BARBA+WHEELOCK
ARCHITECTURE SUSTAINABILITY PRESERVATION

PROJECT MANUAL

for the

Conway Public Library North Entrance Reconstruction and Preservation

15 Greenwood Avenue
Conway, New Hampshire 03818

VOLUME 1

Divisions 01 thru 07

100% CONSTRUCTION DOCUMENTS

AUGUST 30, 2023

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BARBA+WHEELOCK
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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Contractor's use of site and premises.
4. Work restrictions.
5. Specification and Drawing conventions.
6. Miscellaneous provisions.

B. Related Requirements:

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

1.2 PROJECT INFORMATION

A. Project Identification: Conway Public Library North Entrance Reconstruction and Preservation

1. Project Location: 15 Greenwood Avenue, Conway, New Hampshire.

B. Owner: Board of Trustees; Conway Public Library; Conway, NH.

C. Architect Identification: The Contract Documents were prepared for Project by Barba + Wheelock, 456 Capisic Street, Portland, Maine 04102. Telephone 207-772-2722.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:

1. The Work involves the reconstruction and preservation of the North Historic Entrance of approximately 770 SF of the Conway Public Library facade. Work includes but is not limited to, repointing with cement-lime mortar, stone cleaning, stone restoration, masonry mortar and grout, cast stone masonry, reassembly of historic stone facade, wrought iron railing, and joint sealants. One of the primary tasks for the project will be installation of three large cast stone architectural elements, two roughly 14 foot tall by 2

foot diameter column shafts and a roughly 8 foot tall by 7 inch wide and 11 inches deep pilaster.

1.4 CONTRACTOR'S USE OF SITE AND PREMISES

A. Unrestricted Use of Site: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

C. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.5 WORK RESTRICTIONS

A. Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Work shall be generally performed during normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, except otherwise indicated.

1. Weekend Hours: As approved by Architect/Engineer and Owner.
2. Early Morning Hours: As approved by Architect/Engineer and Owner.
3. Hours for Utility Shutdowns: As approved by Architect/Engineer and Owner.
4. Provide 24 hour notice to Architect/Engineer when performing work other than normal working hours.

C. Smoking and Controlled Substance Restrictions: Use of tobacco products and other controlled substances within the existing building is not permitted.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect/Engineer's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

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

1.3 SUBMITTAL FORMATS

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

1. Project name.
2. Date.
3. Name of Architect/Engineer.
4. Name of firm or entity that prepared submittal.
5. Names of subcontractor, manufacturer, and supplier.
6. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.

    a. Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., ABCD-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., ABCD-061000.01.A).

7. Category and type of submittal.
8. Submittal purpose and description.
9. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.

10. Drawing number and detail references, as appropriate.
11. Location(s) where product is to be installed, as appropriate.
12. Other necessary identification.
13. Remarks.
14. Signature of transmitter.

B. Options: Identify options requiring selection by Architect/Engineer.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect/Engineer on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number. The only exception to this is the color charts which will be sent as hard copies in the mail. No photo copies or PDF copies of color charts will be acceptable.

1.4 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package and transmit to Architect/Engineer by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect/Engineer.

   a. Architect/Engineer will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
3. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.

   a. Architect/Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows.

Time for review shall commence on Architect/Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect/Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect/Engineer's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
5. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
6. Submittals with color selection: The Contractor shall deliver to Architect/Engineer a list for the exterior color package and all items for exterior color selection at one time. The Architect/Engineer needs to coordinate the colors of all exterior items and the Contractor shall allow 4 weeks for return of exterior color selections.

D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect/Engineer's action stamp.

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect/Engineer's action stamp.

1.5 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable. Mark with dark colored pen that permits photocopying.
3. Include the following information, as applicable:

a. Manufacturer's catalog cuts.
b. Manufacturer's product specifications.
c. Standard color charts.
d. Statement of compliance with specified referenced standards.
e. Testing by recognized testing agency.
f. Application of testing agency labels and seals.
g. Manufacturer’s Safety and Data Sheets (SDS).
h. Notation of coordination requirements.
i. Availability and delivery time information.

4. Submit Product Data before Shop Drawings, and before or concurrently with Samples.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Notation of dimensions established by field measurement.
b. Relationship and attachment to adjoining construction clearly indicated.
c. Seal and signature of professional engineer if specified.

C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.

1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
2. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's hard copy color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available. Copies of color charts will not be reviewed and any submittal that includes copies will be rejected and count as one of two allowed submittals per section.

a. Number of Samples: Submit one full set(s) of available choices to Architect/Engineer where color, pattern, texture, or similar characteristics are

required to be selected from manufacturer's product line.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit Two (2) sets of Samples. Architect/Engineer will retain one (1) Sample set; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.

        1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
        2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

D. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

E. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

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

1.6 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

    1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect/Engineer.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file or three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

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

1.7 ARCHITECT/ENGINEER'S REVIEW

A. Action Submittals: Architect/Engineer will review each submittal, indicate corrections or revisions required, and return. Architect/Engineer will indicate, via markup on each submittal, the appropriate action.

    1. The Architect/Engineer’s marking of “Approved,” “Approved As Noted” or similar verbiage means submittal has been reviewed for general conformance to the Contract Documents only and does not mean unqualified acceptance. The Contractor is fully responsible for compliance with the Contract Documents.

B. Informational Submittals: Architect/Engineer will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect/Engineer will forward each submittal to appropriate party.

C. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

D. Architect/Engineer will return without review submittals received from sources other than Contractor.

E. Submittals not required by the Contract Documents will be returned by Architect/Engineer without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013591 - 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 and the following specific work.

1.2 DEFINITIONS

A. Consolidate: To strengthen loose or deteriorated materials in place.

B. Existing to Remain: Existing items that are not to be removed or dismantled.

C. Historic: Spaces, areas, rooms, surfaces, materials, finishes, and overall appearance which are important to the successful preservation and rehabilitation as determined by Architect/Engineer. Designated historic surfaces are scheduled in this Section.

D. 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/Engineer.

E. Reinstall: To protect removed or dismantled item, repair and clean it as indicated for reuse, and reinstall it in original position, or where indicated.

F. Remove: Specifically for historic spaces, areas, rooms, and surfaces, the term means to detach an item from existing construction to the limits indicated, using hand tools and hand-operated power equipment, and legally dispose of it off-site, unless indicated to be salvaged or reinstalled.

G. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.

H. Salvage: To protect removed or dismantled items and deliver them to Owner.

1.3 INFORMATIONAL SUBMITTALS

A. 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.

1.4 STORAGE AND PROTECTION OF HISTORIC MATERIALS

A. Historic Materials for Salvage/Attic Stock:

1. Clean only loose 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 designated by Owner.
5. Protect items from damage during transport and storage.

B. Historic Materials for Reinstallation:

1. Repair and clean historic items as indicated and to functional condition for reuse.
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 item 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/Engineer, 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.

PART 2 - PRODUCTS [NOT USED]

PART 3 - EXECUTION

3.1 EXAMINATION

A. Preparation for Removal and Dismantling: Examine construction to be removed or dismantled to determine best methods to safely and effectively perform removal and dismantling work. Examine adjacent work to determine what protective measures will be necessary.

1. 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.

3.2 PROTECTION, GENERAL

A. Temporary Protection of Historic Materials:

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

B. 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.

3.3 GENERAL HISTORIC TREATMENT

A. 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.

B. 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.

3.4 HISTORIC REMOVAL AND DISMANTLING

A. Removing and Dismantling Items on or near Historic Surfaces:

1. Use only dismantling tools and procedures within 12 inches (300 mm) of historic surface. Do not use pry bars. Protect historic surface from contact with or damage by tools.
2. Unfasten items to be removed, 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.

3.5 HISTORIC REMOVAL AND DISMANTLING SCHEDULE

A. Existing Items to Be Removed and Replaced: Metal anchors for prior handrail. New anchors shall be set in new locations in solid parent stone.

B. Existing Items to Be Removed and Reinstalled: Brownstone column capitals, column capital scroll fragments, and column bases. Large brownstone panel at base of west return facade.

C. Existing Items to Be Salvaged/Used for Attic Stock: Brownstone column pieces.

END OF SECTION

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect/Engineer, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.2 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.

1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).

C. Mockups: Full-size physical assemblies that are constructed either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
2. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.

E. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" shall have the same meaning as the term "testing agency."

H. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

I. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect/Engineer.

1.3 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect/Engineer.

B. Delegated-Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.4 CONFLICTING REQUIREMENTS

~~A.~~ Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect/Engineer regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect/Engineer for clarification before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect/Engineer for a decision before proceeding.

1.5 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1.6 QUALITY ASSURANCE

A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing

engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged in the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following Contractor's responsibilities, including the following:

1. Provide test specimens representative of proposed products and construction.
2. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
3. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
4. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.
5. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect/Engineer, with copy to Contractor. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by Architect/Engineer.
3. Notify Architect/Engineer seven days in advance of dates and times when mockups will be constructed.
4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
5. Demonstrate the proposed range of aesthetic effects and workmanship.
6. Obtain Architect/Engineer's approval of mockups before starting corresponding Work, fabrication, or construction.

    a. Allow the number of days specified in corresponding specification sections for initial review and each re-review of each mockup.

7. Promptly correct unsatisfactory conditions noted by Architect/Engineer's preliminary review, to the satisfaction of the Architect/Engineer, before completion of final mockup.
8. Approval of mockups by the Architect/Engineer does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect/Engineer specifically approves such deviations in writing.
9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
10. Demolish and remove mockups when directed unless otherwise indicated.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Engage a qualified testing agency to perform quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires

testing or inspection will be performed.

4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect/Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect/Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform duties of Contractor.

E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.

4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspection equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.

1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
2. Distribution: Distribute schedule to Owner, Architect/Engineer, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect/Engineer.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect/Engineer's reference during normal working hours.

1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect/Engineer's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect/Engineer's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect/Engineer. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

J. Substantial Completion: The stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the Work for its intended use. Minor corrections and repairs that can be performed while the Owner has occupied the building and without undue annoyance to personnel will be acceptable under the definition of Substantial Completion. It shall also include major final cleaning required under the Contract, removal of all surplus equipment and material not required for completion or remaining work, and the placement of remaining materials and equipment in convenient locations as approved by the Owner.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

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

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

1. ICC - International Code Council; www.iccsafe.org.
2. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

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

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.

7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov/fdsys.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. ACI - American Concrete Institute
2. ASCE - Structural Engineering Institute of American Society of Civil Engineers
3. ASTM International – American Society for Testing and Materials
4. CRSI - Concrete Reinforcing Steel Institute
5. FED-STD - Federal Standard; (See FS).
6. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.

    a. Available from Defense Standardization Program; www.dsp.dla.mil.
    b. Available from General Services Administration; www.gsa.gov.
    c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.

7. MIA - Marble Institute of America
8. NBGQA - National Building Granite Quarries Association, Inc.
9. PCI - Precast Concrete Institute
10. SSPC - Steel Structures Painting Council
11. TMS - The Masonry Society
12. USAB - United States Access Board; www.access-board.gov.
13. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the

following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. NHDES - State of New Haampshire Department of Environmental Services.
2. NHDOT - State of New Hampshire Department of Transportation

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 USE CHARGES

A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Architect/Engineer, testing agencies, and authorities having jurisdiction.

B. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.

C. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

D. Heating Fuel: Fuel required for temporary heating will be the responsibility of the Contractor, as needed.

1.3 INFORMATIONAL SUBMITTALS

A. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

B. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
2. Indicate methods to be used to avoid trapping water in finished work.

C. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements (as needed) to protect install concrete and masonry.

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.5 PROJECT CONDITIONS

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

B. Frost Protection: Protect footings and slabs from freezing temperatures and prevent frost from occurring beneath footings and slabs. Frozen water found on soil or concrete surface shall be reason for rejection of protection method. Provide corrective measures within 24 hours after notice of condition is given. Evidence of frost at these locations shall be reason for rejection, removal, and replacement at no additional cost to the Owner.

C. Use of new heating or cooling systems, during the construction period, will not be allowed unless authorized in writing by the Owner.

1. If Contractor intends to use any new heating or cooling systems, Contractor to submit proposed source to Architect/Engineer and Owner for review.

D. Electrical services for project operations:

1. Contractor may use on site electrical supply, including existing outlets. No generators will be permitted.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portable Chain-Link Fencing: Minimum 2-inch, 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top and bottom rails. Provide concrete or galvanized steel bases for supporting posts.

1. Contractor to submit aerial plan showing extents of proposed fencing for Owner's approval.

B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.

C. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches.

2.2 TEMPORARY FACILITIES

A. Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

1. Field Offices may be located west of Library's west facade. Contractor to submit aerial plan showing location of proposed field office for Owner's approval.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect/Engineer, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Drinking water.
2. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

2.3 EQUIPMENT

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

B. HVAC Equipment will not be allowed unless authorized in writing by the Owner.

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

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

3.3 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

D. Temporary heating and cooling will not be allowed unless authorized in writing by the Owner.

1. If Contractor determines temporary heating and cooling are required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity, Contractor to submit proposed source to Architect/Engineer and Owner for review. Select equipment that will not have a harmful effect on completed installations or elements being installed.

a. Maintain a minimum temperature of 50 deg F adjacent to facade for normal

construction activities, and 65 deg F for finishing activities and areas where finished Work has been installed. Refer to Divisions 02 through 48 for additional temporary heat, ventilation, and humidity requirements for products in those Sections.

2. Provide temporary heat to protect all masonry work during installation as well as other trades needing specific heat requirements to perform and protect their work. See individual specification sections for detailed information.

3. All footings and foundations not below the frost line shall be protected from freezing either by heating or protecting with insulation until substantial completion.

E. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.

F. Telephone Service: Provide temporary cellular telephone service with voice mail throughout construction period.

3.4 SUPPORT FACILITIES INSTALLATION

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

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

B. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

C. Storage and Staging: Use designated areas of Project site for storage and staging needs.

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

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

E. Project Identification and Temporary Signs: Prepare Project identification and other signs in sizes indicated. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.

1. Engage an experienced sign painter to apply graphics for Project identification signs. Comply with details indicated. Include name of project, and names of Owner, Architect/Engineer and Contractor.
2. Construct signs of exterior-type Grade B-B high-density concrete form overlay plywood in

size of 4 by 8 feet and 3/4 inch thickness, unless otherwise indicated. Support on posts or framing of preservative-treated wood or steel.

3. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer.
4. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

    a. Provide temporary, directional signs for construction personnel and visitors. Include signage to appropriate exits for Library personnel and visitors in the case of an emergency.

5. Maintain and touch up signs, so they are legible at all times.

F. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

G. Temporary Elevator Use: Use of elevators is not permitted.

H. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

I. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

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

1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

F. Site Enclosure Fence: Prior to commencing earthwork, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.

G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

J. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
3. Combustion-type temporary heating units are not permissible.
4. Develop and supervise an overall fire-prevention and -protection program for personnel

at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.6 MOISTURE AND MOLD CONTROL

A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard and replace stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use temporary heating system, if required and approved, to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

    a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
    b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation.
    c. Remove and replace materials that cannot be completely restored to their

manufactured moisture level within 48 hours.

3.7 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required and approved to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.

C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.

D. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures."

1.3 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more

products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:

   a. Name of product and manufacturer.
   b. Model and serial number.
   c. Capacity.
   d. Speed.
   e. Ratings.

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

C. Products with asbestos: Asbestos containing materials are not to be purchased or installed in this project.

1.4 COORDINATION

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

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
2. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
3. Inspect products on delivery to determine compliance with the Contract Documents and

that products are undamaged and properly protected.

C. Storage:

1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
2. Store products to allow for inspection and measurement of quantity or counting of units.
3. Store materials in a manner that will not endanger Project structure.
4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.

D. During the construction process, meet or exceed the following minimum requirements to prevent the growth of mold and bacteria:

1. Keep building materials dry. Wood, porous insulation, paper, fabric, and similar absorptive materials shall be kept dry to prevent the growth of mold and bacteria. Cover these materials to prevent rain damage, and if resting on the ground, use spacers to allow air to circulate between the ground and the materials.
2. Replace water-damaged materials, or dry within 24 hours, due to the possibility of mold and bacterial growth. Materials that are damp or wet for more than 24 hours shall be discarded if evidence of mold occurs.
3. Immediately bring to the attention of the Architect/Engineer any materials showing signs of mold and mildew, including materials with exposed moisture stains, from the site and properly dispose of them. Replace moldy materials with new, undamaged materials.
4. Require that moisture sensitive materials be delivered dry and protected from the elements.
5. Allow for time in the construction schedule for materials to dry before they are enclosed.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written standard warranty form furnished by individual

manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.

2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects and as approved by Architect/Engineer.
3. Architect/Engineer reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect/Engineer will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or “or approved substitute" or approved," comply with provisions in "Product Substitutions" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Limited List of Products: Where Specifications include a list of names of both

manufacturers and products, provide one of the products listed that complies with requirements.

a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."

2. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.

a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.

3. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.

a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."

4. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.

a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named.

C. Visual Matching Specification: Where Specifications require the phrase "match Architect/Engineer's sample," provide a product that complies with requirements and matches Architect/Engineer's sample. Architect/Engineer's decision will be final on whether a proposed product matches.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect/Engineer from manufacturer's full range" or a similar phrase, select a product that

complies with requirements. Architect/Engineer will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

E. Sustainable Product Selection: Where Specifications require product to meet sustainable product characteristics, select products complying with indicated requirements. Comply with requirements in Division 01 sustainability requirements Section and individual Specification Sections.

1. Select products for which sustainable design documentation submittals are available from manufacturer.

PART 3 - EXECUTION [Not Used]

END OF SECTION

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:

1. Installation of the Work.
2. Cutting and patching.
3. Progress cleaning.
4. Starting and adjusting.
5. Protection of installed construction.

1.2 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.3 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect/Engineer of locations and details of cutting and await directions from Architect/Engineer before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual

evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect/Engineer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching that are visually identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible, including texture, color, etc.

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine walls for suitable conditions where products and systems are to be installed.
2. Verify compatibility with and suitability of substrates, including compatibility with sealant.

C. Proceed with installation only after unsatisfactory conditions have been identified and brought to the attention of the Architect/Engineer and corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Architect/Engineer that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take all field measurements to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work. Bring discrepancies between field measurements and Contract Documents to the attention of the Architect/Engineer.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect/Engineer.

3.3 INSTALLATION

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

1. Make vertical work plumb, and make horizontal work level.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products per manufacturer’s recommendations at the time and under conditions that will ensure satisfactory results as determined by Architect/Engineer. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.

F. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Anchors and Fasteners: provide anchors and fasteners and required to anchor each

component securely in place, accurately located and aligned with other portions of the Work.

1. Allow for building movement, including thermal expansion and contraction between disparate materials.
2. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, anchor bolts, and items with integral anchors, that are to be embedded in masonry. Deliver such items to Project site in time for installation.
3. Provide metal fastenings and accessories in same texture, color and finish as adjacent materials, unless otherwise indicated.
4. Prevent electrolytic action between dissimilar metal and materials.
5. Space anchors within their load limit or shear capacity and ensure they provide positive permanent anchorage per manufacturer. Wood, or any other organic material plugs are not acceptable.
6. No exposed fastenings are permitted.
7. Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.
8. Use non-corrosive, stainless steel fasteners and anchors for securing exterior work, unless galvanized or other material is specifically requested in the affected specification section.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.

