowance.
- C. Repointing stonework is part of repointing historic masonry allowance.

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."
 - 1. Unit prices apply to authorized work covered by **[quantity allowances]** **[estimated quantities]**.
 - 2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.4 DEFINITIONS

- A. Low-Pressure Spray:
 - 1. Pressure: **[100 to 400]** **<Insert range of values>** psi
 - 2. Flow Rate: **[4 to 6]** **<Insert range of values>** 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.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference on historic masonry repair and repointing at **[Project site]** **<Insert location>**.
 - 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 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. Fire-protection plan.
 - e. Stone historic treatment program.
 - f. Coordination with building occupants.

1.6 SEQUENCING AND SCHEDULING

- A. Order sand[**and gray portland cement**] for pointing mortar immediately after approval of **[Samples] [mockups]**. Take delivery of and store at Project site a sufficient quantity to complete Project.
- B. Work Sequence: Perform stone historic treatment work in the following sequence, which includes work specified in this and other Sections:
 - 1. Remove plant growth.
 - 2. Inspect for open mortar joints and permanently or temporarily point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
 - 3. Remove paint.
 - 4. Clean stone.
 - 5. Rake out mortar from joints surrounding stone to be replaced and from joints adjacent to stone repairs along joints.
 - 6. Repair stonework, including replacing existing stone with new stone.
 - 7. Rake out mortar from joints to be repointed.
 - 8. Point mortar[**and sealant**] joints.
 - 9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
 - 10. Where water repellents are to be used on or near stonework, delay application of these chemicals until after pointing and cleaning.
- C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in stone according to Section 040342 "Historic Stone Masonry Repair." Patch holes in mortar joints according to Part 3 "Repointing" Article.

1.7 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.
 - 3. Include test data substantiating that products comply with requirements.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and locations of repointing work on the structure.
 - 2. Show provisions for expansion joints or other sealant joints.
 - 3. Show locations of scaffolding and points of scaffolding in contact with masonry. Include details of each point of contact or anchorage.
- C. Samples for Initial Selection: For the following:
 - 1. Pointing Mortar: Submit sets of mortar for pointing in the form of sample mortar strips, 6 inches long by **[1/4 inch] [1/2 inch]** wide, set in aluminum or plastic channels.
 - a. Have each set contain a close color range of at least **[three] [six] <Insert number>** Samples of different mixes of colored sands and cements that produce a mortar matching 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. Each type of sand used for pointing mortar; minimum 8 oz. of each in plastic screw-top jars.
 - a. For blended sands, provide Samples of each component and blend. Identify blend ratio.
 - b. Identify sources, both supplier and quarry, of each type of sand.
 - 3. Sealant materials.
 - 4. Include similar Samples of accessories involving color selection.
- D. Samples for Verification: For the following:
 - 1. Each type, color, and texture of pointing mortar in the form of sample mortar strips, 6 inches long by **[1/4 inch] [1/2 inch]** wide, set in aluminum or plastic channels.
 - a. Include with each Sample a list of ingredients with proportions of each. Identify sources, both supplier and quarry, of each type of sand and brand names of cementitious materials and pigments if any.

2. Sealant materials.
3. Accessories: Each type of anchor, accessory, and miscellaneous support.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For [historic treatment specialist] [including field supervisors and workers] [and] [testing service].
- B. Preconstruction Test Reports: For existing stone types and mortar.
- C. Quality-control program.
- D. Stone historic treatment program.

1.9 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic masonry repointing specialist. Experience in pointing or repointing only new or nonhistoric masonry is insufficient experience for masonry historic treatment work.
- B. 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.
- C. Stone Historic Treatment Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of the historic treatment work, including protection of surrounding materials and Project site.
 1. Include methods for keeping pointing mortar damp during curing period.
 2. If materials and methods other than those indicated are proposed for any phase of historic treatment work, add to the quality-control program 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[**on existing surfaces**] to demonstrate aesthetic effects and to set quality standards for materials and execution.
 1. Repointing: Rake out joints in two separate areas[, **each approximately 36 inches high by 48 inches wide**] [**as indicated**] <Insert dimensions> for each type of repointing required, and repoint one 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.

1.10 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: [**Owner will engage**] [**Engage**] a qualified testing agency to perform preconstruction testing on stone units as follows:
 1. Provide test specimens as indicated and representative of proposed materials and existing construction.
 2. Existing Stone: Test each type of existing stone indicated for repointing, according to ASTM C170/C170M for compressive strength, wet and dry, perpendicular and parallel to rift. Carefully remove [**three**] <Insert number> existing stones for testing from locations designated by Architect. Take testing samples from these stones.
 3. Existing Mortar: Test according to ASTM C1324, modified as agreed by testing service and Architect for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength. Use x-ray diffraction, infrared spectroscopy, and differential thermal analysis to supplement microscopical methods. Carefully remove existing mortar for testing from within joints at [**five**] <Insert number> locations designated by [**Architect**] [**or**] [**testing service**].

4. Temporary Patch: As directed by Architect, provide temporary materials at locations from which existing samples were taken.

1.11 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 days.
- D. Store lime putty covered with water in sealed containers.
- E. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.12 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: Repoint mortar joints only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven 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 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 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.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- 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 C150/C150M, Type I or Type II; white[**or gray or both,**] where required for color matching of mortar.
 1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C114.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Factory-Prepared Lime Putty: ASTM C1489.

- D. Quicklime: ASTM C5, pulverized lime.
- E. Mortar Sand: ASTM C144 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: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.
 - 3. Provide sand with rounded edges.
- F. Mortar Pigments: ASTM C979/C979M, compounded for use in mortar mixes, and having a record of satisfactory performance in masonry mortars.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- G. Water: ASTM C270, potable.

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."
 - a. Type: [Single-component, nonsag urethane sealant] <Insert type>.
 - 2. Colors: Provide colors of exposed sealants to match colors of mortar adjoining installed sealant unless otherwise indicated.
 - 3. Ground-Mortar Aggregate: 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] <Insert number> sieve.
- B. Joint-Sealant Backing:
 - 1. Cylindrical Sealant Backings: ASTM C1330, [**Type C (closed-cell material with a surface skin)**] [or] [**Type B (bicellular 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. 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.

2.4 MORTAR MIXES

- A. Preparing Lime Putty: Slake quicklime and prepare lime putty according to appendix in ASTM C5 and to manufacturer's written instructions.
- B. 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 hour of final mixing; do not retemper or use partially hardened material.
- C. 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. Where mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.
- D. Do not use admixtures in mortar unless otherwise indicated.
- E. Mixes: Mix mortar materials in the following proportions:
1. Pointing Mortar by Volume: ASTM C270, Proportion Specification, [1 part portland cement, 2 parts lime, and 7 parts sand] [1 part portland cement, 4 parts lime, and 12 parts sand] <Insert proportions>.[Add mortar pigments to produce mortar colors required.]
 2. Pointing Mortar by Type: ASTM C270, Proportion Specification, **[Type N] [Type O]** <Insert type> unless otherwise indicated; with cementitious material limited to portland cement and lime.[**Add mortar pigments to produce mortar colors required.**]
 3. Pointing Mortar by Property: ASTM C270, Property Specification, **[Type N] [Type O]** <Insert type> unless otherwise indicated; with cementitious material limited to portland cement and lime.[**Add mortar pigments to produce mortar colors required.**]
 4. Pointing Mortar by ASTM C1713 Composition: ASTM C1713, with binder material limited to **[portland cement and lime]** <Insert binder(s)>, and with a volume ratio of **[1 part portland cement, 1 part lime, and 6 parts sand]** <Insert proportions>.[**Add mortar pigments to produce mortar colors required.**]

PART 3 EXECUTION

3.1 HISTORIC TREATMENT SPECIALIST

- A. Historic Treatment Specialist Firms: Subject to compliance with requirements, [provide historic masonry repointing by one of the following] [firms that may provide historic masonry repointing include, but are not limited to, the following]:
1. <Insert, in separate subparagraphs, names of historic treatment specialist firms>.

3.2 PROTECTION

- A. 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 stone and other surfaces.
- B. Remove **[gutters and]** downspouts and associated hardware adjacent to immediate work area and store during stone repointing work. Reinstall when repointing is complete.
1. Provide temporary rain drainage during work to direct water away from building.

3.3 STONE REPOINTING, GENERAL

- A. Have repointing work performed only by qualified historic treatment specialist.
- B. Appearance Standard: Repointed surfaces are to have a uniform appearance as viewed from **[20] [50]** <Insert dimension> feet away by Architect.

3.4 REPOINTING <INSERT DRAWING DESIGNATION>

- A. Rake out and repoint joints to the following extent:
1. All joints in areas indicated.
 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 [1/16] [1/8] <Insert dimension> 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 [joint width plus 1/8 inch] [2 times the joint width] [2-1/2 times the joint width] [not less than 1/2 inch] [not less than 3/4 inch] [and] [not less than that required to expose sound, unweathered mortar] <Insert requirement>. Do not remove unsound mortar more than [2] <Insert dimension> inches deep; consult Architect for direction.
 2. Remove mortar from stone surfaces within raked-out joints to provide reveals with square backs and to expose stone for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
 3. Do not spall edges of stone units or widen joints. Replace or patch damaged stone units as directed by Architect.
 - a. Cut out mortar by hand with chisel and resilient mallet. Do not use power-operated grinders without Architect's written approval based on approved quality-control program.
 - b. 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.
- D. Notify Architect of unforeseen detrimental conditions, including voids in mortar joints, cracks, loose stone, 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] <Insert dimension> inch until 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 layers not greater than [3/8] <Insert dimension> inch. Fully compact each layer, and allow it to become thumbprint hard before applying next layer. Where existing stone has worn or rounded edges, slightly recess finished mortar surface below face of stone to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed stone 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 Section 079200 "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 stonework 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. Where repointing work precedes cleaning of existing stone, allow mortar to harden at least 30 days before beginning cleaning work.

3.5 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 nonstone 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.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage qualified testing agencies to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.
- B. 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.
- C. Notify **[testing agency] [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 **[inspectors] [and] [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

SECTION 040345 HISTORIC STONE CONSOLIDATION TREATMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes historic treatment work consisting of stone consolidation treatment.

1.2 ALLOWANCES

- A. Allowances for stone consolidation treatments are specified in Section 012100 "Allowances."
- B. Preconstruction testing is part of testing and inspecting allowance.

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."
 - 1. Unit prices apply to authorized work covered by [quantity allowances] [estimated quantities].
 - 2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.4 DEFINITIONS

- A. Low-Pressure Spray:
 - 1. Pressure: [100 to 400] <Insert range of values> psi.
 - 2. Flow Rate: [4 to 6] <Insert range of values> gpm.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference on historic masonry repair and stone consolidation at [Project site] <Insert location>.
 - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to masonry historic treatment and stone consolidation.
 - 2. Review methods and procedures related to stone consolidation treatment 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, and sequencing.
 - c. Fire-protection plan.
 - d. Stone consolidation treatment program.
 - e. Coordination with building occupants.

1.6 SEQUENCING AND SCHEDULING

- A. Work Sequence: Perform stone consolidation treatment work where scheduled in "Sequencing and Scheduling" Article in [Section 040310 "Historic Masonry Cleaning"] [Section 040342 "Historic Stone Masonry Repair"] [and] [Section 040343 "Historic Stone Masonry Repointing."] <Insert requirement>.
- B. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry according to [Section 040322 "Historic Brick Unit Masonry Repair"] [and] [Section 040342 "Historic Stone Masonry Repair"] as appropriate for locations of holes.

1.7 ACTION SUBMITTALS

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

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For [historic treatment specialist] [including field supervisors and workers] [consolidant manufacturer] [testing service] [and] [inspectors].
- B. Preconstruction Test Reports: For consolidation treatment on existing stone.
- C. Stone consolidation treatment program.

1.9 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified stone consolidation treatment specialist. Experience applying standard coatings or sealers is insufficient experience for stone consolidation treatment work.
- B. Consolidant Manufacturer Qualifications: A firm regularly engaged in producing stone consolidants that have been used for similar applications with successful results, and with factory-authorized service representatives who are available for consultation and Project-site inspection and on-site assistance.
- C. Stone Consolidation Treatment Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of the historic treatment work, including protection of surrounding materials and Project site.
 - 1. Include methods for protecting consolidant-treated surfaces from precipitation during curing period.
 - 2. 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 and worker's ability to use such materials and methods properly.
- D. Mockups: Prepare mockups of consolidation treatment to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Apply stone consolidation treatment to an area [approximately **4 sq. ft.**] [as indicated] <Insert dimension>.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: **[Owner will engage] [Engage]** a qualified testing agency to perform preconstruction testing on stone as follows:
 - 1. Provide test specimens as indicated and representative of proposed materials and existing construction.
 - 2. Existing Stone: Test each type of existing stone indicated for consolidation treatment, according to ASTM C170/C170M for compressive strength, wet and dry, perpendicular and parallel to rift, and according to ASTM C97/C97M for absorption. Carefully remove **[three] <Insert number>** existing stones for testing from locations designated by Architect. Take testing samples from these stones.

1.11 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit stone consolidation treatment work to be performed according to product manufacturers' written instructions and specified requirements.
- B. Apply stone consolidation treatment only when surface and air temperatures are between 50 and 90 deg F and rain is not expected within 24 hours.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Source Limitations: Obtain each type of stone consolidation treatment from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 STONE CONSOLIDATION MATERIALS

- A. Stone Consolidation Treatment: Ready-to-use product designed for consolidation of stone that has deteriorated from weathering and exposure to pollutants. Active ingredients shall be based on silicic ethyl esters.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Stone Consolidation and Water-Repellent Treatment: Ready-to-use product designed for consolidation and water-repellent treatment of stone that has deteriorated from weathering and exposure to pollutants. Active ingredients shall be based on silicic ethyl esters and a silane water repellent.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2.3 ACCESSORY MATERIALS

- A. Masking Tape: Nonstaining, nonabsorbent material, recommended in writing by consolidant manufacturer; compatible with mortar, sealants, and surfaces adjacent to consolidant-application area; and that easily comes off entirely, including adhesive.
- B. 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.

PART 3 EXECUTION

3.1 HISTORIC TREATMENT SPECIALIST

- A. Historic Treatment Specialist Firms: Subject to compliance with requirements, [provide stone consolidation treatment by one of the following] [firms that may provide stone consolidation treatment include, but are not limited to, the following]:
 - 1. <Insert, in separate subparagraphs, names of historic treatment specialist firms>.

3.2 PROTECTION

- A. Prevent consolidation treatment from contacting face of surrounding stone, not indicated to be treated, and other surfaces.
 - 1. Cover sills, ledges, and other projecting items to protect them from droppings.
 - 2. Immediately remove treatment in contact with exposed stone, not indicated to be treated, and other surfaces.
- B. Remove[**gutters and**] downspouts and associated hardware adjacent to immediate work area and store during stone consolidation treatment. Reinstall when consolidation treatment is complete.
 - 1. Provide temporary rain drainage during work to direct water away from building.

3.3 CONSOLIDATION TREATMENT, GENERAL

- A. Have stone consolidation work performed only by qualified historic treatment specialist.
- B. Appearance Standard: Fully cured, treated surfaces are to have a uniform appearance as viewed from [20] [50] <Insert distance> feetaway by Architect.

3.4 STONE CONSOLIDATION TREATMENT <INSERT DRAWING DESIGNATION>

- A. Apply treatment to clean, dry surfaces according to manufacturer's written instructions. Remove areas of blind exfoliation, delamination, and flaking before applying.
- B. Apply in cycles to small sections of stonework, not more than 100 sq. ft. in area. Each cycle shall consist of three successive saturating applications, applied at five- to 15-minute intervals depending on drying conditions.
- C. Apply by low-pressure spray to point of rejection in each application. Apply from bottom of the section to top.
- D. Apply three cycles, allowing treated surface to dry for 60 to 90 minutes between cycles.
- E. Protect treated surfaces from precipitation for 48 hours after treatment.
- F. Allow treated surfaces to dry for at least 21 days before repointing, patching, or applying water repellents or sealants.

3.5 FINAL CLEANING

- A. Remove masking materials, leaving no residues that could trap dirt.

3.6 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. 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.
- C. Notify [testing agency] [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 [inspectors] [and] [Architect's Project representatives] have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.
- D. Manufacturer's Field Service: Engage consolidant manufacturers' factory-authorized service representatives for consultation and Project-site inspection, and provide on-site assistance when requested by Architect.

END OF SECTION

SECTION 050371 HISTORIC DECORATIVE METAL CLEANING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes historic treatment of decorative metal in the form of cleaning as follows:
 - 1. Cleaning metal.
 - 2. Removing paint.
 - 3. Removing corrosion.
 - 4. Priming for repainting.

1.2 ALLOWANCES

- A. Allowances for historic treatment of decorative metals are specified in Section 012100 "Allowances."
 - 1. Perform historic treatment of decorative metals under quantity allowances and only as authorized. Authorized work includes **[work required by Drawings and Specifications and]** work as directed in writing by Architect.
 - 2. Notify Architect **[weekly]** **<Insert time interval>** of extent of work performed that is attributable to quantity allowances.
 - 3. Perform work that exceeds quantity allowances only as authorized by Change Orders.
- B. Preconstruction testing is part of testing and inspecting allowance.
- C. Cleaning and removing paint from **<Insert item description>** is part of **<Insert name of allowance>**.

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."
 - 1. Unit prices apply to authorized work covered by **[quantity allowances]** **[estimated quantities]**.
 - 2. Unit prices apply to authorized additions to and deletions from the Work as authorized by Change Orders.

1.4 DEFINITIONS

- A. Low-Pressure Spray:
 - 1. Pressure: **[100 to 400]** **<Insert value>** psi.
 - 2. Flow Rate: **[4 to 6]** **<Insert value>** gpm.
- B. Medium-Pressure Spray:
 - 1. Pressure: **[400 to 800]** **<Insert value>** psi.
 - 2. Flow Rate: **[4 to 6]** **<Insert value>** gpm.
- C. High-Pressure Spray:
 - 1. Pressure: **[800 to 1200]** **<Insert value>** psi.
 - 2. Flow Rate: **[4 to 6]** **<Insert value>** gpm.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** **<Insert location>**.
 - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to historic treatment of decorative metal.
 - 2. Review methods and procedures related to historic treatment of decorative metal 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, and sequencing.
- c. Fire-protection plan.
- d. Decorative metal historic treatment program.
- e. Coordination with building occupants.

1.6 ACTION SUBMITTALS

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

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For [historic treatment specialist] [chemical-cleaner manufacturer] [paint-remover manufacturer].
- B. Decorative Metal Historic Treatment Program: For cleaning historic decorative metalwork.
- C. Preconstruction Test Reports: For **[chemical cleaning of] [and] [paint removal from]** historic decorative metal.

1.8 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic decorative metal cleaning specialist. Cleaning specialist shall be experienced in using mechanical and chemical methods on the types of metal surfaces indicated.
 1. Single Specialist: Have the work of [this Section] [Section 050372 "Historic Decorative Metal Repair"] [Section 050373 "Historic Decorative Metal Refinishing"] [Section 050374 "Historic Decorative Metal Replication"] [and] [Section 050383 "Historic Cast Iron Repair"] performed by the same historic treatment specialist firm, meeting the specialist qualifications of those Sections.
- B. Chemical-Cleaner Manufacturer Qualifications: A firm regularly engaged in producing metal cleaners that have been used for similar historic decorative metal applications with successful results and with factory-authorized service representatives who are available for consultation and Project-site inspection[, **preconstruction product testing,**] and on-site assistance.
- C. Paint-Remover Manufacturer Qualifications: A firm regularly engaged in producing paint removers that have been used for similar historic decorative metal applications with successful results and with factory-authorized service representatives who are available for consultation and Project-site inspection[, **preconstruction product testing,**] and on-site assistance.
- D. 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 cleaning 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.
- E. Mockups: Prepare mockups of historic treatment cleaning processes[**on existing surfaces**] to demonstrate aesthetic effects and to set quality standards for materials and execution. Prepare mockups so they are inconspicuous.
 1. Cleaning: Prepare an area [**approximately 2 sq. ft.**] [**as indicated on Drawings**] **<Insert dimension>** for each process on each type of metal indicated for treatment.
 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 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified historic treatment specialist or one or more **[chemical-cleaner] [and] [paint-remover]** manufacturers to perform preconstruction testing on each type of historic metal.
 1. Use test areas as indicated and representative of proposed materials and existing construction.
 2. Propose changes to materials and methods to suit Project.

1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with historic treatment of decorative metal 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 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 of tetrasodium pyrophosphate (TSPP), 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal. of solution required.
- D. Nonacidic Liquid Chemical Cleaner: Manufacturer's standard mildly alkaline liquid cleaner, formulated for removing organic soiling from ordinary building materials including polished stone, brick, copper, brass, bronze, aluminum, stainless steel, plastics, wood, and glass.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- E. Abrasive Materials:
 1. Abrasive Pads for Copper-Alloy Cleaning: Extra fine bronze wool or plastic abrasive pads.
 2. Blasting Abrasive: [Pulverized walnut shells] [Powdered aluminum silicate] <Insert material>.
 3. Abrasives for Ferrous Metal Cleaning: Aluminum oxide paper, emery paper, fine steel wool, steel scrapers, and steel-wire brushes of various sizes.
- F. Rust Remover: Manufacturer's standard phosphoric acid-based gel formulation, also called "naval jelly," for removing corrosion from iron and steel.

2.2 PAINT REMOVERS

- A. Alkaline Paste Paint Remover: Manufacturer's standard alkaline paste or gel formulation for removing paint from metals, and containing no methylene chloride.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Covered or Skin-Forming Alkaline Paint Remover: Manufacturer's standard covered or skin-forming alkaline paste or gel formulation for removing paint from metal, and containing no methylene chloride.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- C. Solvent-Type Paste Paint Remover: Manufacturer's standard water-rinsable, solvent-type paste or gel formulation for removing paint from metals.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- D. Low-Odor, Solvent-Type Paste Paint Remover: Manufacturer's standard low-odor, water-rinsable, solvent-type paste, gel, or foamed emulsion formulation for removing paint from metals; and containing no methanol or methylene chloride.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

- E. Covered, Solvent-Type Paste Paint Remover: Manufacturer's standard, low-odor, covered, water-rinsable, solvent-type paste or gel formulation for removing paint from metals; and containing no methanol or methylene chloride.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2.3 MISCELLANEOUS MATERIALS

- A. 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.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

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

- C. 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 FERROUS METAL PRIMERS

- A. Repair Primer: Manufacturer's standard, rust-inhibiting, fast-curing, lead- and chromate-free, universal primer, compatible with[**firmly adhered existing paint and**] 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 090391 "Historic Treatment of Plain Painting"**] **<Insert Section number and title>** for finish painting of primed historic metal.

PART 3 EXECUTION

3.1 HISTORIC TREATMENT SPECIALIST

- A. Historic Treatment Specialist Firms: Subject to compliance with requirements [provide historic decorative metal cleaning by one of the following] [firms that may provide historic decorative metal cleaning include, but are not limited to, the following]:
1. **<Insert, in separate subparagraphs, names of historic treatment specialist firms>**.

3.2 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 proven 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 sufficient 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.

3.3 HISTORIC DECORATIVE METAL CLEANING, GENERAL

- A. Have historic decorative metal cleaning performed by a historic treatment specialist.
- B. Cleaning Appearance Standard: Cleaned surfaces are to have a uniform appearance as viewed from [20] [50] <Insert distance> feet away by Architect.
- C. Execution of the Work: In cleaning historic items, disturb them as minimally as possible and as follows:
 1. Remove deteriorated coatings and corrosion.
 2. Sequence work to minimize time before protective coatings are reapplied.
 3. Clean items in place unless otherwise indicated.
- D. Mechanical Coating Removal: Use most gentle mechanical methods, such as scraping and wire brushing, that will 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.
- E. Repaint: Where indicated, prepare painted decorative metal by [cleaning surface, removing less than firmly adhered existing paint, sanding edges smooth,] [removing existing paint] and priming for painting as specified.

3.4 CLEANING

- A. Use only those methods indicated for each type of decorative metal and its location.
 1. Brushes: If using wire brushes, use brushes of same base metal composition as metal being treated. Use brushes that are resistant to chemicals being used.
 2. Spray Equipment: 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 chemical-cleaner spray application, use low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with nozzle having a cone-shaped spray.
 - c. For water-spray application, use fan-shaped spray that disperses water at an angle of 25 to 50 degrees.
 - d. For high-pressure water-spray application, use fan-shaped spray that disperses water at an angle of at least 40 degrees.
 - e. 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: Clean with [cold] [hot] water applied by [low] [medium] [high]-pressure spray. Supplement with [natural-fiber] [or] [plastic] bristle brush. Use small brushes to remove soil from joints and crevices.
- C. Detergent Cleaning:
 1. Wet surface with [cold] [hot] water applied by low-pressure spray.

2. Scrub surface with detergent solution and **[natural-fiber] [or] [plastic]** 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. Rinse with **[cold] [hot]** water applied by **[low] [medium] [high]**-pressure spray to remove detergent solution and soil.
 4. Repeat cleaning procedure where needed if required to produce cleaning effect established by mockup.
- D. Nonacidic Liquid Chemical Cleaning: Apply chemical cleaner to surfaces according to chemical-cleaner manufacturer's written instructions.
1. Wet surface with **[cold] [hot]** water applied by low-pressure spray.
 2. Apply cleaner to surface[in two applications] by brush[or low-pressure spray].
 3. Let cleaner remain on surface for period [recommended in writing by chemical-cleaner manufacturer] [established by mockup] [of two to three minutes] <Insert requirement>.
 4. Non-Ferrous Metals: Rinse with **[cold] [hot]** water applied by **[low] [medium] [high]**-pressure spray to remove chemicals and soil.
 5. Ferrous Metals: Do not rinse ferrous metals with water; neutralize chemical cleaner on ferrous metals as recommended in writing by manufacturer. Dry immediately with clean soft cloths. Follow direction of grain in metal.
 6. Repeat cleaning procedure where needed if required to produce cleaning effect established by mockup. Do not repeat more than once.
- E. Cleaning with Abrasive Pads: Clean surfaces to remove dirt[, leaving uniform patina intact,] by light rubbing with abrasive pads and water. [Rinse with cold water to remove residue. Apply rinse by low-pressure spray] [Do not rinse ferrous metals with water; wipe with damp cloths to remove residue] <Insert requirement>.
- F. Cleaning by Abrasive Blasting: Clean surfaces to remove dirt[, **leaving uniform patina intact,**] by dry blasting with specified blasting abrasive at pressure and distance from surface indicated below. **[Rinse with cold water, low-pressure spray to remove residue] [Do not rinse ferrous metals with water; wipe with damp cloths to remove residue] <Insert requirement>.**
1. Pressure and Distance from Surface: Maximum pressure of **[60] [100] [200] <Insert value>** psi with specified blasting abrasive propelled from a distance of **[6 to 12] [12 to 18] <Insert dimension>** inches from the surface.
 2. Pressure and Distance from Surface: As established by mockup.
- G. Chemical Rust Removal:
1. Remove loose rust scale with approved abrasives for ferrous metal cleaning.
 2. Apply rust remover with brushes or as recommended in writing by manufacturer.
 3. Allow rust remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing. Do not allow extended dwell time.
 4. Wipe off residue with mineral spirits and either steel wool or soft rags, or clean with method recommended in writing by manufacturer to remove residue.
 5. Dry immediately with clean, soft cloths. Follow direction of grain in metal.
 6. Prime immediately to prevent rust. Do not touch cleaned metal surface until primed.
- H. Mechanical Rust Removal:
1. Remove rust with approved abrasives for ferrous metal cleaning.
 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.

3.5 PAINT REMOVAL

- A. Use only those paint-removal methods indicated for each type of decorative metal.
1. Application: Apply paint removers according to paint-remover manufacturer's written instructions. Do not allow paint removers to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.

- a. Apply materials to all surfaces, corners, contours, and interstices, to provide a uniform final appearance without streaks.
 - b. After work is complete, remove protection no longer required. Remove tape and adhesive marks.
2. Brushes: If using wire brushes, use brushes of same base metal composition as metal being treated. Use brushes that are resistant to chemicals being used.
3. Spray Equipment: 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. Unless otherwise indicated, hold spray nozzle at least 6 inches from surface and apply material in horizontal, back-and-forth sweeping motion, overlapping previous strokes to produce uniform coverage.
 - c. For chemical spray application, use low-pressure tank or chemical pump suitable for chemical indicated, equipped with cone-shaped spray.
 - d. For water-spray application, use fan-shaped spray that disperses water at an angle of 25 to 50 degrees.
 - e. For high-pressure water-spray application, use fan-shaped spray tip that disperses water at an angle of at least 40 degrees.
 - f. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F at flow rates indicated.
- B. Paint Removal with Alkaline Paste Paint Remover:
 1. Remove loose and peeling paint using water, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 2. Apply paint remover to dry, painted metal with brushes.
 3. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 4. Rinse with **[cold]** **[hot]** water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and paint residue.
 5. Use mechanical methods recommended in writing by manufacturer to remove chemicals and paint residue.
 6. Repeat process if necessary to remove all paint.
- C. Paint Removal with Covered or Skin-Forming Alkaline Paint Remover:
 1. Remove loose and peeling paint using water, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 2. Apply paint remover to dry, painted metal with brushes or as recommended in writing by manufacturer.
 3. Apply cover according to manufacturer's written instructions.
 4. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 5. Scrape off paint and remover.
 6. Rinse with **[cold]** **[hot]** water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and paint residue.
 7. Use mechanical methods recommended in writing by manufacturer to remove chemicals and paint residue.
 8. For spots of remaining paint, apply alkaline paste paint remover according to "Paint Removal with Alkaline Paste Paint Remover" Paragraph.
- D. Paint Removal with Solvent-Type Paste Paint Remover:
 1. Remove loose and peeling paint using water, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 2. Apply thick coating of paint remover to painted decorative metal with natural-fiber cleaning brush, deep-nap roller, or large paint brush. Apply in one or two coats according to manufacturer's written instructions.
 3. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 4. Rinse with **[cold]** **[hot]** water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and paint residue.

5. Use mechanical methods recommended in writing by manufacturer to remove chemicals and paint residue.
 6. Repeat process if necessary to remove all paint.
- E. Paint Removal with Covered, Solvent-Type Paste Paint Remover:
1. Remove loose and peeling paint using water, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 2. Apply paint remover to dry, painted decorative metal with natural-fiber cleaning brush, deep-nap roller, or large paint brush; or as recommended in writing by manufacturer.
 3. Apply cover according to manufacturer's written instructions.
 4. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 5. Scrape off paint and remover.
 6. Rinse with **[cold]** **[hot]** water applied by **[low]** **[medium]** **[high]**-pressure spray to remove chemicals and paint residue.
 7. Use mechanical methods recommended in writing by manufacturer to remove remaining chemicals and paint residue.

3.6 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.
- C. Manufacturer's Field Service: Engage chemical-cleaner and paint-remover manufacturers' factory-authorized service representatives for consultation and Project-site inspection[, **to perform pre-construction product testing,**] and to provide on-site assistance when requested by Architect.

3.7 REMOVAL, DISMANTLING, AND REINSTALLATION

- A. Perform removal, dismantling, and reinstallation work as required in Section 024296 "Historic Removal and Dismantling" and Section 050372 "Historic Decorative Metal Repair."

3.8 PRIMING

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

3.9 HISTORIC DECORATIVE METAL CLEANING SCHEDULE

- A. Treatment of Decorative Railing **[DMR-1]** **<Insert drawing designation>**: Wrought-iron railing and gate.
 1. Perform work [in the shop] [or] [in the field].
 2. Paint Removal: [Alkaline paste paint remover] [Covered or skin-forming alkaline paint remover] [Solvent-type paste paint remover] [Low-odor, solvent-type paste paint remover] [Covered, solvent-type paste paint remover] **<Insert method>**.
 3. Repairs: As specified in Section 050372 "Historic Decorative Metal Repair."
 4. Painted Finish: As specified in [Section 090391 "Historic Treatment of Plain Painting."] **<Insert Section number and title.>**
- B. Treatment of Decorative Railing **[DMR-2]** **<Insert drawing designation>**: Cast-iron balustrade.
 1. Perform work [in the shop] [or] [in the field].
 2. Paint Removal: [Alkaline paste paint remover] [Covered or skin-forming alkaline paint remover] [Solvent-type paste paint remover] [Low-odor, solvent-type paste paint remover] [Covered, solvent-type paste paint remover] **<Insert method>**.
 3. Rust Removal: [Chemical] [Mechanical] **<Insert method>**.

4. Repair: As specified in Section 050372 "Historic Decorative Metal Repair."
 5. Painted Finish: As specified in [Section 090391 "Historic Treatment of Plain Painting."] <Insert Section number and title.>
- C. Treatment of Decorative Railing [**DMR-3**] <Insert drawing designation>: Bronze railing with bronze handrail.
1. Perform work [in the shop] [or] [in the field].
 2. Cleaning: [Water cleaning] [Detergent cleaning] [Chemical cleaning] [Abrasive blasting] <Insert description>.
 3. Repair: As specified in Section 050372 "Historic Decorative Metal Repair."
 4. Bronze Finish: [Satin finish with statuary conversion coating on railing; satin hand-rubbed finish, lacquered, on handrail] <Insert requirement>.
- D. Treatment of Decorative Cast-Iron Facade and Storefront [**DMFS-#**] <Insert drawing designation>: Repair facade and storefront and replace missing components.
1. Perform work [in the shop] [or] [in the field].
 2. Cleaning: [Water cleaning] [Detergent cleaning] [Chemical cleaning] [Abrasive blasting] <Insert description>.
 3. Paint Removal: [Alkaline paste paint remover] [Covered or skin-forming alkaline paint remover] [Solvent-type paste paint remover] [Low-odor, solvent-type paste paint remover] [Covered, solvent-type paste paint remover] <Insert method>.
 4. Rust Removal: [Chemical] [Mechanical] <Insert method>.
 5. Repair: As specified in Section 050372 "Historic Decorative Metal Repair."
 6. Finish Treatment: As specified in [Section 050373 "Historic Decorative Metal Refinishing."] [Section 090391 "Historic Treatment of Plain Painting."] <Insert Section number and title.>
- E. Treatment of Bronze Grille [**DMG-#**] <Insert drawing designation>: Strip paint and coat grille.
1. Perform work [in the shop] [or] [in the field].
 2. Paint Removal: [Solvent-type paste paint remover] [Low-odor, solvent-type paste paint remover] [Covered, solvent-type paste paint remover] <Insert method>.
 3. Protective Coating: As specified in [Section 050373 "Historic Decorative Metal Refinishing."] <Insert Section number and title.>

END OF SECTION

SECTION 050372 HISTORIC DECORATIVE METAL REPAIR

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes historic treatment of decorative metal in the form of repair as follows:
 - 1. Repairing metals other than cast iron and replacing damaged and missing components in place.
 - 2. Removing and dismantling metal for shop repair and replacement of components; reinstalling repaired metal.
 - 3. Painting steel uncovered during the Work.
 - 4. Installing wood rails supported by or attached to decorative metal railings or brackets.

1.2 ALLOWANCES

- A. Allowances for historic treatment of decorative metals are specified in Section 012100 "Allowances."
 - 1. Perform historic treatment of decorative metals under quantity allowances and only as authorized. Authorized work includes **[work required by Drawings and Specifications and]** work as directed in writing by Architect.
 - 2. Notify Architect **[weekly]** **<Insert time interval>** of extent of work performed that is attributable to quantity allowances.
 - 3. Perform work that exceeds quantity allowances only as authorized by Change Orders.
- B. Repairing **<Insert item description>** is part of **<Insert name of allowance>**.

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."
 - 1. Unit prices apply to authorized work covered by **[quantity allowances]** **[estimated quantities]**.
 - 2. Unit prices apply to authorized additions to and deletions from the Work as authorized by Change Orders.

1.4 DEFINITIONS

- A. Low-Pressure Spray: **[100 to 400 psi; 4 to 6 gpm]** **<Insert range of values>**.
- B. Medium-Pressure Spray: **[400 to 800 psi; 4 to 6 gpm]** **<Insert range of values>**.
- C. High-Pressure Spray: **[800 to 1200 psi; 4 to 6 gpm]** **<Insert range of values>**.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** **<Insert location>**.
 - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to historic treatment of decorative metal.
 - 2. Review methods and procedures related to historic decorative metal 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. Decorative metal historic treatment program.
 - e. Coordination with building occupants.

1.6 SEQUENCING AND SCHEDULING

- A. Perform decorative metal repair in the following sequence, which includes work specified in this and other Sections:
1. Dismantle existing surface-mounted objects and hardware that overlie decorative metal surfaces 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 decorative metal.
 4. Clean decorative metal surface, and remove paint and other finishes to the extent required.
 5. Repair and replace existing decorative metal and supports to the degree required for a uniform and sound surface on which to paint or apply other finishes.
 6. Cure repaired surfaces and allow them to dry for proper finishing.
 7. Paint and apply other finishes.
 8. Reinstall dismantled surface-mounted objects and hardware unless otherwise indicated.

1.7 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. Include recommendations for product application and use.
 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. Full-size patterns with complete dimensions for new decorative metal components and their jointing, showing relation of existing to new components.
 - 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 between decorative metal components and for sealant-type joints if required.
- C. Samples for Initial Selection: For each type of decorative metal item and component with factory-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 products in manufacturer's standard sizes unless otherwise indicated, finished as required for use in the Work:
1. Each type of new material to be used for replacing existing or missing decorative metal; 6 inches long in least dimension or whole item.
 - a. Patterns for Casting: Before casting components, submit the actual patterns from which molds will be made for casting. Package and ship to prevent loss or damage, or make patterns available for inspection by Architect at fabrication plant.
 - b. Casting Samples: For castings, provide one of each shape, color, and texture of component, suitable and ready for installation. [**Make this submittal after acceptance of patterns for casting.**]
 2. Fittings and brackets.
 3. Each type of exposed connection between components. Show method of finishing components at connections.
 4. Each type of exposed finish prepared on metal of the same alloy to be used for the Work of this Section; 6 inches long in least dimension.
 5. Wood Rail: 12 inches long.
 6. Sealant materials.

7. Accessories: Each type of anchor, accessory, and miscellaneous support in required finishes.
- E. Delegated-Design Submittal: For structural performance of repaired **[railings] [handrails] [handrail brackets] [and] [anchors] <Insert item>**, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For historic treatment specialist.
- B. Evaluation Reports: For post-installed structural anchors, from ICC-ES.
- C. Decorative Metal Historic Treatment Program: For repairing historic decorative metalwork.

1.9 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents, including material, finish, source, and location on or in building.
1. Cast Metal Replications: **[Five] <Insert number>** additional [castings of each type] [cast grilles of each type] **<Insert requirement>**.
 2. Wrought-Iron Decorative Railing Posts: **[Five] <Insert number>** additional posts **[of each type] <Insert requirement>**.
- B. Molds for Castings: On completion of manufacturing of cast components, deliver one unused mold of each 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 molds 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.

1.10 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic decorative metal repair specialist. **[Repair specialist shall be experienced in forge welding.]** Experience **[in torch- or arc-welding and]** installing and finishing new decorative metal work is insufficient experience for decorative metal historic treatment work.
1. Single Specialist: Have the work of [Section 050371 "Historic Decorative Metal Cleaning"] [Section 050372 "Historic Decorative Metal Repair"] [Section 050373 "Historic Decorative Metal Refinishing"] [Section 050374 "Historic Decorative Metal Replication"] **[and] [Section 050383 "Historic Cast Iron Repair"]** performed by the same historic treatment specialist firm, meeting the specialist qualifications of those Sections.
- B. Decorative Metal Historic Treatment Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for historic decorative metal repair work, including each process or phase of repairing 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.
- C. 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. Prepare mockups so they are inconspicuous.
1. Replacing Metal Component: **[Two] <Insert number>** each of [wrought-iron spirals replaced on gate] **[and] [cast-bronze wall registers] <Insert item description>**.
 2. Cast-Metal Components: Submit patterns, models, or plaster castings made from existing decorative metal for each replacement casting required.
 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 FIELD CONDITIONS

- A. Weather Limitations: Proceed with historic treatment of decorative metal 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 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design **[railings] [handrails] [handrail brackets] [and] [anchors]** <Insert item> according to structural performance requirements.
- B. Structural Performance: **[Railings] [handrails] [and] [handrail brackets]** <Insert item>, 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. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
 2. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 3. Uniform and concentrated loads need not be assumed to act concurrently.

2.2 METAL MATERIALS

- A. Provide metal materials made of the 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 Cast Materials: Obtain castings for historic treatment of decorative metal from single source from single manufacturer with resources to provide materials of consistent quality in appearance and physical properties.
- C. Aluminum: Alloy and temper recommended in writing by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required:
 1. Extruded Bars and Shapes: ASTM B221, Alloy 6063-T6.
 2. Extruded Structural Pipe and Tubes: ASTM B429/B429M, Alloy 6063-T6.
 3. Drawn General-Purpose Seamless Tubes: ASTM B210, Alloy 6063-T832.
 4. Plate and Sheet: ASTM B209, Alloy 6061-T6.
 5. Die and Hand Forgings: ASTM B247, Alloy 6061-T6.
 6. Castings: ASTM B26/B26M, Alloy A356-T6.
- D. Copper Alloys, Bronze:
 1. Extruded Shapes: ASTM B455, Alloy UNS No. C38500 (extruded architectural bronze, 57 percent copper, 40 percent zinc, and 3 percent lead).
 2. Plate, Sheet, Strip, and Bars: ASTM B36/B36M, Alloy UNS No. C28000 (muntz metal, 60 percent copper and 40 percent zinc).
 3. Seamless Pipe: ASTM B43, Alloy UNS No. C23000 (red brass, 85 percent copper and 15 percent zinc).
 4. Seamless Tubes: ASTM B135, Alloy UNS No. C23000 (red brass, 85 percent copper and 15 percent zinc).
 5. Composition Bronze Castings: ASTM B62, Alloy UNS No. C83600 ("85-5-5" is the common trade name; 85 percent copper and 5 percent each of tin, lead, and zinc).
 6. Sand Castings: ASTM B584, Alloy UNS No. C86500 (No. 1 manganese bronze; 58 percent copper, 39 percent zinc, 1 percent manganese, and small amounts of other metals).
- E. Copper Alloys, Brass:

1. Extruded Shapes: ASTM B249/B249M, Alloy UNS No. C36000 (free-cutting brass, 60 percent copper, 36 percent zinc, and small amounts of other metals).
 2. Plate, Sheet, Strip, and Bars: ASTM B36/B36M, Alloy UNS No. C26000 (cartridge brass, 70 percent copper and 30 percent zinc).
 3. Seamless Tubes: ASTM B135, Alloy UNS No. C26000 (cartridge brass, 70 percent copper and 30 percent zinc).
 4. Sand Castings: ASTM B584, Alloy UNS No. C85200 (high-copper yellow brass, 72 percent copper, 24 percent zinc, and small amounts of other metals).
- F. Monel (Nickel-Copper Alloy):
1. Plate, Sheet, and Strip: ASTM B127, Alloy UNS No. N04400.
 2. Rod, Bar, and Wire: ASTM B164, Alloy UNS No. N04400.
 3. Seamless Tubes: ASTM B165, Alloy UNS No. N04400.
 4. Forgings: ASTM B564, Alloy UNS No. N04400.
 5. Sand Castings: Monel alloy matching Alloy UNS No. N04400.
- G. Nickel Silver (Copper-Nickel-Zinc Alloy):
1. Extruded Shapes: ASTM B151/B151M, Alloy [UNS No. C74500] [UNS No. C75200].
 2. Plate, Sheet, Strip, and Bar: ASTM B122/B122M, Alloy [UNS No. C74500] [UNS No. C75200].
- H. Stainless Steel:
1. Tubing: ASTM A554, [Grade MT-304] [Grade MT-316].
 2. Pipe: ASTM A312/A312M, [Grade TP304] [Grade TP316].
 3. Castings: ASTM A743/A743M, [Grade CF8 or CF20] [Grade CF8M].
 4. Strip, Plate, and Flat Bar: ASTM A666, [Type 304] [Type 316].
 5. Bars and Shapes: ASTM A276, [Type 304] [Type 316].
- I. Steel:
1. Tubing: Cold formed, ASTM A500/A500M.
 2. Steel Plate, Shapes, and Bars: ASTM A36/A36M.
 3. Steel Bars: Mild steel; ASTM A29/A29M, Grade 1010.
 4. Steel Sheet: ASTM A1008/A1008M, cold-rolled commercial steel sheet; matte finish; suitable for exposed applications.
- J. Cast Iron: Standard designated below for each type of casting:
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.
- K. Wrought Iron: [Pure iron with not more than 0.035 percent carbon and containing fibrous slag (iron silicate)] [Pure iron with not more than 0.035 percent carbon and no slag (iron silicate)] [or] [mild steel; ASTM A29/A29M, Grade 1010]; hand worked or machine forged to the form indicated.

2.3 WOOD MATERIALS

- A. Wood Rails: Hardwood rails of species and profile indicated, with [transparent finish] <Insert finish>, and prepared for securing to metal subrail or brackets as indicated on Drawings.
1. Species and Finish: [Match design reference sample] [Match existing] [As indicated on Drawings] [Ash, natural finish] [Cherry, natural finish] [Walnut, natural finish] [White oak, light-stained finish] <Insert species and finish>.
 2. Profile: [Match design reference sample] [Match existing] [As indicated on Drawings] [Square shape, **1-3/4 by 1-3/4 inches**, with edges eased to **1/4-inch** radius] [Rectangular shape, **1-3/4 by 5 inches**, with edges eased to **1/4-inch** radius] [Round shape, **2-inch** diameter] <Insert description>.
- B. Wood Rails: Hardwood rails of species and profile [matching design reference sample] [matching existing] [as indicated on Drawings] <Insert description>, complying with [Section 050383 "Historic Cast Iron Repair."] [Section 060312 "Historic Wood Repair."] [Section 064013 "Exterior Architectural Woodwork."] [Section 064023 "Interior Architectural Woodwork."] <Insert Section number and title.>

2.4 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 of tetrasodium pyrophosphate (TSPP), 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal. 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.
 - 4. Blasting Abrasive: [Pulverized walnut shells] [Powdered aluminum silicate] <Insert material>.
- 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.

2.5 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 decorative metal components and for attaching them to other work unless exposed fasteners are **[unavoidable] [or] [the existing fastening method]**.
 - 3. For exposed fasteners, use Phillips-type 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.
- B. Post-Installed Structural Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES **[AC01] [AC193] [AC58] [or] [AC308]** as appropriate for the substrate.
 - 1. Uses: Securing [railings] [handrails] [and] [handrail brackets] <Insert item> to structure.
 - 2. Type: [Torque-controlled, expansion anchor] [torque-controlled, adhesive anchor] [or] [adhesive anchor].
 - 3. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
 - 4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy **[Group 1] [Group 2]** stainless steel bolts, ASTM F593, and nuts, ASTM F594.
- C. Post-Installed Nonstructural Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES **[AC01] [AC193] [AC58] [or] [AC308]** as appropriate for the substrate.
 - 1. Type: [Expansion anchor] [adhesive anchor] [types matching existing] [or] [types indicated on Drawings].
 - 2. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.

3. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy [Group 1] [Group 2] stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.6 ACCESSORIES

- A. Metal-Patching Compound: 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 metal 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 Copper Alloys: Type and alloy as recommended in writing by brazing-rod manufacturer and as required for color match, strength, and compatibility in fabricated items.
- C. Welding Electrodes and Filler Metal: Select according to AWS specifications for metal alloy welded; use metal type and alloy as required for color match, strength, and compatibility in fabricated 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. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
1. Water-Resistant Product: **[At exterior locations] [and] [where indicated]**, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or water-proof coating and that is recommended in writing by manufacturer for exterior use.
- F. Sealant Materials:
1. Provide manufacturer's standard, elastomeric **[nonstaining, single-component, nonsag silicone] [single-component, nonsag urethane] <Insert type>** 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.
- G. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer according to **[MPI #23 (surface tolerant, anticorrosive metal primer)] [or] [SSPC-Paint 20 or SSPC-Paint 29] <Insert requirement>**.
1. Surface Preparation: Use coating requiring no better than [SSPC-SP 2, "Hand Tool Cleaning"] [SSPC-SP 3, "Power Tool Cleaning"] [or] [SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning"] **<Insert surface preparation standard>** surface preparation according to manufacturer's literature or certified statement.
2. VOC Limit: Use coating with a VOC content of **[400 g/L] <Insert VOC limit>** or less.
- H. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- I. 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.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- J. Masking Tape: Nonstaining, nonabsorbent material; compatible with chemical solutions being used and substrate surfaces, and that will easily come off entirely, including adhesive.
- K. 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 METAL FABRICATION

- A. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Custom fabricate repairs of decorative metal items and components in sizes and profiles to match existing decorative metal unless otherwise indicated, with accurate curves, lines, and angles. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
- C. Provide uniform, neat seams with minimum exposure of welds, brazing, solder, and sealant.
- D. 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.
- E. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.
 - 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, match contours of adjoining surfaces, and finish exposed surfaces smooth and blended so no roughness shows after finishing.
- F. Castings: Fabricate castings free of warp, cracks, blowholes, or other defects that impair strength or appearance. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks.
 - 1. Finish castings to match existing decorative metal work.
 - 2. Replacement Casting for Handrail Bracket: Duplicate existing handrail bracket on the wrought-iron railing of first-floor stairs in the lobby. Make molds from this bracket to create new cast-bronze brackets.
- G. Date Identification: Emboss on a concealed, interior surface of the metal body of each new component, in easily read characters, "MADE <Insert year>." Manufacturer's name may also be embossed. **[For cast metals, add the identification to the mold pattern before casting.][For malleable metals, stamp identification with an imprinting tool.]**

2.8 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.

2.9 ALUMINUM FINISHES

- A. Mill finish.
- B. Clear Anodic Finish: AAMA 611, [Class I, 0.018 mm] [Class II, 0.010 mm] or thicker over a [satin (directionally textured)] [polished (buffed)] [nonspecular as fabricated] <Insert requirement> mechanical finish.
- C. Color Anodic Finish: AAMA 611, [Class I, 0.018 mm] [Class II, 0.010 mm] or thicker over a [satin (directionally textured)] [polished (buffed)] [nonspecular as fabricated] <Insert requirement> mechanical finish.

- D. Baked-Enamel or Powder-Coat Finish: AAMA 2603. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.10 COPPER-ALLOY FINISHES

- A. Finish designations for copper alloys comply with the system defined in NAAMM's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)."
- B. Buffed Finish: [M21 (Mechanical Finish: buffed, smooth specular)] [M22 (buffed, specular mechanical finish)] <Insert description>.
- C. Buffed Finish, Lacquered: [M22 (Mechanical Finish: buffed, specular; specified clear organic coating)] <Insert description>.
- D. Satin Hand-Rubbed Finish: [M32-M34 (Mechanical Finish: directionally textured, medium satin and hand-rubbed)] <Insert description>.
- E. Satin Hand-Rubbed Finish, Lacquered: [M32-M34-06x (Mechanical Finish: directionally textured, medium satin and hand-rubbed; specified clear organic coating)] <Insert description>.
- F. Satin Finish with Statuary Conversion Coating: [M32-C55 (directionally textured, medium satin; sulfide conversion coating)] <Insert description>.
 - 1. Color: [Match design reference sample] [Match existing] [Match Architect's sample] <Insert color>.
- G. Brushed Finish with Patina Conversion Coating: M35-C12-C52 (directionally textured, rotary brushed and buff polished, nonetched cleaned; ammonium sulfate conversion coating).
 - 1. Texture and Color: [Match design reference sample] [Match existing] [Match Architect's sample] <Insert description>.
- H. Bright-Relieved Statuary Conversion Coating, Lacquered: M12-C55-M2x-06x (matte finish as cast; sulfide conversion coating; buffed to brighten high spots; specified clear organic coating):
 - 1. Color and Buffing: [Match design reference sample] [Match existing] [Match Architect's sample] <Insert description>.
- I. <Insert name> Patina Finish: <Insert description>.

2.11 FERROUS METAL FINISHES

- A. Repair Primer: Manufacturer's standard, rust-inhibiting, fast-curing, lead- and chromate-free universal primer, compatible with [**firmly adhered existing paint and**] 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 090391 "Historic Treatment of Plain Painting"**] <Insert Section number and title> for finish painting of primed metal.
- C. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
- D. Patina Finish: <Insert description>.

2.12 STAINLESS STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines from new replacement stainless steel, or blend into finish.
- B. Restored Finish: Grind and polish surfaces to produce uniform, directionally textured, polished finish to match [**existing finish**] [**Architect's sample**], free of cross scratches.
 - 1. Run grain to match existing metal.

2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- C. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
1. Run grain of directional finishes with long dimension of each piece.
 2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 3. Directional Satin Finish: ASTM A480/A480M, No. 4.
 4. Dull Satin Finish: ASTM A480/A480M, No. 6.
 5. Reflective, Directional Polish: ASTM A480/A480M, No. 7.
 6. Mirrorlike Reflective, Nondirectional Polish: ASTM A480/A480M, No. 8.
- D. Bright, Cold-Rolled, Unpolished Finish: ASTM A480/A480M, No. 2B.

PART 3 EXECUTION

3.1 HISTORIC TREATMENT SPECIALIST

- A. Historic Treatment Specialist Firms: Subject to compliance with requirements [provide historic decorative metal repair by one of the following] [firms that may provide historic decorative metal repair include, but are not limited to, the following]:
1. <Insert, in separate subparagraphs, names of historic treatment specialist firms>.

3.2 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.

3.3 HISTORIC DECORATIVE METAL REPAIR, GENERAL

- A. Repair Appearance Standard: Repaired surfaces are to have a uniform appearance as viewed from [20 feet] [50 feet] <Insert distance> 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 decorative metal 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 decorative metal 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 Decorative Metal Items: Match existing materials and features, retaining as much original material as possible to complete the repair.
 - 1. Unless otherwise indicated, repair decorative metals by patching, filling, piecing-in, splicing, or otherwise reinforcing metals with new material matching existing.
 - 2. Where indicated, repair decorative metal by limited replacement to the extent indicated, matching existing material.
- E. Replacing Decorative Metal Components: Where indicated, duplicate and replace items with new metal matching existing metal.
 - 1. Replace heavily deteriorated or missing parts or features of decorative metal with compatible materials, using surviving prototypes to create patterns or molds for duplicate replacements.
 - 2. Do not use substitute materials unless otherwise indicated.
 - 3. Compatible substitute materials may be used.

3.4 PREPARATORY CLEANING

- A. Perform preparatory cleaning before performing repair work. Use only those methods indicated for each type of decorative metal and its location.
 - 1. Brushes: If using wire brushes, use brushes of same base metal composition as metal being treated. Use brushes that are resistant to chemicals being used.
 - 2. Spray Equipment: 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 high-pressure water-spray application, use fan-shaped spray that disperses water at an angle of at least 40 degrees.
 - d. 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: Clean with **[cold] [hot]** water applied with **[sponges or wash cloths] [low-pressure spray] [medium-pressure spray] [high-pressure spray]**. Supplement with **[natural-fiber] [or] [plastic]** bristle brush **[and abrasive pads]**. Use small brushes to remove soil and loose paint from joints and crevices. **[Leave uniform patina intact.]**
- C. Detergent Cleaning:
 - 1. Wet surface with **[cold] [hot]** water applied with **[sponges or wash cloths] [low-pressure spray]**.
 - 2. Scrub surface with detergent solution and **[natural-fiber] [or] [plastic]** bristle brush **[and abrasive pads]** 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. **[Leave uniform patina intact.]**
 - 3. Rinse with **[cold] [hot]** water applied with **[sponges or wash cloths] [low-pressure spray] [medium-pressure spray] [high-pressure spray]** to remove detergent solution and soil.
- D. Cleaning by Abrasive Blasting: Clean surfaces to remove dirt **[and loose paint]** by dry blasting with specified blasting abrasive at pressure and distance from surface indicated below. **[Rinse with cold-water, low-pressure spray to remove residue.] [Do not rinse ferrous metals with water; wipe with soft brushes and damp cloths to remove residue.] <Insert requirement>.[Leave uniform patina intact.]**

1. Pressure and Distance from Surface: Maximum pressure of **[60 psi] [100 psi] [200 psi] <Insert value>** with specified blasting abrasive propelled from a distance of **[6 to 12 inches] [12 to 18 inches] <Insert dimension>** from surface.
 2. Pressure and Distance from Surface: As established by mockup.
- E. Chemical Rust Removal:
1. Remove loose rust scale with approved, medium abrasives for ferrous metals.
 2. Apply rust remover with brushes or as recommended in writing by manufacturer.
 3. Allow rust remover to remain on surface for period recommended in writing by manufacturer or as determined by testing. Do not allow extended dwell time.
 4. Wipe off residue with mineral spirits and either steel wool or soft rags, or clean with method recommended in writing by manufacturer to remove residue.
 5. Dry immediately with clean, soft cloths. Follow direction of grain in metal.
 6. Prime immediately to prevent rust. Do not touch cleaned metal surface until primed.
- F. Mechanical Rust Removal:
1. Remove rust 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.

3.5 DISMANTLING, REPAIR, AND INSTALLATION

- A. Repair decorative metal 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 decorative metal 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. Reinstalling **[Railing] [and] [Fence]** Posts: After posts have been inserted into sleeves, fill annular space between post and sleeve with **[nonshrink, nonmetallic grout] [or] [anchoring cement]**, mixed and placed to comply with anchoring material manufacturer's written instructions. Leave anchorage joint exposed, wipe off surplus anchoring material, and leave 1/8-inch buildup sloped away from post.
- E. Anchoring Wood Rails: Secure wood rails to metal subrail or brackets from bottom of rail as indicated on Drawings. Make fastener heads flush to metal surface of subrail or brackets.
- F. Sealant: Clean and prepare joint surfaces and apply and cure sealant according to Section 079200 "Joint Sealants."
1. Keep joints to receive sealant dry and free of debris.
 2. [Prime joint surfaces unless sealant manufacturer recommends against priming.] Do not allow primer to spill or migrate onto adjoining surfaces.

3. Apply sealant on joint surfaces between abutting cast-metal components in a continuous application immediately before joining the components together. Remove excess after components are joined and tightened.
4. 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.

3.6 FILLING DEFECTS IN PAINTED SURFACES

- A. Repair non-load-bearing defects in existing metal surfaces, including dents and gouges more than **[1/16 inch (1.6 mm)] [1/8 inch (3 mm)] <Insert dimension>** deep or **[1/2 inch (13 mm)] [1 inch (25 mm)] <Insert dimension>** across and all holes and tears by filling with metal-patching compound. Remove burrs. Prime iron and steel surfaces immediately after repair to prevent flash rusting.
 1. Apply metal-patching compound to fill depressions, nicks, cuts, and other voids created by rusted, removed, or missing metal.
 2. Mix only as much patching compound as can be applied according to manufacturer's written instructions.
 3. Apply patching compound in layers of maximum 1/8 inch (3 mm) thickness and as recommended in writing by manufacturer until the void is completely filled.
 4. Finish patch surface smooth and shaped flush with adjacent contours, without voids in patch material.
 5. Clean spilled compound from adjacent materials immediately.

3.7 PRIMING

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

3.8 PAINTING STEEL UNCOVERED DURING THE WORK

- A. Notify Architect if steel is exposed during metal removal. Where Architect determines that the steel is structural, or for other reasons cannot be totally removed, prepare and paint it as follows:
 1. Surface Preparation: Remove paint, rust, and other contaminants according to [SSPC-SP 2, "Hand Tool Cleaning,"] [SSPC-SP 3, "Power Tool Cleaning,"] [or] [SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning,"] <Insert surface preparation standard,> 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] <Insert dimension>**, notify Architect before proceeding.

3.9 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.

3.10 HISTORIC DECORATIVE METAL REPAIR SCHEDULE

- A. Treatment of Decorative Railing **[DMR-1]** <Insert drawing designation>: Wrought-iron railing and gate.
1. Perform work [in the shop] [or] [in the field].
 2. Paint Removal: As specified in Section 050371 "Historic Decorative Metal Cleaning."
 3. Repairs: Repair railing and replace missing components with hand-worked **[steel bars]** **[wrought iron]**.
 4. Painted Finish: As specified in [Section 090391 "Historic Treatment of Plain Painting."] <Insert Section number and title.>
 5. Baked-Enamel or Powder-Coat Finish: [Color as indicated by manufacturer's designations] [Color matching design reference sample] [Color matching Architect's sample] [Color as selected by Architect from manufacturer's full range] <Insert color and gloss>.
 6. Gilding: As specified in [Section 090398 "Historic Treatment of Gilding."] <Insert Section number and title.>
- B. Treatment of Decorative Railing **[DMR-2]** <Insert drawing designation>: Bronze railing with bronze handrail.
1. Perform work [in the shop] [or] [in the field].
 2. Cleaning: As specified in Section 050371 "Historic Decorative Metal Cleaning."
 3. Repair: [Splice new material into deteriorated section] <Insert description>.
 4. Bronze Finish: [Satin finish with statuary conversion coating on railing; satin hand-rubbed finish, lacquered, on handrail] <Insert requirement>.
- C. Treatment of Decorative Railing and Handrail **[DMRH-1]** <Insert drawing designation>: Deteriorated **[bronze]** **[wood]** handrail on wrought-iron railing.
1. Repair: Replace broken wrought-iron railing components and repaint railing. Replace entire, deteriorated **[bronze]** **[wood]** handrail with shop-fabricated **[aluminum]** **[steel]** **[wood]** <Insert material> handrail. Replicate wrought-iron as specified in Section 050374 "Historic Decorative Metal Replication."
 2. Paint Removal: As specified in Section 050371 "Historic Decorative Metal Cleaning."
 3. Railing Finish: Paint as specified in [Section 090391 "Historic Treatment of Plain Painting."] <Insert Section number and title.>
 - a. Color: [As indicated by manufacturer's designations] [Matching design reference sample] [Matching Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color and gloss>.
 4. Gilding: As specified in [Section 090398 "Historic Treatment of Gilding."] <Insert Section number and title.>
 5. Handrail Finish:
 - a. Aluminum Finish: [Light bronze anodized] [Medium bronze anodized] [Dark bronze anodized] [Anodized color matching design reference sample] [Anodized color matching Architect's sample] [Anodized color as selected by Architect from full range of industry colors and color densities] <Insert color>.
 - b. Baked-Enamel or Powder-Coat Finish: [Color as indicated by manufacturer's designations] [Color matching design reference sample] [Color matching Architect's sample] [Color as selected by Architect from manufacturer's full range] <Insert color and gloss>.

END OF SECTION

SECTION 060312 HISTORIC WOOD REPAIR

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes historic treatment of wood in the form of repairing wood features as follows:
 - 1. Repairing wood [paneling] [built-in shelving] [mantles] [columns] [railings] [and] [trim] <Insert item>.
 - 2. Replacing wood [paneling] [built-in shelving] [mantles] [columns] [railings] [and] [trim] <Insert item>.
 - 3. Repairing, refinishing, and replacing hardware.

1.2 ALLOWANCES

- A. Allowances for historic wood repair are specified in Section 012100 "Allowances."
 - 1. Perform historic wood repair under quantity allowances and only as authorized. Authorized work includes **[work required by Drawings and Specifications and] [only]** work as directed in writing by Architect.
 - 2. Notify Architect **[weekly]** <Insert time interval> of extent of work performed that is attributable to quantity allowances.
 - 3. Perform work that exceeds quantity allowances only as authorized by Change Orders.
- B. Provide preconstruction testing as part of testing and inspecting allowance.
- C. Repair carved wood mantle in Room No. 101 as part of <Insert name of allowance>.
- D. Replace wood base moldings in Room No. 101 as part of <Insert name of allowance>.
- E. Replace wood columns with replicas as part of <Insert name of allowance>.
- F. Repair <Insert item description> as part of <Insert name of allowance>.
- G. Furnish new window-seat hardware as part of **[door hardware allowance]** <Insert allowance>.

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."
 - 1. Unit prices apply to authorized work covered by **[quantity allowances]** **[estimated quantities]**.
 - 2. Unit prices apply to authorized additions to and deletions from Work as authorized by Change Orders.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** <Insert location>.
 - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to historic wood repair.
 - 2. Review methods and procedures related to historic wood 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. Wood historic treatment program.
 - e. Coordination with building occupants.

1.5 SEQUENCING AND SCHEDULING

- A. Perform historic wood repair in the following sequence, which includes work specified in this and other Sections:
 - 1. Before removing wood components for on-site or off-site repair, tag each component with location-identification numbers. Indicate on tags and building plans the locations of each component, such as "Baseboard on North Side of Room 101."
 - 2. Dismantle hardware and tag with location-identification numbers.
 - 3. In the shop, label each repaired component and whole or partial replacement with permanent location-identification number in inconspicuous location and remove site-applied tags.
 - 4. Sort units by condition, separating those that need extensive repair.
 - 5. Clean surfaces.
 - 6. General Wood-Repair Sequence:
 - a. Remove paint to bare wood.
 - b. Repair wood by consolidation, replacement, partial replacement, and patching.
 - c. Sand, prime, fill, sand again, and prime surfaces again for refinishing.
 - 7. Repair, refinish, and replace hardware if required. Reinstall operating hardware.
 - 8. Reinstall components.
 - 9. Apply finish coats.
 - 10. Install remaining hardware.

1.6 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 or attaching wood members to other surfaces, 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 relationship of existing components to new components.
 - b. Templates and directions for installing hardware and anchorages.
 - c. Identification of each new unit and its corresponding location in the building on annotated plans and elevations.
 - d. Provisions for [sealant joints] [flashing] [and] <Insert item> 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 Wood: 12-inch- long, full-size molding sections with applied finish.
 - a. Additional Samples of replacement members that show fabrication techniques, materials, and finishes as requested by Architect.
 - 2. Repaired Wood: Prepare Samples using existing wood removed from site, repaired, and prepared for refinishing.
 - 3. Refinished Wood: Prepare Samples using existing wood removed from site, repaired, and refinished.
 - 4. Hardware: Full-size units with each factory-applied or restored finish.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For [historic treatment specialist] [including workers] [and] [wood-repair-material manufacturer].

