UNIVERSITY of MARYLAND
BALTIMORE

ADMINISTRATION & FINANCE

DESIGN AND CONSTRUCTION

SPECIFICATIONS FOR THE BRESSLER RESEARCH BUILDING - FAÇADE RESTORATION

FRANK C. BRESSLER RESEARCH BUILDING (BRB)
AT THE UNIVERSITY OF MARYLAND, BALTIMORE
655 WEST BALTIMORE STREET
BALTIMORE, MARYLAND 21201

UNIVERSITY PROJECT # 16-350
BUILDING INVENTORY No. 8050

BID / CONSTRUCTION ISSUE
PROJECT MANUAL

NOVEMBER 11, 2019

Owner
University of Maryland, Baltimore
Design and Construction
Office of Facilities Management
620 W. Lexington Street, 6th Floor
Baltimore, Maryland 21201

Board of Public Works
Lawrence J. Hogan Jr., Governor
Peter Franchot, Comptroller
Nancy K. Kopp, Treasurer

Maryland General Assembly
Thomas V. Miller Jr, Senate President
Adrienne Jones, House Speaker

Architect
Ziger/Snead LLP
1006 Morton Street
Baltimore, MD 21201

Associate Architect
Murdoch Architects LLC
3809 Keswick Rd
Baltimore, MD 21211

Structural Engineer
Simpson, Gumpertz & Heger
1625 Eye Street NW, Suite 900
Washington DC 20006

Envelope Consultant
Simpson, Gumpertz & Heger
1625 Eye Street NW, Suite 900
Washington DC 20006

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SECTION 003100 – AVAILABLE PROJECT INFORMATION

PART 1 - GENERAL

1.1 LEGACY DOCUMENTATION

A. Construction Documents – 1961 Original Construction – Howard Hall.
   1. A digital copy of a limited number of surviving sheets from the original construction drawings are available in PDF format from the Architect.
      a. Title: John Eager Howard Hall
      b. Date: May 24, 1961
      c. Prepared by: Wheeler, Bonn, Shockey & Associates, Architects
      d. No representation is made that these drawings accurately depict existing conditions. Contractor must verify all existing conditions in field.

B. Construction Documents – 1972 Original Construction – Howard Hall Addition.
   1. A digital copy of a limited number of surviving sheets from the original construction drawings are available in PDF format from the Architect.
      a. Title: Addition to Howard Hall
      b. Date: September 11, 1972
      c. Prepared by: Wheeler, Bonn, Shockey, Taylor & Associates, Architects
      No representation is made that these drawings accurately depict existing conditions. Contractor must verify all existing conditions in field.

1.2 SURVEYS AND REPORTS

A. Building Facade Assessment Report
   1. A digital copy of the façade assessment report is available in PDF format from the Architect.
      a. Title: Conceptual Rehabilitation Narrative
      b. Date: October 16, 2017
      c. Prepared by: Simpson, Gumpertz & Heger.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 003100

SECTION 010100 - SUMMARY OF WORK

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Project information.
   2. Work covered by Contract Documents.
   3. Access to site.
   4. Occupancy requirements.
   5. Work restrictions.
   6. Miscellaneous provisions.

B. Related Requirements:
   1. Section 015000 "Construction Facilities and Temporary Controls" for limitations and procedures governing temporary use of University facilities.

1.2 PROJECT INFORMATION

A. Project Identification:
   1. Project Name: Façade restoration for the Frank C. Bressler Research Building (BRB), Building No. 8050.
   2. UMB Project 16-350

B. Project Location: 655 West Baltimore Street, Baltimore, Maryland 21201

C. Owner: University of Maryland, Baltimore.

D. Owner's Representative:
   1. University of Maryland, Baltimore – Design & Construction
      Office of Facilities Management
      620 W. Lexington Street, 6th Floor, Baltimore, MD 21201
   2. Contact: Ted Warner, Project Manager

E. Architect:
   1. Ziger/Snead LLP
      1006 Morton Street, Baltimore, MD 21201
   2. Contact: Jonathan Lessem, Project Manager

F. Architect's Consultants: Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

   1. Associate Architect: Murdoch Architects LLC, 3809 Keswick Rd, Baltimore, MD 21211

   2. Structural Engineer & Envelope Consultant: Simpson, Gumpertz & Heger, 1625 Eye Street NW, Suite 900, Washington DC 20006

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following two major components:

   1. Systematic replacement of exterior sealant joints throughout the exterior enclosure, including wall joints, penetrations joints, wall/door/louver perimeter joints, and exterior wet seals for window glazing. Some limited replacement of failed exterior glazing units will be required.

2. Masonry veneer modifications & restoration to address structural deficiencies in the attachment and support of the masonry veneer. This work will include improvements to the backup wall systems behind the masonry veneer, where deficiencies have been identified.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

C. Existing Building Description:

1. The Bressler Research Building is part of the UMB School of Medicine and currently houses offices, research, teaching, and laboratory spaces. The site is located on the south side of Baltimore Street, and is connected (via two bridges) to the University of Maryland Medical Center to the east and to Howard Hall to the south and west. The facility shares a common loading zone with the Medical Center and Shock Trauma Center to the south.

2. Built as an addition to Howard Hall in 1972, Bressler Hall is a fifteen-story building that has one partially below-grade basement and a mechanical penthouse that occupies the entire fifteenth floor. It is attached to six-story Howard Hall along the west side and a portion of the south side. Some HVAC equipment on the roof of Howard Hall serves laboratory functions in Bressler Hall.

3. Bressler Hall is connected to the adjacent Medical Center via two enclosed pedestrian bridges – one at the third floor and one at the ninth floor. The lower bridge is original to the 1972 building. The upper bridge was added at a later date.

4. Existing Structure: The existing building is primarily a steel frame structure with cast-in-place concrete floors. The original construction documents indicate that the structural steel frame is intended to be fireproofed for a three-hour fire rating.

5. Existing Envelope: The exterior envelope typically consists of a combination of brick veneer (on 4” CMU backup, with no cavity) and precast concrete wall panels. Windows are basic aluminum-framed windows, roughly 1-1/2” deep with no thermal break. Most windows are original to the 1972 building. Glazing appears to be 1” insulated glass in most locations.

