ALEXANDRIA CITY PUBLIC SCHOOLS

GEORGE WASHINGTON MIDDLE SCHOOL

CONSTRUCTION DOCUMENTS

EXTERIOR WALL REPAIRS

February 28, 2017

Prepared by:
Gale Associates, Inc.
1122 Kenilworth Drive, Suite 206
Towson, MD 21204-2143
443-279-4500

GALE JN 670589

Prepared for:
Alexandria City Public Schools
Education Facilities: Planning, Design & Construction Office
1340 Braddock Place
Alexandria, VA 22314
# Table of Contents

**Division 01 - General Requirements**
- 011100 Summary of Work
- 012200 Unit Prices
- 013300 Submittal Procedures
- 015000 Temporary Facilities and Controls
- 017700 Closeout Procedures

**Division 03 - Concrete**
- 033000 Cast in Place Concrete

**Division 04 - Masonry**
- 040110 Masonry Cleaning
- 040120 Maintenance of Unit Masonry
- 040140.61 Stone Repair
- 040140.62 Stone Repointing
- 047200 Cast Stone Masonry

**Division 07 - Thermal and Moisture Protection**
- 076000 Flashing and Sheet Metal
- 079200 Joint Sealants

**Division 08 - Openings**
- 085101 Aluminum Windows and Glazing

**Division 09 - Finishes**
- 099100 Painting

**List of Drawings**
- G-001 Cover Sheet
- G-002 Standard Abbreviations, Legend, Symbols and General Notes
- C-101 Site Plan
- A-200 Schedule of Work
- A-201 Elevations
- A-202 Elevations
- A-203 Elevations
- A-204 Elevations
- A-205 Elevations
- A-206 Elevations
- A-207 Elevations
- A-208 Elevations
- A-209 Elevations
- A-210 Elevations
- A-211 Elevations
- A-501 Typical Masonry Repair Details
- A-502 Typical Masonry Repair Details
- A-503 Typical Masonry Repair Details
- A-504 Typical Masonry Repair Details
- PH-01 Photos
- PH-02 Photos
PART 1 - GENERAL

1.1 SUMMARY

A. This Section outlines the scope of work included in the exterior wall repair project at 1005 Mount Vernon Avenue in Alexandria, VA. Refer to the appropriate specification section for further information about installation methods and components to be provided. In general, the work includes, but is not limited to, the following items:
   1. Remove and replace cracked/spalled or otherwise damaged brick masonry and point mortar joints where indicated (Division 04 Section “Maintenance of Unit Masonry”).
   2. Clean limestone and cast stone masonry throughout (Division 04 Section “Masonry Cleaning”).
   3. Repair cracked/spalled or otherwise damaged stone at exterior walls (Division 04 Section “Stone Repair”).
   4. Remove damaged limestone panels and provide cast stone replacement panels (Division 04 Section “Cast Stone Replacement”).
   5. Provide precast capstones at entrances (Division 04 Section “Cast Stone Masonry”).
   6. Remove and replace sealant and backer material at fenestrations and at base of exterior walls at hardscape locations (Division 07 Section “Joint Sealants”).
   7. Remove and replace window assembly (Division 08 “Aluminum Windows and Glazing”).

B. The Contract Documents showing the existing construction of the facility were developed from historic documents and from limited field observations by the Architect and its consultants. Actual conditions may vary from those shown. Hidden conditions may be discovered over the course of the work. Further investigations may uncover conditions which may require remedial attention prior to proceeding with demolition or construction. Contractor shall be aware of the need to proceed with diligence and care and shall notify Architect of conditions which do not reflect those indicated or which require further testing and repair prior to proceeding. Contractor shall correct conditions that are detrimental to timely and proper execution of the Work. Contractor shall not proceed until unsatisfactory conditions have been corrected. Commencement or continuation of work constitutes acceptance of conditions and responsibility for satisfactory performance.

1.2 PROJECT CONDITIONS

A. The building will be occupied and in use during construction. Take necessary precautions to create as little disturbance or disruption to the building and its occupants as possible during the work.

B. Supply, install, and maintain barriers, protection, warning lines, lighting, and personnel required to segregate the work area(s) from pedestrian or vehicular traffic, as well as to prevent damage to the building, its occupants, and the surrounding landscaped and paved areas. The Contractor shall observe all applicable OSHA and MOSHA requirements.
C. Schedule and execute work without exposing the building interior to the effects of inclement weather. Protect the building and its occupants against such risks and repair/replace work-related damage to the Owner’s satisfaction.

D. Supply labor, equipment, scaffold, platforms, tools and appliances necessary for the proper completion of the work.

E. Do not install masonry or sealants during precipitation, including fog, or when air temperature is below 40° F (4° C) (or is expected to go below 40° F) (4° C) during application, or when there is ice, frost, moisture, or visible dampness.

F. Phased or temporary construction will only be permitted as specified. Schedule, execute, and coordinate work on a daily basis so that components are installed completely and permanently as specified.

G. Supply shoring, supports, and other items or materials necessary to brace and support the structure, fixtures, and facilities affected by the work. This includes, but is not limited to, heating and air handling ducts, lighting, antennas, balustrades, awnings, rooftop equipment and other items presently supported by or suspended from the walls to be repaired, and associated structural members.

H. All work shall be performed in accordance with the International Building Code (IBC) in effect at the time of Bid and applicable Federal, State, and local code amendments, requirements, and publications.

I. All workmanship and materials shall be of the best construction practice. Should a conflict arise between the specification requirements and those of the referenced publications, the better quality or more stringent requirement will prevail. Specification requirements that exceed the minimum requirements of the manufacturer shall be complied with by the Contractor.

J. Coordinate the work in this Section with other Sections, including preparatory work, building protection, daily clean-up, and protection of building, and occupants.

K. Supply labor, vacuums, tools and appliances necessary to keep the interior and exterior building and site areas below and around the construction clean, with as little accumulation of dust and debris as possible on a daily basis.

L. Work will be observed by an on-site monitor paid for by the Owner.

M. Contractor will provide unlimited access to swing stage scaffolding to the Engineer of Record, Owner’s representative, and third party Special Inspector throughout the duration of the project; will operate motors during observations/inspections; and will provide rope safety lines. The full height of the façade will be evaluated by Owner at each swing stage scaffold location.

1.3 REFERENCES

A. Applicable publications: Publications listed herein form a part of this Specification to the extent referenced and are indicated in the text by basic designation only. Applicable publications referenced shall be those that were issued and in use at the time of the Bid Submission.
1.4 PRECONSTRUCTION CONFERENCE

A. A preconstruction conference will be held with the Owner’s Representatives, Contractor, and involved trades to discuss all aspects of the project. The Contractor’s foreman or field representative will attend this conference. The foreman must be English-speaking and shall be on site at all times that work is performed.

B. The Owner shall reserve the right to require an alternate superintendent and/or foreman.

C. The preconstruction conference shall not be held until all specified submittals have been received, reviewed and accepted as to form by the Owner and Owner’s Representative.

D. Delivery of materials and commencement of construction shall not proceed until the preconstruction conference is held. Delays in obtaining a complete set of submittals shall not extend the contracted completion date.

1.5 EMERGENCY RESPONSE

A. The Contractor shall provide the Owner with after-hours (24 hour) emergency telephone numbers of the Contractor’s superintendent and foreman.

B. The Contractor must respond to emergency situations or calls within two (2) hours.

1.6 CONSTRUCTION SCHEDULE

A. The Contractor shall be permitted to perform all aspects of the work based upon the following conditions:
   1. The Owner has reviewed and approved the Contractor’s construction schedule.
   2. The Owner determines that the disruption to building occupants from the construction is tolerable.

B. Proper coordination of all aspects of the work by the Contractor and any sub-trades is critical to ensure proper installation and performance of the work. The Contractor’s Construction Schedule shall clearly outline the coordination between job tasks of all involved disciplines. Subject to review and acceptance by the Owner, this Schedule will be strictly adhered to by the Contractor and sub-trades.

C. The Contractor’s Construction Schedule shall clearly identify the on-site crew foreman and the size of the crew to be utilized. The crew size shall remain consistent and work shall be continuous throughout the project, from start-up to completion.

D. The Owner shall review the Contractor’s Construction Schedule prior to the start of any work. After defining the location(s) of the work progress, the Owner shall arrange to control occupancy in the building to the greatest extent possible. It shall be the responsibility of the Contractor to supply the Owner with written notice, 72 hours in advance, if his work location(s) for a workday is different from the schedule. The Contractor shall update his Construction Schedule weekly and submit a copy to the Owner for review.
1.7 SCHEDULE OF VALUES
   A. Provide a line item breakdown of construction labor and materials costs for each identified
      Scope of Work item included in these Contract Documents. Additionally, provide line item
      values for any Unit Price. Utilize AIA Forms G702 and G703, to prepare and submit the
      Schedule of Values.

1.8 WORK HOURS
   The Contractor will be allowed to work at the project site, including noise restrictions, between
   the hours of 7:30 am and 4:30 pm, local time, Monday through Friday. Work outside these
   hours may be allowed with 48 hours minimum written notice to the Owner. Work on Saturday
   or Sunday may be performed from 8:00 am to 4:30 pm, with prior approval from the Owner.
   The Owners reserves the right to disapprove or suspend a request to work outside of normal
   working hours. If interior access is required after hours, weekend, or holidays, Contractor must
   give 72 hours’ notice for coordination.

1.9 PROGRESS MEETINGS
   A. Progress meetings shall be scheduled bi-weekly by the Owner or as deemed necessary.

1.10 OWNER AND ENGINEER REPORTING DEFICIENCIES
   A. The Owner and Engineer, and other design consultants will visit the site periodically and may
      issue field reports to the Contractor Field Superintendent. Any issues or deficiencies in the
      Work identified in any such field reports shall be recorded in the Construction Progress
      Documentation reports and corrected.
   B. Progress meetings will be conducted regularly (typically every two weeks) by the Owner’s
      Representative and shall be attended by the Owner, Contractor, Contractor Field
      Superintendent, and applicable sub-contractor. Any issues or deficiencies in the Work identified
      in these meetings shall be recorded in the Construction Progress Documentation and corrected.

1.11 DIMENSIONS AND QUANTITIES
   A. The Project Plans and Drawings have been compiled from observations only and may not
      reflect the actual field conditions at the time of construction. It is the contractor’s responsibility
      to verify dimensions and quantities in the field prior to bid submission.
   B. The Contractor is solely responsible for means and methods of construction. Make necessary
      investigations to become familiar with the project conditions.
   C. Additional compensation due to unfamiliarity with project conditions will not be considered.
   D. In case of inconsistency between Drawings and Specifications or within either document, the
      better quality and/or greater quantity of work shall be provided, as determined by the Owner.
1.12 MATERIAL AND SAFETY DATA SHEETS
   A. Material safety data sheets (MSDS) shall be submitted in complete sets for all products to be used prior to any work being performed.

1.13 GUARANTEES AND WARRANTIES
   A. Refer to specific Sections of this specification for systems and product warranty requirements. Verify with Manufacturer of proposed systems and products that specified warranty requirements are acceptable, without exception, prior to selecting materials for use on this project.
   B. Submit a full Contractor's Guarantee of the Work to be free from defect in materials and workmanship upon Substantial Completion, and prior to final payment. This Guarantee shall be for a period of five (5) years from the date of Substantial Completion, and shall be signed by a Principal of the Contractor’s firm, and sealed if a corporation.

1.14 CLEAN-UP
   A. Restore property of the Owner to its original condition prior to the start of construction. Refer to Division 01 Section “Temporary Facilities and Controls.” General clean-up of the site shall be performed on a daily basis.
   B. Clean, restore, and/or replace items stained, dirtied, discolored, or otherwise damaged due to the Work, as required by the Owner.
   C. Clean roof, building (interior and exterior), landscaped areas, and parking areas so they are free of trash, debris and dirt caused by or associated with the Work.
   D. Sweep paved areas clean.