- B. Wood Historic Treatment Program: Submit before work begins.
- C. Preconstruction Test Reports: For historic wood repair.

1.8 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic wood-repair specialist, experienced in repairing, refinishing, and replacing wood in whole and in part. Experience only in fabricating and installing new woodwork is insufficient experience for wood historic treatment work.
- 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, Project-site inspection, and on-site assistance.
- C. Wood 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 surfaces where directed by Architect] [in locations that enable viewing under same conditions as the completed Work] <Insert requirement>.
 - 2. Wood Baseboard Repair: Prepare an approximately **[72-inch]** **<Insert dimension>** length of baseboard to serve as mockup to demonstrate samples of each type of wood repair.
 - 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.

1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified historic treatment specialist to perform preconstruction testing on historic wood materials as follows:
 - 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.

1.10 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 will not be deformed, broken, or otherwise damaged.
- B. Until installed, 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.

1.11 FIELD CONDITIONS

- A. Weather Limitations: Proceed with historic wood 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 HISTORIC WOOD REPAIR, 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, grade rules, 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 REPLICATED WOOD ITEMS

- A. Replicated Wood [Paneling] [Built-in Shelving] [Mantle] [Columns] [Railings] [and] [Trim] <Insert item>: Custom-fabricated replacement wood units and components[, with operating and latching hardware].
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 - 2. Joint Construction: [Joints matching existing joints] [Mortise and tenon joints] [Doweled joints] <Insert requirement>.
 - 3. Wood Species: [Match species of existing wood] [White oak] <Insert requirement>.
 - 4. Wood Cut: [Match cut of existing wood] [Plain sliced/plain sawn] [Quarter cut/quarter sawn] <Insert requirement>.
 - 5. Wood Member and Trim Profiles: Match profiles and detail of existing.
 - 6. Hardware: [Reuse existing unless otherwise indicated] [Match design reference sample] [Match existing hardware] [As shown on Drawings] [As required to secure hinged panel in frame] <Insert requirement>.
 - 7. Date Identification: Emboss on a concealed surface of each replaced item, in easily read characters, "<Insert item> MADE <Insert year>." Manufacturer's name may also be embossed.

2.3 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: [Ponderosa pine] [Match species of each existing type of wood component or assembly] <Insert species> unless otherwise indicated.
- B. [Paneling] [Built-in Shelving] [Mantle] [Columns] [Railings] <Insert Item>: [Match existing species] [Ponderosa pine] [Ponderosa pine, eastern white pine, or Idaho white pine] [Redwood] [Douglas fir] [African mahogany] [Western red cedar] <Insert species>.
- C. Exterior Trim: [Match existing species] [All-heart vertical grain redwood] [African mahogany] <Insert species>.
- D. Interior Trim: [Match existing species] [Ponderosa pine] [Ponderosa pine, eastern white pine, or Idaho white pine] [African mahogany] <Insert species>.

2.4 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. <Double click here to find, evaluate, and insert list of manufacturers and products.>

- 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 featheredge.
1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

2.5 HARDWARE

- A. Hardware, General: Provide hardware required for each type of replicated or repaired wood, including but not limited to, hinges, pulls, latches, fasteners, and accessories indicated or required for proper operation. Hardware shall smoothly operate, tightly close, and secure units appropriately for frequency of use, unit weight, and dimensions.
- B. Replacement Hardware: Replace existing damaged or missing hardware with new hardware manufactured by one of the following:
1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- C. Material and Design:
1. Material: [Solid bronze of alloy indicated] [Nonmagnetic stainless steel] <Insert material> unless otherwise indicated.
 2. Design: [Custom hardware to replicate] [Match type and appearance of] existing hardware.
 3. Replacement Hardware: Regardless of mechanisms within, match existing, exposed hardware of the following types:
 - a. Knobs, levers, and escutcheons.
 - b. Latches.
 - c. Surface-mounted bolts
 - d. Handles.
 - e. Pulls.
 - f. Handrail brackets.
 - g. <Insert hardware type>.
 4. Date Identification: Emboss on a concealed surface of the metal body of each new hardware item, in easily read characters, "MADE <Insert year>." Manufacturer's name may also be embossed. **[For cast iron or other brittle metals, add the identification to the mold pattern before casting.][For malleable metals, stamp identification with an imprinting tool.]**
- D. 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.
 3. BHMA 611: Bright bronze, clear-coated; bronze base metal.
 4. BHMA 612: Satin bronze, clear-coated; bronze base metal.
 5. BHMA 613: Dark-oxidized satin bronze, oil-rubbed; bronze base metal.
 6. BHMA 624: Dark-oxidized statuary bronze, clear-coated; bronze base metal.
 7. BHMA 628: Satin aluminum, clear anodized; aluminum base metal.
 8. BHMA 630: Satin stainless steel; stainless-steel base metal.
 9. BHMA 689: Aluminum painted; over any base metal.
 10. <Insert finish or special custom finish>.

2.6 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 caused by fungi and wood-boring insects; complying with AWWA P5; containing no boric acid.
1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- 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 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 and exposure condition.
- 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 **[unavoidable] [or] [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.

2.7 WOOD FINISHES

- A. Unfinished Replacement Units: Provide exposed **[exterior] [and] [interior]** wood surfaces of replacement units unfinished; smooth, filled, and suitably prepared for on-site priming and finishing.
- B. Factory-Primed Replacement Units: **[Manufacturer's standard] <Insert requirement>** factory-prime coat on exposed **[exterior] [and] [interior]** wood surfaces; compatible with indicated finish coating.
- C. Factory-Finished Units: **[Alkyd] [Latex] <Insert system type>** finish system consisting of **[primer and two finish coats] <Insert requirement>** on exposed **[exterior] [and] [interior]** wood surfaces.
1. Finish Coats: [Manufacturer's standard.] [Match intermediate coat and topcoat products used for nearby, repaired wood, as specified in Section 090391 "Historic Treatment of Plain Painting."] <Insert requirement.>
 2. Color and Gloss: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated on Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.

PART 3 EXECUTION

3.1 HISTORIC TREATMENT SPECIALIST

- A. Historic Treatment Specialist Firms: Subject to compliance with requirements, [provide historic wood repair by one of the following] [firms that may provide historic wood repair include, but are not limited to, the following]:
1. <Insert, in separate subparagraphs, names of historic treatment specialist firms>.

3.2 PREPARATION

- A. Protect adjacent materials from damage by historic wood repair.
- B. Clean wood 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. Condition replacement wood members and replacement units to prevailing conditions at installation areas before installing.

3.3 HISTORIC WOOD REPAIR, GENERAL

- A. Historic Treatment Appearance Standard: Completed work is to have a uniform appearance as viewed by Architect from **[5 feet] [10 feet] <Insert distance>** away for interior work and from **[20 feet] [50 feet] <Insert distance>** away for exterior work.
- B. General: In treating historic items, disturb them as minimally as possible and as follows:
 - 1. Stabilize and repair wood 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-treatment work that is indicated to be completed later.
 - 5. Refinish historic wood 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 hardware; strip paint, repair, and refinish it to match finish samples; and lubricate moving parts just enough to function smoothly.
- E. Repair Wood: Match existing materials and features, retaining as much original material as possible to perform repairs.
 - 1. Unless otherwise indicated, repair wood by consolidating, patching, splicing, or otherwise reinforcing wood with new wood matching existing wood or with salvaged, sound, original wood.
 - 2. Where indicated, repair wood by limited replacement matching existing material.
- F. Replace Wood: Where indicated, duplicate and replace units with units made from salvaged, sound, original wood or with new wood matching existing wood. 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. Identify removed items with numbering system corresponding to item locations, to ensure reinstallation in same location. Key items to Drawings showing location of each removed unit. Permanently label units in a location that will be concealed after reinstallation.

3.4 WOOD PATCH-TYPE REPAIR

- A. General: Patch wood that exhibits depressions, holes, or similar voids, and that has limited amounts of rotted or decayed wood.
 - 1. Verify that surfaces are sufficiently clean and free of paint residue prior to patching.
 - 2. Treat wood with wood consolidant prior to application of patching compound. Coat wood surfaces by brushing, applying multiple coats until wood is saturated and refuses to absorb more. Allow treatment to harden before filling void with patching compound.
 - 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.

3.5 WOOD-REPLACEMENT REPAIR

- A. General: Replace parts of or entire wood items at locations [indicated on Drawings] [indicated in the Historic Wood-Repair Schedule] [and] [where damage is too extensive to patch] <Insert requirement>.
 1. Remove surface-attached items from wood surface before performing wood-replacement repairs unless otherwise indicated.
 2. Verify that surfaces are sufficiently clean and free of paint residue prior to 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. Reinstall items removed for repair into original locations.

3.6 FIELD QUALITY CONTROL

- A. Manufacturers Field Service: Engage wood-repair-material manufacturers' factory-authorized service representatives for consultation and Project-site inspection, and provide on-site assistance when requested by Architect.

3.7 ADJUSTMENT

- A. Adjust existing and replacement operating items, hardware, and accessories for a tight fit at contact points and for smooth operation and tight closure. Lubricate hardware and moving parts.

3.8 CLEANING AND PROTECTION

- A. Protect wood surfaces from contact with contaminating substances resulting from construction operations. Monitor wood 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 wood surfaces, remove contaminants immediately.
- B. Clean exposed surfaces immediately after historic wood repair. Avoid damage to coatings and finishes. Remove excess sealants, patching materials, dirt, and other substances.

3.9 HISTORIC WOOD-REPAIR SCHEDULE

- A. Wall Paneling[HWW-#] <Insert drawing designation>: [Rooms 101 and 104] <Insert description>.
 1. General: Remove paneling completely, refinish **[on-site]** **[off-site]** **[either on-site or off-site]** **<Insert requirement>** and replace missing sections with new, replacement sections matching refinished existing paneling.
 2. Removal of Existing Paint and Refinishing: See Section 090391 "Historic Treatment of Plain Painting" for paint removal, surface preparation for refinishing, and refinishing historic wood.

3. Stile-and-Rail Repairs: [Wood consolidant] [Patch-type repairs] [Whole or partial member-replacement repairs] [and] [re-anchor as shown on Drawings] <Insert repair description>.
 4. Flat Panel and Cupboard-Door Repairs: [Wood consolidant] [Patch-type repairs in place] [and] [whole or partial panel-replacement repairs] <Insert repair description>.
 5. Hardware: [**Two butt hinges**] [**Thumb latch with pull**] [and] [**pull**] <Insert hardware type> for new cupboard door replicating existing door.
- B. Wood Mantle[HWW-#] <Insert drawing designation>: [Carved wood mantle for Room 104] <Insert description>.
1. General: Replicate mantle in Room 102 and install on north wall <Insert requirement>.
- C. Running Trim[HWW-#] <Insert drawing designation>: [Base] [and] [crown moldings] <Insert description>.
1. General: Repair existing wood using indicated treatments [**on-site**] [**off-site**] [**either on-site or off-site**] <Insert requirement>.
 2. Finishing: See [Section 090391 "Historic Treatment of Plain Painting."] <Insert Section number and title.>

END OF SECTION

SECTION 080314 HISTORIC TREATMENT OF WOOD DOORS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes historic treatment of wood doors in the form of the following:
 - 1. Repairing wood doors and trim.
 - 2. Replacing wood door **[leaves] [and] [frames]**.
 - 3. Reglazing.
 - 4. Repairing, refinishing, and replacing hardware.
 - 5. Repairing [storm doors] [storm vestibules] [and] [screen doors].
 - 6. Replacing [storm-door] [storm vestibules] [and] [screen-door] units.
 - 7. Providing new [storm-door] [storm-vestibule] [and] [screen-door] units.

1.2 ALLOWANCES

- A. Allowances for historic treatment of wood doors are specified in Section 012100 "Allowances."
 - 1. Perform historic treatment of wood doors under quantity allowances and only as authorized. Authorized work includes **[work required by Drawings and Specifications and] [only]** work as directed in writing by Architect.
 - 2. Notify Architect **[weekly] <Insert time interval>** of extent of work performed that is attributable to quantity allowances.
 - 3. Perform work that exceeds quantity allowances only as authorized by Change Orders.
- B. Provide preconstruction testing as part of testing and inspecting allowance.
- C. Replace wood storm door in Door No. 1 as part of **<Insert name of allowance>**.
- D. Replace screen-door screening at two doors as part of **<Insert name of allowance>**.
- E. Repair **<Insert item description>** as part of **<Insert name of allowance>**.
- F. Furnish new door hardware as part of **[door hardware allowance] <Insert allowance>**.

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."
 - 1. Unit prices apply to authorized work covered by **[quantity allowances] [estimated quantities]**.
 - 2. Unit prices apply to authorized additions to and deletions from Work as authorized by Change Orders.

1.4 DEFINITIONS

- A. Glazing: Includes glass, glazing points, glazing tapes, glazing sealants, and glazing compounds.
- B. Door: Generally, this term includes door frame, leaves, hardware, side panels or lights, fan light, transom, storm and screen doors, and storm vestibule unless otherwise indicated by context.
- C. Storm Vestibule: Removable winter enclosure erected on a covered porch, which includes side panels or lights and door leaf and may include top panels.
- D. Wood Door Component Terminology: Wood door components for historic treatment work include the following classifications:
 - 1. Frame Components: Head, jambs, stop, and threshold or sill.
 - 2. Leaf Components: Stiles, rails, and muntins.
 - 3. Exterior Trim: Exterior casing, brick mold, and cornice or drip cap.
 - 4. Interior Trim: Casing.

5. <Insert item>.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** <Insert location>.
 - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to historic treatment of wood doors.
 - 2. Review methods and procedures related to historic treatment of wood doors 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 door historic treatment program.
 - e. Coordination with building occupants.

1.6 SEQUENCING AND SCHEDULING

- A. Perform historic treatment of wood doors in the following sequence, which includes work specified in this and other Sections:
 - 1. Label each door frame with permanent opening-identification number in inconspicuous location.
 - 2. Tag existing door leaves, storm doors, and storm-vestibule panels with opening-identification numbers and remove for on-site or off-site repair. Indicate on tags the locations on door of each component, such as "left-hand door leaf," "right-hand reverse door leaf," "top dutch-door leaf," "bottom dutch-door leaf," "first left-side storm-vestibule panel," and "second left-side storm-vestibule panel."
 - 3. Remove door, dismantle hardware, and tag hardware with door opening-identification numbers.
 - 4. In the shop, label each leaf, storm door, storm-vestibule panel, and screen-door unit with permanent opening-identification number in inconspicuous location and remove site-applied tags.
 - 5. Install temporary protection and security at door openings.
 - 6. Sort units by condition, separating those that need extensive repair.
 - 7. Clean surfaces.
 - 8. 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 glass thicker than original 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.
 - 9. Repair, refinish, and replace hardware if required. Reinstall operating hardware.
 - 10. Install glazing.
 - 11. Remove temporary protection and security at door openings.
 - 12. Reinstall units.
 - 13. Apply finish coats.
 - 14. Install remaining hardware and weather stripping.

1.7 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: For locations and extent of wood-door repair and replacement work.
 - 1. Include plans, elevations, sections, and details of replacement parts indicating materials, profiles, joinery, reinforcing, method of splicing into or attaching to existing wood door, 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 door locations in the building on annotated plans and elevations.
 - d. Provisions for **[sealant joints]** **[flashing]** **[and]** **<Insert item>** 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]** **[leaf]** sections with applied finish.
 - 2. Replacement Members: 12 inches long for each replacement member, including parts of frame, leaf, 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 Door Members: Prepare Samples using existing wood door members removed from site, repaired, and prepared for refinishing.
 - 4. Refinished Wood Door Members: Prepare Samples using existing wood door 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.
 - 7. Glass: **[Full-size]** **<Insert dimensions>** units of each type and appearance.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For [historic treatment specialist] [including workers] [and] [wood-repair-material manufacturer].
- B. Wood Door Historic Treatment Program: Submit before work begins.
- C. Preconstruction Test Reports: For historic treatment of wood doors.

1.9 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic wood door specialist, experienced in repairing, refinishing, and replacing wood doors in whole and in part. Experience only in fabricating and installing new wood doors is insufficient experience for wood-door historic treatment work.
- 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 Door 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 wood materials where directed by Architect] [in locations that enable viewing under same conditions as the completed Work] **<Insert requirement>**.
 - 2. Wood Door Repair: Prepare one entire door unit to serve as mockup to demonstrate Samples of each type of repair of wood door members including frame, leaves, 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.

1.10 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified historic treatment specialist to perform preconstruction testing on historic wood doors.
 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.

1.11 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 will not be deformed, broken, or otherwise damaged.
- B. Store products inside a well-ventilated area, protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity, and where environmental conditions comply with manufacturer's requirements.

1.12 FIELD CONDITIONS

- A. Weather Limitations: Proceed with historic treatment of wood doors 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 DOORS, 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 doors, and other requirements unless otherwise indicated.
 1. Exception: Industry practices cited in the "Architectural Woodwork Standards," Section 12, Article 1.5, "Industry Practices," do not apply to the work of this Section.

2.2 REPLICATED WOOD DOOR UNITS

- A. Replicated Wood Door **[Frames]** **[and]** **[Leaves]**: Custom-fabricated replacement wood units and trim, with operating and latching hardware.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Joint Construction: [Joints matching existing] [Mortise and tenon joints] [Doweled joints] <Insert requirement>.
 3. Wood Species: [Match wood species of existing exterior door and frame parts] [White oak] <Insert requirement>.
 4. Wood Cut: [Match cut of existing exterior wood door and frame parts] [Plain sliced/plain sawn] [Quarter cut/quarter sawn] <Insert requirement>.
 5. Wood Member and Trim Profiles: Match profiles and detail of existing door members and trim.
 6. Hardware: [Reuse existing unless otherwise indicated] [Match design reference sample] [Match existing hardware] [As indicated on Drawings] [As required to secure storm door to door frame] <Insert requirement>.
 7. Hardware Set: Door Hardware Set No. <Insert number> according to [Section 087100 "Door Hardware."] [Section 087111 "Door Hardware (Descriptive Specification)."]
 8. Glazing Stops: Provide replacement glazing stops coordinated with glazing system indicated.
 9. Weather Stripping: Full-perimeter weather stripping for each exterior door leaf.

10. Date Identification: Emboss on a concealed surface of each replaced door frame and leaf, in easily read characters, "DOOR FRAME MADE <Insert year>" or "DOOR LEAF MADE <Insert year>." Manufacturer's name may also be embossed.

2.3 STORM DOORS

- A. General: Custom fabricated, tight fitting, [**replicating appearance of existing storm door,**] and with operating and latching hardware.
 1. Make storm doors removable for cleaning and storage.
- B. Wood Storm Doors:
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Interchangeable Storm and Screen Inserts: Equip storm-door leaf with [full height] [partial height] <Insert requirement> panels fitting into stile-and-rail construction of storm door and secured with [six] [eight] <Insert number> thumb-operable clips on storm-door to secure panels in door leaf. Storm insert shall be fully glazed with [subdivided lights] [single glass light] and screen insert fully screened.
 3. Joint Construction: [Joints matching existing] [Mortise and tenon joints] [Doweled joints] <Insert requirement>.
 4. Wood Species: [Match wood species of primary door and frame parts] [Cedar] <Insert requirement>.
 5. Wood Cut: [Match cut of existing exterior wood door and frame parts] [Plain sliced/plain sawn] [Quarter cut/quarter sawn] <Insert requirement>.
 6. Wood Member Profiles: [Match design reference sample] [Match wood profiles of existing storm door] [As indicated on Drawings] <Insert requirement>.
 7. Hardware: [Reuse existing unless otherwise indicated] [Match design reference sample] [Match existing hardware] [Three butt hinges] [Three pintle-type, lift-off hinges] [Thumb latch with pull] [As indicated on Drawings] [As required to secure storm door to door frame] <Insert requirement>.
 8. Hardware Set: Door Hardware Set No. <Insert number> according to [Section 087100 "Door Hardware."] [Section 087111 "Door Hardware (Descriptive Specification)."]
 9. Glazing Material: [Uncoated clear safety glass] [Plastic glazing] <Insert requirement>.
 10. Date Identification: Emboss on a concealed surface of each storm door, in easily read characters, "STORM DOOR MADE <Insert year>." Manufacturer's name may also be embossed.
- C. Wood Storm Vestibule: Removable, seasonal weather enclosures on covered porch, including a storm door and glazed side panels.
 1. Height: [Full height to porch ceiling] [Partial height and including tongue-and-groove wood top panels finished to match side panels] <Insert requirement>.
 2. Joint Construction: [Joints matching existing] [Mortise and tenon joints] [Doweled joints] <Insert requirement>.
 3. Wood Species: [Match wood species of primary door and frame parts] [Cedar] <Insert requirement>.
 4. Wood Cut: [Match cut of existing exterior wood door and frame parts] [Plain sliced/plain sawn] [Quarter cut/quarter sawn] <Insert requirement>.
 5. Wood Member Profiles: [Match design reference sample] [Match wood profiles of existing storm door] [As indicated on Drawings] <Insert requirement>.
 6. Vestibule Panel Hardware: Fasteners, clips, panel-alignment guides, and accessories indicated or required to easily assemble and disassemble storm vestibule. For removable screws, use round-headed type.
 7. Storm Door Hardware: [Reuse existing unless otherwise indicated] [Match design reference sample] [Match existing hardware] [Three butt hinges] [Three pintle-type, lift-off hinges] [Thumb latch with pull] [As indicated on Drawings] [As required to secure storm door to door frame] <Insert requirement>.
 8. Storm Door Hardware Set: Door Hardware Set No. <Insert number> according to [Section 087100 "Door Hardware."] [Section 087111 "Door Hardware (Descriptive Specification)."]
 9. Glazing Material: [Uncoated clear safety glass] [Plastic glazing] <Insert requirement>.
 10. Date Identification: Emboss on a concealed surface of each new storm-enclosure panel, in easily read characters, "PANEL MADE <Insert year>." Manufacturer's name may also be embossed.

2.4 SCREEN DOORS

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Joint Construction: [Joints matching existing] [Mortise and tenon joints] [Doweled joints] <Insert requirement>.
- C. Wood Species: [Match wood species of primary door and frame parts] [Cedar] <Insert requirement>.
- D. Wood Cut: [Match cut of wood primary door and frame parts] [Plain sliced/plain sawn] [Quarter cut/quarter sawn] <Insert requirement>.
- E. Wood Member Profiles: [Match design reference sample] [Match wood profiles of existing screen door] [As indicated on Drawings] <Insert requirement>.
- F. Hardware: [Reuse existing unless otherwise indicated] [Match design reference sample] [Match existing hardware] [Three butt hinges] [Three pintle-type, lift-off hinges] [Thumb latch with pull] [As indicated on Drawings] [As required to secure storm door to door frame] <Insert requirement>.
- G. Hardware Set: Door Hardware Set No. <Insert number> according to [Section 087100 "Door Hardware."] [Section 087111 "Door Hardware (Descriptive Specification)."]
- H. Date Identification: Emboss on a concealed surface of each screen door, in easily read characters, "SCREEN DOOR MADE <Insert year>." Manufacturer's name may also be embossed.

2.5 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: [Ponderosa pine] [Match species of each existing type of wood component or assembly] <Insert species> unless otherwise indicated.
- B. Frame Heads and Jambs[and Exterior Trim]: [Match existing species] [Ponderosa pine] [Ponderosa pine, eastern white pine, or Idaho white pine] [Redwood] [Douglas fir] [African mahogany] [Western red cedar] <Insert species>.
- C. Exterior Trim: [Match existing species] [All-heart vertical grain redwood] [African mahogany] <Insert species>.
- D. Thresholds or Sills: [Match existing species] [White oak] [All-heart vertical grain redwood] [African mahogany] [Western red cedar] <Insert species>.
- E. Leaf Components: [Match existing species] [Ponderosa pine] [Ponderosa pine, eastern white pine, or Idaho white pine] [African mahogany] [Douglas fir] <Insert species>.
- F. Interior Trim: [Match existing species] [Ponderosa pine] [Ponderosa pine, eastern white pine, or Idaho white pine] [African mahogany] <Insert species>.

2.6 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 because of weathering and decay and designed specifically to enhance the bond of wood-patching compound to existing wood.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

- 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 because of weathering and decay. Compound shall be capable of filling deep holes and spreading to feather edge.
1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

2.7 GLAZING MATERIALS

- A. Glass: See Section 088000 "Glazing."
- B. Glass: [Uncoated clear safety glass] [Clear insulating safety glass] [Low-E, clear insulating safety glass] [Glass Type GL-xx] <Insert description> units according to Section 088000 "Glazing."
- C. Glass: <Insert requirements>
- D. Plastic Glazing: [Uncoated monolithic acrylic] [Coated monolithic acrylic] [Uncoated monolithic polycarbonate] [Abrasion- and UV-resistant monolithic polycarbonate] [UV-resistant monolithic polycarbonate] <Insert description> sheet according to Section 088400 "Plastic Glazing."
- E. 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.
 - a. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
 2. Modern Glazing Products: Glazing points and single-component polyurethane glazing compound; ASTM C920, Type S, Grade NS, Class 25, Use G; struck uniformly to match taper of existing glazing putty (removed); colored as required to match painted sash.
 3. Primers and Cleaners for Glazing: As recommended in writing by glazing material manufacturer.

2.8 HARDWARE

- A. Primary Door Hardware, General: Provide complete sets of door hardware consisting of hinges, pulls, locks, latches, and accessories indicated for each door or required for proper operation. Sets shall include replacement hardware to complement repaired and refinished, existing hardware. Door hardware shall smoothly operate, tightly close, and securely lock wood doors and be sized to accommodate frequency of use, glazing weight, and dimensions.
- B. Other Hardware, General: Provide complete sets of hardware for each type of **[storm door]** **[storm vestibule]** **[and]** **[screen door]** consisting of hinges, pulls, latches, fasteners, clips, and accessories indicated or required for proper operation. Hardware shall smoothly operate, tightly close, and secure units appropriately for frequency of use, unit weight, and dimensions.
- C. Replacement Hardware: Replace existing damaged or missing hardware with new hardware manufactured by one of the following:
1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- D. Material and Design:
1. Material: [Solid bronze or alloy indicated] [Nonmagnetic stainless steel] <Insert material> unless otherwise indicated.
 2. Design: [Custom hardware to replicate] [Match type and appearance of] existing hardware.
 3. Replacement Door Hardware: Regardless of mechanisms within, match existing, exposed door hardware of the following types:
 - a. Door knobs, levers, and escutcheons.
 - b. Door latches.
 - c. Surface-mounted flush bolts.
 - d. Handles.
 - e. Projecting transom hinges and latch with pole ring.
 - f. <Insert hardware type>.

4. Date Identification: Emboss on a concealed surface of the metal body of each new hardware item, in easily read characters, "MADE <Insert year>." Manufacturer's name may also be embossed. [**For cast iron or other brittle metals, add the identification to the mold pattern before casting.**] [**For malleable metals, stamp identification with an imprinting tool.**]
- 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.
 3. BHMA 611: Bright bronze, clear-coated, bronze base metal.
 4. BHMA 612: Satin bronze, clear-coated, bronze base metal.
 5. BHMA 613: Dark-oxidized satin bronze, oil rubbed, bronze base metal.
 6. BHMA 624: Dark-oxidized statuary bronze, clear-coated, bronze base metal.
 7. BHMA 628: Satin aluminum, clear anodized, aluminum base metal.
 8. BHMA 630: Satin stainless steel, stainless-steel base metal.
 9. BHMA 689: Aluminum painted, over any base metal.
 10. <Insert finish or special custom finish>.

2.9 WEATHER STRIPPING

- A. Compression-Type Weather Stripping: Compressible weather stripping designed for permanently resilient sealing under bumper or wiper action; completely concealed when door is closed.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Weather-Stripping Material: Match existing materials and profiles as much as possible unless otherwise indicated.
 - a. Cellular Elastomeric Gaskets: Preformed; complying with ASTM C509.
 - b. Dense Elastomeric Gaskets: Preformed; complying with ASTM C864.
- B. Sliding-Type Weather Stripping: Woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Weather Seals: Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material.
- C. Metal Weather Stripping: [**Bronze**] [**Zinc**] <Insert metal> weather stripping; designed either as one piece to seal door at head and jambs by door sliding against it or as two pieces that interlock; and completely concealed when door is closed.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2.10 MISCELLANEOUS MATERIALS

- A. Insect Screening:
 1. Copper Wire Fabric: 16-by-16 count per sq. in. mesh of 0.011-inch- diameter copper wire.
 2. Bronze Wire Fabric: 18-by-14 count per sq. in. mesh of [**0.009-inch-**] [**0.011-inch-**] diameter bronze wire with a clear varnish finish.
 3. Aluminum Wire Fabric: 18-by-16 count per sq. in. mesh of 0.011-inch- diameter, coated aluminum wire; [**natural bright**] [**charcoal gray**] [**black**] finish.
- B. 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 AWP A P5; containing no boric acid.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- C. 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.

- D. Adhesives: Wood adhesives 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 and exposure conditions.
- E. 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 **[unavoidable] [or] [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.
- F. Anchors, Clips, and Accessories: Fabricate anchors, clips, and door accessories of aluminum, non-magnetic stainless steel, or hot-dip zinc-coated steel complying with requirements in ASTM B633 for SC 3 (Severe) service condition.

2.11 WOOD DOOR FINISHES

- A. Unfinished Replacement Units: Provide exposed **[exterior] [and] [interior]** wood surfaces of replacement units unfinished; smooth, filled, and suitably prepared for on-site priming and finishing.
- B. Factory-Primed Replacement Units: **[Manufacturer's standard] <Insert requirement>** factory-prime coat on exposed **[exterior] [and] [interior]** wood surfaces; compatible with indicated finish coating.
- C. Factory-Finished Units: **[Alkyd] [Latex] <Insert system type>** finish system consisting of **[primer and two finish coats] <Insert requirement>** on exposed **[exterior] [and] [interior]** wood surfaces.
 - 1. Finish Coats: [Manufacturer's standard.] [Match intermediate coat and topcoat products used for nearby, repaired wood doors, as specified in Section 090391 "Historic Treatment of Plain Painting."] <Insert requirement.>
 - 2. Color and Gloss: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated on Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.

PART 3 EXECUTION

3.1 HISTORIC TREATMENT SPECIALIST

- A. Historic Treatment Specialist Firms: Subject to compliance with requirements, [provide historic treatment of wood doors by one of the following] [firms that may provide historic treatment of wood doors include, but are not limited to, the following]:
 - 1. <Insert, in separate subparagraphs, names of historic treatment specialist firms>.

3.2 PREPARATION

- A. Protect adjacent materials from damage by historic treatment of wood doors.
- B. Clean wood doors 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. Condition replacement wood members and replacement units to prevailing conditions at installation areas before installing.

3.3 HISTORIC TREATMENT OF WOOD DOORS, GENERAL

- A. Historic Treatment Appearance Standard: Completed work is to have a uniform appearance as viewed by Architect from the door interior at **[5 feet] [10 feet] <Insert distance>** away and from the door exterior at **[20 feet] [50 feet]<Insert distance>** away.
- B. General: In treating historic items, disturb them as minimally as possible and as follows:
 - 1. Stabilize and repair wood doors 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 door 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 door hardware; strip paint, repair, and refinish it to match finish Samples; and lubricate moving parts just enough to function smoothly.
- E. Repair Wood Doors: Match existing materials and features, retaining as much original material as possible to perform repairs.
 - 1. Unless otherwise indicated, repair wood doors by consolidating, patching, splicing, or otherwise reinforcing wood with new wood matching existing wood or with salvaged, sound, original wood.
 - 2. Where indicated, repair wood doors by limited replacement matching existing material.
- 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. 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 doors are indicated for removal, cover resultant openings with temporary enclosures so that openings are weathertight during repair period.
- H. Identify removed doors, frames, leaves, and members with numbering system corresponding to door locations to ensure reinstallation in same location. Key doors, leaves, 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 DOOR 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 **[leaves] [storm doors] [and] [screen doors]** from door frames before performing patch-type repairs at meeting or sliding surfaces unless otherwise indicated. Reglaze units prior to reinstallation.
 - 2. Verify that surfaces are sufficiently clean and free of paint residue before patching.
 - 3. Treat wood members with wood consolidant before applying patching compound. Coat wood surfaces by brushing, applying multiple coats until wood is saturated and unable to absorb more. Allow treatment to harden before filling void with patching compound.
 - 4. 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.

3.5 WOOD DOOR MEMBER-REPLACEMENT REPAIR

- A. General: Replace parts of or entire wood door members at locations [indicated on Drawings] [indicated in the Historic Wood Door Schedule] [and] [where damage is too extensive to patch] <Insert requirement>.
 - 1. Remove **[leaves]** **[storm doors]** **[and]** **[screen doors]** from doors 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. Mill new and rout existing glazed members to accommodate new glass thickness.
 - 2. Provide replacement glazing stops coordinated with glazing system indicated.
 - 3. Provide glazing stops to match contour of door frames.
- F. Reinstall units removed for repair into original openings.
- G. Weather Stripping: Replace nonfunctioning and install missing weather stripping to ensure full-perimeter weather stripping for each exterior leaf.

3.6 GLAZING

- A. Comply with combined written instructions of manufacturers of glass, glazing system, and glazing materials, unless more stringent requirements are indicated.
- B. Remove cracked and damaged glass and glazing materials from openings and prepare surfaces for reglazing.
- C. Remove existing glass and glazing where indicated **[on Drawings]** **[in the Historic Wood Door Schedule]**, and prepare surfaces for reglazing.
- D. Remove glass and glazing from openings and prepare surfaces for reglazing.

- E. Size glass as required by Project conditions to provide necessary bite on glass, minimum edge and face clearances, with reasonable tolerances.
- F. Apply primers to joint surfaces where required for adhesion of glazing system, as determined by preconstruction testing.
- G. Install setting bead, side beads, and back bead against stop in glazing rabbets before setting glass.
- H. Install glass with proper orientation so that coatings, if any, face exterior or interior as required.
- I. Install glazing points.
- J. Disposal of Removed Glass: [Remove from Owner's property and legally dispose of it] [Protect unbroken lites and deliver as salvage to Owner for storage where directed] <Insert requirement> unless otherwise indicated.

3.7 WOOD DOOR UNIT REPLACEMENT

- A. General: Replace existing wood [door frame] [leaf] [storm door] [and] [screen door] units with new custom-fabricated units to match existing at locations [indicated on Drawings] [indicated in the Historic Wood Door Schedule] [and] [where damage is too extensive to repair] <Insert requirement>.
- B. Apply borate preservative treatment to accessible surfaces before finishing. Apply treatment liberally by brush to joints, edges, and ends; top, sides, and bottom.
- C. Mill glazed members to accommodate glass thickness. Glaze units before installation.
- D. Install units, hardware, weather stripping, accessories, and other components[**as indicated on Drawings**].
- E. Install units level, plumb, square, true to line, without distortion or impeding movement, anchored securely in place to structural support, and in proper relation to wall flashing, trim, and other adjacent construction.
- F. Set threshold or sill members in bed of sealant for weathertight construction unless otherwise indicated.
- G. Install door units with new anchors into existing openings.
- H. Weather Stripping: Install full-perimeter weather stripping for each operable exterior leaf.
- I. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
- J. Disposal of Removed Units: [Remove from Owner's property and legally dispose of them] [Deliver as salvage to Owner for storage where directed] <Insert requirement>.

3.8 STORM DOOR INSTALLATION

- A. Fit wood storm doors at each door jamb[**indicated**]. Verify that storm door and door frames are correctly tagged with opening-identification numbers.
- B. Adjust hardware, clips, and removable fasteners for a tight fit with uniform joints.[**Uninstall and re-install door at least once to ensure proper fit.**]
- C. Install and leave storm doors in place[when directed by Architect to suit the season].
- D. Install units by mounting to door frames according to manufacturer's written instructions.

3.9 STORM VESTIBULE INSTALLATION

- A. Fit wood storm vestibule on porch. Verify that storm vestibule panels are correctly and sequentially tagged for disassembly and reassembly with meeting surfaces at joints bearing the same identification numbers.
- B. Adjust hardware, clips, and removable fasteners for vestibule panels for a tight fit, secured against abutting surfaces, and with uniform joints. Disassemble and reassemble entire vestibule at least once to ensure proper fit.
- C. Install and leave storm vestibule in place[when directed by Architect to suit the season].
- D. Install units by mounting with removable fasteners and screws to porch and wall surfaces according to shop Drawings and manufacturer's written instructions.

3.10 SCREEN DOOR INSTALLATION

- A. Fit wood screen doors at each door jamb[**indicated**]. Verify that screen door and door frames are correctly tagged with opening-identification numbers.
- B. Adjust hardware, clips, and removable fasteners for a tight fit with uniform joints.[**Uninstall and re-install door at least once to ensure proper fit.**]
- C. Install and leave screen doors in place[when directed by Architect to suit the season].
- D. Install units by mounting to door frames according to manufacturer's written instructions.
- E. Replace existing insect screening[**where indicated**]; remove it from Owner's property.
- F. Install insect screening to be smooth, flat, and uniformly taut.

3.11 WEATHER STRIPPING INSTALLATION

- A. Install weather stripping for tight seal of joints as determined by preconstruction testing and demonstrated in mockup.

3.12 FIELD QUALITY CONTROL

- A. Manufacturers Field Service: Engage a factory-authorized, wood-repair-material service representative for consultation and Project-site inspection and to provide on-site assistance when requested by Architect.

3.13 ADJUSTING

- A. Adjust existing and replacement operating leaves, screens, hardware, weather stripping, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather-tight closure. Lubricate hardware and moving parts.

3.14 CLEANING AND PROTECTION

- A. Protect door surfaces from contact with contaminating substances resulting from construction operations. Monitor door 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 door surfaces, remove contaminants immediately.
- B. Clean exposed surfaces immediately after historic treatment of wood doors. Avoid damage to coatings and finishes. Remove excess sealants, glazing and patching materials, dirt, and other substances.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

3.15 HISTORIC WOOD DOOR SCHEDULE

- A. Historic Wood Door[HWD-#] <Insert drawing designation>: [Single-leaf] [Double-leaf] [Dutch] <Insert door description> door.
1. General: Repair existing wood doors using indicated treatments. Repair leaves, storm doors, and screen doors **[on-site]** **[or]** **[off-site]** <Insert requirement>.
 2. Removal of Existing Paint and Refinishing: See Section 090391 "Historic Treatment of Plain Painting" for paint removal, surface preparation for refinishing, and refinishing historic wood doors.
 3. Door Frame Repair: [Wood consolidant] [patch-type repairs] [whole or partial member-replacement repairs] [and] [re-anchor frame as indicated on Drawings] <Insert repair description>.
 4. Door Frame Member Repair: Repair [head] [jambs] [threshold] with [wood consolidant] [patch-type repairs] [and] [whole or partial member-replacement repairs]. [Re-anchor] [and] [realign] the [head] [jambs] [threshold]. <Insert repair description>.
 5. Door [Leaf] <Insert item> Repair: [Wood consolidant] [patch-type repairs with leaf removed from opening] [patch-type repairs in place] [and] [whole or partial member-replacement repairs] <Insert repair description>.
 6. Door [Leaf] <Insert item> Member Repair: Repair [stile] [rails] [stop] [and] [muntins] <Insert component> with [wood consolidant] [patch-type repairs] [and] [whole or partial member-replacement repairs]. Realign [stiles] [rails] [and] [stops] <Insert component>.
 7. Door **[Leaf]** <Insert item> Replacement: Remove existing units for replacement with custom-fabricated, replicated units.
 8. Hardware: [Three butt hinges] [three pintle-type, lift-off hinges] [mortise lock] [thumb latch with pull] [and] [pull] <Insert hardware type>.
- B. Historic Wood Door[HWD-#] <Insert drawing designation>: [Single-leaf] [Double-leaf] [Dutch] <Insert door description>.
1. General: Remove wood door completely, including door frame, and replace with custom-fabricated, new replacement door.
 2. New Replacement Door: See Section <Insert MF04 Section number> "<Insert MF04 Section title>."
 3. Finishing: See [Section 090391 "Historic Treatment of Plain Painting."] <Insert Section number and title.>
 4. Wood Storm Door: Custom-fabricated, **[new]** **[replicated]** units specified in this Section.
 5. Hardware: <Insert hardware set description or set number>.

END OF SECTION

SECTION 080352 HISTORIC TREATMENT OF WOOD WINDOWS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes historic treatment of wood windows in the form of the following:
 - 1. Repairing wood windows and trim.
 - 2. Replacing wood window **[frames]** **[and]** **[sash units]**.
 - 3. Reglazing.
 - 4. Repairing, refinishing, and replacing hardware.
 - 5. Repairing [storm windows] [shutters] [and] [insect screens].
 - 6. Replacing [storm-window] [shutter] [and] [insect-screen] units.
 - 7. Providing new [storm-window] [shutter] [and] [insect-screen] units.

1.2 ALLOWANCES

- A. Allowances for historic treatment of wood windows are specified in Section 012100 "Allowances."
 - 1. Perform historic treatment of wood windows under quantity allowances and only as authorized. Authorized work includes **[work required by Drawings and Specifications and]** **[only]** work as directed in writing by Architect.
 - 2. Notify Architect **[weekly]** **<Insert time interval>** of extent of work performed that is attributable to quantity allowances.
 - 3. Perform work that exceeds quantity allowances only as authorized by Change Orders.
- B. Provide preconstruction testing as part of testing and inspecting allowance.
- C. Replace wood sash in Window No. 1 as part of **<Insert name of allowance>**.
- D. Replace shutters at 10 windows as part of **<Insert name of allowance>**.
- E. Repair **<Insert item description>** as part of **<Insert name of allowance>**.

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."
 - 1. Unit prices apply to authorized work covered by **[quantity allowances]** **[estimated quantities]**.
 - 2. Unit prices apply to authorized additions to and deletions from Work as authorized by Change Orders.

1.4 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.
 - 5. **<Insert item>**.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** **<Insert location>**.

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.

1.6 SEQUENCING AND SCHEDULING

- 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. Tag existing window sash, storm windows, 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."
 3. Remove window, dismantle hardware, and tag hardware with opening-identification numbers.
 4. Install temporary protection and security at window openings.
 5. In the shop, label each sash, storm window, shutter, and louvered blind unit with permanent opening-identification number in inconspicuous location and remove site-applied tags.
 6. Sort units by condition, separating those that need extensive repair.
 7. Clean surfaces.
 8. 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.
 9. Repair, refinish, and replace hardware if required. Reinstall operating hardware.
 10. Install glazing.
 11. Remove temporary protection and security at window openings.
 12. Reinstall units.
 13. Apply finish coats.
 14. Install remaining hardware and weather stripping.

1.7 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 **[sealant joints] [flashing] [and] <Insert item>** 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- (300-mm-) long, full-size **[frame]** **[and]** **[sash]** sections with applied finish.
 - 2. Replacement Members: 12 inches (300 mm) 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- (300-mm-) long sections.
 - 7. Glass: **[Full-size]** **<Insert dimensions>** units of each type and appearance.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For [historic treatment specialist] [including workers] [and] [wood-repair-material manufacturer].
- B. Wood Window Historic Treatment Program: Submit before work begins.
- C. Preconstruction Test Reports: For historic treatment of wood windows.

1.9 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.
- 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] [in locations that enable viewing under same conditions as the completed Work] **<Insert requirement>**.
 - 2. Wood Window Repair: Prepare one entire window unit to serve as 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.

1.10 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.

1.11 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.

1.12 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 REPLICATED WOOD WINDOW UNITS

- A. Replicated Wood Window **[Frames]** **[and]** **[Sash]**: Custom-fabricated replacement wood units and trim, with operating and latching hardware.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Joint Construction: [Joints matching existing] [Mortise and tenon joints] [Doweled joints] <Insert requirement>.
 3. Wood Species: [Match wood species of exterior window trim and sash parts] <Insert requirement>.
 4. Wood Cut: [Match cut of existing exterior wood window trim and sash parts] [Plain sliced/plain sawn] [Quarter cut/quarter sawn] <Insert requirement>.
 5. Wood Window Members and Trim: Match profiles and detail of existing window members and trim.
 6. Glazing Stops: Provide replacement glazing stops coordinated with glazing system indicated.
 7. Integral, **[Storm]** **[and]** **[Screen]** Sash Inserts: Manufacturer's standard **[aluminum]** **[wood]**-framed sash inserts; sash-insert frames recessed fully in rebates routed in window frame or sash as required; and secured with turn-button hardware. Provide insect screen **[for each operable exterior sash or ventilator]** **[where indicated on Drawings]** <Insert requirement>. Shop finish sash inserts to match window frame.
 8. Exposed Hardware: **[Reuse]** **[Match]** existing exposed window hardware.
 9. Weather Stripping: Full-perimeter **[and meeting rail]** weather stripping for each operable sash.

10. Date Identification: Emboss on a concealed surface of each replaced window frame and sash, in easily read characters, "WINDOW MADE <Insert year>" or "SASH MADE <Insert year>." Manufacturer's name may also be embossed.

2.3 STORM WINDOWS

- A. General: Custom fabricated, tight fitting, [**replicating appearance of existing storm windows,**] and with operating and latching hardware.
 1. Fabricate storm windows for installation [on inside of primary window] [on outside of primary window] [matching design reference sample] [matching existing location] [where indicated on Drawings] <Insert requirement>.
 2. Fabricate storm window frame and sash so as not to be visible from the [exterior] [interior].
 3. Make storm windows removable for cleaning and storage.
- B. Wood Storm Windows:
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Joint Construction: [Joints matching existing] [Mortise and tenon joints] [Doweled joints] <Insert requirement>.
 3. Wood Species: [Match wood species of exterior trim and sash parts] [Cedar] <Insert requirement>.
 4. Wood Cut: [Match cut of existing exterior wood window trim and sash parts] [Plain sliced/plain sawn] [Quarter cut/quarter sawn] <Insert requirement>.
 5. Wood Storm-Window Members: [Match design reference sample] [Match wood profiles of existing storm windows] [As indicated on Drawings] <Insert requirement>.
 6. Hardware: [Reuse existing unless otherwise indicated] [Match design reference sample] [Match existing hardware] [As indicated on Drawings] [As required to secure storm window to window frames] <Insert requirement>.
 7. Glazing Material: [Uncoated clear float glass] [Plastic glazing] <Insert requirement>.
 8. Date Identification: Emboss on a concealed surface of each storm window, in easily read characters, "STORM WINDOW MADE <Insert year>." Manufacturer's name may also be embossed.
- C. Interior Aluminum Storm Windows: Fabricated from extruded aluminum to fit inside the wood window frame; finish as indicated; storm window frames concealed from exterior view.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Aluminum Finish: Manufacturer's standard [clear anodized] [light bronze anodized] [medium bronze anodized] [dark bronze anodized] [anodized color matching design reference sample] [anodized color matching Architect's sample] [anodized color as selected by Architect from manufacturer's full range] <Insert color>.
 3. Baked-Enamel or Powder-Coated Finish: [Color as indicated by manufacturer's designations] [Color matching design reference sample] [Color matching Architect's sample] [Color as selected by Architect from manufacturer's full range] <Insert color>.
 4. Hardware: [As indicated on Drawings] [As required to secure storm window to window frames] [Magnetic mounting] [Extruded-aluminum track slides at head and sill] <Insert requirement>.
 5. Glazing Material: [Uncoated clear float glass] [Plastic glazing] <Insert requirement>.

2.4 SHUTTERS

- A. General: Stile and rail units, [**replicating appearance of existing units,**] with concealed fasteners.
- B. Exterior Wood Shutters: Custom fabricated, tight fitting, and with operating and latching hardware.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Operation: [Fixed to wall] [Swinging on vertical stile] [Bahama or Bermuda style, out-swinging from top rail] [Match design reference sample] [Match existing] <Insert requirement>.
 3. Panel Configuration: [Louvered] [Flat] [Raised] [Match design reference sample] [Match existing] [As indicated on Drawings] <Insert requirement>.
 4. Joint Construction: [Mortise and tenon joints] [Doweled joints] [Joints matching design reference sample] [Joints matching existing] <Insert requirement>.

5. Louver-Slat Construction: [Routed slats] [Dadoed slats] [Pivot pin movable slats with interior control rod] [Match design reference sample] [Match existing] [As indicated on Drawings] <Insert requirement>.
 6. Wood Species: [Match wood species of exterior trim and sash parts] [Cedar] <Insert requirement>.
 7. Wood Cut: [Match cut of existing exterior wood window trim and sash parts] [Plain sliced/plain sawn] [Quarter cut/quarter sawn] <Insert requirement>.
 8. Wood Shutter Members: [Match wood profiles of design reference sample] [Match wood profiles of existing shutters] [As indicated on Drawings] <Insert requirement>.
 9. Wood Preservative: Apply borate preservative treatment to accessible surfaces of exterior wood shutters before finishing. Apply treatment liberally by brush to joints, edges, and ends; top, sides, and bottom.
 10. Hardware: [Reuse existing unless otherwise indicated] [Match design reference sample] [Match existing hardware] [As indicated on Drawings] [As required to secure shutter to window frames and latch tightly] [As required to secure shutter to window frames, with pintle hinges to allow removability, and to latch tightly] [As required to secure shutter to wall] <Insert requirement>.
 11. Drip Cap: [Aluminum] [Copper] <Insert requirement> drip cap fitted to window head; finished [to match window trim] [white] <Insert requirement>.
 12. Date Identification: Emboss on a concealed surface of each shutter, in easily read characters, "SHUTTER MADE <Insert year>." Manufacturer's name may also be embossed.
- C. Interior Wood Shutters: Custom fabricated; tight fitting and removable and with operating and latching hardware.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Operation: [Swinging on vertical stile] [Bifolding leaves, swinging on vertical stile] [Match design reference sample] [Match existing] <Insert requirement>.
 3. Panel Configuration: [Louvered] [Flat] [Raised] [Match design reference sample] [Match existing] [As indicated on Drawings] <Insert requirement>.
 - a. Height: [Full-height, single units] [Full-height, double-stacked units] [Half-height units] [Match design reference sample] [Match existing] [As indicated on Drawings] <Insert requirement>.
 4. Joint Construction: [Mortise and tenon joints] [Doweled joints] [Match design reference sample] [Match existing] <Insert requirement>.
 5. Louver-Slat Construction: [Routed slats] [Dadoed slats] [Pivot pin movable slats with interior control rod] [Match design reference sample] [Match existing] [As indicated on Drawings] <Insert requirement>.
 6. Wood Species: [Match wood species of interior trim and sash parts] [White oak] <Insert requirement>.
 7. Wood Cut: [Match cut of existing exterior wood window trim and sash parts] [Plain sliced/plain sawn] [Quarter cut/quarter sawn] <Insert requirement>.
 8. Wood Members: [Match wood profiles of design reference sample] [Match wood profiles of existing units] [As indicated on Drawings] <Insert requirement>.
 9. Hardware: [Reuse existing unless otherwise indicated] [Match design reference sample] [Match existing hardware] [As indicated on Drawings] [As required to secure shutter to window frames and latch tightly] <Insert requirement>.
 10. Date Identification: Emboss on a concealed surface of each shutter, in easily read characters, "SHUTTER MADE <Insert year>." Manufacturer's name may also be embossed.

2.5 INSECT SCREENS

- A. Wood Insect-Screen Frames: Custom fabricated; tight fitting and removable[, **replicating appearance of existing insect-screen frames,**] and with a minimum of exposed fasteners and latches.
1. Joint Construction: [Joints matching existing] [Mortise and tenon joints] [Doweled joints] <Insert requirement>.
 2. Wood Species: [Match wood species of window] [Cedar] <Insert requirement>.
 3. Wood Cut: [Match cut of window wood] [Plain sliced/plain sawn] [Quarter cut/quarter sawn] <Insert requirement>.
 4. Insect-Screen Members: [Match wood profiles of existing shutters] [As indicated on Drawings] <Insert requirement>.

- B. Aluminum Insect-Screen Frames: Extruded aluminum custom fabricated to fit inside interior wood window frame; tight fitting and removable, with a minimum of exposed fasteners and latches; finish as indicated; concealed from exterior view.
 - 1. Mounting: Manufacturer's standard [magnetic mounting consisting of extruded-aluminum guide at head with magnetic tape at jambs and weather seal at sill] [mounting consisting of extruded-aluminum guide at sill with screw attachment at head and jambs] <Insert description>.
 - 2. Aluminum Finish: Manufacturer's standard [clear anodized] [light bronze anodized] [medium bronze anodized] [dark bronze anodized] [anodized color matching design reference sample] [anodized color matching Architect's sample] [anodized color as selected by Architect from manufacturer's full range] <Insert color>.
 - 3. Baked-Enamel or Powder-Coated Finish: [Color as indicated by manufacturer's designations] [Color matching design reference sample] [Color matching Architect's sample] [Color as selected by Architect from manufacturer's full range] <Insert color>.
- C. Wickets: Provide [**sliding**] [**or**] [**hinged**] wickets matching insect-screen frame material and finish; framed and trimmed for a tight fit and durability during use.
- D. Copper Wire Fabric: 16-by-16 count per sq. in. (1.3-by-1.3-mm) mesh of 0.011-inch- (0.28-mm-) diameter copper wire.
- E. Bronze Wire Fabric: 18-by-14 count per sq. in. (1.1-by-1.5-mm) mesh of [**0.009-inch- (0.23-mm-)**] [**0.011-inch- (0.28-mm-)**] diameter bronze wire with a clear varnish finish.
- F. Aluminum Wire Fabric: 18-by-16 count per sq. in. (1.1-by-1.3-mm) mesh of 0.011-inch- (0.28-mm-) diameter, coated aluminum wire; [**natural bright**] [**charcoal gray**] [**black**] finish.

2.6 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 (0.8 mm) deep by 2 inches (51 mm) wide.
 - 1. Species: [Ponderosa pine] [Match species of each existing type of wood component or assembly] <Insert species> unless otherwise indicated.
- B. Frame Heads and Jambs[and Exterior Trim]: [Match existing species] [Ponderosa pine] [Ponderosa pine, eastern white pine, or Idaho white pine] [Redwood] [Douglas fir] [African mahogany] [Western red cedar] <Insert species>.
- C. Exterior Trim: [Match existing species] [All-heart vertical grain redwood] [African mahogany] <Insert species>.
- D. Sills: [Match existing species] [White oak] [All-heart vertical grain redwood] [African mahogany] [Western red cedar] <Insert species>.
- E. Sash Components: [Match existing species] [Ponderosa pine] [Ponderosa pine, eastern white pine, or Idaho white pine] [African mahogany] [Douglas fir] <Insert species>.
- F. Interior Trim: [Match existing species] [Ponderosa pine] [Ponderosa pine, eastern white pine, or Idaho white pine] [African mahogany] <Insert species>.

2.7 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. <Double click here to find, evaluate, and insert list of manufacturers and products.>

- 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. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

2.8 GLAZING MATERIALS

- A. Glass: See Section 088000 "Glazing."
- B. Glass: [Uncoated clear float-glass] [Clear insulating-glass] [Low-E clear insulating-glass] [Glass Type GL-xx] <Insert description> units according to Section 088000 "Glazing."
- C. Glass: <Insert requirements>.
- D. Plastic Glazing: [Uncoated monolithic acrylic] [Coated monolithic acrylic] [Uncoated monolithic polycarbonate] [Abrasion- and UV-resistant monolithic polycarbonate] [UV-resistant monolithic polycarbonate] <Insert description> sheet according to Section 088400 "Plastic Glazing."
- E. 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.
 - a. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
 2. Modern Glazing Products: Glazing points and single-component polyurethane glazing compound; ASTM C920, Type S, Grade NS, Class 25, Use G; struck uniformly to match taper of existing glazing putty (removed); colored as required to match painted sash.
 3. Primers and Cleaners for Glazing: As recommended in writing by glazing material manufacturer.

2.9 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]** **[shutter]** **[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. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- D. Material and Design:
1. Material: [Solid bronze of alloy indicated] [Cast or wrought aluminum] [Nonmagnetic stainless steel] <Insert material> unless otherwise indicated.
 2. Design: [Custom hardware to replicate] [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, **[synthetic sash cord]** **[bronze sash chain]** **[or]** **[stainless-steel sash chain]** <Insert requirement>; size and capacity to hold sash stationary at any open position.
 4. Spring Sash-Balance: Concealed **[tape-spring]** **[spiral-tube]** **[spring-loaded, block-and-tackle]** <Insert description> type; size and capacity to hold sash stationary at any open position.
 5. Replacement Window Hardware: Match existing window hardware of the following types:
 - a. Projected window hinge.

- b. Window lock.
 - c. Window latch.
 - d. Handle.
 - e. Pole ring.
 - f. <Insert hardware type>.
6. Date Identification: Emboss on a concealed surface of the metal body of each new hardware item, in easily read characters, "MADE <Insert year>." Manufacturer's name may also be embossed. [**For cast iron or other brittle metals, add the identification to the mold pattern before casting.**][**For malleable metals, stamp identification with an imprinting tool.**]
- 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.
 - 3. BHMA 611: Bright bronze, clear-coated; bronze base metal.
 - 4. BHMA 612: Satin bronze, clear-coated; bronze base metal.
 - 5. BHMA 613: Dark-oxidized satin bronze, oil-rubbed; bronze base metal.
 - 6. BHMA 624: Dark-oxidized statuary bronze, clear-coated; bronze base metal.
 - 7. BHMA 628: Satin aluminum, clear-anodized; aluminum base metal.
 - 8. BHMA 630: Satin stainless steel; stainless-steel base metal.
 - 9. BHMA 689: Aluminum painted; over any base metal.
 - 10. <Insert finish or special custom finish>.

2.10 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. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 - 2. Weather-Stripping Material: Match existing materials and profiles as much as possible unless otherwise indicated.
 - a. Cellular Elastomeric Gaskets: Preformed; complying with ASTM C509.
 - b. Dense Elastomeric Gaskets: Preformed; complying with ASTM C864.
- B. Sliding-Type Weather Stripping: Woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric.
- 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 - 2. Weather Seals: Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material.
- C. Metal Weather Stripping: [**Bronze**] [**Zinc**] <Insert metal> 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.
- 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2.11 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. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Cleaning Materials:
- 1. Detergent Solution: Solution prepared by mixing 2 cups (0.5 L) of tetrasodium pyrophosphate (TSPP), 1/2 cup (125 mL) of laundry detergent that contains no ammonia, 5 quarts (5 L) of 5 percent sodium hypochlorite bleach, and 15 quarts (15 L) of warm water for each 5 gal. (20 L) of solution required.
 - 2. Mildewcide: Commercial, proprietary mildewcide or a solution prepared by mixing 1/3 cup (80 mL) of household detergent that contains no ammonia, 1 quart (1 L) of 5 percent sodium hypochlorite bleach, and 3 quarts (3 L) of warm water.

- C. Adhesives: Wood adhesives for exterior exposure, with minimum 15- to 45-minute cure at 70 deg F (21 deg C), 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 **[unavoidable] [or] [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 B633 for SC 3 (Severe) service condition.

2.12 WOOD WINDOW FINISHES

- A. Unfinished Replacement Units: Provide exposed **[exterior] [and] [interior]** wood surfaces of replacement units unfinished; smooth, filled, and suitably prepared for on-site priming and finishing.
- B. Factory-Primed Replacement Units: **[Manufacturer's standard]** <Insert requirement> factory-prime coat on exposed **[exterior] [and] [interior]** wood surfaces; compatible with indicated finish coating.
- C. Factory-Finished Units: **[Alkyd] [Latex]** <Insert system type> finish system consisting of **[primer and two finish coats]** <Insert requirement> on exposed **[exterior] [and] [interior]** wood surfaces.
 - 1. Finish Coats: [Manufacturer's standard.] [Match intermediate coat and topcoat products used for adjacent, repaired wood windows, as specified in Section 090391 "Historic Treatment of Plain Painting."] <Insert requirement.>
 - 2. Color and Gloss: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated on Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.

PART 3 EXECUTION

3.1 HISTORIC TREATMENT SPECIALIST

- A. Historic Treatment Specialist Firms: Subject to compliance with requirements, [provide historic treatment of wood windows by one of the following] [firms that may provide historic treatment of wood windows include, but are not limited to, the following]:
 - 1. <Insert, in separate subparagraphs, names of historic treatment specialist firms>.

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. 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 (1.5 m)] [10 feet (3 m)] <Insert distance>** away and from the window exterior at **[20 feet (6 m)] [50 feet (15 m)]<Insert distance>** 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.
- 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.
 - 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. 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 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] [storm windows] [and] [screens]** 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. Treat wood members with wood consolidant before applying patching compound. Coat wood surfaces by brushing, applying multiple coats until wood is saturated and unable to absorb more. Allow treatment to harden before filling void with patching compound.

4. 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.

3.5 WOOD WINDOW MEMBER-REPLACEMENT REPAIR

- A. General: Replace parts of or entire wood window members at locations [indicated on Drawings] [indicated in the Historic Wood Window Schedule] [and] [where damage is too extensive to patch] <Insert requirement>.
 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. Mill new and rout existing glazed members to accommodate new glass thickness.
 2. Provide replacement glazing stops coordinated with glazing system indicated.
 3. Provide glazing stops to match contour of sash frames.
- F. Reinstall units removed for repair into original openings.
- G. Weather Stripping: Replace nonfunctioning and install missing weather stripping to ensure full-perimeter **[and meeting rail]** weather stripping for each operable sash.

3.6 GLAZING

- A. Comply with combined written instructions of manufacturers of glass, glazing systems, and glazing materials, unless more stringent requirements are indicated.
- B. Remove cracked and damaged glass and glazing materials from openings and prepare surfaces for reglazing.
- C. Remove existing glass and glazing where indicated **[on Drawings]** **[in the Historic Wood Window Schedule]**, and prepare surfaces for reglazing.
- D. Remove glass and glazing from openings and prepare surfaces for reglazing.

- E. Size glass as required by Project conditions to provide necessary bite on glass, minimum edge and face clearances, with reasonable tolerances.
- F. Apply primers to joint surfaces where required for adhesion of glazing system, as determined by preconstruction testing.
- G. Install setting bead, side beads, and back bead against stop in glazing rabbets before setting glass.
- H. Install glass with proper orientation so that coatings, if any, face exterior or interior as required.
- I. Install glazing points.
- J. Disposal of Removed Glass: [Remove from Owner's property and legally dispose of it] [Protect unbroken lites and deliver as salvage to Owner for storage where directed] <Insert requirement> unless otherwise indicated.

3.7 WOOD WINDOW UNIT REPLACEMENT

- A. General: Replace existing wood [window frame] [sash] [storm window] [and] [shutter] units with new custom-fabricated units to match existing at locations [indicated on Drawings] [indicated in the Historic Wood Window Schedule] [and] [where damage is too extensive to repair] <Insert requirement>.
- B. Apply borate preservative treatment to accessible surfaces before finishing. Apply treatment liberally by brush to joints, edges, and ends; top, sides, and bottom.
- C. Mill glazed members to accommodate glass thickness. Glaze units before installation.
- D. Install units, hardware, weather stripping, accessories, and other components[**as indicated on Drawings**].
- E. Install units level, plumb, square, true to line, without distortion or impeding movement; anchored securely in place to structural support; and in proper relation to wall flashing, trim, and other adjacent construction.
- F. Set sill members in bed of sealant for weathertight construction unless otherwise indicated.
- G. Install window units with new anchors into existing openings.
- H. Weather Stripping: Install full-perimeter[**and meeting rail**] weather stripping for each operable sash.
- I. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
- J. Disposal of Removed Units: [Remove from Owner's property and legally dispose of them] [Deliver as salvage to Owner for storage where directed] <Insert requirement>.

3.8 STORM WINDOW INSTALLATION

- A. Install wood storm windows at each window jamb[**indicated**].
- B. Install interior aluminum storm windows at each window[**indicated**].
- C. Install units by mounting to window frames[**as indicated on Drawings and**] according to manufacturer's written instructions.

3.9 SHUTTER INSTALLATION

- A. Install wood shutters at each window jamb[**indicated**].

- B. Install units by mounting[**as indicated on Drawings and**] according to manufacturer's written instructions.

3.10 INSECT-SCREEN INSTALLATION

- A. Install [wood] [aluminum] insect-screen frames [for each operable exterior sash or ventilator] [where indicated] <Insert requirement>.
 - 1. Locate insect-screen frames on [**inside**] [**outside**] of window unless otherwise indicated.
 - 2. Install insect-screen frames by mounting to window or sash frame[**as indicated on Drawings and**] according to manufacturer's written instructions.
- B. Replace existing insect screening; remove it from Owner's property.
- C. Install insect screening to be smooth, flat, and uniformly taut.

3.11 WEATHER STRIPPING INSTALLATION

- A. Install weather stripping for tight seal of joints as determined by preconstruction testing and demonstrated in mockup.

3.12 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.

3.13 ADJUSTING

- A. Adjust existing and replacement operating sash, screens, 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.

3.14 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. 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.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction.

3.15 HISTORIC WOOD WINDOW SCHEDULE

- A. Historic Wood Window[HWW-#] <Insert drawing designation>: [Single-hung] [Double-hung] [Triple-hung] [Casement] [Fixed] <Insert window description> window.
 - 1. General: Repair existing wood windows using indicated treatments. Repair sash, storm windows, and shutters [**on-site**] [**or**] [**off-site**] <Insert requirement>.
 - 2. Removal of Existing Paint and Refinishing: See Section 090391 "Historic Treatment of Plain Painting" for paint removal, surface preparation for refinishing, and refinishing historic wood windows.
 - 3. Window Frame Repair: [Wood consolidant] [patch-type repairs] [whole or partial member-replacement repairs] [and] [re-anchor frame as indicated on Drawings] <Insert repair description>.