6. Hazardous Materials: No hazardous materials are expected to be encountered with this Work.

1.4 ACCESS TO SITE

A. General: During the construction period the Contractor shall have full access to the site for construction operations. Access to the interior of the occupied building will be limited, and must be coordinated with the UMB Project Manager. The Contractor's use of the premises is limited by the University's need to maintain continuing operations of Bressler Hall, Howard Hall, and the Medical Center, including the common loading dock area.

1. All on-site employees of the Contractor and Subcontractors are required to obtain a UMB ID Badge. Related fees to be paid by the contractor and included in the cost of the work.

B. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.

1. University Occupancy: Allow for University occupancy and use by the public.

2. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving the premises clear and available to the University, the University's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

   a. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

   b. Schedule deliveries to minimize use of driveways and entrances by construction operations.

C. Use of the Existing Building: Maintain the existing building in a weathertight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

   1. Access to the interior of Bressler Hall for construction personnel will be limited and must be coordinated in advance with the UMB Project Manager.

      a. The existing freight elevator will be available for contractor use during limited hours, as coordinated in advance with UMB.

      b. The existing roof scuttle will be available for contractor use, as coordinated in advance with UMB.

      c. Restroom facilities inside the building will not be available to construction personnel.

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

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

1.5 OCCUPANCY REQUIREMENTS

A. Full University Occupancy: The University will occupy the site and Bressler Hall during the entire construction period. The adjacent Medical Center will be occupied during the entire construction period. Cooperate with the University and Medical Center during construction operations to minimize conflicts and facilitate University usage. Perform the Work so as not to interfere with University and Hospital day-to-day operations. Maintain existing exits unless otherwise indicated.

   1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.

      a. Provide overhead protection for all pedestrian pathways below work areas. Refer to Section 015000 “Construction Facilities and Temporary Controls” for requirements.

   2. Notify the UMB Project Manager not less than 72 hours in advance of activities that will affect University or Medical Center operations.

1.6 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

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

2. Work areas not otherwise accessible from the ground or adjacent building roofs must be accessed via swing stages suspended from the roof or structure of the existing louvered enclosures.

3. Protect existing roofs from damage due to construction activities. Do not void existing roof warranties. Do not exceed the structural capacity of the existing roof structures with scaffolding or materials.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 8 a.m. to 5 p.m., Monday through Friday, unless otherwise indicated.

1. Hours for Work with Excessive Noise (masonry cutting, etc.): 6:00am to 8:00am, or by prior arrangement with the UMB Project Manager. This restriction only applies to noisy work at the east and south facades.

2. Weekend Hours: 8:00am to 8:00pm.

3. Early Morning Hours: 5:00am to 8:00am, Monday through Friday.

4. Hours for Utility or HVAC Shutdowns: To be coordinated in advance with the UMB Project Manager.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify the UMB Project Manager not less than two weeks in advance of proposed utility interruptions.
2. Obtain UMB Project Manager's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to University or Medical Center occupancy with the UMB Project Manager.

1. Notify the UMB Project Manager not less than three days in advance of proposed disruptive operations.
2. Obtain the UMB Project Manager's written permission before proceeding with disruptive operations.

E. Restricted Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

F. Employee Identification: The University will provide (for a fee) identification badges for Contractor personnel working on Project site. Require personnel to use identification badges at all times.

1. It is the Contractor's responsibility to apply for and obtain the required ID Badges, at the Contractor's cost.

1.7 PROTECTION OF EXISTING CONSTRUCTION AND FURNISHINGS

A. The Contractor shall take all necessary precautions to protect the University's property and furnishings. The Contractor shall promptly remedy damage and loss to the University's property

caused in whole or in part by the Contractor, a Subcontractor, a Sub-Subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 010100

SECTION 010200 – ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.

1. Selected materials and equipment are specified in the Contract Documents by allowances. In some cases, these allowances include installation. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

2. Whenever costs are more or less than allowances, the contract sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect the difference between actual costs and the allowance.

B. Types of allowances include the following:

1. Lump-sum allowances.
   a. This is a fixed amount allowance for a given item.

2. Unit-cost allowances.
   a. This is a price per unit of measurement for materials and labor.

3. Inspection and testing allowances.

C. Related Requirements:
1. Section 010260 "Unit Prices" for procedures for using unit prices, including adjustment of quantity allowances when applicable.

1.2 SELECTION AND PURCHASE

A. Three (3) weeks after award of the Contract, advise the University of the date when the final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work. Include these milestone dates in the Contractor’s Construction Schedule.

B. At the University's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by the University from the designated supplier.

1.3 SUBMITTALS

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

B. Submit invoices and delivery slips to show the actual costs and quantities of materials delivered to the site for use in fulfillment of each allowance.

1.4 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.5 UNIT-COST ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.6 INSPECTION AND TESTING ALLOWANCES

A. Inspection and testing allowances include the cost of engaging the inspection or testing agencies, the actual inspections and tests, and reporting the results.

A. The allowance does not include incidental labor required to assist the testing agency or costs for retesting upon failure of previous tests and inspections. Such costs shall be included in the Contractor’s bid amount.

B. Costs of services not required by the Contract Documents are not included in the allowance.

1.7 UNUSED MATERIALS

A. Return unused materials to the manufacturer or supplier for credit to the University, after installation has been completed and accepted.

1. When requested by the University, prepare unused material for storage by University where it is not economically practical to return the material for credit. When directed by the University anytime during the contract period, deliver unused material to the University's storage space. Otherwise, disposal of unused material is the Contractor's responsibility.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly upon delivery for damage or defects. Report any damages or defects to the University and make arrangements for replacement of defective or damaged materials.

3.2 PREPARATION

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

3.3 SCHEDULE OF ALLOWANCES

A. ALLOWANCE NO. 1: Face Brick

1. Unit-Cost Allowance: Include the cost for new face brick material as specified in Section 042000 "Unit Masonry" and as shown on Drawings.

a. Allowance Quantity: New brick required for typical brick reconstruction areas as indicated by notes 21, 22, 24 & 25 on the building elevation drawings: 130,950 bricks (19,400 square feet of wall area). Does not include salvaged brick per Allowance No. 3.

b. Unit of Measurement: Per 1,000 brick.

c. Unit Rate: $750 per 1,000 bricks.