1.15 PERMITS
   A. The Contractor will obtain and pay for any and all permits required to perform the work.

1.16 OWNER OCCUPANCY
   A. Owner will occupy premises during entire construction period. Cooperate with Owner in scheduling operations to minimize conflict with Owner’s use of facility.
   B. Utility Shutdowns: Obtain written approval from the Owner for any required shutdown or outage of any utility. Schedule any outages to minimize impact on existing operations. Comply with all applicable codes and ordinances.
1.17 PRE-JOB SURVEY OF FACILITY

A. Perform a thorough pre-job survey of the façade and all required work items. The Contractor shall confirm the quantities of work items prior to initiating work. Quantities, if different from those indicated on the Drawings, shall be brought to the Owner’s attention prior to initiating work. Repairs of additional items not shown on the initial survey will be at the Contractor’s cost.

1.18 CORRECTION OF DAMAGE TO PROPERTY

A. Consider any damage to building or property not identified in the pre-job damage survey as having resulted from execution of this Contract and correct at no additional expense to Owner.

B. The Contractor will include in the Base Bid the cost to perform any exterior wall or roof related repair that is due to Contractor’s faulty workmanship and/or materials.

C. Repair, immediately, damages to facility or site that present a safety hazard or danger to the public.

1.19 SUMMARY OF PROJECT REQUIREMENTS

A. The Work requirements of the Contract are summarized by reference to the Bidding Requirements, the Contract forms, the Conditions of the Contract, the Specification, the Drawings, and Addenda and Contract Modifications, including, but not limited to, the printed matter referenced in these requirements. It is recognized that the Work is affected or influenced by governing regulations, natural phenomenon (including weather conditions), unforeseen conditions uncovered by the Work, and other forces outside of the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011100
SECTION 012200 - UNIT PRICES

1.1 SUMMARY

A. The Owner may elect certain aspects of the work, whose quantity cannot be determined at this time, to be performed or deleted by the Contractor. If such work items are elected or are not performed, the Contract price will be adjusted accordingly by the Unit Price amount shown for each item in the Bid Forms.

1.2 GENERAL CONDITIONS

A. A Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

B. By submitting a bid, the Contractor acknowledges acceptance of the established Unit Prices for their use in determining the value of change work. Prices as stated will remain in effect until final completion of the Contract.

C. Performance of Work not authorized by a Change Order or Field Order, whether or not such work is set forth hereunder as a Unit Price item, shall not be considered cause for extra payment beyond the Contract Sum.

1.3 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Prior to commencing removal or replacement of materials set forth in the schedule of Unit Prices, the Contractor shall notify the Owner in sufficient time to permit proper inspection and measurements to be taken. Only quantities that have been approved in writing by the Owner will be considered in determination of adjustments to the Contract Amount.

C. Unit Prices and quantities are provided to adjust the specific work items because quantity of work is unknown. Work of similar scope as those unit price items contained in and defined by the Construction Documents shall not be considered as Unit Price Work.

D. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent inspector acceptable to Contractor.

E. List of Unit Prices: A list of unit prices and quantities to be provided in the Base Bid is included in Part 3. The quantities shown in the list of unit prices shall be exclusive of the quantities shown on the drawings. Specification sections referenced in the schedule contain requirements for materials described under each unit price.
PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

A. For removal and replacement of more/less stone stair treads than the fifty (50) square feet carried in the Base Bid as outlined in Division 03 Section “Cast In Place Concrete.”

B. For removal and replacement of more/less brick masonry units than the thirty (30) square feet carried in the Base Bid as outlined in Division 04 Section “Maintenance of Unit Masonry.”

C. For the repointing of more/less brick masonry than the two hundred (200) square feet carried in the Base Bid as outlined in Division 04 Section “Maintenance of Unit Masonry.”

D. For shallow spall repair of stone masonry of more/less than the twenty (20) square feet carried in the Base Bid as outlined in Division 04 Section “Stone Repair.”

E. For deep spall repair of stone masonry of more/less than the ten (10) square feet carried in the Base Bid as outlined in Division 04 Section “Stone Repair.”

F. For cracked stone repair of stone masonry of more/less than the twenty (20) linear feet carried in the Base Bid as outlined in Division 04 Section “Stone Repair.”

G. For the removal and replacement of more/less deteriorated/corroded steel lintels than the ten (10) lintels (approximately 50 square feet) carried in the Base Bid as outlined in Division 04 Section “Maintenance of Unit Masonry.”

H. For the removal and replacement of more/less sealant at the fenestration and wall elements than the five hundred (500) linear feet carried in the Base Bid, as outlined in Division 07 Section “Joint Sealants.”

I. For the removal and replacement of more/less sealant at base of exterior walls to hardscape elements than the two hundred (200) linear feet carried in the Base Bid, as outlined in Division 07 Section “Joint Sealants.”

END OF SECTION 012200
PART 1 - GENERAL

1.1 SUMMARY
A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

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

1.3 SUBMITTAL PROCEDURES
A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
      a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
B. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
   1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
   2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
   3. Resubmittal Review: Allow 15 days for review of each resubmittal.
C. Identification: Place a permanent label or title block on each submittal for identification.
   1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.

3. Include the following information on label for processing and recording action taken:
   
a. Project name.
b. Date.
c. Name and address of Architect.
d. Name and address of Contractor.
e. Name and address of subcontractor.
f. Name and address of supplier.
g. Name of manufacturer.
h. Submittal number or other unique identifier, including revision identifier.
   
1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
   
i. Number and title of appropriate Specification Section.
j. Drawing number and detail references, as appropriate.
k. Location(s) where product is to be installed, as appropriate.
l. Other necessary identification.

D. Deviations: Deviations from specifications are considered substitutions. Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals as proposed substitutions. Further identify deviations by providing a written description for each deviation or variation from the contract documents.

E. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

F. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.

G. 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 "Approved or approved as noted."

H. 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.

I. Use for Construction: Use only final submittals with mark indicating "Approved or approved as noted" taken by Architect.
PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

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

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
   a. Manufacturer's written recommendations.
   b. Manufacturer's product specifications.
   c. Manufacturer's installation instructions.
   d. Manufacturer's catalog cuts.
   e. Compliance with specified referenced standards.

4. Number of Copies: Submit four copies of Product Data, unless otherwise indicated. Architect will return two copies. Mark up and retain one returned copy as a Project Record Document.

C. 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, unless submittal of Architect's CAD Drawings is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Dimensions.
   b. Identification of products.
   c. Fabrication and installation drawings.
   d. Roughing-in and setting diagrams.
   e. Shopwork manufacturing instructions.
   f. Templates and patterns.
   g. Schedules.
   h. Notation of coordination requirements.
   i. Notation of dimensions established by field measurement.
   j. Relationship to adjoining construction clearly indicated.
   k. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
3. Number of Copies: Submit two opaque (bond) copies of each submittal. Architect will return one copy.
D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of appropriate Specification Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
   a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

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 three sets of Samples. Architect will retain two Sample sets; remainder will be returned.

E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location.

1. Number of Copies: Submit one copies of product schedule or list, unless otherwise indicated. Architect will return one copy.

F. Construction Schedule: Construction schedule showing sequence and duration of activities.

G. Schedule of Values: Itemize separately labor and materials for each technical section within the Specification as they will be shown on the Application for Payment (use AIA form G703).

H. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design.
1. Number of Copies: Submit three copies of subcontractor list, unless otherwise indicated. Architect will return one copy.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.
   1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies.
   2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
   3. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Requirements."

B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

D. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

E. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

F. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

I. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
J. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.

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

2. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.

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

M. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.

1. Architect will not review submittals that include MSDSs and will return them for resubmittal.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.
C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300
SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for the provision and utilization of temporary facilities to protect the Owner’s property, the site, and construction materials, and for daily maintenance and cleanup of the site during the project.

1.2 CONTRACTOR’S USE OF EXISTING FACILITIES

A. Limit use of the premises to the work indicated, so as to allow for the Owner's uninterrupted occupancy and use. Confine operations to the areas indicated under the Contract. Conformance to the regulations set forth by the Owner regarding use of existing facilities is mandatory.

B. Sanitary facilities shall be provided by the Contractor. Use of the building's sanitary facilities is not permitted.

C. Owner will assist in controlling occupancy. Contractor shall provide and place portable barricades, as coordinated with the Owner, under work areas inside the building.

D. Clean interior and exterior areas affected by the construction on a daily basis. Do not allow construction debris, waste materials, tools, excess packaging materials or other construction related materials to accumulate on the roof, in the facility, or on the exterior grounds and pavements.

E. See Division 01 Section “Product Delivery Requirements” for product storage facilities and requirements.

1.3 UTILITIES

A. Electrical service will be provided to the Contractor free of charge by the Owner through exterior electrical outlets if available and operable. Use shall be limited to construction hours. The Owner reserves the right to charge the Contractor for excessive electrical service usage (i.e., wasteful usage). Should charges be considered, the Owner will notify the Contractor in writing of his intent, 48 hours in advance.

B. Water for construction purposes will be provided to the Contractor free of charge by the Owner through exterior water spigots if operable. The Owner reserves the right to charge the Contractor for excessive or wasteful use. Should charges be considered, the Owner will notify the Contractor in writing of his intent, 48 hours in advance. Drinking water shall be provided by the Contractor.

C. All other utilities required will be provided by the Contractor.
D. Plumbing, heating, and electrical work, including reinstallation of equipment and other work to be performed by the Contractor, shall be carried out without interference to the building's normal operation. Where work requires interruption of service, the Contractor shall make advance arrangements with the Owner for dealing with such interruption.

E. Ensure proper and safe operation and maintenance of utility systems within the construction limits, whether these are supplied by the Owner's distribution system or otherwise, until the work is accepted by the Owner. Maintain and operate appurtenances within the construction area that serve the distribution system, subject to periodic inspection by the Owner's operating personnel. Inspection by any representative or personnel of the Owner shall not relieve the Contractor of his responsibilities in connection with operation and maintenance of these facilities and equipment.

1.4 ACCESS

A. Provide ladders, scaffolding and staging as required to access the project area(s) in accordance with OSHA and MOSHA guidelines. Should damage to the building occur, restore damaged areas to their original condition and clean up debris for the duration of the project.

B. Do not interfere with normal building operations. Coordinate activities with the Owner and building occupants.

1.5 BARRIERS

A. Install temporary fencing, warning lines, barriers and guards, as required, to segregate the construction areas from adjacent operational facilities, occupants and the public. In the event that access cannot be interrupted in the construction area, provide protection above doorways and walks in the construction area. Provide guard lights on barriers and lighting as necessary to prevent vandalism of work and storage areas. The Owner is not responsible for Contractor's losses due to damage or theft by vandals.

B. Install protective coverings at paving and building walls adjacent to hoist prior to starting work. Lap protective coverings at least 1 foot, secure against wind, and vent to prevent condensation of moisture on covered surfaces. Maintain the protective coverings in place for the duration of the project. Cover windows adjacent to Contractor operation areas with plywood.

1.6 TEMPORARY PROTECTION

A. Provide suitable Owner approved temporary protection to prevent the entrance of debris and obstructions into the building.

B. Provide temporary protection such as plywood and tarps for streets, drives, curbs, sidewalks, landscaping and existing exterior improvements as required during all phases of the project.
1.7 ROOFTOP PROTECTION

A. Provide ¾-inch plywood double layered with extruded polystyrene that has a 100 PSI minimum compression strength.

1.8 WEATHER PROTECTION

A. Weather protection includes temporary protection of components adversely affected by moisture, wind, heat and cold by covering, patching, sealing, enclosing, ventilating, cooling and/or heating. Provide protection for locations within the project area as necessary, to protect the building and its contents, trafficked adjacent areas, new construction materials and accessories. The cost of heat, fuel and power necessary for proper weather protection shall be the responsibility of the Contractor. Installed weather protection shall comply with safety regulations, and provisions for adequate ventilation and fire protection.

1.9 VEHICLES

A. Acceptable areas for the locations of the Contractor's vehicles shall be as designated by the Owner. No other areas may be utilized without the Owner's permission.