4. Window Frame Member Repair: Repair [head] [jamb] [sill] with [wood consolidant] [patch-type repairs] [and] [whole or partial member-replacement repairs]. [Re-anchor] [and] [realign] the [head] [jamb] [sill]. <Insert repair description>.
 5. Window [Sash] <Insert item> Repair: [Wood consolidant] [patch-type repairs with sash removed from opening] [patch-type repairs in place] [and] [whole or partial member-replacement repairs] <Insert repair description>.
 6. Window [Sash] <Insert item> Member Repair: Repair [stile] [rails] [parting bead] [stop] [and] [muntins] <Insert component> with [wood consolidant] [patch-type repairs] [and] [whole or partial member-replacement repairs]. Realign [stiles] [rails] [parting bead] [and] [stops] <Insert component>.
 7. Window [**Sash**] <Insert item> Replacement: Remove existing units for replacement with custom-fabricated, replicated units.
 8. Hardware: [Sash balance] [Projected window hinge] [Window lock] [Window latch] [Handle] [Pole ring] <Insert hardware type>.
- B. Historic Wood Window[HWW-#] <Insert drawing designation>: [Single-hung] [Double-hung] [Triple-hung] [Casement] [Fixed] <Insert window description> window.
1. General: Remove wood window completely, including window frame and sash, and replace with custom-fabricated, new replacement windows.
 2. New Replacement Windows: See Section <Insert MF04 Section number> "<Insert MF04 Section title>."
 3. Finishing: See [Section 090391 "Historic Treatment of Plain Painting."] <Insert Section number and title.>
 4. Wood [**Exterior**] [**Interior**] Shutters: Custom-fabricated, [**new**] [**replicated**] units specified in this Section.
 5. Hardware: [Sash balance] [Projected window hinge] [Window lock] [Window latch] [Handle] [Pole ring] <Insert hardware type>.

END OF SECTION

SECTION 081433

STILE AND RAIL WOOD DOORS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Exterior stile and rail wood doors.
 - 2. Interior stile and rail wood doors.
 - 3. Interior fire-rated stile and rail wood doors.
 - 4. Fire-rated wood door frames.
 - 5. Factory fitting stile and rail wood doors to frames and factory machining for hardware.
 - 6. Factory [priming] [finishing].
- B. Related Requirements:
 - 1. Section 064214 "Stile and Rail Wood Paneling" for requirements for veneers from the same flitches for both wood paneling and stile and rail wood doors.
 - 2. [Section 099113 "Exterior Painting"] [Section 099123 "Interior Painting"] [Section 099300 "Staining and Transparent Finishing"] for field finishing stile and rail doors.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, including the following:
 - 1. Details of construction[**and glazing**].
 - 2. Door frame construction.
 - 3. Factory-machining criteria.
 - 4. Factory-[**priming**] [**finishing**] specifications.
- B. Sustainable Design Submittals:
 - 1. <Double click to insert sustainable design text for regional materials.>
 - 2. <Double click to insert sustainable design text for certified wood.>
 - 3. <Double click to insert sustainable design text for certified wood.>
 - 4. <Double click to insert sustainable design text for adhesives.>
 - 5. <Double click to insert sustainable design text for composite wood.>
- C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data, including those for stiles, rails, panels, and moldings (sticking); and other pertinent data, including the following:
 - 1. Door schedule indicating door[**and frame**] location, type, size, fire protection rating, and swing.
 - 2. Door elevations, dimensions and location of hardware, lite locations, and glazing thickness.
 - 3. Details of frame for each frame type, including dimensions and profile.
 - 4. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
 - 5. Dimensions and locations of mortises and holes for hardware.
 - 6. Clearances and undercuts.
 - 7. Requirements for veneer matching.
 - 8. Doors to be factory [**primed**] [**finished**] and application requirements.
 - 9. Apply [AWI Quality Certification] [WI Certified Compliance] Program label to Shop Drawings.
- D. Samples for Initial Selection: For [factory-finished doors] [and] [factory-finished door frames].
- E. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. [**For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.**]
2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For door inspector.
 1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, section 5.2.3.1.
 2. Egress Door Inspector: Submit documentation of compliance with NFPA 101, section 7.2.1.15.4.
 3. Submit copy of DHI Fire and Egress Door Assembly Inspector (FDAI) certificate.
- B. Field quality control reports.
- C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS.

- A. Special warranties.
- B. Quality Standard Compliance Certificates: [AWI Quality Certification] [WI Certified Compliance] Program certificates.
- C. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.6 QUALITY ASSURANCE

- A. <Double click to insert sustainable design text for manufacturer qualifications.>
- B. <Double click to insert sustainable design text for vendor qualifications.>
- C. Manufacturer's Certification: Licensed participant in [AWI's Quality Certification Program] [WI's Certified Compliance Program].
- D. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies shall meet the qualifications set forth in NFPA 80, section 5.2.3.1 and the following:
 1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.
- E. Egress Door Inspector Qualifications: Inspector for field quality control inspections of egress door assemblies shall meet the qualifications set forth in NFPA 101, section 7.2.1.15.4 and the following:
 1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in opaque plastic bags or cardboard cartons.
- C. Mark each door on [**top and**] bottom rail with opening number used on Shop Drawings.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather-tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature and relative humidity levels designed for building occupants for the remainder of construction period.

- B. Environmental Limitations: Do not deliver or install doors until building is enclosed and weathertight, wet work is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between [25 and 55] [43 and 70] [17 and 50] <Insert numbers> percent during remainder of construction period.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors[**and frames**] that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Delamination of veneer.
 - b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors[**and frames**].
 3. Warranty shall be in effect during specified period of time from date of Substantial Completion.
 4. Warranty Period for Exterior Doors: [Two years] [Five years].
 5. Warranty Period for Interior Doors: [One year] [Five years] [Life of installation].
 6. Insulating[**Leaded**] Glass Vision Panels: [Three] [Five] years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain [stile and rail wood doors] [each type of stile and rail wood door] from single manufacturer.
- B. Source Limitations: Obtain[**custom**] stile and rail wood doors from same fabricator as work in [Section 064214 "Stile and Rail Wood Paneling."]
- C. Source Limitations: Provide[**custom**] stile and rail wood doors finished in same shop as work in [Section 064214 "Stile and Rail Wood Paneling."]

2.2 PERFORMANCE REQUIREMENTS

- A. Exterior Door Thermal Transmittance: Maximum whole fenestration product U-factor of [0.25] [0.30] [0.35] [0.40] [0.45] [0.65], <Insert Btu/sq. ft. x h x deg F>, according to AAMA 1503, ASTM E1423, or NFRC 100.
- B. Fire-Rated Wood Door[**and Frame**] Assemblies: Complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings [and temperature-rise limits] indicated on Drawings, based on testing at positive pressure according to [UL 10C] [or] [NFPA 252].
1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
 2. Temperature-Rise Limit: [Where indicated on Drawings] [At vertical exit enclosures and exit passageways], provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
- C. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

2.3 MATERIALS

- A. Use only materials that comply with referenced standards and other requirements specified.
1. Assemble exterior doors, including components, with wet-use adhesives complying with ASTM D5572 for finger joints and with ASTM D5751 for joints other than finger joints.

2. Assemble interior doors, including components, with either dry-use or wet-use adhesives complying with ASTM D5572 for finger joints and with ASTM D5751 for joints other than finger joints.
- B. <Double click to insert sustainable design text for regional materials.>
 - C. <Double click to insert sustainable design text for certified wood.>
 - D. <Double click to insert sustainable design text for adhesives.>
 - E. <Double click to insert sustainable design text for composite wood products.>
 - F. Panel Products: Any of the following unless otherwise indicated:
 1. Particleboard: ANSI A208.1, Grade M-2.
 2. <Double click to insert sustainable design text for straw-based particleboard.>
 3. Medium-density fiberboard (MDF,) complying with ANSI A208.2, Grade 130.
 4. Hardboard complying with ANSI A135.4.
 5. Veneer-core plywood.
 - G. Safety Glass: Provide products complying with testing requirements in 16 CFR 1201, for Category II materials, unless those of Category I are expressly indicated and permitted.

2.4 EXTERIOR STILE AND RAIL WOOD DOORS

- A. Exterior Stile and Rail Wood Doors[**Type SRD-<#>**]: Exterior **[stock]** **[custom]** doors complying with **[the AWI, AWMAC, and WI's Architectural Woodwork Standards,]** **[or]** **[WDMA I.S. 6A,]** and with other requirements specified.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Performance Grade: WDMA I.S. 6A [Extra Heavy Duty] [Heavy Duty] [As indicated on Drawings].
 3. [Architectural Woodwork Standards] [WDMA I.S. 6A] Grade: Custom.
 4. Panel Designs: As indicated on Drawings.
 - a. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval.
 - b. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
 5. Finish: [Transparent] [Opaque].
 6. Wood Species and Cut for Transparent Finish: [Idaho white, lodgepole, ponderosa, or sugar pine, plain sawed/sliced] [Douglas fir or western hemlock, quarter sawed/sliced (vertical grain)] [Red oak, quarter sawed/sliced stiles and rails, plain sawed/sliced panels] [Species indicated on Drawings, plain sawed/sliced] <Insert species and cut>.
 7. Door Construction for Transparent Finish:
 - a. Stile and Rail Construction: Clear lumber; may be edge glued for width. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
 - b. Stile and Rail Construction: Veneered, structural composite lumber[**or veneered, edge-and end-glued clear lumber**]. Select veneers for similarity of grain and color, and arrange for optimum match between adjacent pieces.[**Use veneers not less than 1/16 inch thick.**]
 - c. Raised-Panel Construction: Clear lumber; edge glued for width. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
 - d. Raised-Panel Construction: Edge-glued, clear lumber; glued to both sides of a wood-based panel product. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
 - e. Raised-Panel Construction: Veneered, wood-based panel product with mitered, raised rims made from matching clear lumber.
 - f. Raised-Panel Construction: Veneered, shaped, wood-based panel product with veneer conforming to raised-panel shape.
 8. Door Construction for Opaque Finish:
 - a. Stile and Rail Construction: Clear softwood; may be edge glued for width and finger jointed.
 - b. Stile and Rail Construction: Veneered, structural composite lumber[**or veneered edge-and end-glued lumber**].

- c. Raised-Panel Construction: Clear softwood lumber; edge glued for width.
- d. Raised-Panel Construction: Veneered, wood-based panel product.
- 9. Stile and Rail Widths: [As indicated on Drawings.] [Manufacturer's standard, but not less than the following:]
 - a. Stiles, Top and Intermediate Rails: **[5-3/8 inches]** <Insert dimension>.
 - b. Bottom Rails: **[11-3/8 inches]** <Insert dimension>.
- 10. Raised-Panel Thickness: [As indicated on Drawings] **[1-3/4 inches]** **[1-3/8 inches]** [Manufacturer's standard, but not less than **1-1/8 inches**].
- 11. Molding Profile (Sticking): [Bead and cove] [Ogee] [Oval] [Recessed bevel] [Recessed square] [Manufacturer's standard] [As selected by Architect from manufacturer's full range].
- 12. Glass: Uncoated, clear, [fully tempered float glass, 5.0 mm thick] [laminated glass made from two lites of 3.0-mm-thick annealed glass] [insulating-glass units made from two lites of 3.0-mm-thick, fully tempered glass with **1/4-inch** interspace] <Insert requirements>, complying with Section 088000 "Glazing."
- 13. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S. 6A and grade specified.

2.5 INTERIOR STILE AND RAIL WOOD DOORS

- A. Interior Stile and Rail Wood Doors[**Type SRD-<#>**]: Interior **[stock]** **[custom]** doors complying with **[AWI, AWMAC, and WI's Architectural Woodwork Standards]** **[WDMA I.S. 6A]** and with other requirements specified.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 - 2. Performance Grade: WDMA I.S. 6A [Extra Heavy Duty] [Heavy Duty] [Standard Duty] [As indicated on Drawings].
 - 3. [Architectural Woodwork Standards] [WDMA I.S. 6A] Grade: Custom.
 - 4. Panel Designs: Indicated on Drawings. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
 - 5. Finish: [Transparent] [Opaque].
 - 6. Wood Species and Cut for Transparent Finish: [Idaho white, lodgepole, ponderosa, or sugar pine, plain sawed/sliced] [Douglas fir or western hemlock, quarter sawed/sliced (vertical grain)] [Red oak, quarter sawed/sliced stiles and rails, plain sawed/sliced panels] [Species indicated on Drawings, plain sawed/sliced] <Insert species and cut>.
 - 7. Door Construction for Transparent Finish:
 - a. Stile and Rail Construction: Clear lumber; may be edge glued for width. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
 - b. Stile and Rail Construction: Veneered, structural composite lumber[**or veneered, edge-and end-glued clear lumber**]. Select veneers for similarity of grain and color, and arrange for optimum match between adjacent pieces.[**Use veneers not less than 1/16 inch thick.**]
 - c. Raised-Panel Construction: Clear lumber; edge glued for width. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
 - d. Raised-Panel Construction: Edge-glued, clear lumber; glued to both sides of a wood-based panel product. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
 - e. Raised-Panel Construction: Veneered, wood-based panel product with mitered, raised rims made from matching clear lumber.
 - f. Raised-Panel Construction: Veneered, shaped, wood-based panel product with veneer conforming to raised-panel shape.
 - g. Flat-Panel Construction: Veneered, wood-based panel product.
 - 8. Door Construction for Opaque Finish:
 - a. Stile and Rail Construction: Clear softwood; may be edge glued for width and finger jointed.
 - b. Stile and Rail Construction: Veneered, structural composite lumber[**or veneered edge-and end-glued lumber**].
 - c. Raised-Panel Construction: Clear softwood lumber; edge glued for width.
 - d. Raised-Panel Construction: Shaped, medium-density fiberboard.
 - e. Flat-Panel Construction: [Veneered, wood-based panel product] [Medium-density fiberboard].
 - 9. Stile and Rail Widths: [As indicated.] [Manufacturer's standard, but not less than the following:]
 - a. Stiles, Top and Intermediate Rails: **[4-1/2 inches]** <Insert dimension>.

- b. Bottom Rails: **[9 inches]** <Insert dimension>.
- 10. Raised-Panel Thickness: [As indicated] **[1-3/4 inches]** **[1-3/8 inches]** [Manufacturer's standard, but not less than **1-1/8 inches**] [Manufacturer's standard, but not less than **3/4 inch**].
- 11. Flat-Panel Thickness: [As indicated] **[1/2 inch]** **[3/8 inch]** **[1/4 inch]**.
- 12. Molding Profile (Sticking): [Bead and cove] [Ogee] [Oval] [Recessed bevel] [Recessed square] [Manufacturer's standard] [As selected by Architect from manufacturer's full range].
- 13. Glass: Uncoated, clear, [fully tempered float glass, 5.0 mm thick] [laminated glass made from two lites of 3.0-mm-thick annealed glass] <Insert requirements>, complying with Section 088000 "Glazing."
- 14. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S. 6A and grade specified.

2.6 INTERIOR FIRE-RATED STILE AND RAIL WOOD DOORS

- A. Interior Fire-Rated Stile and Rail Wood Doors[**Type SRD-<#>**]: Fire-rated (20-minute rating) doors complying with **[AWI, AWMAC, and WI's Architectural Woodwork Standards]** **[WDMA I.S. 6A]** and with other requirements specified.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 - 2. Performance Grade: WDMA I.S. 6A [Extra Heavy Duty] [Heavy Duty] [Standard Duty] [As indicated on Drawings].
 - 3. [Architectural Woodwork Standards] [WDMA I.S. 6A] Grade: Custom.
 - 4. Panel Designs: Indicated on Drawings. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
 - 5. Finish: [Transparent] [Opaque].
 - 6. Wood Species and Cut for Transparent Finish: [Idaho white, lodgepole, ponderosa, or sugar pine, plain sawed/sliced] [Douglas fir or western hemlock, quarter sawed/sliced (vertical grain)] [Red oak, quarter sawed/sliced stiles and rails, plain sawed/sliced panels] [Species indicated on Drawings, plain sawed/sliced] <Insert species and cut>.
 - 7. Door Construction for Transparent Finish: 1-3/4-inch- thick stiles and rails and veneered **[flat panels not less than 5/8 inch thick]** **[raised panels not less than 1-1/8 inches thick]**.
 - a. Stile and Rail Construction: Veneered, structural composite lumber[**or veneered, edge-and end-glued clear lumber**]. Select veneers for similarity of grain and color, and arrange for optimum match between adjacent pieces.[**Use veneers not less than 1/16 inch thick.**]
 - b. Raised-Panel Construction: Veneered, shaped, wood-based panel product with veneer conforming to raised-panel shape.
 - c. Flat-Panel Construction: Veneered, wood-based panel product.
 - d. Edge Construction for Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 - e. Edge Construction for Fire-Rated Pairs of Doors: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
 - f. Edge Construction for Fire-Rated Pairs of Doors: Provide formed-steel edges and astragals with intumescent seals.
 - 1) Finish steel edges and astragals with baked enamel[**same color as doors**].
 - 2) Finish steel edges and astragals to match door hardware (locksets or exit devices).
 - 8. Door Construction for Opaque Finish: 1-3/4-inch- thick stiles and rails and veneered [flat panels not less than **5/8 inch** thick] **[raised panels not less than 1-1/8 inches** thick].
 - a. Stile and Rail Construction: Veneered, structural composite lumber[**or veneered edge-and end-glued lumber**].
 - b. Raised-Panel Construction: Shaped medium-density fiberboard (MDF.)
 - c. Flat-Panel Construction: [Veneered, wood-based panel product] [Medium-density fiberboard (MDF)].
 - d. Edge Construction for Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.

- e. Edge Construction for Fire-Rated Pairs of Doors: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
 - f. Edge Construction for Fire-Rated Pairs of Doors: Provide formed-steel edges and astragals with intumescent seals.
 - 1) Finish steel edges and astragals with baked enamel[**same color as doors**].
 - 2) Finish steel edges and astragals to match door hardware (locksets or exit devices).
 9. Stile and Rail Widths: [As indicated on Drawings.] [Manufacturer's standard, but not less than the following:]
 - a. Stiles, Top and Intermediate Rails: **[4-1/2 inches]** <Insert dimension>.
 - b. Bottom Rails: **[9 inches]** <Insert dimension>.
 10. Molding Profile (Sticking): [Bead and cove] [Ogee] [Ovalo] [Recessed bevel] [Recessed square] [Manufacturer's standard] [As selected by Architect from manufacturer's full range].
 11. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S. 6A and grade specified.
- B. Interior Fire-Rated Stile and Rail Wood Doors[**Type SRD-<#>**]: Fire-rated (45-minute rating) doors complying with AWI, AWMAC, and WI's Architectural Woodwork Standards and with other requirements specified.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Performance Grade: WDMA I.S. 6A [Extra Heavy Duty] [Heavy Duty] [Standard Duty] [As indicated on Drawings].
 3. [Architectural Woodwork Standards] [WDMA I.S. 6A] Grade: Custom.
 4. Panel Designs: Indicate on Drawings. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
 5. Finish: [Transparent] [Opaque].
 6. Wood Species and Cut for Transparent Finish: [Idaho white, lodgepole, ponderosa, or sugar pine, plain sawed/sliced] [Douglas fir or western hemlock, quarter sawed/sliced (vertical grain)] [Red oak, quarter sawed/sliced stiles and rails, plain sawed/sliced panels] [Species indicated on Drawings, plain sawed/sliced] <Insert species and cut>.
 7. Interior Fire-Rated Door Construction: 1-3/4-inch- thick, edged and veneered mineral-core stiles and rails and 1-1/8-inch- thick, veneered mineral-core raised panels.
 8. Edge Construction for Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 - a. At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
 - 1) Screw-Holding Capability: **[550 lbf] [475 lbf] [400 lbf]** according to WDMA T.M. 10.
 9. Edge Construction for Fire-Rated Pairs of Doors: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
 - a. At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
 - 1) Screw-Holding Capability: **[550 lbf] [475 lbf] [400 lbf]** according to WDMA T.M. 10.
 10. Edge Construction for Fire-Rated Pairs of Doors: Provide formed-steel edges and astragals with intumescent seals.
 - a. At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
 - 1) Screw-Holding Capability: **[550 lbf] [475 lbf] [400 lbf]** according to WDMA T.M. 10.
 - b. Finish steel edges and astragals with baked enamel[**same color as doors**].
 - c. Finish steel edges and astragals to match door hardware (locksets or exit devices).
 11. Stile and Rail Widths: [As indicated.] [Manufacturer's standard, but not less than the following:]
 - a. Stiles, Top and Intermediate Rails: **[4-1/2 inches]** <Insert dimension>.
 - b. Bottom Rails: **[9 inches]** <Insert dimension>.
 12. Molding Profile (Sticking): [Bead and cove] [Ogee] [Ovalo] [Recessed bevel] [Recessed square] [Manufacturer's standard] [As selected by Architect from manufacturer's full range].

2.7 FIRE-RATED WOOD DOOR FRAMES

A. Interior Frames:

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. [Architectural Woodwork Standards] [WDMA I.S. 6A] Grade: [Premium] [Custom].
3. Wood Species and Cut: Match species and cut indicated for wood doors unless otherwise indicated.
4. Species: [Anigre] [Select white ash] [Figured select white ash] [Select white birch] [Select red birch] [Cherry] [Select red gum] [Figured select red gum] [Select white maple] [Red oak] [White oak] [Persimmon] [Sapele] [Sycamore] [Walnut] <Insert species>.
5. Cut: [Plain sliced/plain sawn] [Quarter cut/quarter sawn] [Rift cut/rift sawn].
6. Wood Moisture Content: **[5 to 10] [8 to 13] [4 to 9]** percent.
7. Profile: [T-stop] [Flat] [Single rabbet] [Double rabbet] [As indicated on Drawings].
8. Construction: Solid lumber, fire-retardant particleboard, or fire-retardant medium density fiberboard (MDF) with veneered exposed surfaces and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated on Drawings.

2.8 STILE AND RAIL WOOD DOOR FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels unless otherwise indicated:

1. Clearances:
 - a. Provide **[1/8 inch] <Insert dimension>** at heads, jambs, and between pairs of doors.
 - b. Provide **[1/2 inch] <Insert dimension>** from bottom of door to top of decorative floor finish or covering.
 - c. Where threshold is shown on Drawings or scheduled, provide not more than **[3/8 inch] <Insert dimension>** from bottom of door to top of threshold.
 - d. Comply with NFPA 80 requirements for fire-rated doors.
2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches on lock edge; trim stiles and rails only to extent permitted by labeling agency.

B. Fabricate stile and rail wood doors in sizes indicated for field fitting.

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

1. Locate hardware to comply with DHI-WDHS-3.
2. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
3. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
4. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

D. Glazed Openings: Trim openings indicated for glazing with solid-wood moldings, with one side removable. Miter wood moldings at corner joints.

E. Glazed Openings: Factory install glazing in doors, complying with Section 088000 "Glazing." Install glass using manufacturer's standard elastomeric glazing sealant complying with ASTM C920. Secure glass in place with removable wood moldings. Miter wood moldings at corner joints.

F. Transom and Side Panels:

1. Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors.
2. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
3. Fabricate door and transom panels with full-width, solid-lumber[, **rabbeted,**] meeting rails.
4. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.

G. Exterior Doors: Factory treat exterior doors with water-repellent preservative after fabrication has been completed but before **[shop priming] [factory finishing]**.

1. Comply with WDMA I.S. 4.

2. Flash top of outswinging doors with manufacturer's standard metal flashing.

2.9 FACTORY PRIMING

- A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in [Section 099113 "Exterior Painting."] [Section 099123 "Interior Painting."]

2.10 FACTORY FINISHING

- A. Comply with referenced quality standard for factory finishing.
 1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 2. Finish faces, all four edges, edges of cutouts, and mortises.
 3. Stains and fillers may be omitted on [top and] bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.
- C. Factory finish doors that are indicated to receive transparent finish.
- D. Factory finish doors where indicated in schedules or on Drawings.
- E. Transparent Finish:
 1. [Architectural Woodwork Standards] [WDMA I.S. 6A] Grade: [Premium] [Custom].
 2. Finish: Architectural Woodwork Standards System 5, varnish, conversion.
 3. Finish: Architectural Woodwork Standards System 9, UV Curable, Acrylated Epoxy, Polyester, or Urethane.
 4. Finish: Architectural Woodwork Standards System 10, UV Curable, Water Based.
 5. Finish: Architectural Woodwork Standards System 11, Polyurethane, Catalyzed.
 6. Finish: WDMA I.S. 6A TR-4 Conversion Varnish.
 7. Finish: WDMA I.S. 6A TR-6 Catalyzed Polyurethane.
 8. Finish: WDMA I.S. 6A TR-8 UV Cured Acrylated Polyester/Urethane.
 9. Staining: [Match Architect's sample] [As selected by Architect from manufacturer's full range] [None required].
 10. Effect: [Open-grain finish] [Filled finish] [Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores].
 11. Sheen: [Satin] [Semigloss].
- F. Opaque Finish:
 1. [Architectural Woodwork Standards] [WDMA I.S. 6A] Grade: [Premium] [Custom].
 2. Finish: Architectural Woodwork Standards System 5, Varnish, Conversion.
 3. Finish: Architectural Woodwork Standards System 9, UV Curable, Acrylated Epoxy, Polyester, or Urethane.
 4. Finish: Architectural Woodwork Standards System 10, UV Curable, Water Based.
 5. Finish: Architectural Woodwork Standards System 11, Polyurethane, Catalyzed.
 6. Finish: WDMA I.S. 6A OP-4 Conversion Varnish.
 7. Finish: WDMA I.S. 6A OP-6 Catalyzed Polyurethane.
 8. Color: [Match Architect's sample] [As selected by Architect from manufacturer's full range].
 9. Sheen: [Satin] [Semigloss] [Gloss].

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Hardware: For installation, see [Section 087100 "Door Hardware."] [Section 087111 "Door Hardware (Descriptive Specification)."]
- B. Install doors[**and frames**] to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
 - 1. Install fire-rated door frames according to NFPA 80.
 - a. Install frames level, plumb, true, and straight.
 - 1) Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
 - b. Anchor frames to anchors or blocking built in or directly attached to substrates.
 - 1) Secure with countersunk, concealed fasteners and blind nailing.
 - 2) Use fine finishing nails[**or finishing screws**] for exposed fastening, countersunk and filled flush with woodwork.
 - c. For shop-finished items, use filler matching finish of items being installed.
 - 2. Install fire-rated doors according to NFPA 80.
 - 3. Install smoke- and draft-control doors according to NFPA 105.
- C. Job-Fitted Doors:
 - 1. Align and fit doors in frames with uniform clearances and bevels as indicated below.
 - a. Do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors.
 - 2. Machine doors for hardware.
 - 3. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 4. Clearances:
 - a. Provide 1/8 inch at heads, jambs, and between pairs of doors.
 - b. Provide [**1/8 inch**] [**1/4 inch**] [**3/8 inch**] [**1/2 inch**] from bottom of door to top of decorative floor finish or covering unless otherwise indicated on Drawings.
 - c. Where threshold is shown on Drawings or scheduled, provide [**1/4 inch**] [**3/8 inch**] from bottom of door to top of threshold unless otherwise indicated.
 - d. Comply with NFPA 80 for fire-rated doors.
 - 5. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
 - 6. Bevel fire-rated doors 1/8 inch in 2 inches on lock edge; trim stiles and rails only to extent permitted by labeling agency.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory- Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: [**Owner will engage**] [**Engage**] a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
 - 1. Provide inspection of installed Work through [**AWI's Quality Certification Program**] [**WI's Certified Compliance Program**], certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.
 - 2. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, section 5.2.
 - 3. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements according to NFPA 101, section 7.2.1.15.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

- D. Reinspect repaired or replaced installations to determine if replaced or repaired door installations comply with specified requirements.
- E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in **[NFPA 80]** **[and]** **[NFPA 101]**.

3.4 ADJUSTING

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

END OF SECTION

SECTION 090190 MAINTENANCE REPAINTING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes maintenance repainting as follows:
 - 1. Removing existing paint.
 - 2. Patching substrates.
 - 3. Repainting[, including staining and varnishing of wood].

1.2 ALLOWANCES

- A. Allowances for maintenance repainting are specified in Section 012100 "Allowances."
 - 1. Perform maintenance repainting under quantity allowances and only as authorized. Authorized work includes **[work required by Drawings and Specifications and] [only]** work as directed in writing by Architect.
 - 2. Notify Architect **[weekly]** **<Insert time interval>** of extent of work performed that is attributable to quantity allowances.
 - 3. Perform work that exceeds quantity allowances only as authorized by Change Orders.
- B. Provide preconstruction testing as part of testing and inspecting allowance.
- C. Repaint library walls and ceiling as part of **<Insert name of allowance>**.

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."
 - 1. Unit prices apply to authorized work covered by **[quantity allowances] [estimated quantities]**.
 - 2. Unit prices apply to authorized additions to and deletions from Work as authorized by Change Orders.

1.4 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.
- H. Low-Pressure Spray: **[100 to 400 psi; 4 to 6 gpm]** **<Insert range of values>**.
- I. Medium-Pressure Spray: **[400 to 800 psi; 4 to 6 gpm]** **<Insert range of values>**.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** **<Insert location>**.

1.6 SEQUENCING AND SCHEDULING

- A. Perform maintenance repainting in the following sequence, which includes work specified in this and other Sections:
 - 1. Dismantle existing surface-mounted objects and hardware 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 surfaces to be painted.
 - 4. Remove existing paint to the degree required for each substrate and surface condition of existing paint.
 - 5. Apply paint system.
 - 6. Reinstall dismantled surface-mounted objects and hardware unless otherwise indicated.

1.7 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include recommendations for product application and use.
 - 2. Include test data substantiating that products comply with requirements.
- B. Sustainable Design Submittals:
 - 1. <Double click to insert sustainable design text for paints and coatings.>
- C. Samples: For each type of paint system and each pattern, color, and gloss; [in sizes indicated below] [minimum **6 inches** long in least dimension, but not less than whole pattern].
 - 1. Include stepped Samples defining each separate coat, including fillers and primers. Resubmit until each required sheen, color, and texture is achieved.
 - 2. For each painted color being matched to a standardized color-coding system, include the color chips from the color-coding-system company with Samples.
 - 3. Include a list of materials for each coat of each Sample.
 - 4. Label each Sample for location and application.
 - 5. Sample Size:
 - a. Painted Surfaces: [**4-by-8-inch**] **<Insert dimensions>** Samples for each color and material, on hardboard.
 - b. Stained or Natural Wood: [**12-by-12-inch**] **<Insert dimensions>** Samples of natural- or stained-wood finish, on representative **<Insert required species of wood>** surfaces.
- D. Product List: For each paint product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of current "MPI Approved Products List" for each MPI-product category specified in paint systems, with the proposed product highlighted.
 - 3. VOC content.

1.8 INFORMATIONAL SUBMITTALS

- A. Color Matching Certificate: For computer-matched colors.
- B. Preconstruction Test Reports: For cleaning materials, [**paint removers**] [**and**] [**paint coatings and systems**].

1.9 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra paint materials, from the same production run, that match products applied and that are packaged with protective covering for storage and identified with labels describing contents, including material, finish, source, and location on building.
 - 1. Quantity: Furnish Owner with an additional [**3**] [**5**] [**7**] **<Insert number>** percent, but not less than 1 gal. or one case, as appropriate, of each material and color applied.

1.10 QUALITY ASSURANCE

- A. Color Matching: Custom computer-match paint colors to colors indicated [in maintenance repainting schedule(s) at the end of Part 3] [on Drawings] <Insert requirement>.[For colors indicated by a standardized coding system, obtain a color chip for each color indicated from the color-coding-system company; computer match paint colors to the color chips.]
- B. Mockups: Prepare mockups of maintenance repainting processes for each type of coating system and substrate indicated and each color and finish required to demonstrate aesthetic effects and to set quality standards for materials and execution. Duplicate appearance of approved Sample submittals.
 - 1. Locate mockups [on existing surfaces where directed by Architect] [in locations that enable viewing under same conditions as the completed Work] <Insert requirement>.
 - 2. Surface-Preparation Mockups: On existing surfaces using applicable specified methods of cleaning and other surface preparation, provide mockup sample of at least **[100 sq. ft.] <Insert dimension>**.
 - 3. Coating Mockups: **[Two] <Insert number>** surfaces of at least **[100 sq. ft.] <Insert dimension>** to represent surfaces and conditions for application of each type of coating system under same conditions as the completed 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.

1.11 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing of cleaning materials, **[paint removers] [and] [compatibility of paint coatings and systems]** for each **[indicated]** type of painted surface.
 - 1. Use test areas as indicated and representative of proposed materials and existing construction.
 - 2. Propose changes to materials and methods to suit Project.

1.12 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste daily.

1.13 FIELD CONDITIONS

- A. Weather Limitations: Proceed with maintenance repainting only when existing and forecasted weather conditions are within the environmental limits set by each manufacturer's written instructions and specified requirements.
- B. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer for surface preparation and during paint application and drying periods.

PART 2 PRODUCTS

2.1 PREPARATORY CLEANING MATERIALS

- A. Water: Potable.

- B. Hot Water: Water heated to a temperature of 140 to 160 deg F.
- C. 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 every 5 gal. of solution required.
- D. Mildewcide: Commercial proprietary mildewcide or a job-mixed 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.
- E. Abrasives for Ferrous Metal Cleaning: Aluminum oxide paper, emery paper, fine steel wool, steel scrapers, and steel-wire brushes of various sizes.
- F. Rust Remover: Manufacturer's standard phosphoric acid-based gel formulation, also called "naval jelly," for removing corrosion from iron and steel.

2.2 PAINT REMOVERS

- A. Alkaline Paste Paint Remover: Manufacturer's standard alkaline paste or gel formulation for removing paint from masonry, stone, wood, plaster, or metal as required to suit Project; and containing no methylene chloride.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Covered or Skin-Forming Alkaline Paint Remover: Manufacturer's standard covered or skin-forming alkaline paste or gel formulation for removing paint from masonry, stone, wood, plaster, or metal as required to suit Project; and containing no methylene chloride.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- C. Solvent-Type Paste Paint Remover: Manufacturer's standard water-rinsable, solvent-type paste or gel formulation for removing paint from masonry, stone, wood, plaster, or metal as required to suit Project.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- D. Low-Odor, Solvent-Type Paste Paint Remover: Manufacturer's standard low-odor, water-rinsable, solvent-type paste, gel, or foamed emulsion formulation for removing paint from masonry, stone, wood, plaster, or metal as required to suit Project; and containing no methanol or methylene chloride.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- E. Covered, Solvent-Type Paste Paint Remover: Manufacturer's standard, low-odor, covered, water-rinsable, solvent-type paste or gel formulation for removing paint from masonry, stone, wood, plaster, or metal as required to suit Project; and containing no methanol or methylene chloride.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2.3 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Colors: [As indicated with each paint system in maintenance repainting schedule(s) at the end of Part 3] [Match Architect's samples] [As selected by Architect from full range of industry colors] <Insert requirement>.

2.4 PAINT MATERIALS, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

- B. <Double click to insert sustainable design text for paint.>
- C. Transition Coat: Paint manufacturer's recommended coating for use where a residual existing coating is incompatible with the paint system.

2.5 PAINT MATERIAL MANUFACTURERS

- A. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2.6 PAINT MATERIALS

A. Primers and Sealers:

1. Primer Sealer, Latex, Interior:[**MPI #50.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
2. Primer, Latex, for Interior Wood:[**MPI #39.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
3. Primer Sealer, Alkyd, Interior:[**MPI #45.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
4. Undercoat, Enamel, Interior:[**MPI #46.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
5. Primer, Stain Blocking, Water Based:[**MPI #137.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
6. Alkyd, Sanding Sealer, Clear:[**MPI #102.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
7. Shellac:[**MPI #88.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
8. Stain, Semi-Transparent, for Interior Wood:[**MPI #90.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.

B. Metal Primers:

1. Primer, Metal, Surface Tolerant:[**MPI #23.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
2. Primer, Alkyd, Anti-Corrosive for Metal:[**MPI #79.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
3. Primer, Rust-Inhibitive, Water Based:[**MPI #107.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
4. Primer, Zinc Rich, Organic:[**MPI #18.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
5. Primer, Zinc-Rich, Epoxy:[**MPI #20.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
6. Primer, Epoxy, Anti-Corrosive, for Metal:[**MPI #101.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.

C. Wood Primers:

1. Primer, Latex for Exterior Wood:[**MPI #6.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
2. Primer, Alkyd for Exterior Wood:[**MPI #5.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.

D. Water-Based Paints:

1. Latex, Exterior Flat (Gloss Level 1):[**MPI #10.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
2. Latex, Exterior Low Sheen (Gloss Levels 3-4):[**MPI #15.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
3. Latex, Exterior Semigloss (Gloss Level 5):[**MPI #11.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
4. Latex, Exterior, Gloss (Gloss Level 6):[**MPI #119.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
5. Latex, Interior, Flat, (Gloss Level 1):[**MPI #53.**]

- a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 6. Latex, Interior, (Gloss Level 2):[**MPI #44.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 7. Latex, Interior, (Gloss Level 3):[**MPI #52.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 8. Latex, Interior, (Gloss Level 4):[**MPI #43.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 9. Latex, Interior, Semigloss, (Gloss Level 5):[**MPI #54.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 10. Latex, Interior, Gloss, (Gloss Level 6, except Minimum Gloss of 65 Units at 60 Degrees):[**MPI #114.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 11. Latex, Interior, Institutional Low Odor/VOC, Flat (Gloss Level 1):[**MPI #143.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 12. Latex, Interior, Institutional Low Odor/VOC (Gloss Level 2):[**MPI #144.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 13. Latex, Interior, Institutional Low Odor/VOC (Gloss Level 3):[**MPI #145.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 14. Latex, Interior, Institutional Low Odor/VOC (Gloss Level 4):[**MPI #146.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 15. Latex, Interior, Institutional Low Odor/VOC, Semigloss (Gloss Level 5):[**MPI #147.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 16. Latex, Interior, Institutional Low Odor/VOC, Gloss (Gloss Level 6):[**MPI #148.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
- E. Solvent-Based Paints:
1. Alkyd, Exterior Flat (Gloss Level 1):[**MPI #8.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 2. Alkyd, Exterior, Semigloss (Gloss Level 5):[**MPI #94.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 3. Alkyd, Exterior Gloss (Gloss Level 6):[**MPI #9.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 4. Alkyd, Interior, Flat (Gloss Level 1):[**MPI #49.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 5. Alkyd, Interior, (Gloss Level 3):[**MPI #51.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 6. Alkyd, Interior, Semigloss (Gloss Level 5):[**MPI #47.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 7. Alkyd, Interior, Gloss (Gloss Level 6):[**MPI #48.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
- F. Floor Coatings:
1. Floor Paint, Latex, Low Gloss (Maximum Gloss Level 3):[**MPI #60.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 2. Floor Paint, Latex, Gloss[**MPI #68.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 3. Floor Paint, Alkyd, Low Gloss (Gloss Level 6):[**MPI #59.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 4. Floor Enamel, Alkyd, Gloss (Gloss Level 6):[**MPI #27.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
- G. Solvent-Based Varnishes:
1. Varnish, with UV Inhibitor, Exterior, Semigloss (Gloss Level 5):[**MPI #30.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 2. Varnish, with UV Inhibitor, Exterior, Gloss (Gloss Level 6):[**MPI #29.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 3. Varnish, Marine Spar, Exterior, Gloss (Gloss Level 7):[**MPI #28.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 4. Varnish, Interior, Flat (Gloss Level 1):[**MPI #73.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.

5. Varnish, Interior, Semigloss (Gloss Level 5):[**MPI #74.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 6. Varnish, Interior, Gloss (Gloss Level 6):[**MPI #75.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
- H. Epoxy Coatings:
1. Epoxy, Gloss:[**MPI #77.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 2. Epoxy, High-Build, Low Gloss:[**MPI #108.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
- I. Polyurethane Coatings:
1. Polyurethane, Two-Component, Pigmented, Gloss (Gloss Level 6):[**MPI #72.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
- J. Polyurethane Varnishes:
1. Varnish, Interior, Polyurethane, Oil-Modified, Gloss (Gloss Level 6):[**MPI #56.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 2. Varnish, Polyurethane, Moisture-Cured, Gloss (Gloss Level 6):[**MPI #31.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 3. Varnish, Aliphatic Polyurethane, Two Component (Gloss Level 6 or 7):[**MPI #78.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.

2.7 PATCHING MATERIALS

- A. 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 from weathering and decay. Compound shall be capable of filling deep holes and spreading to feather edge.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Metal-Patching Compound: Two-part, 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 metal that has deteriorated from corrosion. Filler shall be capable of filling deep holes and spreading to feather edge.
- C. Cementitious Patching Compounds: Cementitious patching compounds and repair materials specifically manufactured for filling cementitious substrates and for sanding or tooling prior to repainting; formulation as recommended in writing by manufacturer for type of cementitious substrate indicated, exposure to weather and traffic, the detail of work, and site conditions.
- D. Gypsum-Plaster Patching Compound: Finish coat plaster and bonding compound according to ASTM C842 and manufacturer's written instructions.

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 proven to resist chemical solutions being used unless the solutions will not damage adjacent surfaces. Use protective materials that are UV resistant and waterproof. 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 sufficient force to spread them to unprotected surfaces.
3. Neutralize and collect 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.

3.2 MAINTENANCE REPAINTING, GENERAL

- A. Maintenance Repainting Appearance Standard: Completed work is to have a uniform appearance as viewed by Architect from building interior at **[5 feet] [10 feet] <Insert distance>** away from painted surface and from building exterior at **[20 feet] [50 feet] <Insert distance>** away from painted surface.
- B. Execution of the Work: In repainting surfaces, disturb them as minimally as possible and as follows:
 1. Remove failed coatings and corrosion and repaint.
 2. Verify that substrate surface conditions are suitable for repainting.
 3. Allow other trades to repair items in place before repainting.
- C. Mechanical Abrasion: Where mechanical abrasion is needed for the work, use gentle methods, such as scraping and lightly hand sanding, that will not abrade softer substrates, reducing clarity of detail.
- D. Heat Processes: Do not use torches, heat guns, or heat plates.

3.3 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of painting work. Comply with paint manufacturer's written instructions for inspection.
- B. Maximum Moisture Content of Substrates: Do not begin application of coatings unless moisture content of exposed surface is below the maximum value recommended in writing by paint manufacturer and not greater than the following maximum values when measured with an electronic moisture meter appropriate to the substrate material:
 1. Concrete: **[12] <Insert number>** percent.
 2. Gypsum Board: **[12] <Insert number>** percent.
 3. Gypsum Plaster: **[12] <Insert number>** percent.
 4. Masonry (Clay and CMU): **[12] <Insert number>** percent.
 5. Portland Cement Plaster: **[12] <Insert number>** percent.
 6. Wood: **[15] <Insert number>** percent.
 7. **<Insert surface to be repainted>**: **<Insert number>** percent.
- C. Alkalinity: Do not begin application of coatings unless surface alkalinity is within range recommended in writing by paint manufacturer. Conduct alkali testing with litmus paper on exposed plaster, cementitious, and masonry surfaces.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
 1. If existing surfaces cannot be prepared to an acceptable condition for proper finishing by using specified surface-preparation methods, notify Architect in writing.
- E. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.4 PREPARATORY CLEANING

- A. General: Use the gentlest, appropriate method necessary to clean surfaces in preparation for painting. Clean all surfaces, corners, contours, and interstices.

- B. Detergent Cleaning: Wash surfaces by hand using clean rags, sponges, and bristle brushes. Scrub surface with detergent solution and 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. Rinse with water applied by clean rags or sponges.
- C. Solvent Cleaning: Use solvent cleaning to remove oil, grease, smoke, tar, and asphalt from painted or unpainted surfaces before other preparation work. Wipe surfaces with solvent using clean rags and sponges. If necessary, spot-solvent cleaning may be employed just prior to commencement of paint application, provided enough time is allowed for complete evaporation. Use clean solvent and clean rags for the final wash to ensure that all foreign materials have been removed. Do not use solvents, including primer thinner and turpentine, that leave residue.
- D. Mildew: Clean off existing 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. Rinse with water applied by clean rags or sponges.
- E. Chemical Rust Removal:
 - 1. Remove loose rust scale with specified abrasives for ferrous-metal cleaning.
 - 2. Apply rust remover with brushes or as recommended in writing by manufacturer.
 - 3. Allow rust remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing. Do not allow extended dwell time.
 - 4. Wipe off residue with mineral spirits and either steel wool or soft rags, or clean with method recommended in writing by manufacturer to remove residue.
 - 5. Dry immediately with clean, soft cloths. Follow direction of grain in metal.
 - 6. Prime immediately to prevent rust. Do not touch cleaned metal surface until primed.
- F. Mechanical Rust Removal:
 - 1. Remove rust with specified abrasives for ferrous-metal cleaning. Clean to bright metal.
 - 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.

3.5 PAINT REMOVAL

- A. General: Remove paint where indicated. Where cleaning methods have been attempted and further removal of the paint is required because of incompatible or unsatisfactory surfaces for repainting, remove paint to extent required by conditions.
 - 1. Application: Apply paint removers according to paint-remover manufacturer's written instructions. Do not allow paint removers to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.
 - a. Apply materials to all surfaces, corners, contours, and interstices, to provide a uniform final appearance without streaks.
 - b. After work is complete, remove protection no longer required. Remove tape and adhesive marks.
 - 2. Brushes: Use brushes that are resistant to chemicals being used.
 - a. Metal Substrates: If using wire brushes on metal, use brushes of same metal composition as metal being treated.
 - b. Wood Substrates: Do not use wire brushes.
 - 3. Spray Equipment: 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. Unless otherwise indicated, hold spray nozzle at least 6 inches from surface and apply material in horizontal, back-and-forth sweeping motion, overlapping previous strokes to produce uniform coverage.
 - c. For chemical spray application, use low-pressure tank or chemical pump suitable for chemical indicated, equipped with nozzle having a cone-shaped spray.

- d. For water-spray application, use fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees.
 - e. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F at flow rates indicated.
- B. Paint Removal with Hand Tools: Remove paint manually using hand-held scrapers, wire brushes, sandpaper, and metallic wool as appropriate for the substrate material.
- C. Paint Removal with Alkaline Paste Paint Remover:
 - 1. Remove loose and peeling paint using[**water,**] scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 - 2. Apply paint remover to dry, painted surface with brushes.
 - 3. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 - 4. Rinse with [**cold**] [**hot**] water applied by [**low**] [**medium**]-pressure spray to remove chemicals and paint residue.
 - 5. Use mechanical methods recommended in writing by manufacturer to remove chemicals and paint residue.
 - 6. Repeat process if necessary to remove all paint.
- D. Paint Removal with Covered or Skin-Forming Alkaline Paint Remover:
 - 1. Remove loose and peeling paint using[**water,**] scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 - 2. Apply paint remover to dry, painted surface with brushes or as recommended in writing by manufacturer.
 - 3. Apply cover according to manufacturer's written instructions.
 - 4. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 - 5. Scrape off paint and remover.
 - 6. Rinse with [**cold**] [**hot**] water applied by [**low**] [**medium**]-pressure spray to remove chemicals and paint residue.
 - 7. Use mechanical methods recommended in writing by manufacturer to remove chemicals and paint residue.
 - 8. For spots of remaining paint, apply alkaline paste paint remover according to "Paint Removal with Alkaline Paste Paint Remover" Paragraph.
- E. Paint Removal with Solvent-Type Paste Paint Remover:
 - 1. Remove loose and peeling paint using[**water,**] scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 - 2. Apply thick coating of paint remover to dry, painted surface with natural-fiber cleaning brush, deep-nap roller, or large paintbrush. Apply in one or two coats according to manufacturer's written instructions.
 - 3. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 - 4. Rinse with [**cold**] [**hot**] water applied by [**low**] [**medium**]-pressure spray to remove chemicals and paint residue.
 - 5. Use mechanical methods recommended in writing by manufacturer to remove chemicals and paint residue.
 - 6. Repeat process if necessary to remove all paint.
- F. Paint Removal with Covered, Solvent-Type Paste Paint Remover:
 - 1. Remove loose and peeling paint using[**water,**] scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 - 2. Apply paint remover to dry, painted surface with natural-fiber cleaning brush, deep-nap roller, or large paint brush or as recommended in writing by manufacturer.
 - 3. Apply cover according to manufacturer's written instructions.
 - 4. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 - 5. Scrape off paint and remover.
 - 6. Rinse with [**cold**] [**hot**] water applied by [**low**] [**medium**]-pressure spray to remove chemicals and paint residue.

7. Use mechanical methods recommended in writing by manufacturer to remove remaining chemicals and paint residue.

3.6 SUBSTRATE REPAIR

- A. General: Repair substrate surface defects that are inconsistent with the surface appearance of adjacent materials and finishes.
- B. Wood Substrate:
 1. Repair wood defects including dents and gouges more than **[1/8 inch] [1/4 inch] <Insert dimension>** in size and all holes and cracks by filling with wood-patching compound and sanding smooth. Reset or remove protruding fasteners.
 2. Where existing paint is allowed to remain, sand irregular buildup of paint, runs, and sags to achieve a uniformly smooth surface.
- C. Cementitious Material Substrate:
 1. General: Repair defects including dents and chips more than **[1/4 inch] [1/2 inch] <Insert dimension>** in size and all holes and cracks by filling with cementitious patching compound and sanding smooth. Remove protruding fasteners.
 2. New and Bare Plaster: Neutralize surface of plaster with mild acid solution as recommended in writing by paint manufacturer. In lieu of acid neutralization, follow manufacturer's written instruction for primer or transition coat over alkaline plaster surfaces.
 3. Concrete, Cement Plaster, and Other Cementitious Products: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. If surfaces are too alkaline to paint, correct this condition before painting.
- D. Gypsum-Plaster and Gypsum-Board Substrates:
 1. Repair defects including dents and chips more than **[1/8 inch] [1/4 inch] <Insert dimension>** in size and all holes and cracks by filling with gypsum-plaster patching compound and sanding smooth. Remove protruding fasteners.
 2. Rout out surface cracks to remove loose, unsound material; fill with patching compound and sand smooth.
- E. Metal Substrate:
 1. Preparation: Treat repair locations by wire-brushing and solvent cleaning. Use **[chemical] [or] [mechanical]** rust removal method to clean off rust.
 2. Defects in Metal Surfaces: Repair non-load-bearing defects in existing metal surfaces, including dents and gouges more than **[1/16 inch] [1/8 inch] <Insert dimension>** deep or **[1/2 inch] [1 inch] <Insert dimension>** across and all holes and cracks by filling with metal-patching compound and sanding smooth. Remove burrs and protruding fasteners.
 3. Priming: Prime iron and steel surfaces immediately after repair to prevent flash rusting. Stripe paint corners, crevices, bolts, welds, and sharp edges. Apply two coats to surfaces that are inaccessible after completion of the Work.

3.7 PAINT APPLICATION, GENERAL

- A. Comply with manufacturers' written instructions for application methods unless otherwise indicated in this Section.
- B. Prepare surfaces to be painted according to the Surface-Preparation Schedule and with manufacturer's written instructions for each substrate condition.
- C. Apply a transition coat over incompatible existing coatings.
- D. Metal Substrate: Stripe paint corners, crevices, bolts, welds, and sharp edges before applying full coat. Apply two coats to surfaces that are inaccessible after completion of the Work. Tint stripe coat different than the main coating and apply with brush.
- E. Blending Painted Surfaces: When painting new substrates patched into existing surfaces or touching up missing or damaged finishes, apply coating system specified for the specific substrate. Apply final finish coat over entire surface from edge to edge and corner to corner.

3.8 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage paint-remover manufacturer's factory-authorized service representative for consultation and Project-site inspection and to provide on-site assistance when requested by Architect.
- B. Paint Material Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for composition and dry film thickness.
 - 1. Paint Composition: The following procedure may be performed at any time and as often as Owner deems necessary during the period when paints are being applied:
 - a. Testing agency will sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - b. Testing agency will perform tests for compliance of paint materials with product requirements.
 - c. If test results show materials being used do not comply with product requirements, Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.
 - 2. Dry Film Thickness:
 - a. Contractor shall touch up and restore painted surfaces damaged by testing.
 - b. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written instructions, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written instructions.

3.9 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.10 SURFACE-PREPARATION SCHEDULE

- A. General: Before painting, prepare surfaces[**where indicated on Drawings**] for painting according to applicable requirements specified in this schedule.
 - 1. Examine surfaces to evaluate each surface condition according to paragraphs below.
 - 2. Where existing degree of soiling prevents examination, preclean surface and allow it to dry before making an evaluation.
 - 3. Repair substrate defects according to "Substrate Repair" Article.
- B. Surface Preparation for **[MPI DSD 0] <Insert designation>** Degree of Surface Degradation:
 - 1. Surface Condition: Existing paint film in good condition and tightly adhered.
 - 2. Paint Removal: Not required.
 - 3. Preparation for Painting: Wash surface by detergent cleaning; use solvent cleaning where needed. Roughen or degloss cleaned surfaces to ensure paint adhesion according to paint manufacturer's written instructions.
- C. Surface Preparation for **[MPI DSD 1] <Insert designation>** Degree of Surface Degradation:
 - 1. Surface Condition: Paint film cracked or broken but adhered.
 - 2. Paint Removal: Scrape by hand-tool cleaning methods to remove loose paint until only tightly adhered paint remains.

3. Preparation for Painting: Wash surface by detergent cleaning; use other cleaning methods for small areas of bare substrate if required. Roughen, degloss, and sand the cleaned surfaces to ensure paint adhesion and a smooth finish according to paint manufacturer's written instructions.
- D. Surface Preparation for **[MPI DSD 2] <Insert designation>** Degree of Surface Degradation:
1. Surface Condition: Paint film loose, flaking, or peeling.
 2. Paint Removal: Remove loose, flaking, or peeling paint film by hand-tool or chemical paint-removal methods.
 3. Preparation for Painting: Wash surface by detergent cleaning; use solvent cleaning where needed. Use other cleaning methods for small areas of bare substrate if required. Sand surfaces to smooth remaining paint film edges. Prepare bare cleaned surface to be painted according to paint manufacturer's written instructions for substrate construction materials.
- E. Surface Preparation for **[MPI DSD 3] <Insert designation>** Degree of Surface Degradation:
1. Surface Condition: Paint film [severely deteriorated] [obscuring fine architectural detail work because of paint-layer buildup] [and] [surface indicated to have paint completely removed].
 2. Paint Removal: Completely remove paint film by hand-tool or chemical paint-removal methods. Remove rust.
 3. Preparation for Painting: Prepare bare cleaned surface according to paint manufacturer's written instructions for substrate construction materials.
- F. Surface Preparation for **[MPI DSD 4] <Insert designation>** Degree of Surface Degradation:
1. Surface Condition: Missing material, small holes and openings, and deteriorated or corroded substrate.
 2. Substrate Preparation: Repair, replace, and treat substrate according to "Substrate Repair" Article[**and requirements in other Specification Sections**].
 3. Preparation for Painting: Sand substrate surfaces to smooth remaining paint film edges and prepare according to paint manufacturer's written instructions for substrate construction materials. Remove rust.
 4. Painting: Paint as required for **[MPI DSD 2] <Insert designation>** degree of surface degradation.

3.11 EXTERIOR MAINTENANCE REPAINTING SCHEDULE

- A. Ferrous Metal Substrates: [Iron railing and gate] <Insert item description or drawing designation, or both>:
1. Alkyd System: **[MPI REX 5.1D] <Insert system description>** system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1] <Insert designation>** degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2] <Insert designation>** degree of surface degradation, spot prime with Primer, Metal, Surface Tolerant[, **MPI #23**].
 - c. Prime Coat: For **[MPI DSD 3] <Insert designation>** degree of surface degradation, fully prime coat with Primer, Metal, Surface Tolerant[, **MPI #23**].
 - d. Intermediate Coat: [Alkyd, exterior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Alkyd, exterior, semigloss (Gloss Level 5)[, **MPI #94**].
 - f. Topcoat: Alkyd, exterior, gloss (Gloss Level 6)[, **MPI #9**].
 - g. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
 2. High-Performance, Pigmented-Polyurethane-over-Epoxy System: **[MPI REX 5.1H] <Insert system description>** system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1] <Insert designation>** degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2] <Insert designation>** degree of surface degradation, spot prime with Primer, Epoxy, Anti-Corrosive, for Metal[, **MPI #101**].
 - c. Prime Coat: For **[MPI DSD 3] <Insert designation>** degree of surface degradation, fully prime coat with Primer, Epoxy, Anti-Corrosive, for Metal[, **MPI #101**].
 - d. Intermediate Coat in Primed Areas: Epoxy, High Build, Low Gloss[, **MPI #108**].

- e. Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6)[, **MPI #72**].
 - f. Second Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6)[, **MPI #72**].
 - g. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
- B. Wood [Columns] [Beams] [Ceilings] [Siding] [and] [Fencing] <Insert item description or drawing designation, or both>:
1. Latex System: [MPI REX 6.2A] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [**MPI DSD 1**] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [**MPI DSD 2**] <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[, **MPI #5**].
 - c. Prime Coat: For [**MPI DSD 2**] <Insert designation> degree of surface degradation, spot prime with Primer, Latex for Exterior Wood[, **MPI #6**].
 - d. Prime Coat: For [**MPI DSD 3**] <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[, **MPI #5**].
 - e. Prime Coat: For [**MPI DSD 3**] <Insert designation> degree of surface degradation, fully prime coat with Primer, Latex for Exterior Wood[, **MPI #6**].
 - f. Intermediate Coat: [Latex, exterior, matching topcoat] <Insert requirement or coating designation>.
 - g. Topcoat: Latex, exterior flat (Gloss Levels 1-2)[, **MPI #10**].
 - h. Topcoat: Latex, exterior, low sheen (Gloss Levels 3-4)[, **MPI #15**].
 - i. Topcoat: Latex, exterior semigloss (Gloss Level 5)[, **MPI #11**].
 - j. Topcoat: Latex, exterior gloss (Gloss Level 6)[, **MPI #119**].
 - k. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
 2. Alkyd System: [MPI REX 6.2C] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [**MPI DSD 1**] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [**MPI DSD 2**] <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[, **MPI #5**].
 - c. Prime Coat: For [**MPI DSD 3**] <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[, **MPI #5**].
 - d. Intermediate Coat: [Latex, exterior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Alkyd, exterior flat (Gloss Level 1)[, **MPI #8**].
 - f. Topcoat: Alkyd, exterior semigloss (Gloss Level 5)[, **MPI #94**].
 - g. Topcoat: Alkyd, exterior gloss (Gloss Level 6)[, **MPI #9**].
 - h. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
- C. Wood [Doors] [Windows] [Frames] [Casings] [and] [Smooth Fasciae] <Insert item description or drawing designation, or both>:
1. Latex System: [MPI REX 6.3A] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [**MPI DSD 1**] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [**MPI DSD 2**] <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[, **MPI #5**].
 - c. Prime Coat: For [**MPI DSD 3**] <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[, **MPI #5**].
 - d. Intermediate Coat: [Latex, exterior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, exterior flat (Gloss Levels 1-2)[, **MPI #10**].
 - f. Topcoat: Latex, exterior, low sheen (Gloss Levels 3-4)[, **MPI #15**].
 - g. Topcoat: Latex, exterior semigloss (Gloss Level 5)[, **MPI #11**].
 - h. Topcoat: Latex, exterior gloss (Gloss Level 6)[, **MPI #119**].
 - i. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.

2. Alkyd System: [MPI REX 6.3B] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[, MPI #5].
 - c. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[, MPI #5].
 - d. Intermediate Coat: [Alkyd, exterior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Alkyd, exterior flat (Gloss Level 1)[, MPI #8].
 - f. Topcoat: Alkyd, exterior semigloss (Gloss Level 5)[, MPI #94].
 - g. Topcoat: Alkyd, exterior gloss (Gloss Level 6)[, MPI #9].
 - h. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
 3. Varnish System (Clear): [MPI REX 6.3F] <Insert system description>.
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with topcoat.
 - c. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with topcoat.
 - d. Intermediate Coat: [Exterior varnish matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Varnish, with UV inhibitor, exterior, semigloss (Gloss Level 5)[, MPI #30].
 - f. Topcoat: Varnish, with UV inhibitor, exterior, gloss (Gloss Level 6)[, MPI #29].
 - g. Topcoat: Varnish, marine spar, exterior, gloss (Gloss Level 6)[, MPI #28].
- D. Wood [Deck] [and] [Stairs] <Insert item description or drawing designation, or both>:
1. Latex Porch and Floor System over Alkyd Primer: [MPI REX 6.5A] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd/Oil for Exterior Wood[, MPI #5].
 - c. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd/Oil for Exterior Wood[, MPI #5].
 - d. Intermediate Coat: [Floor Paint, Latex, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Floor paint, latex, low gloss[, MPI #60].
 - f. Topcoat: Floor paint, latex, gloss[, MPI #68].
 - g. Topcoat Additive: Manufacturer's standard additive to increase skid resistance of painted surface.
 - h. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
 2. Alkyd Floor Enamel System: [MPI REX 6.5B] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with topcoat.
 - c. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with topcoat.
 - d. Intermediate Coat: [Floor enamel matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Floor paint, alkyd, low gloss[, MPI #59].
 - f. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)[, MPI #27].
 - g. Topcoat Additive: Manufacturer's standard additive to increase skid resistance of painted surface.
 - h. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.

- E. Wood [Shingle] [Shake] Siding <Insert item description or drawing designation, or both>:
1. Latex System: [MPI REX 6.6A] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[, MPI #5].
 - c. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[, MPI #5].
 - d. Intermediate Coat: [Latex, exterior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, exterior flat (Gloss Levels 1-2)[, MPI #10].
 - f. Topcoat: Latex, exterior, low sheen (Gloss Levels 3-4)[, MPI #15].
 - g. Topcoat: Latex, exterior semigloss (Gloss Level 5)[, MPI #11].
 - h. Topcoat: Latex, exterior gloss (Gloss Level 6)[, MPI #119].
 - i. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
 2. Alkyd System: [MPI REX 6.6B] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[, MPI #5].
 - c. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[, MPI #5].
 - d. Intermediate Coat: [Latex, exterior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Alkyd, exterior flat (Gloss Level 1)[, MPI #8].
 - f. Topcoat: Alkyd, exterior semigloss (Gloss Level 5)[, MPI #94].
 - g. Topcoat: Alkyd, exterior gloss (Gloss Level 6)[, MPI #9].
 - h. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.

3.12 INTERIOR MAINTENANCE REPAINTING SCHEDULE

- A. Ferrous Metal Substrates: [Iron railing] <Insert item description or drawing designation, or both>:
1. Latex System: [MPI RIN 5.1N] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer, Metal, Surface Tolerant[, MPI #23].
 - c. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd, Anti-Corrosive for Metal[, MPI #79].
 - d. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer, Rust-Inhibitive, Water Based[, MPI #107].
 - e. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with Primer, Metal, Surface Tolerant[, MPI #23].
 - f. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd, Anti-Corrosive for Metal[, MPI #79].
 - g. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with Primer, Rust-Inhibitive, Water Based[, MPI #107].
 - h. Intermediate Coat: [Latex matching topcoat] <Insert requirement or coating designation>.
 - i. Topcoat: Latex, interior, flat (Gloss Level 1)[, MPI #53].
 - j. Topcoat: Latex, interior (Gloss Level 2)[, MPI #44].
 - k. Topcoat: Latex, interior (Gloss Level 3)[, MPI #52].
 - l. Topcoat: Latex, interior (Gloss Level 4)[, MPI #43].
 - m. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, MPI #54].
 - n. Topcoat: Latex, interior, gloss (Gloss Level 6)[, MPI #114].
 - o. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
 2. Alkyd System: [MPI RIN 5.1E] <Insert system description> system[over a transition coat].

- a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Metal, Surface Tolerant[, **MPI #23**].
 - c. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd, Anti-Corrosive for Metal[, **MPI #79**].
 - d. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Metal, Surface Tolerant[, **MPI #23**].
 - e. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd, Anti-Corrosive for Metal[, **MPI #79**].
 - f. Intermediate Coat: [Alkyd, matching topcoat] <Insert requirement or coating designation>.
 - g. Topcoat: Alkyd, interior, flat (Gloss Level 1)[, **MPI #49**].
 - h. Topcoat: Alkyd, interior (Gloss Level 3)[, **MPI #51**].
 - i. Topcoat: Alkyd, interior, semigloss (Gloss Level 5)[, **MPI #47**].
 - j. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, **MPI #48**].
 - k. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
3. High-Performance, Pigmented-Polyurethane-over-Epoxy System: **[MPI RIN 5.1H]** <Insert system description> system[over a transition coat].
- a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with Epoxy, Gloss[, **MPI #77**].
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Zinc Rich, Organic[, **MPI #18**].
 - c. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Zinc Rich, Epoxy[, **MPI #20**].
 - d. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Zinc Rich, Organic[, **MPI #18**].
 - e. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Zinc Rich, Epoxy[, **MPI #20**].
 - f. Intermediate Coat in Primed Areas: Epoxy, Gloss[, **MPI #77**].
 - g. Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6)[, **MPI #72**].
 - h. Second Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6)[, **MPI #72**].
 - i. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
- B. Wood [Columns] [Beams] [and] [Ceilings] <Insert item description or drawing designation, or both>:
1. Latex System over Latex Primer: **[MPI RIN 6.2D]** <Insert system description> system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Latex, for Interior Wood[, **MPI #39**].
 - c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Latex, for Interior Wood[, **MPI #39**].
 - d. Intermediate Coat: [Latex, interior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, interior flat (Gloss Level 1)[, **MPI #53**].
 - f. Topcoat: Latex, interior (Gloss Level 2)[, **MPI #44**].
 - g. Topcoat: Latex, interior (Gloss Level 3)[, **MPI #52**].
 - h. Topcoat: Latex, interior (Gloss Level 4)[, **MPI #43**].
 - i. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, **MPI #54**].
 - j. Topcoat: Latex, interior, gloss (Gloss Level 6)[, **MPI #114**].
 - k. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
 2. Latex System over Alkyd Primer: **[MPI RIN 6.2A]** <Insert system description> system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.