B. ALLOWANCE NO. 2: Brick Repointing

1. Unit-Cost Allowance: Include repointing of worn, cracked, or otherwise distressed existing-to-remain brick masonry mortar joints. Refer to the General Notes in the S-Series Drawings and Section 040120.64 “Brick Masonry Repointing”. Includes 2,210 square feet of wall area specifically indicated by Note 29 on the building elevation drawings, plus an additional 2,790 square feet of wall across the remaining existing wall surfaces, to be determined in the field.

a. Allowance Quantity: 5,000 square feet of wall area.

b. Unit of Measurement: Square foot of wall area

C. ALLOWANCE NO. 3: Brick Removal and Replacement

1. Unit-Cost Allowance: Include removal and replacement of worn, cracked, or otherwise distressed brick masonry units in areas outside of typical brick reconstruction areas. Utilize salvaged and cleaned existing brick for replacement. Refer to the General Notes in the S-Series Drawings and Section 040120.63 “Brick Masonry Repair”.

a. Allowance Quantity: 200 bricks.

b. Unit of Measurement: per brick

D. ALLOWANCE NO. 4: Masonry Cleaning

1. Unit-Cost Allowance: Include cleaning of existing masonry outside of typical brick reconstruction areas, in locations to be coordinated with Owner. Refer to Section 040110

"Masonry Cleaning". This allowance does NOT include cleaning of new face brick in typical brick reconstruction areas.

a. Allowance Quantity: 6,000 square feet of existing-to-remain brick masonry surfaces across all elevations.

b. Unit of Measurement: Per square foot of wall area.

E. ALLOWANCE No. 5: Helical Anchors.

1. Unit-Cost Allowance: Provide and install remedial helical anchors where existing joint reinforcement is missing or damaged as indicated on the Structural Drawings.

a. Allowance Quantity: 300 anchors.

b. Unit of Measurement: Each anchor installation.

F. ALLOWANCE No. 6: Precast Concrete Panel Repair

1. Unit-Cost Allowance: Include repair of cracks and spalls in the existing precast concrete cladding panels and sills as required by the Structural Drawings and Section 030100 "Maintenance of Precast Concrete".

a. Allowance Quantity: 10 Repairs at 1 sq. ft. each

b. Unit of Measurement: Per square foot of repair.

G. ALLOWANCE No. 7: CMU Vertical Crack Repairs

1. Unit-Cost Allowance: Include repair of vertical cracks in the existing CMU at interface between louvers and building exterior wall by "stitching". Refer to S-Series Elevations and Detail Drawings.

a. Allowance Quantity: 50 joint stitch locations (total across all elevations)

b. Unit of Measurement: Each stitch location.

H. ALLOWANCE No. 8: CMU Horizontal Crack Repairs

1. Unit-Cost Allowance: Include repair of horizontal cracks in the existing CMU at interface between louvers and building exterior wall by "trenching". Refer to S-Series Elevations and Detail Drawings.

a. Allowance Quantity: 10 joint trench locations (total across all elevations)

b. Unit of Measurement: Each trench location.

I. ALLOWANCE No. 9: IGU Window Lite Replacement:

1. Unit-Cost Allowance: Remove and replace fogged, stained, and/or broken Insulated Glass Unit (IGU) Window Lites, with the associated sealant and accessory materials. Refer to the A-Series Detail Drawings and Section 088000 “Glazing”.

    a. Allowance Quantity:

        1. 10 IGU window lites at the upper bridge (Window Type W9 – 16.8 square feet each)

        2. 10 IGU window lites at the lower bridge (Window Type W4&W5 – 8 square feet each)

        3. 10 IGU window lites at the main building (Window Type W3 – 10 square feet each)

    b. Unit of Measurement: Each IGU lite unit.

J. ALLOWANCE No. 10: Relieving Angle Load Test:

1. Testing & Inspection Allowance: Load testing of existing steel relieving angles. Refer to the General Notes on the S-Series Drawings.

    a. Allowance Quantity: 3 tests.

    b. Unit of Measurement: Per test.

K. ALLOWANCE No. 11: Cold / Hot Weather Protection Measures:

1. Lump Sum Allowance: Include cost of procedures and equipment for completing and/or protecting work during periods of hot or cold weather per specification requirements.

    a. Lump Sum allowance estimate based on project schedule.

END OF SECTION 010200

SECTION 010260 - UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for unit prices.

B. Related Requirements:

1. Section 010200 "Allowances" for procedures for using unit prices to adjust quantity allowances.

1.2 DEFINITIONS

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 the estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

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

B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

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

D. Schedule: A "Unit Price Schedule" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

1.1 SCHEDULE OF UNIT PRICES

A. UNIT PRICE No. 1: Face Brick:

1. Description: New face brick for installation where existing face brick is designated for removal. Material only, delivered to project site.
2. Unit of Measurement: Quantity of brick units, in increments of 1,000 bricks.
3. Unit Rate: $750 per thousand bricks.

B. UNIT PRICE No. 2: Precast Concrete Panel Repairs:

1. Description: Repair of cracks and spalls in the existing precast concrete cladding panels and sills as required by the Structural Drawings and Section 030100 “Maintenance of Precast Concrete”.

   a. Unit of Measurement: Per square foot of repair

C. UNIT PRICE No. 3: CMU Vertical Crack Repairs:

1. Description: Repair of vertical cracks in the existing CMU at interface between louvers and building exterior wall by “stitching”. Refer to S-Series Elevations and Detail Drawings.

   a. Unit of Measurement: Per stitch location.

D. UNIT PRICE No. 4: CMU Horizontal Crack Repairs:

1. Description: Repair of horizontal cracks in the existing CMU at interface between louvers and building exterior wall by “trenching”. Refer to S-Series Elevations and Detail Drawings.

   a. Unit of Measurement: Per trench location.

E. UNIT PRICE No. 5: Brick Repointing:

1. Description: Repointing of worn, cracked, or otherwise distressed existing-to-remain brick masonry mortar joints. Refer to the General Notes in the S-Series Drawings and Section 040120.64 “Brick Masonry Repointing”.

   a. Unit Price Measurement: square foot of wall area

F. UNIT PRICE No. 6: Brick Removal and Replacement:

1. Description: Removal and replacement of damaged brick masonry units in areas outside of typical brick reconstruction areas, utilizing salvaged and cleaned existing brick for replacement. Refer to the General Notes in the S-Series Drawings and Section 040120.63 “Brick Masonry Repair”.

   a. Unit Price Measurement: per brick

G. UNIT PRICE No. 7: Remedial Helical Anchors:

1. Description: Provide and install remedial helical anchors where existing joint reinforcement is missing or damaged as indicated on the Structural Drawings.

   a. Unit Price Measurement: Each anchor installation.