1.10 WALKWAY COVERING

A. Install walkway coverings where designated on the drawings or above entrances which must remain accessible. The framework supporting the walkway covering shall be free-standing and well braced. The roof covering and support framing shall be designed to support a live load of at least 150 psf. The roof coverings shall be of width sufficient to cover the entire walkway or sidewalk. A minimum height clearance of 6-feet, 8-inches, or as required to allow building doors to open, shall be maintained below coverings. Should coverings obscure the building’s address, a temporary address shall be installed so as to be visible from the street. Lettering shall be approved by the Owner. Protection shall be in accordance with all applicable OSHA standards.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portable Chain-Link (Site Enclosure) Fencing: Minimum 2-inch, 9-gage, galvanized steel, chain-link fabric fencing; minimum 8-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 bases for supporting posts.

B. Paint: Comply with requirements in Division 09 Section “Painting.”
2.2 TEMPORARY FACILITIES

A. General: Maintain all temporary facilities and controls necessary for the performance of the Work. Comply with all applicable codes and regulations of authorities having jurisdiction; obtain permits as required. Locate and install all facilities and controls where acceptable to the local authorities having jurisdiction, utility, and Owner and remove same and terminate, in a manner suitable to the utility owner, at completion of the Work or when otherwise directed. Pay all costs associated with the provision and maintenance of temporary facilities and controls including power, water, and fuel (if any) consumed until Substantial Completion.

B. Storage and Staging Areas: The Contractor shall be responsible for coordination, protection, and safekeeping of products stored on site under this Contract including soil cut and fill. Refer to Contract Documents for any defined staging areas.
   1. Move stored products that interfere with construction of the Work, or operations of the Owner or separate contractors.
   2. Obtain any pay for use of additional storage or staging areas as needed for the Work.
   3. Provide storage areas sized to storage requirements for products of individual Sections, allowing for access and orderly maintenance and inspection of products.

PART 3 - EXECUTION (Not Used)

END OF SECTION 015000
SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout.

1.2 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
3. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
4. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
5. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
6. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
7. Submit certificate of manufacturer's inspection.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

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

1.3 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit a final Application for Payment.
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

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

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

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

1.5 WARRANTIES

A. Submittal Time: Submit manufacturer's warranties and contractor's guarantees on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

1.6 PROJECT CLOSEOUT SUBMITTALS

A. When both the Owner or Owner's Representative and the Manufacturer's Representative agree that the Contractor has performed according to the Specifications and has installed the materials to the satisfaction of the Manufacturer, submit the following:
   1. Specified Contractor's and Manufacturer's Warranties and Guarantees.
   2. Lien Releases from Contractor, subcontractor, and suppliers (AIA Forms G706, G706A).
   3. Consent of Surety to Final Payment (AIA Form G707).

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION 017700
SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Design Mixtures: For each concrete mixture.

1.3 INFORMATIONAL SUBMITTALS
   A. Material certificates.
   B. Material test reports.
   C. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.

1.4 QUALITY ASSURANCE
   A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
      1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.5 PRECONSTRUCTION TESTING
   A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.6 FIELD CONDITIONS
   A. Cold-Weather Placement: Comply with ACI 306.1.
      1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M).

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301 (ACI 301M).
2. ACI 117 (ACI 117M).

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

2.3 STEEL REINFORCEMENT

A. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

B. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed bars, ASTM A 775/A 775M or ASTM A 934/A 934M, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.4 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I or Type II.

B. Normal-Weight Aggregates: ASTM C 33/C 33M, graded.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C 260/C 260M.

D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

E. Water: ASTM C 94/C 94M and potable.

2.5 WATERSTOPS

A. Flexible Rubber Waterstops: CE CRD-C 513, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

B. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

2.7 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
2.8 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Normal-Weight Concrete:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.50.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
5. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of 1.0 lb/cu. yd.

2.9 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

2.11 ANCHORS

A. Epoxy Anchor: Anchors to be 1/2-inch diameter, fully threaded, stainless steel rod (AISI 304 or 316) set into screen tubes, and manufactured as a proprietary adhesive anchor system (with ICBO or otherwise approved certified testing). Anchor system must meet quality (as determined by Gale) of Hilti HIT-HY200.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.4 JOINTS

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

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.5 WATERSTOP INSTALLATION

A. Waterstops: Install in construction joints and at other locations indicated, according to manufacturer’s written instructions.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1-1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1 part portland cement and 1 part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.
3.8 FINISHING CONCRETE

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

C. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.9 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

3.10 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

END OF SECTION 033000
SECTION 040110 - MASONRY CLEANING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cleaning the following:
   1. Stone surfaces.

1.2 DEFINITIONS

A. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.
B. Medium-Pressure Spray: 400 to 800 psi; 4 to 6 gpm.
C. High-Pressure Spray: 800 to 1200 psi; 4 to 6 gpm.

1.3 SUBMITTALS

A. Product Data: For each type of product.

1.4 QUALITY ASSURANCE

A. Mockups: Prepare mockups of cleaning on existing surfaces to demonstrate aesthetic effects and to set quality standards for materials and execution.
   1. Cleaning: Clean an area approximately 25 sq. ft. for each type of masonry and surface condition.
      a. Test cleaners and methods on samples of adjacent materials for possible adverse reactions. Do not test cleaners and methods known to have deleterious effect.
      b. Allow a waiting period of not less than seven days after completion of sample cleaning to permit a study of sample panels for negative reactions.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS

A. Water: Potable.
B. Hot Water: Water heated to a temperature of 140 to 160 deg F.
C. Detergent Solution, Job Mixed: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal. of solution required.

D. Mold, Mildew, and Algae Remover, Job Mixed: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 5 quarts of 5 percent sodium hypochlorite (bleach), and 15 quarts of hot water for every 5 gal. of solution required.

E. Nonacidic Gel Cleaner: Manufacturer's standard gel formulation, with pH between 6 and 9, that contains detergents with chelating agents and is specifically formulated for cleaning masonry surfaces such as Cathedral Stone MasonRE G-Heavy Duty Cleaner.

F. Stone Cleaner: Manufacturer's standard formulation for cleaning limestone.
   1. Prosoco Sure Klean 942 Limestone and Marble Cleaner
   2. Dumond Safe ‘n Easy Limestone Cleaner
   3. Cathedral Stone MasonRE B+ Cleaner

PART 3 - EXECUTION

3.1 PROTECTION

A. Comply with each manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent paint removers and chemical cleaning solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

   1. Cover adjacent surfaces with materials that are proven to resist paint removers and chemical cleaners used unless products being used will not damage adjacent surfaces. Use protective materials that are waterproof and UV resistant. Apply masking agents according to manufacturer's written instructions. Do not apply liquid strippable masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.

3.2 CLEANING MASONRY, GENERAL

A. Cleaning Appearance Standard: Cleaned surfaces are to have a uniform appearance as viewed from 20 feet away by Architect.

B. Proceed with cleaning in an orderly manner; work from top to bottom of each scaffold width and from one end of each elevation to the other. Ensure that dirty residues and rinse water do not wash over dry, cleaned surfaces.

C. Use only those cleaning methods indicated for each masonry material and location.
1. **Brushes**: Do not use wire brushes or brushes that are not resistant to chemical cleaner being used.

2. **Spray Equipment**: Use spray equipment that provides controlled application at volume and pressure indicated, measured at nozzle. Adjust pressure and volume to ensure that cleaning methods do not damage surfaces, including joints.
   
   a. Equip units with pressure gages.
   b. For chemical-cleaner spray application, use low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with nozzle having a cone-shaped spray.
   c. For water-spray application, use fan-shaped spray that disperses water at an angle of 25 to 50 degrees.
   d. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F at flow rates indicated.

D. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces. Keep wall wet below area being cleaned to prevent streaking from runoff.

E. Perform additional general cleaning, paint and stain removal, and spot cleaning of small areas that are noticeably different when viewed according to the "Cleaning Appearance Standard" Paragraph, so that cleaned surfaces blend smoothly into surrounding areas.

F. **Water-Spray Application Method**: Unless otherwise indicated, hold spray nozzle at least 6 inches from masonry surface and apply water in horizontal back-and-forth sweeping motion, overlapping previous strokes to produce uniform coverage.

G. Rinse off chemical residue and soil by working upward from bottom to top of each treated area at each stage or scaffold setting. Periodically during each rinse, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed.

1. Apply neutralizing agent and repeat rinse if necessary to produce tested pH of between 6.7 and 7.5.

### 3.3 PRELIMINARY CLEANING

A. **Removing Plant Growth**: Completely remove visible plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing remaining growth to dry as long as possible before removal. Remove loose soil and plant debris from open joints to whatever depth they occur.

B. **Preliminary Cleaning**: Before beginning general cleaning, remove extraneous substances that are resistant to planned cleaning methods. Extraneous substances include paint, calking, asphalt, and tar.

1. Carefully remove heavy accumulations of rigid materials from masonry surface with sharp chisel. Do not scratch or chip masonry surface.
2. Remove paint and calking with alkaline paint remover.
   b. Repeat application up to two times if needed.

3. Remove asphalt and tar with solvent-type paste paint remover.
   b. Apply paint remover only to asphalt and tar by brush without prewetting.
   c. Allow paint remover to remain on surface for 10 to 30 minutes.
   d. Repeat application if needed.

3.4 PAINT REMOVAL

A. Paint-Remover Application, General: Apply paint removers according to paint-remover manufacturer's written instructions. Do not allow paint removers to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.

B. Paint Removal with Covered or Skin-Forming Alkaline Paint Remover:
   1. Remove loose and peeling paint using low to medium-pressure water spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
   2. Apply paint remover to dry, painted surface with trowel, spatula, or as recommended in writing by manufacturer.
   3. Apply cover according to manufacturer's written instructions.
   4. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
   5. Scrape off paint and remover.
   6. Rinse with cold water applied by low to medium-pressure spray to remove chemicals and paint residue.
   7. Apply acidic cleaner or manufacturer's recommended afterwash to surface, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner or afterwash remain on surface as a neutralizing agent for period recommended by chemical-cleaner or afterwash manufacturer.
   8. Rinse with cold water applied by low to medium-pressure spray to remove chemicals and soil.
   9. Retreat spots of remaining paint.

C. Paint Removal with Solvent-Type Paste Paint Remover:
   1. Remove loose and peeling paint using low to medium-pressure water spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
   2. Apply thick coating of paint remover to painted surface with natural-fiber cleaning brush, deep-nap roller, or large paint brush. Apply in one or two coats according to manufacturer's written instructions.
   3. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
4. Rinse with cold water applied by low to medium-pressure spray to remove chemicals and paint residue.

3.5 CLEANING MASONRY

A. Detergent Cleaning:

1. Wet surface with cold water applied by low-pressure spray.
2. Scrub surface with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that surface remains wet.
3. Rinse with cold water applied by low to medium-pressure spray to remove detergent solution and soil.
4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

B. Mold, Mildew, and Algae Removal:

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

C. Nonacidic Gel Cleaning:

1. Wet surface as per manufacturer’s instructions.
2. Apply gel cleaner in 1/8-inch thickness by brush, working into joints and crevices. Apply quickly and do not brush out excessively, so area is uniformly covered with fresh cleaner and dwell time is uniform throughout area being cleaned.
3. Let cleaner remain on surface for period recommended in writing by manufacturer.
4. Remove bulk of gel cleaner.
5. Rinse with cold water applied by low to medium-pressure spray to remove chemicals and soil.
6. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.

D. One-Part Limestone Cleaning:

1. Wet surface with cold water applied by low-pressure spray.
2. Apply cleaner to surface by brush or low-pressure spray.
3. Let cleaner remain on surface for period recommended in writing by manufacturer.
4. Immediately repeat application of one-part limestone cleaner as indicated above over the same area.
5. Rinse with cold water applied by medium-pressure spray to remove chemicals and soil.

END OF SECTION 040110
SECTION 040120 - MAINTENANCE OF UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies requirements for the following Scope of Work:

1. Remove and replace areas of damaged / deteriorated masonry veneer.
2. Repoint brick masonry veneer.
3. Provide retrofit helical masonry veneer ties where indicated.
4. Clean masonry, including removal of plant growth.

1.2 UNIT PRICES

A. Technical requirements for related Unit Price work are defined in this section. Refer to Division 01 Section “Unit Prices,” for quantities to be carried in the Base Bid and provided on the Bid Form.