1. Allow for building movement, including thermal expansion and contraction.
2. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width to match typical existing building joint profile. Fit exposed connections together to form hairline joints.

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

1. Comply with Section 017700 "Closeout Procedures" for repairing or removing and replacing defective Work.

3.4 CUTTING AND PATCHING

A. General: Employ skilled workers to perform cutting and patching.

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

C. Protection: Protect in-place construction during cutting and patching to prevent damage.

Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Existing Utility Services: Where existing services/systems are required to be relocated, bypass such services/systems before disconnecting to minimize interruption to occupied areas.

E. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
3. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.

F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible and practicable, as judged by Architect/Engineer. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a similar condition as it was following its initial construction and ensures thermal and moisture integrity of building enclosure.

G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, sealant, soiling, and similar materials from adjacent finished surfaces.

3.5 PROGRESS CLEANING

A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

a. Use containers intended for holding waste materials of type to be stored.

3. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

   a. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly coated surfaces.

3. Remove materials and debris that create tripping hazards.

D. For general construction, each trade shall pick up the debris and rubbish, generated by that trade, and dispose of in dumpsters furnished by the General Contractor.

E. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

F. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

G. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

H. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

K. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.7 PROTECTION AND REPAIR OF INSTALLED CONSTRUCTION

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

B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.

C. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

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

END OF SECTION

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

A. Product Data: For each type of cleaning agent.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

1.5 MAINTENANCE MATERIAL SUBMITTALS

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

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list").

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, and similar final record information.
2. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
3. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect/Engineer. Label with manufacturer's name and model number.

   a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section.

4. Submit testing, adjusting, and balancing records.
5. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Instruct Owner's personnel in maintenance of products and systems.
2. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
3. Complete final cleaning requirements.
4. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect/Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect/Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect/Engineer, that must be completed or corrected before certificate will be issued.

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

completed or corrected.

2. Results of completed inspection will form the basis of requirements for Final Completion.

1.2 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:

1. Certified List of Incomplete Items: Submit certified copy of Architect/Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect/Engineer. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
2. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect/Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements.

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

1.3 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect/Engineer for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

1. Unless indicated otherwise, all warranties shall commence on the date of Substantial Completion.

B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

1. Submit by email to Architect/Engineer.

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

E. Warranty Response Time: The Contract shall respond and begin to take necessary action within 7 days of receipt of written notification from the Owner. Response time for life safety items, and for building perimeter security shall be within 24 hours of receipt of written notification from the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Clean each exposed surface. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Clean granite steps and landing, removing debris, dirt, and staining; clean according to manufacturer's recommendations.

i. Clean transparent materials, including mirrors and glass in doors and windows. Polish mirrors and glass, taking care not to scratch surfaces. Cleaning of windows shall be done just before project completion.

j. Leave Project clean and ready for project completion.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations required by Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory manuals.
2. Product maintenance manuals.

1.2 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.3 CLOSEOUT SUBMITTALS

A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect/Engineer will comment on whether content of operation and maintenance submittals is acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operation and maintenance manuals in the following format:

1. Submit by email to Architect/Engineer. Enable reviewer comments on draft submittals.

C. Initial Manual Submittal: Thirty (30) day Architect/Engineer review period.

D. Final Manual Submittal: Fifteen (15) day Architect/Engineer review period. Architect/Engineer will return copy with comments.

1. Correct or revise each manual to comply with Architect/Engineer's comments. Fifteen

(15) day Architect/Engineer review period.

E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.4 FORMAT OF OPERATION AND MAINTENANCE MANUALS

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

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.

1.5 REQUIREMENTS FOR OPERATION AND MAINTENANCE MANUALS

A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Construction Manager.
6. Name and contact information for Architect/Engineer.
7. Names and contact information for major consultants to the Architect/Engineer that designed the systems contained in the manuals.
8. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system and subsystem. If possible, assemble instructions for subsystems and components of

one system into a single binder.

1.6 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to operation and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:

1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
2. Tables of Contents: Include a table of contents for each operation and maintenance manual.

1.7 PRODUCT MAINTENANCE MANUALS

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

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

D. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

E. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.

5. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS [Not Used]

PART 3 - EXECUTION [Not Used]

END OF SECTION

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Product Data.
2. Directories.

1.2 CLOSEOUT SUBMITTALS

A. Submit all project record documents as one submittal package.

B. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

1. Where record Product Data is required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

1.3 RECORD PRODUCT DATA

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until the end of Project.

B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders where applicable.

C. Format: Submit Record Product Data as annotated PDF electronic file.

1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

1.4 DIRECTORIES

A. Directories: Contractor/Subcontractor directory.

1. Submit one hard copy and one copy on USB storage device in PDF format.

B. Directory: Name, address and telephone number for General Contractor, all major subcontractors, organized by specification section. Provide a separate list in alphabetical order.

1.5 MAINTENANCE OF RECORD DOCUMENTS

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

PART 2 - PRODUCTS [Not Used]

PART 3 - EXECUTION [Not Used]

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 Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

C. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

1.3 MATERIALS OWNERSHIP

A. Salvaged brownstone is to be the property of the Owner.

B. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.4 INFORMATION SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property. Indicate proposed locations and construction of barriers.

1.5 CLOSEOUT SUBMITTALS

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

1.6 FIELD CONDITIONS

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

B. Notify Architect/Engineer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect/Engineer and Owner. Hazardous materials will be removed by Owner under a separate contract.

D. Storage or sale of removed items or materials on-site is not permitted.

E. 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.
2.

1.7 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.

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 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. Verify that hazardous materials have been remediated before proceeding with building

E. Survey of Existing Conditions: Record existing conditions by use of measured drawings.

1. 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.
2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 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 Relocated: Locate, identify and disconnect as needed.

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.

3.3 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. 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.

3.4 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 24 hours after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
8. Dispose of demolished items and materials promptly.

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. 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.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect/Engineer, 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.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site.

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.

B. Burning: Do not burn demolished materials.

3.7 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.

END OF SECTION

SECTION 040127 – REPOINTING WITH CEMENT-LIME MORTAR

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Supply and preparation of mortar and grout for brick masonry, brownstone, and granite unit masonry repairs and restoration. Repointing brownstone and granite at locations designated on Drawings.

B. Related Sections include the following:

1. Division 04 Section "Stone Restoration" for repointing during stone restoration work.
2. Division 04 Section "Cast Stone Masonry" for repointing following cast stone masonry installation.

1.2 Unit Prices

A. Perform repointing Work on unit price basis. Payment based on linear feet of joints repointed.

1.3 DEFINITIONS

A. Existing mortar: Mortar currently in joint, including original setting mortar and pointing mortar, and subsequent repair mortar.

B. Half moon: Concave configuration of mortar resulting from removal of mortar by grinding only middle portion of joint.

C. Rake out mortar joint: Removal of hardened mortar from joint.

D. Reinforced Masonry: Masonry containing reinforcing steel embedded in adhesive in vertical cores.

E. Repointing: Process of raking out mortar joint to specified depth and placing fresh mortar; also called tuckpointing.

F. Thumbprint hard: Mortar that has reached initial set. Time required to achieve initial set varies based on masonry characteristics, weather conditions, and mortar composition.

G. Low-pressure water spray: less than 100 pounds per square inch; 4 to 6 gallons per minute.

H. Very-low-pressure water spray: 80 pounds per square inch.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate Work to ensure that adjacent areas are not adversely affected. Coordinate:

1. With Owner and Architect/Engineer.
2. With other restoration and cleaning work.
3. With other trades:

a. To ensure that work done by other trades is complete and ready for repointing Work.
b. To avoid or minimize work in immediate vicinity of repointing Work in progress.
c. To ensure that subsequent work will not adversely affect repointed surfaces.

B. Scheduling:

1. Order materials at earliest possible date, to avoid delaying completion of Work.
2. Order sand for repointing mortar immediately after approval of mockups. Take delivery of and store at Site a sufficient quantity of sand to complete Project.

1.5 ACTION SUBMITTALS

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

1. Color admixtures, as needed: Product name and type, and name of manufacturer.
2. Dry, preblended mortar mix: Types and proportions of ingredients.
3. Include Safety Data Sheets (SDS) for information only.

B. Test Reports:

1. Mortar Analysis: Existing mortar, including sand gradation.
2. Aggregates: Type, gradation, impurities, and source.

C. Repointing Subcontractor Qualifications: Evidence that Subcontractor's existing company has minimum five (5) years of continuous experience in similar repointing work; list of at least five representative, successfully-completed projects of similar scope and size, including:

1. Project name.
2. Owner's name.
3. Owner name, address, and telephone number.
4. Description of repointing work.
5. Project supervisor.
6. Total cost of repointing work and total cost of project.
7. Completion date.

D. Samples for Verification: Before preparing mockup, submit samples of the following:

1. Each type of sand used for pointing mortar.

   a. For blended sands, provide samples of each component and blend.
   b. Identify sources, both supplier and quarry, of each type of sand.

2. Each type of pointing mortar in the form of sample mortar strips, 6 inches long by 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 quantity, of each type of sand and brand names of cementitious materials and pigments if any.

E. Mockups:

1. Per Quality Assurance below.

F. Restoration Program: Provide detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of restoration work including protection of surrounding materials on building 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 restoration work. provide a written description, including evidence of successful use on comparable projects, and a testing program to demonstrate their effectiveness for this Project.

1.6 QUALITY ASSURANCE

A. Repointing Subcontractor Qualifications: Experienced firm that has successfully completed repointing Work similar in material, design, and extent to that indicated for the Project. Must have successful construction with specified materials in local area in use for minimum of five (5) years.

1. Employ foreman with minimum five (5) years of experience as foreman on similar projects to be on Site at all times during the Work. Do not change foremen during the course of the Project except for reasons beyond the control of Subcontractor; inform Architect/Engineer in advance of any changes.
2. Employ masons with minimum two (2) years of experience in placement of repointing mortar. Fully supervise apprentices with experienced masons.

B. Preconstruction Testing:

1. Contractor to have independent testing agency complete mortar analysis on existing mortar for components, including sand gradation for mortar match.

C. Source Limitations: Obtain each type of material for masonry restoration (cement, sand, etc.) from one source with resources to provide materials of consistent quality in appearance and physical properties.

D. Mockups: Each mason to rake out approximately three linear feet of joints (approximately 1.5 feet horizontal and 1.5 feet vertical) in wall and repoint, to demonstrate surface preparation, execution quality, and aesthetic effect.

1. Location of mockup as directed by Architect/Engineer.
2. Prepare mockup for each type of repointing required, under same weather conditions anticipated during Work.
3. Include cleaning mortar at masonry units adjacent to repointed joints prior to repointing mockup.
4. Allow mockups to cure 14 days minimum, and per manufacturer recommended dwell time, whichever is longer, prior to inspection by Owner and Architect/Engineer.
5. If Owner or Architect/Engineer determines mockup does not comply with requirements, modify mockup or construct new mockup until mockup is approved.
6. Approved mockups will be standard for judging completed Work.
7. Approved mockups may become part of completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in original containers and packaging with seals unbroken, labeled with manufacturer's name, product brand name, and type.

B. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, or installation. Reject and remove from Site new materials which have been exposed to moisture to their detriment.

C. Store and handle materials in accordance with manufacturer's written instructions, safety requirements, and all applicable laws and regulations. Remove from Site, and replace at no cost to Owner, any materials that are damaged or otherwise negatively affected by not being stored or handled in accordance with manufacturer's written instructions.

D. Store materials in original, undamaged containers and packaging in clean, dry, location on raised platforms and protected from weather, within temperature range required by manufacturer. Protect stored materials from direct sunlight and sources of ignition. Manufacturer's standard packaging and covering alone is not considered adequate weather protection.

E. Locate materials in a secure location approved by Owner.

F. Conspicuously mark damaged or opened containers, containers with contaminated materials, damaged materials, and materials that cannot be used within stated shelf life and remove from Site as soon as possible. Replace discarded materials in a timely manner at no cost to Owner.

G. Limit stored materials on structures so as to preclude damage to materials and structures.

H. Maintain copies of all applicable Safety Data Sheets (SDS) with materials in storage area, such that they are available for ready reference on Site.

1.8 PROJECT CONDITIONS

A. Verify existing dimensions and details prior to start of repointing Work. Notify Architect/Engineer of conditions found to be different than those indicated in the Contract Documents. Architect/Engineer will review situation and inform Contractor and Repointing Subcontractor of how to proceed.

B. Comply with Owner's limitations and restrictions for Site use and accessibility.

C. Environmental Limitations:

1. Place mortar in joints only when substrate and ambient temperatures are above 40 degrees F and predicted to remain so for at least seven days after completion of Work, unless procedures and precautions approved by Architect/Engineer are used in response to lower temperatures.
2. Place mortar in joints only when substrate and ambient temperatures are at or below 90 degrees F and predicted to remain so for at least seven days after completion of Work, unless procedures and precautions approved by Architect/Engineer are used in response to higher temperatures.

1.9 CHANGES IN WORK

A. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with, or preclude, the Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the integrity or performance of the Work.

1. Notify Architect/Engineer of conditions that may interfere with proper execution of the Work or jeopardize the performance of the Work prior to proceeding with the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I. Provide natural color or white cement as required to match mortar analysis and color of existing mortar.

2. Hydrated Lime: ASTM C207, Type S.

3. Mortar Aggregate: ASTM C 144.

   a. Washed aggregate consisting of natural sand or crushed stone. Use aggregate graded with 100 percent passing No. 16 sieve.
   b. Sand color, size, and texture should match the original as closely as possible. Provide a sample of the sand for comparison to the original, and have it approved by the Architect/Engineer before beginning repointing work.
   c. When possible, use bar sand or beach sand rather than crushed sand for the repointing mortar.
   d. Aggregate shall contain no more than 50 parts per million of chloride ions and shall be free of organic contaminants.
   e. Maximum size not to exceed 1/3 joint width.

4. Water: Clean and potable; free from deleterious amounts of acids, alkalis, or organic materials.

5. Mortar Pigment: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in masonry mortar.

   a. Use one of the following or approved equal:
      1) Bayferrox Inorganic Pigments by LANXESS Corporation.
      2) True Tone Sweet 16 Mortar Colors by Davis Colors, Inc.
      3) SGS Mortar Colors by Solomon Colors, Inc.

6. Admixtures: Unless otherwise specified, such as color admixtures to match original mortar color, do not use admixtures, including:

   a. Calcium chloride or admixtures containing calcium chloride.
   b. Air-entraining admixtures or material containing air-entraining admixtures.
   c. Antifreeze compounds.

7. Do not use masonry cement.

2.2 MORTAR AND GROUT MIXES

A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing times, and other procedures needed to produce setting-bed and joint materials of uniform quality and with optimal performance characteristics. Discard mortars and grout if they have reached their initial set before being used.

B. Setting and Pointing Mortar: Type S, ASTM C270; proportioned by volume.

C. Latex-Modified, Portland Cement Setting-Bed Mortar: Proportion and mix Type S, Portland cement, sand, and latex additive for setting bed to comply with written instructions of latex-additive manufacturer and as necessary to produce stiff mixture with a moist surface when bed is ready to receive brownstone or cast stone.

D. Grout: ASTM C476 and ASTM C404; fine or coarse, based on parameters in Table 1.19.1 in TMS 402/ACI 530/ASCE 5 and Contractor experience.

1. Slump: 8 to 11 inches, measured according to ASTM C143/C143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements and other conditions affecting installation or performance of repointing Work.

1. Ensure that work done by other trades is complete and ready for repointing Work.
2. Verify that areas and conditions under which repointing Work is to be performed permit proper and timely completion of Work.
3. Notify Architect/Engineer in writing of conditions which may adversely affect installation or performance of repointing Work and recommend corrections.
4. Do not proceed with repointing Work until adverse conditions have been corrected and reviewed by Architect/Engineer.
5. Commencing repointing Work constitutes acceptance of Work surfaces and conditions.

3.2 PROTECTION

A. Prevent mortar from staining face of surrounding masonry and other surfaces.

1. Cover sills, ledges, and projections to protect from mortar droppings. Do not extend coverings into mortar joints.
2. Keep wall area wet below rebuilding and repointing Work to discourage mortar from adhering.

B. Cleaning materials may include caustic or acidic chemicals and may be subject to dispersion by wind and other weather features.

C. Protect the following elements:

1. Surfaces being cleaned from cleaning materials not designated for use on those surfaces.
2. Decorative features, such as plaques, entrances, planters, and signs.
3. Gutters and downspouts.
4. Paving and sidewalks from staining or damage from cleaning operations.
5. Windows, doors, joints, and other openings from infiltration of water or cleaning materials.

D. Comply with cleaning-material manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products.

E. Cover adjacent surfaces with materials that are proven to resist cleaners being used unless cleaners will not damage adjacent surfaces.

F. Take precautions to ensure safety of people (including building users, passers-by, and workers) and protection of property.

G. Erect temporary protective canopies and walls, as necessary, at points of vehicular access that must remain in service during Work.

H. Take precautions to protect against air-borne materials and run-off.

I. Protect paving, sidewalk, and adjacent building areas from mechanical damage due to scaffolding and other equipment.

J. Prevent dust, debris, coating overspray/spatter, and other construction materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

K. Limit access to Work areas.

L. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

M. Protect from damage, all elements of completed work and original construction to remain.

3.3 SITE MIXING

A. Develop batching and mixing operations so that quality control is assured.

B. Designate one or two individuals to batch and mix mortar and grout. Fully instruct these individuals on batching and mixing procedures. No other persons shall batch or mix mortar or grout without prior notification to Architect/Engineer.

C. Maintain accurate mix proportions. Batch materials by volume with containers of known volume. Do not measure materials by shovel.

1. Incorporate admixtures into mix in manner recommended by manufacturer and approved by Architect/Engineer. Measure with accuracy of +/-3 percent. Add each admixture separately.

D. Combine and mix materials in appropriate drum-type batch machine mixer to uniform consistency.

`Mix mortar for three to five minutes after materials are in mixer.

1. Mix grout for five minutes minimum after materials are in mixer.
2. Provide sufficient number of mixers, including reserve mixers, so that mortar and grout placement operations will proceed uninterrupted.

3.4 PREPARATION FOR REPOINTING

A. Rake out and repoint 100% of mortar joints at the North Facade Entrance, including all returns and setbacks.

B. Rake out joints as demonstrated in approved mockup:

1. Remove mortar from joints to depth of at least 1 inch from face of unit, to expose sound, unweathered mortar. If unsound mortar extends more than 1 inch from face of units, stop Work and notify Architect/Engineer.

2. Remove mortar to provide reveals with square backs and to expose clean masonry surfaces. Do not leave half moons.

3. Do not use power tools without written approval of Architect/Engineer.

a. Demonstrate ability of operators to use tools without damaging masonry.
b. Submit quality control program with provisions for supervising performance and preventing damage due to worker fatigue.
c. Width of power tool blade should not exceed 1/3 the width of the joints.