- b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Undercoat, Enamel, Interior[, **MPI #46**].
 - c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[, **MPI #46**].
 - d. Intermediate Coat: [Latex, interior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, interior flat (Gloss Level 1)[, **MPI #53**].
 - f. Topcoat: Latex, interior (Gloss Level 2)[, **MPI #44**].
 - g. Topcoat: Latex, interior (Gloss Level 3)[, **MPI #52**].
 - h. Topcoat: Latex, interior (Gloss Level 4)[, **MPI #43**].
 - i. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, **MPI #54**].
 - j. Topcoat: Latex, interior, gloss (Gloss Level 6)[, **MPI #114**].
 - k. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
3. Alkyd System: [MPI RIN 6.2C] <Insert system description> system[over a transition coat].
- a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Undercoat, Enamel, Interior[, **MPI #46**].
 - c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[, **MPI #46**].
 - d. Intermediate Coat: [Alkyd, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Alkyd, interior, flat (Gloss Level 1)[, **MPI #49**].
 - f. Topcoat: Alkyd, interior (Gloss Level 3)[, **MPI #51**].
 - g. Topcoat: Alkyd, interior, semigloss (Gloss Level 5)[, **MPI #47**].
 - h. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, **MPI #48**].
 - i. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
- C. Wood [Doors] [Windows] [Frames] [and] [Moldings] <Insert item description or drawing designation, or both>:
1. Latex System over Latex Primer: [MPI RIN 6.3U] <Insert system description> system[over a transition coat].
- a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Latex, for Interior Wood[, **MPI #39**].
 - c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Latex, for Interior Wood[, **MPI #39**].
 - d. Intermediate Coat: [Latex, interior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, **MPI #54**].
 - f. Topcoat: Latex, interior, gloss (Gloss Level 6)[, **MPI #114**].
 - g. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
2. Low-Odor Latex System over Latex Primer: [MPI RIN 6.3V] <Insert system description> system[over a transition coat].
- a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Latex, for Interior Wood[, **MPI #39**].
 - c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Latex, for Interior Wood[, **MPI #39**].
 - d. Intermediate Coat: [Latex, interior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, interior, institutional low odor/VOC flat (Gloss Level 1)[, **MPI #143**].
 - f. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 2)[, **MPI #144**].
 - g. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 3)[, **MPI #145**].
 - h. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 4)[, **MPI #146**].

- i. Topcoat: Latex, interior, institutional low odor/VOC, semigloss (Gloss Level 5)[, **MPI #147**].
 - j. Topcoat: Latex, interior, institutional low odor/VOC, gloss (Gloss Level 6)[, **MPI #148**].
 - k. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
3. Latex System over Alkyd Primer: [MPI RIN 6.3A] <Insert system description> system[over a transition coat].
- a. Prime Coat: For [**MPI DSD 1**] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [**MPI DSD 2**] <Insert designation> degree of surface degradation, spot prime with Undercoat, Enamel, Interior[, **MPI #46**].
 - c. Prime Coat: For [**MPI DSD 3**] <Insert designation> degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[, **MPI #46**].
 - d. Intermediate Coat: [Latex, interior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, **MPI #54**].
 - f. Topcoat: Latex, interior, gloss (Gloss Level 6)[, **MPI #114**].
 - g. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
4. Alkyd System: [MPI RIN 6.3B] <Insert system description> system[over a transition coat].
- a. Prime Coat: For [**MPI DSD 1**] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [**MPI DSD 2**] <Insert designation> degree of surface degradation, spot prime with Undercoat, Enamel, Interior[, **MPI #46**].
 - c. Prime Coat: For [**MPI DSD 3**] <Insert designation> degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[, **MPI #46**].
 - d. Intermediate Coat: [Alkyd, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Alkyd, interior, semigloss (Gloss Level 5)[, **MPI #47**].
 - f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, **MPI #48**].
 - g. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
5. Alkyd Varnish System (Clear): [MPI RIN 6.3J] <Insert system description>.
- a. Prime Coat: For [**MPI DSD 1**] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [**MPI DSD 2**] <Insert designation> degree of surface degradation, spot prime with Shellac[, **MPI #88**].
 - c. Prime Coat: For [**MPI DSD 2**] <Insert designation> degree of surface degradation, spot prime with Alkyd, Sanding Sealer, Clear[, **MPI #102**].
 - d. Prime Coat: For [**MPI DSD 3**] <Insert designation> degree of surface degradation, fully prime coat with Shellac[, **MPI #88**].
 - e. Prime Coat: For [**MPI DSD 3**] <Insert designation> degree of surface degradation, fully prime coat with Alkyd, Sanding Sealer, Clear[, **MPI #102**].
 - f. Intermediate Coat: [Interior varnish matching topcoat] <Insert requirement or coating designation>.
 - g. Topcoat: Varnish, interior, flat (Gloss Level 1)[, **MPI #73**].
 - h. Topcoat: Varnish, interior, semigloss (Gloss Level 5)[, **MPI #74**].
 - i. Topcoat: Varnish, interior, gloss (Gloss Level 6)[, **MPI #75**].
- D. Wood [Paneling] [Casework] [and] [Millwork] <Insert item description or drawing designation, or both>:
1. Latex System over Latex Primer: [MPI RIN 6.4T] <Insert system description> system[over a transition coat].
- a. Prime Coat: For [**MPI DSD 1**] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [**MPI DSD 2**] <Insert designation> degree of surface degradation, spot prime with Primer, Latex, for Interior Wood[, **MPI #39**].
 - c. Prime Coat: For [**MPI DSD 3**] <Insert designation> degree of surface degradation, fully prime coat with Primer, Latex, for Interior Wood[, **MPI #39**].
 - d. Intermediate Coat: [Latex, interior, matching topcoat] <Insert requirement or coating designation>.

- e. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, **MPI #54**].
- f. Topcoat: Latex, interior, gloss (Gloss Level 6)[, **MPI #114**].
- g. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
- 2. Low-Odor Latex System over Latex Primer: [MPI RIN 6.4D] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [**MPI DSD 1**] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [**MPI DSD 2**] <Insert designation> degree of surface degradation, spot prime with Primer, Latex, for Interior Wood[, **MPI #39**].
 - c. Prime Coat: For [**MPI DSD 3**] <Insert designation> degree of surface degradation, fully prime coat with Primer, Latex, for Interior Wood[, **MPI #39**].
 - d. Intermediate Coat: [Latex, interior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, interior, institutional low odor/VOC flat (Gloss Level 1)[, **MPI #143**].
 - f. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 2)[, **MPI #144**].
 - g. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 3)[, **MPI #145**].
 - h. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 4)[, **MPI #146**].
 - i. Topcoat: Latex, interior, institutional low odor/VOC, semigloss (Gloss Level 5)[, **MPI #147**].
 - j. Topcoat: Latex, interior, institutional low odor/VOC, gloss (Gloss Level 6)[, **MPI #148**].
 - k. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
- 3. Latex System over Alkyd Primer: [MPI RIN 6.4A] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [**MPI DSD 1**] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [**MPI DSD 2**] <Insert designation> degree of surface degradation, spot prime with Undercoat, Enamel, Interior[, **MPI #46**].
 - c. Prime Coat: For [**MPI DSD 3**] <Insert designation> degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[, **MPI #46**].
 - d. Intermediate Coat: [Latex, interior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, interior flat (Gloss Level 1)[, **MPI #53**].
 - f. Topcoat: Latex, interior (Gloss Level 2)[, **MPI #44**].
 - g. Topcoat: Latex, interior (Gloss Level 3)[, **MPI #52**].
 - h. Topcoat: Latex, interior (Gloss Level 4)[, **MPI #43**].
 - i. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, **MPI #54**].
 - j. Topcoat: Latex, interior, gloss (Gloss Level 6)[, **MPI #114**].
 - k. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
- 4. Alkyd System: [MPI RIN 6.4C] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [**MPI DSD 1**] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [**MPI DSD 2**] <Insert designation> degree of surface degradation, spot prime with Undercoat, Enamel, Interior[, **MPI #46**].
 - c. Prime Coat: For [**MPI DSD 3**] <Insert designation> degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[, **MPI #46**].
 - d. Intermediate Coat: [Alkyd, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Alkyd, interior flat (Gloss Level 1)[, **MPI #49**].
 - f. Topcoat: Alkyd, interior (Gloss Level 3)[, **MPI #51**].
 - g. Topcoat: Alkyd, interior, semigloss (Gloss Level 5)[, **MPI #47**].
 - h. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, **MPI #48**].
 - i. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
- 5. Alkyd Varnish System over Stain: [**MPI RIN 6.4F**] <Insert system description>.
 - a. Prime Coat: For [**MPI DSD 1**] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [**MPI DSD 2**] <Insert designation> degree of surface degradation, spot prime with Stain, Semi-Transparent, for Interior Wood[, **MPI #90**].

- c. Prime Coat: For **[MPI DSD 3] <Insert designation>** degree of surface degradation, fully prime coat with Stain, Semi-Transparent, for Interior Wood[, **MPI #90**].
 - d. Intermediate Coat: [Interior varnish matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Varnish, interior, flat (Gloss Level 1)[, **MPI #73**].
 - f. Topcoat: Varnish, interior, semigloss (Gloss Level 5)[, **MPI #74**].
 - g. Topcoat: Varnish, interior, gloss (Gloss Level 6)[, **MPI #75**].
 - h. Stain Color: Match [adjacent, cleaned wood of same type] [existing color] [color indicated on Drawings] <Insert color or requirement>.
- E. Wood [Floors] [and] [Stairs] <Insert item description or drawing designation, or both>:
1. Latex Porch and Floor System over Alkyd Primer: **[MPI RIN 6.5J] <Insert system description>** system[**over a transition coat**].
 - a. Prime Coat: For **[MPI DSD 1] <Insert designation>** degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2] <Insert designation>** degree of surface degradation, spot prime with Primer Sealer, Alkyd, Interior[, **MPI #45**].
 - c. Prime Coat: For **[MPI DSD 3] <Insert designation>** degree of surface degradation, fully prime coat with Primer Sealer, Alkyd, Interior[, **MPI #45**].
 - d. Intermediate Coat: [Floor Paint, Latex, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Floor paint, latex, low gloss[, **MPI #60**].
 - f. Topcoat: Floor paint, latex, gloss[, **MPI #68**].
 - g. Topcoat Additive: Manufacturer's standard additive to increase skid resistance of painted surface.
 - h. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
 2. Alkyd Floor Enamel System: **[MPI RIN 6.5A] <Insert system description>** system[**over a transition coat**].
 - a. Prime Coat: For **[MPI DSD 1] <Insert designation>** degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2] <Insert designation>** degree of surface degradation, spot prime with topcoat.
 - c. Prime Coat: For **[MPI DSD 3] <Insert designation>** degree of surface degradation, fully prime coat with topcoat.
 - d. Intermediate Coat: [Floor enamel matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Floor paint, alkyd, low gloss[, **MPI #59**].
 - f. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)[, **MPI #27**].
 - g. Topcoat Additive: Manufacturer's standard additive to increase skid resistance of painted surface.
 - h. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
 3. Polyurethane Varnish System (Clear): **[MPI RIN 6.5C] <Insert system description>**.
 - a. Prime Coat: For **[MPI DSD 1] <Insert designation>** degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2] <Insert designation>** degree of surface degradation, spot prime with topcoat.
 - c. Prime Coat: For **[MPI DSD 3] <Insert designation>** degree of surface degradation, fully prime coat with topcoat.
 - d. Intermediate Coat: [Interior varnish matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Varnish, interior, polyurethane, oil modified, gloss[, **MPI #56**].
 4. Two-Component Aliphatic Polyurethane System (Clear): **[MPI RIN 6.5G] <Insert system description>**.
 - a. Prime Coat: For **[MPI DSD 1] <Insert designation>** degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2] <Insert designation>** degree of surface degradation, spot prime with topcoat.

- c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with topcoat.
- d. Intermediate Coat: [Aliphatic polyurethane varnish matching topcoat] <Insert requirement or coating designation>.
- e. Topcoat: Varnish, aliphatic polyurethane, two-component[, **MPI #78**].
- 5. Moisture-Cured Polyurethane System (over Stain): **[MPI RIN 6.5L]** <Insert system description>.
 - a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Stain, Semi-Transparent, for Interior Wood[, **MPI #90**].
 - c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Stain, Semi-Transparent, for Interior Wood[, **MPI #90**].
 - d. Intermediate Coat: [Moisture-cured polyurethane varnish matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Varnish, polyurethane, moisture cured, gloss (Gloss Level 6)[, **MPI #31**].
 - f. Stain Color: Match [adjacent, cleaned wood of same type] [existing color] [color indicated on Drawings] <Insert color or requirement>.
- F. [Plaster] <Insert item description or drawing designation, or both>:
 - 1. Latex System over Waterborne Primer: **[MPI RIN 9.2A]** <Insert system description> system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer Sealer, Latex, Interior[, **MPI #50**].
 - c. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Stain Blocking, Water Based[, **MPI #137**].
 - d. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer Sealer, Latex, Interior[, **MPI #50**].
 - e. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Stain Blocking, Water Based[, **MPI #137**].
 - f. Intermediate Coat: [Latex matching topcoat] <Insert requirement or coating designation>.
 - g. Topcoat: Latex, interior, flat (Gloss Level 1)[, **MPI #53**].
 - h. Topcoat: Latex, interior (Gloss Level 2)[, **MPI #44**].
 - i. Topcoat: Latex, interior (Gloss Level 3)[, **MPI #52**].
 - j. Topcoat: Latex, interior (Gloss Level 4)[, **MPI #43**].
 - k. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, **MPI #54**].
 - l. Topcoat: Latex, interior, gloss (Gloss Level 6)[, **MPI #114**].
 - m. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
 - 2. Low-Odor Latex System over Waterborne Primer: **[MPI RIN 9.2M]** <Insert system description> system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer Sealer, Latex, Interior[, **MPI #50**].
 - c. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Stain Blocking, Water Based[, **MPI #137**].
 - d. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer Sealer, Latex, Interior[, **MPI #50**].
 - e. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Stain Blocking, Water Based[, **MPI #137**].
 - f. Topcoat: Latex, interior, institutional low odor/VOC flat (Gloss Level 1)[, **MPI #143**].
 - g. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 2)[, **MPI #144**].
 - h. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 3)[, **MPI #145**].
 - i. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 4)[, **MPI #146**].
 - j. Topcoat: Latex, interior, institutional low odor/VOC, semigloss (Gloss Level 5)[, **MPI #147**].
 - k. Topcoat: Latex, interior, institutional low odor/VOC, gloss (Gloss Level 6)[, **MPI #148**].

- l. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
3. Latex System over Alkyd Primer: [MPI RIN 9.2K] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer Sealer, Alkyd, Interior[, MPI #45].
 - c. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat Primer Sealer, Alkyd, Interior[, MPI #45].
 - d. Intermediate Coat: [Latex matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, interior, flat (Gloss Level 1)[, MPI #53].
 - f. Topcoat: Latex, interior (Gloss Level 2)[, MPI #44].
 - g. Topcoat: Latex, interior (Gloss Level 3)[, MPI #52].
 - h. Topcoat: Latex, interior (Gloss Level 4)[, MPI #43].
 - i. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, MPI #54].
 - j. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.
4. Alkyd System: [MPI RIN 9.2C] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer Sealer, Latex, Interior[, MPI #50].
 - c. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer, Stain Blocking, Water Based[, MPI #137].
 - d. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with Primer Sealer, Latex, Interior[, MPI #50].
 - e. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with Primer, Stain Blocking, Water Based[, MPI #137].
 - f. Intermediate Coat: [Alkyd, matching topcoat] <Insert requirement or coating designation>.
 - g. Topcoat: Alkyd, interior, flat (Gloss Level 1)[, MPI #49].
 - h. Topcoat: Alkyd, interior (Gloss Level 3)[, MPI #51].
 - i. Topcoat: Alkyd, interior, semigloss (Gloss Level 5)[, MPI #47].
 - j. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, MPI #48].
 - k. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [existing colors] [colors indicated on Drawings] <Insert color(s) or requirement>.

END OF SECTION

SECTION 090320 HISTORIC TREATMENT OF PLASTER

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Repair[**and replacement**] of historic [interior] [and] [exterior] lime plaster.
 - 2. Repair[**and replacement**] of interior gypsum plaster.
 - 3. Replication of cast [lime] [and] [gypsum] plasterwork.

1.2 ALLOWANCES

- A. Allowances for historic treatment of plaster are specified in Section 012100 "Allowances."
 - 1. Perform historic treatment of plaster under quantity allowances and only as authorized. Authorized work includes [work required by Drawings and Specifications and] [only] work as directed in writing by Architect.
 - 2. Notify Architect [weekly] <Insert time interval> of extent of work performed that is attributable to quantity allowances.
 - 3. Perform work that exceeds quantity allowances only as authorized by Change Orders.
- B. Historic plaster repair and replacement is part of historic plaster repair allowance unless otherwise indicated.
- C. Repair and replace plasterwork in ballroom as part of <Insert name of allowance>.
- D. Repair plasterwork in first floor service corridor as part of <Insert name of allowance>.

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."
 - 1. Unit prices apply to authorized work covered by [quantity allowances] [estimated quantities].
 - 2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.
 - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to historic treatment of plaster.
 - 2. Review methods and procedures related to historic treatment of plaster 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, colors, patterns, and sequencing.
 - c. Fire-protection plan.
 - d. Plasterwork historic treatment program.
 - e. Coordination with building occupants.

1.5 SEQUENCING AND SCHEDULING

- A. Perform historic treatment of plaster in the following sequence, which includes work specified in this and other Sections:
 - 1. Dismantle existing surface-mounted objects and hardware that overlie plaster surfaces 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 plaster surfaces.
 - 4. Clean plaster surface and remove paint and other finishes to the extent required.

5. Repair and replace existing plaster and supports to the degree required for a uniform, tightly adhered surface on which to paint or apply other finishes.
6. Cure repaired surfaces and allow them to dry for proper finishing.
7. Paint and apply other finishes.
8. Reinstall dismantled surface-mounted objects and hardware unless otherwise indicated.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. Include recommendations for product application and use.
- B. Shop Drawings: For each configuration of **[new or replicated plaster molding and ornament]** **<Insert item>** required for the work.
 1. Include plans, elevations, and sections that show locations and extent of work.
 2. Show full-size details of configurations, joint locations, and attachments to other work.
- C. Samples for Initial Selection: For each exposed product that will be exposed and not be painted or otherwise finished and for each color and texture specified.
- D. Samples for Verification: For the following products:
 1. Cast Plaster: Each type and form of cast-plaster fabrication.
 - a. Patterns for Casting: Before manufacturing cast-plaster fabrications, submit the actual patterns from which molds will be made for casting new units. Package and ship to prevent loss or damage or make patterns available for inspection by Architect at fabrication plant.
 - b. Cast-Plaster Fabrications: Provide one unit of each shape and surface design, suitable and ready for installation. **[Submit unit samples after acceptance of patterns for casting.]**
 2. Linear Moldings: 24-inch- (610-mm-)long section of each configuration wet-applied molding with finished joint. Show complete pattern and applied nonlinear cast-plaster shapes, if any.
 3. Nonlinear Shapes: Full-size unit of each configuration.
 4. Wood Lath: 18-inch- (450-mm-)long section.
 5. Metal Lath: 18 inches (450 mm)square.
 6. Accessories: Each type in manufacturer's standard size.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified [historic treatment specialist] [and] [cast-plaster manufacturer].
- B. Plasterwork Historic Treatment Program: Submit before work begins.

1.8 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic plastering specialist with expertise in matching and performing the types of historic plasterwork repairs required. Experience only in installing and repairing new plasterwork, veneer plaster, or gypsum board is insufficient experience for historic treatment work.
- B. Cast-Plaster Manufacturer Qualifications: A firm regularly engaged in manufacturing custom-cast plasterwork for building restoration purposes, of same types and of similar size, complexity, and tolerances as those required for the Work.
- C. Plasterwork Historic Treatment Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for historic treatment work and protection of surrounding materials and Project site.
 1. Include methods and procedures to protect plastered surfaces from damage caused by construction operations, including, but not limited to, exposure to moisture, vibration, mechanical damage, and soiling.
 2. 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 processes for each type of plaster repair and reconstruction work to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation.
 1. Locate mockups [on existing surfaces where directed by Architect] [in locations that enable viewing under same conditions as the completed Work] <Insert requirement>.
 2. Number and Size: [Two] <Insert number> wall surfaces of at least [50 sq. ft. (4.5 sq. m)] <Insert size> or approximately [48 inches (1200 mm)] <Insert dimension> in least dimension to represent surfaces and conditions for application of each type of plaster repair and reconstruction under same conditions as the completed Work. Include at least the following:
 - a. Install [4-sq. ft. (4-sq. m)] <Insert value> area of wet-applied plaster replacement[with grooves simulating stone joints, as indicated] <Insert requirement>.
 - b. Patch [10-sq. ft. (1-sq. m)] <Insert value> area of wet-applied plaster replacement[with grooves simulating stone joints, as indicated] <Insert requirement>.
 - c. Install [6 linear ft. (2 m)] <Insert dimension> of wet-applied plaster molding.
 - d. Install [6 linear ft. (2 m)] <Insert dimension> of cast-plaster molding, but not less than [two] <Insert number> cast units.
 - e. Repair [3 linear ft. (1 m)] <Insert dimension> of plaster cracks.
 - f. Reattach [4-sq. ft. (4-sq. m)] <Insert value> area of delaminated plaster that has not fallen.
 3. Simulate finished lighting conditions for review of mockups.
 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.

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 materials on elevated platforms, under cover, and in a dry location with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
- C. Store hydrated lime and factory-prepared lime putty in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
- D. Store materials not in use in tightly covered containers.
- E. Store lime putty covered with water in sealed containers.
- F. Store sand where grading and other required characteristics can be maintained and contamination avoided.
- G. Handle cast-plaster fabrications to prevent overstressing, chipping, defacement, and other damage.

1.10 FIELD CONDITIONS

- A. Comply with plaster-material manufacturers' written instructions.[**For gypsum plaster, also comply with ASTM C842 requirements.**]
- B. Temperatures: Maintain temperatures in work areas at not less than 55 deg F (13 deg C) or greater than 80 deg F (27 deg C) for at least seven days before application of plaster, continuously during application, and for seven days after plaster has set or until plaster has dried.
- C. Conditioning: Acclimatize cast-plaster fabrications to ambient temperature and humidity of spaces in which they are installed. Remove packaging and move units into installation spaces not less than 48 hours before installing them.

- D. Field Measurements: Where cast-plaster fabrications are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- E. Avoid conditions that result in plaster drying out too quickly.
 - 1. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
 - 2. Maintain relative humidity levels for prevailing ambient temperature that produce normal drying conditions.
 - 3. Ventilate work areas in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.

1.11 REUSABLE PLASTER MOLDS AND PATTERNS

- A. On completion of the manufacturing of cast units, deliver **[one unused mold]** **[and]** **[pattern]** of each shape and size of unit delivered to Project site. Deliver to a location and at a time determined by Owner, to become Owner's property.
- B. Identify each piece whether it was sized for casting lime- or gypsum-plaster fabrications and where the fabrications were used.
- C. Have molds delivered 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.

PART 2 PRODUCTS

2.1 LIME-PLASTER MATERIALS

- A. Hydrated Lime: ASTM C206, **[Type S]** **[or]** **[Type N]**.
- B. Lime Putty: [Slaked hydrated lime] **[or]** [factory-prepared lime putty according to ASTM C1489].
- C. Sand Aggregates: ASTM C897.
 - 1. Finish-Coat Sand: [Match size, texture, and gradation of existing sand as closely as possible. Blend several sands if necessary to achieve suitable match] **<Insert requirement>**.
- D. Pigments for Colored Plaster: ASTM C979/C979M and having a record of satisfactory performance in lime plaster.
- E. Fiber: 1/2 to 1 inch (13 to 25 mm) in length; composed of [cattle, goat, or hog hair or body hair from horses] [natural linen, cotton, hemp, or jute fiber] **[or]** [alkali-resistant glass or polypropylene fiber] **<Insert requirement>**; free of grease, waxes, and oils; and beaten well to separate fibers before blending into unfibered plaster material.
 - 1. Proportion of Fiber to Unfibered Plaster Material: **[3.5 oz./cu. ft. (3.5 g/L) of unfibered plaster material]** **<Insert value>**, adjusted as required to produce a well-fibered, cohesive, spreadable, stiff mix with fibers uniformly distributed.
- F. Fabric Reinforcing: [Coarse, open-weave, sackcloth made of natural linen, cotton, hemp, or jute; free of grease and oils] [Coarse, open-weave, alkali-resistant fiberglass or polypropylene fabric] **<Insert requirement>**; free of grease, waxes, and oils.

2.2 GYPSUM PLASTER MATERIALS

- A. Gypsum Materials:
 - 1. Lightweight Gypsum Ready-Mixed Plaster: ASTM C28/C28M, with mill-mixed perlite aggregate.
 - 2. Gypsum Neat Plaster: ASTM C28/C28M for use with job-mixed aggregates.
 - 3. Gypsum Wood-Fibered Plaster: ASTM C28/C28M.

4. High-Strength Gypsum Neat Plaster: ASTM C28/C28M; with a minimum, average, dry compressive strength of 2800 psi (19 MPa) per ASTM C472 for a mix of 100 lb (45 kg) of plaster and 2 cu. ft. (0.06 cu. m) of sand.
 5. Gypsum Gaging Plaster: ASTM C28/C28M.
 6. High-Strength Gypsum Gaging Plaster: ASTM C28/C28M; with a minimum, average, dry compressive strength of 5000 psi (34 MPa) per ASTM C472 for a neat mix.
 7. Gypsum Ready-Mixed Finish Plaster: ASTM C28/C28M; manufacturer's standard, mill-mixed, gaged, interior finish.
 8. Gypsum Keene's Cement: ASTM C61/C61M.
- B. Hydrated Lime: ASTM C206, **[Type S]** [or] **[Type N]**.
- C. Aggregates:
1. Aggregate for Base-Coat Plasters: ASTM C35, **[sand]** **[perlite]**.
 2. Aggregate for Float Finishes: ASTM C35, **[sand]** **[perlite]**; graded per ASTM C842.
- D. Fiber: 1/2 to 1 inch (13 to 25 mm) in length; composed of [cattle, goat, or hog hair or body hair from horses] [natural linen, cotton, hemp, or jute fiber] [or] [glass or polypropylene fiber] <Insert requirement>; free of grease, waxes, and oils; and beaten well to separate fibers before blending into unfibered plaster material.
1. Proportion of Fiber to Unfibered Plaster Material: **[3.5 oz./cu. ft. (3.5 g/L) of unfibered plaster material]** <Insert value>, adjusted as required to produce a well-fibered, cohesive, spreadable, stiff mix with fibers uniformly distributed.
- E. Fabric Reinforcing: [Coarse, open-weave, sackcloth made of natural linen, cotton, hemp, or jute; free of grease and oils] [Coarse, open-weave, alkali-resistant fiberglass or polypropylene fabric] <Insert requirement>; free of grease, waxes, and oils.
- F. Bonding Compound: ASTM C631.

2.3 LATH

- A. Wood Lath: **[1/4 inch by 1-1/4 inch (6 mm by 32 mm)]** <Insert dimensions> sound, straight-grained, wood strips
- B. Metal Lath:
1. Expanded-Metal Lath: ASTM C847, cold-rolled carbon-steel sheet, ASTM A653/A653M, G60 (Z180), hot-dip galvanized zinc coated.
 - a. Paper Backing: Kraft paper factory bonded to back of lath.
 - b. Diamond-Mesh Lath: [Flat] [Self-furring], **[2.5 lb/sq. yd. (1.4 kg/sq. m)]** **[3.4 lb/sq. yd. (1.8 kg/sq. m)]**.
 - c. Flat Rib Lath: Rib depth of not more than 1/8 inch (3 mm), **[2.75 lb/sq. yd. (1.5 kg/sq. m)]** **[3.4 lb/sq. yd. (1.8 kg/sq. m)]**.
 - d. 3/8-Inch (9.5-mm) Rib Lath: **[3.4 lb/sq. yd. (1.8 kg/sq. m)]** **[4 lb/sq. yd. (2.2 kg/sq. m)]**.

2.4 TRIM ACCESSORIES

- A. General: According to **[ASTM C1063 for lime plaster]** **[and]** **[ASTM C841 for gypsum plaster]**; coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
- B. Metal Accessories:
1. Cornerite: Fabricated from expanded-metal lath with ASTM A653/A653M, G60 (Z180), hot-dip galvanized zinc coating.
 2. Striplath: Fabricated from expanded-metal lath with ASTM A653/A653M, G60 (Z180), hot-dip galvanized zinc coating.
 3. Cornerbeads: Fabricated from **[zinc]** **[or]** **[zinc-coated (galvanized) steel]**.
 - a. Small nose cornerbead with expanded flanges; use unless otherwise indicated.
 - b. Small nose cornerbead with perforated flanges; use on curved corners.
 - c. Small nose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing unit masonry corners.

- d. Bull nose cornerbead, radius of 3/4 inch (19 mm) minimum, with expanded flanges; use at locations indicated on Drawings.
4. Casing Beads: Fabricated from **[zinc] [or] [zinc-coated (galvanized) steel]**; square-edged style; with expanded flanges.
5. Control Joints: Fabricated from **[zinc] [or] [zinc-coated (galvanized) steel]**; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
6. Expansion Joints: Fabricated from **[zinc] [or] [zinc-coated (galvanized) steel]**; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
7. Two-Piece Expansion Joints: Fabricated from **[zinc] [or] [zinc-coated (galvanized) steel]**; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8 inch (6 to 16 mm) wide; with perforated flanges.

2.5 MISCELLANEOUS MATERIALS

- A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
- B. Fasteners for Attaching Lath to Substrates:
 1. For Lime Plaster: ASTM C1063.
 2. For Gypsum Plaster: ASTM C841.
 3. For Wood Lath: ASTM C841 requirements for wood-floor-runner or wood-furring fasteners unless otherwise indicated on Drawings.
- C. Wire Ties: ASTM A641/A641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch (1.21-mm) diameter, unless otherwise indicated.
- D. Plaster-Stabilization Materials: Acrylic emulsion(s) and related installation products shall have proven effectiveness in reattaching delaminated plaster and shall have been used previously by historic treatment specialist with successful results.
 1. Acrylic Emulsion(s), General: Aqueous emulsion(s) of acrylic polymer, adhesive to plaster and plaster substrates, nontoxic, and non-reemulsifiable after curing.
 2. Prewet Solution: Low-viscosity acrylic emulsion.
 3. Adhesive: Thickened acrylic emulsion; thickener as recommended in writing by resin manufacturer and historic treatment specialist.
- 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. 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 contract.
 - b. Leave an unintended residue on surfaces.

2.6 CAST-PLASTER FABRICATIONS

- A. General: Fabricate cast-plaster units with uniformly finished surfaces and sharply defined details; repair hollows, voids, scratches, and other surface imperfections.
 1. Fabricate units of sizes and shapes to match similar existing plasterwork unless otherwise indicated.
 2. Fabricate units in lengths and sizes that minimize number of joints between abutting units unless otherwise indicated.
 3. Configure joints between units so that they may be finished flush or otherwise concealed inconspicuously.
 4. Maximum deviation from true line, size, or shape shall be **[1/16 inch (2 mm)] <Insert dimension>**, noncumulative.

- B. Composition: Fabricate units from **[lime-]** **[and]** **[gypsum-]**plaster materials. Reinforce units with **[fiber]** **[or]** **[fabric reinforcing]** **<Insert requirement>**.
 - 1. Plaster Face: Molding plaster with or without aggregate as is standard with manufacturer for required surface finish.
 - 2. Plaster Backup: Molding plaster with or without aggregate, but with high-proportion of plaster-saturated fiber or fabric reinforcing as is standard with manufacturer.
- C. Thickness: Not less than **[3/16-inch (5-mm)]** **<Insert dimension>** thickness of plaster material at any point[, except for surface-applied, fine plaster tracery as indicated on Drawings].
- D. Finish: [Smooth for paint finish] **<Insert finish>**.
- E. Embedments: Incorporate manufacturer's standard embedments for attaching units to supporting elements unless otherwise indicated. Place embedments to develop the full strength of cast-plaster fabrications. Cover embedments with not less than **[3/16-inch (5-mm)]** **<Insert dimension>** thickness of reinforced plaster material.
- F. Joint-Treatment Materials: As recommended in writing by manufacturer.

PART 3 EXECUTION

3.1 HISTORIC TREATMENT SPECIALIST

- A. Historic Treatment Specialist Firms: Subject to compliance with requirements, [provide historic treatment of plaster by one of the following] [firms that may provide historic treatment of plaster include, but are not limited to, the following]:
 - 1. **<Insert, in separate subparagraphs, names of historic treatment specialist firms>**.

3.2 HISTORIC TREATMENT OF PLASTER, GENERAL

- A. Historic Treatment Appearance Standard: Completed work is to have a uniform appearance as viewed by Architect from building interior at **[5 feet (1.5 m)]** **[10 feet (3 m)]** **<Insert distance>** away from surface and from building exterior at **[20 feet (6 m)]** **[50 feet (15 m)]** **<Insert distance>** away from surface.
- B. General: In treating historic plaster, disturb it as minimally as possible and as follows unless otherwise indicated:
 - 1. Dismantle loose, damaged, or deteriorated plaster, lath, and support systems that cannot be repaired.
 - 2. Verify extent of plaster deterioration against that indicated on Drawings. Consult Architect on types and extent of required work.
 - 3. Verify that substrate surface conditions are suitable for repairs.
 - 4. Provide lath, furring, and support systems for plaster included in the work of this Section.
 - 5. Replace lost details in new, wet-applied and cast plaster that replicate existing or indicated plaster configurations.
 - 6. Leave repaired plasterwork in proper condition for painting or applying other finishes as indicated.
 - 7. Install temporary protective measures to protect historic surfaces that shall be treated later.
- C. Illumination: Perform plastering work with adequate, uniform illumination that does not distort the flatness or curvature of surfaces.

3.3 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate and environmental conditions, installation tolerances, and other conditions affecting performance of the Work.
 - 1. If existing substrates cannot be prepared to an acceptable condition for plastering work, notify Architect in writing.

2. Notify Architect of undocumented detrimental conditions including cracks, bulges, loose backup, rotted wood, rusted metal, and other deteriorated items.
- B. Masonry Substrates: Verify that mortar joints are struck flush. Notify Architect of undocumented masonry substrate without flush joints. Proceed with plastering as directed by Architect.
 - C. Begin historic plastering work only after unsatisfactory conditions have been corrected.

3.4 PREPARATION FOR PLASTERING

- A. Substrates: Prepare according to plaster manufacturer's written instructions and as follows:
 1. Clean surfaces to remove dust, loose particles, grease, oil, incompatible curing compounds, form-release agents, and other foreign matter and deposits that could impair bond with plaster.
 2. Remove ridges and protrusions greater than 1/8 inch (3 mm) and fill depressions greater than 1/4 inch (6 mm) with patching material. Allow to set and dry.

3.5 PLASTER REMOVAL AND REPLACEMENT, GENERAL

- A. Dismantle plaster that is damaged or deteriorated to the limits indicated. Carefully dismantle areas along straight edges that lie over supports, without damaging surrounding plasterwork.
- B. Maintain lath and supporting members in an undamaged condition so far as practicable. Dismantle damaged lath and supports that cannot be repaired or resecured and replace with new work of same type.
- C. Notify Architect of undocumented detrimental conditions including cracks, bulges, loose backup, rotted wood, rusted metal, and other deteriorated items.
- D. Do not deviate more than plus or minus 1/8 inch in 10 feet (3 mm in 3 m) from a true plane in finished plaster surfaces, as measured by a 10-foot (3-m) straightedge placed on surface.
- E. Clean substrate surfaces to remove grease, waxes, oils, waterborne staining, debris, and other foreign matter and deposits that could impair bond with repair material.
- F. Wet **[wood lath]** **[masonry]** **[and]** **[concrete]** bases before plaster application. Keep substrate damp to the touch but without visible water droplets.
- G. Wet remaining plaster abutting the replacement plaster before installing new plasterwork.
- H. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
- I. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

3.6 FLAT LIME-PLASTER REMOVAL AND REPLACEMENT <INSERT DRAWING DESIGNATION>

- A. General: Dismantle deteriorated plaster to existing sound plaster **[at locations indicated on Drawings]**.
 1. Inspect for lath deterioration. If any, replace lath.
 2. Sand bonding surfaces of repair area, and clean the surface with a nonmetallic bristle brush.
 3. Wet substrate to damp condition, but without visible water droplets, then install new plaster to original profiles.
- B. Lime-Plaster Base Coats:
 1. Scratch Coat: [1 part lime putty, 2-1/2 parts base-coat sand] [1 part lime putty, 2-1/2 parts base-coat sand, and fiber] <Insert mix>.[Add hair fiber to mix and evenly distribute it without clumps just before spreading.]
 2. Brown Coat: [1 part lime putty, 3 parts base-coat sand] <Insert mix>.
- C. Lime-Plaster Finish Coats:

1. Finish-Coat Mix for Smooth-Troweled Finish: [As required to match finish of design reference sample] [3 parts lime putty, 1 part finish-coat sand] <Insert requirement or proportions>.
 2. Finish-Coat Mix for Smooth-Float Finish: [As required to match finish of design reference sample] [1 part lime putty, 1 part finish-coat sand] <Insert requirement or proportions> <Insert proportions>.
 3. Finish-Coat Mix for Sandy Float Finish: [As required to match finish of design reference sample] [1 part lime putty, 3 parts finish-coat sand] <Insert requirement or proportions>.
- D. Lime-Plaster Finishes: [Match finish(es) of design reference sample(s)] <Insert requirement>.
1. Provide smooth-troweled finish [unless otherwise indicated] [where indicated] <Insert locations>. Apply in [one layer] [two layers] [three layers] <Insert quantity> totaling [1/16 inch (2 mm)] [1/8 inch (3 mm)] [3/16 inch (5 mm)] thick.
 2. Provide smooth-float finish [unless otherwise indicated] [where indicated] <Insert locations>. Apply in [one layer] [two layers] [three layers] <Insert quantity> totaling [1/16 inch (2 mm)] [1/8 inch (3 mm)] [3/16 inch (5 mm)] thick.
 3. Provide sandy-float finish [unless otherwise indicated] [where indicated] <Insert locations>. Apply in [one layer] [two layers] [three layers] <Insert quantity> totaling [1/16 inch (2 mm)] [1/8 inch (3 mm)] [3/16 inch (5 mm)] thick.
- E. Hairline cracking within the plaster or plaster separation at edge of a replacement is unacceptable. Completely dismantle such work and reinstall or repair as a crack repair.

3.7 FLAT GYPSUM-PLASTER REMOVAL AND REPLACEMENT <INSERT DRAWING DESIGNATION>

- A. General: Dismantle deteriorated plaster to existing sound plaster[**at locations indicated on Drawings**]. Use replacement plaster mixes of gypsum, lime, and aggregate; and application according to ASTM C842 unless otherwise indicated.
1. Inspect for lath deterioration. If any, replace lath.
 2. Sand bonding surfaces of repair area, and clean the surface with a nonmetallic bristle brush.
 3. Wet substrate to damp condition, but without visible water droplets, then install new plaster to original profiles.
- B. Bonding Compound: Apply on [unit masonry] [and] [concrete] plaster bases.
- C. Gypsum-Plaster Base Coats:
1. Base Coats over Wood Lath: Gypsum [neat plaster with job-mixed sand and fiber] [wood-fibered plaster with job-mixed sand] [lightweight ready-mixed plaster with fiber] <Insert mix>.
 2. Base Coats over Expanded-Metal Lath: [High-strength gypsum] [Gypsum neat] plaster with job-mixed sand for scratch and brown coats.[**Add fiber to scratch coat.**]
 3. Base Coats over Expanded-Metal Lath:
 - a. Scratch Coat: Gypsum wood-fibered plaster; neat or with job-mixed sand.
 - b. Brown Coat: Gypsum [wood-fibered plaster with job-mixed sand] [neat plaster with job-mixed sand] [lightweight ready-mixed plaster] [neat plaster with job-mixed perlite].
 4. Base Coats over Unit Masonry: Gypsum [wood-fibered plaster with job-mixed sand] [neat plaster with job-mixed sand] [lightweight ready-mixed plaster] <Insert mix>.
 5. Base-Coat Mix over Monolithic Concrete: [Gypsum neat plaster with job-mixed sand] <Insert mix>.
- D. Gypsum-Plaster Finish Coats:
1. Finish-Coat Mix for Smooth-Troweled Finishes: [Gypsum gaging plaster] [Gypsum ready-mixed finish plaster] [High-strength gypsum gaging plaster] [Gypsum Keene's cement] <Insert finish-coat plaster>.
 2. Finish-Coat Mix for Float Finishes: [Gypsum gaging plaster] [Gypsum Keene's cement] <Insert finish-coat plaster>.
 3. Finish-Coat Mix for Textured Finishes: [Gypsum ready-mixed finish plaster] <Insert finish-coat plaster>.
- E. Gypsum-Plaster Finishes: [Match finish(es) of design reference sample(s)] <Insert requirement>.
1. Provide troweled finish [unless otherwise indicated] [where indicated] <Insert locations>.
 2. Provide float finish [unless otherwise indicated] [where indicated] <Insert locations>.

3. Provide textured finish [where indicated] <Insert locations>.

3.8 CAST-PLASTER REMOVAL AND REPLACEMENT <INSERT DRAWING DESIGNATION>

- A. General: Dismantle and replace cast-plaster that is damaged or deteriorated[**at locations indicated on Drawings**]. Carefully dismantle whole cast units from joint to joint, without damaging surrounding plasterwork.
 1. Coordinate removal and installation of cast plaster with other plaster repair and installation work.
 2. Inspect for deterioration of supporting plaster and lath, and repair or replace deteriorated material as required for a sound substrate.
 3. Maintain lath and supporting members in an undamaged condition so far as practicable. Dismantle damaged lath and supports that cannot be repaired or resecured and replace with new work of same type.
 4. Sand repair bonding surfaces and clean the surface with a nonmetallic bristle brush.
 5. Wetting Substrate: Wet to damp condition, but without visible water droplets.
- B. Replacement Material: Replace cast [**lime-plaster**] fabrications [**in kind**] [**or**] [**with cast gypsum-plaster fabrications**]. Replace cast gypsum-plaster fabrications with cast gypsum-plaster fabrications.
- C. Adhering Cast Plaster: [Wet the substrate in replacement area and affix cast plaster using finish-coat plaster for smooth-troweled finish as adhesive] <Insert requirement>. Support units until adhesive can fully support weight of plaster. Remove excess adhesive.
- D. Install cast-plaster fabrications level, plumb, true, and aligned with adjacent materials and ready to receive required finishes. Use concealed shims secured with wet plaster where required for alignment.
 1. Install replacement, cast-plaster units into bonding and coursing pattern of existing units.[**Maintain articulated joint widths, if any, between units to match existing joints.**]
 2. Finish nonarticulated joints with joint-treatment materials so that they are flush or otherwise concealed inconspicuously.
 3. Where cast-plaster units are joined to form composite fabrications, join units inconspicuously and as recommended in writing by manufacturer.
 4. Repair hollows, voids, scratches, and other surface imperfections on units.
- E. Hairline cracking within the plaster or plaster separation at edge of a replacement is unacceptable. Completely dismantle such work and reinstall or repair as a crack repair as directed by Architect.

3.9 REMOVING AND INSTALLING LATH AND ACCESSORIES

- A. General: Dismantle existing plaster as necessary to expose deteriorated or rusted lath, wire ties, and support system, back to firm substrates and supports. Repair with new materials, well secured to existing lath in good condition and to building structure.
 1. Cutting: Cut lath so it can be taken out completely from one support to the next. Cut to avoid cracking surrounding plaster.
 2. Cut out existing base-coat plaster beyond the edges of the new lath to permit new plaster to extend onto the old lath. Then step subsequent plaster coats to permit new plaster to extend over the old material.
 3. Fasten new lath to support system and to good existing lath. Wire tie at least every 6 inches (150 mm).
 4. Install new lath according to [ASTM C1063 for lime plaster] [and] [ASTM C841 for gypsum plaster].
- B. Notify Architect of undocumented detrimental conditions including cracks, bulges, loose backup, rotted wood, rusted metal, and other deteriorated items.

- C. Wood Lath: Install wood lath in same orientation and spacing as remaining wood lath and with lath ends supported by furring or framing. Stagger ends of adjacent laths over different supports, not aligned, and secure with fasteners at each end and spaced a maximum of 24 inches (610 mm) o.c. into supports.
- D. Metal Lath: Install according to [ASTM C1063 for lime plaster] [and] [ASTM C841 for gypsum plaster].
 - 1. Partition Framing and Vertical Furring: Install **[flat diamond-mesh] [flat rib]** lath.
 - 2. Flat-Ceiling and Horizontal Framing: Install **[flat diamond-mesh] [flat rib]** lath.
 - 3. Curved-Ceiling Framing: Install flat diamond-mesh lath.
 - 4. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.

3.10 PATCH-TYPE REPAIR <INSERT DRAWING DESIGNATION>

- A. General: Patch voids, fractured surfaces, and crushed areas in otherwise sound plaster that are larger than cracks[**at locations indicated on Drawings**].
 - 1. Notify Architect of undocumented detrimental conditions including cracks, bulges, loose backup, rotted wood, rusted metal, and other deteriorated items.
 - 2. Inspect for deterioration of supporting plaster and lath, and repair or replace deteriorated material as required for a sound substrate.
 - 3. Rake perimeter of hole to sound plaster, and slightly undercut existing plaster to enable replacement plaster to tuck behind existing plaster.
 - 4. Replace missing lath in kind. Bridge gaps in wood lath with expanded-metal lath, overlapping wood by 6 inches (150 mm) and fastening them together.
 - 5. Clean hole to remove loose materials and other foreign matter and deposits that could impair bond with repair material. Where grease, waxes, oils, waterborne staining, or other foreign matter and deposits that could impair bond with repair material have penetrated into the plaster, enlarge the hole to remove these deposits.
 - 6. Wet substrate to damp condition, but without visible water droplets, then install patch material to original profiles.
 - 7. Maintain adjacent plasterwork in an undamaged condition so far as practicable.
- B. Lime-Plaster Mix: [3 parts lime putty, 1 part gypsum neat plaster or gypsum gaging plaster] [1 part lime putty, 3 parts sand] [1 part lime putty, 2-1/2 parts sand, applied in two coats with fiber in first coat] [Repair mix demonstrated in mockup] <Insert proportions>.[Add hair fiber to mix and evenly distribute it without clumps just before spreading.]
- C. Gypsum-Plaster Mix: [Gypsum gaging plaster] [Gypsum neat plaster with job-mixed sand] [Gypsum neat plaster with job-mixed sand, applied in two coats with fiber in first coat] [Repair mix demonstrated in mockup] <Insert proportions>.[Add hair fiber to mix and evenly distribute it without clumps just before spreading.]
- D. Finishing: Finish flat surfaces flush and with same texture as adjacent existing plaster. For molded plaster shapes, tool surface to restore the sharp edges and the shape of the molded shape to original contours.
- E. Hairline cracking within the plaster or plaster separation at edge of a patch is unacceptable. Completely dismantle such work and reinstall or repair.

3.11 HAIRLINE CRACK REPAIR <INSERT DRAWING DESIGNATION>

- A. General: Repair cracks [**1/32 inch (1 mm)**] <Insert dimension> in width or narrower in otherwise sound plaster[**at locations indicated on Drawings**].
 - 1. Notify Architect of undocumented detrimental conditions including cracks, bulges, loose backup, rotted wood, rusted metal, and other deteriorated items.
 - 2. Maintain adjacent plasterwork in an undamaged condition so far as practicable.
- B. Existing Topcoat: Open crack in existing topcoat to at least [**1/8 inch (3 mm)**] <Insert dimension> in width and check for broken fiber reinforcement in base coats.

- C. Existing Base Coats: Do not open crack wider in existing base coats unless inspection or other indication shows that the fiber reinforcement has broken. Where inspections indicate failure of fiber reinforcement, proceed as for a large crack repair, but only for length of crack with broken fiber reinforcement.
- D. Clean out crack to remove loose materials and other foreign matter and deposits that could impair bond with repair material. Where grease, waxes, oils, waterborne staining, or other foreign matter and deposits that could impair bond with repair material have penetrated into the topcoat plaster, widen the crack and sand surface of the exposed basecoat to remove these deposits.
- E. Wet substrate to damp condition, but without visible water droplets.
- F. Force [finish-coat plaster without aggregate] [repair material demonstrated in mockup] <Insert requirement> into crack, filling crack to original plaster profile.
- G. Finishing: Finish flat surfaces flush and with same texture as adjacent existing plaster. For molded plaster shapes, tool surface to restore the sharp edges and the shape of the molded shape to original contours.

3.12 LARGE CRACK REPAIR <INSERT DRAWING DESIGNATION>

- A. General: Repair cracks over [**1/32 inch (1 mm)**] <Insert dimension> in width in otherwise sound plaster[**at locations indicated on Drawings**].
 - 1. Notify Architect of undocumented detrimental conditions including cracks, bulges, loose backup, rotted wood, rusted metal, and other deteriorated items.
 - 2. Maintain adjacent plasterwork in an undamaged condition so far as practicable.
- B. Open crack to at least [**1/8 inch (3 mm)**] <Insert dimension> in width and full depth with V-groove tool, and check for bond separation or lath deterioration.
- C. Abrade side surfaces of crack and remove inner crack debris by gouging (keying) the inside area of the crack.
- D. Clean out crack to remove loose materials and other foreign matter and deposits that could impair bond with repair material. Where grease, waxes, oils, waterborne staining, or other foreign matter and deposits that could impair bond with repair material have penetrated into the plaster, widen the crack to remove these deposits.
- E. Wet substrate to damp condition, but without visible water droplets.
- F. Install [finish-coat plaster] [repair material demonstrated in mockup] <Insert requirement> to fill crack to original plaster profile.
- G. Finishing: Finish flat surfaces flush and with same texture as adjacent existing plaster. For molded plaster shapes, tool surface to restore the sharp edges and the shape of the molded shape to original contours.
- H. Offset Cracks: If the crack is offset in surface plane by more than [**1/8 inch (3 mm)**] <Insert dimension>, dismantle the plaster on each side of the crack, a minimum width of 6 inches (150 mm) and down to the lath or other substrate. Then, repair as specified for flat-plaster removal and replacement.

3.13 REATTACHMENT OF DELAMINATED PLASTER <INSERT DRAWING DESIGNATION>

- A. General: Reattach plaster that has detached from its wooden lath[**at locations indicated on Drawings**].
 - 1. Notify Architect of undocumented detrimental conditions including cracks, bulges, loose backup, rotted wood, rusted metal, and other deteriorated items.
 - 2. Maintain adjacent plasterwork in an undamaged condition so far as practicable.

- B. Verify extent of detachment of plaster that has not yet fallen by tapping on plaster surface and evaluating the hollow or solid resonance.
- C. Protect floors from spillage and debris in the vicinity of work. Use materials resistant to the passage of fluids used in work.
- D. Drill 1/4-inch (6-mm) injection ports (holes) through the plaster spaced 3 to 6 inches (75 to 150 mm) apart over surface of detached plaster. Dislodge loose plaster particles, and vacuum debris from holes.
- E. Prewet injection ports, gaps at edges of lost plaster, back of plaster, and wooden lath with prewet solution.
- F. Inject adhesive into ports, enough to fill gaps between detached plaster and lath, and inject into gaps at edges of lost plaster.
- G. Clean off excess and smeared adhesive while wet.
- H. Apply temporary battens over surface of treated plaster to prevent further separation during repair work. Secure battens in place against plaster with [**screws through the battens and plaster and into the wood lath**] [**braces supported from floor below**] <Insert requirement>.
- I. Maintain temporary battens in place for a week or more, allowing adhesive to coalesce and dry.
- J. Remove battens, patch holes and missing plaster, and repair cracks.

3.14 INSTALLATION TOLERANCES

- A. Completed plaster installation shall not deviate from a true plane by more than [**1/8 inch (3 mm)**] <Insert dimension> as measured by a 5-foot (1.5-m) straightedge placed at any location on a surface, except where existing plaster is retained as a substrate for new plasterwork.

3.15 CLEANING AND PROTECTION

- A. Protect work of other trades against damage. Promptly remove plaster from surfaces not indicated to be repaired or plastered. Do not scratch or damage finished surfaces.
- B. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.
- C. Correct damage to other historic surfaces and to new work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. Remove temporary protection and enclosure of other work.

END OF SECTION

SECTION 090391 HISTORIC TREATMENT OF PLAIN PAINTING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes historic treatment of plain painting as follows:
 - 1. Removing existing paint.
 - 2. Repairing substrates.
 - 3. Plain painting of historic surfaces[, including staining and varnishing of historic wood].

1.2 ALLOWANCES

- A. Allowances for historic treatment of painting are specified in Section 012100 "Allowances."
 - 1. Perform historic treatment of painting under quantity allowances and only as authorized. Authorized work includes **[work required by Drawings and Specifications and] [only]** work as directed in writing by Architect.
 - 2. Notify Architect **[weekly] <Insert time interval>** of extent of work performed that is attributable to quantity allowances.
 - 3. Perform work that exceeds quantity allowances only as authorized by Change Orders.
- B. Provide preconstruction testing as part of testing and inspecting allowance.
- C. Repaint ballroom ceiling as part of **<Insert name of allowance>**.

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."
 - 1. Unit prices apply to authorized work covered by **[quantity allowances] [estimated quantities]**.
 - 2. Unit prices apply to authorized additions to and deletions from Work as authorized by Change Orders.

1.4 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.
- H. Historic Paint Materials: Paint materials manufactured to match historic paint formulations; either custom-formulated products or standard products of manufacturers of historic paint materials.
- I. Modern Paint Materials: Paint materials not designed to match historic paint formulations but that may be required to match historic paint colors.

- J. Plain Painting: For historic treatment, this means painting that requires attention to historic treatment requirements, but no special, decorative or artistic painting skill.
- K. Low-Pressure Spray: **[100 to 400 psi; 4 to 6 gpm]** <Insert range of values>.
- L. Medium-Pressure Spray: **[400 to 800 psi; 4 to 6 gpm]** <Insert range of values>.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** <Insert location>.
 - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to historic treatment of painting.
 - 2. Review methods and procedures related to historic treatment of painting 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, colors, patterns, and sequencing.
 - c. Fire-protection plan.
 - d. Plain painting historic treatment program.
 - e. Coordination with building occupants.

1.6 SEQUENCING AND SCHEDULING

- A. Perform historic treatment of painting in the following sequence, which includes work specified in this and other Sections:
 - 1. Dismantle existing surface-mounted objects and hardware 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 surfaces to be painted.
 - 4. Remove existing paint to the degree required for each substrate and surface condition of existing paint.
 - 5. Apply paint system.
 - 6. Reinstall dismantled surface-mounted objects and hardware unless otherwise indicated.

1.7 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. Sustainable Design Submittals:
 - 1. <Double click to insert sustainable design text for paints and coatings.>
- C. Samples: For each type of paint system and each pattern, color, and gloss; [in sizes indicated below] [minimum **6 inches** long in least dimension, but not less than whole pattern].
 - 1. Include stepped Samples defining each separate coat, including fillers and primers. Resubmit until each required sheen, color, and texture is achieved.
 - 2. For each painted color being matched to a standardized color-coding system, include the color chips from the color-coding-system company with Samples.
 - 3. Include a list of materials for each coat of each Sample.
 - 4. Label each Sample for location and application.
 - 5. Sample Size:
 - a. Plain Painted Surfaces: **[4-by-8-inch]** <Insert dimensions> Samples for each color and material, on hardboard.
 - b. Stained or Natural Wood: **[12-by-12-inch]** <Insert dimensions> Samples of natural- or stained-wood finish, on representative <Insert required species of wood> surfaces.
- D. Product List: For each paint product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current MPI's "MPI Approved Products List" for each MPI-product category specified in paint systems, with the proposed product highlighted.
3. VOC content.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For [historic treatment specialist(s)] [and] [paint-remover manufacturer].
- B. Plain Painting Historic Treatment Program: Submit before work begins.
- C. Color Matching Certificate: For computer color matching of historic colors.
- D. Preconstruction Test Reports: For cleaning materials, [paint removers] [and] [paint coatings and systems].

1.9 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra paint materials, from the same production run, that match products applied and that are packaged with protective covering for storage and identified with labels describing contents, including material, finish, source, and location on building.
 1. Quantity: Furnish Owner with an additional [3] [5] [7] <Insert number> percent, but not less than 1 gal. or one case, as appropriate, of each material and color applied.

1.10 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic painting specialist with expertise in matching and touching up existing painting. Experience only in new painting work is insufficient experience for historic treatment work.
- B. Paint-Remover Manufacturer Qualifications: A firm regularly engaged in producing paint removers that have been used for similar historic painting applications with successful results, and with factory-authorized service representatives who are available for consultation and Project-site inspection and on-site assistance.
- C. Color Matching: Custom computer-match paint colors to colors indicated [in historic painting schedule(s) at the end of Part 3] [in the Historic Structure Report] [on Drawings] <Insert requirement>.[For colors indicated by a standardized coding system, obtain a color chip for each color indicated from the color-coding-system company; computer match paint colors to the color chips.]
- D. Plain Painting 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 and control of runoff during cleaning, paint removal, repainting, and other processes.
 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.
- E. Mockups: Prepare mockups of historic treatment processes for each type of coating system and substrate indicated and each color and finish required to demonstrate aesthetic effects and to set quality standards for materials and execution. Duplicate appearance of approved Sample submittals.
 1. Locate mockups [on existing surfaces where directed by Architect] [in locations that enable viewing under same conditions as the completed Work] <Insert requirement>.
 2. Surface-Preparation Mockups: On existing surfaces using applicable specified methods of cleaning and other surface preparation, provide mockup sample of at least [100 sq. ft.] <Insert dimension>.

3. Coating Mockups: **[Two]** **<Insert number>** wall surfaces of at least **[100 sq. ft.]** **<Insert dimension>** to represent surfaces and conditions for application of each type of coating system under same conditions as the completed Work.
 - a. Plain painted surfaces.
 - b. Stained or natural wood.
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.

1.11 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified historic treatment specialist to perform preconstruction testing of cleaning materials, **[paint removers]** **[and]** **[compatibility of paint coatings and systems]** for each **[indicated]** type of historic painted surface.
 1. Use test areas as indicated and representative of proposed materials and existing construction.
 2. Propose changes to materials and methods to suit Project.

1.12 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste daily.

1.13 FIELD CONDITIONS

- A. Weather Limitations: Proceed with historic treatment of painting only when existing and forecasted weather conditions are within the environmental limits set by each manufacturer's written instructions and specified requirements.
- B. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer for surface preparation and during paint application and drying periods.
- D. Concealed and undocumented historic items, murals, and similar objects encountered during historic treatment remain Owner's property. Carefully protect each item or object.
 1. Coordinate with Owner's **[archaeologist]** **[historical adviser]** **<Insert requirement>**, who will establish special procedures for protection.

PART 2 PRODUCTS

2.1 PREPARATORY CLEANING MATERIALS

- A. Water: Potable.
- B. Hot Water: Water heated to a temperature of 140 to 160 deg F.
- C. 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 every 5 gal. of solution required.

- D. Mildewcide: Commercial proprietary mildewcide or a job-mixed 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.
- E. Abrasives for Ferrous Metal Cleaning: Aluminum oxide paper, emery paper, fine steel wool, steel scrapers, and steel-wire brushes of various sizes.
- F. Rust Remover: Manufacturer's standard phosphoric acid-based gel formulation, also called "naval jelly," for removing corrosion from iron and steel.

2.2 PAINT REMOVERS

- A. Alkaline Paste Paint Remover: Manufacturer's standard alkaline paste or gel formulation for removing paint from masonry, stone, wood, plaster, or metal as required to suit Project; and containing no methylene chloride.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Covered or Skin-Forming Alkaline Paint Remover: Manufacturer's standard covered or skin-forming alkaline paste or gel formulation for removing paint from masonry, stone, wood, plaster, or metal as required to suit Project; and containing no methylene chloride.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- C. Solvent-Type Paste Paint Remover: Manufacturer's standard water-rinsable, solvent-type paste or gel formulation for removing paint from masonry, stone, wood, plaster, or metal as required to suit Project.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- D. Low-Odor, Solvent-Type Paste Paint Remover: Manufacturer's standard low-odor, water-rinsable, solvent-type paste, gel, or foamed emulsion formulation for removing paint from masonry, stone, wood, plaster, or metal as required to suit Project; and containing no methanol or methylene chloride.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- E. Covered, Solvent-Type Paste Paint Remover: Manufacturer's standard, low-odor, covered, water-rinsable, solvent-type paste or gel formulation for removing paint from masonry, stone, wood, plaster, or metal as required to suit Project; and containing no methanol or methylene chloride.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2.3 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Colors: [As indicated with each paint system in historic painting schedule(s) at the end of Part 3] [Match Architect's samples] [As selected by Architect from full range of industry colors] <Insert requirement>.

2.4 HISTORIC PAINT MATERIALS

- A. <Double click to insert sustainable design text for paint.>
- B. Milk Paint: [Manufacturer's standard] <Insert requirement> casein paint emulsion produced primarily from organic milk casein, lime, pigments, and natural fillers; containing zero VOCs.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2. Bonding Agent: [Manufacturer's recommended] <Insert requirement> bonding admixture to improve paint adhesion over [residual existing coating] [latex joint compound] [latex paint] [and] [alkyd paint] <Insert requirement>.
3. Transition Coat: [Manufacturer's recommended] <Insert requirement> coating for [locations where existing coating is incompatible with milk paint] [locations indicated on Drawings] <Insert requirement>.
4. Sealer: [Manufacturer's recommended] <Insert requirement> clear[, matte] <Insert requirement> sealer for [high-traffic surfaces] [kitchen walls] <Insert requirement>.

2.5 MODERN PAINT MATERIALS, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. <Double click to insert sustainable design text for paint.>
- C. Transition Coat: Paint manufacturer's recommended coating for use where a residual existing coating is incompatible with the paint system.

2.6 MODERN PAINT MATERIAL MANUFACTURERS

- A. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2.7 MODERN PAINT MATERIALS

- A. Primers and Sealers:
 1. Primer Sealer, Latex, Interior:[**MPI #50.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 2. Primer, Latex, for Interior Wood:[**MPI #39.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 3. Primer Sealer, Alkyd, Interior:[**MPI #45.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 4. Undercoat, Enamel, Interior:[**MPI #46.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 5. Primer, Stain Blocking, Water Based:[**MPI #137.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 6. Alkyd, Sanding Sealer, Clear:[**MPI #102.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 7. Shellac:[**MPI #88.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 8. Stain, Semi-Transparent, for Interior Wood:[**MPI #90.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
- B. Metal Primers:
 1. Primer, Metal, Surface Tolerant:[**MPI #23.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 2. Primer, Alkyd, Anti-Corrosive for Metal:[**MPI #79.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 3. Primer, Rust-Inhibitive, Water Based:[**MPI #107.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 4. Primer, Zinc Rich, Organic:[**MPI #18.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 5. Primer, Zinc-Rich, Epoxy:[**MPI #20.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 6. Primer, Epoxy, Anti-Corrosive, for Metal:[**MPI #101.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
- C. Wood Primers:
 1. Primer, Latex for Exterior Wood:[**MPI #6.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 2. Primer, Alkyd for Exterior Wood:[**MPI #5.**]

- a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.

D. Water-Based Paints:

1. Latex, Exterior Flat (Gloss Level 1):[**MPI #10.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
2. Latex, Exterior Low Sheen (Gloss Levels 3-4):[**MPI #15.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
3. Latex, Exterior Semigloss (Gloss Level 5):[**MPI #11.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
4. Latex, Exterior, Gloss (Gloss Level 6):[**MPI #119.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
5. Latex, Interior, Flat, (Gloss Level 1):[**MPI #53.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
6. Latex, Interior, (Gloss Level 2):[**MPI #44.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
7. Latex, Interior, (Gloss Level 3):[**MPI #52.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
8. Latex, Interior, (Gloss Level 4):[**MPI #43.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
9. Latex, Interior, Semigloss, (Gloss Level 5):[**MPI #54.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
10. Latex, Interior, Gloss, (Gloss Level 6, except Minimum Gloss of 65 Units at 60 Degrees):[**MPI #114.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
11. Latex, Interior, Institutional Low Odor/VOC, Flat (Gloss Level 1):[**MPI #143.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
12. Latex, Interior, Institutional Low Odor/VOC (Gloss Level 2):[**MPI #144.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
13. Latex, Interior, Institutional Low Odor/VOC (Gloss Level 3):[**MPI #145.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
14. Latex, Interior, Institutional Low Odor/VOC (Gloss Level 4):[**MPI #146.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
15. Latex, Interior, Institutional Low Odor/VOC, Semigloss (Gloss Level 5):[**MPI #147.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
16. Latex, Interior, Institutional Low Odor/VOC, Gloss (Gloss Level 6):[**MPI #148.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.

E. Solvent-Based Paints:

1. Alkyd, Exterior Flat (Gloss Level 1):[**MPI #8.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
2. Alkyd, Exterior, Semigloss (Gloss Level 5):[**MPI #94.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
3. Alkyd, Exterior Gloss (Gloss Level 6):[**MPI #9.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
4. Alkyd, Interior, Flat (Gloss Level 1):[**MPI #49.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
5. Alkyd, Interior, (Gloss Level 3):[**MPI #51.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
6. Alkyd, Interior, Semigloss (Gloss Level 5):[**MPI #47.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
7. Alkyd, Interior, Gloss (Gloss Level 6):[**MPI #48.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.

F. Floor Coatings:

1. Floor Paint, Latex, Low Gloss (Maximum Gloss Level 3):[**MPI #60.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
2. Floor Paint, Latex, Gloss[**MPI #68.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
3. Floor Paint, Alkyd, Low Gloss (Gloss Level 6):[**MPI #59.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.