1.3 DEFINITIONS

A. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.
B. Medium-Pressure Spray: 400 to 800 psi; 4 to 6 gpm.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Work Plan: Indicating sequence of work, temporary scaffolding and staging locations, proposed method for temporary wall shoring.
C. Letter Certifying that tradesmen have five or more years of experience.
D. Samples: For each exposed product and for each color and texture specified.

1.5 QUALITY ASSURANCE

A. Restoration Specialist Qualifications: Provide experienced personnel with a minimum of 5 years of experience to perform the specified work. Provide experienced personnel with a minimum of 5 years of experience to perform the specified work. Personnel shall have completed work similar in material, design, and extent to that indicated for this Project with a
record of successful in-service performance. Experience installing standard unit masonry is not sufficient experience for masonry restoration work.

1. At Contractor's option, work may be divided between two specialist firms: one for cleaning work and one for repair work.
2. Field Supervision: Restoration specialist firms shall maintain experienced full-time supervisors on Project site during times that clay masonry restoration and cleaning work is in progress.
3. Restoration Worker Qualifications: Persons who are experienced in restoration work of types they will be performing. When masonry units are being patched, assign at least one worker among those performing patching work who is trained and certified by manufacturer of patching compound to apply its products.

B. Mockups: Prepare mockups of restoration and cleaning to demonstrate aesthetic effects and set quality standards for materials and execution and for fabrication and installation.

1. Masonry Repair: Prepare sample areas for each type of masonry material indicated to have repair work performed. If not otherwise indicated, size each mockup not smaller than 2 adjacent whole units or approximately 48-inches in least dimension. Erect sample areas in existing walls unless otherwise indicated, to demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:

   a. Replacement:
      1) Eight brick units replaced.

   b. Patching: Three small holes at least 1-inch in diameter for each type of masonry material indicated to be patched, so as to leave no evidence of repair.

2. Repointing: Rake out joints in 2 separate areas, each approximately 36-inches high by 48-inches wide for each type of repointing required and repoint one of the areas.
3. Cleaning: Clean an area approximately 25 sq. ft. for each type of masonry and surface condition.

1.6 PROJECT CONDITIONS

A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.


D. Prepare, install, and cure all materials in accordance with these Specifications, Brick Institute of America (B.I.A.) Technical Notes, and Manufacturer's Printed Instructions.
E. Provide brick or concrete masonry units as required to replace units damaged during removal and replacement.

PART 2 - PRODUCTS

2.1 MASONRY MATERIALS

A. Face Brick: Provide face brick, including specially molded, ground, cut, or sawed shapes where required to complete masonry restoration work.

1. Provide units with physical properties, colors, color variation within units, surface texture, size, and shape to match existing brickwork meeting ASTM C 216, Grade SW, Type FBS.

   a. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.

B. Building Brick: Provide building brick complying with ASTM C 62, Grade SW where in contact with earth, Grade SW, MW, or NW for concealed backup; and of same vertical dimension as face brick, for masonry work concealed from view.

2.2 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II, white or gray or both where required for color matching of exposed mortar.

1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Mortar Sand: ASTM C 144 unless otherwise indicated.

   1. Color: Provide natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.
   2. For pointing mortar, provide sand with rounded edges.
   3. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.

D. Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.

E. Water: Potable.
2.3 MANUFACTURED REPAIR MATERIALS

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

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Cathedral Stone Products, Inc.; Jahn M100 Terra Cotta and Brick Repair Mortar.
   b. Conproco Corporation; Matrix.
   c. Edison Coatings, Inc.; Custom System 45.

2. Use formulation that is vapor- and water permeable (equal to or more than the masonry unit), exhibits low shrinkage, has lower modulus of elasticity than the masonry units being repaired, and develops high bond strength to all types of masonry.

3. Formulate patching compound used for patching brick in colors and textures to match each masonry unit being patched.

B. Precast Stone Repair: Jahn M90

2.4 ACCESSORIES

A. Retrofit Masonry Veneer Anchor: Type 304 stainless-steel helical retrofit masonry anchors designed to anchor existing veneer to the existing back-up wall such as Heli-Tie as manufactured by Simpson Strong-Tie. Length as required to provide 2-inch minimum embedment into the back-up wall.

B. Masonry Joint Reinforcement for Multi-wythe Masonry:

1. Ladder type with 1 side rod at each face shell of hollow masonry units more than 4-inches wide, plus 1 side rod at each wythe of masonry 4-inches wide or less.

2. Tab type, either ladder or truss design, with 1 side rod at each face shell of backing wythe and with rectangular tabs sized to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.

2.5 CLEANING MATERIALS

A. Water: Potable.

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

2.6 MORTAR MIXES

A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
1. **Mixing Pointing Mortar:** Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.

2. **Colored Mortar:** Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.

   1. **Mortar Pigments:** Where mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.

3. **Do not use admixtures in mortar unless otherwise indicated.**

4. **Mortar Type:** Provide mortar materials in the following proportions or as indicated below:

   1. **Pointing and Rebuilding Mortar:** Comply with ASTM C 270, Proportion Specification, Type N.
   2. **Pointing Mortar for Brick:** 1 part portland cement, 1 parts lime, and 6 parts sand
      a. Add mortar pigments to produce mortar colors required.

**PART 3 - EXECUTION**

3.1 **PROTECTION**

   A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.

3.2 **BRICK REMOVAL AND REPLACEMENT**

   A. At locations indicated, remove brick veneer that is damaged, spalled, cracked or deteriorated. Carefully demolish or remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

   B. Remove in an undamaged condition as many whole bricks as possible to allow new masonry to be “toothed” in.

      1. Remove mortar and loose particles from brick by cleaning with hand chisels, brushes, and water.
      2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.

   C. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
D. Support masonry, specifically at location of new throughwall flashing installation, in accordance with approved drawings but in no case more than 4 feet o.c. Protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

E. Notify Owner of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.

F. Clean bricks surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.

G. Replace removed damaged brick with other removed brick in good quality, where possible, or with new brick matching existing brick, including size. Do not use broken units unless they can be cut to usable size.

H. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
   1. Maintain joint width for replacement units to match existing joints.
   2. Use setting buttons or shims to set units accurately spaced with uniform joints.

I. Lay replacement brick with completely filled bed and head joints. Wet both replacement and surrounding bricks that have ASTM C 67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.
   1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.

J. Provide open head joints, spaced at 24-inches on center in brick masonry courses located directly above any throughwall flashings. Provide polypropylene full height venting matrix within open head joint.

K. Clean masonry veneer with water and a stiff bristle brush.

3.3 REANCHORING VENEERS

A. Reuse existing ties where possible.

B. Provide masonry anchors or reinforcing ties in horizontal mortar joints according to the manufacturer’s written instructions. Install at not more then 16-inches on center vertically and 32-inches on center horizontally unless otherwise indicated. Install at locations to avoid penetrating flashing.

C. Recess anchors at least 5/8-inch from surface of mortar joint and fill recess with pointing mortar.
3.4 MASONRY WALL TIE RESTORATION

A. Remove existing mortar and leading edge of the horizontal galvanized steel truss type tie at areas exhibiting deterioration. Remove material to a depth of approximately 1-1/2 – inches.

B. Repoint mortar joint as indicated in this section.

C. Provide helical retrofit wall ties in the horizontal mortar joint directly about the damaged joint as directed by the manufacturer. Space helical ties at 24-inches on center along the length of the joint.

D. Recess ties approximately ½-inch from the exterior surface of the wall and fill recess with pointing mortar.

3.5 PRELIMINARY CLEANING

A. Removing Plant Growth: Completely remove visible plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing to dry as long as possible before removal. Remove loose soil and debris from open masonry joints to whatever depth they occur.

B. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used. Extraneous substances include paint, calking, asphalt, and tar.

1. Carefully remove heavy accumulations of material from surface of masonry with a sharp chisel. Do not scratch or chip masonry surface.

3.6 REPOINTING MASONRY

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

1. All joints in areas indicated.
2. Joints where mortar is missing or where they contain holes.
3. Cracked joints where cracks can be penetrated at least 1/4-inch by a knife blade 0.027-inch thick.
4. Cracked joints where cracks are 1/16-inch or more in width and of any depth.
5. Joints where they sound hollow when tapped by metal object.
6. Joints where they are worn back 1/4-inch or more from surface.
7. Joints where they are deteriorated to point that mortar can be easily removed by hand, without tools.
8. Joints where they have been filled with substances other than mortar.
9. Joints indicated as sealant-filled joints.

B. Do not rake out and repoint joints where not required. Report quantity of area daily to Owner.

C. Rake out joints as follows, according to procedures demonstrated in approved mockup:
1. Remove mortar from joints to depth of 2 times joint width, but not less than 1/2-inch or not less than that required to expose sound, unweathered mortar.
2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.
   a. Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar by hand with chisel and resilient mallet.

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

E. Pointing with Mortar:
   1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
   2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8-inch until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
   3. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than 3/8-inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
   4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
   5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours including weekends and holidays.
      a. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
   6. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

F. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

3.7 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, spray applied at low pressure.
1. Do not use metal scrapers or brushes.
2. Do not use acidic or alkaline cleaners.

END OF SECTION 040120
SECTION 040140.61 - STONE REPAIR

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Repairing stone masonry, including replacing partial units.

1.2 ALLOWANCES

A. Allowances for stone repair are specified in Section 012100 "Allowances."

1.3 UNIT PRICES

A. Technical requirements for related unit price work are defined in this section. Refer to Division 01 Section “Unit Prices” for quantities to be included in the Base Bid and provided on the Bid Form.

1.4 DEFINITIONS

A. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.

B. Rebuilding (Setting) Mortar: Mortar used to set and anchor masonry in a structure, distinct from pointing mortar installed after masonry is set in place.

C. Rift: The most pronounced direction of splitting or cleavage of a stone.


1.5 SEQUENCING AND SCHEDULING

A. Order sand and gray portland cement for colored mortar immediately after approval of mockups. Take delivery of and store at Project site enough quantity to complete Project.

B. Work Sequence: Perform stone repair work in the following sequence, which includes work specified in this and other Sections:
   1. Remove plant growth.
   2. Inspect masonry for open mortar joints and permanently or temporarily point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
   3. Remove paint.
   4. Clean stone.
5. Rake out mortar from joints surrounding stone to be replaced and from joints adjacent to stone repairs along joints.
6. Repair stonework, including replacing existing stone with new stone.
7. Rake out mortar from joints to be repointed.
8. Point mortar and sealant joints.
9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
10. Where water repellents are to be used on or near stonework, delay application of these chemicals until after pointing and cleaning.

C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in stone according to "Stone Patching" Article. Patch holes in mortar joints according to Section 040140.62 "Stone Repointing."

1.6 SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For the following:
   1. Each type of patching compound in form of briquettes, at least 3 inches long by 1-1/2 inches wide. Document each Sample with manufacturer and stock number or other information necessary to order additional material.
   2. Each type of adhesive.
   3. Accessories: Each type of anchor, accessory, and miscellaneous support.

C. Qualification Data: For stone repair specialist including field supervisors and workers.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For stone repair specialist including field supervisors and workers.

B. Preconstruction Test Reports: For replacement stone.

C. Quality-control program.

1.8 QUALITY ASSURANCE

A. Stone Repair Specialist Qualifications: Engage an experienced stone repair firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience in only installing standard unit masonry or new stone masonry is insufficient experience for stone repair work.

1. Field Supervision: Stone repair specialist firms shall maintain experienced full-time supervisors on Project site during times that stone repair work is in progress.
2. Stone Repair Worker Qualifications: When stone units are being patched, assign at least one worker per crew who is trained and certified by manufacturer of patching compound to apply its products.
B. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging stonework. Include provisions for supervising performance and preventing damage.

C. Mockups: Prepare mockups of stone repair to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation.

1. Stone Repair: Prepare sample areas for each type of stone indicated to have repair work performed. If not otherwise indicated, size each mockup not smaller than two adjacent whole units or approximately 48 inches in least dimension. Construct sample areas in locations in existing walls where directed by Architect unless otherwise indicated. Demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:
   b. Stone Plug Repair: Two stone plug repairs for each type of stone indicated to be plugged.
   c. Crack Injection: Apply crack injection in two separate areas, each approximately 36 inches long.
   d. Patching: Three small holes at least 1 inch in diameter.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

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

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver stone units to Project site strapped together in suitable packs or pallets or in heavy-duty crates and protected against impact and chipping.