4. Do not spall edges of masonry units or widen joints. Replace damaged masonry units as directed by Architect/Engineer.

5. Remove mortar from joints.

6. Brush, vacuum, or flush joints with water to remove dirt and loose debris.

C. Cover wall in ground-out areas that have not yet been fully repointed when Work is not in progress.

1. Extend cover 24 inches minimum beyond ground-out area.
2. Hold cover securely in place.

D. Masonry units adjacent to repair areas that are damaged during Work shall be removed and replaced at Contractor's expense and to acceptance of Architect/Engineer and Owner.

3.5 REPOINT JOINTS:

A. Blow loose mortar and dust out prepared joints with compressed air, or vacuum joints.

1. Rinse joint surfaces with very-low-pressure water spray to remove residual dust and mortar particles. Time rinsing so joint surfaces are damp but free of standing water at time of repointing. If joint surfaces are dry, dampen before repointing.

2. Place mortar in areas with greater removal depths than surrounding areas, until uniform depth is achieved.

a. Place in layers not greater than 1/4 inch.
b. Fully compact each layer and allow to become thumbprint hard before applying next layer.

3. After deeper removal areas have been filled, place mortar in joints.

a. Place in layers not greater than 1/4 inch.
b. Fully compact each layer and allow to become thumbprint hard before applying next layer.
c. Where existing masonry has worn or rounded edges, slightly recess finished mortar surface from face of masonry to avoid wider joints.
d. Take care not to spread mortar onto exposed masonry surfaces or to featheredge mortar.

4. When mortar is thumbprint hard, tool joints to match the original appearance of joints. Remove excess mortar from edges of joints by brushing.

B. Cure mortar by maintaining in damp condition for at least 72 hours, including weekends and holidays.

1. Acceptable curing methods include covering with wet burlap and plastic sheeting; periodic hand misting; or periodic mist spraying using system of pipes, mist heads, and timers.
2. Adjust curing method to ensure that repointing mortar is damp throughout its depth without eroding surface mortar.

3. Allow wall to thoroughly dry prior to re-wetting.
4. Keep mortar from drying out too quickly or from becoming too wet. Protect from direct sun and high winds for 72 hours after installation and from driving rain for 24 hours after installation.
5. Maintain air movement and air circulation, particularly when using plastic.

C. Do not begin cleaning work until mortar has cured at least 28 days.

3.6 FIELD QUALITY CONTROL

A. Owner may retain Architect/Engineer or qualified independent inspection agency to observe the progress and quality of Work and prepare inspection reports.

1. Allow inspector use of lift devices and scaffolding to access Work areas.
2. Notify inspector at least 48 hours in advance of times when lift devices and scaffolding will be relocated.

3.7 CLEANING

A. Immediately after completing repointing Work in a work area, remove mortar from exposed masonry and other surfaces.

1. Wipe excess mortar from masonry surfaces adjacent to mortar joints with damp sponge or cloth.

a. Use only sponge or cloth that is damp, not wet or saturated. When tightly squeezed, water should not run from damp sponge or cloth. Surface of masonry shall not have visible accumulation of water immediately following cleaning.
b. Do not touch or disturb newly-installed repointing mortar during cleaning.
c. Clean until mortar and mortar haze are removed from adjacent masonry surfaces.

2. Wash adjacent non-masonry surfaces with detergent and soft brushes or cloths.

B. After mortar has fully cured, thoroughly rinse wall surfaces affected by repointing Work to remove dust and other surface residue resulting from repointing Work. Use very-low-pressure water spray.

1. Remove excess mortar and foreign matter from exposed masonry surfaces with wood scrapers, stiff-nylon or fiber brushes, and water spray.

a. Do not use metal scrapers or brushes.
b. Do not use acidic or alkaline cleaners unless specified herein or approved by Architect/Engineer.

C. Clean mortar splatters from scaffolding at the end of the day.

D. Remove debris from gutters and downspouts. Rinse off and flush gutters and downspouts.

E. At the end of each workday, broom-clean Site and Work areas and place all items to be discarded in appropriate containers.

F. Return building surfaces, landscaping, and grounds to condition prior to cleaning Work, to satisfaction of Architect/Engineer at no additional cost to Owner.

G. At conclusion of repointing Work, remove scaffolding and equipment used in Work.

H. Repair at no cost to Owner all items damaged during the Work.

I. Remove debris and surplus materials from Site.

END OF SECTION

SECTION 04 01 40.52 – STONE CLEANING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Cleaning brownstone and cast stone

1. Purpose of cleaning is to remove as much atmospheric deposits, biological staining, copper staining, soil, staining, grease, oil, and other contaminants as possible without damaging stone.
2. General cleaning of all brownstone and cast stone following masonry work, before project completion.

B. Related Sections include the following:

1. Division 04 Section "Repointing with Cement-Lime Mortar" for cleaning following repointing.
2. Division 04 Section "Stone Restoration" for cleaning following stone restoration.
3. Division 04 Section "Cast Stone Masonry" for cleaning following cast stone installation.
4. Division 07 Section "Joint Sealants" for cleaning following installing sealant.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordinate Work to ensure that adjacent areas are not adversely affected. Coordinate:

1. With Owner.

2. With other trades:

a. To ensure that work done by other trades is complete and ready for cleaning Work.
b. To avoid or minimize work in immediate vicinity of cleaning Work in progress.
c. To ensure that subsequent work will not adversely affect cleaned surfaces.

B. Notify Architect/Engineer of conflicts between Specifications and cleaning material manufacturer's recommendations.

C. Sequencing: Perform cleaning and repair Work in the following sequence:

1. Remove plant growth (vines, plants, etc.).
2. Prior to cleaning, inspect for open mortar or sealant joints and other potential sources of water infiltration, and perform repairs and repointing as necessary to prevent intrusion of water and other cleaning materials into wall.

3. Complete cleaning mock-up in location specified by Architect/Engineer prior to approval of cast stone samples and mock-ups.
4. Architect/Engineer to choose selected methods of cleaning for each form of soiling/discoloration based on cleaning mock-up.
5. Remove coatings and clean walls by approved methods from mock-up as specified.
6. Perform remaining repairs and repointing as specified.
7. Complete final cleaning of all brownstone and cast stone following masonry work, before project completion.

1.3 SUBMITTALS

A. Product Data: List of products proposed for use, with Manufacturer's product literature and application instructions.

1. Include Safety Data Sheets (SDS) for information only; safety restrictions are sole responsibility of Contractor.

B. Samples for Verification: Before performing mockups, samples of cleaning chemicals.

C. Cleaning System Descriptions: Modify specified requirements as needed based on approved mockups and submit complete written descriptions of cleaning systems, including materials and procedures.

D. Protection Plan: Written plan describing protection measures proposed for use on Project.

E. Containment, Collection, and Disposal Plan: Written plan describing methods for containing, collecting, and disposing of runoff during cleaning operations.

F. Cleaning Subcontractor Qualifications: Evidence that Subcontractor’s existing company has minimum five (5) years of continuous experience in use of specified cleaning system; list of at least five representative, successfully-completed projects of similar scope and size, including:

1. Project name.
2. Owner’s name.
3. Owner’s Representative name, address, and telephone number.
4. Description of work.
5. Cleaning system, including materials and procedures, used.
6. Project supervisor.
7. Total cost of cleaning work and total cost of project.
8. Completion date.

1.4 QUALITY ASSURANCE

A. Cleaning Subcontractor Qualifications: Experienced firm that has successfully completed cleaning work similar in material, design, and extent to that indicated for the Project. Must have successful use of specified cleaning system in local area for minimum of five (5) years.

1. Employ trained foreman with a minimum five (5) years of experience as foreman on similar projects to be on Site at all times during the Work. Do not change foreman during the course of the Project except for reasons beyond the control of Subcontractor; inform Architect/Engineer in advance of any changes.
2. Employ laborers with training and at least three (3) years of experience with the specified cleaning system.

B. Cleaning-System Manufacturer Qualifications: Firm regularly engaged in supplying cleaning system that has been used for similar applications with successful results; with technical representatives who are available for consultation and Site inspection and assistance at no additional cost to Owner.

C. Trial Samples

1. Trial samples: Prepare trial samples of cleaning as follows to demonstrate effects and qualities of materials and execution. Prepare trial samples on existing walls under same weather conditions to be expected during remainder of the Work.
2. Execute a trial sample using the materials and techniques for each specified cleaning system.
3. Area(s) where trial samples are to be applied shall be selected by the Architect/Engineer in consultation with the Contractor, and shall be approved by the Owner.
4. Area of each trial sample shall be 4 square feet in area representing each type of surface condition. Document location and materials of trial samples.
5. Additional trial samples shall be made until an acceptable result is achieved. Minor adjustments to methods of application, dilutions and dwell times of products shall be made in accordance with limits defined in manufacturer's recommendations.
6. Prior to proceeding with samples, test cleaners and methods for adverse reactions on adjacent materials or other materials that may be affected by the cleaning process, if those materials are to remain unprotected. Test areas of adjacent materials shall be small and in an unobtrusive location. Protect against now deleterious effects of cleaners and methods during testing.
7. Allow a waiting period of not less than 14 days, and as specified by manufacturer, whichever is longer, after completion of sample cleaning to permit a study of same area for effectiveness of cleaner and for negative reactions.

D. Mockups: Apply cleaning system at locations selected by Architect/Engineer for each proposed cleaning approach and soiling typology to demonstrate procedures and effectiveness.

1. Mockups: Apply selected cleaning system at two additional mockup locations selected by Architect/Engineer to demonstrate procedures and effectiveness.
2. Mockups to be 4 square feet unless noted otherwise.
3. Prepare mockups on salvage stone not for reinstallation, or on existing walls (if similar soiling does not exist on salvage stone), at locations designated by Architect/Engineer and in presence of Architect/Engineer, under same weather conditions expected during Work. Provide access to mockup locations.

4. Test adjacent materials and other materials that may be affected by cleaning system, to determine if materials need to be protected. Test areas shall be small and in unobtrusive locations.
5. Include protection systems and devices proposed for use to counteract adverse effects of cleaning system, in mockup.
6. Allow a waiting period of not less than 14 days, and as specified by manufacturer, whichever is longer, after completion of sample cleaning to permit a study of same area for effectiveness of cleaner and for negative reactions.
7. If Owner's Representative and Architect/Engineer determine mockup does not comply with requirements, modify mockup or construct new mockup until mockup is approved. Modifications may include minor adjustments to application methods, dilutions, and dwell times of products within limits recommended by manufacturers.
8. Approved mockups shall be maintained in an undisturbed condition throughout the Project as a basis for acceptance of completed work.
9. Architect/Engineer will record locations and materials and methods used for mockups on drawings and in field reports for reference as Work proceeds.
10. Do not order materials, including cast stone, or proceed with Work until mockups have been approved by Architect/Engineer and Owner's Representative.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in original containers and packaging with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, lot number, directions for storing, and complete manufacturer's written instructions.

B. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, or installation. Reject and remove from Site new materials which have been exposed to moisture to their detriment.

C. Store and handle materials in accordance with manufacturer's written instructions, safety requirements, and all applicable laws and regulations. Remove from Site, and replace at no cost to Owner, any materials that are damaged or otherwise negatively affected by not being stored or handled in accordance with manufacturer's written instructions.

D. Store materials in original, undamaged containers and packaging in clean, dry, location on raised platforms and protected from weather, within temperature range required by manufacturer. Protect stored materials from direct sunlight and sources of ignition. Manufacturer's standard packaging and covering alone is not considered adequate weather protection.

E. Locate materials in a secure location approved by Owner's Representative

F. Conspicuously mark damaged or opened containers, containers with contaminated materials, damaged materials, and materials that cannot be used within stated shelf life and remove from Site as soon as possible. Replace discarded materials in a timely manner at no cost to Owner.

G. Limit stored materials on structures so as to preclude damage to materials and structures.

H. Maintain copies of all applicable Safety Data Sheets (SDS) with materials in storage area, such that they are available for ready reference on Site.

1.6 PROJECT CONDITIONS

A. Verify existing dimensions and details prior to start of Work. Promptly notify Architect/Engineer of conditions found to be different than those indicated in the Contract Documents. Architect/Engineer will review conditions and inform Contractor and Installer how to proceed.

B. Comply with limitations and restrictions for Site use, accessibility, and work hours imposed by codes, ordinances, rules, regulations, orders, laws, and other legal requirements of public authorities having jurisdiction, and by Owner.

1. Comply with city, state, water department, and Federal regulations covering protection and waste water disposal.

C. Environmental Limitations:

1. Perform cleaning Work when air temperature is 40° Fahrenheit or above and is predicted to remain so for at least seven days after completion of cleaning.
2. Do not perform chemical cleaning when air temperature is greater than 90° Fahrenheit.
3. Do not perform cleaning Work when winds are sufficiently strong to spread cleaning materials to unprotected areas.

D. Maintain adequate ventilation during preparation and application of cleaning materials.

1.7 CHANGES IN WORK

A. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the performance of the Work.

1. Notify Architect/Engineer of conditions that may interfere with or preclude proper execution of the Work or jeopardize the performance of the Work, prior to proceeding with the Work.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS

A. Water for Prewetting, Cleaning, and Rinsing:

1. Clean, potable water, with iron content of less than two parts per million by weight.

B. Cleaner for General Atmospheric Soiling:

1. Restoration Cleaner by Prosoco, Inc.
2. Or approved equal.

C. Cleaner for Biological Growth:

1. ReVive by Prosoco, Inc.
2. Or approved equal.

D. Cleaner for Biological Growth if not removed by above product:

1. ReKlaim Cleaner by Prosoco, Inc.
2. Or approved equal.

E. Cleaner for Copper Staining:

1. Copper Stain Remover by Prosoco, Inc.
2. Or approved equal.

F. Cleaner for Paint Residue:

1. SafStrip by Prosoco, Inc.
2. Or approved equal.

G. Auxiliary Materials:

1. pH Indicator: Litmus paper or other indicator capable of identifying neutral solutions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions with Cleaning Subcontractor and representatives of cleaning materials manufacturers and cleaning equipment suppliers, as applicable, for compliance with requirements and other conditions affecting performance of cleaning Work.

1. Ensure that Work done by other trades is complete and ready for cleaning Work.
2. Verify that areas and conditions under which cleaning Work is to be performed permit proper and timely completion of Work.
3. Notify Architect/Engineer in writing of conditions which may adversely affect cleaning Work and recommend corrections.
4. Do not proceed with cleaning Work until adverse conditions have been reviewed by Architect/Engineer and, if necessary, corrections have been made.
5. Commencing cleaning Work constitutes acceptance of Work surfaces and conditions.

3.2 PROTECTION

A. Cleaning materials may include caustic or acidic chemicals, and may be subject to dispersion by wind and other weather features.

B. Protect the following elements:

1. Surfaces being cleaned from cleaning materials not designated for use on those surfaces.
2. Decorative features, such as plaques, entrances, planters, and signs.
3. Gutters and downspouts.
4. Paving and sidewalks from staining or damage from cleaning operations.
5. Windows, doors, joints, and other openings from infiltration of water or cleaning materials.
6. Roofing system components.

C. Comply with cleaning-material manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products.

D. Cover adjacent surfaces with materials that are proven to resist cleaners being used unless cleaners will not damage adjacent surfaces.

E. Take precautions to ensure safety of people (including building users, passers-by, and workers) and protection of property (including adjacent building elements, landscaping, and motor vehicles).

F. Erect temporary protective canopies and walls, as necessary, at points of vehicular access that must remain in service during Work.

G. Take precautions to protect against air-borne materials and run-off.

H. Protect paving, sidewalk, and adjacent building areas from mechanical damage due to scaffolding and other equipment.

I. Prevent dust, debris, coating overspray/spatter, and other construction materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

J. Limit access to Work areas.

K. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

L. Protect from damage, all elements of completed work and original construction to remain.

3.3 EQUIPMENT

A. Spray Equipment: With pressure gages at compressor and spray nozzle, and volume meter at spray nozzle; ability to adjust pressure and volume at nozzle.

1. For chemical cleaner, use low-pressure tank or pump recommended by chemical cleaner manufacturer, equipped with cone-shaped spray nozzle.

B. Water Heater: Capable of maintaining temperature at 120° F at specified flow rate.

3.4 CLEANING, GENERAL

A. Perform cleaning Work in compliance with applicable codes and regulations that govern Work, including city, state, water department, OSHA, and Federal regulations, and with requirements of material manufacturers.

B. Use only cleaning products and methods indicated for wall material and location, and approved by mockups.

1. Do not use wire brushes or scrapers.

C. Perform cleaning Work in a systematic manner, proceeding from the top of the wall to the bottom and from one end of the elevation to the other.

D. Perform cleaning Work to achieve uniform coverage of surfaces, including corners, moldings, and interstices, and to produce uniform effect without streaking or damaging wall surface.

E. Keep wall wet below area being cleaned to prevent streaking from runoff.

F. Perform cleaning Work in strict accordance with approved mockup materials and procedures and manufacturer recommendations. Propose modifications to materials or methods as necessary to meet or exceed level of cleaning in mockups. Perform mockups of proposed modifications; do not proceed with modifications until approved in writing by Owner and Architect/Engineer.

G. Prewetting and Rinsing Procedures:

1. For prewetting and rinsing:

a. Prewet and rinse surfaces with warm water at minimum flow rate of 4 gallons per minute. Use hot water, if approved, to improve effectiveness of cleaning and rinsing. Do not use higher pressures or lower flow rates unless approved by mock-ups.

1) Prewet surfaces at maximum pressure of 80 pounds per square inch.
2) Rinse surfaces at maximum pressure of 100 pounds per square inch.

b. Use stainless steel nozzle with 45-degree fan spray, held at least 12 inches from surface.

c. Apply water in a horizontal sweeping motion, overlapping previous strokes vertically to produce uniform coverage.

2. On hot days, in direct sunlight, or as necessary, prewet multiple times so cleaning solution is applied to wet surface.

3. Rinse off cleaning solution and soil residue, moving upward from bottom to top of surface at each access location.

   a. Continue rinsing until pH of surface has returned to neutral, 6.5 to 7.5.
   b. Periodically test pH of rinse water running off surface with pH paper.
   c. Repeat application of neutralizing afterwash if specified and rinsing as necessary until neutral pH is measured.
   d. Measure pH of surface 48 hours after cleaning has been completed, when wall is dry. If pH is not neutral, rinse surface until neutral pH is achieved.

H. Chemical Cleaner Application Methods: Apply chemical cleaner to surfaces in conformance with chemical cleaner manufacturer's written instructions and approved mockups.

1. Use brush or spray application methods, at Contractor's option. Use brushes that are resistant to chemical cleaners being used.
2. Do not spray apply at pressures exceeding 50 pounds per square inch, or less as determined by mockups.
3. Adjust pressure and volume of spray to ensure that cleaning methods do not damage wall material.
4. Do not allow chemical cleaners to remain on surface for periods longer than those recommended by chemical-cleaner manufacturer or specified.
5. Control wind drift of chemical cleaners.

I. Collect and legally dispose of cleaning materials and debris.

1. Neutralize alkaline and acid wastes for disposal off Owner's property.
2. Dispose of runoff from cleaning operations by legal means, in manner that prevents soil erosion, undermining of pavement and foundations, damage to landscaping, and water penetration into building interior.