4. Floor Enamel, Alkyd, Gloss (Gloss Level 6):[**MPI #27.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
- G. Solvent-Based Varnishes:
 1. Varnish, with UV Inhibitor, Exterior, Semigloss (Gloss Level 5):[**MPI #30.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 2. Varnish, with UV Inhibitor, Exterior, Gloss (Gloss Level 6):[**MPI #29.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 3. Varnish, Marine Spar, Exterior, Gloss (Gloss Level 7):[**MPI #28.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 4. Varnish, Interior, Flat (Gloss Level 1):[**MPI #73.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 5. Varnish, Interior, Semigloss (Gloss Level 5):[**MPI #74.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 6. Varnish, Interior, Gloss (Gloss Level 6):[**MPI #75.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
- H. Epoxy Coatings:
 1. Epoxy, Gloss:[**MPI #77.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 2. Epoxy, High-Build, Low Gloss:[**MPI #108.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
- I. Polyurethane Coatings:
 1. Polyurethane, Two-Component, Pigmented, Gloss (Gloss Level 6):[**MPI #72.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
- J. Polyurethane Varnishes:
 1. Varnish, Interior, Polyurethane, Oil-Modified, Gloss (Gloss Level 6):[**MPI #56.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 2. Varnish, Polyurethane, Moisture-Cured, Gloss (Gloss Level 6):[**MPI #31.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.
 3. Varnish, Aliphatic Polyurethane, Two Component (Gloss Level 6 or 7):[**MPI #78.**]
 - a. [Basis-of-Design Product:] <Insert manufacturer's name; product name or designation>.

2.8 PATCHING MATERIALS

- A. 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. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Metal Patching Compound: Two-part, 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 metal that has deteriorated due to corrosion. Filler shall be capable of filling deep holes and spreading to feather edge.
- C. Cementitious Patching Compounds: Cementitious patching compounds and repair materials specifically manufactured for filling cementitious substrates and for sanding or tooling prior to repainting; formulation as recommended in writing by manufacturer for type of cementitious substrate indicated, exposure to weather and traffic, the detail of work, and site conditions.
- D. Gypsum-Plaster Patching Compound: Finish coat plaster and bonding compound according to ASTM C842 and manufacturer's written instructions.

PART 3 EXECUTION

3.1 HISTORIC TREATMENT SPECIALIST

- A. Historic Treatment Specialist Firms: Subject to compliance with requirements, [provide historic treatment of plain painting by one of the following] [firms that may provide historic treatment of plain painting include, but are not limited to, the following]:
1. <Insert, in separate subparagraphs, names of historic treatment specialist firms>.

3.2 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 proven to resist chemical solutions being used unless the solutions will not damage adjacent surfaces. Use protective materials that are UV resistant and waterproof. 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 sufficient force to spread them to unprotected surfaces.
 3. Neutralize and collect 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.

3.3 HISTORIC TREATMENT OF PAINTING, GENERAL

- A. Historic Treatment Appearance Standard: Completed work is to have a uniform appearance as viewed by Architect from building interior at [5 feet] [10 feet] <Insert distance> away from painted surface and from building exterior at [20 feet] [50 feet] <Insert distance> away from painted surface.
- B. Execution of the Work: In treating historic items, disturb them as minimally as possible and as follows:
1. Remove failed coatings and corrosion and repaint.
 2. Verify that substrate surface conditions are suitable for painting.
 3. Allow other trades to repair items in place and retain as much original material as possible before repainting.
 4. Reproduce original, historic paint systems where indicated or scheduled.
 5. Install temporary protective measures to protect historic painted surfaces that shall be treated later.
- C. Mechanical Abrasion: Where mechanical abrasion is needed for the work, use only the gentlest mechanical methods, such as scraping and lightly hand sanding, that will not abrade softer substrates, reducing clarity of detail. Do not use abrasive methods such as rotary sanding, rotary wire brushing, or power tools except as indicated as part of the historic treatment program and as approved by Architect.
- D. Heat Processes: Do not use torches, heat guns, or heat plates.

3.4 EXAMINATION

- A. Examine substrates and conditions, with historic treatment specialist present, for compliance with requirements for maximum moisture content and other conditions affecting performance of painting work. Comply with paint manufacturer's written instructions for inspection.

- B. Maximum Moisture Content of Substrates: Do not begin application of coatings unless moisture content of exposed surface is below the maximum value recommended in writing by paint manufacturer and not greater than the following maximum values when measured with an electronic moisture meter appropriate to the substrate material:
1. Concrete: [12] <Insert number> percent.
 2. Gypsum Board: [12] <Insert number> percent.
 3. Gypsum Plaster: [12] <Insert number> percent.
 4. Masonry (Clay and CMU): [12] <Insert number> percent.
 5. Portland Cement Plaster: [12] <Insert number> percent.
 6. Wood: [15] <Insert number> percent.
 7. <Insert surface to be repainted>: <Insert number> percent.
- C. Alkalinity: Do not begin application of coatings unless surface alkalinity is within range recommended in writing by paint manufacturer. Conduct alkali testing with litmus paper on exposed plaster, cementitious, and masonry surfaces.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
1. If existing surfaces cannot be prepared to an acceptable condition for proper finishing by using specified surface-preparation methods, notify Architect in writing.
- E. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.5 PREPARATORY CLEANING

- A. General: Use only the gentlest, appropriate method necessary to clean surfaces in preparation for painting. Clean all surfaces, corners, contours, and interstices.
- B. Detergent Cleaning: Wash surfaces by hand using clean rags, sponges, and bristle brushes. Scrub surface with detergent solution and 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. Rinse with water applied by clean rags or sponges.
- C. Solvent Cleaning: Use solvent cleaning to remove oil, grease, smoke, tar, and asphalt from painted or unpainted surfaces before other preparation work. Wipe surfaces with solvent using clean rags and sponges. If necessary, spot-solvent cleaning may be employed just prior to commencement of paint application, provided enough time is allowed for complete evaporation. Use clean solvent and clean rags for the final wash to ensure that all foreign materials have been removed. Do not use solvents, including primer thinner and turpentine, that leave residue.
- D. Mildew: Clean off existing 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. Rinse with water applied by clean rags or sponges.
- E. Chemical Rust Removal:
1. Remove loose rust scale with approved abrasives for ferrous-metal cleaning.
 2. Apply rust remover with brushes or as recommended in writing by manufacturer.
 3. Allow rust remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing. Do not allow extended dwell time.
 4. Wipe off residue with mineral spirits and either steel wool or soft rags, or clean with method recommended in writing by manufacturer to remove residue.
 5. Dry immediately with clean, soft cloths. Follow direction of grain in metal.
 6. Prime immediately to prevent rust. Do not touch cleaned metal surface until primed.
- F. Mechanical Rust Removal:
1. Remove rust with approved abrasives for ferrous-metal cleaning. Clean to bright metal.
 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.

3.6 PAINT REMOVAL

- A. General: Remove paint where indicated. Where cleaning methods have been attempted and further removal of the paint is required because of incompatible or unsatisfactory surfaces for repainting, remove paint to extent required by conditions.
 1. Application: Apply paint removers according to paint-remover manufacturer's written instructions. Do not allow paint removers to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.
 - a. Apply materials to all surfaces, corners, contours, and interstices, to provide a uniform final appearance without streaks.
 - b. After work is complete, remove protection no longer required. Remove tape and adhesive marks.
 2. Brushes: Use brushes that are resistant to chemicals being used.
 - a. Metal Substrates: If using wire brushes on metal, use brushes of same metal composition as metal being treated.
 - b. Wood Substrates: Do not use wire brushes.
 3. Spray Equipment: 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. Unless otherwise indicated, hold spray nozzle at least 6 inches from surface and apply material in horizontal, back-and-forth sweeping motion, overlapping previous strokes to produce uniform coverage.
 - c. For chemical spray application, use low-pressure tank or chemical pump suitable for chemical indicated, equipped with nozzle having a cone-shaped spray.
 - d. For water-spray application, use fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees.
 - e. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F at flow rates indicated.
- B. Paint Removal with Hand Tools: Remove paint manually using hand-held scrapers, wire brushes, sandpaper, and metallic wool as appropriate for the substrate material. Do not use other methods except as indicated as part of the historic treatment program and as approved by Architect.
- C. Paint Removal with Alkaline Paste Paint Remover:
 1. Remove loose and peeling paint using[**water**,] scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 2. Apply paint remover to dry, painted surface with brushes.
 3. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 4. Rinse with [**cold**] [**hot**] water applied by [**low**] [**medium**]-pressure spray to remove chemicals and paint residue.
 5. Use mechanical methods recommended in writing by manufacturer to remove chemicals and paint residue.
 6. Repeat process if necessary to remove all paint.
- D. Paint Removal with Covered or Skin-Forming Alkaline Paint Remover:
 1. Remove loose and peeling paint using[**water**,] scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 2. Apply paint remover to dry, painted surface with brushes or as recommended in writing by manufacturer.
 3. Apply cover according to manufacturer's written instructions.
 4. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 5. Scrape off paint and remover.

6. Rinse with [**cold**] [**hot**] water applied by [**low**] [**medium**]-pressure spray to remove chemicals and paint residue.
 7. Use mechanical methods recommended in writing by manufacturer to remove chemicals and paint residue.
 8. For spots of remaining paint, apply alkaline paste paint remover according to "Paint Removal with Alkaline Paste Paint Remover" Paragraph.
- E. Paint Removal with Solvent-Type Paste Paint Remover:
1. Remove loose and peeling paint using[**water**,] scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 2. Apply thick coating of paint remover to dry, painted surface with natural-fiber cleaning brush, deep-nap roller, or large paintbrush. Apply in one or two coats according to manufacturer's written instructions.
 3. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 4. Rinse with [**cold**] [**hot**] water applied by [**low**] [**medium**]-pressure spray to remove chemicals and paint residue.
 5. Use mechanical methods recommended in writing by manufacturer to remove chemicals and paint residue.
 6. Repeat process if necessary to remove all paint.
- F. Paint Removal with Covered, Solvent-Type Paste Paint Remover:
1. Remove loose and peeling paint using[**water**,] scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 2. Apply paint remover to dry, painted surface with natural-fiber cleaning brush, deep-nap roller, or large paint brush or as recommended in writing by manufacturer.
 3. Apply cover according to manufacturer's written instructions.
 4. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 5. Scrape off paint and remover.
 6. Rinse with [**cold**] [**hot**] water applied by [**low**] [**medium**]-pressure spray to remove chemicals and paint residue.
 7. Use mechanical methods recommended in writing by manufacturer to remove remaining chemicals and paint residue.

3.7 SUBSTRATE REPAIR

- A. General: Repair substrate surface defects that are inconsistent with the surface appearance of adjacent materials and finishes.
- B. Wood Substrate:
1. Repair wood defects including dents and gouges more than [**1/8 inch**] [**1/4 inch**] <Insert dimension> in size and all holes and cracks by filling with wood-patching compound and sanding smooth. Reset or remove protruding fasteners.
 2. Where existing paint is allowed to remain, sand irregular buildup of paint, runs, and sags to achieve a uniformly smooth surface.
- C. Cementitious Material Substrate:
1. General: Repair defects including dents and chips more than [**1/4 inch**] [**1/2 inch**] <Insert dimension> in size and all holes and cracks by filling with cementitious patching compound and sanding smooth. Remove protruding fasteners.
 2. New and Bare Plaster: Neutralize surface of plaster with mild acid solution as recommended in writing by paint manufacturer. In lieu of acid neutralization, follow manufacturer's written instruction for primer or transition coat over alkaline plaster surfaces.
 3. Concrete, Cement Plaster, and Other Cementitious Products: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. If surfaces are too alkaline to paint, correct this condition before painting.
- D. Gypsum-Plaster and Gypsum-Board Substrates:

1. Repair defects including dents and chips more than **[1/8 inch]** **[1/4 inch]** **<Insert dimension>** in size and all holes and cracks by filling with gypsum-plaster patching compound and sanding smooth. Remove protruding fasteners.
 2. Rout out surface cracks to remove loose, unsound material; fill with patching compound and sand smooth.
- E. Metal Substrate:
1. Preparation: Treat repair locations by wire-brushing and solvent cleaning. Use **[chemical]** **[or]** **[mechanical]** rust removal method to clean off rust.
 2. Defects in Metal Surfaces: Repair non-load-bearing defects in existing metal surfaces, including dents and gouges more than **[1/16 inch]** **[1/8 inch]** **<Insert dimension>** deep or **[1/2 inch]** **[1 inch]** **<Insert dimension>** across and all holes and cracks by filling with metal patching compound and sanding smooth. Remove burrs and protruding fasteners.
 3. Priming: Prime iron and steel surfaces immediately after repair to prevent flash rusting. Stripe paint corners, crevices, bolts, welds, and sharp edges. Apply two coats to surfaces that are inaccessible after completion of the Work.

3.8 PAINT APPLICATION, GENERAL

- A. Comply with manufacturers' written instructions for application methods unless otherwise indicated in this Section.
- B. Prepare surfaces to be painted according to the Surface-Preparation Schedule and with manufacturer's written instructions for each substrate condition.
- C. Apply a transition coat over incompatible existing coatings.
- D. Metal Substrate: Stripe paint corners, crevices, bolts, welds, and sharp edges before applying full coat. Apply two coats to surfaces that are inaccessible after completion of the Work. Tint stripe coat different than the main coating and apply with brush.
- E. Blending Plain Painted Surfaces: When painting new substrates patched into existing surfaces or touching up missing or damaged finishes, apply coating system specified for the specific substrate. Apply final finish coat over entire surface from edge to edge and corner to corner.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a 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 testing agency has had reasonable opportunity to inspect work areas at lift device or scaffold location.
- C. Manufacturer's Field Service: Engage paint-remover manufacturer's factory-authorized service representative for consultation and Project-site inspection, and provide on-site assistance when requested by Architect.
- D. Paint Material Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for composition and dry film thickness.
 1. Paint Composition: The following procedure may be performed at any time and as often as Owner deems necessary during the period when paints are being applied:
 - a. Testing agency will sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - b. Testing agency will perform tests for compliance of paint materials with product requirements.
 - c. If test results show materials being used do not comply with product requirements, Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

2. Dry Film Thickness:
 - a. Contractor shall touch up and restore painted surfaces damaged by testing.
 - b. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written instructions, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written instructions.

3.10 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.11 SURFACE-PREPARATION SCHEDULE

- A. General: Before painting, prepare surfaces[**where indicated on Drawings**] for painting according to applicable requirements specified in this schedule.
 1. Examine surfaces to evaluate each surface condition according to paragraphs below.
 2. Where existing degree of soiling prevents examination, preclean surface and allow it to dry before making an evaluation.
 3. Repair substrate defects according to "Substrate Repair" Article.
- B. Surface Preparation for **[MPI DSD 0] <Insert designation>** Degree of Surface Degradation:
 1. Surface Condition: Existing paint film in good condition and tightly adhered.
 2. Paint Removal: Not required.
 3. Preparation for Painting: Wash surface by detergent cleaning; use solvent cleaning where needed. Roughen or degloss cleaned surfaces to ensure paint adhesion according to paint manufacturer's written instructions.
- C. Surface Preparation for **[MPI DSD 1] <Insert designation>** Degree of Surface Degradation:
 1. Surface Condition: Paint film cracked or broken but adhered.
 2. Paint Removal: Scrape by hand-tool cleaning methods to remove loose paint until only tightly adhered paint remains.
 3. Preparation for Painting: Wash surface by detergent cleaning; use other cleaning methods for small areas of bare substrate if required. Roughen, degloss, and sand the cleaned surfaces to ensure paint adhesion and a smooth finish according to paint manufacturer's written instructions.
- D. Surface Preparation for **[MPI DSD 2] <Insert designation>** Degree of Surface Degradation:
 1. Surface Condition: Paint film loose, flaking, or peeling.
 2. Paint Removal: Remove loose, flaking, or peeling paint film by hand-tool or chemical paint-removal methods.
 3. Preparation for Painting: Wash surface by detergent cleaning; use solvent cleaning where needed. Use other cleaning methods for small areas of bare substrate if required. Sand surfaces to smooth remaining paint film edges. Prepare bare cleaned surface to be painted according to paint manufacturer's written instructions for substrate construction materials.
- E. Surface Preparation for **[MPI DSD 3] <Insert designation>** Degree of Surface Degradation:
 1. Surface Condition: Paint film [severely deteriorated] [obscuring fine architectural detail work because of paint-layer buildup] [and] [surface indicated to have paint completely removed].

2. Paint Removal: Completely remove paint film by hand-tool or chemical paint-removal methods. Remove rust.
 3. Preparation for Painting: Prepare bare cleaned surface according to paint manufacturer's written instructions for substrate construction materials.
- F. Surface Preparation for **[MPI DSD 4] <Insert designation>** Degree of Surface Degradation:
1. Surface Condition: Missing material, small holes and openings, and deteriorated or corroded substrate.
 2. Substrate Preparation: Repair, replace, and treat substrate according to "Substrate Repair" Article[**and requirements in other Specification Sections**].
 3. Preparation for Painting: Sand substrate surfaces to smooth remaining paint film edges and prepare according to paint manufacturer's written instructions for substrate construction materials. Remove rust.
 4. Painting: Paint as required for **[MPI DSD 2] <Insert designation>** degree of surface degradation.

3.12 EXTERIOR HISTORIC PAINTING SCHEDULE

- A. Wood [Porch Ceiling] <Insert item description or drawing designation, or both>:
1. Historic [milk paint] <Insert system description> system[over a transition coat].
 - a. Prime Coat: <Insert requirement>.
 - b. Intermediate Coat: [Match topcoat] <Insert requirement>.
 - c. Topcoat: [Milk paint] <Insert requirement>.
 - d. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
- B. Ferrous Metal Substrates: [Cast-iron facade and storefront] [Wrought-iron railing and gate] <Insert item description or drawing designation, or both>:
1. Alkyd System: [MPI REX 5.1D] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1] <Insert designation>** degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2] <Insert designation>** degree of surface degradation, spot prime with Primer, Metal, Surface Tolerant[, **MPI #23**].
 - c. Prime Coat: For **[MPI DSD 3] <Insert designation>** degree of surface degradation, fully prime coat with Primer, Metal, Surface Tolerant[, **MPI #23**].
 - d. Intermediate Coat: [Alkyd, exterior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Alkyd, exterior, semigloss (Gloss Level 5)[, **MPI #94**].
 - f. Topcoat: Alkyd, exterior, gloss (Gloss Level 6)[, **MPI #9**].
 - g. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
 2. High-Performance, Pigmented-Polyurethane-over-Epoxy System: **[MPI REX 5.1H] <Insert system description>** system[**over a transition coat**].
 - a. Prime Coat: For **[MPI DSD 1] <Insert designation>** degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2] <Insert designation>** degree of surface degradation, spot prime with Primer, Epoxy, Anti-Corrosive, for Metal[, **MPI #101**].
 - c. Prime Coat: For **[MPI DSD 3] <Insert designation>** degree of surface degradation, fully prime coat with Primer, Epoxy, Anti-Corrosive, for Metal[, **MPI #101**].
 - d. Intermediate Coat in Primed Areas: Epoxy, High Build, Low Gloss[, **MPI #108**].
 - e. Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6)[, **MPI #72**].
 - f. Second Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6)[, **MPI #72**].
 - g. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.

- C. Wood [Columns] [Beams] [Ceilings] [Siding] [and] [Fencing] <Insert item description or drawing designation, or both>:
1. Latex System: [MPI REX 6.2A] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[, MPI #5].
 - c. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer, Latex for Exterior Wood[, MPI #6].
 - d. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[, MPI #5].
 - e. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with Primer, Latex for Exterior Wood[, MPI #6].
 - f. Intermediate Coat: [Latex, exterior, matching topcoat] <Insert requirement or coating designation>.
 - g. Topcoat: Latex, exterior flat (Gloss Levels 1-2)[, MPI #10].
 - h. Topcoat: Latex, exterior, low sheen (Gloss Levels 3-4)[, MPI #15].
 - i. Topcoat: Latex, exterior semigloss (Gloss Level 5)[, MPI #11].
 - j. Topcoat: Latex, exterior gloss (Gloss Level 6)[, MPI #119].
 - k. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
 2. Alkyd System: [MPI REX 6.2C] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[, MPI #5].
 - c. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[, MPI #5].
 - d. Intermediate Coat: [Latex, exterior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Alkyd, exterior flat (Gloss Level 1)[, MPI #8].
 - f. Topcoat: Alkyd, exterior semigloss (Gloss Level 5)[, MPI #94].
 - g. Topcoat: Alkyd, exterior gloss (Gloss Level 6)[, MPI #9].
 - h. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
- D. Wood [Doors] [Windows] [Frames] [Casings] [and] [Smooth Fasciae] <Insert item description or drawing designation, or both>:
1. Latex System: [MPI REX 6.3A] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[, MPI #5].
 - c. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[, MPI #5].
 - d. Intermediate Coat: [Latex, exterior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, exterior flat (Gloss Levels 1-2)[, MPI #10].
 - f. Topcoat: Latex, exterior, low sheen (Gloss Levels 3-4)[, MPI #15].
 - g. Topcoat: Latex, exterior semigloss (Gloss Level 5)[, MPI #11].
 - h. Topcoat: Latex, exterior gloss (Gloss Level 6)[, MPI #119].
 - i. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
 2. Alkyd System: [MPI REX 6.3B] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.

- b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[, **MPI #5**].
 - c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[, **MPI #5**].
 - d. Intermediate Coat: [Alkyd, exterior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Alkyd, exterior flat (Gloss Level 1)[, **MPI #8**].
 - f. Topcoat: Alkyd, exterior semigloss (Gloss Level 5)[, **MPI #94**].
 - g. Topcoat: Alkyd, exterior gloss (Gloss Level 6)[, **MPI #9**].
 - h. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
3. Varnish System (Clear): [MPI REX 6.3F] <Insert system description>.
- a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with topcoat.
 - c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with topcoat.
 - d. Intermediate Coat: [Exterior varnish matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Varnish, with UV inhibitor, exterior, semigloss (Gloss Level 5)[, **MPI #30**].
 - f. Topcoat: Varnish, with UV inhibitor, exterior, gloss (Gloss Level 6)[, **MPI #29**].
 - g. Topcoat: Varnish, marine spar, exterior, gloss (Gloss Level 6)[, **MPI #28**].
- E. Wood [Deck] [and] [Stairs] <Insert item description or drawing designation, or both>:
1. Latex Porch and Floor System over Alkyd Primer: **[MPI REX 6.5A]** <Insert system description> system[over a transition coat].
- a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd/Oil for Exterior Wood[, **MPI #5**].
 - c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd/Oil for Exterior Wood[, **MPI #5**].
 - d. Intermediate Coat: [Floor Paint, Latex, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Floor paint, latex, low gloss[, **MPI #60**].
 - f. Topcoat: Floor paint, latex, gloss[, **MPI #68**].
 - g. Topcoat Additive: Manufacturer's standard additive to increase skid resistance of painted surface.
 - h. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
2. Alkyd Floor Enamel System: [MPI REX 6.5B] <Insert system description> system[over a transition coat].
- a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with topcoat.
 - c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with topcoat.
 - d. Intermediate Coat: [Floor enamel matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Floor paint, alkyd, low gloss[, **MPI #59**].
 - f. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)[, **MPI #27**].
 - g. Topcoat Additive: Manufacturer's standard additive to increase skid resistance of painted surface.

- h. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
- F. Wood [Shingle] [Shake] Siding <Insert item description or drawing designation, or both>:
- 1. Latex System: [MPI REX 6.6A] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[, MPI #5].
 - c. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[, MPI #5].
 - d. Intermediate Coat: [Latex, exterior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, exterior flat (Gloss Levels 1-2)[, MPI #10].
 - f. Topcoat: Latex, exterior, low sheen (Gloss Levels 3-4)[, MPI #15].
 - g. Topcoat: Latex, exterior semigloss (Gloss Level 5)[, MPI #11].
 - h. Topcoat: Latex, exterior gloss (Gloss Level 6)[, MPI #119].
 - i. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
 - 2. Alkyd System: [MPI REX 6.6B] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[, MPI #5].
 - c. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[, MPI #5].
 - d. Intermediate Coat: [Latex, exterior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Alkyd, exterior flat (Gloss Level 1)[, MPI #8].
 - f. Topcoat: Alkyd, exterior semigloss (Gloss Level 5)[, MPI #94].
 - g. Topcoat: Alkyd, exterior gloss (Gloss Level 6)[, MPI #9].
 - h. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.

3.13 INTERIOR HISTORIC PAINTING SCHEDULE

- A. [Plaster Ceiling] [Wood Ceiling] <Insert item description or drawing designation, or both>:
- 1. Historic [milk paint] <Insert system description> system[over a transition coat].
 - a. Prime Coat: <Insert requirement>.
 - b. Intermediate Coat: [Match topcoat] <Insert requirement>.
 - c. Topcoat: [Milk paint] <Insert requirement>.
 - d. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
- B. Ferrous Metal Substrates: [Cast-iron grilles] [Wrought-iron railing] <Insert item description or drawing designation, or both>:
- 1. Latex System: [MPI RIN 5.1N] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer, Metal, Surface Tolerant[, MPI #23].
 - c. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd, Anti-Corrosive for Metal[, MPI #79].
 - d. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer, Rust-Inhibitive, Water Based[, MPI #107].

- e. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Metal, Surface Tolerant[, **MPI #23**].
 - f. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd, Anti-Corrosive for Metal[, **MPI #79**].
 - g. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Rust-Inhibitive, Water Based[, **MPI #107**].
 - h. Intermediate Coat: [Latex matching topcoat] <Insert requirement or coating designation>.
 - i. Topcoat: Latex, interior, flat (Gloss Level 1)[, **MPI #53**].
 - j. Topcoat: Latex, interior (Gloss Level 2)[, **MPI #44**].
 - k. Topcoat: Latex, interior (Gloss Level 3)[, **MPI #52**].
 - l. Topcoat: Latex, interior (Gloss Level 4)[, **MPI #43**].
 - m. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, **MPI #54**].
 - n. Topcoat: Latex, interior, gloss (Gloss Level 6)[, **MPI #114**].
 - o. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
2. Alkyd System: [MPI RIN 5.1E] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Metal, Surface Tolerant[, **MPI #23**].
 - c. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Alkyd, Anti-Corrosive for Metal[, **MPI #79**].
 - d. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Metal, Surface Tolerant[, **MPI #23**].
 - e. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Alkyd, Anti-Corrosive for Metal[, **MPI #79**].
 - f. Intermediate Coat: [Alkyd, matching topcoat] <Insert requirement or coating designation>.
 - g. Topcoat: Alkyd, interior, flat (Gloss Level 1)[, **MPI #49**].
 - h. Topcoat: Alkyd, interior (Gloss Level 3)[, **MPI #51**].
 - i. Topcoat: Alkyd, interior, semigloss (Gloss Level 5)[, **MPI #47**].
 - j. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, **MPI #48**].
 - k. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
 3. High-Performance, Pigmented-Polyurethane-over-Epoxy System: **[MPI RIN 5.1H]** <Insert system description> system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with Epoxy, Gloss[, **MPI #77**].
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Zinc Rich, Organic[, **MPI #18**].
 - c. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Zinc Rich, Epoxy[, **MPI #20**].
 - d. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Zinc Rich, Organic[, **MPI #18**].
 - e. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Zinc Rich, Epoxy[, **MPI #20**].
 - f. Intermediate Coat in Primed Areas: Epoxy, Gloss[, **MPI #77**].
 - g. Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6)[, **MPI #72**].
 - h. Second Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6)[, **MPI #72**].
 - i. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
- C. Wood [Columns] [Beams] [and] [Ceilings] <Insert item description or drawing designation, or both>:
1. Latex System over Latex Primer: [MPI RIN 6.2D] <Insert system description> system[over a transition coat].

- a. Prime Coat: For **[MPI DSD 1] <Insert designation>** degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2] <Insert designation>** degree of surface degradation, spot prime with Primer, Latex, for Interior Wood[, **MPI #39**].
 - c. Prime Coat: For **[MPI DSD 3] <Insert designation>** degree of surface degradation, fully prime coat with Primer, Latex, for Interior Wood[, **MPI #39**].
 - d. Intermediate Coat: [Latex, interior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, interior flat (Gloss Level 1)[, **MPI #53**].
 - f. Topcoat: Latex, interior (Gloss Level 2)[, **MPI #44**].
 - g. Topcoat: Latex, interior (Gloss Level 3)[, **MPI #52**].
 - h. Topcoat: Latex, interior (Gloss Level 4)[, **MPI #43**].
 - i. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, **MPI #54**].
 - j. Topcoat: Latex, interior, gloss (Gloss Level 6)[, **MPI #114**].
 - k. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
2. Latex System over Alkyd Primer: [MPI RIN 6.2A] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1] <Insert designation>** degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2] <Insert designation>** degree of surface degradation, spot prime with Undercoat, Enamel, Interior[, **MPI #46**].
 - c. Prime Coat: For **[MPI DSD 3] <Insert designation>** degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[, **MPI #46**].
 - d. Intermediate Coat: [Latex, interior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, interior flat (Gloss Level 1)[, **MPI #53**].
 - f. Topcoat: Latex, interior (Gloss Level 2)[, **MPI #44**].
 - g. Topcoat: Latex, interior (Gloss Level 3)[, **MPI #52**].
 - h. Topcoat: Latex, interior (Gloss Level 4)[, **MPI #43**].
 - i. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, **MPI #54**].
 - j. Topcoat: Latex, interior, gloss (Gloss Level 6)[, **MPI #114**].
 - k. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
 3. Alkyd System: [MPI RIN 6.2C] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1] <Insert designation>** degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2] <Insert designation>** degree of surface degradation, spot prime with Undercoat, Enamel, Interior[, **MPI #46**].
 - c. Prime Coat: For **[MPI DSD 3] <Insert designation>** degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[, **MPI #46**].
 - d. Intermediate Coat: [Alkyd, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Alkyd, interior, flat (Gloss Level 1)[, **MPI #49**].
 - f. Topcoat: Alkyd, interior (Gloss Level 3)[, **MPI #51**].
 - g. Topcoat: Alkyd, interior, semigloss (Gloss Level 5)[, **MPI #47**].
 - h. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, **MPI #48**].
 - i. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
- D. Wood [Doors] [Windows] [Frames] [and] [Moldings] <Insert item description or drawing designation, or both>:
1. Latex System over Latex Primer: [MPI RIN 6.3U] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1] <Insert designation>** degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2] <Insert designation>** degree of surface degradation, spot prime with Primer, Latex, for Interior Wood[, **MPI #39**].

- c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Latex, for Interior Wood[, **MPI #39**].
 - d. Intermediate Coat: [Latex, interior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, **MPI #54**].
 - f. Topcoat: Latex, interior, gloss (Gloss Level 6)[, **MPI #114**].
 - g. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
2. Low-Odor Latex System over Latex Primer: [MPI RIN 6.3V] <Insert system description> system[over a transition coat].
- a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Latex, for Interior Wood[, **MPI #39**].
 - c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Latex, for Interior Wood[, **MPI #39**].
 - d. Intermediate Coat: [Latex, interior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, interior, institutional low odor/VOC flat (Gloss Level 1)[, **MPI #143**].
 - f. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 2)[, **MPI #144**].
 - g. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 3)[, **MPI #145**].
 - h. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 4)[, **MPI #146**].
 - i. Topcoat: Latex, interior, institutional low odor/VOC, semigloss (Gloss Level 5)[, **MPI #147**].
 - j. Topcoat: Latex, interior, institutional low odor/VOC, gloss (Gloss Level 6)[, **MPI #148**].
 - k. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
3. Latex System over Alkyd Primer: [MPI RIN 6.3A] <Insert system description> system[over a transition coat].
- a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Undercoat, Enamel, Interior[, **MPI #46**].
 - c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[, **MPI #46**].
 - d. Intermediate Coat: [Latex, interior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, **MPI #54**].
 - f. Topcoat: Latex, interior, gloss (Gloss Level 6)[, **MPI #114**].
 - g. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
4. Alkyd System: [MPI RIN 6.3B] <Insert system description> system[over a transition coat].
- a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Undercoat, Enamel, Interior[, **MPI #46**].
 - c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[, **MPI #46**].
 - d. Intermediate Coat: [Alkyd, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Alkyd, interior, semigloss (Gloss Level 5)[, **MPI #47**].
 - f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, **MPI #48**].
 - g. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
5. Alkyd Varnish System (Clear): [MPI RIN 6.3J] <Insert system description>.
- a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.

- b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Shellac[, **MPI #88**].
 - c. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Alkyd, Sanding Sealer, Clear[, **MPI #102**].
 - d. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Shellac[, **MPI #88**].
 - e. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Alkyd, Sanding Sealer, Clear[, **MPI #102**].
 - f. Intermediate Coat: [Interior varnish matching topcoat] <Insert requirement or coating designation>.
 - g. Topcoat: Varnish, interior, flat (Gloss Level 1)[, **MPI #73**].
 - h. Topcoat: Varnish, interior, semigloss (Gloss Level 5)[, **MPI #74**].
 - i. Topcoat: Varnish, interior, gloss (Gloss Level 6)[, **MPI #75**].
- E. Wood [Paneling] [Casework] [and] [Millwork] <Insert item description or drawing designation, or both>:
- 1. Latex System over Latex Primer: [MPI RIN 6.4T] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Latex, for Interior Wood[, **MPI #39**].
 - c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Latex, for Interior Wood[, **MPI #39**].
 - d. Intermediate Coat: [Latex, interior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, **MPI #54**].
 - f. Topcoat: Latex, interior, gloss (Gloss Level 6)[, **MPI #114**].
 - g. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
 - 2. Low-Odor Latex System over Latex Primer: [MPI RIN 6.4D] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Latex, for Interior Wood[, **MPI #39**].
 - c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Latex, for Interior Wood[, **MPI #39**].
 - d. Intermediate Coat: [Latex, interior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, interior, institutional low odor/VOC flat (Gloss Level 1)[, **MPI #143**].
 - f. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 2)[, **MPI #144**].
 - g. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 3)[, **MPI #145**].
 - h. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 4)[, **MPI #146**].
 - i. Topcoat: Latex, interior, institutional low odor/VOC, semigloss (Gloss Level 5)[, **MPI #147**].
 - j. Topcoat: Latex, interior, institutional low odor/VOC, gloss (Gloss Level 6)[, **MPI #148**].
 - k. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
 - 3. Latex System over Alkyd Primer: [MPI RIN 6.4A] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Undercoat, Enamel, Interior[, **MPI #46**].
 - c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[, **MPI #46**].

- d. Intermediate Coat: [Latex, interior, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, interior flat (Gloss Level 1)[, **MPI #53**].
 - f. Topcoat: Latex, interior (Gloss Level 2)[, **MPI #44**].
 - g. Topcoat: Latex, interior (Gloss Level 3)[, **MPI #52**].
 - h. Topcoat: Latex, interior (Gloss Level 4)[, **MPI #43**].
 - i. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, **MPI #54**].
 - j. Topcoat: Latex, interior, gloss (Gloss Level 6)[, **MPI #114**].
 - k. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
4. Alkyd System: [MPI RIN 6.4C] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [**MPI DSD 1**] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [**MPI DSD 2**] <Insert designation> degree of surface degradation, spot prime with Undercoat, Enamel, Interior[, **MPI #46**].
 - c. Prime Coat: For [**MPI DSD 3**] <Insert designation> degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[, **MPI #46**].
 - d. Intermediate Coat: [Alkyd, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Alkyd, interior flat (Gloss Level 1)[, **MPI #49**].
 - f. Topcoat: Alkyd, interior (Gloss Level 3)[, **MPI #51**].
 - g. Topcoat: Alkyd, interior, semigloss (Gloss Level 5)[, **MPI #47**].
 - h. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, **MPI #48**].
 - i. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
 5. Alkyd Varnish System over Stain: [**MPI RIN 6.4F**] <Insert system description>.
 - a. Prime Coat: For [**MPI DSD 1**] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [**MPI DSD 2**] <Insert designation> degree of surface degradation, spot prime with Stain, Semi-Transparent, for Interior Wood[, **MPI #90**].
 - c. Prime Coat: For [**MPI DSD 3**] <Insert designation> degree of surface degradation, fully prime coat with Stain, Semi-Transparent, for Interior Wood[, **MPI #90**].
 - d. Intermediate Coat: [Interior varnish matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Varnish, interior, flat (Gloss Level 1)[, **MPI #73**].
 - f. Topcoat: Varnish, interior, semigloss (Gloss Level 5)[, **MPI #74**].
 - g. Topcoat: Varnish, interior, gloss (Gloss Level 6)[, **MPI #75**].
 - h. Stain Color: Match [adjacent, cleaned wood of same type] [color indicated in the Historic Structure Report] [color indicated on Drawings] <Insert color or requirement>.
- F. Wood [Floors] [and] [Stairs] <Insert item description or drawing designation, or both>:
1. Latex Porch and Floor System over Alkyd Primer: [**MPI RIN 6.5J**] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [**MPI DSD 1**] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [**MPI DSD 2**] <Insert designation> degree of surface degradation, spot prime with Primer Sealer, Alkyd, Interior[, **MPI #45**].
 - c. Prime Coat: For [**MPI DSD 3**] <Insert designation> degree of surface degradation, fully prime coat with Primer Sealer, Alkyd, Interior[, **MPI #45**].
 - d. Intermediate Coat: [Floor Paint, Latex, matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Floor paint, latex, low gloss[, **MPI #60**].
 - f. Topcoat: Floor paint, latex, gloss[, **MPI #68**].
 - g. Topcoat Additive: Manufacturer's standard additive to increase skid resistance of painted surface.
 - h. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.

2. Alkyd Floor Enamel System: [MPI RIN 6.5A] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with topcoat.
 - c. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with topcoat.
 - d. Intermediate Coat: [Floor enamel matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Floor paint, alkyd, low gloss[, MPI #59].
 - f. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)[, MPI #27].
 - g. Topcoat Additive: Manufacturer's standard additive to increase skid resistance of painted surface.
 - h. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
 3. Polyurethane Varnish System (Clear): [MPI RIN 6.5C] <Insert system description>.
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with topcoat.
 - c. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with topcoat.
 - d. Intermediate Coat: [Interior varnish matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Varnish, interior, polyurethane, oil modified, gloss[, MPI #56].
 4. Two-Component Aliphatic Polyurethane System (Clear): [MPI RIN 6.5G] <Insert system description>.
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with topcoat.
 - c. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with topcoat.
 - d. Intermediate Coat: [Aliphatic polyurethane varnish matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Varnish, aliphatic polyurethane, two-component[, MPI #78].
 5. Moisture-Cured Polyurethane System (over Stain): [MPI RIN 6.5L] <Insert system description>.
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Stain, Semi-Transparent, for Interior Wood[, MPI #90].
 - c. Prime Coat: For [MPI DSD 3] <Insert designation> degree of surface degradation, fully prime coat with Stain, Semi-Transparent, for Interior Wood[, MPI #90].
 - d. Intermediate Coat: [Moisture-cured polyurethane varnish matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Varnish, polyurethane, moisture cured, gloss (Gloss Level 6)[, MPI #31].
 - f. Stain Color: Match [adjacent, cleaned wood of same type] [color indicated in the Historic Structure Report] [color indicated on Drawings] <Insert color or requirement>.
- G. [Plaster] <Insert item description or drawing designation, or both>:
1. Latex System over Waterborne Primer: [MPI RIN 9.2A] <Insert system description> system[over a transition coat].
 - a. Prime Coat: For [MPI DSD 1] <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For [MPI DSD 2] <Insert designation> degree of surface degradation, spot prime with Primer Sealer, Latex, Interior[, MPI #50].

- c. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Stain Blocking, Water Based[, **MPI #137**].
 - d. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer Sealer, Latex, Interior[, **MPI #50**].
 - e. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Stain Blocking, Water Based[, **MPI #137**].
 - f. Intermediate Coat: [Latex matching topcoat] <Insert requirement or coating designation>.
 - g. Topcoat: Latex, interior, flat (Gloss Level 1)[, **MPI #53**].
 - h. Topcoat: Latex, interior (Gloss Level 2)[, **MPI #44**].
 - i. Topcoat: Latex, interior (Gloss Level 3)[, **MPI #52**].
 - j. Topcoat: Latex, interior (Gloss Level 4)[, **MPI #43**].
 - k. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, **MPI #54**].
 - l. Topcoat: Latex, interior, gloss (Gloss Level 6)[, **MPI #114**].
 - m. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
2. Low-Odor Latex System over Waterborne Primer: **[MPI RIN 9.2M]** <Insert system description> system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer Sealer, Latex, Interior[, **MPI #50**].
 - c. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Stain Blocking, Water Based[, **MPI #137**].
 - d. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer Sealer, Latex, Interior[, **MPI #50**].
 - e. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Stain Blocking, Water Based[, **MPI #137**].
 - f. Topcoat: Latex, interior, institutional low odor/VOC flat (Gloss Level 1)[, **MPI #143**].
 - g. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 2)[, **MPI #144**].
 - h. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 3)[, **MPI #145**].
 - i. Topcoat: Latex, interior, institutional low odor/VOC (Gloss Level 4)[, **MPI #146**].
 - j. Topcoat: Latex, interior, institutional low odor/VOC, semigloss (Gloss Level 5)[, **MPI #147**].
 - k. Topcoat: Latex, interior, institutional low odor/VOC, gloss (Gloss Level 6)[, **MPI #148**].
 - l. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
 3. Latex System over Alkyd Primer: **[MPI RIN 9.2K]** <Insert system description> system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer Sealer, Alkyd, Interior[, **MPI #45**].
 - c. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat Primer Sealer, Alkyd, Interior[, **MPI #45**].
 - d. Intermediate Coat: [Latex matching topcoat] <Insert requirement or coating designation>.
 - e. Topcoat: Latex, interior, flat (Gloss Level 1)[, **MPI #53**].
 - f. Topcoat: Latex, interior (Gloss Level 2)[, **MPI #44**].
 - g. Topcoat: Latex, interior (Gloss Level 3)[, **MPI #52**].
 - h. Topcoat: Latex, interior (Gloss Level 4)[, **MPI #43**].
 - i. Topcoat: Latex, interior, semigloss (Gloss Level 5)[, **MPI #54**].
 - j. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.
 4. Alkyd System: **[MPI RIN 9.2C]** <Insert system description> system[over a transition coat].
 - a. Prime Coat: For **[MPI DSD 1]** <Insert designation> degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer Sealer, Latex, Interior[, **MPI #50**].

- c. Prime Coat: For **[MPI DSD 2]** <Insert designation> degree of surface degradation, spot prime with Primer, Stain Blocking, Water Based[, **MPI #137**].
- d. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer Sealer, Latex, Interior[, **MPI #50**].
- e. Prime Coat: For **[MPI DSD 3]** <Insert designation> degree of surface degradation, fully prime coat with Primer, Stain Blocking, Water Based[, **MPI #137**].
- f. Intermediate Coat: [Alkyd, matching topcoat] <Insert requirement or coating designation>.
- g. Topcoat: Alkyd, interior, flat (Gloss Level 1)[, **MPI #49**].
- h. Topcoat: Alkyd, interior (Gloss Level 3)[, **MPI #51**].
- i. Topcoat: Alkyd, interior, semigloss (Gloss Level 5)[, **MPI #47**].
- j. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[, **MPI #48**].
- k. Color: Match [Munsell Color 10 G 8/2] [Plochere Color System #8da399] [colors indicated in the Historic Structure Report] [colors indicated on Drawings] <Insert color(s) or requirement>.

END OF SECTION

SECTION 092300 GYPSUM PLASTERING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Gypsum plastering on expanded-metal lath.
 - 2. Gypsum plastering on unit masonry.
 - 3. Gypsum plastering on monolithic concrete.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. <Double click to insert sustainable design text for recycled content.>
- C. Shop Drawings: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.

1.3 QUALITY ASSURANCE

- A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Build mockups for each substrate and finish texture indicated for gypsum plastering, including accessories.
 - a. Size: [100 sq. ft.] <Insert dimension> in surface area.
 - 2. Simulate finished lighting conditions for review of mockups.
 - 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.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover, and keep them dry and protected against damage from weather, moisture, direct sunlight, contamination, corrosion, construction traffic, and other causes.

1.5 FIELD CONDITIONS

- A. Comply with ASTM C842 requirements or gypsum plaster manufacturer's written recommendations, whichever are more stringent.
- B. Room Temperatures: Maintain temperatures at not less than 55 deg F or greater than 80 deg F for at least seven days before application of gypsum plaster, continuously during application, and for seven days after plaster has set or until plaster has dried.
- C. Avoid conditions that result in gypsum plaster drying out too quickly.
 - 1. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
 - 2. Maintain relative humidity levels for prevailing ambient temperature that produce normal drying conditions.
 - 3. Ventilate building spaces in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Where indicated, provide gypsum plaster assemblies identical to those of assemblies tested for fire resistance according to ASTM E119 by a qualified testing agency.
- B. Sound-Transmission Characteristics: Where indicated, provide gypsum plaster assemblies identical to those of assemblies tested for STC ratings according to ASTM E90 and classified according to ASTM E413 by a qualified testing agency.

2.2 EXPANDED-METAL LATH

- A. Expanded-Metal Lath: ASTM C847, cold-rolled carbon-steel sheet with ASTM A653/A653M, G60, hot-dip galvanized-zinc coating.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 - 2. <Double click to insert sustainable design text for recycled content.>
 - 3. Paper Backing: Kraft paper factory bonded to back of lath.
 - 4. Diamond-Mesh Lath:
 - a. Type: [Flat] [Self-furring].
 - b. Weight: [2.5 lb/sq. yd.] [3.4 lb/sq. yd.].
 - 5. Flat-Rib Lath: Rib depth of not more than 1/8 inch, [2.75 lb/sq. yd.] [3.4 lb/sq. yd.].
 - 6. 3/8-Inch Rib Lath: [3.4 lb/sq. yd.] [4 lb/sq. yd.].

2.3 ACCESSORIES

- A. General: Comply with ASTM C841, and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
- B. Metal Accessories:
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 - 2. Cornerite: Fabricated from expanded-metal lath with ASTM A653/A653M, G60, hot-dip galvanized-zinc coating.
 - 3. Striplath: Fabricated from expanded-metal lath with ASTM A653/A653M, G60, hot-dip galvanized-zinc coating.
 - 4. Cornerbeads: Fabricated from [zinc] [or] [zinc-coated (galvanized) steel].
 - a. Smallnose cornerbead with expanded flanges; use unless otherwise indicated.
 - b. Smallnose cornerbead with perforated flanges; use on curved corners.
 - c. Smallnose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing unit masonry corners.
 - d. Bullnose cornerbead, radius 3/4-inch minimum, with expanded flanges; use at locations indicated on Drawings.
 - 5. Casing Beads: Fabricated from [zinc] [or] [zinc-coated (galvanized) steel]; square-edged style; with expanded flanges.
 - 6. Control Joints: Fabricated from [zinc] [or] [zinc-coated (galvanized) steel]; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
 - 7. Expansion Joints: Fabricated from [zinc] [or] [zinc-coated (galvanized) steel]; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
 - 8. Two-Piece Expansion Joints: Fabricated from [zinc] [or] [zinc-coated (galvanized) steel]; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8 inch wide; with perforated flanges.
- C. Plastic Accessories: Manufactured from high-impact PVC.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 - 2. Cornerbeads: With perforated flanges.
 - a. Smallnose cornerbead; use unless otherwise indicated.
 - b. Bullnose cornerbead, radius 3/4-inch minimum; use at locations indicated on Drawings.

3. Casing Beads: With perforated flanges in depth required to suit plaster bases indicated and flange length required to suit applications indicated.
 - a. Square-edge style; use unless otherwise indicated.
 - b. Bullnose style, radius 3/4-inch minimum; use at locations indicated on Drawings.
 4. Control Joints: One-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
 5. Expansion Joints: Two-piece type, formed to produce slip-joint and square-edged [1/2-inch-] [1-inch-] [1-1/2-inch-] <Insert dimension> wide reveal; with perforated concealed flanges.
- D. Aluminum Trim: Extruded accessories of profiles and dimensions indicated on Drawings.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221, Alloy 6063-T5.
 3. Finish: [Mill] [Chemical-conversion coating, ASTM D1730, Type B, compatible with field-applied finish coatings specified] <Insert requirements for anodic or other factory-applied coatings>.

2.4 MISCELLANEOUS MATERIALS

- A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
- B. Bonding Compound: ASTM C631.
- C. Fasteners for Attaching Metal Lath to Substrates: ASTM C841.
- D. Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter unless otherwise indicated.
- E. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing), produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of rated assembly.
 2. <Double click to insert sustainable design text for recycled content.>
- F. Mix Additives: Use gypsum plaster accelerators and retarders from plaster manufacturer if required by Project conditions. Use only additives that manufacturer recommends in writing for use with plaster to which it is added.

2.5 BASE-COAT PLASTER MATERIALS

- A. <Double click to insert sustainable design text for recycled content.>
- B. Lightweight-Gypsum Ready-Mixed Plaster: ASTM C28/C28M, with mill-mixed perlite aggregate.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- C. Gypsum Neat Plaster: ASTM C28/C28M, for use with job-mixed aggregates.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- D. Gypsum Wood-Fibered Plaster: ASTM C28/C28M, for use as is or with the addition of job-mixed sand in up to equal proportions by weight.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- E. High-Strength Gypsum Neat Plaster: ASTM C28/C28M, with a minimum, average, dry compressive strength of 2800 psi according to ASTM C472 for a mix of 100 lb of plaster and 2 cu. ft. of sand.
 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- F. Aggregates for Base-Coat Plasters: ASTM C35, [sand] [and] [perlite].

2.6 FINISH-COAT PLASTER MATERIALS

- A. <Double click to insert sustainable design text for recycled content.>

- B. Gypsum Gaging Plaster: ASTM C28/C28M.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- C. Gypsum Ready-Mixed Finish Plaster: Manufacturer's standard, mill-mixed, gaged, interior finish.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- D. High-Strength Gypsum Gaging Plaster: ASTM C28/C28M, with a minimum, average, dry compressive strength of 5000 psi according to ASTM C472 for a neat mix.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- E. Gypsum Keene's Cement: ASTM C61/C61M.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- F. Lime: ASTM C206, Type S, special finishing hydrated lime.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- G. Lime: ASTM C206, Type N, normal finishing hydrated lime.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- H. Aggregates for Float Finishes: ASTM C35, [**sand**] [**perlite**]; graded according to ASTM C842.

2.7 PLASTER MIXES

- A. Mixing: Comply with ASTM C842 and manufacturer's written instructions for applications indicated.
- B. Mix Additives: Use accelerators and retarders, if required by Project conditions, according to manufacturer's written instructions.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for 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. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

3.3 INSTALLATION, GENERAL

- A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.
- B. STC-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.
- C. Sound-Attenuation Blankets: Where required, install blankets before installing lath unless blankets are readily installed after lath has been installed on one side.
- D. Acoustical Sealant: Where required, seal joints between edges of plasterwork and abutting construction with acoustical sealant.

3.4 INSTALLING EXPANDED-METAL LATH

- A. Expanded-Metal Lath: Install according to ASTM C841.
 - 1. Partition Framing and Vertical Furring: Install [**flat-diamond-mesh**] [**flat-rib**] lath.

2. Flat-Ceiling and Horizontal Framing: Install **[flat-diamond-mesh]** **[flat-rib]** lath.
3. Curved-Ceiling Framing: Install flat-diamond-mesh lath.
4. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.
5. Solid-Plaster Partitions: Where supported by channel studs and L-runners, install **[flat-rib]** **[flat-diamond-mesh]** lath.
6. Studless Solid-Plaster Partitions: Where supported by L-runners, install 3/8-inch rib lath.

3.5 INSTALLING ACCESSORIES

- A. General: Install according to ASTM C841.
- B. Cornerbeads: Install at external corners.
- C. Casing Beads: Install at terminations of plasterwork, except where plaster passes behind and is concealed by other work and where metal screeds, bases, or frames act as casing beads.
- D. Control Joints: Locate as approved by Architect for visual effect, with spacing between joints in either direction not exceeding the following:
 1. Partitions: 30 feet.
 2. Ceilings: **[50 feet]** **[30 feet]**.
- E. Aluminum Trim: Install according to manufacturer's written instructions.

3.6 PLASTER APPLICATION

- A. General: Comply with ASTM C842.
 1. Do not deviate more than plus or minus 1/8 inch in 10 feet from a true plane in finished plaster surfaces when measured by a 10-foot straightedge placed on surface.
 2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
 3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.
- B. Bonding Compound: Apply on **[unit masonry]** **[and]** **[concrete]** substrates for direct application of plaster.
- C. Base-Coat Plaster:
 1. Over Expanded-Metal Lath:
 - a. Scratch Coat: [Gypsum neat plaster with job-mixed sand] [Gypsum wood-fibered plaster; neat or with job-mixed sand] [High-strength gypsum neat plaster with job-mixed sand] <Insert requirements>.
 - b. Brown Coat: [Lightweight-gypsum ready-mixed plaster] [Gypsum neat plaster with job-mixed sand] [Gypsum neat plaster with job-mixed perlite] [Gypsum wood-fibered plaster with job-mixed sand] [High-strength gypsum neat plaster with job-mixed sand] <Insert requirements>.
 2. Over Unit Masonry: [Lightweight-gypsum ready-mixed plaster] [Wood-fibered gypsum plaster with job-mixed sand] [Gypsum neat plaster with job-mixed sand] <Insert requirements>.
 3. Over Monolithic Concrete: [Gypsum neat plaster with job-mixed sand] <Insert requirements>.
- D. Finish Coats:
 1. Smooth-Troweled Finishes:
 - a. Materials: [Gypsum gaging plaster and lime putty] [Gypsum ready-mixed finish plaster] [High-strength gypsum gaging plaster and lime putty] [Gypsum Keene's cement and lime putty] <Insert requirements>.
 - b. Locations: Provide smooth-troweled finish [unless otherwise indicated] [where indicated] <Insert locations>.
 2. Float Finishes:
 - a. Materials: [Gypsum gaging plaster and lime putty] [Gypsum Keene's cement and lime putty] <Insert requirements>.

- b. Locations: Provide float finish [unless otherwise indicated] [where indicated] <Insert locations>.
 - 3. Sprayed Finishes: [Match Architect's sample] <Insert requirements>.
 - a. Materials: [Gypsum ready-mixed finish plaster] <Insert requirements>.
 - b. Locations: Provide sprayed finish [unless otherwise indicated] [where indicated] <Insert locations>.
 - 4. Textured Finishes: [Match Architect's sample] <Insert requirements>.
 - a. Materials: [Gypsum ready-mixed finish plaster] <Insert requirements>.
 - b. Locations: Provide textured finish [unless otherwise indicated] [where indicated] <Insert locations>.
- E. Concealed Plaster:
 - 1. Where plaster application is concealed behind built-in cabinets, similar furnishings, and equipment, apply finish coat.
 - 2. Where plaster application is concealed above suspended ceilings and in similar locations, omit finish coat.
 - 3. Where plaster application is used as a base for adhesive application of tile and similar finishes, omit finish coat.

3.7 PLASTER REPAIRS

- A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.8 CLEANING AND PROTECTION

- A. Remove temporary protection and enclosure of other work after plastering is complete. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION

SECTION 096623 RESINOUS MATRIX TERRAZZO FLOORING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Thin-set, epoxy-resin terrazzo flooring.
 - 2. Precast epoxy-resin terrazzo units.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** **<Insert location>**.
 - 1. Review methods and procedures related to terrazzo including, but not limited to, the following:
 - a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
 - b. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - c. Review special terrazzo designs and patterns.
 - d. **<Insert agenda items>**.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. <Double click to insert sustainable design text for recycled content.>
 - 2. <Double click to insert sustainable design text for adhesives.>
 - 3. <Double click to insert sustainable design text for low-emitting sealers.>
- C. Shop Drawings: Include terrazzo installation requirements. Include plans, sections, component details, and relationship to other work. Show layout of the following:
 - 1. Divider strips.
 - 2. Control-joint strips.
 - 3. Accessory strips.
 - 4. Abrasive strips.
 - 5. Stair treads, risers, and landings.
 - 6. Precast terrazzo jointing and edge configurations.
 - 7. Terrazzo patterns.
 - 8. **<Insert requirements>**.
- D. Samples: For each exposed product and for each color and texture specified, **[6 inches]** **<Insert dimension>** in size.
- E. Samples for Initial Selection: NTMA's "Terrazzo Color Palette" showing the full range of colors and patterns available for each terrazzo type.
- F. Samples for Verification: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo Sample to identify manufacturer's matrix color and aggregate types, sizes, and proportions. Prepare Samples of same thickness and from same material to be used for the Work, in sizes indicated below:
 - 1. Terrazzo: **[6-inch-]** **<Insert dimension>** square Samples.
 - 2. Precast Terrazzo: **[6-inch-]** **<Insert dimension>** square Samples.
 - 3. Accessories: **[6-inch-]** **<Insert dimension>** long Samples of each exposed strip item required.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Material Certificates: For each type of terrazzo material or product.
- C. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.
- D. Preinstallation moisture-testing reports.

1.5 CLOSEOUT SUBMITTALS

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

1.6 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Engage an installer who is a contractor member of NTMA.
 - 2. Engage an installer who is certified in writing by terrazzo manufacturer as qualified to install manufacturer's products.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockups for terrazzo including accessories.
 - a. Size: Minimum 100 sq. ft. of typical poured-in-place flooring[**and base**] condition for each color and pattern [**in locations indicated**] [**in locations directed by Architect**] **<Insert location requirements>**.
 - b. Include [base] [first three stair treads] **<Insert item>**.
 - 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.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in supplier's original wrappings and containers, labeled with source's or manufacturer's name, material or product brand name, and lot number if any.
- B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting terrazzo installation.
- B. Field Measurements: Verify actual dimensions of construction contiguous with precast terrazzo by field measurements before fabrication.
- C. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.
- D. Close spaces to traffic during terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.
- E. Control and collect water and dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain primary terrazzo materials from single source from single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.
- B. Source Limitations for Aggregates: Obtain each color, grade, type, and variety of granular materials from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 PERFORMANCE REQUIREMENTS

- A. NTMA Standards: Comply with NTMA's written recommendations for terrazzo type indicated unless more stringent requirements are specified.
- B. <Double click to insert sustainable design text for flooring.>

2.3 EPOXY-RESIN TERRAZZO

- A. Epoxy-Resin Terrazzo **<Insert designation>**: Comply with manufacturer's written instructions for matrix and aggregate proportions and mixing.
 - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Mix Color and Pattern: [As selected by Architect from manufacturer's full range] [As selected by Architect from NTMA's "Terrazzo Color Palette" EI Series] [As selected by Architect from NTMA's "Terrazzo Color Palette" EII Series] [As selected by Architect from NTMA's "Terrazzo Color Palette" EIII Series] [As selected by Architect from NTMA's "Terrazzo Color Palette" EIV Series] [Match Architect's sample] [Match existing] **<Insert NTMA designation or custom mix>..**
- C. Materials:
 - 1. Moisture-Vapor-Emission-Control Membrane: Two-component, high-solids, high-density, low-odor, epoxy-based membrane-forming product produced by epoxy terrazzo manufacturer that reduces moisture emission from concrete substrate to not more than 3 lb of water/1000 sq. ft. in 24 hours.
 - 2. Substrate-Crack-Suppression Membrane: Product of terrazzo-resin manufacturer, having minimum 120 percent elongation potential according to ASTM D412.
 - a. Reinforcement: Fiberglass scrim.
 - 3. Primer: [Manufacturer's product recommended for substrate and use indicated] **<Insert requirements>**.
 - 4. Epoxy-Resin Matrix: [Manufacturer's standard recommended for use indicated] **<Insert requirements>** and in color required for mix indicated.
 - a. Physical Properties without Aggregates:
 - 1) Hardness: 60 to 85 per ASTM D2240, Shore D.
 - 2) Minimum Tensile Strength: 3000 psi per ASTM D638 for a 2-inch specimen made using a "C" die per ASTM D412.
 - 3) Minimum Compressive Strength: 10,000 psi per ASTM D695, Specimen B cylinder.
 - 4) Chemical Resistance: No deleterious effects by contaminants listed below after seven-day immersion at room temperature per ASTM D1308.
 - (a) Distilled water.
 - (b) Mineral water.
 - (c) Isopropanol.
 - (d) Ethanol.
 - (e) 0.025 percent detergent solution.
 - (f) 1.0 percent soap solution.
 - (g) 5 percent acetic acid.
 - (h) 10 percent sodium hydroxide.
 - (i) 10 percent hydrochloric acid.

- (j) 30 percent sulfuric acid.
- b. Physical Properties with Aggregates: For terrazzo blended according to manufacturer's recommendations with one part epoxy resin with three parts marble aggregate consisting of 60 percent No. 1 chips and 40 percent No. 0 chips that is ground and grouted to a 1/4-inch nominal thickness, and cured for 7 days at 75 deg F plus or minus 2 deg F and at 50 percent plus or minus 2 percent relative humidity.
 - 1) Flammability: Self-extinguishing, maximum extent of burning 1/4 inch according to ASTM D635.
 - 2) Thermal Coefficient of Linear Expansion: 0.0025 inch/inch per deg F according to ASTM C531.
- 5. Aggregates: Comply with NTMA gradation standards for mix indicated and contain no deleterious or foreign matter.
 - a. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C131/C131M.
 - b. 24-Hour Absorption Rate: Less than 0.75 percent.
 - c. Dust Content: Less than 1.0 percent by weight.
- 6. <Double click to insert sustainable design text for recycled content.>
- 7. Finishing Grout: Resin based.

2.4 PRECAST EPOXY-RESIN TERRAZZO

- A. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Precast Terrazzo Base **<Insert designation>**: Minimum 3/8-inch- thick, epoxy terrazzo units cast in maximum lengths possible, but not less than 36 inches. Comply with manufacturer's written instructions for fabricating precast terrazzo base units in sizes and profiles indicated.
 - 1. Type: [As indicated] [Coved with minimum **3/4-inch** radius] [Straight] [Splayed] **<Insert requirements>**.
 - 2. Top Edge: [Straight, unfinished] [Beveled with polished top surface] [Radius edge with polished top surface] **<Insert requirements>**.
 - 3. Metal Toe Strip: **[Zinc] [Brass]**.
 - 4. Outside Corner Units: With finished returned edges at outside corner.
 - 5. Color, Pattern, and Finish: [As selected by Architect from full range of industry colors] [Match Architect's sample] [Match adjacent poured-in-place terrazzo flooring] **<Insert requirements>**.
- C. Precast Terrazzo Units **<Insert designation>**: Minimum **[3/4-inch]** **<Insert dimension>** thick, epoxy terrazzo units. Comply with manufacturer's written instructions for fabricating precast units in sizes and profiles indicated. Reinforce units as required by unit sizes, profiles, and thicknesses and as recommended by manufacturer. Finish exposed-to-view edges and reveals to match face finish. Ease exposed edges to 1/8-inch radius.
 - 1. Color, Pattern, and Finish: [As selected by Architect from full range of industry colors] [Match Architect's sample] [Match adjacent poured-in-place terrazzo flooring] **<Insert requirements>**.

2.5 STRIP MATERIALS

- A. Thin-Set Divider Strips: L-type angle in depth required for topping thickness indicated.
 - 1. Material: [As indicated] [White-zinc alloy] [Brass] [Aluminum] [Plastic, in color selected from full range of industry colors] **<Insert requirements>**.
 - 2. Top Width: [As indicated] **[1/8 inch] [1/4 inch]** **<Insert dimension>**.
- B. Heavy-Top Divider Strips: L-type angle in depth required for topping thickness indicated.
 - 1. Bottom-Section Material: [As indicated] [Galvanized steel] [Matching top-section material] **<Insert requirements>**.
 - 2. Top-Section Material: [As indicated] [White-zinc alloy] [Brass] [Aluminum] [Plastic, in color selected from full range of industry colors] **<Insert requirements>**.
 - 3. Top-Section Width: [As indicated] **[1/8 inch] [1/4 inch] [3/8 inch] [1/2 inch]** **<Insert dimension>**.
- C. Control-Joint Strips: Separate, double L-type angles, positioned back to back, that match material and color of divider strips and in depth required for topping thickness indicated.

- D. Accessory Strips: Match divider-strip width, material, and color unless otherwise indicated. Use the following types of accessory strips as required to provide a complete installation:
 - 1. Base-bead strips for exposed top edge of terrazzo base.
 - 2. Edge-bead strips for exposed edges of terrazzo.
 - 3. Nosings for terrazzo stair treads and landings.
 - 4. <Insert requirements>.
- E. Abrasive Strips: **[Three-line] [Two-line] [One-line] [Abrasive nosing strip and two-line] <Insert requirements>** abrasive inserts at nosings. Silicon carbide or aluminum oxide, or combination of both, in epoxy-resin binder and set in channel.
 - 1. Width: **[1/2 inch]** <Insert dimension>.
 - 2. Depth: As required by terrazzo thickness.
 - 3. Length: **[4 inches]** less than stair width] [As indicated] <Insert dimension>.
 - 4. Color: [As selected by Architect from full range of industry colors] <Insert requirements>.