B. Deliver each piece of stone with code mark or setting number on unexposed face, corresponding to Shop Drawings, using nonstaining paint.

C. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

D. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

E. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

F. Store sand where grading and other required characteristics can be maintained and contamination avoided.

G. Handle stone to prevent overstressing, chipping, defacement, and other damage.
1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit stone repair work to be performed according to product manufacturers' written instructions and specified requirements.

B. Temperature Limits, General: Repair stone units only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.

C. Cold-Weather Requirements: Comply with the following procedures for stone repair unless otherwise indicated:
   1. When air temperature is below 40 deg F, heat mortar ingredients, repair materials, and existing stone to produce temperatures between 40 and 120 deg F.
   2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for seven days after repair.

D. Hot-Weather Requirements: Protect stone repairs when temperature and humidity conditions produce excessive evaporation of water from mortar and patching materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

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

2.2 STONE MATERIALS

A. Stone Matching Existing: Natural building stone of variety, color, texture, grain, veining, finish, size, and shape that match existing stone and with physical properties as listed below:

1. Physical Properties for Limestone:
   a. Density: 110 lb/ft³
   b. Compressive Strength: 1,000 psi according to ASTM C 170/C 170M.
   d. Absorption: 12 percent by weight according to ASTM C 97/C 97.

2. For existing stone that exhibits a range of colors, texture, grain, veining, finishes, sizes, or shapes, provide stone that proportionally matches that range rather than stone that matches an individual color, texture, grain, veining, finish, size, or shape within that range.
B. Cutting New Stone: Cut each new stone so that, when it is set in final position, the rift or natural bedding planes will match the rift orientation of existing stones.

2.3 MORTAR MATERIALS

A. Refer to Division 04 Section “Maintenance of Unit Masonry” for Mortar Materials.

2.4 MANUFACTURED REPAIR MATERIALS

A. Stone Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching stone.
   2. Use formulation that is vapor and water permeable (equal to or more than the stone), exhibits low shrinkage, has lower modulus of elasticity than stone units being repaired, and develops high bond strength to all types of stone.
   3. Use formulation having working qualities and retardation control to permit forming and sculpturing where necessary.
   4. Formulate patching compound in colors, textures, and grain to match stone being patched. Provide sufficient number of colors to enable matching of each piece of stone.

B. Cementitious Crack Filler: Ultrafine superplasticized grout that can be injected into cracks, is suitable for application to wet or dry cracks, exhibits low shrinkage, and develops high bond strength to all types of stone.

C. Stone-to-Stone Adhesive: Two-part polyester or epoxy-resin stone adhesive with a 15- to 45-minute cure at 70 deg F, recommended in writing by adhesive manufacturer for type of stone repair indicated, and matching stone color.

2.5 ACCESSORY MATERIALS

A. Stone Repair Anchors and Pins: Mechanical fasteners and pins of Type 304 stainless steel; designed for stone stabilization and pinning stone pieces; matching shape and size of existing anchors unless otherwise indicated.

B. Setting Buttons and Shims: Resilient plastic, nonstaining to stone, sized to suit joint thicknesses and bed depths of stone units, less the required depth of pointing materials unless removed before pointing.

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

2.6 MORTAR MIXES

A. Refer to Division 04 Section “Maintenance of Unit Masonry” for Mortar Mixes.
PART 3 - EXECUTION

3.1 PROTECTION

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

B. Remove downspouts and associated hardware adjacent to stone and store during stone repair. Reinstall when repairs are complete.
   1. Provide temporary rain drainage during work to direct water away from building.

3.2 STONE REPAIR, GENERAL

A. Appearance Standard: Repaired surfaces are to have a uniform appearance as viewed from 20 feet away by Engineer.

3.3 PARTIAL STONE REPLACEMENT

A. Remove defective portion of existing stone unit (backing stone). Carefully remove defective portion of stone by making vertical and horizontal saw cuts at face of backing stone and removing defective material to depth required for fitting partial replacement (dutchman).
   1. Make edges of backing stone at cuts smooth and square to each other and to finished surface; essentially rectangular. Make back of removal area flat and parallel to stone face.
   2. Do not overcut at corners and intersections. Hand trim to produce clean sharp corners with no rounding and no damage to existing work to remain.
   3. If backing stone becomes further damaged, remove damaged area and enlarge partial replacement as required.

B. Remove mortar from joints that abut area of stone removal to same depth as stone was removed. Remove loose mortar particles and other debris from surfaces to be bonded and surfaces of adjacent stone units that will receive mortar by cleaning with stiff-fiber brush.

C. Cut and trim partial replacement to accurately fit area where material was removed from backing stone. Fabricate to size required to produce joints between partial replacement and backing stone of no more than 1/16 inch in width, and to produce joints between partial replacement and other stones that match existing joints between stones. Cut partial replacement so that, when it is set in final position, natural bedding planes will match the orientation of bedding planes of the backing stone unless otherwise indicated.

D. Concealed Pinning: Before applying adhesive, prepare for concealed mechanical anchorage consisting of 1/4-inch- diameter, threaded stainless-steel pins set into 1/4-inch- diameter holes drilled into backing stone and into, but not through, the partial replacement. Center and space pins 3 to 5 inches apart and at least 2 inches from any edge. Insert pins at least 2 inches into
backing stone and 2 inches into partial replacement, but no closer than 3/4 inch from exposed face of partial replacement.

E. Apply stone-to-stone adhesive according to adhesive manufacturer's written instructions. Coat bonding surfaces of backing stone and partial replacement, completely filling all crevices and voids.

F. Apply partial replacement while adhesive is still tacky and hold securely in place until adhesive has cured. Use shims, clamps, wedges, or other devices as necessary to align face of partial replacement with face of backing stone.

G. Clean adhesive residue from exposed surfaces and patch chipped areas and exposed drill holes as specified in "Stone Patching" Article.

3.4 STONE PLUG REPAIR

A. Remove cylindrical piece of damaged stone by core-drilling perpendicular to stone surface.

B. Prepare a replacement plug by core-drilling replacement stone. Use a drill sized to produce a core that will fit into hole drilled in damaged stone with only minimum gap necessary for adhesive. Cut and install plug so that, when it is set in final position, natural bedding planes will match the orientation of bedding planes of the backing stone unless otherwise indicated.

C. Apply stone-to-stone adhesive according to adhesive manufacturer's written instructions. Coat bonding surfaces of existing stone and plug, completely filling all crevices and voids.

D. Apply plug while adhesive is still tacky and hold securely in place until adhesive has cured.

E. Clean adhesive residue from exposed surfaces.

3.5 STONE-FRAGMENT REPAIR

A. Carefully remove cracked or fallen stone fragment indicated to be repaired. Reuse only stone fragment that is in sound condition.

B. Remove soil, loose particles, mortar, and other debris or foreign material from fragment surfaces to be bonded and from parent stone where fragment had broken off, by cleaning with stiff-fiber brush.

C. Concealed Pinning: Before applying adhesive, prepare for concealed mechanical anchorage consisting of 1/4-inch- diameter, threaded stainless-steel pins set into 1/4-inch- diameter holes drilled into parent stone and into, but not through, the fragment. Center and space pins between 3 and 5 inches apart and at least 2 inches from any edge. Insert pins at least 2 inches into parent stone and 2 inches into fragment, but no closer than 3/4 inch from exposed face of fragment.

D. Apply stone-to-stone adhesive according to adhesive manufacturer's written instructions. Coat bonding surfaces of fragment and parent stone, completely filling all crevices and voids.
E. Fit stone fragment onto parent stone while adhesive is still tacky and hold fragment securely in place until adhesive has cured. Use shims, clamps, wedges, or other devices as necessary to align face of fragment with face of parent stone.

F. Clean adhesive residue from exposed surfaces and patch chipped areas and exposed drill holes as specified in "Stone Patching" Article.

3.6 CRACK INJECTION

A. General: Comply with cementitious crack-filler manufacturer's written instructions.

B. Drill 1/4-inch- diameter injection holes as follows:

1. Transverse Cracks Less Than 3/8 inch Wide: Drill holes through center of crack at 12 to 18 inches o.c.
2. Transverse Cracks More Than 3/8 inch Wide: Drill holes through center of crack at 18 to 36 inches o.c.
3. Delaminations: Drill holes at approximately 18 inches o.c. both vertically and horizontally.
4. Drill holes 2 inches deep.

C. Clean out drill holes and cracks with compressed air and water. Remove dirt and organic matter, loose material, sealants, and failed crack repair materials.

D. Place plastic injection ports in drilled holes and seal face of cracks between injection ports with clay or other nonstaining, removable plugging material. Leave openings at upper ends of cracks for air release.

E. Inject cementitious crack filler through ports sequentially, beginning at one end of area and working to opposite end; where possible, begin at lower end of injection area and work upward. Inject filler until it extrudes from adjacent ports. After port has been injected, plug with clay or other suitable material and begin injecting filler at adjacent port, repeating process until all ports have been injected.

F. Clean cementitious crack filler from face of stone before it sets by scrubbing with water.

G. After cementitious crack filler has set, remove injection ports, plugging material, and excess filler. Patch injection holes and surface of cracks as specified in "Stone Patching" Article.

3.7 STONE PATCHING

A. Patch the following stone units unless another type of repair or replacement is indicated:

1. Units indicated to be patched.
2. Units with holes.
3. Units with chipped edges or corners. Patch chipped edges or corners measuring more than 3/4 inch in least dimension.
4. Units with small areas of deep deterioration. Patch deep deteriorations measuring more than 3/4 inch in least dimension and more than 1/4 inch deep.
B. Remove and replace existing patches where indicated.

C. Remove deteriorated material and remove adjacent material that has begun to deteriorate. Carefully remove additional material so patch does not have feathered edges but has square or slightly undercut edges on area to be patched and is at least 1/4 inch thick, but not less than recommended in writing by patching compound manufacturer.

D. Mask adjacent mortar joint or rake out for repointing if patch extends to edge of stone unit.

E. Mix patching compound in individual batches to match each stone unit being patched. Combine one or more colors of patching compound, as needed, to produce exact match.

F. Brush-coat stone surfaces with slurry coat of patching compound according to manufacturer's written instructions.

G. Place patching compound in layers as recommended in writing by patching compound manufacturer, but not less than 1/4 inch or more than 2 inches thick. Roughen surface of each layer to provide a key for next layer.

1. Simple Details: Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of the stone. Shape and finish surface before or after curing, as determined by testing, to best match existing stone.
2. Carved Details: Build patch up 1/4 inch above surrounding stone, and carve surface to match adjoining stone after patching compound has hardened.

H. Keep each layer damp for 72 hours or until patching compound has set.

I. Remove and replace patches with hairline cracks or that show separation from stone at edges, and those that do not match adjoining stone in color or texture.

3.8 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed stone surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, applied by low-pressure spray.

1. Do not use metal scrapers or brushes.
2. Do not use acidic or alkaline cleaners.

B. Clean adjacent nonstone surfaces. Use detergent and soft brushes or cloths.

C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

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

3.9 STONE WASTE DISPOSAL

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

END OF SECTION 040140.61
SECTION 040140.62 - STONE REPOINTING

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes repointing joints with mortar.

1.2 UNIT PRICES
   A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."

1.3 SUBMITTALS
   A. Product Data: For each type of product.
   B. Shop Drawings.
   C. Samples: For each exposed product and for each color and texture specified.

1.4 QUALITY ASSURANCE
   A. Stone Repointing Specialist Qualifications: Engage an experienced stone repointing firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience in only installing standard unit masonry or new stone masonry is insufficient experience for stone repointing work.
   B. Mockups: Prepare mockups of stone repointing to demonstrate aesthetic effects and to set quality standards for materials and execution.
      1. Repointing: Rake out joints in two separate areas each approximately 36 inches high by 48 inches wide unless otherwise indicated for each type of repointing required, and repoint one of the areas.

PART 2 - PRODUCTS

2.1 MORTAR MATERIALS
   A. Portland Cement: ASTM C 150/C 150M, Type I or Type II, except Type III may be used for cold-weather construction; white or gray, or both where required for color matching of mortar.
1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Masonry Cement: ASTM C 91/C 91M.