3.5 CLEANING STONE

A. Removal of Plant Growth: Carefully and completely remove vines, moss, shrubs, and plant growth from wall surfaces.

1. Cut at roots and allow to dry for as long as possible before removal.
2. Remove loose soil and debris from open joints.

B. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used, including sealant, asphalt, and tar.

1. Carefully remove heavy accumulations of material from wall surface with wood scraper. Do not scratch or chip wall surface.

C. Hot-Water Wash: Low-pressure spray, not exceeding 100 pounds per square inch.

1. Heat water to 120° F.
2. Hold spray nozzle at least 12 inches from wall surface and apply water in horizontal back-and-forth sweeping motion, overlapping previous strokes to produce uniform coverage.

D. Cleaning with Prosoco Inc. Restoration Cleaner:

1. Dilute solution as recommended by manufacturer.
2. Prewet surface.
3. Apply cleaning solution liberally per manufacturer recommendations.
4. Leave the cleaning solution on the surface for 3–5 minutes. Reapply.
5. Do not let the cleaning solution "dry in" to the masonry.
6. Water rinse with low-pressure, flood rinse to remove initial acidic residue with minimum risk of wind drift.
7. Rinse treated area thoroughly with higher-pressure spray (100 pound per square inch pressure or less).
8. Rinse from the bottom to the top. Flush each section of the surface with a concentrated stream of water. Keep the wall below wet and rinsed free of cleaner and residues to avoid streaks.

E. Cleaning with Prosoco Inc. ReVive:

1. Dilute solution as recommended by manufacturer.
2. Working from the bottom to the top, apply generously to dry surface until surface is thoroughly wet.
3. Leave on the surface for 2–3 minutes. If needed, apply more to keep the surface wet.
4. Mist treated surfaces with water and gently scrub with a non-metallic, short-fibered scrub brush to loosen biological soiling.
5. Working from the bottom to the top, rinse thoroughly with clean water. Reduce rinsing pressure as needed for fragile or deteriorated stone.
6. NOTE: It may take several days for the full cleaning effect to be realized. When practical, allow two or more weeks for biological soiling to disappear. Repeat as necessary to remove remaining biological soiling.

F. Cleaning with Prosoco Inc. ReKlaim Cleaner if biological staining persists, as determined by Architect/Engineer, after manufacturer-specified dwell time of Prosoco Inc. Revive:

1. Dilute solution as recommended by manufacturer.
2. Working from the bottom to the top, apply prepared ReKlaim solution to a dry surface.
3. Leave solution on the surface for 5–20 minutes.
4. If solution begins to dry, reapply.

5. Gently scrub heavily soiled areas.
6. Rinse thoroughly with clean water. If using a sponge or string mop to rinse, change rinse water often. Pressure-rinse porous surfaces to remove heavy soiling.
7. Immediately after rinsing ReKlaim from masonry surface, apply the prepared Limestone & Masonry Afterwash to the wet surface.
8. Let the Afterwash dwell for three to five minutes.
9. Pressure rinse from the bottom of the treated area to the top. Make sure to cover each portion of the masonry surface with a concentrated stream of water. To avoid streaking, keep wall surfaces immediately below area being cleaned running wet and free of cleaner rundown and residues.

G. Cleaning with Prosoco Inc. Copper Stain Remover:

1. Mix Part A and Part B per manufacturer recommended proportions.
2. Using a plasterer's trowel or soft-fibered brush, apply a 1/8 to 1/4 inch thick coating of the poultice mixture over the stained area. Poultice should cling to vertical surfaces.
3. Allow poultice to remain on the surface for 24 hours or until completely dry. If cleaner is left on the surface unattended, cover the poultice with PROSOCO's OverCoat, glossy side down. Press the OverCoat protective paper against poultice. It will cling to the surface. Rub gently to remove air pockets and ensure smooth, overall adhesion. Tape/seal off edges of the film. Allow to dwell.
4. Remove OverCoat, if used. Allow the poultice to dry completely, 2–4 hours. The poultice surface develops cracks as it contracts and dries. A fully developed network of cracks indicates the poultice is completely dry. Dry times may vary with environmental conditions such as temperature, wind and humidity.
5. Scrape dry poultice from the surface.
6. Water-rinse the treated area using a soft-fibered brush to remove all poultice residue.
7. Reapplication may be necessary on severely stained areas.

H. Cleaning with Prosoco Inc. SafStrip:

1. Do not let stripper dry on the surface. If tests indicate long dwell times, reapply to keep the previously applied material wet.
2. Working from the bottom to the top, apply SafStrip 1/8 to 1/4 inch thick to dry surface.
    3. Let the application dwell 15–60 minutes or until coating "lifts" or shows signs of dissolving. Periodic agitation with a stiff bristle brush improves penetration. Some coatings will need multiple applications/increased dwell time.
    4. Working from the bottom to the top, remove stripper and residue with pressure-water rinse. Heated water may improve stripping efficiency.

3.6 FIELD QUALITY CONTROL

A. Architect/Engineer will monitor progress and quality of cleaning Work, possibly including:

1. Observe completed Work and compare to approved mockups.
2. Observe wall material with field microscope for damage.
3. Test pH of runoff and wall surfaces.

4. Test samples of cleaning products and mixed solutions for conformance with Specifications and approved mockups.

B. Contactor Responsibilities:

1. Test pH of runoff and wall surfaces to verify neutral pH.
2. Provide access to Work for Architect/Engineer, Owner, and other consultants hired by Owner.
3. Notify Architect/Engineer at least 48 hours in advance of when lift devices or scaffolding will be relocated. Do not relocate lift devices or scaffolding until Architect/Engineer has observed completed Work.
4. Upon request, provide samples of cleaning products and mixed solutions to Architect/Engineer.

C. Failure to use cleaning products and mix solutions as specified and approved are grounds for immediate termination of Contract Agreement.

D. Remedy areas that do not satisfy requirements at no additional cost to Owner. Modify cleaning procedures as required and approved by Architect/Engineer.

3.7 SITE CLEANING

A. At the end of each workday:

1. At the end of each workday, broom-clean Site and Work areas and place all items to be discarded in appropriate containers.
2. Thoroughly rinse sidewalks to remove chemicals, dirt, pollutants, and other materials washed off building.

B. After completing cleaning Work:

1. Carefully remove protection materials, including tape, adhesive marks, and residue.
2. Clean spillage and soiling from adjacent surfaces using cleaning agents and procedures recommended by manufacturer of affected surface. Exercise care to avoid scratching or damage to surfaces.
3. Return building surfaces, landscaping, and grounds to condition prior to cleaning Work, including painted and glass surfaces, to satisfaction of Architect/Engineer at no additional cost to Owner.
4. Repair at no cost to Owner all items damaged during the Work.
5. Remove debris and surplus materials from Site.

C. Waste Management:

1. Collect surplus cleaning materials that cannot be reused and deliver to recycling or disposal facility.
2. Treat materials that cannot be reused as hazardous waste and dispose of per manufacturer's instructions.

END OF SECTION

SECTION 040140.91 - STONE RESTORATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Restoration of deteriorated and distress stone facade units, including but not limited to:

1. Patch repairs.
2. Pin-in-place repairs.
3. Stone dutchman repairs.
4. Reattach stone fragment repair: recommended for surfaces that are delaminated but cannot be composite patched, or if the void between layers exceeds 1/2". Composite patching is the process of reconstructing missing stone surfaces by applying layers of cement/sand mixtures to the deteriorated surface.
5. Rout and point crack repair.
6. Rout and seal crack repair.
7. Cylindrical mortar patch repair.
8. Grout injection crack repair.

B. Related Sections include the following:

1. Division 04 Section “Repointing with Cement-Lime Mortar” for repointing after restoration work.
2. Division 04 Section “Stone Cleaning” for cleaning after restoration work.
3. Division 04 Section “Cast Stone Masonry” for cast stone masonry used in restoration work.
4. Division 07 Section “Joint Sealants” for sealant used in restoration work.

1.2 REFERENCES

A. Definitions: ASTM C119.

1. Cut stone: Stone fabricated to specific dimensions.
2. Dimension stone: Natural stone that has been selected and fabricated to specific sizes or shapes.
3. Dressed stone: See cut stone and finished stone.
4. Dutchman: Piece of stone used to repair larger stone panel.
5. Finished stone: Dimension stone with one or more mechanically exposed surfaces.
6. Seam: Naturally filled or bonded feature in stone, such as streak or vein, which may or may not adversely affect strength of stone.

a. Open seam: Unfilled fissure or naturally occurring crack in stone.

1. Snip: Area of stone surface from which a chip, or irregularly-shaped fragment, has been dislodged.
2. Spall: Fragment or chip from piece of dimension stone.
3. Veining: Presence in otherwise homogeneous stone of bands, streaks, or irregular bodies of contrasting color or appearance, and frequently having different mineralogical composition to predominant material.

B. Reference Standards: Latest edition as of Specification date.

1. ASTM International:
   a. A276: Standard Specification for Stainless Steel Bars and Shapes.
   b. C97/C97M: Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.
   c. C99/C99M: Standard Test Method for Modulus of Rupture of Dimension Stone.
   d. C119: Standard Terminology Relating to Dimension Stone.
   e. C144: Standard Specification for Aggregate for Masonry Mortar.
   f. C150/C150M: Standard Specification for Portland Cement.
   g. C170/C170M: Standard Test Method for Compressive Strength of Dimension Stone.
   h. C207: Standard Specification for Hydrated Lime for Masonry Purposes.
   i. C880/C880M: Standard Test Method for Flexural Strength of Dimension Stone.
   j. C1354/C1354M: Standard Test Method for Strength of Individual Stone Anchorages in Dimension Stone.
   k. D1729: Standard Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials.
   l. E164: Standard Practice for Contact Ultrasonic Testing of Weldments.
   m. F593: Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

2. Marble Institute of America (MIA):

   a. Dimension Stone Design Manual (Design Manual).

3. National Building Granite Quarries Association, Inc. (NBGQA):

   a. Specifications for Architectural Granite (Specifications).

1.3 SUBMITTALS

A. Product Data: Manufacturer's literature including material properties; test data substantiating that products comply with requirements; recommendations for storage and handling; installation procedures; and recommendations for field testing. Include VOC content of components, where present.

1. New Patch Material.
2. Include Safety Data Sheets (SDS) for information only.

B. Shop Drawings:

1. Replacement Stone Units: Complete cutting and setting drawings showing:

   a. Sizes, sections, and dimensions of stone.
   b. Joint locations.
   c. Anchoring details.
   d. Other necessary details.

2. Pin-in-place Repairs: Typical dimensions and anchoring details.
3. Dutchmen Repairs: Typical dimensions and anchoring details.
4. Reattach Stone Fragment Repairs: Typical dimensions and anchoring details.
5. Anchors: Include details of anchors within individual stone units, with locations of anchors and dimensions, directions, and angles of holes and recesses in stone.

C. Samples:

1. Replacement Patch Material: Sets of at least three 4-inch-by-4-inch samples for each type of stone, finished to match cleaned existing stone units and demonstrating range of variations in stone appearance. Approved samples are for comparison of texture, finish, and color of new stone patches supplied for Project.

   a. Cleaning should follow the procedure approved during cleaning mock-up.
   b. Resubmit samples until approved by Architect/Engineer and Owner.

2. Three samples of each product:

   a. Patch material
   b. Compressible filler materials.
   c. Anchors.
   d. Shims.
   e. Stone plugs.

D. Certificates:

1. For workers that will be installing adhesive anchors.

E. Test Reports:

1. For stainless steel elements; signed by steel manufacturer certifying compliance with requirements; include physical properties and chemical analysis.

F. Qualifications:

1. Contractor: Evidence that Contractor's existing company has minimum five (5) years of continuous experience in similar stone restoration work; list of at least five representative, successfully-completed projects of similar scope and size, including:

   a. Project name.
   b. Owner's name.
   c. Owner's Representative name, address, and telephone number.
   d. Description of stone restoration work.
   e. Project supervisor.
   f. Total cost of stone restoration work and total cost of project.
   g. Completion date.

G. Record Documentation: Elevation drawings showing as-built repair locations and types of repairs installed provided by the Contractor.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Contractor: Experienced firm that has successful completed stone restoration work similar in material, design, and extent to that indicated for the Project. Must have successful construction with specified materials in local area in use for minimum of five (5) years.

   a. Foreman: Minimum five (5) years of experience as foreman on similar projects to be on Site at all times during the Work. Do not change foremen during the course of the Project except for reasons beyond the control of Contractor; inform Architect/Engineer in advance of any changes.
   b. Stone masons: Minimum five (5) years of experience as stone mason on similar projects.

B. Certifications:

1. Written certification from adhesive anchor manufacturer that each laborer who will be installing anchors has successfully completed training program and is qualified to install anchors; include results of anchor pull-out tests.

C. Preconstruction Testing:

1. Independent Testing Agency:

a. Employ and pay for independent testing agency acceptable to Architect/Engineer and Owner.
b. Testing agency shall submit test procedures to Architect/Engineer for review and approval prior to testing.
c. Testing agency shall conduct and interpret tests and report test results to Contractor, Architect/Engineer, and Owner. Reports shall state whether or not test specimens conform to specified requirements and shall specifically note deviations.

2. Cast Stone: See Specification Section 04 72 00.

D. Mockups: Perform mockups of repair Work to demonstrate quality of surface preparation, repair installation, and execution, and completed repair appearance.

1. Mockups shall include:

a. Dutchman repair: 4 inch by 4 inch minimum in location selected by Architect/Engineer. Architect/Engineer to inspect removal cavity prior to dutchman installation.
b. Crack repair: 12 inch length minimum in location selected by Architect/Engineer.
c. Patches: 6 inches square minimum in location selected by Architect/Engineer.

1) See that the patch adheres well to the adjacent stone and does not shrink, crack or fall away.
2) See that the composite patch does not cause deterioration of the old stone by differing too greatly in hardness, moisture transmission, or thermal expansion and contraction.

d. Reattach stone fragment repair: 4 inch by 4 inch minimum in location selected by Architect/Engineer. Architect/Engineer to inspect removal cavity prior to Contractor reattaches stone fragment.
e. Pin-in-place repair: 4 inch by 4 inch minimum in location selected by Architect/Engineer. Architect/Engineer to inspect removal cavity prior to pin-in-place repair.

2. Construct mockups at locations designated by Architect/Engineer and in presence of Architect/Engineer, under same weather conditions expected during Work. Provide access to mockup locations.

3. Demonstrate specified materials and methods, using tools and equipment intended for use by workmen who will perform Work.

4. Photograph concealed portions of approved mockup before concealing and retain photographs at Site.

5. If Architect/Engineer determines mockup does not comply with requirements, modify mockup or construct new mockup until mockup is approved.

    a. Cleaning should be completed using the procedure approved during cleaning mock-up.

6. Approved mockups shall be maintained in undisturbed condition throughout Project as basis for acceptance of completed Work and may become part of completed Work if Mock-Up was completed on the building and if undisturbed at time of Substantial Completion.

7. At direction of Architect/Engineer, remove unacceptable mockups.

8. Do not order materials or proceed with repair Work until mockups have been approved by Architect/Engineer and Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store stone and patch elements above ground on non-staining wood skids or other suitable surfaces, with polyethylene sheet between stone and supporting surface. Cover stone units with waterproof paper, clean canvas, or polyethylene sheet.

    1. Use skids constructed of cypress, white pine, poplar, or yellow pine without excessive amount of resin.
    2. Do not use skids constructed of chemically-treated wood.
    3. Do not use skids constructed of wood containing tannin, such as chestnut, walnut, oak, or fir, or other substances that might stain stone.

B. Do not use liquids that have frozen, or cementitious materials that were exposed to moisture.

C. Store sand to maintain grading and other required characteristics and avoid contamination.

D. Limit stored materials on structures so as to preclude damage to materials and structures. Do not store large numbers of stone or patch elements on structure unless approved in advance by Architect/Engineer.

E. Deliver materials to Site in original containers and packaging with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, lot number, directions for storing, and complete manufacturer's written instructions.

F. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, or installation. Reject and remove from Site new materials which have been exposed to moisture to their detriment.

G. Store and handle materials in accordance with manufacturer's written instructions, safety requirements, and all applicable laws and regulations. Remove from Site, and replace at no cost to Owner, any materials that are damaged or otherwise negatively affected by not being stored or handled in accordance with manufacturer's written instructions.

H. Store materials in original, undamaged containers and packaging in clean, dry, location on raised platforms and protected from weather, within temperature range required by manufacturer. Protect stored materials from direct sunlight and sources of ignition. Manufacturer's standard packaging and covering alone is not considered adequate weather protection.

I. Locate materials in a secure location approved by Owner.

J. Conspicuously mark damaged or opened containers, containers with contaminated materials, damaged materials, and materials that cannot be used within stated shelf life and remove from Site as soon as possible. Replace discarded materials in a timely manner at no cost to Owner.

K. Maintain copies of all applicable SDS (Safety Data Sheets) with materials in storage area, such that they are available for ready reference on Site.

L. All salvaged brownstone not included in reconstruction scope is property of Owner.

1.6 PROJECT CONDITIONS

A. Verify existing dimensions and details prior to start of restoration Work. Notify Architect/Engineer of conditions found to be different than those indicated in the Contract Documents. Architect/Engineer will review the situation and inform the Contractor how to proceed.

B. Comply with Owner's limitations and restrictions for Site use and accessibility.

C. Environmental Limitations: Apply materials when existing and forecast weather conditions permit materials to be installed according to material manufacturer's written instructions.

1. Place cementitious materials only when substrate and ambient temperatures are above 55 degrees F and below 90 degrees F and predicted to remain so during curing period, unless precautions approved by Architect/Engineer are taken.
2. Protect cementitious materials from excessive evaporation of water after placement.

1.7 CHANGES IN WORK

A. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the

Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the integrity or performance of the Work.

1. Notify Architect/Engineer of conditions that may interfere with proper execution of the Work or jeopardize the performance of the Work prior to proceeding with the Work.

PART 2 PRODUCTS

2.1 GENERAL

A. Historic fabric that has been dismantled and stored shall be used in the reassembly as noted on Drawings otherwise salvaged brownstone is the property of the Owner.

B. Source Limitations: Obtain each type of material, including cast stone, cement, and sand, from one source with resources to provide material of consistent quality in appearance and physical properties.

C. Fabrication

1. General:

a. Measure field dimensions necessary for fabrication, including 3D scan of elements for cast stone reproduction as noted on Drawings Refer to Specification Section 047200 Cast Stone Masonry.
b. Follow jointing shown on Drawings, unless modified by approved shop drawings.
c. Cut units accurately to shape and dimension.
d. Dress exposed faces true.
e. Exactly match decorative carvings stippling on elements being replaced.
f. Drill holes in elements for anchors as shown on Drawings.

2. Finish: Match existing weathered condition of units. Cast stone manufacturer shall field-verify existing stone finish.

D. Other Materials:

1. Setting Mortar, General: Type S Mortar.
2. Setting Mortar, Column Bases and Column Capitals: Type S Mortar with Laticrete 3642 Latex Adhesive.
3. Setting Mortar, Columns Shafts:

a. Bonstone Materials Historic Restoration Mortar (HRM).
b. Or approved alternative.