H. UNIT PRICE No. 8: IGU Window Lite Replacement:

1. Description: Removal and replacement of fogged, stained, and/or broken Insulated Glass Unit (IGU) Window Lites, with associated sealant and accessory materials. Refer to the A-Series Detail Drawings and Section 088000 “Glazing”.

a. Unit Price Measurement: each additional IGU lite (10 square foot lite size)

I. UNIT PRICE No. 9: Masonry Cleaning

1. Description: Cleaning of exterior masonry outside of typical brick reconstruction areas. Refer to Section 040110 “Masonry Cleaning”.

a. Unit of Measurement: Per square foot of wall area.

END OF SECTION 010260

SECTION 010270 - APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.

1. This Section specifies administrative and procedural requirements governing each prime contractor's Applications for Payment.

2. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, Submittal Schedule, and List of Subcontracts.

B. Related Sections: The following Sections contain requirements that relate to this Section.

1. Schedules: The Contractor's Construction Schedule and Submittal Schedule are specified in Division 1 Section "Submittals."

1.2 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
   a. Contractor's Construction Schedule.
   b. Application for Payment forms, including Continuation Sheets.
   c. List of subcontractors.
   d. Schedule of allowances.
   e. Schedule of alternates.
   f. List of products.
   g. List of principal suppliers and fabricators.
   h. Schedule of submittals.

2. Submit the Schedule of Values to the University at the earliest possible date but no later than 7 days before the date scheduled for submittal of the initial Applications for Payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish the format for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values:
   a. Project name and location.
   b. University’s Project number.
   c. Contractor's name and address.
   d. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
   a. Related Specification Section or Division.
   b. Description of Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.

e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value.
h. Percentage of Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Break principal subcontract amounts down into several line items.

4. Round amounts to nearest whole dollar; the total shall equal the Contract Sum.

5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed.
   a. Differentiate between items stored on-site and items stored off-site. Include requirements for insurance and bonded warehousing, if required.

6. Provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

7. Unit-Cost Allowances: Show the line-item value of unit-cost allowances, as a product of the unit cost, multiplied by the measured quantity. Estimate quantities from the best indication in the Contract Documents.

8. Margins of Cost: Show line items for indirect costs and margins on actual costs only when such items are listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete. Include the total cost and proportionate share of general overhead and profit margin for each item.
   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at the Contractor's option.

9. Schedule Updating: Update and resubmit the Schedule of Values prior to the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications for payment as paid for by the University.

   1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

B. Refer to the University of Maryland Baltimore Standard General Condition of Construction for requirements and procedures governing applications for payment.

C. Initial Application for Payment: Administrative actions and submittals, that must precede or coincide with submittal of the first Application for Payment, include the following:
   1. List of subcontractors.
   2. List of principal suppliers and fabricators.
   3. Schedule of Values.
   4. Contractor's Construction Schedule.

5. Schedule of principal products.
6. Schedule of unit prices.
7. Submittal Schedule.
8. List of Contractor's staff assignments.
9. List of Contractor's principal consultants.
10. Copies of authorizations and licenses from governing authorities for performance of the Work.
11. Initial progress report.
12. Report of preconstruction meeting.
13. Certificates of insurance and insurance policies.
14. Performance and payment bonds.
15. Data needed to acquire the University's insurance.
16. Initial settlement survey and damage report, if required.

D. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment.

1. This application shall reflect Certificates of Partial Substantial Completion issued previously for University occupancy of designated portions of the Work.

2. Administrative actions and submittals that shall precede or coincide with this application include:
    a. Warranties (guarantees) and maintenance agreements.
    b. Test/adjust/balance reports.
    c. Operation and Maintenance Manuals.
    d. Meter readings if appropriate.
    e. Startup performance reports.
    f. Commissioning Reports.
    g. Final cleaning.
    h. Application for reduction of retainage and consent of surety.
    i. Advice on shifting insurance coverages.
    j. Final progress photographs.
    k. List of incomplete Work, recognized as exceptions to University's Certificate of Substantial Completion.

E. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include the following:

1. Completion of Project closeout requirements.
2. Completion of items specified for completion after Substantial Completion.
3. Resolve all previously unsettled claims.
4. Resolve all previously incomplete Work.
5. Transmittal of required Project construction records to the University.
6. Proof that taxes, fees, and similar obligations were paid.
7. Removal of temporary facilities and services.
8. Removal of surplus materials, rubbish, and similar elements.
9. Change of door locks to University's access.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 010270

SECTION 010350 - MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing contract modifications.

1.2 MINOR CHANGES IN THE WORK

A. The University will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or Contract Time.

1.3 CHANGE ORDER PROPOSAL REQUESTS

A. University Initiated Change Order Proposal Requests: The University will issue a detailed description of proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal requests issued by the University are for information only. Do not consider them as an instruction either to stop work in progress or to execute the proposed change.
2. Within a mutually agreed upon time period, submit an estimate of cost necessary to execute the change to the University for review.
    a. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities. Include required labor hours and unit costs, with totals for each labor category. Include all credits for deleted work.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts, for new work and deleted work.
    c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.

B. Contractor-Initiated Proposals: When latent or unforseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the University.

1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
2. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities. Include required labor hours and unit costs, with totals for each labor category. Include all credits for deleted work.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts, for new work and deleted work.
4. Comply with requirements in Section "Product Substitutions" if the proposed change requires substitution of one product or system for a product or system specified.

C. Proposal Request Form: Use forms provided by the Owner for Change Order Proposals. Sample copies are included at the end of this Section.

1.4 ALLOWANCES

A. Allowance Adjustment: For allowance-cost adjustment, base each Change Order Proposal on the difference between the actual purchase amount and the allowance.

1. Include installation costs in the purchase amount only where indicated as part of the allowance.
2. Prepare explanations and documentation to substantiate the margins claimed.
3. The University reserves the right to establish the actual quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or the Contractor's handling, labor, installation, overhead, and profit. Submit claims within 21 days of receipt of the Change Order authorizing work to proceed. The University will reject claims submitted later than 21 days.

1. Do not include the Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in Contract Documents.
2. No change to the Contractor's indirect expense is permitted for selection of higher or lower-priced materials or systems of the same scope and nature as originally indicated.