D. Mortar Cement: ASTM C 1329/C 1329M.

E. Mortar Sand: ASTM C 144.

1. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.

2. Color: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.

F. Mortar Pigments: ASTM C 979/C 979M, compounded for use in mortar mixes, and having a record of satisfactory performance in stone mortars.

G. Water: Potable.

2.2 MORTAR MIXES

A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again, adding only enough water to produce a damp, unworkable mix that retains its form when pressed into a ball. Maintain mortar in this dampered condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.

B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.

1. Mortar Pigments: Where mortar pigments are indicated, do not add pigment exceeding 10 percent by weight of the cementitious or binder materials, except for carbon black which is limited to 2 percent.

C. Do not use admixtures in mortar unless otherwise indicated.

D. Mixes: Mix mortar materials in the following proportions:

1. Pointing Mortar by Volume: ASTM C 270, Proportion Specification, 1 part portland cement, 1 part lime, and 6 parts sand. Add mortar pigments to produce mortar colors required.
2. Pointing Mortar by Type: ASTM C 270, Proportion Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime. Add mortar pigments to produce mortar colors required.

PART 3 - EXECUTION

3.1 REPOINTING STONWORK

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

1. All joints in areas indicated.
2. Joints indicated as sealant-filled joints. Seal joints according to Section 079200 "Joint Sealants."
3. Joints at locations of the following defects:
   a. Holes and missing mortar.
   b. Cracks that can be penetrated 1/4 inch or more by a knife blade 0.027 inch thick.
   c. Cracks 1/16 inch or more in width and of any depth.
   d. Hollow-sounding joints when tapped by metal object.
   e. Eroded surfaces 1/4 inch or more deep.
   f. Deterioration to point that mortar can be easily removed by hand, without tools.
   g. Joints filled with substances other than mortar.

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

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

1. Remove mortar from joints to depth of 2 times joint width, but not less than 3/4 inch or not less than that required to expose sound, unweathered mortar. Do not remove unsound mortar more than 2 inches deep; consult Architect for direction.
2. Remove mortar from stone surfaces within raked-out joints to provide reveals with square backs and to expose stone for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
3. Do not spall edges of stone units or widen joints. Replace or patch damaged stone units as directed by Architect.

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

E. Pointing with Mortar:

1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Fully compact each layer, and allow it to become thumbprint hard before applying next layer.
3. After deep areas have been filled to same depth as remaining joints, point joints by placing mortar in layers not greater than 3/8 inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing stone has worn or rounded edges, slightly recess finished mortar surface below face of stone to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed stone surfaces or to featheredge the mortar.

4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.

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

6. Hairline cracking within mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

F. Where repointing work precedes cleaning of existing stone, allow mortar to harden at least 30 days before beginning cleaning work.

3.2 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed stone surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, applied by low-pressure spray.

1. Do not use metal scrapers or brushes.

2. Do not use acidic or alkaline cleaners.

END OF SECTION 040140.62
SECTION 047200 - CAST STONE MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Cast-capstone.
   2. Cast-stone panels.

1.2 SUBMITTALS

A. Product Data: For each type of product.
   1. For cast-stone units, include dimensions and finishes.

B. Shop Drawings: Show fabrication and installation details for cast-stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.

C. Samples:
   1. For each color and texture of cast stone required.
   2. For colored mortar.

D. Qualification Data: For manufacturer.

E. Material Test Reports: For each mix required to produce cast stone, based on testing according to ASTM C 1364, including test for resistance to freezing and thawing.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer of cast-stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units, and is a plant certified by the Cast Stone Institute, the Architectural Precast Association, or the Precast/Prestressed Concrete Institute for Group A, Category AT.

PART 2 - PRODUCTS

2.1 CAST-STONE UNITS

A. Cast-Stone Units: Comply with ASTM C 1364.
   1. Units shall be resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666/C 666M, Procedure A, as modified by ASTM C 1364.
B. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.
   1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
   2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
   3. Provide drips on projecting elements unless otherwise indicated.

C. Cure Units as Follows:
   1. Cure units in enclosed, moist curing room at 95 to 100 percent relative humidity and temperature of 100 deg F for 12 hours or 70 deg F for 16 hours.
   2. Keep units damp and continue curing to comply with one of the following:
      a. No fewer than five days at mean daily temperature of 70 deg F or above.
      b. No fewer than six days at mean daily temperature of 60 deg F or above.
      c. No fewer than seven days at mean daily temperature of 50 deg F or above.
      d. No fewer than eight days at mean daily temperature of 45 deg F or above.

D. Acid etch units after curing to remove cement film from surfaces to be exposed to view.

E. Colors and Textures: Match surrounding limestone masonry.

2.2 ACCESSORIES

A. Anchors: Type and size indicated, fabricated from Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666.

B. Dowels: 1/2-inch- diameter round bars, fabricated from Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666.

C. Epoxy Anchoring Adhesive: Manufactured as a proprietary adhesive anchor system (with ICBO or otherwise approved certified testing). Anchor system must meet quality (as determined by Gale) of Hilti HIT-HY200.

2.3 MORTAR

A. Comply with requirements in Section 042000 "Unit Masonry" for mortar mixes.
   1. For setting mortar, use Type N.
   2. For pointing mortar, use Type N.

2.4 CLEANER

A. Refer to Section 040110 “Masonry Cleaning” for cast stone cleaners.
PART 3 - EXECUTION

3.1 SETTING CAST STONE IN MORTAR

A. Install cast-stone units to comply with requirements in Section 042000 "Unit Masonry."

B. Set units in full bed of mortar with full head joints unless otherwise indicated.
   1. Fill dowel holes and anchor slots with mortar.
   2. Fill collar joints solid as units are set.
   3. Build concealed flashing into mortar joints as units are set.
   4. Keep head joints in copings and between other units with exposed horizontal surfaces open to receive sealant.
   5. Keep joints at shelf angles open to receive sealant.

C. 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.

D. Tool exposed joints slightly concave when thumbprint hard. Use a smooth plastic jointer larger than joint thickness.

3.2 INSTALLATION TOLERANCES

A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

B. Variation from Level: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

C. 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.

D. 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 where variation is due to warpage of units within tolerances specified.

3.3 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.

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. 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.
D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of cast stone.
3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.

3.4 GENERAL CLEANING

A. Refer to Section 040110 for stone cleaning.

END OF SECTION 047200
SECTION 076000 - FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies requirements for the following Scope of Work:
   1. Provide sheet metal flashings and components at locations indicated on the drawings.

1.2 SUBMITTALS

A. Product Data:
   1. For each item specified in Part 2 of this Section.
   2. Color charts for coated metals.

1.3 QUALITY ASSURANCE

A. Installation procedures shall be in accordance with the industry standards and codes indicated in Division 01 Section “Summary of Work” and those indicated in this Section.

B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

C. Sheet Metal Standard: Comply with NRCA “Roofing and Waterproofing Manual, Fifth Edition.” Conform to dimensions and profiles shown unless more stringent requirements are indicated.

1.4 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. Galvanized (Zinc-Coated) Steel Sheet: ASTM A 653, G90 coating designation; structural quality, mill phosphatized for field painting.
B. Prepainted, Metallic-Coated Steel Sheet: Galvanized sheet steel (G90); prepainted by coil-coating process, ASTM A 755; provide with manufacturer’s strippable plastic film. Exposed finishes:

1. High-Performance Organic Finish: Two-coat thermocured system containing not less than 70 percent polyvinylidene fluoride (Kynar/Hylar) resin by weight; complying with AAMA 2604. Color as selected by Owner from standard colors.

2.2 ACCESSORIES

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Self Adhering Membrane: High temperature self-adhering, SBS modified bitumen membrane with poly-surface and release-paper backing, minimum 40-mil thickness, designed for a minimum melting temperature of 220 deg F such as Ice & Water Shield HT by W.R. Grace, Lastobond Shield HT by Soprema, Metshield by MetFab, or accepted substitute.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nontoxic, nonstaining tape.

D. Exposed elastomeric Sealant: ASTM C 920, Type S, Grade NS, Class 25, Use A. Use an elastomeric silicone polymer sealant.

E. Concealed sealant for metal-to-metal connections: ASTM C 1085, single-component, butyl (polyisobutylene) rubber sealant, heavy bodied for hooked-type expansion joints with limited movement.

2.3 FASTENERS

A. Sheet metal to wood blocking connections (concealed securement): No. 12 annular threaded Series 300 stainless steel nails minimum 1-1/2-inches long.

B. Sheet metal to wood blocking connections and mechanical unit securement (exposed securement): Self-drilling, self-tapping, Number 10, stainless steel hex-washer-head screws, 1-1/2-inch long, with metal-capped EPDM washers.

C. Sheet metal to masonry wall connections: 1/4-inch diameter, concrete/masonry screws of sufficient length to penetrate substrate 1-1/2-inch minimum. Provide metal capped EPDM washers at exposed locations.

D. Sheet metal fascia to wood connections: 1-inch long, #10, Series 300 stainless steel pan head screws.
2.4 FABRICATION – GENERAL

A. General: Fabricate sheet metal flashing and trim to comply with IBC and recommendations in SMACNA and NRCA that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before shop fabrication.

B. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
   2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

D. Expansion Provisions: Where lapped expansion provisions in Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

E. Provide concealed fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

F. Provide cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal, and in thickness not less than that of metal being secured.

2.5 FABRICATION SCHEDULE

A. PVDF Coated Galvanized Steel (24 gauge)
   1. Closures
   2. Counterflashing

B. Galvanized Steel (22 gauge)
   1. Cleats

C. Stainless Steel (26 gauge)
   1. Sill Flashing

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that substrate and anchorage materials to receive sheet metal flashings are properly secured and aligned, without gaps, lumps, or offsets that may distort metal.
3.2 INSTALLATION, GENERAL

A. Comply with these specifications and applicable industry standards to include the IBC, NRCA, and SMACNA, whichever is more stringent.

B. General: Anchor sheet metal flashing and trim and other components of Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
   1. Torch cutting of sheet metal flashing and trim is not permitted.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

D. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

E. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and butyl sealant.

F. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

G. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10-feet, with no joints allowed within 18-inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with butyl sealant concealed within joints.

H. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4-inches for nails and not less than 3/4-inch for wood screws.

I. Non-moving seams and joints on non-solderable metal shall be interlocked, filled with sealant, and riveted, unless otherwise indicated.

J. Seal joints as required for watertight construction. Use elastomeric sealant for exposed conditions. Use butyl sealant for hidden conditions.

K. Provide sheet metal closure components at transitions to rising walls and similar changes in plane for edge metal, parapet caps, expansion joint covers, and other termination flashings. Fully crimp and seal closures to continuous blind nailed cleats.

L. Soldered Joints: Comply with SMACNA and CDA requirements. Use conduction soldering methods.
   1. Clean surfaces to be soldered, removing oils and foreign matter. Smooth irregularities and round edges. Pretin edges of sheets to be soldered to width of 1-1/2-inches except where pretinned surface would show in finished Work.
   2. Apply flux to surfaces to receive solder. Remove oxides and other impurities from joint.
3. Position and immobilize parts to be soldered. Heat parts above fluid temperature of solder. Draw solder into joint, creating 1-inch wide lap. Allow to cool before moving parts.

4. Remove flux and acid by cleaning with neutralizing agent.

M. Fabricate sheet metal components to the dimensions and shapes shown on the Drawings.

3.3 METAL COMPONENT INSTALLATION

A. Cleats
1. Form cleats with 3/4-inch kicks, bent out at 30 degree angle to vertical surface. Height of cleat shall be as indicated on Drawings.
2. Secure continuous cleats to wood blocking with fasteners spaced at 6-inches on center.
3. Provide 1/4-inch gap between cleat sections. Offset from joints in cover metal being secured.

B. Sill Flashing
1. Fabricate sill flashing with as indicated with a minimum 1-inch upturn leg on interior of skylight.
2. Provide prefabricated, fully soldered corners.

3.4 CLEANING

A. Remove scrap metal, burrs, fasteners, and related debris from roof daily. Take precautions to prevent damage to roof membrane and flashings.