4. Sealant: Single-component, Non-sag, Silicone Sealant per Section 07 92 00.

2.2 REPAIR MATERIALS

A. Salvaged Stone

1. Use the original salvaged units in the same locations wherever possible. Match the finish, appearance and graining of the existing adjacent stone.
2. Based on a survey of the existing salvaged material, identify stone material recommended for reinstallation to the Architect/Engineer and the Owner for each stone unit.

B. Cast Stone

1. Match the color, finish, appearance and graining of the existing stone on the building.
2. Based on a survey of the existing material, identify cast stone material and recommend to the Architect/Engineer and the Owner the cast stone material most suitable for replacement for each stone type utilized.
3. Cast stone thickness and ornament shall match original.

C. Stone Components:

1. Dutchmen: Select material for Dutchmen from attic stock which match color, finish, texture, and cut profile of panel to be repaired, and provide for review by Architect/Engineer prior to installation.

   a. Mortar for Exposed Joint Surfaces: General: Type S Mortar.
   b. Setting Epoxy Adhesive including the following or approved equal:

      1) Bonstone Duropoxi by Bonstone Materials Corporation.
         NOTE: Not intended for UV exposure. Product intended for application between stone unit fragments to adhere stone units together.

   c. Anchor Embedment in Brick or Mixed Masonry: Use the following or approved equal:

      1) HIT HY-270 Adhesive Anchor by Hilti and
      2) HIT-SC Screen Tube by Hilti

   d. Anchor Embedment in Brownstone or Cast Stone Patches:

      1) ASTM F593, Group 2 (Type 316) stainless steel.
      2) Anchor Epoxy by Bonstone Materials Corporation.

2. Stone Plugs for Concealed Anchors: Shop fabricate from cores taken from broken stone that cannot be reused; minimum thickness 1/4 inch; minimum diameter 1/8 inch less than diameter of hole.

a. Setting material: Use one of the following or approved equal:

1) Sealant per Specification Section 079200.

D. Repair Mortar: Intended for patching stone and compatible with Project stone; high bond strength, low shrinkage, and water-vapor permeable.

1. Material colors and textures to be developed by material manufacturer to match Project stone and approved in writing by Owner and Architect/Engineer. Provide at least three colors to enable matching each piece of stone.

2. Stone Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching stone, is vapor- and water permeable, exhibits low shrinkage, and develops high bond strength to each type of stone. Formulate in colors and textures to match stone being patched. Provide not less than three colors to enable matching each piece of stone.

3. Brownstone: Use the following or approved equal:

a. Jahn M70 by Cathedral Stone Products, Inc.

4. Granite: Use the following or approved equal:

a. Granite and Marble Repair Kit by Bonstone Materials

E. Crack Repair Materials:

1. Injection Grout: Low-viscosity cementitious grout intended for bonding cracks in stone. Use the following or approved equal:

a. Jahn M35 Injection Grout by Cathedral Stone Products, Inc.
b. Dispersed Hydrated Lime Injection Mortar by US Heritage Group.

2. Sealant: Single-component, Non-sag, Silicone Sealant per Section 07 92 00.

F. Water: Clean, potable; iron content less than two parts per million, by weight.

G. Dowels:

1. Stainless steel conforming with ASTM A 167, Type 304.
2. Anchor embedment depth and countersink dimension as shown on Drawings or as determined during shop drawings phase.

2.3 AUXILIARY MATERIALS

A. Hardware:

1. Adhesive Anchor for Stone Dutchman Repairs into brick or mixed masonry:

   a. HIT HY-270 Adhesive Anchor by Hilti and
   b. HIT-SC Screen Tube by Hilti

2. Fabrication:

   a. Cutting: Use reciprocating saw; do not use saw blades or cutting tools used to cut other materials. Do not flame cut or use other methods involving high temperatures.

B. Shims

1. Shim material

   a. High Density Polyethylene Korolath
   b. Wood shims are not to be used
   c. Plastic horseshoe shaped shims shall not be used

2. Setting

   a. Thickness, as Required
   b. Shims supporting the gravity load of the panel shall be continuous.

3. Adhere together shim packs that resist forces in the plane of the shim, to form a monolithic shim in order to avoid slippage of shims.F

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements and other conditions affecting installation or performance of restoration Work.

1. Ensure that work done by other trades is complete and ready for restoration Work.
2. Verify that areas and conditions under which restoration Work is to be performed permit proper and timely completion of Work.
3. Notify Architect/Engineer in writing of conditions which may adversely affect installation or performance of restoration Work and recommend corrections.
4. Do not proceed with restoration Work until adverse conditions have been corrected and reviewed by Architect/Engineer.

B. Establish work points and set forth other construction aids as may be required as a guide

to craftsmen.

C. Utilize survey documents and control elevations to ensure reassembled facades match existing profiles, heights, including joint thicknesses and profiles.

D. Notify Architect/Engineer of additional damage or distress not included in repairs on Contract Drawings on existing or salvaged elements prior to commencing Work.

3.2 PROTECTION

A. Take precautions to ensure safety of people (including building users, passers-by, and workers) and protection of property (including adjacent building elements, landscaping, and motor vehicles).

B. Erect temporary protective canopies and walls, as necessary, at points of vehicular access that must remain in service during Work.

C. Provide temporary structural support to support existing and proposed loading.

D. Take precautions to protect against air-borne materials and run-off.

E. Protect paving, sidewalk, and adjacent building areas from mechanical damage due to scaffolding and other equipment.

F. Prevent dust, debris, coating overspray/spatter, and other construction materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

G. Limit access to Work areas.

H. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

I. Protect from damage, all elements of completed work and original construction to remain.

3.3 EQUIPMENT

A. Drilling Holes into Masonry: Use high-speed, three-jaw-chuck-type, rotary-percussion drill; or coring drill with diamond core bits. Special-direct-system (SDS) hammer drills are not permitted.

3.4 GENERAL

A. Allow Architect/Engineer to inspect Work before permanently covering or concealing.

B. Maintain stone elements in secure and stable position at all times.

1. Shore adjacent stone elements as necessary to prevent shifting or collapse during repair or replacement of stone units.
2. Stabilize stone elements with anchors where specified prior to commencing other repair Work.

C. Protection of Work:

1. Temporarily mask adjacent surfaces to prevent staining from repair materials. Promptly remove spilled materials and clean soiled surfaces.
2. Protect wall from mortar droppings and promptly remove.
3. At the end of the day or when Work is not in progress, cover openings and partially completed Work to prevent infiltration of moisture, insects, or animals.

   a. Extend cover beyond edges of openings or Work and secure tightly.

3.5 STABILIZING STONE ELEMENTS

A. Install anchors at locations identified in Contract Drawings, in accordance with anchor manufacturer's written instructions and recommendations.

   1. Locate anchors at least 2 inches from voids, cracks, and unit edges.

B. Take necessary precautions to avoid spalls or other distress during drilling and anchor installation operations. Notify Architect/Engineer of distress that occurs.

C. Carefully drill holes through dutchman stone into backup material of diameter recommended by adhesive manufacturer. Extend holes at least 1 inch longer than anchor length. Angle holes downward at approximately 30 degrees in locations noted on drawings.

   1. When drilling through stone, use rotary hammer drill set on rotary. Do not use an SDS hammer drill.

D. Remove dust and debris from hole by blowing oil-free compressed air into hole.

E. Install anchors in accordance with anchor manufacturer's recommendations. Countersink anchors 1/2 inch beyond surface of stone.

F. Mask face of stone and install repair patching mortar in hole over anchor in accordance with mortar manufacturer's instructions and recommendations. Wipe excess mortar off stone surface with clean, slightly moistened cloth, leaving grout flush with stone surface.

   1. After 72 hours, lightly buff stone surface to remove excess material.

G. Install stone plug in hole over removed or abandoned handrail anchors.

1. Dampen stone surface in and adjacent to hole by lightly spraying with water.
2. Carefully fill approximately 3/4 of hole depth with grout.
3. Install stone plug in hole by pressing plug into hole, displacing excess grout, until face of plug is flush with face of stone panel.
4. Immediately after placing plug in hole, remove excess grout and secure 2-inch-square piece of kraft paper over plug.
5. After 24 hours, remove kraft paper, and wipe plug and adjacent area clean with clean, slightly-moistened cloth.

3.6 BLENDING AND REDRESSING STONE SURFACES

A. Carefully remove loose, exfoliated, and unsound stone at existing and incipient snips designated for repair, to sound stone.

B. Tool stone within removal area and at edges to feather out and finish to blend with adjacent stone surface.

1. Use only hand tools or small, hand-held, pneumatic chisels.

3.7 DUTCHMAN REPAIRS

A. At locations designated for dutchman repair, cut out immediate area of spall, adjacent unsound stone, and, as necessary, sound stone to form rectangular removal area.

B. Inspect exposed backup material and notify Architect/Engineer of visible distress or deterioration. Repair backup material as specified or as directed by Architect/Engineer.

C. Fabricate dutchman to match color and texture of adjacent stone. Maintain the following tolerances unless otherwise indicated on Drawings:

1. Joints between dutchman and parent stone: 1/32 to 1/8 inch.
2. Joints at stone perimeter: Match edge of parent stone, +/- 1/8 inch.
3. Circular dutchman plug covers: Diameter 1/16 to 1/8 inch smaller than hole; maintain 1/32-inch-minimum joint around repair hole.

D. Install dutchman as shown on Drawings.

1. Install at least two anchors/dowels per dutchman repair unless indicated otherwise.

a. Drill holes of diameter recommended by adhesive manufacturer, extending at least 1-1/2 inches into parent stone and dutchman.
b. Set pins in epoxy. Do not allow epoxy to drip onto exterior face of stone.

2. Set dutchman in thin bed of setting mortar on edges adjacent to parent stone.

a. Provide shims at cavities to properly position dutchman.
b. Promptly remove material from exposed stone face.

3. Anchors: After Dutchman setting bed has set, install anchors per Article 3.5.
4. Dress dutchman repairs at least seven days after installation as necessary to match pattern and texture of adjacent parent stone. Use hand tools only.

3.8 CRACK REPAIRS

A. Install injection grout or install sealant, as shown on Drawings or directed by Architect/Engineer, in cracks designated for repair.

B. Injection Grout Installation: For previously routed cracks and cracks wider than 1/8 inch:

1. Remove crack fillers, taking care not to damage stone surfaces.
2. Rout or grind out crack to square cross-sectional profile; V-shaped profile is not acceptable.
3. Wash crack surfaces with clean water to remove dust and loose or deleterious material.
4. Mix, place, finish, and cure grout per grout manufacturer's written instructions; finish to match adjacent stone surfaces.

a. For fine profile finish, trowel at time of initial setting or sand with fine carborundum paper in seven days or when material is sufficiently hard.
b. Finish to simulate rough finish approximately five hours after application.
c. If shaping, forming of details, or tooling is required, scrape to profile or level with metal tools 24 hours to two to three days after application.

C. Crack Sealant: For cracks narrower than 1/8 inch.

1. Rout crack to square profile with minimum width at surface of 1/4 inch. Carefully follow crack path.
2. Clean dust and debris from crack with oil-free compressed air.
3. Install bond breaker tape in square-profiled grooves.
4. Install Single-component, Non-sag, Silicone Sealant per Section 07 92 00.

3.9 PATCHING

A. At locations designated for patching, remove unsound stone, prepare surfaces, and install repair mortar.

B. Surface Preparation:

1. Cut out loose and deteriorated stone.
2. Remove additional sound stone with hand tools.

a. 1/16 inch minimum additional removal.
b. As necessary to achieve minimum removal depth of 3/4 inch, but not less than minimum depth recommended by repair mortar manufacturer.
c. Do not damage adjacent sound stone.

3. Eliminate feathered edges and provide square edges with minimum specified depth.
4. Use manual or pneumatic cutting equipment. Do not use saws.
5. Notify Architect/Engineer if removal depth is 3 inches or more.
6. Provide prepared surfaces that are clean, sound, stable, and free of loose particles, dust, dirt, soil, debris, grease, oil, other contaminants, laitance and/or any other coating or foreign substance which may prevent proper adhesion. Remove all loose and deteriorated masonry from the repair area.
7. Surfaces shall be clean but rough cut and tooled to assure optimum bonding of repair mortar.
8. Tap stone surfaces with acrylic hammer to verify that stone is solid and stable.
9. Install stainless-steel dowels as shown on Drawings.
10. Wash the prepared surface with clean water and a bristle brush to remove dust from the pores. Rinse.

C. Placing Repair Mortar:

1. Mix, place, and cure repair mortar in accordance with mortar manufacturer's recommendations.
2. Wet stone surfaces using clean water and maintain in saturated-surface dry condition.
3. Mix repair mortar in individual batch to match stone panel being patched. Combine one or more colors of repair mortar as needed to produce exact match.
4. Mortar should be applied to a glistening wet surface on vertical applications and a well-dampened surface (with no pooling water) on horizontal applications.
5. Place repair mortar with trowel in lifts, with no waiting period or scratch coat necessary between lifts, to maximum total thickness of 3 inches.

    a. Do not use bonding agent.
    b. Use light pressure during placement.
    c. Work mortar firmly into surface of stone, including corners and under and around mechanical anchors.
    d. For patches thicker than 3 inches, apply repair mortar in two lifts during the same work shift.

        1) Place first lift and allow to set approximately 1/8 inch thick.
        2) Scrape off about 1/16 inch of mortar if cement skin has formed.
        3) Dampen surface and place second lift.
6. Build up repair mortar slightly above adjacent stone surface. Allow mortar to set slightly. Due to the effects of heat, humidity, and wind on the final color, the waiting period for scraping should be determined on the job. Scrape off excess material using straight edge such as plasterer's miter rod. Do not press down or "float" patch. For the best result, wait until the Jahn Mortar is the consistency of dry sand and does not stick to the screeding tool. To achieve a rougher texture, wait longer before finishing.
7. When repairing horizontal surfaces using this product, apply material flush to the surface and finish to a tight steel troweled finish, float, or broom to achieve a textured effect.

8. Where patches occur at panel edges or corners, form repair mortar to match profile of adjacent stone.
9. Clean repair mortar from adjacent stone surfaces by rubbing with a rubber sponge and clean water, before mortar dries. Wipe several times to prevent staining or halo effect on stone.
10. Finish patch to blend in with adjacent stone.

a. Simulation of rough stone finish:

1) Shaping, forming of details, and tooling: approximately five hours after placement.
2) Scraping to profile or level with metal tools, and finishing work: within 24 hours up to two to three days after placement.
3) Feather edging: At least five to seven days after placement.

11. Placement Limitations:

a. Stone surfaces shall not have frost or be exceedingly hot.
b. Protect repair mortar from extreme heat, freezing, excessive wind, direct sunlight, and rain. Ambient temperature range shall be 40 to 90 degrees F with low to average humidity.
c. Do not add bonding agents to Jahn Mortar or use them as surface preparation materials.
d. Do not add bonding agents to Jahn Mortar or use them as surface preparation materials.

12. Curing: Maintain patches in moist condition and protect from direct sun and wind.

a. Periodically mist patches with clean water for at least three days after placement. Mist several times each day. Avoid water runoff onto adjacent stone surfaces.
b. Mist patches with clean water within 30 to 60 minutes after placement in hot, dry ambient conditions and within several hours in cool, damp ambient conditions.
c. Mist patches with clean water for at least three minutes at the end of the day of placement.
d. Securely install plastic sheets over patches. Maintain clear gap of 3 to 4 inches between sheets and patch surfaces. The application of plastic, however, does not remove the need for normal curing techniques.
e. No curing is necessary when masonry surface temperature is 85°F or lower. When working on surface temperatures above 85°F, follow the Traditional Cure procedures outlined above.

3.10 MISCELLANEOUS REPAIRS

A. Exposed Steel Elements:

1. Notify Architect/Engineer of steel anchors and other elements exposed during Work not shown on Contract Drawings. Architect/Engineer will determine if steel element should be removed or painted.
2. Remove steel elements as directed by Architect/Engineer.

    a. Core drill small plug if necessary at anchors.

3. Repair visible voids in stone with dutchman repairs. For holes less than 1 inch in diameter, install patch repair mortar.

B. Spall Repair at Sealant Joint: Install sealant in edge spalls along sealant joints, as directed by Architect/Engineer.

1. Remove joint sealant adjacent to edge spall.
2. Remove loose stone fragments and grind edges of spall smooth.
3. Prepare surfaces; install bond breaker tape or backer rod in joint; and install sealant in joint and spall per Section 07 92 00.

3.11 REMOVAL AND REPLACEMENT OF STONE FACADE UNITS

A. Carefully remove stone units to avoid damaging adjacent stone units, substrate, and other facade elements.

1. If stone units will be reused, mark panel with unique identifying code and record code on elevation drawing to ensure reinstallation in proper location.

B. Salvaged Stone:

1. Inspect salvaged stone units for damage such as chipping, cracking, or spalling. Notify Architect/Engineer of damage observed.
2. Clean mortar, sealant, and residue from surfaces that will be exposed or bonded to. Rinse masonry to remove residual dust and mortar particles. Time rinsing application so at time of pointing, joint surfaces are damp but free of standing water.

C. Reset existing masonry units that have shifted from their original locations, as noted on Contract Drawings.

D. Install stone units as shown on shop drawings, clean of dust and debris:

1. Support stone panel for gravity and lateral loads, including temporary support.
    a. Install supports, anchors, fasteners and other attachments in accordance with supplier's written instructions.
    b. Drill holes in stone panel, as noted on Contract Documents, without spalling backside of panel. Use only rotary percussion drill.

2. Attach stone support framing to backup at connection points indicated.
3. Isolate dissimilar metals.

4. Install stone panel plumb, square, and true to line.

    a. Match joints and coursing in existing and mirrored sections of masonry, where present, with adjacent existing construction or to replicate original conditions.
    b. Notify Architect/Engineer prior to deviating from specified alignment.
    c. Adjust anchors, supports, and accessories as necessary to position stone panel.
    d. Shim stone panel where indicated on shop drawings.

        1) Size shims to avoid overstressing stone.
        2) Use single shim of required thickness where possible.
        3) If shim stack is required, use shim thickness combination resulting in fewest shims. Adhere or pin together shim stacks.
        4) Maximum thickness of shim stack: 1 inch or as indicated on shop drawings.

    e. For mortar-joint installations:

        1) Set stone panel in full bed of setting mortar.
        2) Fill vertical joints with setting mortar and shush full.
        3) Do not set units above until mortar in course below is sufficient to hold weight without mortar extruding from the joint.
        4) After mortar has achieved initial set, rake out setting mortar to depth of 3/4 inch and point joints in accordance with Section 04 01 27.

    f. Completely fill anchor, dowel, lifting, and other similar holes in top bed joints or other locations where moisture can collect with high-modulus elastomeric sealant after installation and final alignment.
    g. Maintain joints between edges of stone units free of hard inclusions. Tool joints to the correct profile and to provide superior bond with adjacent masonry surface.

5. Install backer rod and sealant in joints designated to be sealed, between dissimilar materials, in accordance with Section 07 92 00.
    a. Comply with manufacturer's instructions regarding surface preparation, the use of a primer, the joint profile and backing/support materials.
    b. Install masking tape on adjacent surfaces to prevent permanent staining or damage due to contact with sealant or cleaning methods to remove sealant smears. Remove tape immediately after tooling sealant, without disturbing sealant.
    c. Install sealant immediately after installing backer material to produce a uniform, cross-sectional shape and depth. Ensure direct contact with adjacent materials.