1.5 UNIT PRICES

A. Take measurements and compute quantities. Contractor will verify measurements and quantities.

B. Unit Quantities: Actual quantities supplied or placed in the Work shall determine payment.

C. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities accepted by University/Engineer multiplied by unit sum/price for Work incorporated in or made necessary by the Work.

1.6 CHANGE ORDER PROCEDURES

A. Upon the University's approval of a Proposal Request, the University will issue a Change Order Requisition for signatures of the Contractor followed by a Notice to Proceed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 010350

SECTION 010400 - COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and supervisory requirements necessary for coordinating construction operations including, but not necessarily limited to, the following:

1. General project coordination procedures.
2. Conservation.
3. Coordination Drawings.
4. Administrative and supervisory personnel.
5. Cleaning and protection.

1.2 COORDINATION

A. Coordinate construction operations included in various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in the sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to assure required minimum accessibility for maintenance, service, and repair.
3. Make provisions to accommodate items scheduled for later installation.

B. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

1. Prepare similar memoranda for the University and sub-contractors where coordination of their work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of CPM schedules.
2. Installation and removal of temporary facilities.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Work coordination meetings.
6. Project closeout activities.

D. Conservation: Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work.

1.3 SUBMITTALS

A. Coordination Drawings: Prepare coordination drawings where careful coordination is needed for installation of products and materials fabricated by separate entities. Prepare coordination drawings where limited space availability necessitates maximum utilization of space for efficient installation of different components. At a minimum, prepare coordination drawings for all mechanical rooms, electrical rooms and substation rooms.

1. Show the relationship of components shown on separate Shop Drawings.
2. Indicate required installation sequences.
3. Comply with requirements contained in Section "Submittals."
4. The coordination drawings shall be comprehensive drawings that show all work by all disciplines for each location on a single drawing. The drawings shall be prepared at a large enough scale to permit legibility and ease of recognition of all work.

B. Staff Names: Within 15 days of commencement of construction operations, submit a list of the Contractor's principal staff assignments, including the superintendent and other personnel in attendance at the Project Site. Identify individuals and their duties and responsibilities. List their addresses and telephone numbers.

1. Post copies of the list in the Project meeting room, the temporary field office, and at each temporary telephone.

PART 2 - PRODUCTS (Not Applicable)

PART 3 – EXECUTION

3.1 GENERAL COORDINATION PROVISIONS

A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

B. Coordinate temporary enclosures with required inspections and tests to minimize the necessity of uncovering completed construction for that purpose.

3.2 CLEANING AND PROTECTION

A. Clean and protect construction in progress and adjoining materials in place, during handling and installation. Apply protective covering where required to assure protection from damage or deterioration until Substantial Completion.

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

C. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Thermal shock.

5. Excessively high or low humidity.
6. Air contamination or pollution.
7. Water or ice.
8. Solvents.
9. Chemicals.
10. Light.
11. Radiation.
12. Puncture.
13. Abrasion.
14. Heavy traffic.
15. Soiling, staining, and corrosion.
16. Bacteria.
17. Rodent and insect infestation.
18. Combustion.
19. Electrical current.
20. High-speed operation.
21. Improper lubrication.
22. Unusual wear or other misuse.
23. Contact between incompatible materials.
24. Destructive testing.
25. Misalignment.
26. Excessive weathering.
27. Unprotected storage.
28. Improper shipping or handling.
29. Theft.
30. Vandalism.

END OF SECTION 010400

SECTION 01045 - CUTTING AND PATCHING

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the requirements for cutting and patching.

1.2 SUBMITTALS

A. Cutting and Patching Proposal: When unforeseen conditions require cutting and patching of the existing structure and/or related components the Contractor shall submit a cutting and patching proposal to the university, for review and approval before proceeding with any work. Include the following information, as applicable, in the proposal:

1. Describe the extent of cutting and patching required and indicate why it cannot be avoided. Include changes to the building's appearance and other significant visual elements if applicable.
2. Describe the products to be used.
3. Identify the impact to the project's schedule and budget.
4. Indicate the dates when cutting and patching will be performed.
5. Where cutting and patching involves adding reinforcement to structural elements, the modifications to the structure shall be designed by a registered structural engineer. If the design team does not include a structural engineer the CONTRACTOR shall secure the services of an engineer to perform the required design. The CONTRACTOR shall submit the design drawings, details and engineering calculations showing integration of reinforcement with the original structure to the University.
6. Approval by the University to proceed with cutting and patching does not waive the University's right to later require complete removal and replacement of unsatisfactory work.

1.3 QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.

1. Obtain hot work permit from the University for cutting, burning, welding, etc.
   a. Apply online: http://afcf.umaryland.edu/ehs/public/hotworks/

2. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:
   a. Bearing walls.
   b. Structural concrete.
   c. Structural steel.
   d. Lintels.
   e. Structural decking.
   f. Miscellaneous structural metals.
   g. Exterior curtain-wall construction.
   h. Equipment supports.
   i. Piping, ductwork, vessels, and equipment.

B. Operational Limitations: Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.

1. Obtain approval of the cutting and patching proposal from the University before cutting and patching the following operating elements or safety related systems:
   a. Primary operational systems and equipment.
   b. Air or smoke barriers.
   c. Water, moisture, or vapor barriers.
   d. Membranes and flashings.
   e. Fire protection systems.
   f. Noise and vibration control elements and systems.
   g. Control systems.
   h. Communication systems.
   i. Electrical wiring systems.
   j. Fire rated assemblies.

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the University's opinion, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner when directed by the University.

1. If possible, retain the original Installer or fabricator to cut and patch the exposed Work listed below. If it is impossible to engage the original Installer or fabricator, engage another recognized experienced and specialized firm.
   a. Processed concrete finishes.
   b. Firestopping.
   c. Window wall system.

D. Cutting and Patching Responsibilities:

1. Cutting: cutting shall be the work of the trade requiring the cutting for access, or for permitting the alteration to be performed or an approved subcontractor designated by the trade or the CONTRACTOR.
   a. Cutting required for inspections shall be the work of the CONTRACTOR.
   b. Cutting required to obtain test samples of suspected hazardous materials shall be the work of a contractor licensed for the removal of hazardous materials.
2. Patching: Patching shall be the work of the appropriate trade.
   a. Maintain the rating of fire rated barriers, using approved sealant products.
3. Fire Rated Barriers: Where existing fire rated barriers, located in the project area, have unsealed openings for mechanical and electrical work, these openings shall be sealed using the approved sealant products to maintain the fire rating of the barrier.