END OF SECTION 076000
SECTION 079200 – JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies requirements for the following Scope of Work:
   1. Provide sealant and backer materials as indicated on the Drawings.

1.2 SUBMITTALS

A. Product Data: All items specified in Part 2 of this Section.

1.3 QUALITY ASSURANCE

A. Utilize skilled and experienced specialty workers to install work. Experienced trade workers shall be utilized for each aspect of work.

B. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates according to the method in ASTM C 1193 that is appropriate for the types of Project joints.

C. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:
   1. Install a minimum 20 linear feet of each color and type of sealant and sealant configuration at all new sealant joint locations referenced in scope of work. Sealant installation shall conform to Contract Documents and once accepted shall become standard for subsequent work on project. Trial areas shall be determined by Owner or Engineer. Areas shall be repeated until acceptable results are obtained. Installation of test items shall be in conformance with Contract Documents and shall use only submitted materials. Evidence of improper or unsatisfactory performance shall be ground for rejection of submitted materials.

1.4 WARRANTY

A. Special Installer's Warranty: See Division 01 Section “Summary of Work.”

B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: 2 years from date of Substantial Completion.
PART 2 - PRODUCTS

2.1 SEALANTS

A. Color(s) shall be selected by Owner from approved manufacturer's color chart. Colors shall be manufacturers available premium colors Contractor will include multiple colors in his/her Bid.

B. Silicone sealant for use at exterior locations shall be one part silicone sealant specifically formulated for masonry surfaces, conforming to ASTM C 920, Type S, Grade NS, Class 25, Uses T NT, M, G, A and O, such as D.C. 790 as manufactured by Dow Corning, or approved equal.

C. Silicone sealant for use at exterior to metal framed openings (windows, doors, vents, etc.) joint locations shall be one-part silicone sealant for general construction usage conforming to ASTM C 920, Type S, Grade NS, Class 25, Uses NT, M, G, A, such as D.C. 795, as manufactured by Dow Corning or approved equal.

D. Sealant for hardscape joints: Single component urethane such as Masterseal SL-1 by BASF or SikaFlex by Sika Conforming to ASTMC 920, Type S, Grade WJ, Class 25.

E. Sealant for concealed joints shall be one-part butyl sealant, conforming to ASTM C 1085.

F. Sealant for hot pipe shall be one-part silicone, non-corrosive, with service temperature from -60° F to +400° F, minimum, such as “Dow Corning 999-A” or equal.

2.2 ACCESSORIES

A. Primer shall be non-staining type as manufactured or recommended by sealant manufacturer for each substrate.

B. Joint cleaner shall be non-corrosive and non-staining as recommended by sealant manufacturer. Cleaner shall be totally compatible with sealant for each substrate.

C. Bond breaker tape shall be pressure-sensitive tape as recommended by sealant manufacturer.

D. Backer rod shall be continuous length, closed-cell polyethylene foam, as recommended by sealant manufacturer. Backer rod shall be compressible, resilient, non-waxing, non-extruding, and non-staining. Backer rod shall be of sufficient size to be compressed 30% of maximum joint width and shall be totally compatible with sealant, primer, and substrates. Backers shall conform to requirements of ASTM C 962 - Type A, ASTM D 1622, ASTM D 1623, and ASTM D 5249 such as Green Rod by Nomaco, or approved equal.

E. Masking material shall be commercially available masking tape of appropriate width or other material recommended by sealant manufacturer. Self-adhesive masking materials shall be of low tack and completely strippable, leaving no adhesive residue behind when removed.
PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.
   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant.
      a. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.

B. Sawcut existing masonry to masonry joints where required to provide a minimum width of 1/2-inch.

C. Joint Priming: Prime joint substrates based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

D. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION – GENERAL

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Install sealant backings to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability. Provide a 2:1 width to depth ratio unless otherwise indicated by the manufacturer.
   1. Do not leave gaps between ends of sealant backings.
   2. Do not stretch, twist, puncture, or tear sealant backings.
   3. Provide approximately 30% compression of backer materials.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

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

3.3 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
1. Extent of Testing: Test completed and cured sealant joints as follows:
   a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
   b. Perform 1 test for each 1000 feet of joint length thereafter of 1 test per each floor per elevation.

END OF SECTION 079200
PART 1 - GENERAL

1.1 SUMMARY

A. This section specifies requirements for the following Scope of Work:
   1. Provide metal windows at all locations shown on Drawings. Comply with window manufacturer’s components as necessary to achieve wind load requirements.

1.2 JOB CONDITIONS

A. Building will be occupied and in use during construction. Contractor shall provide all protection, guards, and barriers necessary to segregate work area and adjacent or below areas from pedestrian and vehicular traffic. Protect existing building, building finishes, landscaping, and paved areas from damage.

B. All new and temporary construction, including equipment and accessories, shall be secured from vandalism or abuse.

C. All surfaces to receive new window assemblies shall be thoroughly dry and clean. Substrate surfaces shall be swept and vacuumed clear of all debris. Should surface moisture exist, provide necessary equipment to dry surfaces prior to application of materials. No open flames of any kind will be permitted on subject project at any time.

D. Under no circumstances remove existing materials and systems to ground in an uncontrolled manner. Machinery or devices used shall be manufactured for this purpose. Adjacent building and property areas shall be protected from airborne debris.

E. All windows removed in a given day must be replaced and/or made weathertight, and building made secure at end of day. No building interiors shall be left exposed to weather at end of each workday.

F. Contractor is responsible for securing and protecting equipment, materials, and tools (as well as partially completed construction) from vandalism or abuse.

G. Materials which have a temperature other than application temperatures of manufacturer shall not be applied.

H. Contractor shall repair or replace all damaged areas as a result of work. Areas repaired or replaced shall be to satisfaction of Owner and at no cost to Owner.
1.3 SUBMITTALS

A. Submittals shall be made in accordance with General Conditions and Division 01 Section “Submittal Procedures.”

B. Submit Certified Test reports for all referenced requirements.

C. Contractor shall submit a full set of shop drawings for installation of new windows which include all dimensions, sizes, existing conditions, materials to be removed, etc. Shop drawings for head, jamb, and sills for each different existing condition shall be submitted. A separate submittal shall include all flashing components and their relative position with new/existing building components.

D. Submit paint manufacturers information including specifications and complete range of manufacturer's color chips, including anodized coatings.

E. Submit copies of catalog cuts including manufacturer’s technical product data for each item of hardware, installation instructions, maintenance of operating parts and finish and other information necessary to show compliance with requirements for all items specified under part 2 – Products of this specification.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An installer acceptable to window manufacturer for installation of units required for this Project.


1. Provide AAMA-Certified windows with an attached label.

C. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA’s “Glazing Manual” unless more stringent requirements are indicated.

D. Mockups: Building mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup for a typical window type. Location(s) shall be as selected by Owner.

E. Field Measurements: Verify window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.5 WARRANTIES

A. Upon completion of work and prior to final payment, following warranties shall be provided:

1. Starting date for all warranty periods to be date of substantial completion of project.

2. All applicable manufacturer’s guarantees for window frames and hardware including:
   a. Window manufacturer’s 5 year guarantee on insulated glazing units.
   b. Window manufacturer’s 10 year guarantee on painted finishes.
c. Window manufacturer’s 10 year guarantees for window hardware.

3. Products judged to be defective during warranty period shall be replaced or repaired in accordance with manufacturer’s warranty, at no cost to Owner.

1.6 PROTECTION OF WORK AND MATERIALS STORAGE

A. Store materials in enclosed trailers or bring materials to site daily.

B. Glazing materials shall be delivered in manufacturer's original unopened containers, leaving manufacturer's label intact.

C. Exercise care to prevent damage by paint spots to work already in place and use drop cloths where necessary. Any work damaged by work under this Section shall be repaired at no expense to Owner.

D. All hardware shall be protectively wrapped and shall be packed in same package as all screws, bolts and fastenings required for proper installations. Items shall be free from nicks, scratches or blemishes. Defective or damaged materials shall be replaced by Contractor at no expense to Owner.

E. Refinish or replace windows damaged during installation.

1.7 MAINTENANCE

A. Furnish a complete set of specialized tools and maintenance instructions as needed for Owner’s continued adjustment, maintenance and removal and replacement of window hardware.

B. At completion of project furnish 2 copies of following:
   1. Maintenance instructions for each item of hardware.
   2. Catalog pages for each product.
   3. Name, address, and phone number of local representative of each manufacturer.
   4. Parts list for each product.

PART 2 - PRODUCTS

2.1 ALUMINUM WINDOWS - GENERAL

A. Standards: Except as otherwise indicated, requirements for aluminum windows, terminology and standards of performance, and fabrication workmanship are those specified and recommended in AAMA/NWWDA 101/LS.2-97, ANSI AAMA 101-95 and applicable general recommendations published by AAMA and ANSI.

B. All window systems shall be certified by manufacturer as adequate to resist the specified design wind load psf. Certification of anchorage to all substrates shall also be provided. Certification shall be provided by Registered Engineer.
C. Performance and Testing: Except as otherwise indicated, comply with air infiltration tests, water resistance tests, and applicable load tests specified in AAMA/NWWDA 101/I.S.2-97 for type and classification of window units required in each case.

D. Testing Reports: Where manufacturer's standard window units comply with requirements and have been tested in accordance with specified tests, provide certification by manufacturer showing compliance with such tests.
   1. Test reports shall be not more than four years old.
   2. Sample submitted for tests shall be of manufacturer's standard construction and shall have been tested in accordance with ASTM 283. Sequence of tests shall be optional between manufacturer and testing laboratory except that in all cases, the air infiltration test shall be performed before water resistance test.

E. Specific Performance Requirements:
   Fixed and projected shall conform to specified ANSI/AAMA standards and following, whichever are more stringent:
   1. Air Infiltration Test (Fixed Units): window shall be subjected to an air infiltration test in accordance with ASTM E 283. Air infiltration shall not exceed .06 cfm/ft² when tested at pressure of 6.24 psf.
   2. Air Infiltration Test (Operable Units): with vent in closed and locked position, window shall be subjected to an air infiltration test in accordance with ASTM E 283. Air infiltration shall not exceed .06 cfm/sf when tested at pressure of 6.24 psf.
   3. Water Penetration Test: glazed unit shall be mounted in its vertical position continuously supported around perimeter. Window unit shall be subjected to water resistance test in accordance with ASTM E 331 with a water application rate of 5 gal/hr/sf at a pressure differential of 6.24 psf. No water shall pass interior face of window frame and there shall be no leakage as defined in test method.
   4. Condensation Resistance Factor: window shall be tested in accordance with AAMA 1503.1 standards and test of thermal performance, and shall have a condensation resistance factor of 55 minimum.

F. All mullions, windows, and framing shall be extruded aluminum. Cross sections of mullions on details are for diagrammatic purposes only. Manufacturer shall provide appropriate mullions to withstand specified load requirements.

2.2 ALUMINUM WINDOWS

A. Metal windows shall be factory wet glazed, extruded aluminum frame, fixed pane, with fixed unit. All windows shall have self-contained structural thermal breaks, both in frame and in operable units. Nominal frame depth shall be 4-1/2-inch Windows shall be as manufactured by EFCO, Kawneer, Reynolds or Wassau.
   1. Operable units shall meet or exceed designation AW-60 and as designated by AAMA/NWWDA 101/I.S.2-97 and shall be labeled with AAMA label. Operable units shall be of configurations shown on Contract Drawings.
   2. Fixed units shall meet or exceed designation AW-60 as designated by AAMA/NWWDA 101/I.S.2-97 and shall be labeled with AAMA label.

B. All sash, frame and subframe shall be extruded 6063-T5 alloy with a minimum wall thickness of .125”, minimum.
C. Windows shall be pre-assembled by the manufacturer. Vertical frame members shall extend for full window height without interruption. Vent frames shall have mitered corners with aluminum gusset blocks. Joints shall be hydraulically crimped and epoxy welded. All frame and vent joints shall be sealed with non-hardening mastic to provide a watertight joint. Windows shall be equipped with baffled weeps as required to provide drainage for water.