2.6 MISCELLANEOUS ACCESSORIES

- A. Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use.
 - 1. <Double click to insert sustainable design text for VOC content of adhesive.>
 - 2. <Double click to insert sustainable design text for adhesives.>
- B. Anchoring Devices:
 - 1. Strips: Provide mechanical anchoring devices or adhesives for strip materials as recommended by manufacturer and as required for secure attachment to substrate.
 - 2. Precast Terrazzo: Provide mechanical anchoring devices as recommended by fabricator for proper anchorage and support of units for conditions of installation and support.
- C. Patching and Fill Material: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.
- D. Joint Compound: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.
- E. Resinous Matrix Terrazzo Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by sealer manufacturer for use on terrazzo type indicated.
- F. Sealer: [Slip- and stain-resistant, penetrating-type sealer that is chemically neutral; does not affect terrazzo color or physical properties; and is recommended by sealer manufacturer] [Acrylic] [Urethane] [Chemical-resistant epoxy] [Water based] <Insert requirements>.
 - 1. Surface Friction: Not less than 0.6 according to ASTM D2047.
 - 2. Acid-Base Properties: With pH factor between 7 and 10.
 - 3. <Double click to insert sustainable design text for floor treatment products.>

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances, including oil, grease, and curing compounds, that might impair terrazzo bond. Provide clean, dry, and neutral substrate for terrazzo application.
- B. Concrete Slabs:

1. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with terrazzo.
 - a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 - b. Repair damaged and deteriorated concrete according to terrazzo manufacturer's written instructions.
 - c. Use patching and fill material to fill holes and depressions in substrates according to terrazzo manufacturer's written instructions.
- C. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
- D. Preinstallation Moisture Testing:
 1. Testing Agency: **[Owner will engage] [Engage]** a qualified testing agency to perform tests.
 2. Moisture Testing: Perform tests so that each test area does not exceed **[200 sq. ft.] <Insert area>**, and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Moisture-Vapor-Emission Test: Maximum moisture-vapor-emission rate of **[3 lb of water/1000 sq. ft.] <Insert rate>** in 24 hours when tested according to ASTM F1869 using anhydrous calcium chloride.
 - b. Relative Humidity Test: Maximum **[75] <Insert number>** percent relative humidity measurement when tested according to ASTM F2170 using in-situ probes.
 3. Proceed with terrazzo installation only after concrete substrates pass moisture testing[or after installation of moisture-vapor-emission-control membrane on substrate areas that fail testing].
- E. Moisture-Vapor-Emission-Control Membrane: Install according to manufacturer's written instructions.
 1. Install on concrete substrates that incorporate lightweight aggregates.
 2. Install concrete substrates that fail preinstallation moisture testing.
- F. Substrate-Crack-Suppression Membrane: Install to isolate and suppress substrate cracks according to manufacturer's written instructions.
 1. Prepare and prefill substrate cracks with membrane material.
 2. Install membrane [at substrate cracks] [to produce full substrate coverage] in areas to receive terrazzo.
 3. Reinforce membrane with fiberglass scrim.
- G. Protect other work from water and dust generated by grinding operations. Control water and dust to comply with environmental protection regulations.
 1. Erect and maintain temporary enclosures and other suitable methods to limit water damage and dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.

3.3 EPOXY-RESIN TERRAZZO INSTALLATION

- A. Comply with NTMA's written recommendations for terrazzo and accessory installation.
- B. Strip Materials:
 1. Divider and Control-Joint Strips:
 - a. Locate divider strips [in locations indicated] <Insert requirements>.
 - b. Install control-joint strips [back to back and directly above concrete-slab control joints] [in locations indicated] <Insert requirements>.
 - c. Install control-joint strips with **[1/4-inch] <Insert dimension>** gap between strips, and install sealant in gap.
 - d. Install strips in adhesive setting bed without voids below strips, or mechanically anchor strips as required to attach strips to substrate, as recommended by strip manufacturer.
 2. Accessory Strips: Install [as required to provide a complete installation] [in locations indicated] <Insert requirements>.
 3. Abrasive Strips: Install with surface of abrasive strip positioned **[1/16 inch] <Insert dimension>** higher than terrazzo surface.

- C. Apply primer to terrazzo substrates according to manufacturer's written instructions.
- D. Place, rough grind, grout, cure grout, fine grind, and finish terrazzo according to manufacturer's written instructions.
 - 1. Installed Thickness: **[1/4 inch] [3/8 inch]** [As indicated on Drawings] <Insert dimension> nominal.
 - 2. Terrazzo Finishing: Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.
 - a. Rough Grinding: Grind with 24-grit or finer stones or with comparable diamond abrasives. Follow initial grind with 60/80-grit stones or with comparable diamond abrasives.
 - b. Grouting: Before grouting, clean terrazzo with water, rinse, and allow to dry. Apply and cure epoxy grout.
 - c. Fine Grinding/Polishing: Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted. Grind with **[80] [120]**-grit stones or with comparable diamond abrasives until grout is removed from surface.
 - 3. Installation Tolerance: Limit variation in terrazzo surface from level to **[1/4 inch in 10 feet]** <Insert dimensions>; noncumulative.
- E. Install and finish poured-in-place terrazzo stairs at the same time the adjacent terrazzo flooring is installed.
- F. Install and finish poured-in-place terrazzo base at the same time the adjacent terrazzo flooring is installed.

3.4 PRECAST TERRAZZO INSTALLATION

- A. Install precast terrazzo units using method recommended in writing by NTMA and manufacturer unless otherwise indicated.
- B. Do not install units that are chipped, cracked, discolored, or improperly finished.
- C. Seal joints between units with [joint compound matching precast terrazzo matrix] [joint sealant] <Insert requirements>.

3.5 REPAIR

- A. Cut out and replace terrazzo areas that evidence lack of bond with substrate. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo, or repair panels according to NTMA's written recommendations, as approved by Architect.

3.6 CLEANING AND PROTECTION

- A. Cleaning:
 - 1. Remove grinding dust from installation and adjacent areas.
 - 2. Wash surfaces with cleaner according to NTMA's written recommendations and manufacturer's written instructions; rinse surfaces with water and allow them to dry thoroughly.
- B. Sealing:
 - 1. Seal surfaces according to NTMA's written recommendations.
 - 2. Apply sealer according to sealer manufacturer's written instructions.
- C. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure that terrazzo is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 107313 AWNINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fixed awnings.
 - 2. Manually operated retractable awnings.
 - 3. Motorized retractable awnings.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include styles, material descriptions, construction details, fabrication details, dimensions of individual components and profiles, hardware, fittings, mounting accessories, features, and finishes for awnings.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, mounting heights, and attachment details.
 - 2. Detail fabrication and assembly of awnings[, including seam layout, spacing, and orientation of awning fabric].
 - 3. Include diagrams for power, signal, and control wiring.
 - 4. Show locations for blocking, reinforcement, and supplementary structural support.
 - 5. Graphics: Show text message, font, character sizes, and other graphic forms; character, word, and line spacing; margin widths; position of copy; and other information related to graphic design.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Samples for Initial Selection: For each type of exposed finish.
 - 1. Include Samples of graphics[**on fabric**] and accessories involving color or finish selection.
- E. Samples for Verification: For the following:
 - 1. Awning Fabric: 12-inch- square section of fabric from dye lot to be used for the Work, with specified treatments applied. Mark face of fabric.
 - 2. Graphics: Not less than 12-inch- square section showing graphics application method.
 - 3. Seam, Edge, and Corner Condition: Not less than 12-inch- long section showing seam, edge, and corner treatment.
 - 4. Valance: Full-size unit, not less than 12 inches long.
 - 5. Frame Finish: Not less than 6-inch lengths.
- F. Product Schedule: For awnings. Use same designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For awnings to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of products.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.6 WARRANTY

- A. Special Warranty: Manufacturer and fabricator agree to repair or replace components of awnings that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including framework.
 - b. Deterioration of fabric including seam failure.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Faulty operation of operator.
 - 2. Awning Warranty Period: **[Five]** **<Insert number>** years from date of Substantial Completion.
 - 3. Fabric Warranty Period: **[Three]** **[Five]** **[Eight]** **[12]** **<Insert number>** years from date of Substantial Completion.
 - 4. Thread Warranty Period: **[Five]** **[Eight]** **<Insert number>** years from date of Substantial Completion.
 - 5. Graphics Warranty Period: Outdoor durability not less than **[five]** **[three]** **<Insert number>** years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: **[120 deg F, ambient; 180 deg F, material surfaces]** **<Insert temperature change>**.
- B. Fire-Test-Response Characteristics: Provide awning fabrics with the fire-test-response characteristics indicated, as determined by testing identical products according to test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Flame-Resistance Ratings: Passes [NFPA 701] [California Code of Regulations, Title 19].
 - 2. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency for Flame-Spread Index of **[25]** **<Insert value>** or less.
 - 3. Permanently attach label to each awning fabric indicating whether fabric is inherently and permanently flame resistant or is treated with flame-retardant chemicals, and whether it requires retreatment after designated time period or cleaning.

2.2 FABRIC **<INSERT PRODUCT DESIGNATION>**

- A. **<Double click here to find, evaluate, and insert list of manufacturers and products.>**
- B. Fabric:
 - 1. Fiber Content: [Vinyl-laminated or -coated polyester mesh] [Vinyl-laminated or -coated polyester] [Acrylic-coated polyester] [Resin-coated polyester] [Vinyl-coated polyester/cotton blend] [Acrylic-coated polyester/cotton blend] [Resin-coated polyester/cotton blend] [Solution-dyed acrylic] [Solution-dyed modacrylic] [Expanded PTFE] **<Insert description>**.
 - 2. Weight: **<Insert value>**.
 - 3. Width: **<Insert dimension>**.

4. Solar-Optical Properties: <Insert requirements>.
 5. Openness Factor: <Insert number> percent.
 6. UV-Light Blockage: <Insert number> percent.
 7. Mildew Resistance: Showing no growth when tested according to ASTM G21.
 8. Shrinkage: Not greater than [0.1] [0.5] [1] <Insert number> percent according to ASTM D1204.
 9. Stretch Factor: Not less than [0.4] [1] [4] <Insert number> percent according to ASTM D4851.
 10. Applied Treatment: [Stain resistant] [Mildew resistant] [Polymer, flame resistant] [Water repellent] [Lamination] <Insert description>.
 11. Pattern and Color: [Match Architect's samples] [As selected by Architect from manufacturer's full range] [As indicated in an awning schedule] <Insert color>.
- C. Seam Thread: [100 percent expanded PTFE] [100 percent bonded polyester], UV-light, mildew, and rot resistant.
- D. Decorative Trims: [Borders] [Braid and bindings] [Cords] [Fringe] [Patterned edge; scalloped] [Patterned edge; V-shaped] [Streamers] [Tassels] [Welting] <Insert description>.
1. Colors: [As indicated by manufacturer's designations] [Match Architect's samples] [Matching or coordinating with awning fabric color] [As selected by Architect from manufacturer's full range] [As indicated in an awning schedule] <Insert colors>.
- E. Fringe: [As indicated by manufacturer's designation for style and color] [As indicated in awning schedule] <Insert description>.

2.3 AWNING FRAME AND ACCESSORY MATERIALS

- A. Steel:
1. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
 2. Steel Tubing: ASTM A500/A500M.
 3. Galvanized Steel Tubing: ASTM A787/A787M.
 4. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40).
- B. Aluminum: Alloy and temper recommended by awning manufacturer for type of use and finish indicated and with not less than the strength and durability properties of alloy and temper required by structural loads.
1. Aluminum Plate and Sheet: ASTM B209.
 2. Aluminum Extrusions: ASTM B221.
 3. Extruded Structural Pipe and Round Tubing: ASTM B429/B429M, standard weight (Schedule 40).
 4. Drawn Seamless Tubing: ASTM B210.
- C. Anchors, Fasteners, Fittings, Hardware, and Installation Accessories: Complying with performance requirements indicated and suitable for exposure conditions, supporting structure, anchoring substrates, and installation methods indicated. Corrosion-resistant or noncorrodible units; weather-resistant, **[tamperproof, vandal- and theft-resistant]**, compatible, nonstaining materials. Provide as required for awning assembly, mounting, and secure attachment. Number as needed to comply with performance requirements and to maintain uniform appearance; evenly spaced. Where exposed to view, provide finish and color as selected by Architect from manufacturer's full range.
1. Wood Screws: ASME B18.6.1.
 2. Lag Bolts: ASME B18.2.1.
 3. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers, zinc coated.
 4. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing according to ASTM E488 conducted by a qualified independent testing and inspecting agency.
 - a. Material: Stainless steel with bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2.

5. Adhesive-Bonded Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing according to ASTM E1512 conducted by a qualified independent testing and inspecting agency.
 - a. Material: Stainless steel with bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2.
 6. Grommets: [Zinc-coated brass, No. 2] [Stainless steel, No. 2] <Insert description>.
 7. Lacing: [100 percent polyester, braided No. 4] <Insert description>.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.

2.4 AWNING FABRIC FABRICATION

- A. Fabrication: Reinforce wear points and hardware attachment points with [nonwoven] [mesh] [polypropylene mesh] <Insert description> webbing. Seam fabrics [in locations indicated on the Drawings and] as follows:
1. Fabric Edges and Seams: Fold and stitch selvedge and cut fabric edges.
 2. Fabric Edges and Seams: Hot cut and sealed.
 3. Fabric Edges and Seams: Radio-frequency welded.
 4. Fabric Edges and Seams: Adhesively bonded.
 5. Fabric Edges and Seams: Manufacturer's standard hemming and seaming methods.
 6. Fabric Attachment: [Manufacturer's standard.] [Hem pockets.] [Screws.] [Staples.]
 7. Fabric Attachment: Grommets.
 - a. Grommet Spacing: [6 inches o.c.] <Insert spacing>.
- B. Fabric Insets: [Heat-sealed] [Sewn-in] process.
- C. Graphic Application: [Hand painting] [Silk-screen printing] [Heat color transfer] [Vinyl film with pressure-sensitive adhesive backing] [PVDF film with pressure-sensitive adhesive backing] [PVF film with pressure-sensitive adhesive backing] [Radio-frequency, heat-sealed vinyl film] [Eradication] [Cut-out lettering] <Insert description>.
1. Graphic Image: [As indicated on Drawings] [As indicated in awning schedule].
 2. Text Message: [As indicated on Drawings] [As indicated in an awning schedule] <Insert text>.
 - a. Text Font: [Helvetica] <Insert style>.
 - b. Character Size: Minimum [1-inch-] [1-foot-] <Insert dimension> high characters.
 - c. Character Colors: <Insert colors>.
 3. Vinyl Film: [Calendered-vinyl film, not less than 3 mils thick, with pressure-sensitive adhesive backing] [Cast-vinyl film, not less than 2 mils thick, with pressure-sensitive adhesive backing] [Cast-vinyl reflective film, not less than 2 mils thick, with pressure-sensitive adhesive backing] <Insert description>.

2.5 FIXED AWNING FABRICATION

- A. <Double click here to find, evaluate, and insert list of manufacturers and products.>
1. Frame Fabrication: Fabricate awning frames from [steel] [aluminum]. Preassemble in 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 re-assembly and coordinated installation. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
 2. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
 3. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Fabricate slip-fit connections exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
 4. Weld corners and connections continuously. Obtain fusion without undercut or overlap. Remove welding flux immediately. At exposed corners and 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.

5. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure awnings in place and to properly transfer loads.
- B. Steel Finish: [Galvanized mill finish; apply galvanizing repair paint to welds.] [Manufacturer's standard primed and top-coated decorative] [Baked-enamel or powder-coat] <Insert finish> finish complying with finish manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
 1. Color: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color and gloss>.
- C. Aluminum Finish: **[Mill] [Manufacturer's standard primed and top-coated decorative] [Baked-enamel or powder-coat] <Insert finish>** finish complying with finish manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
 1. Color: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color and gloss>.

2.6 MANUALLY OPERATED RETRACTABLE AWNINGS <INSERT PRODUCT DESIGNATION>

- A. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Type: Retractable awning, fabricated form aluminum, with hinged arms attached to **[steel]** torsion bar with tensioning system designed to keep fabric taut in any position.
- C. Fabric Roll Protection: [Cassette design to fully enclose] [Semi-cassette design to partially enclose] [Sheet metal hood to protect] fabric roll when awning is retracted.
- D. Manual Operator: Provide gear and crank operator.
 1. Manual Operator Assist Mechanism: Manufacturer's standard spring assist for operating heavy awnings.
 2. Crank Handle: **[One] [Two] <Insert number>**, detachable.
 3. Awning Coupler System: Designed for simultaneously operating multiple awnings with a single crank. Provide system **[for each group of awnings] [where indicated on Drawings] [where indicated in an awning schedule]**.
 4. Operating Function: [Stop and hold awning at any position in ascending or descending travel] [Stop and hold awning at fully open or fully closed positions only] <Insert requirement>.
- E. Mounting Brackets: Configured for mounting to surface indicated, with adjustable pitch.
- F. Finish: **[Manufacturer's standard primed and top-coated decorative] [Baked-enamel or powder-coat] <Insert finish>** finish complying with finish manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
 1. Color: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color and gloss>.

2.7 MOTORIZED RETRACTABLE AWNINGS <INSERT PRODUCT DESIGNATION>

- A. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Type: Retractable awning, fabricated form aluminum, with hinged arms attached to **[steel]** torsion bar, with tensioning system designed to keep fabric taut in any position.
- C. Fabric Roll Protection: [Cassette design to fully enclose] [Semi-cassette design to partially enclose] [Sheet metal hood to protect] fabric roll when awning is retracted.
- D. Motorized Operator: Provide factory-assembled, motorized, retractable-awning operator designed for retracting awnings of type, size, weight, construction, use, and operation frequency indicated.
- E. Mounting Brackets: Configured for mounting to surface indicated, with adjustable pitch.
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- G. Control Equipment: Comply with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6[**with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc**].
- H. Electric Motors: UL-approved or -recognized, totally enclosed, insulated motor, complying with NEMA MG 1, with thermal-overload protection and internal limit switches; sized by awning manufacturer to start and operate size and weight of awning considering service factor or considering Project's service conditions without exceeding nameplate ratings.
1. Service Factor: According to NEMA MG 1 unless otherwise indicated.
 2. Motor Characteristics: Single phase, **[24] [110] [220] <Insert value>** V, 60 Hz.
 3. Coordinate wiring requirements and electrical characteristics of motors with building electrical system.
 4. Motor Mounting: Within manufacturer's standard roller enclosure.
- I. Remote Controls: Electric controls with NEMA ICS 6, **[Type 1] [Type 4] <Insert type>** enclosure for **[surface] [recessed or flush] <Insert description>** mounting. Provide the following devices for remote-control activation of awnings:
1. Keyed Control Stations: **[Maintained] [Momentary]**-contact, three-position, switch-operated control station with open, close, and off functions. Provide two keys per station.
 2. Control Stations: **[Maintained] [Momentary]**-contact, three-position, **[toggle] [rocker]**-style, wall-switch-operated control station with open, close, and center-off functions.
 - a. Function: [Individual] [Group] [Combined individual and group].
 - b. Color: [Ivory] [White] [As indicated in an awning schedule].
 3. Sun Sensor Controls: Programmable system activated by LEDs detecting daylight intensity and responding by automatically adjusting awnings.
 4. Radio Controls: Digital system consisting of code-compatible universal coaxial receiver, **[one per awning] [where indicated on Drawings]**.
 - a. Single Channel Radio Transmitters: Portable single-channel transmitters for operating a single motor with a single button to open and retract awning; provide **[two] <Insert number>** units.
 - b. Multi-Channel Radio Transmitters: Portable multi-channel transmitters for operating **[two] [four] [up to 12] <Insert number>** awnings individually, each with a single button to open and close awnings; provide **[two] <Insert number>** units.
 5. Timer Controls: Clock timer, **[24-hour] [seven-day] <Insert time period>** programmable for regular events.
 6. Microprocessor Controls: Electronic programmable means for setting, changing, and adjusting control features. Provide unit isolated from voltage spikes and surges.
- J. Operating Features: Include the following:
1. Capable of accepting input from building automation control system.
 2. Override switch.
 3. Backup gear and crank operator for manual operation during power failures with detachable handle, **[6 feet long] [manufacturer's standard length] [length required to make operation convenient from ground level] [length as indicated on Drawings]**.
 4. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop awning at fully raised and fully lowered positions.
 5. Preset Position Function: [Stop and hold awning at any position] [Stop and hold awning at three predetermined positions including open, closed, and one user-programmed position] **<Insert operating mode>**.
- K. Finish: **[Manufacturer's standard primed and top-coated decorative] [Baked-enamel or powder-coat] <Insert finish>** finish complying with finish manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
1. Color: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] **<Insert color and gloss>**.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for supporting members, blocking, inserts, installation tolerances, **[operational clearances, accurate locations of connections to building electrical system,]** **[lighting,]** and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install awnings **[and motor controls]** at locations and in position indicated, securely connected to supports, free of rack, and in proper relation to adjacent construction. Use mounting methods of types described and in compliance with Shop Drawings and fabricator's written instructions.
- B. Install awnings after other finishing operations, including joint sealing and painting, have been completed.
- C. Slip fit frame connections accurately together to form hairline joints, and tighten to secure.
- D. Weld frame connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
 - 1. Field Welding: Comply with the following requirements:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. 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.
- E. Anchoring to In-Place Construction: Use anchors, fasteners, fittings, hardware, and installation accessories where necessary for securing awnings to structural support and for properly transferring load to in-place construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come in contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.
- G. Coordinate awning installation with flashing and joint-sealant installation so these materials are installed in sequence and in a manner that prevents exterior moisture from passing through completed exterior wall and roof assemblies.

3.3 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly, and lubricate as recommended by retractable-awning manufacturer.

3.4 CLEANING AND PROTECTION

- A. Touch up factory-applied finishes to restore damaged or soiled areas.
- B. Galvanized Surfaces: Clean field welds, connections, and abraded areas and repair galvanizing to comply with ASTM A780.

3.5 DEMONSTRATION

- A. **[Engage a factory-authorized service representative to train] [Train]** Owner's maintenance personnel to adjust, operate, and maintain retractable awnings.

END OF SECTION

SECTION 116133 THEATRICAL RIGGING

PART 1 General

1.1 SUMMARY

- A. The work in this section includes Theatrical Rigging (TR) systems and equipment within the following spaces and associated support areas:
 - 1. Proscenium Theatre
 - 2. Studio Theatre
 - 3. Valade Jazz Center
- B. Section Includes
 - 1. Major Systems and Equipment: furnish and install the following major elements and associated accessories:
 - a. Counterweight Rigging System
 - 1) Locking rail
 - 2) Belaying pins
 - 3) Index Lights
 - b. Proscenium safety curtain with lineshaft winch
 - c. Stage Traveler Track assemblies
 - d. Rope rigging for multi-cable management
 - e. Zero fleet hoist
 - f. Zero fleet hoist with integrated structural backbone
 - g. Rigging Control System
 - h. Pipe Grid
 - i. Walk-Draw Drapery Track
 - j. Miscellaneous rigging equipment and accessories
 - 2. Work Results:
 - a. The equipment installed as part of this Section shall result in a complete and working theatrical rigging system.
 - b. Provide fully coordinated and engineered equipment, installation, supervision and commissioning for systems and associated accessories as required for each space.
 - c. Provide supervision of Theatrical Rigging Systems low voltage signal cable pulling, termination and testing by the Division 26 Electrical Contractor.
 - d. Provide coordination of conduit, backboxes and AC power wiring provided by the Division 26 Electrical Contractor.
 - e. Provide all material, components, accessories and services required to provide the work as specified herein, elsewhere in the Contract Documents and/or as shown on related drawings.
 - f. Consult and coordinate with other affected work and contractors throughout the course of the work contained herein.
 - 3. Delegated Design:
 - a. Provide design for the means of fastening, suspension and support of the work of this Section.
 - b. Provide all material, components, accessories and services required to provide the work as specified herein, elsewhere in the Contract Documents and/or as shown on related Drawings.
- C. Products Supplied But Not Installed Under This Section
 - 1. The following equipment supplied under this Section shall be installed and/or terminated under Division 26:
 - a. Operating gallery LED index strip light
 - b. Motor Control Centers (MCC)
 - c. Motion Control Racks (MCR)
 - d. Rigging control system devices including but not limited to control panels, limit switches, detection and safety devices

- e. Low Voltage/Control Wireways for automated hoists
- f. Line Voltage Wireways for automated hoists
- 2. Termination of control system conductors shall be made by Division 26 under the direct onsite supervision of the Contractor.
- 3. If not internal to the equipment, controls, safety and limit switch devices are installed under this Section. Final terminations to the devices are made under Division 26.

D. Related Requirements

- 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications apply to this Section.
- 2. Examine Contract Documents for requirements that directly affect or are affected by work of this Section. A list of those Documents and Sections includes, but is not limited to the following:
 - a. Division 01 – General Requirements
 - b. Division 03 – Concrete
 - c. Division 04 – Masonry
 - d. Division 05 – Metals
 - e. Division 09 – Finishes
 - f. Division 11 – Equipment
 - 1) Section 116113 – Orchestra Shell Enclosure
 - 2) Section 116143 – Theatrical Drapery
 - 3) Section 116163 – Theatrical Lighting Dimming and Control
 - 4) Section 116183 – Theatrical Audio Video Systems
 - g. Division 21 – Fire Suppression
 - h. Division 22 – Plumbing
 - i. Division 23 – Heating, Ventilating and Air Conditioning
 - j. Division 26 – Electrical
 - 1) Section 265561 – Theatrical Systems Electrical Requirements
 - 2) General requirements for all Electrical work, including installation of system cable trays, terminal cabinets, empty conduit, junction/pull boxes and back boxes for system devices and panels (Division 26).
 - 3) Electrical terminations (AC power and grounding only) to all equipment racks and AC power receptacles (Division 26).
 - 4) Provision and installation of all conduit and back boxes (Division 26).
 - 5) Electrical services and main circuit protection (Division 26).
 - 6) Distribution system equipment (Division 26).
 - 7) Conduit, wire, pull boxes, junction boxes and miscellaneous hardware and components as required for a complete electrical installation.
 - 8) Terminations and testing of system continuity.
 - k. Division 27 – Communications
 - 1) Structured cabling systems
 - 2) At common facility panels, coordinate receptacles for building standard communications systems.
 - l. Division 28 – Electronic Safety and Security

1.2 PRICE AND PAYMENT PROCEDURES

- A. Refer to Division 01 – General Requirements for information regarding price and payment procedures.
- B. Unit Prices
 - 1. Provide price to Owner for five year maintenance agreement on winches. Price to include emergency site service (post warranty period), one one-day session of additional operator training per year, and replacement of parts due to failure under normal usage.
- C. Alternates
 - 1. Provide separate price information for material and labor associated with the following equipment and systems:
 - a. <<TBD>>

2. Provide separate price information to deduct the material and labor associated with the following equipment and systems from the price of the full and complete systems as otherwise specified in this document:
 - a. Paint Shop – Motorized Batten and related infrastructure
 - b. Valade Jazz Center – Delete Cyclorama motorized batten and related infrastructure

1.3 REFERENCES

A. Abbreviations:

1. The following abbreviations and acronyms are relevant to this Section and are in addition to those defined in Division 01 – General Requirements:
 - a. MCC – Motor Control Center
 - b. ACC – Automation Control Console
 - c. MCR – Motion Control Rack
 - d. SWL – Safe Working Load

B. Definitions:

1. The following definitions are relevant to this Section and are in addition to those defined in Division 01 – General Requirements:
 - a. In all cases where a device or a part of equipment is referred to in a singular manner within the contract documents, it is intended that such a reference shall include all devices required to complete the installation in accordance with the project documents.
 - b. “Architect”: All references to the “Architect”, Hamilton Anderson Associates, will refer to the process by which the indicated action or decision regarding the work in this section will be administered. All such actions shall be initiated with or by the Architect, who will disseminate all pertinent information and documents to, as well as coordinate all efforts and site visits with, the Theatre Consultant and all other project consultants who may have design responsibility relating to the work in this section.
 - c. “Theatre Consultant”: Auerbach + Associates, Inc. (d.b.a. Auerbach Pollock Friedlander). The Theatre Consultant will be party to all actions and decisions regarding the work in this section.
 - d. “Other Project Consultants”: Acoustical Consultant, Electrical Engineer, Structural Engineer, or Mechanical Engineer as is applicable to a particular issue.
 - e. “Contractor”: Manufacturer / Installer responsible for the fabrication and installation of the work contained in this section.
 - 1) Contractors involved with other work shall be indicated with a specific trade preceding the word “Contractor” (i.e. General, Electrical, etc.).
 - f. “Owner”: Authorized personnel representing Wayne State University.
 - g. “Furnish”: Purchase and/or fabricate and deliver to project site.
 - h. “Install”: Physically install the items in their proper location(s) on the project site.
 - i. “Provide”: Furnish and install.
2. Definitions of Technical Terms:
 - a. “Safe Working Load”: The load that can be applied to the system by the end user.
 - b. “System Load”: Sum of the Safe Working Load and the weight of the load carrying device. The maximum load which can be safely handled by the machinery installation under normal operating conditions, not taking dynamic forces into consideration.
 - c. “Dynamic Force”: Forces exerted on the structure or machine that are the result of the movement patterns of the load and system component parts.
 - d. “Design Load”: Sum of the System Load and the loads due to dynamic forces.
 - e. “Category 0 Stop”: An uncontrolled stop resulting from loss of power to the machine actuators at any time during its movement.
 - f. “Category 1 Stop”: A controlled stop that allows power to the machine actuators to achieve a safe stop, and then removes power from the machine actuators when the stop is achieved.
 - g. “Category 2 Stop”: A controlled stop that leaves power left available to the machine actuators.

- h. "Initial Limit": The mechanical limit switch connected to the electrical system in such a manner as to prevent further movement in the over travel direction. It shall be a Category 2 stop and allow the user to operate the system in the opposite direction.
- i. "Ultimate Limit": The mechanical limit switch is a positive break mechanical limit switch, which executes a Category 1 stop. NOTE: The Ultimate Limit switch shall be located in such a manner that, should the Initial Limit fail to operate, if the machinery strikes the Ultimate Limit at maximum speed all components of the machine shall come to a complete stop before the over travel results in mechanical damage.
- j. "Fleet Angle": The angle formed between the wire rope and the centerline of a sheave or drum as the wire rope traverses to another sheave or fixed point.
- k. "Zero Fleet Winch": A hoist in which the line pays off the drum at the exact same location at all times, thereby maintaining a fleet angle of zero (0) degrees.

C. Reference Standards:

- 1. Reference Division 01 for general project references and standards.
- 2. References to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies will refer to the latest edition of such publications adopted and published prior to submittal of the bid. All such codes and standards will be considered a part of this specification as if they were fully included herein.
- 3. If an applicable code or standard permits work of lesser quality or extent than this specification, then this specification and the related drawings will govern.
- 4. Comply with national, state and local codes.
- 5. Comply with national, state and local labor regulations and requirements.
- 6. The following standards apply to the work of this Section. It remains the Contractor's responsibility to confirm and comply with all industry standards that are applicable to the work of this Section.
 - a. ASTM International
 - 1) ASTM A36 for structural steel shapes
 - 2) ASTM A47 for malleable iron casting
 - 3) ASTM A48 for gray iron casting
 - 4) ASTM A1011 for side plates
 - b. American National Standards Institute (ANSI):
 - 1) ANSI B18.2.1&2 for square and hex bolts and nuts
 - 2) ANSI-Z535 – System load and safety signage
 - 3) ANSI E1.6-1 Entertainment Technology – Powered Hoist Systems
 - 4) ANSI E1.4-1 Entertainment Technology – Manual Counterweight Rigging Systems
 - 5) ANSI E1.22 Entertainment Technology – Fire Safety Curtain Systems
 - c. American Iron and Steel Institute (AISI):
 - 1) AISI 1045 for steel shafts
 - d. National Fire Protection Association (NFPA)
 - 1) NFPA 70 - National Electrical Code
 - e. National Electrical Manufacturers Association (NEMA)
 - 1) NEMA WC 63.1 (2005) Twisted Pair Premise Voice and Data Communications Cables
 - 2) NEMA WC 66 (2001;Errata 2003) Category 6 and Category 7 100 Ohm Shielded and Unshielded Twisted Pairs
 - f. Underwriters Laboratories Incorporated (UL)
 - 1) UL/IEC 61508A Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems
 - 2) UL 1666 (2000; Rev thru Jul 2002) Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
 - 3) UL 467 (2004) Standard for Grounding and Bonding Equipment
 - 4) UL 50 (2003; R 2005) Standard for Enclosures for Electrical Equipment
 - 5) UL 969 (1995; rev Thru Dec 2006) Marking and Labeling Systems

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. The Contractor is required through drawings, memos and meetings to properly coordinate the work with the other sections as necessary to complete the work of this section.
- B. Pre-installation Meeting:
 1. Refer to Division 01 - General Requirements for information regarding pre-installation meeting with the General Contractor.
- C. Sequencing
 1. The installation of the equipment in this section shall be coordinated with other work which may be in conflict with or which must be completed before the work in this section may be installed, including:
 - a. Principal foundation work (see Architectural Drawings)
 - b. Installation of associated electrical work (see Electrical Drawings)
 - c. Installation of HVAC work in ceilings (see Mechanical Drawings)
 - d. Painting
 - e. Finishing of floors and finishes
 - f. Electromechanical and electronic equipment installation shall proceed after environmental site conditions are met. Refer to paragraph 1.10-B for class requirements.

1.5 ACTION SUBMITTALS

- A. All submittals shall be submitted in accordance with Division 01.
- B. All submittals shall be submitted in a timely manner, allowing sufficient time for adequate review and possible resubmittals without jeopardizing project schedule.
- C. Submittals will be reviewed, accepted and field dimension verified prior to proceeding with the fabrication of the work in this section.
- D. All submittals shall leave space available for review stamps and comments.
- E. The Architect and Theatre Consultant shall only mark one set of drawings per submittal with comments. Any additional sets of drawings or product data shall be returned unmarked.
- F. Provide insurance against loss or damage during shipment. Furnish certifications of such coverage to the General Contractor not less than 60 calendar days prior to the shipment of any equipment.
- G. Review all pertinent project Contract Documents. Following this review, provide to the Architect and General Contractor any additional information required to make a fully functioning system. In addition, the Manufacturer shall indicate maximum accepted wire size as it relates to termination points on their equipment.
- H. Verify wire type, count, and routing for all required data wiring between all components to allow for proper conduit sizing and routing by Division 26. Verify and coordinate all line voltage power input required by systems components that shall be provided under Division 26.
- I. Prior to fabrication, it shall be the responsibility of the contractor to provide a complete submittal for approval within 90 days of award of contract.
- J. Product Data
 1. Where standard manufacturer parts are used, submit current product literature describing component, manufacturer's recommended applications, load ratings, safety factors and dimensions. The data shall include all information which indicates compliance with the specifications herein.
 2. Clearly indicate specific component and applicable options.
- K. Shop Drawings
 1. Provide shop drawings on D size minimum (24" x 36") sheets.
 2. Include a cover sheet with a drawing index including sheet number and title for each sheet in the set.
 3. Provide 1/4" = 1'-0" plans of all locations which contain equipment in this contract. Show all equipment properly located, dimensioned and labeled. Note all work by others in the vicinity which may affect work of this Section.

4. Provide complete, fully dimensioned, large scale detailed fabrication drawings of all major components.
 5. Provide requisite schematics, plans and sections indicating assembly and installation of components.
 6. Provide indications by arrow and boxed caption of all variations from contract drawings and specifications, except where variation is indicated as acceptable.
 7. Indicate all elements with appropriate safety factors and/or safety equipment.
 8. Indicate recommended load limits for each element in the system with loading requirements.
 9. Indicate Safe Working Load for each element in the system with loading requirements.
 10. Provide power requirements, one-line riser diagrams and installation circuit diagrams for electrical equipment. Show all required wire sizes and counts between all components. These shall be provided within 30 days of Contract Award.
 11. Provide a full Bill of Materials to be supplied, including quantities, manufacturer's part number, reference to applicable drawings, etc.
- L. Samples
1. Submit sample items including, but not limited to:
 - a. Samples of pipe grid hanging hardware and connections, pipe grid junction hardware.
 - b. Samples of drapery tracks and associated hardware.
 2. Additional samples must be submitted within 14 days of Architect's written request.
- M. Certificates
1. Provide a Certificate of Training for each participant at the conclusion of Owner instruction sessions.
- N. Delegated Design Submittals
1. Provide drawings and calculations meeting the review requirements of the authorities having jurisdiction, stamped and wet signed by a Professional Engineer licensed in the project jurisdiction for work of the specific type performed.
 2. Engineered drawings shall be provided to the Architect and Theatre Consultant for review of coordination and compliance to this Section.
 3. Engineered drawings shall be provided to the Structural Engineer of record for this project. The engineer of record will review the loads imposed on the structure by this equipment and compare those loads to allowable structural loading.
 4. Engineered drawings shall be provided to the Authority Having Jurisdiction for this facility. The AHJ will review the drawings for compliance with local codes. In all cases code compliance is the responsibility of the Contractor.
- O. Test and Evaluation Reports
1. Test Procedures
 - a. Provide test procedures for all custom motor drive assemblies.
 - b. The test procedures shall describe in detail all of the necessary operations to perform verification through a test. A test procedure shall be produced for every verification test required and shall contain the following information:
 - 1) Scope of the test: the test shall be described and the intended result shall be listed.
 - 2) Application Documents: all the documents referred to in the test procedure shall be listed.
 - 3) Test conditions: all applicable requirements needed to correctly perform the test shall be listed and detailed (for example: special environmental conditions, dedicated tools, test rigs, special requirements on the tested items, calibration requirements, etc.)
 - 4) Test procedure: all operations required to perform the test shall be detailed.
 - 5) Test results presentation: the procedures to process the raw data for final presentation of the test results shall be described.
 2. Test Reports
 - a. Winches: Provide a load testing report for every winch and component part installed in the automated system based on Safe Working Load.
 - 1) Static loading of primary brake to 1.25 x SWL for a minimum of 10 minutes
 - 2) Static loading of secondary brake to 1.25 x SWL for a minimum of 10 minutes
 - 3) Dynamic test of primary brake to 1.1 x SWL (drop test)

- 4) Dynamic test of secondary brake to 1.1 x SWL (drop test)
- 5) Full speed E-Stop test with 1.0 x SWL
- 6) Test all limits at full speed with 1.0 x SWL

P. Source Quality Control Submittals

1. The Contractor shall supply as part of the submittal process the following Source Quality Control documents which must contain, at minimum:
 - a. Serial number of hoist
 - b. Motor drive serial number
 - c. Batch number of major components
 - d. Name of person conducting the QC test
 - e. Date the test was conducted
 - f. List of mechanical tests conducted
 - g. List of electrical tests conducted

Q. Special Procedure Submittals

1. Installation/Erection Plan
 - a. The Contractor shall supply as part of the submittal process the following Installation/Erection Plan documents which must contain, at minimum:
 - 1) Required path to site of work, including maximum loads applied to floor in that path
 - 2) Maximum size and weight of pieces to be moved along the path
 - 3) Required erection machinery, including lifts, hoists, etc., including the maximum loads applied to the floor and lift points in the erection area
 - 4) Erection Plan: the plan shall outline the construction methods, erection sequence, erection bracing, temporary bracing if required, equipment required and other engineering details necessary for shipping, erecting and maintaining stability of the equipment detailed in this section
2. Training
 - a. To ensure proper training of the user group, the Contractor shall supply as part of the submittal process the following training documentation:
 - 1) Training syllabus
 - 2) Training guide (bound hard copy)
 - 3) Training guide (hands on system training)
 - 4) Testing document for confirmation of understanding
 - 5) DVD/ MPG video training file
 - b. These shall be provided two (2) months prior to completion.

1.6 CLOSEOUT SUBMITTALS

A. Project Record Documents:

1. Submit documents in accordance with Division 01 – General Requirements
2. At the time of acceptance testing, submit three (3) copies of parts lists and maintenance instruction sheets.
3. Within 60 days of acceptance testing, submit one (1) set of reproducible “as built and approved” drawings showing all equipment as installed. These drawings shall include all adjustments made during the checkout process.
4. Submit operation and maintenance manuals with the “as built and approved” drawings. Each manual shall be bound in an individual binder with the project name on the front cover and system identification on the spine. The manuals shall include:
 - a. Complete parts list for all equipment and telephone numbers for the authorized parts and service distributors.
 - b. Instructions as to the safe operation for all equipment.
 - c. Recommended maintenance schedule for component parts that may need periodic replacement or maintenance.
 - d. Recommendations for cleaning, maintaining and touch-up of all finished surfaces.
 - e. Deliver all copies of approved Operations Manual to Owner during instruction session, and review it as part of that session.
5. Where specific elements do not require manuals, instruction sheets as to care and handling shall be provided.

6. Certificates as required herein.
 7. Warranties as required herein.
- B. Maintenance Contract
1. Refer to 3.10 – Maintenance.
 2. Submit maintenance contract proposal for Owner and Theatre Consultant review no later than one month prior to substantial completion.
- C. Submit verification that all punch list items have been rectified. Such written verification will be required for project closeout and initiation of the warranty period.
- D. The record documents shall be reviewed by the Architect and all modifications to the documents stemming from this review shall be made as required.
- E. Above submissions are required as a condition for final approval of the work.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Spare Parts
1. Furnish the following user-serviceable components as spare parts for major electronics assemblies:
 - a. Furnish 3 spare fuses of each type in the system
 - b. Furnish 1 spare breaker of each type in the system
 - c. Furnish 4 spare keys of each type in the system
 - d. Furnish 2 spare sets of winch control connection cables
 - e. Furnish 1 spare e-stop master controller card
 - f. Furnish 1 spare winch drive motion controller card
 2. Motors and complete motor drives shall not be provided but shall be available within 24-hours of notice to manufacturer.
- B. Extra Stock Materials:
1. Deliver stock of maintenance material to Owner. Furnish the following to match those installed and taken from the same production run, packaged with protective covering for storage and identified with appropriate labels:
 - a. Furnish 12 compression sleeves of each type in the system.
 - b. Furnish 4 shackles of each type in the system.
 - c. Furnish 12 thimbles of each type in the system.
 - d. Furnish 12 bolts and nylock nuts of each type in the system.
 - e. Furnish 12 lockwashers of each type in the system.
 - f. Furnish 4 turnbuckles of each type in the system.
 - g. Furnish 1 master track carrier of each type in the system.
 - h. Furnish 4 other track carriers of each type in the system.

1.8 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Refer to Division 01 – General Requirements.
- B. Qualifications
1. All equipment and installation to be the responsibility of a single Contractor, who shall own and operate their own manufacturing facility for the fabrication, assembly and integration of theatrical rigging equipment, and be regularly engaged in the fabrication of such equipment. Fabrication of such equipment shall comprise no less than 90% of the Contractor's business.
 2. The Contractor's Project Manager shall be qualified and have experience in projects of similar size and scope. The Project Manager shall have binding authority to represent and act for the Contractor. The Project Manager shall be the primary conduit for all information between the supplier of this equipment and the General Contractor. All information given to the Project Manager shall be considered as given to the Contractor.
 3. The Contractor shall have been continuously engaged in the fabrication, integration and installation of theatrical rigging systems for no less than five years.

4. The Contractor shall have, at the time of bid, a current Contractor's License and shall know, understand, and have the required documentation to work in the State of Michigan. This license shall be maintained throughout the course of work of this contract.
5. Contractor is responsible for proper installation, operation and safety of all component equipment.
 - a. Equipment must be procured as specified. Non-specified items may be procured from any nationally recognized manufacturer.
 - b. Metalworking may be done by others. Responsibility in all respects shall be that of the Contractor.
6. The Contractor shall verify all system design loads.
7. Errors and omissions within the Contract Documents shall not relieve the Contractor and the General Contractor of the responsibility for providing a properly functioning installation of the system as described herein.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Delivery, storage and handling shall be coordinated with the General Contractor and shall meet all requirements described in Division 01.
- B. Packing, Shipping, Handling and Unloading
 1. All equipment shall be appropriately and substantially packed for shipment.
 2. All equipment containers shall clearly indicate the equipment contained, "front", "top", "fragile", the project name, and theatre site allocation. Include packing and shipping lists for each container.
 3. All shipping costs to the job site are the responsibility of the Contractor. The shipping method/company is at the total discretion of the Contractor in order to meet the published project schedules.
- C. Acceptance at Site
 1. Coordinate responsibility for acceptance of material and equipment at job site with the General Contractor.
 2. The Contractor shall be responsible for acceptance of the Theatrical Rigging System components at the job site, confirming that all quantities and counts are correct and for keeping accurate logs and records of such information.
- D. Storage and Protection
 1. Upon delivery, the materials shall be stored under cover in a clean and dry location, off the ground. Delivered materials which are damaged or otherwise not suitable for installation shall be removed from the job site and replaced with acceptable materials.
 2. Replace, at no additional expense to the Owner, all equipment and materials which are damaged during storage or handling.

1.10 SITE CONDITIONS

- A. Existing Conditions
 1. Verify all conditions at job site. Promptly report variations and obstructions to the Architect. All additions and/or corrections are to be requested prior to fabrication.
- B. Environmental Requirements
 1. Equipment is classified according to its susceptibility to construction conditions that may affect its operation. Classes shall be defined by the following paragraphs:
 - a. Class 1:
 - 1) Cable and distribution apparatus, structural elements, electrical back boxes, face plates, terminal boxes, and empty equipment rack frames may be stored in weather protected spaces under "normal" construction site conditions provided that no electronic components are contained within devices, storage boxes are sturdy and well-sealed, and equipment is protected with impermeable inner plastic sheeting.

- 2) Contractor may install this class of equipment in weather-protected spaces under "normal" construction site conditions provided that equipment is protected from dust and moisture by sturdy imperforate plastic sheeting and completely covered with corrugated cardboard held securely in place by duct tape. Cardboard covers shall not be removed until area is broom cleaned. Under no circumstances shall equipment remain uncovered overnight during installation or while work which causes high dust or moisture levels in area of placement is taking place.
- b. Class 2:
 - 1) Control panels, spare parts, test and other equipment (except as listed under Class 3) not subject to damage by concrete dust or dirt shall be stored and protected per Class 1 devices.
 - 2) Contractor shall not install equipment in this class until area of installation is broom cleaned, "blown" clean with pressurized air, mopped, air conditioned and secure. Contractor may install control panels with electronic components under Class 1 conditions, but electronic components must be removed and not installed until area of installation meets Class 2 conditions.
- c. Class 3:
 - 1) Control consoles, filled equipment racks and other electronic equipment shall not be shipped to site until the rack and control rooms are finished, air conditioned, dust free, broom and mop cleaned, secure, and in all respects complete and ready for occupation.
 - 2) This class of equipment shall not be unpacked until the system is complete in all other respects. Under no circumstances may any equipment in this class be removed from the rack and control rooms into or through spaces which are not cleaned, air conditioned, and complete.
- C. Field Measurements
 1. Field measurements shall be taken prior to preparation of final shop drawings and prior to fabrication to ensure proper fitting of work. Allow for adjustments during installation whenever taking field measurements.
 2. Should field measurement of site conditions alter the design or installation of system elements from the approved shop drawings, revised shop drawings shall be reissued for review.

1.11 WARRANTY

- A. Comply with the warranty requirements of Division 01 and the following.
- B. The Contractor shall warrant materials and workmanship of systems and equipment installed as free of defects. The Contractor shall guarantee in writing the repair or replacement within 14 days of any item found defective during a period of one (1) year following date of final acceptance. Ordinary wear and defects due to improper usage are excepted.
- C. The Contractor shall warrant the workmanship of the installation services provided under this Section for a period of one (1) year following the date of final acceptance. Ordinary wear and damage due to improper usage are excepted.
- D. During the warranty period, all emergency conditions where systems failures may be hazardous or may cause severe hardship or cancellation of performances shall be responded to within 24 hours. Immediate action shall be undertaken to ensure the safety of the audience and the performers.
- E. During the Warranty Period, for each product that uses software, furnish manufacturer's software updates to the Owner for installation.

PART 2 Products

2.1 MANUFACTURERS

- A. To establish comparative standards of quality, the Contractor may install elements as manufactured by the following, or an approved equal:
 1. Counterweight Rigging Systems

- a. Automatic Devices Company (ADC)
 - b. H & H Specialties Inc.
 - c. J.R. Clancy, Inc.
 - 2. Track Systems
 - a. H & H Specialties Inc.
 - b. Automatic Devices Company (ADC)
 - c. Gerriets
 - d. Triple E
 - 3. Motorized Zero-Fleet Hoist
 - a. J.R. Clancy, Inc.
 - b. ETC Rigging
 - 4. Motorized Rigging Control Systems
 - a. J.R. Clancy, Inc.
 - b. ETC Rigging
- B. Manufacturers shall provide the Warranty and Maintenance services specified herein as applicable to their products.
- C. Manufacturers shall engineer, design, produce shop drawings and fabricate all custom equipment required in this section.

2.2 SYSTEMS DESCRIPTION

- A. The following performance spaces shall contain the following major system components listed below and as shown on the TR-series drawings:
- 1. Proscenium Theatre
 - a. Counterweight System:
 - 1) Structural performance for this entire system must be fully documented under the direct supervision of a Structural Engineer registered in the State of Michigan. The Contractor's engineer shall design and/or select all elements and their connections to meet or exceed the International Building Code.
 - 2) The rigging system shall include provisions for basic hanging, shifting and storing of scenery, stage draperies, masking and elements of the stage lighting systems.
 - 3) The rigging system is highly integrated with the structural steel of the fly tower. See structural Drawings and Specifications for details.
 - 4) The counterweight system shall be a single purchase, "tee" bar guide as detailed in the drawings. See drawings for layout. Operation of the counterweight system shall be from locking rail on the stage floor. The battens shall travel as indicated on the drawings.
 - 5) The technical galleries at stage left and right shall permit the random use of rope line rigging to be spotted on the gridiron at any point above the stage. The loading gallery shall provide access to the counterweight arbors when a batten is being loaded.
 - b. Proscenium Safety Curtain
 - 1) Straight lift proscenium safety curtain with lineshaft winch, smoke pocket, pull station, rate of rise detector, fusible links, and associated hardware.
 - c. Cable Management systems
 - 1) Cable cradles, manual hemp lines, and floor mounted hemp blocks will be included for management of electrical multi-cables.
 - d. Fixed Speaker rigging
 - 1) Provide and install the rigging components necessary to rig the **overhead** speaker clusters
 - e. Portable Capstan Winch
 - f. Stage Traveler Track assemblies
 - 1) Main Drape traveler track shall be furnished for manual, bi-parting, back-packing curtains.
 - 2) Side Tab traveler tracks shall be furnished for manual back-packing curtains.
 - g. Rigging Control System
 - 1) Provide a control system for the motorized theatrical rigging equipment as indicated on the drawings and as detailed herein.

- 2) Additional control system components:
 - (a) Motor control cabinets (MCC)
 - (b) Motion Control Racks (MCR)
 - (c) Control points and E-Stop
 - (d) Hand held control pendant
 - (e) Control pendant receptacles
 - (f) Control for all motors herein
 - h. Acoustic Drapery Track
 - 1) Walk-draw track assembly
 - 2. Studio Theatre
 - a. Tension Wire Grid
 - b. Demountable dead hung drapery pipe battens
 - 3. Valade Jazz Center
 - a. Zero Fleet Motorized Batten System
 - b. Rigging Control System
 - c. Fixed Speaker rigging
 - 1) Provide and install the rigging components necessary to rig the **overhead** speaker clusters
 - d. Acoustic Traveler Track assemblies
 - 1) Acoustic backdrop drape traveler track shall be furnished for manual, bi-parting, back-packing curtains.
 - 4. Paint Shop
 - a. Zero Fleet Motorized Batten System with Integrated Structural Backbone
 - b. Rigging Control System
 - c. Pipe Grid
- B. State of the Art Development
- 1. The Contractor shall furnish only the manufacturer's latest developed appropriate products. In cases where product development from a specified manufacturer surpasses the criteria of this specification, the Contractor shall inform the Architect and make the newer product available to the Owner for acceptance. In no case shall discontinued or obsolete equipment be acceptable. Should a newer product be suggested as a substitution for a discontinued product, or for a product that is in process of being phased out of production, that newer product shall be offered to the Owner at no additional cost.
 - 2. Should product recall by the Manufacturer require temporary or permanent replacement of a product specified under this section, the Contractor shall notify the Owner at the earliest reasonable time and shall arrange to replace the product in question at the earliest possible time.
 - 3. Equipment found defective or subject to recall prior to scheduled installation shall not be delivered to the job site.
 - 4. Equipment defect or intended recall shall not relieve the Contractor from his contractual obligation with regard to delivery schedule of product. In this circumstance, notification shall be made to the Architect by express carrier. Arrangement for alternate product shall be made at this time.
- C. Substitutions
- 1. All requests for variations from the specified materials and products will be reviewed by the Architect according to the procedures outlined in Division 01.
 - 2. All requests for substitutions must be submitted in a timely manner, so as not to adversely impact the project schedule.
 - 3. Substitutions will only be accepted if, in the opinion of the Architect, the product is an equal to the specified product. No substitutions may be made without written acceptance from the Architect. All substitutions made prior to this acceptance are at the sole risk of the Contractor.
 - 4. A substitution must be a product of equal design, construction and performance. The Contractor must submit all pertinent information required to substantiate that the product is equal. The Contractor must submit all additional information, including test data, which may be requested in order for the Architect to fully evaluate the substitution. The burden of proof is solely on the Contractor.

5. All additional expenses of any kind with respect to substitution(s) shall be borne by the Contractor. This shall include, but not be limited to, all fees and expenses incurred by the Architect and other related Consultants for evaluation of the substitution and subsequent integration into the project should the substitution be taken and/or additional costs of other contractors related to the substitution(s).

2.3 MATERIALS

A. General

1. All equipment and components shall be new and complete. No used or reconditioned equipment shall be acceptable unless otherwise noted.
2. All equipment to have pertinent labels.

B. Materials shall conform to the following minimum standard specifications:

1. AISI 1045 for steel shafts
2. ASTM A36 for structural steel shapes
3. ASTM A47 for malleable iron casting
4. ASTM A48 for gray iron casting
5. ASTM A1011 for side plates
6. ANSI B18.2.1&2 for square and hex bolts and nuts

C. Hardware

1. All mounting hardware to be included.
2. All bolts and fasteners must be Grade 5 or better.
3. All bolted attachments to have lock washers or other self-locking fasteners.

D. Electrical

1. All internal wiring shall be factory completed and clearly marked. All field connections shall be by compression connector, terminal strip or other device specified herein. All terminal strip connections shall be clearly labeled as to terminal designation. Insulated wire ferrules are to be used whenever possible for wire termination. Wire nut splices not permitted.
2. All wire sizes and insulation to comply with Underwriters Laboratory and all applicable standards and local codes.
3. All wiring to be harnessed and bound. No loose or randomly routed wires shall be permitted.

E. Design Factors

1. Overhead rigging elements to be designed with a mechanical safety factor of their minimum breaking strength.
 - a. Wire rope: 8:1
 - b. Terminating hardware: 5:1
 - c. Batten clamps: 5:1
2. All drive components shall be designed with a safety factor 3X.
3. Bearings shall be designed with a 2X rating, full speed / 2000 hours.

2.4 COUNTERWEIGHT RIGGING SYSTEM

A. Tee Bar Guide Tracks

1. Provide tee bar guide track.
2. Provide new continuous floor batten and continuous top and bottom stop batten of 2" x 2" x 1/4" steel angle, (see TR series drawings). Continuous bumper strips of 2" x 2" hardwood with neoprene pads bolted to the stop battens. Neoprene bumpers shall be flat head screwed with ferrules to hardwood at 4" o.c. Stop battens bolted to each tee with one 3/8" diameter bolt. Bumper strips at electrics battens to limit high trim coincident with cable pick-up maximum travel.

B. Arbors

1. Size and weight capacity per schedule on Drawings.

2. Arbor top and bottom to be either steel plate formed channel with forged eyes for each lift line and for hand lines, approved steel forgings with integral eyelets, or approved welded assembly. Bottom plates threaded for connecting tension rods.
3. Arbor top and bottom joined on tee bar side by not less than 3" x 1/2" cold rolled steel (CRS) vertical flat bar fastened top and bottom by 2 3/8" bolts and tack welded.
4. Provide tee bar guide shoes mounted top and bottom of tie bar. Each to be 2 pieces of 5/16" UHMW separated by 5/16" UHMW spacer (or as required to properly fit the existing tee bar). Full width 3/16" steel reinforcing plate on front and back. Arbors over 15'-0" in length shall have an intermediate guide shoe attached to the steel back bar. Delrin shoes required for aluminum tees.
5. Provide two 3/4" high tensile strength threaded connecting rods between top and bottom spaced to fit counterweight slots. Fastened with 2 nuts and 1 lock washer each side of top and bottom.
6. Provide 12 gauge, 2" x 12" spreader plates to slip on connecting rods. Top spreader plate with spring keeper on front rod and locking stop collar on back rod. Provide 1 spreader plate for each 3'-0" of arbor height plus top spreader.
7. Provide forged eye as shown on the Drawings for utilization of capstan winch.
8. Provide metal angle iron "counterweight spacers" on any arbor where, after the pipe weight is installed, the counterweight is not level with the loading gallery. In all cases, on each arbor, the pipe weight must be level with the loading gallery.

C. Counterweights

1. Provide standard "U" slotted smooth flame-cut steel weights. All counterweight to fit all arbors (as set to set clearances allow) unless otherwise noted. Weights to be ground free of burrs or any sharp edges or protrusions. Weight to have diagonal cut at opposite corners. Provide the following sized weights:
 - a. 6" wide counterweight:
 - 1) 11 pound weights 1/2" thick by 6" wide by nominally 14" long
 - (a) Provide 5%
 - 2) 22 pound weights 1" thick by 6" wide by nominally 14" long
 - (a) Provide 95%
2. Provide counterweight for the following:
 - a. Pipe weight for general purpose linesets
 - b. Pipe weight for fixed electric battens
 - c. Main Drape and Valance
 - d. 60% of total system working load limit capacity
 - 1) Approximately 52,000 lbs.
3. All weights to be painted with shop coat of flat grey alkyd primer, Benjamin Moore Corotech Alkyd Shop Coat Primer or equal.
 - a. All pipe weight to be completely painted bright yellow.
4. After painting the counterweight shall be distributed:
 - a. 90% at the loading gallery
 - b. 10% at the stage floor
5. Provide necessary thinner sheet steel weights for fine trimming of Main Drape.
6. Batten balance and other permanent weights for all linesets to be permanently held in arbor by 2 bands standard mechanically locked steel strapping. Paint strapped weights bright yellow for identification.

D. Lift Lines:

1. Oil-free, zinc coated, 1/4", 7x19 aircraft cable. 7,000 lbs. minimum breaking strength for general linesets.
2. Pipe batten connection by:
 - a. Pipe clamp
 - b. Rated hot dip galvanized jaw/jaw (cotter pin type) turnbuckle with 6" of take-up, lock nuts, lock washers and safety wire mouse (after adjustment).
 - c. Wire rope thimble
 - d. Copper compression sleeves installed as per manufacturer's recommendation.
 - e. Dress cable ends using black heat shrink tubing.

3. Arbor connections by:
 - a. Thimble
 - b. Rated galvanized shackle, cotter pin type with cotters on inward side.
 - c. Copper compression sleeves installed as per manufacturer's recommendation.
 - d. Dress cable ends using black heat shrink tubing.
 - e. Adjust lengths of lift lines to trim batten parallel to stage floor at low trim height as indicated on the Drawings.
- E. Pipe Battens
1. Provide pipe battens complete with couplings, connectors and fittings as indicated on the Drawings. Pipe to be of 1½" nominal Schedule 40 black iron pipe as per standard industry practice.
 2. Batten segments and couplings to be secured with 5/16" bolts, lock washers and nuts.
 3. Batten ends to be covered with yellow vinyl caps to protect individuals from contact with cut pipe ends.
 4. Battens to be painted with flat black enamel.
 5. Battens to be marked with a 1" wide white stripe on centerline only, full circumference around pipe. Battens to be marked with 1'-0" measured increments from end to end. All markings to be in yellow enamel paint.
- F. Operating (Hand) Lines
1. Unspliced 3/4" first grade line of filament and staple/spun polyester wrapped fibrillated polyolefin. Three-Strand Composite Multiline II, color standard white as manufactured by New England Rope or equal. Clean of slivers and foreign materials.
 2. Dead tie with bowline at top, use 2 tight fitting half hitches after passing through eye at bottom of arbor, tape ends, or dress top with 2 removable nylon tie wraps.
 3. Adjust length for proper tension block takeup after initial line stretch. Bottom of floor block to be approximately 9" above counterweight pit slab at time at final checkout.
- G. Counterweight Locking Rails
1. Continuous 4" x 6" x ¼" steel tube locking rail, running the full length of the tee bar system. Drill for rope locks on required centers to match all tee bar spacing. Drill tube at 4'-0" centers to accept standard belaying pins. Provide 3" square steel engaging tube for capstan winch.
 2. Provide (1) complete locking rail at the stage floor level. Refer to Drawings.
 3. Rail stanchions of 3" square tube, not more than 5'-0" on center. Anchor to stage floor to withstand upward force of 350 lbs. per foot on rail.
 4. Continuous white acrylic index strip as indicated on the Drawings.
 5. Provide neoprene handle bumper on rail or integrated with rope lock (see below).
 6. Provide lineset labeling on the onstage face of the locking rail.
- H. Rope Locks
1. Steel, quick-acting eccentric levers. Heat treated steel cams.
 2. Cast iron bodies acceptable (#30 gray iron).
 3. Provide 3/8" lock adjustment set screw.
 4. Slip ring to hold lever in locked position.
 5. Provide 3/8" bolts to locking rail positioning lock on axis of arbor.
 6. Operating handle and slip ring to be plastic covered.
 7. All internal parts to operate silently. Provide internal neoprene pads and nylon cam shims.
 8. Provide one rope lock per lineset as indicated in the Drawings for each tee bar space.
 9. Provide one high quality, all keyed alike, padlock per each rope lock.
- I. Tension Blocks
1. Provide 10" diameter cast #30 gray iron sheave, turned and grooved for 3/4" hand line, press-fitted with precision ball bearings.
 2. Provide 5/8" minimum steel shafts held by self-locking hex nuts.
 3. Steel housing or cast iron weighing, with sheave, not less than 30 pounds to maintain hand line tension.
 4. Two UHMW and neoprene guide assemblies with ¼" steel full width backing plates on both sides of shoes, as for arbors, for free riding attachment to tee bar tracks.

J. Head Blocks

1. Heavy-duty machined cast ductile iron or #30 gray iron sheave turned and grooved for steel cable lift lines and for 3/4" operating line. Pitch diameter to be matched for steel cable and rope. Grooves to have 1/64" tolerance.
2. See schedule on Drawings for the number of grooves in each head block.
3. Sheaves to have 4" machine faced hubs bored for 2 press-fitted Timkin 7204-B cup and 07100 preloaded cone roller, (no known equal). Alternates require specific approval.
4. Shafts of 1" diameter steel, locked to side plate, with adjustment nut factory tightened to manufacturer's torque specifications and locked to shaft by cotter pin or self-locking nut.
5. Sides not less than 3/16" CRS plate, welded and riveted to 1½" x 2" x ¼" steel base angles with 1½" legs horizontal, turned in and cut to clear vertical lines on 6-line+ sets. Base angle legs shall be turned out for 4-line sets. Side plates to span past edges of head block beam flanges by at least 1½". Side plates to span base angle cut and head block beam flanges by at least 1½".
6. Sides joined into rigid assembly by at least five 3/8" bolts with spacer pipes located where appropriate to retain cables in sheave grooves.
7. Head block sheave to be 12" in diameter, typical, unless otherwise noted on the Drawings.
8. Head blocks attached to the head block beam by double 2" x ¼" clips with forged offset or space plate for thickness of beam flange. Clips bolted to block by 2 ½" bolts with nuts and lockwashers.

K. Loft Blocks:

1. Machined, cast ductile iron or #30 gray iron sheaves, 8" diameter, turned and grooved for one ¼" steel cable. 1/64" groove tolerance.
2. Sheaves bored and press-fitted with double sealed precision ball bearing assemblies. SKF 60 Series 2 RS or equal.
3. Shafts of 5/8" diameter steel locked to side plate, with adjustment nut factory set for proper shaft and bearing adjustment and locked in place.
4. Side plates not less than 10 gauge CRS plate.
5. Base angles shall be 1½" x 1½" x ¼", with legs turned out.
6. Sides joined by five 5/16" bolts with pipe spacers same as head blocks located where appropriate to retain cables in sheave grooves and fully enclose sheave.
7. Idler sheaves (4" minimum diameter) may be of high strength nylon grooved for ¼" steel cable. Precision ball bearings. Provide spacers as required to locate sheaves ½" on center, sheave to sheave. Each loft block shall have one idler for each cable which passes it. Use of sag bars are not permitted.
8. Short line loft blocks to be multigroove sheaves with 1 groove for each pickup cable in set. Construction shall be similar to that indicated for the head block above, without the groove for the operating line.
9. Loft blocks attached with pivot bracket with a pair of 1½" x 1½" x ¼" angles that bolt to loft block base angles and a pair of 1½" x 1½" x ¼" angles attached to roof beams with double 2" X 1¼" clips with forge offset or spacer plate for thickness of beam flange. A ¾" diameter threaded rod to connect the two sets of angles and provides the pivot point. Clips bolted to angle by 2 - 7/16" bolts at each side.

L. Index Strip Light

1. Provide LED index strip light with 2 alternating circuits (white and blue). Fixtures will be dimmable LED, alternating white frosted and blue frosted. Index strip to be full length of locking rail. Suspend from outrigger batten as indicated in the Drawings. Mount the strip lights prior to connection by Division 26.
2. Provide local dimmers of appropriate voltage and capacity for each of the two circuits. Installation by Division 26.

M. Outrigger Battens:

1. Provide bracket support for index strip lights at the locking rail as indicated above and as shown on Drawings.
2. Outrigger batten and index strip light support brackets may not be fastened to the tee bar guide tracks.

N. Counterweight System Labeling

1. The linesets shall be labeled with the designations indicated on the Drawings in the following locations:
 - a. The onstage face of the locking rail.
 - b. The onstage flange of the counterweight head block well buck beam.
 - c. The upper offstage railing of the loading gallery.
 - d. Pipe ends
2. Labels shall be painted with enamel paint on structure using stencils or by a professional sign painter.

O. System Signage:

1. Provide signage indicating system load data for each of the following locations:
 - a. Stage Level
 - b. Loading Gallery
2. System data shall include:
 - a. "When Working on Galleries: Fall Protection Required When Loading/Unloading Counterweights from Arbors"
 - b. Working Load Limit and total load capacity of general purpose sets
 - c. Working Load Limit and total load capacity of fixed electric sets
 - d. Weight per each size of counterweight
3. Signage shall be made of 1/8" aluminum, painted finish.
 - a. Block lettering of 1/4" high minimum letters.

P. Wooden Belaying Pins

1. Pins shall be 21" long by 1-5/32" in diameter with a shoulder and handgrip at the top.
2. Belaying pins shall be machine turned from hardwood and shall fit 1-1/4" diameter holes in the pin rail.
3. Provide 10

2.5 STAGE TRAVELER TRACK ASSEMBLIES

A. Provide tracks for the traveler curtains and side masking draperies as indicated on Drawings and schedules. Complete with all necessary accessories (CWANA).