1.4 WARRANTY

A. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible if identical materials are unavailable or cannot be used. For building exterior or visible interior elements, the Architect and the UMB representative

must approve substitutions. Use materials whose installed performance will equal or surpass that of existing materials. Refer to applicable spec sections for materials.

PART 3 - EXECUTION

3.1 CONSTRUCTION WORK – EXCESSIVE NOISE

A. Construction work that creates excessive noise will be restricted at the south façade and east façade of Bressler Hall, the two bridges, and the Medical Center. Work such as cutting masonry construction or use of powder actuated fasteners shall be scheduled between 6:00am and 8:00am, unless coordinated otherwise in advance with UMB – Project Manager.

1. Excessive-noise work at the north façade and west façade of Bressler Hall is not restricted.

3.2 INSPECTION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.

1. Before proceeding, meet at the Project Site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.3 PREPARATION

A. Temporary Support: Provide temporary support of work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Avoid cutting existing pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them or to take them out of service.

3.4 PERFORMANCE

A. General: Employ skilled workmen or experienced subcontractors to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining construction. Where possible, review proposed procedures with the original Installer; comply with the original Installer's recommendations.

1. In general, when cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.
4. Where services are required to be removed, relocated, or abandoned, by-pass utility services, such as pipe or conduit, before cutting. Ensure all services have been de-energized or drained before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

3.5 PAINTING

A. Extent of Painting:
1. Paint over the entire surface plane, unless otherwise noted.
2. Over patched surfaces paint to the nearest cut off line for the entire surface, such as the intersection with adjacent wall, ceiling, beam, bulkhead, or to the nearest opening frame where a total cut off does not occur within ten (10) feet of the patch, unless otherwise noted.

B. Appearance and Finish:
1. Appearance: Ensure painted surfaces do not present a spotty, touched-up appearance.
2. Finish: Provide a smooth continuous surface in texture, coverage and color.

3.6 CLEANING

A. Areas and spaces where cutting, and patching are performed shall be cleaned. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

END OF SECTION 010450

SECTION 010950 - REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.1 DEFINITIONS

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

B. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, or other paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the reader locate the reference. Location is not limited.

C. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the University, requested by the University, and similar phrases.

D. "Approved": The term "approved," when used in conjunction with the University's action on the Contractor's submittals, applications, and requests, is limited to the University's duties and responsibilities as stated in the Conditions of the Contract.

E. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": The term "furnish" means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": The term "install" describes operations at the Project Site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.

I. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. The term "experienced," when used with the term "installer," means having a minimum of 5 previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of authorities having jurisdiction.
2. Trades: Using terms such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
3. Assigning Specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no option. However, the ultimate responsibility for fulfilling contract requirements remains with the Contractor.
    a. This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade-union jurisdictional settlements and similar conventions.

J. “Project Site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction, with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

K. “Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.2 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Content: This Specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

1. Abbreviated Language: Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Streamlined Language: The Specifications generally use the imperative mood and streamlined language. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.
   a. The words "shall be" are implied where a colon (:) is used within a sentence or phrase.

1.3 INDUSTRY STANDARDS

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

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

C. Conflicting Requirements: Where compliance with 2 or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer to the University before proceeding for a decision on requirements that are different but apparently equal, and where it is uncertain which requirement is the most stringent.

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

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

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

E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authorities having jurisdiction, or other entity applicable to the context of the text provision. Refer to Gale Research Co.'s "Encyclopedia of Associations," available in most libraries.

1.4 SUBMITTALS

A. Permits, Licenses, and Certificates: For the University's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 010950

SECTION 012000 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:

1. Preconstruction conferences.
2. Progress meetings.
3. Coordination meetings.

1.2 PRECONSTRUCTION CONFERENCE

A. The University shall schedule a preconstruction conference before starting construction, at a time convenient to the Contractor and the University, but no later than 15 days after execution of the Agreement. The conference will be held at a site identified by the University.

1. The University will conduct the meeting. Minutes will be recorded and distributed to participants in accordance with contract requirements.

B. Attendees: Authorized representatives of the University, University, and their consultants; the Contractor and its superintendent; major subcontractors; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

C. Agenda: Discuss items of significance that could affect progress, including, but not limited to, the following:

1. Tentative construction schedule.
2. Critical work sequencing.
3. Designation of responsible personnel.
4. Procedures for processing field decisions and Change Orders.
5. Procedures for processing Applications for Payment.
6. Procedures for processing Requests for Information (RFI's).
7. Procedures for processing University's Supplemental Instructions and Contract Clarification.
8. Distribution of Contract Documents.
9. Submittal of Shop Drawings, Product Data, and Samples.
10. Preparation of record documents.
11. Use of the premises.
12. Parking availability.
13. Office, work, and storage areas.
14. Equipment deliveries and priorities.
15. Safety procedures.
16. First aid.
17. Security.
18. Housekeeping.
19. Working hours.
20. Utility outages.
21. Testing.

1.3 PROGRESS MEETINGS

A. The University shall schedule and administer bi-weekly progress meetings throughout the progress of work. The progress meetings will be held at a site identified by the University.

1. The University will conduct the meeting, record minutes, and distribute copies to participants.

B. Attendees: In addition to representatives of the University and the University, each subcontractor, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project.

1. Contractor's CPM Construction Schedule: Review progress since the last meeting. Determine status of each activity in relation to the Contractor's Construction Schedule, whether on time, ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to insure that current and subsequent activities will be completed within the Contract Time. Determine status of tasks on critical path. Identify additional tasks becoming critical due to delays.
2. Review the present and future needs of each entity present, including, but not limited to, the following:
   a. Interface requirements.
   b. Time.
   c. Sequences.
   d. Status of submittals.
   e. Deliveries.
   f. Off-site fabrication problems.
   g. Access.
   h. Site utilization.
   i. Temporary facilities and services.
   j. Hours of work.
   k. Hazards and risks.
   l. Housekeeping.
   m. Quality and work standards.
   n. Change Orders.
   o. Documentation of information for payment requests.
   p. Review submittal log.
   q. Review RFI log.
   r. Review Change Order log.
   s. Review upcoming outages, testing and inspections.