3.12 FIELD QUALITY CONTROL

A. Inspect new cast stone for dimensional accuracy, finish, color, and defects, and recast stone that does not meet requirements or approved samples. Verify acceptability of color in accordance with ASTM D1729.

1. Inspection by Architect/Engineer and Owner:

    a. Notify Architect/Engineer and Owner of arrival of cast stone at Site.
    b. Architect/Engineer and Owner may inspect cast stone elements, and dowel holes. Move cast stone elements as necessary to facilitate inspection.
    c. Architect/Engineer may verify acceptability of color in accordance with ASTM D1729.
    d. Do not install cast stone elements until Architect/Engineer has inspected elements.

2. Pay additional costs to acquire new cast stone elements to replace rejected cast stone elements, including costs related to removing and replacing cast stone elements installed on building prior to review and acceptance by Architect/Engineer.

B. Inspect installed repairs for soundness and conformance with requirements. Remove and replace repairs that are unsound, defective, or do not meet requirements.

C. Provide access to Work area for Architect/Engineer to observe progress and quality of installed Work. Notify Architect/Engineer at least 48 hours in advance of time when access equipment will be relocated.

3.13 CLEANING

A. After completing stone restoration Work:

1. Clean affected stone cladding by rubbing with fiber brushes and clean water.
2. Remove Contractor-provided scaffolding and equipment, and patch anchor holes.

B. At the end of each workday, broom-clean Site and Work areas and place all items to be discarded in appropriate containers.

C. Return building surfaces to condition prior to cleaning Work, to satisfaction of Architect/Engineer at no additional cost to Owner.

D. Repair at no cost to Owner all items damaged during the Work.

E. Clean up debris, refuse, and surplus material; remove from premises; and dispose of legally.

END OF SECTION

SECTION 047200 - CAST STONE MASONRY

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Furnish all labor, materials, tools, and equipment and perform all Work necessary and incidental to providing new cast stone building elements to replace broken brownstone columns and pilaster on the facade as indicated on the Contract Documents; in accordance with the provisions of the Contract Requirements and completely coordinated with the Work of other trades.

1. Cast stone columns and pilaster must each be cast in one monolithic unit to match the original historic units.

B. This section establishes criteria for materials, mixes and evaluations of Cast Stone (architectural precast concrete). Dry Tamp Cast Stone or Vibrant Dry Tamp Cast Stone or measurable slump cast stone not containing large and small aggregate in addition to sand and cement shall not be accepted.

1.2 SUMMARY

A. This Section includes the following:
1. Columns.
2. Column bases.
3. Column capitals.
4. Pilaster.

B. Related Sections include the following:

1. Division 04 Section "Repointing with Cement-Lime Mortar" for setting mortar.
2. Division 04 Section "Stone Restoration" for setting cast stone.
3. Division 07 Section "Joint Sealants" for sealants at joints between dissimilar materials.

1.3 REFERENCED STANDARDS

A. In the event that this specification conflicts with industry standards, industry specifications, manufacturer's recommendations, or other criteria that could be interpreted as governing the manufacture of this cast stone, or that the referenced industry standards, specifications, and recommendations conflict with each other, the most stringent conditions shall apply, at the sole discretion of the Architect/Engineer.

1.4 REFERENCES

A. American Concrete Institute (ACI).

B. Concrete Reinforcing Steel Institute (CRSI).

C. Precast Concrete Institute (PCI).

D. American Society for Testing and Materials (ASTM).

1.5 QUALITY ASSURANCE

A. Manufacturer: A qualified manufacturer of cast stone units similar to those indicated for this Project, with sufficient production capacity to manufacture required units.

1. A producing member of the Cast Stone Institute or has on file and follows a written quality-control plan approved by Architect/Engineer that includes all elements of the Cast Stone Institute's "Quality Control Procedures Required for Plant Inspection."

2. The fabricator shall demonstrate at least ten years experience in the manufacturer of architectural pre-cast concrete (CAST STONE) units of an architectural quality suitable for a landmark building. The fabricator shall provide a list of five Projects of comparable quality, and of reasonable size and complexity using cast stone units which the fabricator has successfully completed, together with address and phone of the owners and architects.

3. The fabricator must demonstrate sufficient plant and personnel trained in cast stone production to produce, store and deliver cast stone units of the quality specified in the period established by the construction schedule included in the bid documents.

4. Fabricator must provide affidavit attesting that the plant has an in-house quality assurance program including quality control personnel and procedures addressing management, materials, machinery, mixes and production processes to ensure continuous compliance with all aspects of this specification.

5. The following Cast Stone Manufacturers are Prequalified:

a. DKI Concrete
dkiconcrete.com
Chris Price
chris@dkiconcrete.com
(845) 255-1044

b. Or equal as approved by Architect/Engineer.

B. Stone Masons: Must have a minimum of five (5) years experience in cast stone installation work and stone restoration and be approved by the Owner and the Architect/Engineer to perform work under the Contract Documents.

C. Three-Dimensional (3D) Laser Scanning Technician: Must have a minimum of five (5) years experience in laser scanning of landmark historic buildings and be approved by the Owner and the Architect/Engineer to perform work under the Contract Documents.

D. Except as modified by the Drawings and Specifications, all cast stone materials and installation methods shall be in accordance with the latest edition of the Cast Stone Institute Technical Manual and related guidelines.

E. Source Limitations for Cast Stone: Obtain cast stone units through one source from a single manufacturer.

F. Preconstruction Testing:

1. Independent Testing Agency:

   a. Employ and pay for an independent testing laboratory qualified according to ASTM E 329 to conduct the testing specified, as documented according to ASTM E 548 acceptable to Architect/Engineer and Owner.

   b. Testing agency shall submit test procedures to Architect/Engineer for review and approval prior to testing.

   c. Testing agency shall conduct and interpret tests and report test results to Contractor, Architect/Engineer, and Owner. Reports shall state whether or not test specimens conform to specified requirements and shall specifically note deviations.

2. Brownstone: Unless noted otherwise, Contractor shall mail the number of specimens as required for associated testing, or (3) three specimens for each of the following standard tests, whichever number is greater. Brownstone samples should be broken pieces of existing brownstone from the building that is not intended for reinstallation per the Contract Documents.

   a. Absorption and Bulk Specific Gravity: ASTM C97/C97M; test three specimens from each type of cast stone.
   b. Compressive Strength: ASTM C170/C170M.
   c. Freezing and Thawing Resistance: ASTM C666, Procedure A, as modified by ASTM C1364.

3. Cast Stone: Unless noted otherwise, fabricator shall create and mail the number of specimens as required for associated testing, or (3) three specimens for each of the following standard tests, whichever number is greater.

   a. Absorption and Bulk Specific Gravity: ASTM C97/C97M; test three specimens from each type of cast stone.
   b. Compressive Strength: ASTM C170/C170M.
   c. Freezing and Thawing Resistance: ASTM C666, Procedure A, as modified by ASTM C1364.

G. Source Limitations for Cast Stone Masonry: Obtain all cast stone masonry through one source from a single manufacturer.

H. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

I. Monolithic Cast Stone Masonry: All three (3) cast stone units for replacement are to be a single monolithic unit of cast stone. There are not to be any joints in the casting.

1.6 DEFINITIONS

A. Cast Stone: Architectural precast concrete building units intended to simulate natural cut stone.

1.7 WARRANTY

A. Contractor shall submit the warranty for the cast stone material prior to beginning fabrication.

B. Warranty period shall be for a minimum of two (2) years, from date of substantial completion.

C. The contractor shall warrant that the cast stone material shall be free of defects and meet all the conditions used for acceptance (see Paragraph 3.9) at the end of the warranty period.

1.8 SUBMITTALS AND SAMPLES

A. Product Data: Manufacturer's literature including material properties; test data substantiating that products comply with requirements; recommendations for storage and handling; installation procedures; and recommendations for field testing. Include VOC content of components, where present. Test data shall include:

B. The Contractor shall submit to the Owner and Architect/Engineer samples for the cast stone elements showing color and texture. Contractor shall submit as many samples as required to match the existing brownstone color, texture, and tooling as accepted by Owner and Architect/Engineer.

C. Shop Drawings:

1. Submit shop drawings showing complete information for fabrication and erection of work in the section for review and approval by the Architect/Engineer.
2. The shop drawings shall be based on actual, verified, field dimensions and shall be fully coordinated with all existing conditions related to the work.
3. Shop drawings shall be legible, drawn to scale, indicate all dimensions, and indicate finished faces.
4. Show layout with all individual cast stone coping pieces identified with unique numbering/labeling over entire extent of work.
5. Clearly show all typical installation details including enlarged plans and cross sections.
6. Show all anchorages reinforcements and ties, clearly identified for their constituent parts, including typical spacing.

7. Coordinate with new and existing unit masonry work and include them in details to clearly show relationship. Include location and details of anchorage devices that are to be embedded in other construction.
8. Show all erection procedures, sequence of erection, and required handling equipment.

D. Laboratory Tests Reports (for Source Quality Control) from a qualified testing laboratory indicating compliance with the requirements specified herein. Source Quality Control testing requirements will be waived if the casting plant is PCI certified. Submit documentation of PCI Plant Certification Program in order to obtain waiver.

E. Samples for Verification:

1. Samples for Initial Selection of colored mortar.

   a. For colored mortar. Make Samples of colored mortar using same sand and mortar ingredients to be used on Project.

   b. For each color and texture of cast stone required. Provide 12 inches by 12 inches by three inches thick samples for each type of stone color and texture.

2. Accessories.

   a. Submit samples of each type of anchor, fastener, or other accessory required for installation.

F. Mockup Samples: Furnish sample units for each color and texture of cast stone required, 12 inches by 12 inches by three inches thick in size as indicated on Drawings for installation in mockups.

1. Build mockup to include typical cast stone installation as shown on Drawings.
2. Finish mockup to match the quality, color, texture and historic bush hammered finish of the existing cleaned brownstone units and demonstrating range of variations in stone appearance.

   a. Cleaning should follow the procedure approved during cleaning mockup.
   b. Resubmit samples until approved by Architect/Engineer and Owner.

G. Qualification Data:

1. For manufacturer if other than pre-approved manufacturer.
2. For 3D laser scanning technician.

H. Quality-Control Plan: Manufacturer's written quality-control plan that includes all elements of the Cast Stone Institute's "Quality Control Procedures Required for Plant Inspection."

1. Provide copies of documentation showing compliance with quality-control plan as requested by Architect/Engineer.

I. Cast Stone 3D Laser Scan Rendering PDF: Laser scan data rendering showing six (6) elevations (one for each cardinal direction and for each horizontal joint surface) of existing conditions of each brownstone element to be reproduced in cast stone.

1. Level of detail to be approved by Architect/Engineer so that the full intricacy of the original brownstone columns can be reproduced to Architect/Engineer and Owner standards.

J. Cast Stone 3D Laser Scan Data: Laser scan data of each brownstone element to be reproduced in cast stone in format acceptable to cast stone manufacturer.

1. Level of detail to be approved by Architect/Engineer so that the full intricacy of the original brownstone columns can be reproduced to Architect/Engineer and Owner standards.

K. Cast Stone Manufacturer's Cleaned Up 3D Laser Scan Rendering: Laser scan data rendering modified by cast stone manufacturer to represent original un-broken historic architectural elements to be reproduced in cast stone. Renderings are to include six (6) elevations (one for each cardinal direction and for each horizontal joint surface) of each proposed cast stone reproduction element.

1. Level of detail to be approved by Architect/Engineer so that the full intricacy of the original brownstone columns can be reproduced in cast stone to Architect/Engineer and Owner standards.

1.9 ENGINEERING SERVICES

A. If the Contractor proposes to deviate from the structural connections indicated in the Construction Documents the Contractor shall retain a Professional Engineer, registered as a structural engineer in the State of New Hampshire, and who shall structurally design and assume professional responsibility for cast stone units and all connections required to handle, erect, and attach cast stone to the building. Reinforcing and connections when shown on the Contract Drawings shall be considered minimum reinforcing required. If alternate structural connections are proposed to those included in the Contract Drawings, Contractor-submitted shop drawings shall include calculations stamped by a Professional Engineer indicating the design of cast stone and all connections showing compliance with these specifications.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Pack cast stone so as to prevent damage in transit, and deliver in accordance with the Contract schedule and setting sequence. Protect from disfiguring elements.

B. Store cast stone on wood skids or pallets with nonstaining, waterproof covers on top and separating units. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation. Store clear of the ground under waterproof covering and keep dry. Remove unacceptable stones from job site immediately.

C. Store units at the job site in a manner to prevent cracking, distortion, warping, staining, and other physical damage, and in a manner to keep markings visible.

D. Store cementitious materials off the ground, under cover, and in a dry location.

E. Comply with manufacturer's written instruction for minimum and maximum temperature requirements for storage.

F. Coordinate delivery of cast stone to avoid delaying the Work.

G. Pack, handle, and ship cast stone units in suitable packs or pallets.

H. Lift and support the units only at designated lifting points or supporting points as shown on the approved Shop Drawings.

I. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining or mechanical damage. Move cast stone units, if required, using dollies with wood supports.

J. Store cast stone units on wood skids or pallets with non-staining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

K. Store installation materials on elevated platforms, under cover, and in a dry location.

L. Store mortar aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

M. Any units damaged before final acceptance shall be replaced by responsible party.

N. Patching of broken units will not be acceptable.

O. Store mortar aggregates where grading and other required characteristics can be maintained and contamination avoided.

1.11 PROJECT CONDITIONS

A. Where conditions are uncovered that are not anticipated by the Drawings and Specifications, the Contractor shall notify the Owner and Architect/Engineer immediately before any repairs are initiated.

B. Protection of Work:

1. The Contractor shall cover all partially completed areas of work at the end of each working day or when work is not in progress.
2. The cover shall extend a minimum of 24 inches beyond each side of partially completed walls.
3. Cover shall be secured tightly in place.
4. Mortar shall be prevented from staining existing and new materials adjacent to area of work.

C. Cold-Weather Requirements: When the ambient air temperature is less than, or expected to be less than, 40 deg. F, comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

D. Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates.

E. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until cast stone has dried, but not less than 7 days after completing cleaning.

F. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 CAST STONE MATERIALS

A. General: Comply with ASTM C1364 and the following:

B. Cement: Portland cement, ASTM C150, Type I, white, non-staining without air entrainment, containing not more than 0.60 percent total alkali when tested according to ASTM C114.

C. Water: Clean, potable, and free of deleterious materials.

D. Course Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation as needed to produce required textures.

E. Fine Aggregates: Composed of graded and washed natural sands, or crushed and ground granite, quartz, or limestone sands complying with ASTM C33; size gradation may vary to produce approved cast stone textures, finishes, and colors, without excessive shrinkage.

F. Metakaolin:

1. MetaMax HRM manufactured by Englehardt
2. Or approved equal.

G. Color Pigment: ASTM C979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black; guaranteed by manufacturer to be fade-proof and unaffected by alkali. Amount of pigment not to exceed 10 percent by weight of cement used.

H. Air-Entraining Admixture: ASTM C 260, certified by the manufacturer to be compatible with other admixtures used.

1. Add to mixes for units exposed to the exterior at manufacturer's prescribed rate to result in an air content of 5 to 7 percent.

I. Admixtures: Do not use admixtures unless specified or approved in writing by Architect/Engineer.

J. Stainless Reinforcing steel: Use stainless steel, Type 304 complying with ASTM A 615/A 615M.

1. Epoxy Coating: ASTM A 775/A 775M.

K. Embedded Anchors, Pins and Other Inserts: Fabricated from stainless steel complying with ASTM A 276 or ASTM A666, Type 304.

1. Standard building stone anchors: Stainless steel Type 304.

L. Sealant:

1. See Specification Section 07 92 00.

2.3 CAST STONE UNITS

A. General:

1. Comply with ASTM C1364, Standard Specification for Architectural Cast Stone, except as otherwise required in these Specifications or,
2. Comply with the recommended practices of PCI MNL-117, Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products; with the ACI Manual of Concrete Inspection; and with the standards of the Cast Stone Institute.

B. Documentation of Original Brownstone Architectural Elements to be Reproduced in Cast Stone:

1. Complete 3D laser scan of original brownstone elements.
2. Send 3D laser scanning data to cast stone manufacturer for use in creating cast stone units.

C. Casting Process: Provide cast stone units complying with ASTM C1364 using the wet-cast method.

1. Wet Cast Method: Consisting of placing a wet, low slump concrete into a rigid form, vibrating to eliminate voids and consolidate material around reinforcement. Yard cure in form while maintaining controlled temperature (above freezing) and humidity.

D. Properties:

1. Compressive strength: wet and dry, ASTM C1194: Minimum 6,500 psi at 28 days.
2. Water Absorption: 48-hour cold water absorption in accordance with ASTM C1195 (Method A): Maximum 5 percent.
3. Water Absorption: 48-hour cold water/5 hour boil absorption in accordance with ASTM C1195 (Method B): Maximum 8 percent.
4. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666, Procedure A, as modified by ASTM C 1364.
5. Air entrainment, ASTM C185: 5 to 7-percent.

E. Detailing:

1. Fabricate units in sizes, shapes, and with joint patterns shown on Contract Drawings and approved shop drawings. Texture to match approved Samples and Mock-ups.
2. Provide 3/8-inch joints, unless otherwise shown.
3. Make exposed edges sharp, straight, and square, unless indicated otherwise. Make flat surfaces into a true plane. Ease edges 1/16-inch.
4. Provide finished units which are straight, true to size and shape, and within the specified casting tolerances.
5. Provide special shapes where required or indicated on the drawings.
6. Fabricate units with sharp arris and details accurately reproduced with indicated texture on all exposed surfaces, unless otherwise indicated. Match existing units in texture, color and shape where units are being replaced. Take all molds as necessary.
7. Slope exposed horizontal surfaces 1:12, unless otherwise indicated.
8. Warped, cracked, broken, spalled, stained, and otherwise defective units will not be acceptable.
9. Place and secure in the forms all anchors, clips, stud bolts, inserts, lifting devices, shear ties, and other devices required for handling and installing the precast units and for attachment of subsequent items as indicated or specified.

F. Colors and Textures

1. Colors and textures of cast stone to be selected by architect from manufacturer's custom color and texture samples.
2. Color shall be uniform for each unit and consistent for all units.

G. Reinforcing:

1. Reinforce units as required by ASTM C 1364. Use epoxy-coated reinforcement.

2. Reinforce units only when necessary for safe handling and structural stress.
3. Provide a minimum of 1-1/2 inches of cast stone material as cover.
4. Do not place reinforcing steel directly at lift lines, and fully consolidate material around reinforcement.
5. Avoid placing reinforcement in the transverse direction of slender pieces (less than 24 inches in width). Highlight placement of transverse reinforcement on shop drawings.

H. Fabrication Tolerances:

1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
2. Variation in Height and Length: Do not vary from original unit dimension plus zero, and minus 1/16" of unit length.
3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.
4. Location of Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces.