B. Track:

1. Track to be heavy-duty channel type, approximately 3" x 3", 14 gauge steel or extruded aluminum formed to provide parallel double tracks for carrier wheels and totally enclosed except for bottom carrier slot.
2. Traveler tracks for bi-part drapes to be in two sections, with 2'-0" combined center overlap, fitted for manual line operation.
3. Traveler tracks for side masking draperies to be single sections, fitted for manual line operation.
4. Each traveler track section to be a single piece, free of burrs, dents or irregularities. Sections for bi-part track assemblies clamped together by at least 3 lap clamps.
5. Hanger fittings and clamps for attachment spaced at 4'-0" on center maximum.

C. Carriers:

1. Provide one master carrier for each single-section line-operated traveler track.
2. Provide two master carriers for each double-section traveler track.
3. Master carriers to each have 4 paired neoprene wheels with ball bearings.
4. Master carriers to have 2 clamps for attachment of operating line and 2 plated swivels with 6" of usable trim chains for curtain attachment.
5. Single carriers to have 2 neoprene wheels with ball bearing with "hollow center" design to bypass the operating line.
6. Each single carrier to have single plated swivels with 6" of usable trim chain.
7. One single carrier for each 1'-0" of track length.
8. Provide end stacking (rear fold, back pack) devices to stack drapery only at offstage track ends. Provide rubber washers to packing tabs.

D. Traveler Track Pulley Blocks:

1. End pulley blocks heavy-duty type with 8" sheaves turned and grooved for 1/2" operating line. Double vertical sheaves on the live end of the tracks; a single horizontal sheave on the dead end. Housings firmly bolted to the track.
 - a. Flying Traveler Tracks: Provide a single 45 degree slanted sheave on the dead end.
 2. Floor pulley blocks to have 8" sheaves with sealed ball bearings. Sheaves mounted to slide vertically and clamp in a steel frame with full side plates of sufficient height to permit 9" tension and adjustment of operating line. Base drilled for 2 improved stage screws for floor mounting. Supply 2 improved stage screws and plugs.
 3. All blocks to provide for positive retention of operating cords in grooves of sheaves.
- E. Traveler Operating Hand Lines:
1. Each hand line to be a single length, first quality, 1/2" diameter, fiberglass center, braided cotton cord.
 2. Rig for curtain operation from the live end of the track.
 3. Length of hand line to be adjusted for tension with traveler curtains mounted and trimmed.
- F. Products:
1. ADC #283-R
 2. H&H #400
 3. Or equal

2.6 SPEAKER RIGGING

- A. Confirm speaker loading configuration with the structural engineer of record.
- B. Provide all necessary rigging components to safely rig the speaker cluster. The safety factor of the components shall be 10:1. This includes but is not limited to; beam clamps, turnbuckles, wire rope, thimbles, compression sleeves, etc.

2.7 MOTORIZED ZERO-FLEET HOIST BATTENS WITH INTEGRATED STRUCTURAL BACKBONE

- A. Winch Architecture
 1. Zero Fleet:
 - a. Provide a system of compact horizontally or vertically mounted "zero fleet" fixed speed winches to be located and mounted as shown on the drawings. Zero fleet is defined as the angle at which the wire rope leaves a grooved winch drum perpendicular to the groove; this angle must remain 0 degrees at all times.
 - b. Winch system shall utilize motor drives local to each individual winch. Winch cables shall be connectorized for connection to wireways.
 - c. The winches shall be mounted on a chassis bolted to structure as shown on the drawings.
 - 1) All mounting hardware is under this contract.
 - d. Total width of winches shall not to exceed dimensions as shown in the drawings.
 - e. The motor carriage with drum or assembly of diverter sheaves shall move horizontally as the drum rotates to allow the pick-up lines to pass internal diverter sheaves maintaining a zero fleet angle.
 - f. If required due to the hoist orientation, diverter sheaves allow the cable to exit the drum and immediately turn 90 degrees to exit the end of the winch parallel to drum axis.
 2. Hoisting Capacity
 - a. The safe working load (SWL) of the hoist shall be as listed in the Lineset Schedule.
 - b. During the commissioning and Compliance Testing phase, this hoist shall be capable of lifting 25% more than the SWL without substitution of any components. See "System Start up, Owners Instruction and Commissioning" above.
 3. Speed
 - a. The speed of the hoist shall be as listed in the Lineset Schedule.
 4. Lift lines:
 - a. The number of wire ropes that will be attached to the hoist drum shall be as listed in the Lineset Schedule. The drum must be sized to accommodate the full travel, plus three dead (safety) wraps and space for two unused wraps for each lift line. The termination of each wire rope shall be by compression stop sleeve installed as per manufacturer's recommendation to hold the wire rope firmly to the drum.

- b. Note: the total length of each lift line is a function of the travel distance and the distance from the hoist to the attachment point for the batten.
- 5. Travel Distance:
 - a. The travel distance shall be as listed herein or as detailed in the drawings.
- 6. Limits:
 - a. The hoist shall be capable of being stopped at any point between its initial up and initial down limits. The exact stopping point shall be determined by the information provided by an absolute encoder which is part of the hoist design.
 - b. The hoist shall have the following hard struck limit switches:
 - 1) "Ultimate up" hard struck limit
 - 2) "Initial up" hard struck limit
 - 3) "Initial down" hard struck limit
 - 4) "Ultimate down" hard struck limit
 - c. The initial hard limits, both up and down, stop the hoist from traveling but allow the operator to drive off the initial limit. The ultimate hard limits, both up and down, initiate an E-stop in which power is removed from the motor drive after a fast deceleration.
 - d. In all cases, proper over travel must be provided in the hoist design to accommodate a failure of the control system. The hoist must come to a complete stop after striking an "initial up" or "initial down" limit without striking an "ultimate" limit. If the "initial limits" fail to function, the striking of an "ultimate" limit must bring the hoist to a complete stop before striking an immovable object.
- 7. Telemetry:
 - a. The telemetry, i.e. position, of the moving element connected to the hoist shall be determined by the feedback of, at minimum, a single absolute encoder. This encoder shall be capable of accurately positioning the moving element. This encoder shall be mounted to the electric motor and shall not be belt driven.
- 8. Brake:
 - a. Each hoist shall have a primary motor brake and a secondary brake. Each brake shall be capable of stopping and holding 200% of the hoisting capacity. Each brake shall be spring applied, fail safe, electromagnetically released.
 - 1) Secondary brake shall be on load side of hoist drive-train. Secondary brake shall be mechanically coupled to wire rope drum with as few connections as possible. Secondary brake located at the motor's high RPM/low torque output shaft shall not be accepted
- 9. Load Detection:
 - a. The hoist shall be provided with a load cell device which is capable of determining the load which has been added or removed from the system. This device shall be integrated into the control system and each hoist shall be able to "learn" its load, as a safeguard against unintentionally overloading or under-loading the hoist.
 - b. The control system must initiate a stop if the system load changes by more than $\pm 6\%$. This threshold shall be user adjustable.
 - c. In no case shall the software system allow movement if the SWL is exceeded.
- 10. Cross Groove Detection:
 - a. The hoist shall be provided with a ground bar or limit switches, one per each lift line, which initiate an E-stop if any of the lift lines leave their established rope drum groove either due to slack line or cross groove condition.
- 11. Drum rollers:
 - a. Provide pinch rollers to ensure lift lines are held in their groove at the tangential point at which the lift line exits the drum.
 - b. Rollers shall rotate on sealed ball bearings. Plain bushings shall not be accepted.
 - c. Rollers shall be machined to match the profile of the lift lines. Machined rollers shall include at least one profile to ride in an empty drum groove and at least one groove for exiting lift line.
- 12. Adjustable acceleration and deceleration:
 - a. The acceleration and or deceleration of the hoist shall be user configurable from the control console, and shall be capable of straight line or S shape acceleration/deceleration ramp curves up to the maximum rates listed above.
- 13. Power and Control Wiring

- a. Power and control cables shall be provided with each winch.
 - b. Power cables shall be properly rated SO cable with NEMA locking connectors. Control cables shall have connectors with steel body and position locking.
 - c. Power and control wireways shall be provided with receptacles to mate with connectors on provided power and control cables.
- 14. The hoist shall be (no other known equals):
 - a. JRClancy PowerLift with extruded aluminum Varion™ Backbone to resist compression forces between hoist and loft blocks.
 - b. ETC Rigging Prodigy P1900G Hoist
- B. Integrated Structural Backbone and Beam Clamps
 - 1. The Structural Backbone shall be a continuous channel of extruded aluminum engineered so as not to add horizontal forces on the building when used in combination with the slip fit beam clamps.
 - a. The tube shall support the loft blocks mounted within the spacing limits of the system.
 - b. Structural Backbone sections shall be joined into a continuous assembly by a pair of dedicated splicing plates at each Structural Backbone joint.
 - c. The Structural Backbone shall be installed only by means of dedicated beam clamps that allow the Structural Backbone to snap-into place and move horizontally to neutralize additional lateral forces on the structure.
 - d. Beam clamps shall be capable of attaching to horizontal beams, joist flanges or flat steel plates measuring from .25" thick up to 1" thick and from 4.25" wide up to 14" wide.
 - e. Hoist systems that add lateral forces to the building shall not be accepted for this project.
 - f. The Structural Backbone shall permit positioning of loft blocks anywhere along its length.
 - 2. Loft Blocks:
 - a. Each loft block shall be an assembly of steel side plates, a wire rope idler, sheave support hardware and an assembly to prevent the loft block from sliding horizontally. Each loft block shall be inserted into a slot on the bottom of the Structural Backbone.
 - b. Loft blocks sheaves shall measure 5.25" in diameter and contain a pair of press fit sealed ball bearings.
 - c. Lift lines shall travel in a groove shaped and sized for 3/16" diameter wire rope per the latest edition of the Wire Rope Users' Manual as published by the Wire Rope Technical Board. The loft block sheave shall be concentric about the hub and shall be evenly balanced for ease of rotation.
 - d. An idler shall be incorporated into the top assembly of the loft block to guide and support lift lines as they pass the loft block.
 - e. Hoisting systems requiring the loft blocks to be mounted directly to the facility steel shall not be accepted for this project.
- C. Lift Lines:
 - 1. Oil-free, zinc coated, 3/16" or 1/4", 7x19 aircraft cable. 7,000 lbs. minimum breaking strength for 1/4" or 4,200 lbs minimum breaking strength for 3/16".
 - 2. Pipe batten connection by:
 - a. Pipe clamp
 - b. Rated hot dip galvanized jaw/jaw (cotter pin type) turnbuckle with 6" of take-up, lock nuts, lock washers and safety wire mouse (after adjustment).
 - c. Wire rope thimble
 - d. Compression sleeve installed as per manufacturer's recommendation.
 - e. Dress cable ends by black heat shrink tubing.
 - 3. Adjust lengths of lift lines to trim batten parallel to stage floor at low trim height as indicated on the Drawings.
- D. Pipe Battens:
 - 1. Provide segmented battens complete with couplings, connectors and fittings as indicated on the Drawings. Pipe to be of 1½" nominal Schedule 40 black steel pipe as per standard industry practice.
 - 2. Batten segments and couplings to be secured with 5/16" bolts, lock washers and nuts.
 - 3. Batten ends to be covered with yellow vinyl caps to protect individuals from contact with cut pipe ends.

4. Battens to be painted with flat black enamel.
5. Battens to be marked with a 1" wide white stripe on centerline only, full circumference around pipe. Battens to be marked with 1'-0" measured increments from end to end. All markings to be in yellow enamel paint.

2.8 RIGGING CONTROL SYSTEM (RCS)

- A. Provide a control system for the motorized theatrical rigging equipment as indicated on the drawings and as detailed herein.
 1. Controller shall be (provide 1):
 - a. JR Clancy: Scene Control Pendant
 - b. ETC Rigging: QuickTouch 1-channel
 - c. Or approved equal
 2. Additional Control System components:
 - a. Motor control cabinets (MCC)
 - b. Motion Control Racks (MCR)
 - c. Control point and E-Stop
 - d. Control pendant receptacles
 - e. Control for all motors herein

2.9 MOTORIZED ZERO-FLEET HOIST BATTENS

- A. Winch Architecture
 1. Zero Fleet:
 - a. Provide a system of compact horizontally or vertically mounted "zero fleet" fixed speed winches to be located and mounted as shown on the drawings. Zero fleet is defined as the angle at which the wire rope leaves a grooved winch drum perpendicular to the groove; this angle must remain 0 degrees at all times.
 - b. Winch system shall utilize motor drives local to each individual winch. Winch cables shall be connectorized for connection to wireways.
 - c. The winches shall be mounted on a chassis bolted to structure as shown on the drawings.
 - 1) All mounting hardware is under this contract.
 - d. Total width of winches shall not to exceed dimensions as shown in the drawings.
 - e. The motor carriage with drum or assembly of diverter sheaves shall move horizontally as the drum rotates to allow the pick-up lines to pass internal diverter sheaves maintaining a zero fleet angle.
 - f. If required due to the hoist orientation, diverter sheaves allow the cable to exit the drum and immediately turn 90 degrees to exit the end of the winch parallel to drum axis.
 2. Hoisting Capacity
 - a. The safe working load (SWL) of the hoist shall be as listed in the Lineset Schedule.
 - b. During the commissioning and Compliance Testing phase, this hoist shall be capable of lifting 25% more than the SWL without substitution of any components. See "System Start up, Owners Instruction and Commissioning" above.
 3. Speed
 - a. The speed of the hoist shall be as listed in the Lineset Schedule.
 4. Lift lines:
 - a. The number of wire ropes that will be attached to the hoist drum shall be as listed in the Lineset Schedule. The drum must be sized to accommodate the full travel, plus three dead (safety) wraps and space for two unused wraps for each lift line. The termination of each wire rope shall be by compression stop sleeve installed as per manufacturer's recommendation to hold the wire rope firmly to the drum.
 - b. Note: the total length of each lift line is a function of the travel distance and the distance from the hoist to the attachment point for the batten.
 5. Travel Distance:
 - a. The travel distance shall be as listed herein or as detailed in the drawings.
 6. Limits:

- a. The hoist shall be capable of being stopped at any point between its initial up and initial down limits. The exact stopping point shall be determined by the information provided by an absolute encoder which is part of the hoist design.
 - b. The hoist shall have the following hard struck limit switches:
 - 1) "Ultimate up" hard struck limit
 - 2) "Initial up" hard struck limit
 - 3) "Initial down" hard struck limit
 - 4) "Ultimate down" hard struck limit
 - c. The initial hard limits, both up and down, stop the hoist from traveling but allow the operator to drive off the initial limit. The ultimate hard limits, both up and down, initiate an E-stop in which power is removed from the motor drive after a fast deceleration.
 - d. In all cases, proper over travel must be provided in the hoist design to accommodate a failure of the control system. The hoist must come to a complete stop after striking an "initial up" or "initial down" limit without striking an "ultimate" limit. If the "initial limits" fail to function, the striking of an "ultimate" limit must bring the hoist to a complete stop before striking an immovable object.
7. Telemetry:
- a. The telemetry, i.e. position, of the moving element connected to the hoist shall be determined by the feedback of, at minimum, a single absolute encoder. This encoder shall be capable of accurately positioning the moving element. This encoder shall be mounted to the electric motor and shall not be belt driven.
8. Brake:
- a. Each hoist shall have a primary motor brake and a secondary brake. Each brake shall be capable of stopping and holding 200% of the hoisting capacity. Each brake shall be spring applied, fail safe, electromagnetically released.
 - 1) Secondary brake shall be on load side of hoist drive-train. Secondary brake shall be mechanically coupled to wire rope drum with as few connections as possible. Secondary brake located at the motor's high RPM/low torque output shaft shall not be accepted
9. Load Detection:
- a. The hoist shall be provided with a load cell device which is capable of determining the load which has been added or removed from the system. This device shall be integrated into the control system and each hoist shall be able to "learn" its load, as a safeguard against unintentionally overloading or under-loading the hoist.
 - b. The control system must initiate a stop if the system load changes by more than $\pm 6\%$. This threshold shall be user adjustable.
 - c. In no case shall the software system allow movement if the SWL is exceeded.
10. Cross Groove Detection:
- a. The hoist shall be provided with a ground bar or limit switches, one per each lift line, which initiate an E-stop if any of the lift lines leave their established rope drum groove either due to slack line or cross groove condition.
11. Drum rollers:
- a. Provide pinch rollers to ensure lift lines are held in their groove at the tangential point at which the lift line exits the drum.
 - b. Rollers shall rotate on sealed ball bearings. Plain bushings shall not be accepted.
 - c. Rollers shall be machined to match the profile of the lift lines. Machined rollers shall include at least one profile to ride in an empty drum groove and at least one groove for exiting lift line.
12. Adjustable acceleration and deceleration:
- a. The acceleration and or deceleration of the hoist shall be user configurable from the control console, and shall be capable of straight line or S shape acceleration/deceleration ramp curves up to the maximum rates listed above.
13. Power and Control Wiring
- a. Power and control cables shall be provided with each winch.
 - b. Power cables shall be properly rated SO cable with NEMA locking connectors. Control cables shall have connectors with steel body and position locking.
 - c. Power and control wireways shall be provided with receptacles to mate with connectors on provided power and control cables.

14. The hoist shall be (no other known equals):
 - a. The PowerLift series by J.R. Clancy
 - b. Prodigy EXO P1000G Hoist by ETC Rigging
- B. Lift Lines:
1. Oil-free, zinc coated, 3/16" or 1/4", 7x19 aircraft cable. 7,000 lbs. minimum breaking strength for 1/4" or 4,200 lbs minimum breaking strength for 3/16".
 2. Pipe batten connection by:
 - a. Pipe clamp
 - b. Rated hot dip galvanized jaw/jaw (cotter pin type) turnbuckle with 6" of take-up, lock nuts, lock washers and safety wire mouse (after adjustment).
 - c. Wire rope thimble
 - d. Compression sleeve installed as per manufacturer's recommendation.
 - e. Dress cable ends by black heat shrink tubing.
 3. Adjust lengths of lift lines to trim batten parallel to stage floor at low trim height as indicated on the Drawings.
- C. Pipe Battens
1. Provide segmented battens complete with couplings, connectors and fittings as indicated on the Drawings. Pipe to be of 1 1/2" nominal Schedule 40 black steel pipe as per standard industry practice.
 2. Batten segments and couplings to be secured with 5/16" bolts, lock washers and nuts.
 3. Batten ends to be covered with yellow vinyl caps to protect individuals from contact with cut pipe ends.
 4. Battens to be painted with flat black enamel.
 5. Battens to be marked with a 1" wide white stripe on centerline only, full circumference around pipe. Battens to be marked with 1'-0" measured increments from end to end. All markings to be in yellow enamel paint.
- D. Loft Blocks:
1. Machined, cast ductile iron or #30 gray iron sheaves, turned and grooved for one 1/4" steel cable. 1/64" groove tolerance. Wire rope to sheave D to d to be 26 times minimum.
 2. Sheaves bored and press-fitted with double sealed precision ball bearing assemblies. SKF 6000 Series 2RS or equal.
 3. Shafts of 15mm diameter steel locked to side plate, with adjustment nut factory set for proper shaft and bearing adjustment and locked in place.
 4. Side plates not less than 10 gauge CRS plate.
 5. Base angles shall be 1 1/2" x 1 1/2" x 1/4", with legs turned out.
 6. Sides joined by five 5/16" bolts with pipe spacers located where appropriate to retain cables in sheave grooves and fully enclose sheave.
 7. Idler sheaves (4" minimum diameter) may be of high strength nylon grooved for system cable. Precision ball bearings. Provide spacers as required to locate sheaves 1/2" on center, sheave to sheave. Each loft block shall have one idler for each cable which passes it.
 8. Idler sheave as shown on drawings.
 9. Loft blocks attached to roof beams by double 2" X 1 1/4" clips with forge offset or spacer plate for thickness of beam flange. Clips bolted to block by 2 7/16" bolts at each side.

2.10 RIGGING CONTROL SYSTEM (RCS)

- A. Provide a control system for the motorized theatrical rigging equipment as indicated on the drawings and as detailed herein.
1. Controller shall be (provide 1):
 - a. JR Clancy: Scene Control 12
 - b. ETC Rigging: QuickTouch 4-channel
 - c. Or approved equal
 2. Additional Control System components:
 - a. Motor control cabinets (MCC)
 - b. Motion Control Racks (MCR)
 - c. Control point and E-Stop

- d. Control pendant receptacles
- e. Control for all motors herein

2.11 TENSION WIRE GRID

A. DESIGN CRITERIA:

1. The following design criteria are intended to establish minimum safety requirements. Where Federal, State and Local legislation address these topics, the more stringent requirement shall take precedence. Factors listed below in no way relieve the contractor from the sole responsibility for furnishing a safe and properly engineered system.
2. Cables, fittings, load bearing components: Minimum safety factor of 8x.
3. Maximum woven cable surface deflection at mid-span: Not greater than L/80 under a 150# load on a 12" x 12" area.
4. Maximum frame compression on any member: 5000#.
5. Design live load on grid: 20# p.s.f. over a panel.

B. TENSION GRID FRAME ASSEMBLY

1. Tension wire grid frames to be welded assemblies of structural steel, sized appropriately for this application. Overall dimensions of the frames as per the Drawings and as verified by field survey of structural support grid.
2. Frame assembly to be drilled, de-burred and chamfered for attachment of woven wire rope grid. Live end (swaged fitting) holes and dead end (compression sleeve) holes to be 9/32" diameter.
3. Frame assembly to be finished with flat black enamel.

C. TENSION GRID WOVEN WIRE ROPE GRID

1. The walking surface of the tension wire grid shall be made of 1/8" wire rope woven at 2" on center in two directions. Connections to channel frame assembly by swaged fittings and compression sleeves as per Drawings and indicated herein.
2. Where members having sloping flange faces, bolted connections shall be provided with appropriate beveled washers to afford square seating of heads and nuts. Alternate method: weld pipe section in place to accommodate a bend in the wire rope.
3. Wire rope lengths shall be continuous lines from the same spool, free of knots, splices or mechanical fasteners along their length unless specifically required in the Contract Documents.
4. Wire rope shall be oil free, preformed 1/8" diameter 7x19 galvanized and blackened cable. Blacken by means of electro-statically applied powder coat. Cable shall be rated at not less than 2,000 pounds. Damaged or deformed cables shall not be used.
5. Blackened wire rope shall be the product of:
 - a. Fehr Brothers (no known equal).

D. TENSION GRID SWAGED FITTINGS

1. Swaged fittings shall be Type 303 selenium bearing, corrosion resistant stainless steel. Stud fittings shall be sized for 1/8" wire rope and be threaded as required to meet the criteria established herein and on the Drawings.
2. Swaged fitting shall be secured in place with 1 washer and 2 nuts.

E. TENSION GRID COMPRESSION SLEEVES

1. Compression sleeves shall be sized appropriately for the cable construction and diameter of the cable with which they are employed.. Sleeves shall be cylindrical for stop sleeves. Sleeves shall be copper. After application, sleeves shall meet or exceed the latest requirements of Military Specification MIL-W-83420.
2. Compression sleeves and tools shall be the product of:
 - a. National Telephone Supply Company, Locoloc, or equal.

F. TEMPORARY COMPRESSION STRUTS

1. If required to prevent deformation during fabrication, provide temporary compression struts. Struts to remain in place until modules are welded down, and tension tabs and perimeter gussets are welded in place.
2. Struts to be completely removed after welding is complete. No remnants or finish variations permitted.

G. TENSION TABS AND PERIMETER GUSSETS

1. Tension tabs and perimeter gussets shall be installed in order to prevent the deformation of the module channel frame.
2. After placement and weld-down of tension grid modules and prior to the removal of the temporary shipping struts, weld 1" x 6" steel strap between adjacent modules, top and bottom. Provide tension tabs at third points on all side. Alternate on either side of centerline across a row to permit future access to wire rope fittings. Center tabs between holes.
3. For the perimeter conditions, after placement and weld-down of tension grid modules and prior to the removal of the temporary shipping struts, weld 4" leg 45 degree triangle steel gusset between module channel and understructure. Provide gussets at third points of module. Locate centered between holes.

H. TENSION GRID SIGNAGE

1. Signage shall be legible both in construction and grammar. A diagram depicting the system layout and maximum load limitations (drawn not less than 1/2" = 1'-0") shall be wall-mounted in a protective transparent faced frame on the wall near the entrance to the grid as to be plainly visible, and as not to interfere with the operation of systems.
2. Provide verbiage in English as listed below:

WARNINGS FOR TENSION GRID:

MAXIMUM LOAD - 4 PERSONS PER MODULE (20 lbs./sq.ft.)

DO NOT BOUNCE ON SURFACE

SECURE LOOSE ITEMS

MAINTAIN CABLE WEAVE AT 2" SQ.

2.12 PIPE GRIDS

- A. Provide pipe grids as shown on the contract drawings. Pipe battens of 1½" nominal diameter I.D. (1.9" outside diameter) Schedule 40 black steel pipe as per standard industry practice.
- B. Provide dead-hung pipe grids as shown on the Drawings.
- C. All hardware to be finished with flat black matte epoxy paint.
- D. Pipe splices to be 18" close fitted internal sleeves secured by 2 bolts perpendicular to floor on each side of joint. ¼" x 20 cap screws through-bolted with nylock nuts. Holes 6" on center, 3" from ends.

- E. Provide rigid supports to overhead structure as shown in drawings and as required to meet specified loading criteria as well as local seismic codes. Confirm final support design with structural engineer.
- F. Provide lateral support to building structure as shown in drawings and as required to meet specified load criteria.
 - 1. Grid wall flange SSRC #WF or equal
- G. Load criteria
 - 1. 30 lbs/lin. ft. uniform load.
 - 2. 100 lb maximum point loads at center of spans.
 - 3. Maximum working load over pipe grids:
 - a. Paint Shop: 3 tons
- H. Pipe grid hangers:
 - 1. WT 3x8 Steel T batten clamp as shown in the drawings
 - 2. Rated hot dip galvanized jaw/ open thread turnbuckle with 6" of take-up, locking hardware and safety wire mouse (after adjustment).
 - 3. Threaded rod sized as appropriate for load / safety factor.
 - 4. Pipe clamp: ADC#2815, or equal
- I. Pipe grid junction connections:
 - 1. Provide J.R. Clancy or SSRC full cross grid connector,
 - 2. Pipe grid junction connections shall be located at a minimum of 50% of all grid junctions.

2.13 DRAPERY TRACK

- A. Walk-Draw Track
 - 1. Furnish and install walk-draw traveler tracks for surround masking draperies as indicated on Drawings and schedules, complete with all necessary accessories (CWANA).
 - 2. Track:
 - a. Track to be heavy-duty extruded aluminum type, approximately 3-1/4" high x 1-5/8" wide I-beam, 7 gauge. Extruded shape shall provide parallel tracks for carrier.
 - b. Tracks to be single pieces, free of burrs, dents or irregularities.
 - c. Provide straight track and radius track sections as per contract drawings.
 - d. Splice sections as required for continuous installation as per contract drawings.
 - e. Finish Black.
 - f. Provide attachment to pipes and walls to properly support track along its entire path.
 - g. Hanger fitting and clamps for attachment spaced at 5'-0" on center maximum or as recommended by manufacturer.
 - 3. Carriers:
 - a. Provide two master carriers per drapery panel. Each with 4 paired neoprene wheels with ball bearings.
 - b. Single carriers to have two neoprene wheels with ball bearings.
 - c. Each single carrier to have single plated swivels with 6" of usable trim chain.
 - d. One single carrier for each 1'-0" of track length.
 - e. Neoprene bumpers and nylon strips attach to carrier to assure quiet operation.
 - f. Finish Black.
 - g. Walk-draw track shall include a paging cord at both ends of curtain attached to master carriers.
 - 4. Acceptable Products:
 - a. ADC Patriarc 500 series
 - b. H&H 500 series
 - c. Or approved equal

2.14 REMOVABLE DEAD HUNG DRAPERY BATTENS

- A. Furnish and install dead hung pipe battens for support of masking drapery and tracks.

2.15 MISCELLANEOUS RIGGING EQUIPMENT AND ACCESSORIES

- A. Provide loose rigging equipment and accessories as indicated in the Appendix.
<<Appendix not provided as part of Design Development Submission>>

2.16 SOURCE QUALITY CONTROL

- A. All equipment and components to be factory tested prior to shipping.

2.17 FABRICATION

- A. Fabricate all work in this section in accordance with the Architect's direction, specifications, approved shop drawings, pertinent project drawings, established trade practices and applicable code requirements.
- B. Machine-finish all operating parts to standard trade tolerance, fits and finishes.
- C. Carry out shop welding in full accordance with the appropriate sections of the "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction (AISC).

PART 3 Execution

3.1 INSTALLERS

- A. The systems, equipment and services described herein shall be provided by a Theatrical Engineering and Rigging Contractor who will be responsible for all the work of this Section, including but not limited to coordination and supervision of the engineering, shop drawings, fabrication and provision for all systems specified herein and shown in the drawings.
- B. To establish comparative standards of quality, the provision of the equipment and services of this section shall be by one of the following contractors:

Beck Studios, Inc
1001 Tech Drive
Milford, OH 45150
Tel: (513) 831-6650

J.R. Clancy Incorporated
7041 Interstate Island Road
Syracuse, NY 13209-9713
Tel: (800) 836-1885

LVH Entertainment Systems
1801 Highland Avenue,
Unit E
Duarte, CA 91010
Tel: (805) 278-4584

Stagecraft Industries
5051 North Lagoon Avenue
Portland, OR 97217
Tel: (503) 286-1600

Texas Scenic Co.
8053 Potranco Road
San Antonio, TX 78251
Tel: 210-684-0091

- C. Substitution Limitations

1. Any contractor who wishes to be listed and has not been pre-approved must submit qualification information to the Architect. Proposal shall include all of the information listed below:
 - a. Statements of financial responsibility for the past five fiscal years showing assets and liabilities.
 - b. List of principal officers and design and service engineers in an organizational structure flow chart.
 - c. List of not less than 5 projects of similar size and scope completed within the five years on which contractor has provided full services: product engineering, shop drawings, manufacture, installation and commissioning. In each instance, indicate specifics of scope of fabrication and installation. Include a contact list: name, address and phone numbers of person(s) directly responsible for operation and maintenance of equipment in each facility.
 - d. List of current projects and approximate contract value and completion dates. Include list of names, phone numbers and addresses of owner, owner's representatives and architect.
 - e. For each above described project, list of names of persons who supervised preparation of shop drawings, manufacture of components, and installation of equipment.
 - f. List of names of persons who would do project management, product engineering, supervision of shop drawing, and supervision of installation should this contract be awarded.
 - g. Contract Bond Company information indicating that contractor has bonding capacity for full duration of project. Include list of other bonded projects coinciding with this project.
 - h. Evidence of ability to undertake custom product engineering to meet specific requirements of project specifications. Provide sample project engineering drawings for custom products and contact information for facility operators where those products have been installed.
2. Standards of Acceptance:
 - a. Refer to Paragraph 1.8B - Quality Assurance/Qualifications.

3.2 EXAMINATION

- A. Verification of Conditions: Contractor must examine areas and conditions under which the equipment is to be installed and must notify the General Contractor in writing of conditions detrimental to proper and timely completion of work. Work will not proceed until unsatisfactory conditions have been corrected in a manner acceptable to the Contractor.

3.3 INSTALLATION

- A. Install all work in this section in accordance with the Architect's direction, specifications, approved shop drawings, pertinent project drawings, established trade practices and applicable code requirements.
- B. Provide site supervision during the installation of electrical work associated with the Theatrical Rigging system elements.
- C. Install all work securely, complete with all bolts, nuts, washers, clips, fittings, supports, and other items required for proper installation and operation.
- D. Position all items accurately as indicated on drawings and true to plumb, line and level. Maintain maximum headroom and clearances at all points.
- E. Coordinate work with all other trades to avoid causing delays in construction schedule.
- F. All field welding requires prior approval of the Architect and Contractor's Structural Engineer.
- G. Carry out approved field welding in full accordance with the appropriate sections of "Specification for the Design, Fabrication and Erection of Structural Steel Buildings" of the American Institute of Steel Construction (AISC).
- H. Do all cutting, drilling, tapping and approved welding required to properly install work. Obtain Architect's prior approval for cutting and drilling of existing structural work.
- I. Clean structural steel and fabricated steelwork of rust, scale and foreign matter by grinding; prime with 1 coat of primer; finish with 1 coat of first quality machinery enamel free of skips, runs and saps. Touch up all field connections, welds and abraded places with primer and enamel.

3.4 FIELD QUALITY CONTROL

- A. The installation of the equipment indicated in this Section shall be supervised by qualified personnel who are regularly employed by the Contractor for supervision of equipment installation similar to that indicated herein.
- B. Installers must be appropriately skilled and experienced for the type and quality of work.
- C. Arrange for all tests and inspections required by the General Requirements.

3.5 SYSTEM STARTUP AND COMMISSIONING

- A. Commissioning
 - 1. Upon completion of installation work required by the work of this Section, the Contractor shall perform all required tests and inspections, including but not limited to the Compliance Testing Procedures specified herein.
 - 2. Contractor shall supply all equipment required for the commissioning process including access equipment (personnel lifts, ladders and appropriate protective equipment), test instruments and communications equipment.
 - 3. Contractor shall provide staff to assist in the commissioning process.
 - 4. Compliance Testing Procedures (CTP)
 - a. The Compliance Testing Procedures are designed to verify that all system motor drive elements function as specified. The following represents a sample of the types of testing that will be conducted:
 - 1) Validation of E-Stop and limit switches
 - 2) Validation of operational speeds
 - 3) Validation of travel limits
 - 4) Validation of target achievement & repeatability
 - 5) Observe motion during E-Stop Activation
 - 6) Observe motion during instantaneous loss of power (bang stop)
 - b. Contractor shall coordinate the site so as to ensure testing can be done in a well-lit, clean, safe environment, including barricades to ensure unauthorized persons are not able to interfere with the testing. No temporary wiring or transformers will be allowed during the CTP.
 - c. All costs associated with the CTP are the responsibility of the Contractor; this includes items such as equipment necessary to access the hoists to ensure limits and brakes can be tested.

3.6 ADJUSTING

- A. Adjust all equipment and components for operation in accordance with the specifications, approved shop drawings and pertinent Contract Drawings prior to the demonstration indicated herein.

3.7 CLEANING

- A. Touch up minor abrasions and imperfections as required.
- B. Remove from the premises all debris caused by this work. All unnecessary equipment and materials shall be removed from the area(s) of this work upon completion, removed from the job site and disposed of legally at no additional cost to the Owner.

3.8 CLOSEOUT ACTIVITIES

- A. Demonstration
 - 1. Upon completion of Commissioning, the Contractor will notify the Theatre Consultant that the system is complete, conforms to specification and is ready for Demonstration.
 - 2. Installed equipment to be operated for approval and inspected for quality by the Theatre Consultant, the Architect and the Owner.
 - 3. The Theatre Consultant will ask for the CTP to be repeated on randomly selected hoist units during the equipment Demonstration. Failure to reproduce the tests on two of the units will require complete retesting of all units in the presence of the Theatre Consultant.

4. Adjustments or modifications shall be made as directed by the Architect and the Theatre Consultant.
5. Costs of re-inspection and additional testing by the Architect and Theatre Consultant, if required, due to lack of completion and/or errors and omissions shall be paid by the Contractor. This work will be conducted on a time and materials basis, including the Architect's and Theatre Consultant's standard hourly rates, and shall be scheduled and approved in writing prior to the re-inspection/testing session.

B. Training

1. Following the equipment demonstration, inspection and final adjustments, provide instruction to the Owner's staff or representatives on the safe operation, care and maintenance of all items.
 - a. Instruction must match information provided at the time of submittals and shall include, but not be limited to, proper general maintenance of the system, replacement procedures for user replaceable parts, and operating procedure to obtain maximum usage of system.
 - b. Deliver all copies of approved Operations Manual to Owner prior to first instruction session, and review it as part of that session.
2. Motorized Rigging Instruction:
 - a. Provide in-depth instruction to Owner or Owner's designated staff on the detailed operation of motorized hoists, control elements and associated devices. This training shall take place in two separate sessions.
3. Timing for all sessions shall be scheduled by the Owner at their convenience.
4. Instruction must be by qualified expert operators who have actual experience with systems in performance conditions.
5. At the conclusion of the training the Contractor shall conduct a written and hands-on test of the participants that shall demonstrate to the Contractor that the participants have reached a level of understanding that will result in safe use of the equipment.
 - a. Provide Certificates of Training for each participant. Log the names of those who successfully completed the training process. Submit as the first page of the bound material.

3.9 PROTECTION

- A. Provide full protection from damage, construction dirt and debris for all equipment from the point of installation to testing and commissioning.
- B. Remove all equipment protection and clean components thoroughly prior to the demonstration session.

3.10 MAINTENANCE

A. Maintenance Services

1. One month prior to the end of the first year following the date of final systems acceptance, a factory engineer shall be provided to examine, adjust and repair the equipment included in this section as required. This service shall not cover adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents caused by persons other than the Contractor. All labor and materials which are required to perform this service shall meet or exceed these specifications and shall not compromise the performance of the equipment in any way.
2. Following this inspection and maintenance service, the Contractor shall provide the Owner and Theatre Consultant with a written report itemizing the results of the inspections and the warranty work that was conducted. The Contractor shall also include in this written report recommendations for any corrective actions which the Contractor feels should be taken with respect to the equipment included in this section but are outside the scope of the warranty agreement.
 - a. The report of the one year inspection shall be furnished within fifteen days of the inspection. It shall indicate the findings, recommendations, revised maintenance procedures, etc.

B. System Programming Updates

1. Contractor shall review system operation and control system programming with the Owner's representatives. Any required adjustments and changes to the control system programming requested by the Owner shall be performed and completed during the time of the corrective service site visit. All control system programming changes shall be documented by the Contractor.

C. Maintenance Contract

1. Provide to the Owner an executed yearly maintenance agreement for a total of 5 years. This agreement must include, but not be limited to:
 - a. Visual inspection of each hoist and all associated loft blocks, idlers, mule blocks, wire rope, connections, etc.
 - b. Upgrade, if available, to the latest release of the software compatible with the existing control system.
 - c. Network data distribution inspection.
 - d. Re-training of existing personnel and new training of new personnel. This training is to be at the same level or better than the original training.
 - e. All material, components, accessories and services required to provide the work as specified herein.

3.11 ATTACHMENTS

- A. Refer to Appendix A of this section for quantities and accessories.
- B. <<Appendix not provided as part of Design Development Submission>>

END OF SECTION

SECTION 116163

THEATRICAL LIGHTING DIMMING & CONTROL

PART 1 General

1.1 SUMMARY

- A. The work in this section includes Theatrical Lighting (TL) systems and equipment within the following spaces and associated support areas:
 - 1. Proscenium Theatre
 - 2. Studio Theatre
 - 3. Valade Jazz Center
- B. Section Includes
 - 1. Major Systems and Equipment: furnish and supervise installation of the following major elements and associated accessories:
 - a. Theatrical and Architectural dimmer racks
 - b. Theatrical and Architectural DMX controlled panelboards
 - c. Auxiliary equipment/electronics racks
 - d. Lighting systems computers
 - e. Theatrical lighting Ethernet data networks
 - 1) Network racks
 - 2) Network components
 - 3) Network devices
 - 4) Network receptacles
 - f. Theatrical lighting control consoles and peripherals
 - 1) Wireless focus remote systems
 - 2) Theatrical control panels and receptacles
 - 3) Video display monitors
 - g. Architectural lighting control systems
 - 1) House lighting controls
 - 2) House panic systems
 - 3) Architectural lighting emergency bypass devices
 - 4) Architectural control panels and receptacles
 - 5) Portable house light master station and receptacles
 - h. Theatrical lighting wiring devices
 - i. Control Room furniture
 - j. All elements shown on "TL" Series drawings
 - 2. Work Results:
 - a. Provide all hardware and software required for a complete and working theatrical lighting system as described herein.
 - b. Provide fully coordinated and engineered equipment, installation, supervision and commissioning for the following major systems and associated accessories as required for each space.
 - c. Provide supervision of Theatrical Lighting Systems low voltage signal cable pulling, termination and testing by the Division 26 Electrical Contractor.
 - d. Provide coordination of conduit, backboxes and AC power wiring provided by the Division 26 Electrical Contractor.
 - e. Provide all material, components, accessories and services required to provide the work as specified herein, elsewhere in the project documents and/or as shown on related drawings.
 - f. Consult and coordinate with other affected work and contractors throughout the course of the work contained herein.
- C. Products Supplied But Not Installed Under This Section
 - 1. All equipment shall be installed and terminated under Division 26, except as noted below in paragraph D.1.
- D. Products Installed But Not Supplied Under this Section

1. The work of this section includes supervision of the termination of all control wiring in panels and racks. All control cabling related to this section shall be installed under Division 26.

E. Related Requirements

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications apply to this Section.
2. Examine Contract Documents for requirements that directly affect or are affected by work of this Section. A list of those Documents and Sections includes, but is not limited to the following:
 - a. Division 01 – General Requirements
 - b. Division 03 – Concrete
 - c. Division 04 – Masonry
 - d. Division 05 – Metals
 - e. Division 09 – Finishes
 - f. Division 11 – Equipment
 - 1) Section 116113 – Orchestra Shell Enclosure
 - 2) Section 116133 – Theatrical Rigging
 - 3) Section 116173 – Theatrical Lighting Fixtures and Accessories
 - 4) Section 116183 – Theatrical Audio Video Systems
 - g. Division 12 – Furnishings
 - 1) Section 126100 – Fixed Audience Seating
 - h. Division 21 – Fire Suppression
 - i. Division 22 – Plumbing
 - j. Division 23 – Heating, Ventilating and Air Conditioning
 - k. Division 26 – Electrical
 - 1) Section 265561 – Theatrical Systems Electrical Requirements
 - 2) General requirements for all Electrical work, including installation of system cable trays, terminal cabinets, empty conduit, junction/pull boxes and back boxes for system devices and panels (Division 26).
 - 3) Electrical terminations (AC power and grounding only) to all equipment racks and AC power receptacles (Division 26).
 - 4) Provision and installation of all conduit and back boxes (Division 26)
 - 5) Electrical services and main circuit protection (Division 26)
 - 6) Distribution system equipment (Division 26)
 - 7) Conduit, wire, pull boxes, junction boxes and miscellaneous hardware and components as required for a complete electrical installation.
 - 8) Terminations and testing of system continuity
 - l. Division 27 – Communications
 - 1) Structured cabling systems
 - 2) At common facility panels, coordinate receptacles for building standard communications systems.

1.2 PRICE AND PAYMENT PROCEDURES

- A. Refer to Division 01 - General Requirements for information regarding price and payment procedures.
- B. Unit Prices
 1. Provide Unit Price for items described in paragraph 1.7.A.2.
- C. Alternates
 1. Provide separate price information for material and labor associated with the following equipment and systems:
 - a. <<TBD>>
 2. Provide separate price information to deduct the material and labor associated with the following equipment and systems from the price of the full and complete systems as otherwise specified in this document:
 - a. Valade Jazz Center - Network Control Infrastructure

1.3 REFERENCES

A. Abbreviations:

1. The following abbreviations and acronyms are relevant to this Section and are in addition to those defined in Division 01 – General Requirements:
 - a. DMX or DMX 512: ANSI E1.11 - 2008, USITT DMX512-A
 - b. NFPA: National Fire Protection Association
 - c. NEC: National Electric Code
 - d. UL: Underwriters Laboratories
 - e. IEEE: Institute of Electronic and Electrical Engineers
 - f. IESNA: Illuminating Engineering Society of North America
 - g. ANSI: American National Standards Institute
 - h. AISC: American Institute of Steel Construction
 - i. NEMA: National Electrical Manufacturers Association
 - j. TIA/EIA: Electronic Industries Alliance/Telecommunications Industry Association

B. Definitions

1. The following definitions are relevant to this Section and are in addition to those defined in Division 01 – General Requirements:
 - a. In all cases where a device or a part of equipment is referred to in a singular manner within the contract documents, it is intended that such a reference shall include all devices required to complete the installation in accordance with the project documents.
 - b. "Architect": All references to the "Architect", Hamilton Anderson Associates, will refer to the process by which the indicated action or decision regarding the work in this section will be administered. All such actions shall be initiated with or by the Architect, who will disseminate all pertinent information and documents to, as well as coordinate all efforts and site visits with, the Theater Consultant and all other project consultants who may have design responsibility relating to the work in this section.
 - c. "Theater Consultant": Auerbach + Associates, Inc. (d.b.a. Auerbach Pollock Friedlander). The Theater Consultant will be party to all actions and decisions regarding the work in this section.
 - d. "Other Project Consultants": Acoustical Consultant, Electrical Engineer, Structural Engineer, or Mechanical Engineer as is applicable to a particular issue.
 - e. "Contractor": Manufacturer / Installer responsible for the fabrication and installation of the work contained in this section.
 - 1) Contractors involved with other work shall be indicated with a specific trade preceding the word "Contractor" (i.e. General, Electrical, etc.).
 - f. "Owner": Authorized personnel representing Wayne State University.
 - g. "Furnish": Purchase and/or fabricate and deliver to project site.
 - h. "Install": Physically install the items in their proper location (s) on the project site.
 - i. "Provide": Furnish and install.

C. Reference Standards:

1. Reference Division 01 for general project references and standards.
2. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies will refer to the latest edition of such publications adopted and published prior to submittal of the bid. All such codes and standards will be considered a part of this specification as if they were fully included herein.
3. If an applicable code or standard permits work of lesser quality or extent than this specification, then this specification and the related drawings will govern.
4. Comply with national, state and local codes.
5. Comply with national, state and local labor regulations and requirements.
6. The following standards apply to the work of this Section. It remains the Contractor's responsibility to confirm and comply with all industry standards that are applicable to the work of this Section.
 - a. Underwriters Laboratories
 - 1) UL 1008
 - b. Institute of Electronic and Electrical Engineers
 - 1) IEEE 802.3af

- 2) IEEE 802.3at
- 3) IEEE 802.3z
- c. Illuminating Engineering Society of North America
- d. American National Standards Institute
 - (a) ANSI E1.11 - 2008, USITT DMX512-A
 - (b) ANSI E1.17-2010, Architecture for Control Networks
 - (c) ANSI E1.20, Remote Device Management over DMX512 Networks
- e. Electronic Industries Alliance/Telecommunications Industry Association
 - 1) ANSI/TIA/EIA 568-A
 - (a) Category 5e Standard
 - 2) ANSI/TIA/EIA-568-B
 - 3) Category 6 Standard
- f. American Institute of Steel Construction
 - 1) Specifications for the Design, Fabrication and Erection of Structural Steel Buildings
- g. National Electrical Manufacturers Association

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. The Contractor is required through drawings, memos and meetings to properly coordinate the work with the other sections as necessary to complete the work of this section.
- B. Pre-installation Meeting:
 - 1. Refer to Division 01 - General Requirements for information regarding pre-installation meeting with the General Contractor.
- C. Sequencing:
 - 1. The installation of the equipment in this section shall be coordinated with other work which may be in conflict with or which must be completed before the work under this section may be installed, including:
 - a. Principal foundation work (see Architectural Drawings)
 - b. Installation of associated electrical work (see Electrical Drawings)
 - c. Installation of HVAC work in ceilings (see Mechanical Drawings)
 - d. The installation of the electromechanical systems equipment, panels and devices shall not occur until all painting in the area has been completed.
 - e. Electromechanical and electronic equipment installation shall proceed after environmental site conditions are met. Refer to paragraph 1.10-B for class requirements.

1.5 ACTION SUBMITTALS

- A. All submittals shall be submitted in accordance with Division 01.
- B. All submittals shall be submitted in a timely manner, allowing sufficient time for adequate review and possible resubmittals without jeopardizing project schedule.
- C. Submittals will be reviewed, accepted and field dimension verified prior to proceeding with the fabrication of the work in this section.
- D. All submittals shall leave space available for review stamps and comments.
- E. The Architect and Theatre Consultant shall only mark one set of drawings per submittal with comments. Any additional sets of drawings or product data shall be returned unmarked.
- F. Provide insurance against loss or damage during shipment. Furnish certifications of such coverage to the General Contractor not less than 60 calendar days prior to the shipment of any equipment.
- G. Review all pertinent project Contract Documents. Following this review, provide to the Architect and General Contractor any additional information required to make a fully functioning system. In addition, the Manufacturer shall indicate the maximum accepted wire size as it relates to termination points on their equipment.

- H. Verify wire type, count and routing for all required data wiring between all components to allow for proper conduit sizing and routing by Division 26. Verify and coordinate all line voltage power input required by systems components that shall be provided under Division 26.
- I. Product Data:
 - 1. Where standard manufacturer parts are used, submit current product literature describing component, manufacturer's recommended applications, load ratings, safety factors and dimensions. The data shall include all information which indicates compliance with the specifications herein.
 - 2. Clearly indicate specific component and applicable options.
- J. Shop Drawings
 - 1. Provide shop drawings on D size minimum (24" x 36") sheets.
 - 2. Include a cover sheet with a drawing index including the sheet number and title for each sheet in the set.
 - 3. Provide complete, fully dimensioned, large-scale detailed drawings of all major components.
 - 4. Provide requisite schematics, plans and sections indicating assembly and installation of components.
 - 5. Provide indications by arrow and boxed caption of all variations from contract drawings and specifications, except where variation is indicated as acceptable.
 - 6. Provide detailed one-line riser diagrams and installation circuit diagrams indicating all control and/or data electrical requirements and point to point connections. These shall be provided within 30 days of Contract Award.
 - 7. Provide a full Bill of Materials to be supplied, including quantities, manufacturers, manufacturer's part numbers, reference to applicable drawings, etc.
- K. Samples
 - 1. Submit sample items including, but not limited to:
 - a. Panel engraving or silk screen
 - b. Distribution device engraved lamacoid label showing attachment method.
 - 2. Additional samples must be submitted within 14 days of Architect's written request.
- L. Source Quality Control Submittals
 - 1. The Contractor shall supply as part of the submittal process the following Source Quality Control documents:
 - a. Serial number of equipment tested
 - b. Serial number of any component device(s)
 - c. Batch number of major components
 - d. Name of person conducting the test
 - e. Date the test was conducted
 - f. List of mechanical tests conducted
 - g. List of electrical tests conducted
- M. Special Procedure Submittals
 - 1. Training
 - a. To ensure proper training of the user group, the Contractor shall supply as part of the submittal process the following training documentation:
 - 1) Training syllabus
 - 2) Training guide (bound hard copy)
 - 3) Training guide (hands on system training)
 - 4) Testing document for confirmation of understanding
 - 5) DVD/ MPG video training file
 - b. These shall be provided two (2) months prior to completion.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents:
 - 1. Submit documents in accordance with Division 01 – General Requirements.

2. At the time of acceptance testing, submit three (3) copies of parts lists and maintenance instruction sheets.
 3. Within 60 days of the acceptance testing, submit one (1) set of reproducible "as built and approved" drawing showing all equipment as installed. These drawings shall include all adjustments made during the checkout process.
 4. Submit operation and maintenance manuals with the "as built and approved" drawings. Each manual shall be bound in an individual binder with the project name on the front cover and system identification on the spine. The manuals shall include:
 - a. Complete parts list for all equipment and telephone numbers for the authorized parts and service distributors.
 - b. Instructions as to the safe operation for all equipment.
 - c. Recommended maintenance schedule for component parts that may need periodic replacement or maintenance.
 - d. Recommendations for cleaning, maintaining and touch-up of all finished surfaces.
 5. Where specific elements do not require manuals, instruction sheets as to care and handling shall be provided.
 6. Warranties as required herein.
- B. Maintenance Contract
1. Refer to 3.10 – Maintenance.
 2. Submit maintenance contract proposal for Owner and Theatre Consultant review no later one month prior to substantial completion.
- C. Submit verification that all punch list items have been rectified. Such written verification will be required for project closeout and initiation of the warranty period.
- D. The record documents shall be reviewed by the Architect and all modifications to the documents stemming from this review shall be made as required.
- E. Above submissions are required as a condition for final approval of the work.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Spare Parts:
1. Furnish a package of spare parts for all user serviceable portions of the theatrical lighting system equipment:
 - a. Furnish 10% of total quantity of each type of small component or part in system as spare parts (minimum of one). Package may include connectors, bulbs, fuses, knobs, switches, and other miscellaneous parts, in addition to any spare parts specifically listed in individual product specifications.
 - b. Label all spare parts with Manufacturer's part number, designation and description, and location(s) where used.
 - c. Furnish durable, clearly labeled, storage containers for all spare parts, including special static free containers for electronically sensitive parts.
 - d. Furnish five (5) 16GB USB flash drives or other appropriate data storage medium.
 2. Provide unit price for recommended package of parts.
- B. Extra Stock Materials:
1. Deliver stock of maintenance material to Owner. Furnish the following to match those installed and taken from the same production run, packaged with protective covering for storage and identified with appropriate labels:
 - a. Furnish spare dimmer modules (minimum of two, or in quantities as listed in the Appendix) for each type of installed dimmer module in the system.
 - b. Furnish one spare node or complete internal components of each type of installed node in the system.
 - c. Furnish 5% circuit breakers (minimum of one) of each size in the system, including automated circuit breakers.

1.8 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Refer to Division 01 – General Requirements.

B. Qualifications:

1. Manufacturers

- a. The Manufacturer shall own and operate their own manufacturing facility for the fabrication of theatrical lighting dimming and control equipment, and be regularly engaged in the fabrication of such equipment. Fabrication of such equipment shall comprise no less than 90% of the Manufacturer's business.

2. Installers / Integrators

- a. The systems and equipment under this Section shall be provided through a single pre-approved Contractor who is a factory authorized dealer, integrator and servicer of all of the equipment specified herein and meets the following requirements.
- b. The Contractor shall maintain a full-time Manufacturer-trained and certified field engineering staff of at least two people available within 4 hours travel of the project location on an emergency basis. Staff shall be employed by the local authorized dealer and trained in electronic lighting control systems and Ethernet systems services.
- c. The Contractor shall have been continuously engaged in the integration and installation of theatrical lighting equipment for no less than five years and shall have provided complete engineering and installation services on a minimum of five projects of similar scope and complexity in the past five years.
- d. Project Manager: The Contractor's Project Manager shall be qualified and have experience in projects of similar size and scope. The Project Manager shall have binding authority to represent and act for the Contractor and Manufacturer of this equipment. The Project Manager shall be the primary conduit for all information between the supplier of this equipment and the General Contractor. All information given to the Project Manager shall be considered as given to the Contractor.
- e. The Contractor shall have, at the time of bid, a current contractor's license and shall know, understand, and have the required documentation to work in the State of Michigan. This license shall be maintained throughout the course of the work of this contract.
- f. Contractor is responsible for proper installation, operation and safety of all component equipment.
- g. Contractor is responsible for the complete integration and engineering of all systems described herein. Contractor shall confirm project details and, if necessary, suggest modifications to the criteria established herein in order to maintain the design intent.
- h. Errors and omissions within the Contract Documents shall not relieve the Contractor and the General Contractor of the responsibility for providing a properly functioning installation of the system as described herein.

1.9 DELIVERY, STORAGE, AND HANDLING

- ### **A. Delivery, storage and handling shall be coordinated with the General Contractor and shall meet all requirements described in Division 01.**

B. Packing, Shipping, Handling and Unloading

1. All equipment shall be appropriately and substantially packed for shipment.
2. All equipment containers shall clearly indicate the equipment contained, "front", "top", "fragile", the project name, and theater site allocation. Include packing and shipping lists for each container.
3. All shipping costs to the job site are the responsibility of the Contractor. The shipping method/company is at the total discretion of the Contractor in order to meet the published project schedules.

C. Acceptance at Site

1. Coordinate responsibility for acceptance of material and equipment at job site with the General Contractor.

2. The Contractor shall be responsible for acceptance of the Theatrical Lighting System components at the job site, confirming that all quantities and counts are correct and for keeping accurate logs and records of such information.

D. Storage and Protection

1. Upon delivery, the materials shall be stored under cover in a clean and dry location, off the ground. Delivered materials which are damaged or otherwise not suitable for installation shall be removed from the job site and replaced with acceptable materials.
2. Replace, at no additional expense to the Owner, all equipment and materials which are damaged during storage or handling.

1.10 SITE CONDITIONS

A. Existing Conditions

1. Verify all conditions at job site. Promptly report variations and obstructions to the Architect. All additions and/or corrections are to be requested prior to fabrication.

B. Environmental Requirements

1. Equipment is classified according to its susceptibility to construction conditions that may affect its operation. Classes shall be defined by the following paragraphs:
 - a. Class 1:
 - 1) Cable and distribution apparatus, structural elements, electrical back boxes, face plates, terminal boxes, and empty equipment rack frames may be stored in weather protected spaces under "normal" construction site conditions provided that no electronic components are contained within devices, storage boxes are sturdy and well-sealed, and equipment is protected with imperforate inner plastic sheeting.
 - 2) Contractor may install this class of equipment in weather-protected spaces under "normal" construction site conditions provided that equipment is protected from dust and moisture by sturdy imperforate plastic sheeting and completely covered with corrugated cardboard held securely in place by duct tape. Cardboard covers shall not be removed until area is broom cleaned. Under no circumstances shall equipment remain uncovered overnight during installation or while work which causes high dust or moisture levels in area of placement is taking place.
 - b. Class 2:
 - 1) Control panels, spare parts, test and other equipment (except as listed under Class 3) not subject to damage by concrete dust or dirt shall be stored and protected per Class 1 devices.
 - 2) Contractor shall not install equipment in this class until area of installation is broom cleaned, "blown" clean with pressurized air, mopped, air conditioned and secure. Contractor may install control panels with electronic components under Class 1 conditions, but electronic components must be removed and not installed until area of installation meets Class 2 conditions.
 - c. Class 3:
 - 1) Control consoles, filled equipment racks and other electronic equipment shall not be shipped to site until the rack and control rooms are finished, air conditioned, dust free, broom and mop cleaned, secure, and in all respects complete and ready for occupation.
 - 2) This class of equipment shall not be unpacked until the system is complete in all other respects. Under no circumstances may any equipment in this class be removed from the rack and control rooms into or through spaces which are not cleaned, air conditioned, and complete.

C. Field Measurements

1. Field measurements must be taken prior to preparation of final shop drawings and prior to fabrication to ensure proper fitting of work. Allow for adjustments during installation whenever taking field measurements.
2. Should field measurement of site conditions alter the design or installation of system elements from the approved shop drawings, revised shop drawings shall be reissued for review.

1.11 WARRANTY

- A. Comply with the warranty requirements of Division 01 and the following.
- B. The Manufacturer shall warrant materials and workmanship of systems and equipment installed as free of defects. The Manufacturer shall guarantee in writing the repair or replacement within 14 days of any item found defective during a period of two (2) years following date of final acceptance. Ordinary wear and defects due to improper usage are excepted.
- C. The Contractor shall warrant the workmanship of the installation services provided under this Section for a period of two (2) years following the date of final acceptance. Ordinary wear and damage due to improper usage are excepted.
- D. During the warranty period, all emergency conditions where systems failures may be hazardous or may cause severe hardship or cancellation of performances shall be responded to within 24 hours. Immediate action shall be undertaken to ensure the safety of the audience and the performers.
- E. During the Warranty Period, for each product that uses software, furnish manufacturer's software updates to the Owner for installation.

PART 2 Products

2.1 MANUFACTURERS

- A. To establish comparative standards of quality the systems and equipment described herein shall be furnished by the manufacturers listed herein and in the Appendix.
 - 1. Manufacturers shall provide the Warranty and Maintenance services specified herein as applicable to their products.
 - 2. Manufacturers shall engineer, design, produce shop drawings and fabricate all custom equipment required in this section.

2.2 SYSTEMS DESCRIPTION

- A. The following performance spaces shall contain the following major system components listed below and as shown on the TL-series drawings:
 - 1. Proscenium Theatre
 - a. Theatrical Dimmer Racks and Modules
 - 1) Installed dimmer racks with 500ms rise-time flexible configuration dimmers
 - 2) Paralleled branch circuits to some quantity of dimmers (ref. schedule)
 - 3) Air flow modules in place of dimmer modules for some quantity of dimmer racks (ref. schedule)
 - b. DMX controlled panelboards
 - 1) 120V 20A single pole circuit breakers feeding receptacles for 120V lighting fixtures, including LED source fixtures with on-board dimming.
 - c. Network data system
 - d. Network connection devices
 - e. Theatrical lighting control console
 - f. Architectural lighting control system
 - 1) DMX bypass for LED source house lighting
 - g. Architectural lighting control panels
 - h. Cue Light System
 - i. Dimmed and switched power distribution devices
 - 1) Plugging strips
 - 2) Plugging boxes
 - 2. Studio Theatre
 - a. DMX controlled panelboards
 - 1) 120V 20A single pole circuit breakers feeding receptacles for 120V lighting fixtures, including LED source fixtures with on-board dimming.
 - b. Network data system
 - c. Network connection devices

- d. Theatrical lighting control console
- e. Architectural lighting control system
 - 1) DMX bypass for LED source house lighting
- f. Architectural lighting control panels
- g. Dimmed and switched power distribution devices
 - 1) Plugging strips
 - 2) Plugging boxes
- h. Control room furniture
- 3. Valade Jazz Center
 - a. DMX controlled panelboards
 - 1) 120V 20A single pole circuit breakers feeding receptacles for 120V lighting fixtures, including LED source fixtures.
 - b. Network data system
 - c. Network connection devices
 - d. Theatrical lighting control console
 - e. Architectural lighting control system
 - 1) DMX bypass for LED source house lighting
 - f. Architectural lighting control panels
 - g. Control room furniture
- B. The systems shall be professional theatrical lighting systems complete with all necessary accessories to provide control, dimming and switching of incandescent and LED theatrical lighting fixtures via a wired and wireless network of power and data distributed through each space included in the work of this section.
- C. The system in each space shall be complete and operate independently allowing concurrent use without dependence on the equipment or components in other spaces. Each performance space's data network system shall allow for a temporary connection to the main building network for communication with equipment manufacturers' firmware updates.
- D. The control system in each space shall be ACN, RDM and DMX compatible, operating over a TCP/IP network using CAT 5e cabling.
 - 1. Data shall be provided via theatrical lighting consoles, architectural lighting processors and control panels, and wired and wireless remote devices. Data shall be input to the network via direct network connection or via DMX input nodes.
 - a. All input devices shall exist as network devices with distinct IP addresses capable of addressing any endpoint device on the network based on the properties defined by the master console.
 - 2. Data shall be distributed over the Ethernet network to installed DMX nodes or to network taps for use with portable DMX nodes. Data shall be converted to DMX at the nodes for use by endpoint devices.
 - 3. The system shall provide POE via endspan network switches compatible with the specified DMX nodes.
- E. State of the Art Development
 - 1. The Contractor shall furnish only the manufacturers' latest developed appropriate products. In cases where product development from a specified manufacturer surpasses the criteria of this specification, the Contractor shall inform the Architect and make the newer product available to the Owner for acceptance. In no case shall discontinued or obsolete equipment be acceptable. Should a newer product be suggested as a substitution for a discontinued product, or for a product that is in process of being phased out of production, that newer product shall be offered to the Owner at no additional cost.
 - 2. Should product recall by the Manufacturer require temporary or permanent replacement of a product specified under this section, the Contractor shall notify the Owner at the earliest reasonable time and shall arrange to replace the product in question at the earliest possible time.
 - 3. Equipment found defective or subject to recall prior to scheduled installation shall not be delivered to the job site.

4. Equipment defect or intended recall shall not relieve the Contractor from his contractual obligation with regard to delivery schedule of product. In this circumstance, notification shall be made to the Architect by express carrier. Arrangement for alternate product shall be made at this time.
5. Under no circumstances shall arrangement for alternate product necessarily require the Owner to accept superseded equipment except on a temporary basis.

F. Substitutions

1. All requests for variations from the specified materials and products will be reviewed by the Architect according to the procedures outlined in Division 01.
2. All requests for substitutions must be submitted in a timely manner, so as not to adversely impact the project schedule.
3. Substitutions will only be accepted if, in the opinion of the Architect, the product is an equal to the specified product. No substitutions may be made without written acceptance from the Architect. All substitutions made prior to this acceptance are at the sole risk of the Contractor.
4. A substitution must be a product of equal design, construction and performance. The Contractor must submit all pertinent information required to substantiate that the product is equal. The Contractor must submit all additional information, including test data, which may be requested in order for the Architect to fully evaluate the substitution. The burden of proof is solely on the Contractor.
5. All additional expenses of any kind with respect to substitution(s) shall be borne by the Contractor. This shall include, but not be limited to, all fees and expenses incurred by the Architect and other related Consultants for evaluation of the substitution and subsequent integration into the project should the substitution be taken and/or additional costs of other contractors related to the substitution(s).

2.3 MATERIALS

A. General

1. All equipment and components shall be new and complete. No used or reconditioned equipment shall be acceptable.
2. All mounting hardware shall be included.
 - a. All bolts and fasteners required to mount equipment to mounting hardware must be Grade 5 or better.
3. All equipment and components shall be factory tested prior to shipping.
4. All bolted attachments shall have lock washers or other approved self-locking hardware.
5. All internal wiring shall be factory completed and clearly marked. All field connections shall be by connector, terminal strip or other device specified herein. Any terminal strip connections shall be clearly labeled as to terminal designation.
6. All wire sizes and insulation shall comply with NEC, NFPA and UL standards and all other applicable national and local codes.
7. All wiring to be harnessed and bound. No loose or randomly routed wires shall be permitted.
8. All control wire counts shall include 10% spares.
9. All microprocessor controls shall utilize a non-volatile memory. System configuration, operating parameter, preset, etc. shall be protected against system power failure for a minimum of 48 hours.
10. Systems components shall be modular in nature. Individual dimming modules shall slide in and be easily disconnected from power and removed from the rack without disturbing adjacent components and shall require no special tools for these tasks. Control circuitry shall be contained on plug-in printed circuit cards. Plug-in circuit cards shall be individually removable without disturbing adjacent components.
11. All fixed components including dimmer modules, non-dim modules, circuit breakers, and cabinets shall be labeled sequentially for ease of maintenance.
12. No manufacturer's logo shall appear on control station faceplates or any other device located in public areas.
13. Any supplementary or auxiliary equipment necessary for the operation of the system shall be supplied with overload and short-circuit protection.