1.4 COORDINATION MEETINGS

A. Conduct project coordination meetings at regular intervals convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings.

B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.

C. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

D. Review the progress of other construction activities and preparations for the particular activity under consideration at each preinstallation conference, including requirements for the following:

1. Contract Documents.
2. Options.
3. Related Change Orders.
4. Purchases.
5. Deliveries.
6. Shop Drawings, Product Data, and quality-control samples.
7. Review of mockups.
8. Possible conflicts.
9. Compatibility problems.
10. Time schedules.
11. Weather limitations.
12. Manufacturer's recommendations.
13. Warranty requirements.
14. Compatibility of materials.
15. Acceptability of substrates.
16. Temporary facilities.
17. Space and access limitations.
18. Governing regulations.
19. Safety.
20. Inspecting and testing requirements.
21. Required performance results.
22. Recording requirements.
23. Protection.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 012000

SECTION 013000 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for submittals by the Contractor as required by the contract documents.

B. Section includes:
1. Administrative requirements
2. Contractor’s review of submittals.
3. Architect’s review of submittals.
4. Product data submittals.
5. Shop drawing submittals.
6. Sample submittals.
7. Manufacturer’s Instructions
8. Reports of results of tests and inspections
9. Operations and Maintenance Data submittals
10. Certificates

C. Related Requirements:

1. Section 016310 “Substitutions” for submitting substitution requests for products, materials, equipment, and methods of construction from those required.
2. Section 010400 "Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
3. Section 013110 "Schedules and Reports” for submitting schedules and reports, including Contractor's construction schedule.
4. Section 013800 "Construction Photographs".
5. Section 014000 "Quality Control" for submitting test and inspection reports, and schedule of tests and inspections.
6. Section 017000 "Contract Closeout" for submitting closeout submittals and maintenance material submittals.

1.2 DEFINITIONS

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

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

C. Shop Drawings, Product Data and Samples: Instruments prepared and submitted by Contractor, for Contractor’s benefit, to communicate to Architect the Contractor’s understanding

of the design intent, for review and comment by Architect on the conformance of the submitted information to the general intent of the design. Shop drawings, product data and samples are not Contract documents. Drawings, diagrams, schedules and illustrations, with related notes, are specially prepared for the Work of the Contract, to illustrate a portion of the Work.

D. Product Data: Standard published information ("catalog cut sheets") and specially prepared data for the Work of the Contract, including standard illustrations, schedules, brochures, diagrams, performance charts, instructions and other information to illustrate a portion of the work.

E. Samples: Physical examples that demonstrate the materials, finishes, features, workmanship or and other characteristics of a portion of the Work. Accepted samples shall service as quality basis for evaluation the Work.

F. Other Submittals: Technical data, test reports, calculations, surveys, certifications, special warranties and guarantees, operation and maintenance data, extra stock and other submitted information and products shall also not be considered Contract Documents but shall be information from Contractor to Architect to illustrate a portion of the Work for confirmation of understanding the design intent.

G. e-Builder: The University employs the e-Builder Construction Project Management System. The software enables members to manage work via a web based graphical interface. Owner will establish project specific page on e-Builder with project specific members. The site login address is https://app.e-builder.net/.

H. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

I. XLS: A file format created by Microsoft for use with Microsoft Excel which is a spreadsheet program that presents table of values arranged in rows and columns.

1.3 SUBMITTAL SCHEDULE

A. Submittal Schedule: Contractor shall prepare and submit a Submittal Schedule which lists submittal items per the product specifications for review and approval by the Architect. Contractor shall allow seven (7) days for Architect and University review. The Submittal Schedule shall identify all specified submittals to be made and shall serve as a checklist for submittals. Arrange the submittals in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Use the Comprehensive Project Submittal/Shop Drawing List (when provided) as a basis for submittals required to be submitted, including requirements for concurrent submittals and for complex submittals requiring additional review time by the Architect at Initial Review.
2. Coordinate Submittal Schedule with list of subcontracts, the Schedule of Values, and Contractor's construction schedule.

3. Format: Submit the Submittal Schedule using the Architect-provided Microsoft Excel file.
4. The first submittal shall be the Submittal Schedule. Architect reserves the right to withhold action on all submittals until complete submittal schedule has been submitted and approved.
5. Review of any submittal without submission and approval of submittal schedule does not relieve Contractor of responsibility to provide Submittal Schedule for approval. Failure to submit Submittal Schedule relieves Architect of all constraints on review periods.

1.4 SUBMITTAL FORMATS

A. Assemble all Action Submittals for each specification section into a single package for delivery to Architect unless otherwise specified or agreed to during the Submittal Schedule review. Failure of Contractor to assemble all Action Submittals in single package may result in Architect withholding action on submittals(s) until associated submittals(s) required by applicable specification section are received.
   1. Submit Product Data (as a separate submittal) before or concurrent with Shop Drawings and before or concurrent with Samples.
   2. Closeout Submittals or Submittals for Work Performed by Separated Trades: Submit in separate package as applicable rather than in single Action Submittal package described above.
   3. Submittals shall be processed electronically using e-Builder (with exceptions such as product and material samples as designated or approved by the Architect). Transmit all submittals from Contractor to Architect via e-Builder, unless otherwise directed. Submittals received from sources other than the Contractor will be returned without action. Include all information specified below for identification of submittals.

1.5 SUBMITTAL IDENTIFICATION

A. Submit each Submittal with a Submittal Identification Form, in a format developed with the Architect and acceptable to the University, including the following information for each submittal:
   1. Project name and University project number.
   2. Submission date.
   3. Name and address of Architect.
   4. Name and address of Contractor.
   5. Name of firm or entity that prepared submittal.
   6. Names of subcontractor, manufacturer, and supplier as applicable.
   7. Unique submittal number, including revision identifier. Submittal number shall be identical to that listed in the approved Submittal Schedule.
   8. Category (action or informational) and type of submittal (product data, test report, etc.).
   9. Place for Contractor submittal approval certification, including name, date and signature.
   10. Other necessary identification.
   11. Submittals not including a Submittal Identification Form will be returned as “Not Reviewed”.
   12. At the contractor’s option, multiple submittals for one specification section may be submitted and shall be coordinated and identified in the submitted and approved Submittal Schedule.