I. Curing:

1. Cure units by one of the following methods:

a. Cure units with steam in enclosed curing room at temperature of 105 deg F or above and 95 to 100 percent relative humidity for 6 hours.
b. Cure units with dense fog and water spray in enclosed warm curing room at 95 to 100 percent relative humidity for 24 hours.

c. Yard cure units until the sum of the mean daily temperatures for each day equals or exceeds 350 deg F.

d. Acid etch units to remove cement film from surfaces indicated to be finished.

2. After initial cure, cover and keep damp for one of the following:

a. Not less than 5 days at mean daily temperature of 70 deg F or above.
b. Not less than 6 days at mean daily temperature of 60 deg F or above.
c. Not less than 7 days at mean daily temperature of 50 deg F or above.
d. Not less than 8 days at mean daily temperature of 45 deg F or above.

J. Colors and Textures: Match the color, texture and historic bush hammered finish of the existing cleaned brownstone units as per Mock-Up approved by Architect/Engineer.

2.4 MORTAR MATERIALS

A. Provide and install mortar materials that comply with Division 4 Section, “Repointing with Cement-Lime.”

2.5 ACCESSORIES

A. Dowels: Round stainless-steel bars complying with ASTM A276, Type 304, diameter as specified on Contract Drawings.

B. Setting Shims:

1. Strips of resilient plastic or vulcanized neoprene, Type A Shore durometer hardness of 50 to 70, nonstaining to stone, of thickness and width needed to prevent point loading of stone on stone anchors and of depths to suit stone anchors without intruding into required depths of sealing materials.
2. Plastic shims for bearing on horizontal surface shall be Korolath strips.
3. Provide Koralath plastic, or approved equal, separators between dissimilar contacting metals to prevent galvanic corrosion.
4. Shim packs that resist forces in the plane of the shim shall be pinned together to form a monolithic shim in order to avoid slippage of shims.
5. Horseshoe shaped shims shall not be used.

2.6 MORTAR MIXES

A. Provide and install mortar materials that comply with Division 4 Section, “Repointing with Cement-Lime.”

2.7 SOURCE QUALITY CONTROL

A. Employ an independent testing agency to sample and test cast stone units according to referenced ASTM standards and the specific test methods specified herein.

B. Include testing for Properties included in Paragraph 2.3.C above.

C. If test specimens fail, the specimens and the entire lot they came from shall be rejected and shall not be used in the project.

D. The requirements for Source Quality Control testing, will be waived by the Owner if the casting plant is PCI Certified.

PART 3 - EXECUTION

3.1 GENERAL ERECTION REQUIREMENTS

A. Comply with manufacturer’s written instruction for products.

B. Build work to the dimensions and profiles indicated.

3.2 PREPARATION

A. Examine substrates and conditions with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of cast stone.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Coordinate installation of work of other trades, in accordance with approved shop drawings.

D. Examine the substrate and conditions under which the work is to be performed with the stone-masonry installer and notify the Architect/Engineer in writing of any condition detrimental to the proper and timely completion of the work.

E. Prior to installation of the units, verify on-site the dimensions affecting proper installation of the work.

1. Bring to the Architect/Engineer's attention any discrepancies between design dimensions and field dimensions that could adversely affect proper installation as required.
2. Do not proceed with the installation until dimensional discrepancies are corrected and accepted by the Architect/Engineer.

F. Prior to setting, clean stone surfaces that have become dirty or stained to remove soil, stains, stone dust, and foreign material. Clean stones by thoroughly scrubbing stones with fiber brushes followed by a thorough drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh filler or abrasives.

1. Do not proceed until unsatisfactory conditions have been corrected in a manner acceptable to the stone-masonry installer and the Architect/Engineer.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

G. Lay out:

1. Lay out the work in advance to ensure accurate spacing of units with uniform joint widths and for accurate location of openings, movement type joints, returns, and offsets.
2. Lay out work in advance to coordinate with other masonry work.
3. Coordinate as required with other trades to assure proper and adequate accommodation with the Work of this Section.

H. Cutting and Shaping: Do not cut or shape cast stone in the field. If a unit is improperly cast, have it factory recast. For very special conditions the Architect/Engineer may permit cutting if the cut end is fully concealed or embedded.

1. Use high-speed cutting equipment, grinders, and appropriate masonry files to cut and smooth edges of units as necessary, subject to the Architect/Engineer's acceptance of methods and results.
2. Where field cut units have exposed the ends of reinforcing, prepare these ends as follows:
   a. Grind back end of reinforcing to a point recessed at least ½-inch into the surface of unit.
   b. Touch-up end of reinforcing in recess with galvanizing repair paint in 2 coats, being careful not to get paint on sides of recess. This is not required for stainless steel reinforcing.

c. Apply bonding agent and pack recess tightly with setting mortar. Damp cure patch, then test patch by tapping with a hammer before setting unit in wall. Replace loose patches.

3.3 SETTING CAST STONE IN MORTAR

A. Perform installations using methods and materials used for accepted mockups.

B. Lay-up: Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

1. Install anchors and other attachments indicated or necessary to secure units in place.
2. Fill dowel holes, slots, and other anchor penetrations into the cast stone with sealant or mortar. Do not use non-shrink grout.

C. Wet joint surfaces thoroughly before applying mortar or setting in mortar.

1. Set units in full bed of mortar with full head joints, unless otherwise indicated. Protect surfaces from splashing mortar or damage by other work. Remove foreign matter splashed on the stone immediately.
2. If not indicated, set units with joints 3/8 inch wide.
3. Build anchors into mortar joints as units are set.
4. Anchors or dowels to be set in substrate with non-shrink grout.
5. Fill collar joints solid as units are set.
6. Keep head joints in units with exposed horizontal surfaces open to receive sealant.

D. After units are set in or on the wall they shall have all top surfaces covered and protected from the elements at the close of each day's work and shall be kept covered and protected until all the Work is completed.

E. Use Koralath shims to set large units to sustain the weight until mortar has set.

F. All joints in units shall be raked out 3/8" deep, bond breaker tape shall be applied to the back of joint and shall be filled with joint sealant.

G. Pointing Joints:

1. Prior to the mortar setting, rake it out of joints for pointing to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.
2. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch. Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
3. Tool exposed joints as indicated on Drawings when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

H. Sealant-filled Joints:

1. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated. Keep joints free of mortar and other rigid materials.

    a. Install sealant at all joints between dissimilar materials (i.e. masonry to metal, brownstone to granite, etc).

2. Form open joint of width indicated, but not less than 3/8 inch.
3. Prepare joints indicated to receive sealant and apply sealant of type and at locations indicated to comply with applicable requirements in Division 7 Section "Joint Sealants."
4. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant, unless otherwise indicated.

I. Protect mortar and cast stone units from freezing during construction and maintain an ambient temperature for cast stone work of at least 32° F for a period of at least 72 hours.

At 40° F and below, heat water or sand to a minimum of 70° F and to maximum of 160° F.

At 32° F and below, heat mixing water and sand to a minimum of 70° F and to maximum of 160° F.

Do not use admixtures to lower the freezing temperature of the mortar.

J. Discrepancies

1. Immediately notify Architect/Engineer.
2. Do not proceed until fully corrected.

3.4 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

A. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
2. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.

B. Fill anchor holes with sealant.

C. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.

D. Set cast stone supported with metallic components on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint, or sufficient distance to comply with sealant installation requirements.

E. Keep joints free of mortar and other rigid materials. Remove temporary shims and spacers from joints after anchors and supports are secured in place and cast stone units are anchored. Do not begin sealant installation until temporary shims and spacers are removed.

1. Form open joint of width indicated, but not less than 1/4 inch.

F. Prepare joints and apply sealant of type and at locations indicated to comply with applicable requirements in Division 7 Section "Joint Sealants."

1. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant, unless otherwise indicated.
2. Tool exposed exterior joints to match existing joints.

3.5 INSTALLATION TOLERANCES

A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.

B. Variation from plumb: For vertical lines and surfaces of columns, walls and arrises, do not exceed ¼ inch in 10 feet, nor 3/8-inch in 20 feet, nor ½-inch in 40 feet or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed ¼ inch in 20 feet, nor ½-inch in 40 feet or more. For vertical alignment of head joints, do not exceed plus or minus ¼-inch in 10 feet, or ½-inch maximum.

C. Variation from Level: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.

D. Variation from level: For bed joints and lines of exposed lintels, sills, parapets, cornices, horizontal grooves, and other conspicuous lines, do not exceed ¼-inch in 20 feet, nor ½-inch in 40 feet or more.

E. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one-fourth of nominal joint width, whichever is less.

F. Variation in mortar joint thickness: maximum plus or minus ¼ of typical joint width. Zero variation between adjacent aligning joints.

G. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except due to warpage of units within tolerances specified.

H. Variation from plane: Set stones within the tolerance of plus-or-minus 1/8-inch out-of-plane from adjacent units.

3.6 POINTING

A. General:

1. Follow manufacturer's instruction regarding the proper preparation of and use of tools and materials.

2. Perform pointing using methods and materials used for accepted mockups.
3. Verify that joints have been raked out prior to pointing. Do not rake out during pointing.
4. Brush, vacuum, or flush joints with compressed air as necessary to remove dirt and loose debris prior to pointing.

B. Pointing with Mortar:

1. Wet the joints thoroughly before applying fresh mortar. Use only as much water as is necessary to wet the surfaces of the joint. Time wetting so that at time of pointing, excess water has soaked in or run off, and the joint surfaces are damp but free of standing water.
2. Apply mortar in layers. For each layer, thoroughly compact the mortar and allow it to become thumb-print hard prior to application of next layer.
3. Tooling: tool joints while mortar is still plastic but thumb-print hard, with jointing tool, compressing the mortar into the joint. Tool joints full and flush with a slight concave profile.
4. Curing: Keep mortar damp until cured, not less than 7 days.
5. Hairline cracking within the joint or bond line separation at the edge of the joint is not acceptable. Completely remove such joints and reinstall.
6. Remove all traces of surplus mortar as the work progresses.

3.7 PATCHING

A. Perform repair of chipped or damaged cast stone only where specifically approved by the Architect/Engineer.

B. Patching and repairing of chipped, spalled, cracked, or otherwise imperfect pieces may not exceed 1 percent of face area.

C. Perform repairs only with mechanics skilled in this class or work, with materials furnished by the manufacturer and according to the manufacturer's directions. Determine patching material and mix design by making at least six cured and dried samples until an approved match is obtained.

D. Cast stone patching and repair is acceptable only if it meets the overall acceptance criteria of this specification.

3.8 ADJUSTING AND CLEANING

A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect/Engineer.

B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.

C. Dismantle and reconstruct work that is unacceptable in appearance, including but not limited to improper alignment; irregularity of joints; outside the approved range of color, texture, and finish; chips; cracks; evidence of having been patched in completed work; and spillage of materials that cannot be satisfactorily removed.

D. After mortar has fully hardened, thoroughly clean exposed surfaces of excess mortar and foreign matter. Use stiff nylon or fiber brushes with clean spray-applied water at low pressure of 100 to 300 psi (measured at spray tip), 3-6 gallons per minute, using fan-shaped spray tip which disperses water at an angle of not less than 15 degrees. Hold spray nozzle not less than 6 inches from surface. Use smallest amount of water necessary.

E. Do not use metal scrapers.

F. Do not use acidic or alkaline cleaners.

G. In-Progress Cleaning: Clean cast stone as work progresses.

1. Remove mortar fins and smears before tooling joints.
2. Remove excess sealant immediately, including spills, smears, and spatter.
3. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
4. Clean cast stone by bucket-and-brush hand-cleaning method described in BIA Technical Notes No. 20.

3.9 ACCEPTANCE

A. Cast stone shall be inspected by the Architect/Engineer prior to and after installation, under wet and dry conditions.

B. The cast stone shall be evaluated in accordance with the following:

1. This project specification and related sections
2. Other applicable contract requirements
3. Section 10 of ASTM C1364
4. The Cast Stone Institute Bulletin #36, “Inspection and Acceptance.”

C. Excessive crazing shall be cause for rejection. Excessive crazing is defined as that which is visible from a distance of 10 feet under dry and normal daylight conditions, similar to other visual and textural irregularities.

D. If there is evidence that the strength of cast stone units may be deficient or may not comply with the specified requirements, the Owner will employ an independent testing laboratory to obtain, prepare, and test cores drilled from hardened cast stone units to determine the compressive strength according to ASTM C 42. Include in the bid, a minimum of 3 units to be field tested and destroyed. If the units are found to be defective, other units will be tested and replaced at no cost to the Owner.

1. Allow the Owner's testing laboratory access to material storage areas. Cooperate with the Owner's testing laboratory and provide samples of materials and concrete mixes as may be requested for testing and evaluation.
2. A minimum of three representative cores will be taken from units of suspect strength, from locations directed by the Owner.
3. Cores will be tested in an air-dry condition.

4. The strength of the cast stone for each series of 3 cores will be considered satisfactory if the average compressive strength is equal to at least 85 percent of the 28-day design compressive strength and no single core is less than 75 percent of the 28-day design compressive strength.

    a. Test results will be made in writing on the same day that tests are performed, with copies to Owner, Contractor, and cast stone fabricator. Test reports will include the following:
    b. Project identification name and number.
    c. Date when tests were performed.
    d. Name of cast stone fabricator.
    e. Name of testing laboratory.
    f. Identification letter, name, and type of cast stone unit or units represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of cast stone as placed.

E. Defective Work: Cast stone units that do not comply with the specified requirements, including compressive strength, manufacturing tolerances, and finishes, are unacceptable. The Contractor shall remove and replace defective Work with cast stone units that comply with the specified requirements at no cost to the Authority.

F. Additional testing, at Fabricator's expense, will be performed by the Authority's testing laboratory to determine compliance of corrected Work with specified requirements.

G. The Architect/Engineer shall have the option to reject any patches, repairs, and/or entire fabricated cast stone elements, if they do not meet the criteria established above.

3.10 ADJUSTING AND CLEANING

A. Remove and replace stained and otherwise damaged units and units not matching approved Samples.

B. Replace units in a manner that results in cast stone matching approved Samples and Mock-Ups, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean cast stone as work progresses. Remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, and after completion of other work liable to damage or soil cast stone units, clean exposed cast stone as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.

3. Clean in conjunction with the cleaning of all other masonry work. Do not clean in temperature below 50° F. Clean by scrubbing with soap powder and water, applied vigorously with stiff fiber brushes, adding clean, sharp, fine, white sand to the soap and water mixture where necessary. After scrubbing, drench all surfaces of the cast stone units thoroughly with clean water. The use of sand blast, wire brushes; or acids of any kind will not be permitted under any circumstances for the cleaning of cast stone work. Start the cleaning operation at the top of the structure and proceed downward.

END OF SECTION

SECTION 057300 - INSTALLING WROUGHT-IRON ORNAMENTAL HANDRAILS AND RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Fabrication and installation of a new wrought iron ornamental railing on the historic north entrance to the Library.

B. This procedure includes guidance on replacing deteriorated handrails and railing systems with new iron ornamental railings.

C. Related Sections include the following:

1. Division 07 Section "Joint Sealants" for installation at posts/anchors into masonry.

1.2 DEFINITIONS

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

B. Definitions in ASTM E 985 for railing-related terms apply to this section.

1.3 COORDINATION AND SCHEDULING

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

B. Coordinate installation of anchorages for railings. Furnish shop drawings, including anchorages into masonry with non-shrink grout. Deliver items to Project site in time for installation.

C. Schedule installation so attachments are made only to completed building components. Do not support railings temporarily by any means that do not meet structural performance requirements.

1.4 PERFORMANCE REQUIREMENTS

A. General: In engineering handrail and railing systems to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. Iron: 72 percent of minimum yield strength.

B. Structural Performance of Handrails and Railing Systems: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

D. Thermal Movements: Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of handrails and railings to prevent buckling, opening up of joints, and over-stressing of components, connections, and other detrimental effects. Base design calculation on actual surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.5 ACTION SUBMITTALS

A. Product Data: For the following:

1. Non-shrink grout and paint products.

B. Shop drawings showing fabrication and installation of handrails and railings including plans, elevations, sections, details of components, and attachments to other units of Work.

1.6 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain handrails and railing systems through one source from a single manufacturer.

B. Producer Qualifications: Firm experienced in successfully producing new iron products similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.

C. Standards: Comply with applicable recommended specifications of the following except to the extent more stringent requirements are indicated.

1. Steel Structures Painting Council (SSPC).

D. Mockups: Build mockups of railing to demonstrate aesthetic effects and set quality standards for execution, fabrication, and installation.

1. Build mockups for finish of railing consisting of scrolled end, two posts, top rail, and anchorage system components that are full height and are not less than 48 inches in length. Each type of exposed finish prepared on metal of the same alloy to be used for the Work of this Section; 12 inches showing stepped coats.

2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Contracting Officer specifically approves such deviations in writing.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls, steps, pavement, and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Coordinate fabrication schedule with construction progress to avoid delay of Work.
2. Provide allowance for trimming and fitting at site.

1.8 DELIVERY, STORAGE AND HANDLING

Storage and Protection: Store handrails and railing systems in clean, dry location, away from uncured concrete and masonry products, protected against damage of any kind, including from weather, moisture, soiling, abrasion, extreme temperatures, and humidity. Cover securely with waterproof polyethylene sheeting; allow for air circulation inside the covering.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes. Exposed-to-view surfaces exhibiting imperfections inconsistent with existing materials are unacceptable.

B. Genuine Wrought Iron: Pure iron with not more than 0.035 percent carbon, containing slag (iron silicate); hand worked or machine forged to the form indicated.

2.2 ACCESSORIES

A. Grout and Anchoring Cement:

1. Non-shrink Nonmetallic Grout: Premixed, factory- packaged, nonstaining, noncorrosive, nongaseous grout. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this procedure such as "Bonsal Construction Grout" (W. R Bonsal Co.), "Diamond- Crete Grout" (Concrete Service Materials Co.), "Euco N-S Grout" (Euclid Chemical Co.), or approved equal.

B. Construction Sealant: Provide manufacturer's standard chemically curing, elastomeric single component, nonsag, urethane sealant for joints between dissimilar materials. complying with applicable requirements Division 07 Section “Joint Sealants."

C. Primer: Provide a two-component, moisture-cured organic, urethane zinc-rich coating. Follow manufacturer’s requirements for surface preparation, including removal of all existing coatings and surface corrosion.

1. 90-97 Tneme-zinc; Tnemec.

D. Intermediate: High solids, epoxy-polyamide coating.

1. Series 27 Typoxy, or Series 69 Hi-Build Epoxoline; Tnemec.

E. Finish Paint: High-build aliphatic acrylic polyurethane coating in custom color to match approved mock-up.

1. Series 73 Endura-Shield; Tnemec.

F. Miscellaneous Products: Base selection of materials and methods of use 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 surfaces, including surrounding surfaces not in contract.
   b. Leave an unintended residue on surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Architect/Engineer to examine substrates to receive anchors, to verify that locations of proposed reinforcement locations.

B. Coordinate installation of anchorages for railings. Furnish shop drawings, including anchorages that are to be embedded in masonry construction with non-shrink grout. Deliver items to Project site in time for installation.

3.2 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads per code and as shown on Drawings.

B. Preassemble railing systems in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

C. Form changes in direction of railing members by radius bends of radius as designated, and by bending, as required.

D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain profile of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

E. Connections: Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

F. Provide inserts and the anchorage devices as needed for connecting handrails and railing systems to masonry work. Fabricate anchorage devices capable of withstanding loadings imposed by handrails and railing systems. Coordinate anchorage devices with supporting structure.

G. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.

H. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

I. Fabricate joints that will be exposed to weather in a manner to exclude water.

J. After installation fill sealant joints with specified joint sealant according to Division 07 Section "Joint Sealants." Utilize primer, backer rod, or other installation materials as recommended by sealant manufacturer and as required by existing conditions.

1. Install sealant using only proven 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.

2. 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.

K. Close ends of returns so clearance between end of the railing and wall is 1/4 inch or less.

L. Finishes:

1. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

2. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are not acceptable if they are within 1/2 of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved samples and they are assembled or installed to minimize contrast.

3. Surface Preparation: Wipe exposed metal surfaces with solvent after completion of fabrication of replacement members. Completely dry all surfaces.

4. Apply primer to exposed metal surfaces within 24 hours, and to comply with coating manufacturer's written instructions. Apply and cure intermediate and finish coat as recommended by paint manufacturer.

   a. Apply one coat of primer with dry film thickness of 2.5-3.5 mils.
   b. Apply one coat of intermediate paint with dry film thickness of 2.0-3.0 mils.
   c. Apply one coat of finish paint with dry film thickness of 2.0-3.0 mils.

3.3 INSTALLATION, GENERAL

A. Fit exposed connections accurately together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installation of handrails and railings. Set handrails and railing accurately in location, alignment, and elevation, measured from established lines and levels and free from rack. TAKE CARE SO AS NOT TO DAMAGE ADJACENT HISTORIC MATERIALS, SUCH AS BROWNSTONE, GRANITE, OR WOOD.

1. Do not weld, cut, or abrade surfaces of handrails and railing components that have been coated or finished after fabrication and are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/4 inch in 12 feet.
3. Align rails so that variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/16 inch in 3 feet.

C. Corrosion Protection: Coat concealed surfaces of masonry or dissimilar metals, which will be in contact with grout, with a heavy coat of bituminous paint or zinc chromate primer.

D. Adjust handrails and railing systems prior to anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated but not less than that required by structural loads. AVOID ORIGINAL ANCHORAGE LOCATIONS TO ENSURE A SOLID SUBSTRATE IS ESTABLISHED.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction. ARCHITECT/ENGINEER TO INSPECT CONNECTIONS AND AVOID ORIGINAL ANCHORAGE LOCATIONS.

3.4 WELDED CONNECTIONS

A. Use fully welded joints for permanently connecting railing components by welding. Cope or butt components to provide 100 percent contact or use manufacturer's standard fitting designed for this purpose.

B. Weld new iron to existing cast-iron with 99% nickel rod in accordance with procedures recommended by the American Welding Society.

3.5 ANCHORING POSTS

A. Core-drill holes not less than 5 inches deep and 3/4 inch larger than outer diameter of post for installing posts in masonry. Clean holes of loose material, insert posts, and fill annular space between post and masonry with non-shrink grout for proposed anchors, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch buildup, sloped away from post.

3.6 PROTECTION

A. Protect finishes of railings and handrails from damage during cleaning period by use of temporary protective coverings approved by fabricator. Remove protective covering at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so that no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

3.7 ADJUST AND CLEAN

A. At completion of work all decorative cast-iron elements shall be in sound, like-new condition.

END OF SECTION

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Surface preparation and installation of sealant in joints.

1. Sealant installation at joints between differing materials (i.e. broanwstone to granite, granite to metal, brownstone to metal, brownstone to wood, etc.).

B. Related Sections include the following:

1. Division 04 Section "Stone Restoration" for sealant installation during stone restoration work.
2. Division 04 Section "Cast Stone Masonry" for sealant installation following cast stone masonry installation.
3. Division 07 Section "Installing Wrought-Iron Ornamental Handrails And Railings" for sealant installation following wrought iron installation.

1.2 REFERENCES

A. Reference Standards: Latest edition as of Specification date.

1. ASTM International:

a. C920: Standard Specification for Elastomeric Joint Sealants.
b. C1193: Standard Guide for Use of Joint Sealants
c. C1248: Standard Test Method for Staining of Porous Substrate by Joint Sealants.
d. C1521: Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordinate Work to ensure that adjacent areas are not adversely affected; that new materials and building interior are kept continuously dry; and that continuous, watertight, new sealant installation is provided. Coordinate:

1. With Owner’s Representative.

2. With other trades:

a. To ensure that work done by other trades is complete and ready for sealant Work.
b. To avoid or minimize work on, or in immediate vicinity of, sealant Work in progress.
c. To ensure that subsequent work will not adversely affect completed sealant Work.

1.4 SUBMITTALS

A. Product Data: Sealant manufacturer's literature including written instructions for evaluating, preparing, and treating substrate; technical data including tested physical and performance properties; and installation instructions.

1. Include temperature ranges for storage and application of materials, and special cold-weather application requirements or limitations.
2. Include Product Data for substrate cleaner and substrate primer recommended by sealant manufacturer for specific substrate surface and conditions.
3. Include Safety Data Sheets (SDS) for information only; safety restrictions are sole responsibility of Contractor.

B. Samples: Sealant manufacturer's color sample card, either printed or with thin sealant beads, showing range of colors available for each product exposed to view. Color to be selected by Architect/Engineer.

C. Manufacturer's Reports and Certifications:

1. Prior to sealant installation, submit report from sealant manufacturer with results of sealant compatibility, sealant and substrate staining, and mockup adhesion tests. Report shall:

a. State that materials which come into contact with or in close proximity to sealant have been tested.
b. Include sealant manufacturer's interpretation of test results relative to material performance, potential staining of sealant and substrates, dirt accumulation of sealant, and dirt runoff from sealant.
c. Include sealant manufacturer's recommendations for substrate preparation and primer needed to obtain durable adhesion and installation procedures successfully used in mockups and field tests.

2. Product Certificates: For each sealant product, accessory, related products, joint type, and substrate, sealant manufacturers' written approval of their products' use for specified conditions; based on mockups and preconstruction testing.

D. Installer Qualifications:

1. Certificate signed by sealant manufacturer, certifying that Installer complies with requirements. Consult with Architect/Engineer if this is not feasible.

E. Sample Warranty: Copy of sealant manufacturer's warranty, stating obligations, remedies, limitations, and exclusions. Submitted with bid.

F. Following completion of the Work:

1. Completed warranty from sealant manufacturer.
2. Completed warranty from Installer.

1.5 QUALITY ASSURANCE

A. Stain Testing: Conduct stain tests according to ASTM C1248 or actual in situ testing, on actual substrate materials with orientation and exposure that replicates finished joint conditions, to verify that sealants will not stain joint substrates.

B. Compatibility Tests: Include sealant and sealers or coatings that may come into contact with sealant following sealant installation.

C. Mockups: Install three linear feet of sealant (approximately 1.5 feet horizontal and 1.5 feet vertical) in each type of joint to verify and set quality standards for materials and installation procedures, and to demonstrate aesthetic effects.

1. Include each type of backing material, sealant, primer and other related products.

2. Mockups shall be accessible or located as indicated by Architect/Engineer and approved by Owner.

3. Notify Owner and Architect/Engineer seven days in advance of date when mockups will be constructed.

4. Field-Adhesion Testing: After sealants have cured, perform field-adhesion tests according to ASTM C1521.

a. Conduct tests for each type of sealant and joint substrate, with and without primer.
b. Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Use alternate materials or modify installation procedure, or both, for sealants that fail to adhere to substrates.

5. If Architect/Engineer determines mockup does not comply with requirements, modify mockup or construct new mockup until mockup is approved.

6. Mockups, when approved by Owner and Architect/Engineer, will become standard for Work.

7. Approved mockups may become part of completed Work if undisturbed at time of Substantial Completion.

8. Do not begin joint sealant Work until mockup is accepted by Owner and Architect/Engineer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials according to manufacturer's recommendations and in such a manner as to prevent damage to materials or structure.

B. Deliver materials to Site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, lot number, and directions for storing and mixing with other components.

C. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, or installation. Reject and remove from Site new materials which exhibit evidence of moisture during application or which have been exposed to moisture.

D. Store materials in original, undamaged containers and packaging in clean, dry, protected location on raised platforms with weather-protective coverings, within temperature range required by manufacturer. Protect stored materials from direct sunlight. Manufacturer's standard packaging and covering is *not* considered adequate weather protection.

E. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.

F. Conspicuously mark wet or damaged materials and remove from Site as soon as possible.

G. Remove and replace materials that cannot be applied within stated shelf life.

1.7 PROJECT CONDITIONS

A. Verify existing dimensions and details prior to start of sealant Work. Notify Architect/Engineer of conditions found to be different than those indicated in the Contract Documents. Architect/Engineer will review situation and inform Contractor and Installer of changes.

B. Comply with Owner's limitations and restrictions for Site use and accessibility.

C. Environmental Limitations: Install sealant when existing and forecast weather conditions permit sealant to be installed according to sealant manufacturer's written instructions and warranty requirements.

1. Do not install sealant when ambient or substrate temperatures are below 40 degrees F or are expected to fall below 40 degrees F in next 12 hours.
2. Do not proceed with installation during inclement weather except for temporary work necessary to protect building interior and installed materials. Remove temporary work and Work that becomes moisture damaged.

D. Handle and install materials in strict accordance with safety requirements required by sealant manufacturer; Safety Data Sheets (SDS); and local, state, and federal rules and regulations. Maintain Safety Data Sheets (SDS) with materials in storage area and available for ready reference on Site.

1.8 CHANGES IN WORK

A. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the integrity or performance of the Work.

1. Notify Architect/Engineer of conditions that may interfere with the proper execution of the Work or jeopardize the performance of the Work prior to proceeding with the Work.

1.9 WARRANTY

A. Manufacturer's Warranty:

1. Written warranty, signed by sealant manufacturer, including:

a. Repair or replace sealant that does not comply with requirements; that does not remain watertight; that fails in adhesion, cohesion, or general durability; or that deteriorates in a manner not clearly specified by submitted sealant manufacturer's data as an inherent quality of the material for the application indicated.

b. Removal and replacement with new bond breaker materials.

c. Labor and materials to perform warranty Work.

d. Warranty does not include sealant deterioration or failure due to the following.

1) Excessive joint movement caused by structural settlement or errors attributable to design or construction, resulting in stresses in sealant exceeding sealant manufacturer's written specifications for sealant elongation or compression.
2) Deterioration or failure of sealant due to failure of substrate prepared according to requirements.
3) Mechanical damage caused by individuals, tools, or other outside agents.
4) Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

2. Warranty Period: 20 years from date of Substantial Completion.

B. Installer's Warranty:

1. Completed warranty form at the end of the Section, signed by sealant Installer, including:

a. Repair or replace sealant that does not comply with requirements; that does not remain watertight; that fails in adhesion, cohesion, or general durability; or that deteriorates in a manner not clearly specified by submitted sealant manufacturer's data as an inherent quality of the material for the application indicated.

b. Removal and replacement with new bond breaker materials.

c. Labor and materials to perform warranty Work.

d. Warranty does not include sealant deterioration or failure due to the following.

1) Excessive joint movement caused by structural settlement or errors attributable to design or construction, resulting in stresses in sealant exceeding sealant manufacturer's written specifications for sealant elongation or compression.
2) Deterioration or failure of sealant due to failure of substrate prepared according to requirements.
3) Mechanical damage caused by individuals, tools, or other outside agents.
4) Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

2. Warranty Period: Seven (7) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ELASTOMERIC JOINT SEALANTS

A. General:

1. Comply with ASTM C920 and other requirements indicated.
2. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing on similar projects, mockups and preconstruction testing for Project, and field experience.
3. Select products based on mockups, preconstruction testing, and sealant manufacturer's previous testing and experience.
4. Source Limitations: Obtain each type of joint sealant through one source from single manufacturer.
5. Colors of Exposed Joint Sealants: Selected and approved in writing by Architect/Engineer to match color of original mortar, from sealant manufacturer's full range.

B. Single-component, Non-sag, Silicone Sealants:

1. 795 Silicone Building Sealant manufactured by Dow Corning Corporation.
2. 864 NST manufactured by Pecora Corporation.
3. SCS2000 SilPruf manufactured by Momentive Performance Materials Inc.

2.2 AUXILIARY MATERIALS

A. General: Sealant-backer materials, primers, surface cleaners, masking tape, and other materials recommended by sealant manufacturer, that are non-staining and compatible with

substrates; based on mockups, preconstruction testing, and sealant manufacturer's previous testing and experience.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions with Installer and sealant manufacturer's representative for compliance with requirements and for other conditions affecting installation or performance of sealant.

1. Verify dimensions of sealant joints at Site by field measurement so that proper sealant profiles will be accurately maintained.
2. Ensure that work done by other trades is complete and ready for sealant Work.
3. Verify that areas and conditions under which sealant Work is to be performed permit proper and timely completion of Work.
4. Notify Architect/Engineer in writing of conditions which may adversely affect installation or performance of sealant, including joints with widths less than those allowed by sealant manufacturer for applications indicated, and recommend corrections.
5. Do not proceed with sealant Work until adverse conditions have been corrected and reviewed by Architect/Engineer.
6. Commencing sealant Work constitutes acceptance of Work surfaces and conditions.

3.2 PROTECTION

A. Take precautions to ensure safety of people, including building users, passers-by, and workmen, and animals, and protection of property, including adjacent building elements, landscaping, and motor vehicles.

B. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.

D. Limit access to Work areas.

E. Erect temporary protective canopies, as necessary, over walkways and at points of pedestrian and vehicular access that must remain in service during Work.

F. Comply with sealant manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products.

G. Cover adjacent surfaces with materials that are proven to resist sealant.

H. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

3.3 SURFACE PREPARATION

A. Remove existing sealant or mortar and other foreign material from joints.

B. Repair damaged or deteriorated substrate surfaces according to sealant manufacturer's written instructions and as approved by Architect/Engineer.

C. Clean joint substrates immediately before installing sealant, to comply with sealant manufacturer's written instructions based on mockups and preconstruction testing.

1. Remove from substrate foreign material that could interfere with adhesion of sealant, including dirt, dust, existing sealant, oil, grease, and surface coatings.
2. Provide dry substrate; prevent wetting of substrate prior to sealant installation.
3. Clean porous substrates, such as masonry and wood, by brushing, or combination of methods to produce clean, sound substrate capable of developing optimum bond with sealant. Remove laitance and form-release agents from concrete. Remove loose particles remaining after cleaning operations by vacuuming or blowing out joints with oil-free, compressed air.
4. Clean nonporous surfaces, such as metal, with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of sealant.
5. Joints with silicone sealant should generally be masked as subsequent cleanup of spillage and smears may be very difficult.

D. Install masking tape on adjacent surfaces to prevent permanent staining or damage due to contact with sealant or cleaning methods to remove sealant smears. Install masking tape on sides of joints where sealant will be recessed. Remove tape immediately after tooling sealant, without disturbing sealant.

3.4 INSTALLATION OF SEALANT

A. General: Comply with sealant manufacturer's written installation instructions for products and applications indicated, based on mockups and preconstruction testing.

B. Joint Priming: Prime joint substrates where recommended in writing by sealant manufacturer, based on mockups and preconstruction testing. Apply primer to comply with sealant manufacturer's written instructions.

1. Confine primer to areas of sealant bond; do not allow spillage or migration onto adjoining surfaces.
2. Limit priming to areas that will be covered with sealant in same day. Unless recommended otherwise by sealant manufacturer, reprime areas exposed for more than 24 hours.

C. Install sealant backer and position to produce cross-sectional shape and proper depth of installed sealant.

1. Use properly-sized backer. Do not use multiple-backer units or braided-backer units to accommodate wide joints.
2. Install backer with device that will provide consistent depth between substrate surface and outer surface of backer.
3. Do not leave gaps between ends of sealant backers.
4. Do not stretch, twist, puncture, or tear sealant backers.
5. Remove wet backers and replace with dry materials.

D. Install sealant immediately after installing backer material; to produce uniform, cross-sectional shape and depth; to directly contact and fully wet joint sides and backer material; and to completely fill recesses in joint configuration.

1. Install sealant flush with surface.
2. Immediately after sealant application and before skinning or curing begins, tool joint with slightly concave surface, compressing sealant into joint to form smooth, uniform sealant bead; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Do not use tooling agent.

3.5 FIELD QUALITY CONTROL

A. At completion of Project, observe installed sealant for damage or deterioration. If damage or deterioration occurs, neatly cut out and remove damaged or deteriorated sealant, prepare and prime surfaces, and install new sealant. Replace sealant immediately so new sealant is indistinguishable from original Work.

B. Field-Adhesion Testing: Architect/Engineer will perform non-destructive and destructive field adhesion tests on sealant in accordance with ASTM C1521.

1. Non-destructive testing:

a. Depress center of sealant bead with probing tool to depth of 50 percent of bead width, or depress sealant bead near substrate bond-line until it appears visually that sealant is about to fail in cohesion.
b. Record if sealant failed and, if so, if failure was adhesive or cohesive and maximum surface depression as percent of joint width.
c. Perform test every 12 inches for first 10 linear feet of joint; if no test failure is observed, test every 24 inches thereafter.

2. Destructive testing:

a. Cut 6-inch-long tail of sealant loose from substrate.
b. Mark tail 1 inch from adhesive bond.
c. Grasp tail 1 inch from adhesive bond and pull until tail extends to 2x the published movement capability of sealant. If sealant has not failed, continue pulling to failure.

d. Record elongation at failure and if failure was adhesive or cohesive.
e. Observe sealant for complete filling of joint with absence of voids, and for joint configuration in compliance with requirements. Record observations and sealant dimensions
f. Perform test every 100 feet for first 1,000 linear feet of joint; if no test failure at 2x the movement capability occurs, test every 1,000 feet thereafter or approximately once per floor per elevation, whichever is more frequent.

3. Test reports shall include date when sealant was installed, name of person who installed sealant, test date, test location, and whether primer was used.

4. Immediately after testing, Contractor shall replace failed sealant in test areas. Neatly cut out and remove failed sealant, prepare and prime surfaces, and install new sealant. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

5. Sealant not evidencing adhesive failure from testing or noncompliance with requirements will be considered satisfactory.

6. Where Architect/Engineer determines that sealant has failed adhesively from testing or does not comply with requirements, additional testing will be performed to determine extent of non-conforming sealant. Neatly cut out and remove non-conforming sealant, prepare and prime surfaces, and install new sealant. Perform field adhesion tests on new sealant. Additional testing and replacement of non-conforming sealant shall be at Contractor's expense.

3.6 CLEANING

A. As sealant Work progresses, clean off excess sealant or sealant smears by methods and with cleaning materials approved in writing by sealant manufacturer and manufacturers of products in which joints occur. Exercise care to avoid scratching or damage to surfaces.

B. At the end of each workday, clean Site and Work areas and place rubbish, empty cans, rags, and other discarded materials in appropriate containers.

C. After completing sealant Work:

1. Repair surfaces stained, marred, or otherwise damaged during sealant Work.
2. Clean up debris and surplus materials and remove from Site.

3.7 PROTECTION

A. Protect sealant during and after curing period from contact with contaminating substances and from damage, so sealants are without deterioration or damage at time of Substantial Completion.

END OF SECTION