D. Thermal Break: inside and outside faces of all sections shall be completely separated by a cast-in-place, high-strength, high-density polyurethane thermal break with a minimum tensile strength of 4000 psi and maximum thermal conductivity of .60 BTU per hour/per square foot/°F.

E. Provide attachment clips or angles on interior surface. Clips shall be 6063-T5 extruded aluminum, 0.125-inch thick minimum. Attachment angle cover plates shall be finished to match window frames. Provide 6063-T5 extruded aluminum receptor system.

2.3 FASTENERS

A. All screws, nuts, washers, bolts, rivets, and other miscellaneous fastening devices incorporated in project shall be of stainless steel except where noted below. Fasteners shall be as follows:
   1. Aluminum to aluminum fasteners shall be self-drilling, self-tapping screws, No. 14 of sufficient length to penetrate receiving substrate by 5/8-inch.
   2. Aluminum to wood fasteners shall be wood screws, No. 14, of sufficient length to penetrate receiving substrate by 1-1/2-inches.
   3. Fasteners for securing aluminum and wood blocking to concrete or brick masonry shall be Hex head type, ¼-inch diameter, self-tapping masonry screws where shown on Contract Drawings. Shank shall be of sufficient length to penetrate substrate 2-inches minimum.

2.4 FINISH

A. Finish for all exposed metal parts of new aluminum windows (frames, sash, vents and trim) shall be an Anodic Finish. Paint dry film thickness shall be not less than 0.7 mils +/- 0.1 mils. Surface preparation and coating shall conform to AAMA Architectural Class I A44 608.1 Specifications. Colors shall be as selected by Owner.

2.5 WINDOW HARDWARE

A. All hardware component parts shall be heavy duty of stainless steel. All hardware shall be as manufactured by Andenberg, Bronze Craft, or approved equal.

B. Operable projected units shall be balanced on 4 bar heavy duty stainless steel hinge assemblies. Brass slides with adjustable pressure screws shall be provided for precision adjustment. Hinges shall have adjustable travel stops. Adjustable limit stops shall be provided to all projected units to be set to limits required by Owner or as required to not allow operable unit to extend 4-inches beyond plane of interior wall furtthest interior projection.
2.6 INSULATING GLASS UNITS

A. Insulated glass units shall be comprised of specified glass for a total thickness of 1-inch. Insulated glass units shall be hermetically sealed and shall be IGCC-CBA rated and certified. IGCC number shall appear on spacer of insulated glass unit. All insulated glass units shall conform to ASTM E774-88 Class A Specifications. Individual lites shall conform to ASTM Specification C1036-85 Quality Q3 (glazing select).
1. Outboard Lite: heat strengthened +/- 1/4-inch thick PPG Solar Ban 60 with a tint.
   a. Low E coating on the number 2 surface.
   b. Color to be selected by owner.
2. Interior Space: Air filled
3. Inboard Lite: Tempered clear, +/- 1/4-inch thick.
   a. Low E coating on the number 3 surface.
   b. Obscured pattern on the number 4 surface
5. Visible light Transmittance: 32%
6. Wintertime U-value:.28

2.7 ACCESSORIES

A. Glazing tape for windows shall be preshimmed self adhesive polyisobutylene product of size required. Tape shall be Tremco 440, PTI 606 by Protective Treatments, Inc., Extru-seal by Pecora or approved equal. Cleaners shall be as recommended by tape manufacturer.

B. Sealant for cap beads over glazing tape shall be one part silicone conforming to ASTM C 920, Type S, Grade NS, Class 25, Uses NT, M, G, A, and O Specifications. Sealant shall be Dow Corning 795, Spectrem 2 by Tremco, Pecora 895, or approved equal.

C. Setting blocks shall be of sufficient height to provide a horizontal and true bearing for glazing assembly. Setting blocks shall be a minimum of 2” long and 1” wide and shall conform to ASTM C 864-84.

D. Sheet metal for exposed head flashings and metal closures shall be.080-inch aluminum. Aluminum shall be finished on both surfaces as specified herein to match window frame. Refer to Division 07 Section “Flashing and Sheet Metal.”

E. Exterior and interior sealant shall be installed to match window frame color. Refer to Division 07 Section “Joint Sealants.”

F. Cleaners and primers shall be as recommended by manufacturer of caulking.

G. Bond breaker tape shall be self adhesive polyethylene tape as recommended by sealant manufacturer.

H. Screws and nails for securement of flashings shall be 300 series stainless steel.
PART 3 - EXECUTION

3.1 GENERAL

A. Prepare all window openings to properly receive new window systems. Assure that all preparatory work to include removals, temporary support, wood blocking, sheet metal flashings, and incidental repairs have been properly performed to receive new windows.

B. Do not deliver to site or install any material or system that has not been reviewed and accepted for use on project.

C. Comply with written instructions of manufacturer and these specifications.

D. All work shall be made weathertight and building secure at end of each day.

E. Report any damaged or unsuitable areas to Owner immediately.

F. All surfaces to receive new window systems shall be properly prepared and free of dust, debris and moisture.

G. Contractor shall install all window systems plumb, level and true to lines and dimensions of existing wall. Contractor is responsible to provide whatever means necessary (i.e., masonry repairs, wood substrates, shims, etc.) to assure proper window installation in accordance with this specification and window manufacturer’s requirements.

H. Cut, patch and support existing ceiling and wallboard as required to install work and provide an existing ceiling and wallboard finish with no gaps or missing tiles.

3.2 WINDOW UNIT INSTALLATION

A. Installation: Windows shall be installed without forcing or distortion so that sills and heads are level and jambs are plumb. Frame shall be securely anchored to attachment angles. Joints between metal windows and metal members, including mullions, shall be set in mastic of type recommended by window manufacturer to provide completely watertight joints. Excess mastic shall be removed before hardening. After installation, each window shall be checked for proper operation and adjusted as necessary to provide proper operation. Metal surfaces shall be cleaned and any staining or discoloring of finish shall be restored or unit replaced. Glass shall be clean at time of installation.

B. Secure attachment angle anchor system to substrates with specified fasteners as recommended by window manufacturer. Provide sealant at all fastener locations and attachment covers. Sub-framing shall be continuous to full practicable length with 1/8-inch spacing between adjacent members.

C. Install all hardware in accordance with approved shop drawings and manufacturer’s instructions.
3.3 SEALANT INSTALLATION

A. Install sealant to all window exterior and interior perimeters in accordance with Division 07 Section “Joint Sealants.”

END OF SECTION 085101
PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies requirements for following Scope of Work:
   1. Prepare, prime, and paint exterior ferrous surfaces where indicated.
   2. Prepare, prime, and paint interior wall and ceiling finishes replaced or repaired. Paint entire surface of affected wall or ceiling areas.

1.2 SPECIAL JOB CONDITIONS

A. Coating products shall not contain: asbestos, zinc chromate, strontium chromate, or lead.

B. Building will be occupied and in use during construction. Contractor shall take all precautions necessary to protect persons and property. Scheduling of work shall be coordinated with Owner’s representative.

C. Provide all necessary temporary protection and barriers to segregate work area and prevent damage to adjacent areas.

1.3 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Paints shall be delivered in sealed containers that legibly show designated name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer’s formulation number, manufacturer’s directions including any warnings and special precautions, and name of manufacturer.

B. Paints and thinner shall be stored in accordance with manufacturer’s written directions and as a minimum stored off ground, under cover, with sufficient ventilation to prevent build-up of flammable vapors and at temperatures between 40 and 95 degrees F.

1.4 ENVIRONMENTAL CONDITIONS

A. Unless otherwise recommended by paint manufacturer, ambient temperature shall be between 45 and 95 degrees F when applying coatings.

1.5 SUBMITTALS

A. Manufacturer’s Instructions
   1. Paint application instructions
2. Paint color charts for Owner’s selection of color
3. Material Safety Data Sheets (MSDS)

B. Schedule for Paint application

C. Applicators Qualifications consisting of evidence showing satisfactory application of proposed paint at a minimum of two sites. Give names and contacts at sites.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

A. Material Compatibility:
   1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

2.2 PRIMER AND PAINT

A. Primer for interior plaster and wallboard surfaces MPI #50: Duron Vinyl Latex Primer, Product Series 18-004.

B. Paint for interior plaster and wallboard surfaces MPI #52 (eggshell): Dura Clad Alkyd, Dry Fog Flat.

C. Colors shall be as selected by Owner from manufacturer’s standard colors, as indicated. Color of undercoats shall vary slightly from color of next coat.

D. Paints containing lead in excess of 0.06 percent by weight of total nonvolatile content (calculated as lead metal) shall not be used.

E. Paints shall comply with applicable state and local laws enacted to insure compliance with Federal Clean Air Standards and shall conform to restrictions of local air pollution control authority.

2.3 ACCESSORIES

A. Paint application shall be performed by brush or roller only. No spraying shall be permitted unless approved in advance by Owner.

B. Masking tapes, sheets, and sealants shall be compatible with materials they are applied to and shall not leave stains on adjacent surfaces.
2.4 PAINT SCHEDULE

A. Exterior doors and frames and interior wallboard and plaster finishes:
   1. Primer
      a. Number of Coats: One, dry film thickness, 1.7 mils
   2. Paint
      a. Number of Coats: Two, dry film thickness, 1.3 mils per coat.

PART 3 - EXECUTION

3.1 GENERAL

A. Prior to surface preparation and coating applications, remove mask or otherwise
   protect all adjacent surfaces. Repair or replace items damaged in course of painting
   to Owner’s satisfaction.

B. Before applying succeeding coats, undercoats shall be completely integral and
   shall perform function for which they are specified. Properly prepare and touch up
   all scratches, abrasions or other disfigurements and remove any foreign matter
   before proceeding with following coat. All spot-priming or painting shall be feathered
   into adjacent areas to produce smooth monolithic appearance.

C. Post “Wet Paint” signs as required.

3.2 PREPARATION

A. Clean all surfaces to be painted as required to remove dust and dirt. Sand as necessary to
   properly prepare surfaces to receive primer and paint.

B. Wipe off dust and grit from properly prepared surfaces prior to applying primer.

C. Remove dirt, scale, loose coatings and particles, grease, oil, disintegrated coatings, and other
   substances deleterious to coating performance for component substrates in accordance with
   SSPC SP-1, Power Tool Cleaning, to remove rust and loose coatings as well as to remove glossy
   surfaces of existing paint films.

D. Gypsum Board Surfaces: Gypsum board surfaces shall be dry and shall have all loose dirt and
dust removed by brushing with a soft brush, rubbing with cloth, or vacuum-cleaning prior to
application of first-coat material. Damp cloth or sponge may be used if paint will be water-based.

E. Previously Painted Surfaces: Previously painted surfaces specified to be repainted or damaged
   during construction shall be thoroughly cleaned of all grease, dirt, dust or other foreign matter.
   Blistering, cracking, flaking and peeling or other deteriorated coatings shall be removed. Slick
   surfaces shall be roughened. Damaged areas such as, but not limited to, nail holes, cracks, chips,
   and spalls shall be repaired with suitable material to match adjacent undamaged areas. Edges of
   chipped paint shall be feather edged and sanded smooth. Rusty metal surfaces shall be cleaned as
per SSPC requirements. Solvent, mechanical, or chemical cleaning methods shall be used to provide surfaces suitable for painting. New, proposed coatings shall be compatible with existing coatings. If existing surfaces are glossy, gloss shall be reduced.

3.3 APPLICATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Apply products in accordance with manufacturers instructions. Rate of application of coating shall be as specified but shall not exceed that as recommended by paint manufacturer for purpose of surface involved.

C. Allow sufficient drying time between coats as recommended by coating manufacturer.

D. Lightly sand and dust between each coat to remove defects visible from 5-feet. Finish coats shall be smooth, free from brush marks, streaks, laps, sags, skips, holidays, etc.

E. Do not apply additional coats until previously installed coat has been reviewed and accepted by Owner. Only accepted coats of paint will be considered in determining number of coats applied.

F. Refinish entire sections if areas which have been previously repaired are rejected.

3.4 CLEANING

A. Repair brush marks, scratches, abrasions, and minor surface defects in coatings finish in accordance with manufacturer’s printed instructions. Finish of repaired surfaces shall be uniform and free from blemishes and variations in color and surface texture.

END OF SECTION 099100