2.4 DIMMER RACKS AND MODULES

A. Dimmer Equipment Racks:

1. The entire dimmer rack assembly shall be UL listed. Rack finishes shall be manufacturer's standard baked enamel color.
2. Dimmer racks shall be floor mounted, dead front switch boards complete with all dimmers, control electronics, timers, circuit breakers, and wiring terminations. No external components shall be required.
3. Dimmer slots shall be sequentially numbered and labeled on both sides of the dimmer slots.
4. Each dimmer rack shall be labeled as indicated on the drawings or as listed in dimmer schedules. Engrave and fill or silk-screen labels.
5. Dimmer racks shall be completely wired internally by the Manufacturer. The Electrical Contractor shall provide input feed wiring, load wiring, low voltage wire pulls and individual cabinet disconnects. All terminals shall be clearly and permanently marked and numbered.
6. Dimmer racks shall be constructed of #14 or #16 US gauge cold rolled sheet steel.
7. Provide access panels or knockouts for bottom feed and top load/control wires.
8. All internal components shall be accessible from the front for testing and adjusting while system is operating. No rear access shall be needed for installation or future service.
9. Power distribution shall be by copper buss bars. Aluminum buss bars are not acceptable.
10. Theatrical and Architectural dimmer racks shall be 120/208 volt, 3 phase, 4 wire, size for minimum 600-amp feeds, as indicated on Division 26 contract documents.
11. Theatrical and Architectural dimmer rack load, neutral and ground terminals shall accept up to #2 AWG wire.
12. Individual rack disconnects shall be provided under Division 26. Coordinate fault current requirements with the Architect.
13. All internal wiring shall terminate in pressure wire or clamp type terminals for installation of Electrical Contractor's wiring. No wire nuts or crimps shall be acceptable.
14. All wiring provided by the Electrical Contractor under Division 26 shall be individually labeled at both ends of wire and at all splice locations.
15. Each branch load circuit must have an individual neutral to the dimmer cabinet terminals. Common neutrals shall not be acceptable for any load wire from the load to the dimmer cabinet terminals. Clearly note this requirement on all documentation.
16. Standard advertised product dimensions are to be considered maximum and are not to be increased. Reduced sizes are acceptable with prior approval of Architect.
17. Location of dimmer racks shall be as shown on drawings. Provide quantities of cabinets dictated by dimmer quantity indicated herein.
18. Provide requisite ancillary, current modifying, regulating, and monitoring devices required for operation of a complete fully functioning system.
19. Dimming panels may be cooled by free convection without the use of cooling fans or by fans or blowers with screened air inlet and outlet grilles. Regardless of cooling method, dimming panels shall operate within a maintained ambient room temperature range of no less than 32°F and no more than 95°F degrees.
20. Provide cabinet overheat sensor and pilot light for each cabinet mounted in face of cabinet. Automatic shut off of the dimming system components shall occur should maximum safe operating temperatures of the cabinet be exceeded. Over heat sensor shall be duplicated to provide remote-warning messages located on the theatrical lighting control console.
21. The interior construction of the entire electrical assembly shall be designed for a minimum standard fault current of 50,000 AIC with the capability for increased protection to 100,000 AIC, if required.
22. Noise generated shall not exceed 55dbc per cabinet, as measured with a Type 2 sound level meter at a distance of three feet from the cabinet in installed dimmer location.
23. The racks shall be mounted on vibration isolation mounts or pads consisting of a neoprene core with steel bearing plate, and a neoprene friction surface. Isolation mounts shall be Mason Industries Type "ND" or as specified by the project Acoustician; isolation pads shall be Mason Industries Type "WMSW" or as specified by the project Acoustician.

24. Dimmer bank shall accept USITT standard DMX512-A protocol digital control signal or Category 5e or greater Ethernet control signal in addition to any proprietary protocol control signal supported by the Manufacturer. Ethernet dimmer rack shall provide two (2) data inputs functioning on a Highest Takes Precedence basis.
25. Selection of signal protocol shall be automatic and shall not require use of mechanical transfer relays.
26. Control signal input of each individual dimmer rack shall be fully opto-isolated from control signal input of any other rack, and fully opto-isolated from any control signal output.

B. Dimmer Modules:

1. Dimmers shall meet all dimming performance criteria as listed in this section.
2. Dimmer electronics shall be completely solid state. Silicon controlled rectifiers shall be used to control AC power supplied to the loads.
3. Dimmers shall utilize two silicon-controlled rectifiers in back-to-back electrical configuration and all required gating circuitry on high voltage side of an integral opto-coupled control voltage isolator.
4. Rectifiers shall be mounted on ceramic substrate and encapsulated along with other components in epoxy-filled high-impact plastic case.
5. All dimmer modules shall be able to operate as “non-dims” with selection of this function through dimmer rack and control console software.
 - a. When selected as a “non-dim”, incoming control signal level is interpreted as either full on or full off signal.
 - b. Level of control signal required to initiate turn-on and turn-off shall be user selectable from 0% to 100%.
 - c. Non-dim function shall operate regardless of load type or wattage.
6. Dimmers shall operate properly on 60 Hz, 120 - 140 volts AC input. Dimmer output shall be AC, containing less than 1% DC component. At maximum input signal, the dimmer shall produce a full sine wave. With the input signal at zero, the dimmer output shall be zero voltage at any load with regulation set OFF. Output shall be symmetrical to the zero voltage axis at any control setting prior to any electronic enhancement.
7. Dimmer efficiency shall be at least 97% at any voltage and with any load to maximum capacity.
8. AC voltage control components shall be rated at a minimum of two times the rated capacity of the dimmer and shall sustain a total short circuit for a sufficient length of time to open primary circuit protection.
9. Incandescent dimmers (line and low voltage) shall be capable of hot patching cold tungsten loads up to full rated capacity without malfunction or change in operating characteristics regardless of control setting.
10. Speed of response of system processor modules to control signal changes shall be no more than 25 milliseconds.
11. Dimmer output shall repeat with respect to the control signal input unit value without hysteresis.
12. Dimmers set to equivalent control signals with equal types and amperage of loads shall not vary from one to another by more than one percent (1%) at any place in the control signal range from full-off to full-on. Dimmer response shall not be phase sensitive with respect to control signal. There shall be exact tracking from one dimmer to the next with no variation.
13. There shall be no visible dimming resolution stepping or flickering regardless of length of fade time or control fader settings.
14. Provide protection from overloads, short-circuiting, and transient voltage. Protection devices requiring reset or replacement must be accessible on the face of the dimming module or dimming cabinet.
15. Circuit Breakers:
 - a. Provide input fully magnetic circuit breaker(s) mounted on the face of each dimmer module or cabinet faceplate. Provide one input breaker for each individual dimmer within a module (e.g. one for single module, two for dual modules, etc.).
 - b. Input breakers must be rated for full load of the dimmer and must trip at 125% of rated capacity. Input breakers shall be rated for a minimum fault current of 10,000 AIC (120V) or 14,000 AIC (277V).
 - c. Acceptable manufacturers: Airpax or approved equal

16. Provide dimmers with a ferrous core toroidal filter choke. This filter choke shall suppress lamp filament or transformer hum and vibration, prevent electromagnetic interference in professional quality audio, video, and computer equipment and limit objectionable harmonics. Laminated E.I. or C.I. type chokes are not acceptable.
 - a. Rise Time Full Load (Theatrical Lighting Dimmers): Voltage rise time shall not be less than 500 microseconds measured and installed on site at 90 degree conduction angle from 10% to 90% of output wave form with dimmer operating at maximum load.
- C. Dimmer Modules with Bypass
 1. Dimmer modules with Bypass shall meet all of the criteria for dimmer modules listed above
 2. Modules shall utilize the same chassis form as the dimmer modules
 3. Modules shall contain two mechanically held relays
 4. Each output in the module shall be configurable to operate as a dimmer or a relay
 5. Local override switches shall permit full manual bypass of control signal at each output
 6. Breakers shall be fully rated at 20 amps
 7. Breakers shall be fully magnetic type
- D. Non-Dim Modules
 1. Non-dim modules shall utilize the same chassis form as the dimmer modules
 2. Modules shall contain two true electrically held relays
 3. Breakers shall be fully rated at 20 amps
 4. Breakers shall be fully magnetic type
- E. Dimmer Control Electronics:
 1. Control electronics shall use digital electronic circuitry, be microprocessor based, and be designed specifically for the control of dimming systems. All user operated controls shall be low voltage, use Class II wiring and be electrically isolated from power wiring by means of a UL listed Class II transformer. Appropriate analog to digital conversion shall be acceptable provided circuitry is integral to the control system and not a stand-alone component.
 2. System configuration, operating parameters, presets, levels and fade times shall be able to be field modified and shall not require components to be returned to the Manufacturer for such modifications.
 3. System configuration, operating parameters, presets, levels and fade times shall be protected against system power failure for a minimum of 10 years. The state of the system status upon restoration of power shall be user selectable.
 4. The dimmer control electronics may be capable of being addressed by the IEEE 802.3 Ethernet protocol.
 - a. The dimmer control electronics shall be capable of being addressed by an ACN-compliant transport system for the USITT DMX512-A protocol when any lighting control console utilizing the same protocol is plugged into a DMX In Node.
 5. Dimmers shall regulate output voltage to maintain constant output RMS voltage as long as input remains over 120V per phase.
 6. Dimmer output RMS voltage versus control input signal shall be consistent with a modified square law curve. The dimmer curve shall be stable and shall not require individual curve adjustment devices. The dimming curve shall be predetermined and shall not vary unless modified through control device software.
 - a. Modified square law curve shall provide a more uniform output response to control level changes than a standard square law curve.
 - b. Other optional curves shall be available for installation through rack and/or control console operations software.
 - c. Field adjustment of dimming curve shall not be required.
- F. Provide:
 1. ETC Sensor3 Racks and ThruPower 500ms rise AF dimmers

2.5 DMX CONTROLLED PANELBOARDS

- A. DMX Relay Panel

1. Panels shall provide over-current circuit protection and remote on and off circuit control utilizing mechanically held relays in a single wall-mounted enclosure.
 2. Panels shall support single, double, and triple pole relays, and include control electronics, electronics power supply, and isolated technical ground bar.
 3. Panels shall support 300W phase-adaptive dimmer modules at any single pole circuit position.
 4. All panels and components shall be ETL or UL Listed.
 5. Panels shall be no larger than 20" wide x 6" deep x 70" high.
 6. Panels shall be constructed of 16-gauge steel with removable knockout panels to facilitate conduit entry. Front panel shall be easily removable for full access to all connections.
 7. Panels shall be convection cooled.
 8. Panels shall be fed by 3-Phase 4-wire (3-Phase conductors, 200% Neutral), Isolated Technical Ground and chassis ground 120/208 or 277/480 VAC 60 Hz supply.
 9. Panels shall have Main Circuit Breaker protection on input feed.
 10. All line, neutral and ground terminals shall accept up to 6 AWG wire.
 11. The individual relays shall contain mechanically held contacts with ampacity ratings of 20 amps at up to 277AC, as required.
 12. Each relay shall have an integral manual override switch with on/off status indication.
 13. The relays shall have the following characteristics:
 - a. Respond to control changes in less than 25 milliseconds
 - b. Rated for a minimum of 100,000 mechanical operations at full resistive load
 14. The panel control electronics shall operate on single phase, 120-277V AC 60Hz fed from an included 15 amp circuit breaker. Fault current protection shall be 25,000 AIC @ 120 VAC.
 15. The panel shall receive DMX512 control protocol and sACN. Up to two additional control protocols, including 0-10V Dimming, Contact Closure, and DALI, shall be available, as required, via on-board interface or accessory card. Addressing shall be set through a user interface.
 16. Panels shall support discrete addressing of each relay.
 17. 2,500V of optical isolation shall be provided between the DMX512 inputs and the control electronics as well as between control and power components.
 18. A voltage barrier shall be provided to separate line voltage and control voltage sections of the panel.
 19. Provide:
 - a. Electronic Theatre Controls Unison Echo Relay Panel Mains Feed in configurations and with accessories as listed in the Appendix.
- B. Small format DMX Relay Panel (Valade)
1. Panels shall provide remote on and off circuit control utilizing mechanically held relays in a single wall-mounted enclosure.
 2. All panels and components shall be ETL or UL Listed.
 3. Panels shall be no larger than 14" wide x 3.5" deep x 12" high.
 4. Panels shall be constructed of 16-gauge steel with removable knockout panels to facilitate conduit entry. Front panel shall be easily removable for full access to all connections.
 5. Panels shall be convection cooled.
 6. Panels shall be fed by discrete 20A circuits from nearby branch circuit distribution board.
 7. All line, neutral and ground terminals shall accept up to 6 AWG wire.
 8. The individual relays shall contain mechanically held contacts with ampacity ratings of 20 amps at up to 277AC, as required.
 9. Each relay shall have an integral manual override switch with on/off status indication.
 10. The relays shall have the following characteristics:
 - a. Respond to control changes in less than 25 milliseconds
 - b. Rated for a minimum of 100,000 mechanical operations at full resistive load
 11. The panel control electronics shall operate on single phase, 120-277V AC 60Hz fed from an ia nearby 15 amp branch circuit. Fault current protection shall be 25,000 AIC @ 120 VAC.
 12. The panel shall receive DMX512 control protocol and sACN. Addressing shall be set through a user interface.
 13. Panels shall support discrete addressing of each relay.
 14. 2,500V of optical isolation shall be provided between the DMX512 inputs and the control electronics as well as between control and power components.

15. A voltage barrier shall be provided to separate line voltage and control voltage sections of the panel.
16. Provide:
 - a. Electronic Theatre Controls Unison Foundry Mini Panel in configurations and with accessories as listed in the Appendix.

NETWORK DATA SYSTEM

C. Equipment Racks

1. Equipment Racks shall be 19" standard freestanding or wall-anchored equipment racks, as indicated in the drawings. Enclosure shall provide adequate space for all network components and auxiliary equipment as required.
2. Equipment racks shall be provided with knockouts as required on top, bottom and sides to allow conduit connection as required.
3. In no case shall loose equipment be permanently mounted outside of a protective equipment rack or cabinet.
4. Provide finished, blank panels, complete with rack-mounting holes and hardware as necessary.
5. Label all controls that are contained within this contract as indicated on related drawings or as appropriate. All labels to be engraved and white filled.
6. Network Control Racks (CR)
 - a. Network Control Racks (CR) shall contain network components and auxiliary equipment including but not limited to:
 - 1) Network switches, patch panels, and cable management, as required.
 - 2) Network devices, including network nodes and taps, as required.
 - 3) DMX Combine Merger and Splitter Units, as required
 - 4) Architectural processors, as required
 - 5) Uninterruptible power supplies
 - 6) Additional equipment as indicated on Drawings.
7. Production Control Panel (PCP)
 - a. The Production Control Panel (PCP) shall contain the following elements:
 - 1) Rack Identification panel with rack name and location.
 - 2) Task Light Panel
 - 3) House and Work Lighting Control panel.
 - 4) Additional Theatrical Lighting equipment as indicated on Drawings.
 - 5) Uninterruptible power supply rated to power equipment contained in this rack for 30 minutes.
 - 6) Blank and vent panels as required.
 - 7) Control panels and equipment for other theatrical systems (e.g., Rigging, Stage Lifts, Variable Acoustics, etc.). Equipment to be supplied and installed in the rack under the work of the respective sections.
 - b. Confirm space requirements with other affected contractors in writing prior to fabrication. Coordinate wall backing requirements for mounting with General Contractor.

D. Network Components:

1. Network switches shall have the following characteristics and functions:
 - a. Switches shall contain (24) dual speed auto-sensing ports, supporting both 100BASE-T and 10BASE-T and PoE per IEEE 802.3af or 802.3at as appropriate.
 - b. Switches shall support IEEE 802.3i Type 100BASE-T standard.
 - c. Switches shall be rack-mounted in standard 19" racks.
 - d. Switches shall have front panel LEDs that shall report switch traffic, collisions and expansion status. Per port LEDs shall indicate link and partition status for individual connections.
 - e. Switches shall have UTP ports on its front face for connecting to nodes and taps via standard 19" patch panel.
 - f. Should Ethernet wire runs exceed 300 feet, provide switches with fiber ports equal to the number of fiber runs in the system.
 - g. Acceptable manufacturers:
 - 1) Cisco

- 2) Approved equal
 2. UTP network patch panels
 - a. Provide Category 5e Patch Bay (or bays as required) for termination of Category 5e wire runs.
 - b. Provide Category 5e patch cords as required for connection between the patch bay (or bays), switches and Ethernet Power Supply.
 - c. Patch bays shall be rack-mounted in standard 19" racks.
 - d. Provide rack mounted standard 19" cable management system for each patch panel.
 - e. Patch bays and cable management panels shall be finished in a black anodized finish and shall contain black Category 5e connectors as required.
 - f. Acceptable Manufacturers:
 - 1) Hubbell
 3. Fiber Optic network patch panels
 - a. Provide Fiber Optic Patch Bay(s) as required, for termination of fiber optic cable runs.
 - b. Each patch panel shall be populated with (12) LC Duplex MM adapters.
 - c. Patch panels shall include internal cable management.
 - d. Provide 1RU label panel above each patch panel with both the appropriate receptacle designation and location description for each patch jack.
 - e. Legends shall correspond with receptacle panel legends where applicable.
 - f. Patch bays shall be rack-mounted in standard 19" racks.
 - g. Patch bays shall be finished in a black anodized finish.
 - h. Provide:
 - 1) Hubbell Fiber Interconnection Shelf, 1RU (FEUR24LCDOM3)
 - 2) Approved equal
- E. Network Cabling:
1. Fiber Optic Cable (as required for all runs greater than 300 feet)
 - a. Contractor to confirm all cable routing distances to determine appropriate use of fiber runs.
 - b. Contractor shall specify 50/125µm fiber optic cable as required to support network components.
 - c. The cable must exceed the IEEE802.3z Gigabit Ethernet Fiber specification for 50/125µm Fiber.
 - 1) For Gigabit Ethernet 1000sx over 50/125µm fiber, a modal bandwidth of 500mHz per km in the 850nm wavelength with 500m minimum distance is required.
 - 2) For Gigabit Ethernet 1000lx over 50/125µm fiber, a modal bandwidth of 500mHz per km in the 1300nm wavelength with 500m minimum distance is required.
 - d. The cable must exceed the TIA/EIA 568B Fiber specification.
 - e. Acceptable Manufacturers:
 - 1) Belden F13D006R9
 2. UTP Cable
 - a. The copper cabling and connecting hardware must fully comply with the existing TIA/EIA 568B Standard and with the standard installation of Category 5e products.
 - b. The copper cabling should also comply with the TIA/EIA Category 5e standard.
 - c. Acceptable Manufacturers:
 - 1) For non-plenum rated applications:
 - (a) CommScope 55N4 Ultra II Enhanced Category 5 UTP cable
 - (b) Belden 1583A
 - 2) For plenum rated applications;
 - (a) CommScope 5504M Ultra II Enhanced Category 5 UTP cable (for plenum rated applications).
 - (b) Belden 1585A
- F. Network Services Gateway
1. The Network Services Gateway shall be a microprocessor-based unit for automatic configuration, monitoring and management of an integrated lighting network system. The gateway shall:
 - a. Communicate with lighting network devices over Ethernet using standard Category 5e cabling and Ethernet switches.

- b. Support multiple protocols, including ACN, DHCP, DNS, and FTP.
 - c. Support real-time logging and notification of system errors.
 - d. Provide storage of system device configurations.
 - e. Allow creation of user-defined reports.
 - 2. Enclosure shall include a backlit graphic LCD display for identification and status reporting.
 - 3. Provide with rack-mounting hardware and power supply.
 - 4. Provide:
 - a. Electronic Theatre Controls Net3 Conductor.
- G. Lighting Systems Computer
- 1. The lighting systems computer serves as both the Theatrical and Architectural lighting network programming device.
 - 2. Provide one laptop PC with 14" diagonal 16:9 format screen, minimum Intel Core i7 processor (Microsoft Windows 7 compatible) with 8GB of RAM and 500 GB solid state hard drive, CD/DVD-RW drive, 3-USB slots, Wireless-N card. The Computer shall have the following:
 - a. Network interface card for direct use over the lighting Ethernet data network.
 - b. Provide fifteen foot cable for plug-in to the network receptacle.
 - 3. Acceptable Manufacturers:
 - a. Lenovo
 - b. Toshiba
 - c. Dell
 - 4. System Software
 - a. Provide one boxed set of the most current Windows based operating system compatible with the proprietary application software and system configuration.
 - b. Provide networking software complete with manuals, technical support resources and CDROM as required allowing on line and off line Owner configuration and operation of all system parameters and dimmer rack configuration settings.
 - c. Provide Architectural lighting system software:
 - 1) ETC Unison Paradigm
- H. Wireless Network
- 1. Provide wireless access points (WAP) to provide continuous and consistent access to the available lighting network using wireless remote lighting control units and laptop computers.
 - 2. Wireless switches shall comply with the latest IEEE 802.3 b/g standards.
 - 3. Coordinate the Ethernet protocols (and frequencies) with other areas of work (AV, Automation, Administration, etc.) to ensure that the lighting system has its own dedicated secured channels and does not broadcast SSID information that would allow the system to be compromised. Setup MAC address filtering if nearby networks require it.
 - 4. Each space shall have a distinct SSID and shall be secured using WPA-2 security.
 - 5. Provide a wireless network map showing WAP locations, discrete address, and coordination with other wireless networks.
 - 6. Provide external antenna connectors for auxiliary antennas.
 - 7. Provide software to allow management and configuration of WAPs.
 - 8. Wireless access points shall be provided with pipe mounting or other appropriate mounting hardware, power supply and 25' Ethernet cable.
 - 9. Manufacturers:
 - a. Cisco Systems
 - b. 3-Com
 - c. Or equal
 - 10. Provide a wireless network for each space listed below:
 - a. Proscenium Theatre
 - b. Studio Theatre
 - c. Valade Jazz Center

2.6 NETWORK GATEWAYS

- A. DMX In/Out Nodes – General:
 - 1. DMX In/Out nodes will be located as noted on drawings. Nodes shall be connected via the Ethernet data network on Category 5e wire.

2. DMX In/Out nodes shall be capable of translating Ethernet based protocol into usable signal for output to plug-in peripheral devices employing USITT standard DMX512-A. These nodes shall comply with IEEE 802.3 standards.
 3. DMX In/Out nodes shall support Remote Device Management (RDM) protocol.
 4. XLR connectors at each node shall be able to be configured to output or allow input for any one frame of DMX512 with normal assignment being sequential. All nodes indicated in the system shall be able to operate simultaneously without data collision or corruption while maintaining recommended minimum and maximum DMX512/RS485 frame length, packet size and refresh rates.
 5. DMX distribution over the data network shall be independent of all devices on the system. Regardless of dedicated theatrical lighting devices that may be connected to the various nodes, the DMX distribution system shall be configurable from a PC or other independent control device. The PC or other independent control device shall be provided under this section. Saving and loading of the system configuration to disk shall be supported.
- B. Install DMX In/Out Nodes - Type 'EN':
1. Provide nodes with female five-pin XLR connectors within one node box, as shown on the drawings.
 - a. Label each receptacle with appropriate designations. All labels to be engraved with white core fill. Provide white acrylic write on surface as shown.
 2. Each node shall be powered via its Ethernet connection using Power Over Ethernet (IEEE 80203.af).
 3. Devices shall be mounted at fixed locations and wired as indicated on the drawings.
 4. Assembly shall have sheet metal back box and faceplate.
 - a. Provide flush mount or surface back box and properly sized face plate as required for each location shown on drawings
 - b. Face plate shall match edges of back box in surface mount conditions.
 5. Provide quantities and configurations as indicated in drawings
 - a. ETC Net3 DMX/RDM Output Gateway
- C. 4-Port DMX In/Out Nodes:
1. Devices shall have (4) five-pin XLR receptacles within one node box.
 - a. Provide male XLR receptacles for DMX 'In' ports
 - b. Provide female XLR receptacles for DMX 'Out' ports
 - c. Label each receptacle with appropriate designations. All labels to be engraved with white core fill.
 2. Each node shall be powered via its Ethernet connection using Power Over Ethernet (IEEE 802.3.af).
 3. Nodes shall be rack mounted in Network racks and wired as indicated on the drawings.
 4. Provide quantities and configurations as indicated in drawings and as required for operation of the system as described herein:
 - a. ETC Response 4-Port DMX/RDM Gateway
- D. Portable 2-Port DMX In/Out Nodes
1. Device shall have (2) female five-pin XLR connectors within one node box.
 - a. Label each receptacle with appropriate designations. All labels to be engraved with white core fill. Provide white acrylic write on surface as shown.
 2. Each node shall be powered via its Ethernet connection using Power Over Ethernet (IEEE 802.3af).
 3. Devices shall be portable.
 4. Connection of Category 5e at nodes shall be via a ruggedized RJ45 connector or what is accepted as industry standard at the time of the installation.
 5. Internal components shall be modular in nature and easily replaced as a unit in case of failure.
 6. Assembly shall be a sheet metal enclosure and faceplate.
 7. Provide 5'-0" Category 5e cable extension for each node.
 8. Provide appropriate mounting hardware to mount node onto 1.5" Schedule 40 pipe.
 9. Provide:
 - a. ETC Net3 Two-Port DMX/RDM Output Touring Gateway

E. Portable Network Full Function Node

1. Provide one (1) 4-Port DMX In/Out Node and one (1) Remote Video Interface in a portable rack enclosure to provide for connection of Designer remote consoles, remote video monitors, focus remote and other DMX devices as required.
2. 120 Volt power
3. All other network features as described above

2.7 NETWORK CONNECTION DEVICES

A. General

1. Provide all network connection devices as indicated on the drawings and as specified herein, for installation by Division 26.
 2. Coordinate size of device, orientation of circuits, and mounting detail to suite site condition.
 3. Assembly shall have a sheet metal back box and faceplate, finished flat black.
 - a. Provide flush mount or surface back box and properly sized faceplate as required for each location shown on drawings.
 - b. Faceplate shall match edges of back box in surface mount conditions.
 4. See drawings for device locations and control device schedules for device type, mounting type, and receptacle types and quantities.
 5. Receptacles:
 - a. 20A Edison (NEMA 5-20 R) duplex panel mounted receptacles
 - 1) All receptacles shall be of the same manufacture
 - 2) Color to be black except where specifically noted otherwise
 - b. RJ45 panel mounted receptacles
 - 1) RJ45 receptacles must comply with all Category 5e or greater standards.
 - 2) Ruggedized locking connector system
 - 3) Provide:
 - (a) Neutrik etherCON RJ45 receptacles
 - c. Fiber optic panel mounted receptacles
 - 1) Fiber optic receptacles must be LC-Duplex compatible.
 - 2) Ruggedized locking connector system
 - 3) Provide:
 - (a) Neutrik opticalCON receptacles
 - d. Multi-Pin receptacles
 - 1) Provide ruggedized multi-pin receptacles to mate with cord-mounted connector on device type HLP, portable houselight controller.
 6. Labeling:
 - a. Label each network receptacle with appropriate designations. All network receptacle labels to be engraved with white core fill, unless otherwise noted.
 - b. Provide lamacoid tags for the following information:
 - 1) Maximum length of external Category 5e cable that can be connected without violating the Category 5e standard
 - 2) Circuit designation(s) of each power receptacle. Circuit designations to be verified by Division 26 prior to fabrication.
 - c. Lamacoid tags to be engraved on black (with white core) with chamfered edges, and shall be securely mechanically fastened to device.
 7. Mounting:
 - a. Devices shall be surface, flush or recess mounted at locations and mounting heights as called out on drawings and device schedules.
 - b. Provide all requisite mounting hardware for installation of devices. Coordinate all device mounting requirements with Division 26.
 - c. All holes in mounting brackets to have 1" minimum slotted hole to enable adjustment for field conditions. Provide lock washers on bolts.
- B. Console Connection panels – Type 'CC':
1. Provide device with one double duplex "clean power" receptacle and control receptacles as shown on the drawings.

2. RJ45 receptacles shall be connected via Category 5e cable to the Ethernet network and shall allow full function nodes or other peripheral portable nodes to be connected to the network.
3. Fiber optic receptacles shall be terminated with 2 fiber cable as specified herein.
4. Portable house light control receptacle shall allow full function of portable house lighting controller including panic and normal functions.
5. Network Taps – Type 'ET':
 - a. Provide device with one duplex "clean" power receptacle and control receptacles as shown on the drawings.
 - b. RJ45 receptacles shall be connected via Category 5e cable to the Ethernet network and shall allow full function nodes or other peripheral portable nodes to be connected to the network.
 - c. Fiber optic receptacles shall be terminated with 2 fiber cable as specified herein.

2.8 THEATRICAL LIGHTING CONTROL CONSOLES

A. Lighting Control Console

1. Console shall be microprocessor-based system designed specifically for theatrical lighting control application. Consoles shall be engineered for ease and clarity of operation and shall incorporate visual display to assist operator in modes of operation.
2. The console shall be capable of operation in blind (preview/non-live) and shall also be capable of operation in live (stage) mode.
3. Console shall be able to organize data for channels other than those associated with dimmer levels through the use of special grouping or numbering schemes. Simply flagging channels with a new color in the video display shall not be acceptable.
4. Console shall graphically organize information, particularly for automated luminaires, to allow easy identification of the large groups of channel numbers involved with such fixtures. Assignment of pan and tilt functions of automated luminaires shall be supported by either level wheel, track pad or a mouse associated with the console. In addition, the pan and tilt axis of multiple luminaires shall be able to be assigned to a single device, such as a level wheel, track ball or mouse, to allow multiple automated fixtures to track together to a single point on stage.
5. Console shall be capable of pan and tilt operation through external devices with virtual focus software (such as Wysiwyg) or automated tracking devices (such as BlackTrax).
6. The console shall allow cues to be modified while they are running. The console shall support color print outs to mimic color displayed on video screens.
7. Console shall support full bi-directional RDM communication with compatible devices.
8. Console shall have Ethernet, USB, DMX512/RDM, MIDI In/Out, and RS-232 ASCII port interfaces.
9. The Console and central processors (if needed in the system) shall be connected through uninterruptible power supplies as needed to protect console and network operations for at least 30 minutes in the event of power failure.
10. The console shall be provided with all currently advertised features and components indicated in the most recently published product literature plus features described in System Description.
11. The console shall be capable of controlling the lighting network by being plugged directly into any network tap.
12. Provide one Theatrical Lighting Main Control Console for each of the spaces listed below:
 - a. Proscenium Theatre
 - 1) Electronic Theatre Controls – Gio – 24K with 2 x 10 fader wing
 - b. Studio Theatre
 - 1) Electronic Theatre Controls – Gio@5 – 24K with 2 x 10 fader wing
 - c. Valade Jazz Center
 - 1) Electronic Theatre Controls – Ion Xe 20 – 12K

B. Wireless Focus Remote Unit

1. Provide Wireless Remote Focus Unit system with all currently advertised features and components indicated in the most recently published product literature.

2. System shall consist of a handheld personal digital assistant equipped with a wireless access card for operation on an 802.11b wireless Ethernet network. Wireless access card must be compatible with wireless access points (WAP) provided with the theatrical lighting Ethernet network.
3. Remote shall "call up" dimmers and channels from remote locations for lamp or focus checks without an operator at the main console.
4. Remote shall be capable of calling up and running through pre-recorded cues and triggering macros.
5. Remote shall not lose data if its battery becomes depleted.
6. Remote shall operate with the main console.
7. Remote shall be provided with a charging cradle.
8. Provide quantities as listed in the Appendix.

C. Video Monitors

1. Monitors shall be high resolution; 17" color flat-screen multi-touch capable LCD monitors capable of displaying all console video display information. Monitors shall have connectors to mate directly with Remote Video Interface and shall have front mounted controls for contrast, brightness, vertical hold, and horizontal hold.
2. Provide: quantity per Appendix.
 - a. Furnish 1 - 10' and 1 - 25' video extension cable for each monitor.
 - b. Furnish 1 - 10' and 1 - 25' power extension cable for each monitor.
 - c. Protective Cover:
 - 1) Provide one protective cover for each monitor.

2.9 ARCHITECTURAL LIGHTING CONTROL SYSTEM

A. General

1. The Architectural lighting control system shall be a microprocessor-based control system that works in conjunction with the theatrical lighting control console in rooms where consoles are provided and otherwise independently to set and control auditorium house lighting or studio lighting levels. The system shall control LED architectural lighting, DMX relay-controlled work lighting and DMX controlled switching for theatrical circuits as shown on the drawings. The system shall operate through master control panels, preset recall stations and entry panel stations located as shown in the drawings. The system shall also be controlled remotely with a portable master station (specified herein) with plug-in locations as shown in the drawings.
2. When in use, the theatrical console shall override preset levels on a highest takes precedence basis and shall directly control only those dimmed architectural circuits within the same performance space.
3. The dimmed circuits in the performance spaces shall operate independently of the dimmed circuits in the lobbies and public spaces. This system shall not control the lobbies and public spaces.

B. Architectural Lighting Control System

1. The System allows programming and recall of preset lighting states, time clock events, and sequences, and control of fade times between presets.
 - a. Provide support for a minimum of 99 lighting presets
2. The System shall be configured to allow multiple active presets to control architectural lighting, work lights, and theatrical lights simultaneously through the use of multiple room assignments.
3. Provide sufficient quantity of system processors to have the ability to "snapshot" DMX levels from Theatrical lighting console and record in to architectural preset for all DMX assigned values including dimmed circuits, relay circuits, moving lights and theatrical lights in each system.
4. Switching between panels shall not cause flicker or change in lighting levels when setting on panels or House Lighting master station are identical.
5. The system shall be a microprocessor based lighting control system. System operating program shall be stored in electrically erasable programmable read only memory (EEPROM).
6. Data storage facilities shall retain memory for an indefinite period of time. In case of power failure, the control module shall retain preset memory for minimum of 72 hours.

7. Provide control system configuration software operating on a PC platform to allow configuration and preset level setting.
 8. Provide:
 - 1) Electronic Theatre Controls Unison Paradigm System
- C. House Light Panic System
1. The House Panic Control System instantly brings the architectural lights to full with the push of one button. The system is always enabled at every location, regardless of the state of other control systems. The system must operate independently of emergency power transfer relays or other power failure reliant systems.
 2. House Light Panic System shall include a separate power supply and DMX driver so that house lights can be brought on in the event of failure of primary supply and/or electronics.
 3. House Light Panic control shall be included in all House Lighting Master Stations, including any portable stations.
 4. Operations:
 - a. The NORMAL push button is illuminated at all locations whenever Panic System is not activated.
 - b. Depressing any PANIC push button illuminates the PANIC push button and turns off illumination of the NORMAL push button at all locations, and causes a control signal from a dedicated set of control electronics and a dedicated power supply to be applied to selected house light dimmers. This causes those house light dimmers to output full line voltage to loads. This state remains until any NORMAL push button is depressed. Depressing any NORMAL push button illuminates the NORMAL push button and turns off illumination of the PANIC push button at all locations, and returns the system to the exact state it was in prior to depression of the PANIC push button.
- D. Architectural LED Lighting Dimming & Control Interfaces
1. Architectural lighting fixtures with LED sources compatible with low voltage dimming will be controlled via DMX data signals generated by the theatrical lighting control systems.
 2. Architectural lighting fixtures with LED sources compatible with mains dimming will be controlled directly by dimmer modules in the theatrical lighting dimming system.
 3. Low voltage drivers and theatrical system dimmer modules for all LED sourced architectural lighting fixture types shall be tested for full 0-100% dimming range compatibility at the dimming and control manufacturer's factory.
 4. Control interface devices, including control signal gateways and repeaters, shall be rack-mounted or provided in DIN rail enclosures.
 5. Fixture interface devices, including device drivers and external power supplies, required between control signals and the LED fixtures shall be provided under Division 26 work.
 6. Provide:
 - a. DMX output nodes, DMX repeaters, and/or DMX-controlled 0-10V output nodes as listed in the Appendix. Review Division 26 Architectural Lighting documents to confirm quantity of outputs required for control of system.
- E. Architectural LED Lighting Emergency Bypass Detection
1. Provide a power loss detection device that will monitor normal power feed and generate a contact closure output to trigger emergency lighting bypass operation upon loss of normal power.
 2. Each unit shall provide isolated outputs for connection of multiple devices.
 3. Unit shall be compatible with single or three phase systems.
 4. Unit shall provide automatic sensing of normal power loss.
 5. Unit shall include an integrated circuit breaker for over-current protection and simulation of normal power loss.
 6. Unit shall provide a normally-closed input for interface with fire alarm systems.
 7. Each unit shall provide a full universe (512 channels) of DMX control.
 8. The unit shall be UL924 listed.
 9. Outputs shall be configurable as normally open or normally closed.
 10. Provide:
 - a. Electronic Theatre Controls Emergency Bypass Detection Kit, model EBDK

F. Architectural LED Lighting Emergency Bypass Controller

1. Provide low voltage bypass device that will allow LED sourced fixtures to operate as normal / emergency fittings by sending DMX512 directly to connected fittings. The unit shall override the control signals on associated emergency lighting fittings upon loss of normal power.
2. When in panic mode, the unit can provide a maintained normally open, normally closed, dry contact or +12VDC signal.
3. Each unit shall provide a full universe (512 channels) of DMX control.
4. The unit shall be UL924 listed.
5. Outputs shall be compatible with DMX512 protocol.
6. Provide:
 - a. Electronic Theatre Controls DMX Emergency Bypass Controller, model DEBC

2.10 ARCHITECTURAL LIGHTING CONTROL PANELS

A. General:

1. Control electronics shall use digital electronic circuitry, be microprocessor based and be designed specifically for the control of architectural lighting systems. Location, overall dimensions, and quantity of control devices shall be as shown on drawings.
2. Control device back boxes, where required, shall be standard deep masonry boxes by Square D or equal.
3. Controls shall be low voltage type and use N.E.C. Class II, low-voltage wiring.
 - a. Only Belden control cables shall be acceptable.
4. Faceplates shall attach to the device with no visible mounting screws. No manufacturer's logo or other marking shall appear on faceplates unless otherwise noted.
5. Faceplate finishes shall be manufacturer's standard finish unless otherwise noted by Architect or Architectural Lighting Consultant. Selection of finish, custom or standard color shall be by Architect.
6. Control devices shall be provided with appropriate zone and/or scene descriptions. These descriptions shall be furnished to the Manufacturer prior to fabrication by the Architect or Architectural Lighting Consultant and shall be engraved and filled with color to be selected by Architect. Any silk screened borders, logos, potentiometer graduations, etc. shall use a chemically bonded graphic process which resists removal by scratching, cleaning, or other light abrasive scouring.
7. All slider potentiometers shall have a minimum travel of one (1) inch and shall have a graduated scale marked adjacent to the slider.

B. House Lighting Master Station 'HL'

1. Provide a panel assembly with flush mounted Color Touchscreen Controller capable of the following operations:
 - a. Random playback of House Light presets as described herein.
 - b. Control of relay controlled work lighting circuits as described herein.
 - c. House Light Panic system control as specified herein.
2. The Color Touchscreen Controller shall include the following:
 - a. Back lit user customizable 7" color liquid crystal display with user interface touch screen face-plate.
 - b. The Controller shall have multiple pages as follows to allow control of:
 - 1) Master levels of each recorded preset.
 - 2) Individual dimmed channel and switched work light channel levels/status.
 - 3) Preset, level and fade time recording.
 - 4) Preset selection and playback.
 - 5) Recording of Theatrical lighting console output into architectural system presets
 - c. Products:
 - 1) Electronic Theatre Controls Unison Paradigm 7" Touchscreen
3. Provide front panel containing all controls as required to operate House, House Panic and Work Lighting Systems as specified herein.
4. Provide EAO Series 31 Switches as specified above for PANIC, NORMAL controls.
5. Provide flush, surface, or 19" rack mount back box as required for each mounting condition shown on drawings.

6. Provide anodized aluminum or painted sheet metal cover plate with chamfered edges, color as per Architect.
- C. Portable House Lighting Master Station 'HLP'
1. Provide one Portable House Lighting Master Station with all of the features described in 'House Light Master Station - HL' above in a rugged portable enclosure.
 2. Case: Provide sturdy case with carrying handles and rubber feet, as indicated on the Theatrical Lighting drawings.
 3. Cables
 - a. Provide 1 – 10', and 1 – 25' male to female combined power and control cable to mate with associated connection panels.
 4. Mating Connectors
 - a. Provide mating female multi-pin receptacle in the CC panels as shown on the drawings.
- D. House Lighting Master Station 'HL2'
1. Provide a panel assembly with flush mounted Color Touchscreen Controller capable of the following operations:
 - a. Random playback of House Light presets as described herein.
 - b. Control of relay controlled work lighting circuits as described herein.
 2. The Color Touchscreen Controller shall include the following:
 - a. Back lit user customizable 7" color liquid crystal display with user interface touch screen face-plate.
 - b. The Controller shall have multiple pages as follows to allow control of:
 - 1) Master levels of each recorded preset.
 - 2) Individual dimmed channel and switched work light channel levels/status.
 - 3) Preset, level and fade time recording.
 - 4) Preset selection and playback.
 - 5) Recording of Theatrical lighting console output into architectural system presets
 - c. Products:
 - 1) Electronic Theatre Controls Unison Paradigm 7" Touchscreen
 3. Provide flush, surface, or 19" rack mount back box as required for each mounting condition shown on drawings.
 4. Provide anodized aluminum or painted sheet metal cover plate with chamfered edges, color as per Architect.
- E. Architectural entry stations - Type 'EP'
1. Provide push button entry stations in surface or flush mounted box in locations as shown on the drawings. See drawings for push button quantities per device type.
 2. Station shall recall designated preset(s) and may be disabled by the main system control.
 3. Provide black sheet metal back box. Do not exceed 4" in depth without prior approval.
 - a. Provide surface or flush mount back box as required for each mounting condition shown on drawings.
 4. Provide anodized aluminum or painted sheet metal cover plate with chamfered edges, color as per Architect. Cover shall be flush with back box edges in surface mount condition.
 5. LED indicators in switches shall indicate the active preset on the panel.
 6. Stations shall allow multiple presets to be concurrently active.

2.11 THEATRICAL WIRING DEVICES

A. General

1. Provide all theatrical wiring devices as indicated on the drawings and as specified herein, for installation by Division 26.
2. Coordinate size of device, orientation of circuits and mounting detail to suit site condition.
3. Device back boxes and faceplates constructed of sheet metal, finished flat black. Provide requisite mounting holes, conduit knockouts, etc.
4. Receptacles:
 - a. Stage Pin Connectors
 - 1) All 20 amp stage pin receptacles shall be of the same manufacture

- 2) Flush mounted female receptacles shall have a screw-driven locking spring to ensure firm fit on face panel
- 3) Provide for 20A stage pin connectors:
 - (a) Union Connector 20-2P&G series
 - (b) Rosco 2000 series
 - (c) Bates Connectors
- b. 20A Edison (NEMA 5-20R) duplex panel mounted receptacles
 - 1) All receptacles shall be of the same manufacture
 - 2) Hospital Grade to UL 498 Supplement SD
 - 3) Retention force of grounding pin tested to NFPA 99. Retention force shall not be less than 4 oz.
 - 4) Color: Black except where specifically noted otherwise
 - 5) Provide:
 - (a) Leviton 8300-E
 - (b) Legrand/Pass & Seymour 8300-BK
- c. 20A Edison (NEMA 5-20R) cord mounted receptacles
 - 1) All receptacles shall be of the same manufacture
 - 2) Hospital Grade to UL 498 Supplement SD
 - 3) Retention force of grounding pin tested to NFPA 99. Retention force shall not be less than 4 oz.
 - 4) Nylon and/or high impact polycarbonate body with screw-open cable gripping jaws
 - 5) Straight body
 - 6) Color: Black and white, black and clear, or clear and white
 - 7) Provide:
 - (a) Leviton 8319C
 - (b) Legrand/Pass & Seymour PS5369XHG
 - (c) Hubbell 8319C
 - (d) Cooper (Arrow/Hart) 8369
- d. 20A Twist-Lock (NEMA L5-20R) single flush mount receptacles
 - 1) All receptacles shall be of the same manufacture
 - 2) Nylon body
 - 3) Color: Black
 - 4) Provide:
 - (a) Leviton 2310
 - (b) Legrand/Pass & Seymour L520R
 - (c) Hubbell 2310
 - (d) Cooper CWL520R
- e. 20A Twist-Lock (NEMA L5-20R) single flush flange mount receptacles
 - 1) All receptacles shall be of the same manufacture
 - 2) Nylon body
 - 3) Color: White
 - 4) Provide:
 - (a) Leviton 2316
 - (b) Hubbell 2316
 - (c) Cooper CWL520FO
- f. 20A 208V Twist-Lock (NEMA L6-20R) single flush mount receptacles
 - 1) All receptacles shall be of the same manufacture
 - 2) Nylon body
 - 3) Color: Black
 - 4) Provide:
 - (a) Leviton 2320
 - (b) Legrand/Pass & Seymour L620R
 - (c) Hubbell 2320
 - (d) Cooper AHL620R
- g. 20A 208V Twist-Lock (NEMA L6-20R) single flush flange mount receptacles
 - 1) All receptacles shall be of the same manufacture
 - 2) Nylon body
 - 3) Color: White

- 4) Provide:
 - (a) Leviton 2326
 - (b) Hubbell 2326
 - (c) Cooper AHL620FO
- h. 20A 3-phase, 4 Wire plus Ground Twist-Lock (NEMA L21-20R) single flush mount receptacles
 - 1) All receptacles shall be of the same manufacture
 - 2) Nylon body
 - 3) Color: Black
 - 4) Provide:
 - (a) Leviton 2510
 - (b) Legrand/Pass & Seymour L2120R
 - (c) Hubbell 2510
 - (d) Cooper CWL2120R
- i. 20A 3-phase, 4 Wire plus Ground Twist-Lock (NEMA L21-20R) single flush flange mount receptacles
 - 1) All receptacles shall be of the same manufacture
 - 2) Nylon body
 - 3) Color: White
 - 4) Provide:
 - (a) Leviton 2516
 - (b) Hubbell 2516
- j. Multi-Pin Locking Connectors
 - 1) All multi-pin receptacles shall be of the same manufacture, including panel mount female and cord mount male and female connectors
 - 2) Provide cord mounted connectors with appropriate strain relief:
 - (a) Single cables with double basket weave strain relief
 - (b) Multiple individual cords with clamping cable glands
 - 3) Multi-pin receptacles and plugs shall be 19-pin connectors wired for 6 circuits with dedicated line and neutral connections and 7 ground wires.
 - 4) Provide:
 - (a) Veam VSC
 - (b) Approved equal
5. Provide all wiring devices with either internal terminal strips or exterior terminal boxes for interconnection to the dimming and switched power system. All wiring devices may be internally wired at the factory prior to shipping.
 - a. Size all terminals as required based on wire sizes indicated on the Electrical Documents.
 - b. Terminal strips shall be grounded to the device enclosure.
6. Terminal Boxes:
 - a. Provide terminal boxes factory assembled with numbered terminal blocks for field connection by others, as indicated in the drawings and schedules.
 - b. All terminal boxes regardless of quantity of circuits shall be the same size.
 - c. Provide six spare terminals in each terminal box in addition to the spare circuits indicated in the schedules. Provide 4 ground lugs per box. Size all lugs and terminals as required based on wire sizes indicated on the Electrical Documents.
 - d. Sheet metal construction, finish flat black. Reinforce base of terminal boxes as required to take load from multi-cable.
 - e. Back box to be clearly labeled with circuit numbers.
7. Labeling:
 - a. Label each receptacle with appropriate circuit designation indicated on distribution schedule and drawings. All labels to be engraved on black (with white core) lamacoid tags with chamfered edges. Tags to be securely mechanically fastened to wiring device.
8. Mounting:
 - a. Devices shall be surface, flush or recess mounted at locations and mounting heights as called out on drawings.
 - b. Provide all requisite mounting hardware for installation of theatrical wiring devices. Coordinate all device mounting requirements with Division 26.

- c. All holes in mounting brackets to have 1" minimum slotted hole to enable adjustment for field conditions. Provide lock washers on bolts.
- 9. The Manufacturer is responsible for providing all wiring devices to meet all requirements as stated by the National Electrical Code and local code in reference to separation, isolation, and clearances for all voltages specified, as well as terminal sizes for all cable sizes, cable entry sizes, and exit routes and standoff.
- B. Plug Boxes with Flush Receptacles - Type 'PBR'
 - 1. Provide plug boxes with flush mounted receptacles as shown on the drawings. See drawings for device locations and distribution schedule for device type, mounting type and circuit quantity.
 - 2. Label each receptacle with appropriate switched circuit designation and DMX address or dimmer designation indicated on distribution schedule and drawings.
- C. Plug Boxes with Pigtails - Type 'PBP'
 - 1. Provide plug boxes with pigtail mounted receptacles as shown on the drawings. See drawings for device locations and distribution schedule for device type, mounting type and circuit quantity.
 - 2. Pigtail length shall be as indicated on drawings.
 - 3. Label each receptacle with appropriate switched circuit designation and DMX address or dimmer designation indicated on distribution schedule and drawings.
- D. Plugging Strip with Flush Receptacles – Type 'PSR'
 - 1. Provide plugging strips of standard plug batten construction with flush mounted receptacles as shown on the drawings. See drawings for device locations and distribution schedule for device type, mounting type and circuit quantity.
 - 2. Label each receptacle with appropriate switched circuit designation and DMX address or dimmer designation indicated on distribution schedule and drawings.
- E. Plugging Strip with Pigtails - Type 'PSP'
 - 1. Provide plugging strips of standard plug batten construction with pigtail mounted receptacles as shown on the drawings. See drawings for device locations and distribution schedule for device type, mounting type and circuit quantity.
 - 2. Pigtail length shall be as indicated on drawings.
 - 3. Label each receptacle with appropriate switched circuit designation and DMX address or dimmer designation indicated on distribution schedule and drawings.
 - 4. Provide with integral control device panels where indicated on drawings.
 - 5. Provide brackets and hardware for mounting boxes. All holes in mounting bracket to have 1" minimum slotted hole to enable adjustment for field conditions. Provide lock washers on bolts.
- F. Multi-cable Box with Flush Receptacles – Type 'MBR'
 - 1. Provide multi-cable boxes with flush mounted receptacles as shown on the drawings. See drawings for device locations and distribution schedule for device type, mounting type and circuit quantity.
 - 2. Provide metal dust caps on cable lanyard captive to back box for each multi-pin receptacle.
 - 3. Provide boxes with forged shouldered eye bolts mounted to reinforced edges of back box for multi-cable strain relief.
 - 4. Label each receptacle with appropriate switched circuit designation and DMX address or dimmer designation indicated on distribution schedule and drawings.
- G. Multi-cable Box with Pigtails - Type 'MBP'
 - 1. Provide multi-cable boxes with pigtail mounted receptacles as shown on the drawings. See drawings for locations of devices and distribution device schedule for device type, mounting type and circuit quantity.
 - 2. Provide metal dust caps on cable lanyard captive to back box for each multi-pin receptacle
 - 3. Provide boxes with forged shouldered eye-bolts mounted to reinforced edges of back box for multi-cable strain relief.
 - 4. Pigtail length shall be as indicated on drawings.

5. Provide multi-cables built from 75°C Extra-Hard Usage Cords, which consist of specified number of circuits rated 20 amps at 125 volts in accordance with Article 520 of National Electric Code.
 6. Strain Relief:
 - a. Provide Hubbell Kellems Deluxe Cord type grips correctly sized to restrain permanently attached multi-conductor cables to all multi-cable junction boxes and drop boxes.
 - b. Provide Hubbell Kellems Heavy Duty, Single Eye, Closed Mesh Strain relief on each multi-cable extension.
 7. Label each receptacle with appropriate switched circuit designation and DMX address or dimmer designation indicated on distribution schedule and drawings.
- H. Flexible Cable Terminal Box - Type 'TB'
1. Provide junction boxes between conduit and flexible multi-cable feeding batten-mounted connector strips. See drawings for device locations and circuit quantities.
 2. All wiring connections shall be internal to the device.
 3. Provide feed through wiring terminals with individual circuit labels.
 4. Provide with low voltage distribution system compatible with DMX and/or Ethernet protocols, as indicated on drawings.
 5. Provide appropriate strain relief at all flexible cable entries.

2.12 CONTROL ROOM FURNITURE

- A. Adjustable Height Desk
1. Provide control room desks for lighting and stage management control positions
 2. Height adjustable from 28" to 47"
 3. Electric lift for height adjustment
 4. Castered base with locking casters
 5. 150lb. lift capacity
 6. Metal understructure with black work surface
 7. Integral cable tray
 8. 29" minimum work surface depth
 9. Widths and quantities as listed in the Appendix
 10. Provide:
 - a. Ergotron Elevate Single Surface
 - b. Or approved equal

2.13 SOURCE QUALITY CONTROL

- A. All equipment and components shall be factory tested prior to shipping.
- B. Assemble in factory any and all system assemblies and subassemblies at Architect or Theatre Consultant's request, for testing in presence of Architect or Theatre Consultant, prior to shipment. Notify Architect at least 3 weeks prior to date when equipment is complete and ready for testing. Make equipment available to Architect or Theatre Consultant in Manufacturer's factory for period of at least 2 weeks for testing prior to shipment.
- C. During the test provide test equipment for all testing required and any other testing requested by the Architect or Theatre Consultant.
1. Test Equipment shall consist of any item that is proprietary to the testing of Manufacturer's equipment. Meters and oscilloscope need not be supplied.
- D. Control Testing:
1. Theatre Lighting Control Console and Network system shall be assembled in factory and tested for control console update time, video refresh rate, remote video picture quality, and any other function requested by Architect.
 2. Architect shall be sole judge of extent of testing necessary and sole judge of acceptability of any system tested.
- E. Verification of Performance:
1. Provide Architect with all test results for verification of system performance.

- F. For equipment that requires in house testing, do not ship any piece of equipment without either written verification of factory testing or written waiver of factory testing from Architect for that particular piece of equipment.

2.14 FABRICATION

- A. Fabricate all work in this section in accordance with the Architect's direction, specifications, approved shop drawings, pertinent project drawings, established trade practices and applicable code requirements.
- B. Machine finish all operating parts to standard trade tolerance, fits and finishes.
- C. Carry out shop welding in full accordance with the appropriate sections of "Specifications for the Design, Fabrication and Erection of Structural Steel Buildings" of the American Institute of Steel Construction (AISC).
- D. Fabrication, assembly and wiring shall be neat and workmanlike throughout.
- E. Control desks, racks and cabinets shall be welded assemblies of sheet steel or aluminum or of bar size angles, channels and tees or aluminum extrusions forming rigid enclosures to support internal components.
- F. All face panels shall be fully supported on all edges, either internally or by rolling interior edges of panels.
- G. Wood furniture/cabinet work for control desks acceptable with prior approval.
- H. Operating elements shall be mechanically safe and electrically "dead".
- I. All steel parts and panels shall be cleaned and primed with rust inhibiting primer. Exterior finishes shall be epoxy resin or baked enamel in matte black or in anodized black aluminum where approved.
- J. Control element working face panels shall be heavy aluminum or bakelite. Legends and control and protective device designations shall be engraved in panels, or in permanently attached plates, and located for ready identification.
- K. Operating instructions shall be similarly engraved and appropriately located on designated equipment.
- L. All panel engraving shall be in Helvetica Regular, height as indicated herein. Engraving shall be 1/4" or 3/16" as shown in drawings. In no case shall the engraving be less than 3/16" high without Architect's approval.
- M. All internal wiring shall be factory completed and clearly marked.
- N. Field connections shall be made by connector devices and cables as specified in preceding sections.
- O. Dimmer modules, dimmer controllers and other plug-in components may have spade lug and/or receptacle devices for connection.
- P. Control relays wherever possible shall be the glass or polycarbonate enclosed plug-in type. Relays shall be acoustically damped.
- Q. Uniform components shall be used throughout the system. All dimmer, fader and preset controllers shall be physically similar; they may vary in voltage according to the Theatrical Lighting Manufacturer circuit requirements.
- R. All wire sizes and insulation to comply with UL standards and local codes and meet or exceed electronics industry standards.
- S. All wiring to be harnessed and bound. No loose or randomly routed wires permitted.
- T. All printed circuit cards to be suitably racked with numbered and indexed guides. Legends to be provided on panel door.
- U. Key all components in this section with locks or key switches alike. Provide six keys minimum.

- V. Each receptacle within a wiring device must have a home run to the dimmer rack or DMX controlled panelboard of its hot and neutral. Circuits with more than one receptacle must be paralleled at the dimmer rack. The method of termination must not void UL listing. Circuits with more than one receptacle within a single wiring device may be paralleled within the device and require only one home run of the hot and neutral to the dimmer rack or DMX controlled panelboard.
- W. Minimize feeder inductance by twisting the hot and neutral conductors in long connector strips. Neutral conductor must be at least the same size or greater than the hot conductor.

part 3 Execution

3.1 INSTALLERS / INTEGRATORS

- A. To establish comparative standards of quality, the provision of equipment and services of this section shall be by one of the following authorized dealers:

Beck Studios, Inc
1001 Tech Drive
Milford, OH 45150
Tel: (513) 831-6650

Fantasee Lighting
14857 Martinsville Road
Belleville, MI 48111
Tel: (734) 699-7200

LVH Entertainment Systems
1801 Highland Avenue,
Unit E
Duarte, CA 91010
Tel: (805) 278-4584

Texas Scenic Co.
8053 Potranco Road
San Antonio, TX 78251
Tel: 210-684-0091

- B. Substitution Limitations

- 1. Any contractor who wishes to be listed and has not been pre-approved must submit qualification information to the Architect. Proposal shall include all of the information listed below:
 - a. Statements of financial responsibility for the past five fiscal years showing assets and liabilities.
 - b. List of principal officers and design and service engineers in an organizational structure flow chart.
 - c. List of not less than 5 projects of similar size and scope completed within the five years on which contractor has provided full services: product engineering, shop drawings, manufacture, installation and commissioning. In each instance, indicate specifics of scope of fabrication and installation. Include a contact list: name, address and phone numbers of person(s) directly responsible for operation and maintenance of equipment in each facility.
 - d. List of current projects and approximate contract value and completion dates. Include list of names, phone numbers and addresses of owner, owner's representatives and architect.
 - e. For each above described project, list of names of persons who supervised preparation of shop drawings, manufacture of components, and installation of equipment.
 - f. List of names of persons who would do project management, product engineering, supervision of shop drawing, and supervision of installation should this contract be awarded.
 - g. Contract Bond Company information indicating that contractor has bonding capacity for full duration of project. Include list of other bonded projects coinciding with this project.

- h. Evidence of ability to undertake custom product engineering to meet specific requirements of project specifications. Provide sample project engineering drawings for custom products and contact information for facility operators where those products have been installed.
- 2. Standards of Acceptance:
 - a. Refer to Paragraph 1.8B - Quality Assurance/Qualifications.

3.2 EXAMINATION

- A. Verification of Conditions: Contractor must examine areas and conditions under which the equipment is to be installed and must notify the General Contractor in writing of conditions detrimental to proper and timely completion of work. Work will not proceed until unsatisfactory conditions have been corrected in a manner acceptable to the Contractor.

3.3 INSTALLATION

- A. Install all work in this section in accordance with the Architect's direction, specifications, approved shop drawings, pertinent project drawings, established trade practices and applicable code requirements.
- B. Provide site supervision during the installation of electrical work associated with the Theatrical and Architectural Lighting system elements.
- C. Install all work securely, complete with all bolts, nuts, washers, clips, fittings, supports, and other items required for proper installation and operation.
- D. Position all items accurately as indicated on drawings and true to plumb, line and level. Maintain maximum headroom and clearances at all points.
- E. Coordinate work with all other trades to avoid causing delays in construction schedule.
- F. All field welding requires prior approval of the Architect and Contractor's Structural Engineer.
- G. Carry out approved field welding in full accordance with the appropriate sections of "Specifications for the Design, Fabrication and Erection of Structural Steel Buildings" of the American Institute of Steel Construction (AISC).
- H. Do all cutting, drilling, tapping and approved welding required to properly install work. Obtain Architect's prior approval for cutting and drilling of existing structural work.
- I. Clean structural steel and fabricated steelwork of rust, scale and foreign matter by grinding; prime with 1 coat of chromated primer; finish with 1 coat of first quality machinery enamel free of skips, runs and saps. Touch up all field connections, welds and abraded places with primer and enamel.

3.4 FIELD QUALITY CONTROL

- A. The installation of the equipment indicated in this section shall be supervised by qualified personnel who are regularly employed by the Contractor for supervision of equipment installation similar to that indicated herein.
- B. Installers must be appropriately skilled and experienced for the type and quality of work.
- C. Arrange for all tests and inspections required by the General Requirements.

3.5 SYSTEM STARTUP AND COMMISSIONING

- A. Commissioning
 - 1. Upon completion of installation work required by the work of this Section, the Contractor shall perform all required tests and inspections, including but not limited to the Compliance Testing Procedures specified herein.
 - 2. Contractor shall supply all equipment required for the commissioning process including access equipment (personnel lifts, ladders and appropriate protective equipment), test instruments and communications equipment.
 - 3. Contractor shall provide staff to assist in the commissioning process.
 - 4. Compliance Testing Procedures (CTP)

- a. Test all dimmed/switched receptacle circuits:
 - 1) Polarity
 - 2) Circuit identification
 - 3) Assignment to designated device
- b. Test all control receptacles for data integrity
 - 1) DMX
 - 2) Ethernet
- c. Test all theatrical control devices for function
 - 1) DMX Nodes
 - 2) Remotes
 - 3) Consoles
 - 4) Architectural Panels
- d. Test all cables provided as part of this section

3.6 ADJUSTING

- A. Adjust all equipment and components for operation in accordance with the specifications, approved shop drawings and pertinent Contract Drawings prior to the demonstration indicated herein.

3.7 CLEANING

- A. Touch up minor abrasions and imperfections as required.
- B. Remove from the premises all debris caused by this work. All unnecessary equipment and materials shall be removed from the area(s) of this work upon completion, removed from the job site and disposed of legally at no additional cost to the Owner.

3.8 CLOSEOUT ACTIVITIES

- A. Demonstration
 - 1. Upon completion of Commissioning, the Contractor will notify the Architect and Theatre Consultant that system is complete, conforms to specification and is ready for Demonstration.
 - 2. Installed equipment is to be operated for approval and inspected for quality by the Theatre Consultant, the Architect and the Owner.
 - 3. The Theatre Consultant will perform the tests listed in the Compliance Testing Procedures to verify compliance with specifications.
 - 4. Contractor shall supply all equipment required for the Demonstration, including access equipment (personnel lifts, ladders and appropriate protective equipment), test instruments and communications equipment.
 - 5. Contractor shall provide staff to assist in the Demonstration, as necessary.
 - 6. Adjustments or modifications shall be made as directed by the Architect and the Theatre Consultant.
 - 7. Costs of re-inspection and additional testing by the Architect and Theatre Consultant, if required, due to lack of completion and/or errors and omissions shall be paid by the Contractor. This work will be conducted on a time and materials basis, including the Architect's and Theatre Consultant's standard hourly rates, and shall be scheduled and approved in writing prior to the re-inspection/testing session.
- B. Training
 - 1. Following the equipment demonstration, inspection and final adjustments, provide an instruction session to the Owner's staff or representatives on the safe operation, care and maintenance of the system.
 - a. Provide instruction of not less than eight hours total, in 2 separate sessions.
 - b. Instruction shall include, but not be limited to, proper general maintenance of the system, replacement procedures for user replaceable parts, and operating procedure to obtain maximum usage of system.
 - c. Deliver all copies of approved Operations Manual to Owner prior to first instruction session, and review it as part of that session.

- d. The first session shall take place in the presence of the Architect or Theatre Consultant and shall occur directly after finish of Completion Checkout. If Owner, Architect judge that any work inspected fails to conform to the specification or is not substantially complete at time of Completion Checkout, postpone instruction session until Owner and Architect judge the entire Lighting System to conform with specification.
- e. The second session shall occur at a time arranged by the Owner no sooner than 1 day and no later than 1 month after first session.
- 2. Console Operator Instruction:
 - a. Provide instruction to Owner or Owner's selected key Lighting Control Console Operators on the detailed operation of Console. This training shall take place in two separate sessions. Each session shall be no less than four hours and shall take place on site.
- 3. Timing for all sessions shall be scheduled by the Owner at their convenience.
- 4. Instruction must be by qualified expert operators who have actual experience with systems in performance conditions.

3.9 PROTECTION

- A. Provide full protection from damage, construction dirt and debris for all equipment from the point of installation to testing and commissioning.
- B. Remove all equipment protection and clean components thoroughly prior to the demonstration session.

3.10 MAINTENANCE

- A. Maintenance Service
 - 1. One month prior to the end of the first year following the date of final systems acceptance, a factory engineer shall be provided to examine, adjust and repair the equipment included in this section which is found to require warranty work prior to the end of the warranty period. This service shall not cover adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents caused by persons other than the Manufacturer. All labor and materials which are required to perform this service shall meet or exceed these specifications and shall not compromise the performance of the equipment in any way.
 - 2. Following this inspection and maintenance service, the Contractor shall provide the Owner and Theatre Consultant with a written report itemizing the results of the inspections and the warranty work that was conducted. The Contractor shall also include in this written report recommendations for any corrective actions which the Contractor feels should be taken with respect to the equipment included in this section, but are outside the scope of the warranty agreement.
- B. System Programming Updates
 - 1. Contractor shall review system operation and control system programming with the Owner's representatives. Any required adjustments and changes to the control system programming requested by the Owner shall be performed and completed during the time of the corrective service site visit. All control system programming changes shall be documented by the Contractor.

3.11 ATTACHMENTS

- A. Refer to Appendix A of this section for quantities and accessories.

<<APPENDIX NOT ISSUED AS A PART OF DESIGN DEVELOPMENT SUBMISSION>>

END OF SECTION