B. Identify each element in a submittal by reference to the Specifications article and paragraph, Drawing sheet number, detail, schedule, room number, assembly or equipment number, and or

any other pertinent information that can be used to clearly correlate submittal with Contract Drawings. On the Submittal Identification Form, or on a separate transmission sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information submitted complies with requirement of the Contract Document.

C. Identify each submittal by Specification Section number followed by a number indicating sequential submittal for that Section. Resubmittals shall use same number as original submittal, followed by a letter indicating sequential resubmittal. For example:

- 093013-01 Ceramic Tile Product Data (First submittal for Section 093013)
- 093013-02 Ceramic Tile Shop Drawings (Second submittal for Section 093013)
- 093013-02-R1 Ceramic Tile Shop Drawings Color Only (Resubmittal)
- 093013-02-R2 Ceramic Tile Shop Drawings Color Only revised (Second resubmittal)
- 093013-03 Ceramic Tile Base Samples (Third submittal for Section 093013)
- 093013-03-R1 Ceramic Tile Base Samples (Resubmittal)

D. For submittals including multiple individual items:
1. Identify each submittal by Specification Section number followed by the article title of the group of products submitted, followed by a number indicating sequential submittal for that Section. Resubmittals shall use same number as original submittal, followed by a letter indicating sequential resubmittal. For example:

- 220523-01 Shut Off, Drain & Specialty Valves (First submittal for Section 220523)
  Submittal includes the following individually identified items:
  - 220523-2.2.B.1 Shut Off Valves (Solder Joint Piping-1/4 to 2 inch).
  - 220523-2.2.B.2 Shut Off Valves (ProPress Piping Systems- 1/2 to 1 1/4 inch).
  - 220523-2.2.B.3 Shut Off Valves (ProPress Piping Systems- 1 ½ to 2 inch).
  - 220523-2.2.B.4 Shut Off Valves (Solder Joint Piping- 2 ½ and larger).
  - 220523-2.2.B.5 Drain Valves (Solder Joint Piping ½ to 2 inch).
  - 220523-2.2.B.6 Drain Valves (ProPress Piping Systems ½ to 2 inch).
  - 220523-2.2.B.7 Drain Valves (Solder Joint Piping 2 ½ and larger).
  - 220523-2.2.B.8 Specialty Valves (Solder Joint Piping 1/4 inch).
  - 220523-2.2.B.9 Specialty Valves (ProPress Piping Systems 1/2 inch).
  - 220523-2.2.B.10 Shut Off Valves (Special Gas- ½ to 2 inch)
  - 220523-2.2.B.11 Shut Off Valves (Special Gas- 2 ½ to 3 inch)
  - 220523-2.2.B.12 Shut Off Valves (RO/DI- ½ to 2 inch)
  -
- 220523-02 Check Valves (Second submittal for Section 220523)
  Submittal includes the following individually identified items:
  - 220523-2.3.B Bronze Lift Check Valves - metallic
  - 220523-2.3.C Bronze Lift Check Valves - nonmetallic
  - 220523-2.3.D Bronze Swing Check Valves – metallic
  - 220523-2.3.E Bronze Swing Check Valves – nonmetallic
  - 220523-2.3.F Check Valves for RO/DI
  -
- 220523-03 Special Valves (Third submittal for Section 220523)
  Submittal includes the following individually identified items:
  - 220523-2.4.A Solenoid Valves
  - 220523-2.4.B Pressure Regulating Valves
  - 220523-2.4.C Water Temperature Limiting Devices

- 220523-2.4.D Safety Relief Valves
- 220523-2.4.E Combined Pressure/Temperature Relief Valves

- 220523-03-R1 Special Valves (Resubmittal)
  Submittal includes all of the initial individually identified items

- 220523-03-R2 Special Valves (Second Resubmittal)
  Submittal includes all of the initial individually identified items

2. In addition to requirements listed above include for each item the following:
   a. Easily identifiable Title Block with Number and title of Specification Section, with paragraph number and generic name for each of multiple items. For Example:

220523 VALVES FOR PLUMBING PIPING 2.2.B.1- Shut off Valves (Solder Joint Piping- ¼ TO 2 inch)

E. Options: Identify options requiring selection by Architect.

F. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with the submittal identification number and brief description, for example:

093013-01 Ceramic Tile Shop Drawings.pdf
093013-02-R1 Ceramic Tile Shop Drawings.pdf
093013-02-R2 Ceramic Tile Shop Drawings.pdf
220523-03 Special Valves
220523-03-R1 Special Valves.pdf

1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections. Each submittal shall be one e-Builder item, and the Contractor may submit multiple items as one Package within a specification section. No Package may include submittals from multiple specification sections
   1. Use the eBuilder Submittal Module to create each submittal item. Persons entering submittals shall be trained by UMB on the eBuilder Submittal Module prior to entering the Submittal Schedule and any other submittals. Upload the pdf of the submittal directly to the e-Builder Submittal Module.
      a. Submitted file shall be a searchable PDF electronic file.
      b. Architect will return annotated (and flattened) file, incorporating Owner's comments. This file will be retained by UMB as the digital Project Record Document file.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections so processing will not be delayed because of need to review submittals concurrently for coordination.
    a. Certain submittals need to be reviewed concurrently, including but not limited to, the following:
        1) 087100 Door Hardware with 281300 Access Control System
        2) Brick and Mortar.
        3) Fire Protection Product Data and Layout Shop Drawings.
        4) Wall and floor finishes for coordination of colors.
            a) Submittals that require selection of colors will be reviewed. Color selection may not be provided until all submittals requiring color selection have been received and reviewed, and color selections have been approved by the Architect.
    b. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows: Time for review shall commence on Architect'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 working days for initial review of each submittal (which includes University’s review) unless otherwise noted on the approved Submittal Schedule. Allow additional time if coordination with concurrent submittals is required. The Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Initial Review of Concurrent Submittals: Allow additional time if coordination with concurrent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
3. Initial Review of Complex Submittals: At the time of review and approval of the Submittal Schedule, the Architect will advise Contractor of certain submittals that are substantially complicated or require multiple reviewers and need an extended initial review time, including but not limited to, the following:
    a. 081113 Hollow Metal Doors and Frames (21 days)
    b. 084413 Glazed Aluminum Curtainwall (30 days).
    c. 087100 Door Hardware (21 days).
    d. 123450 Wood Laboratory Casework (21 days)
    e. 142100 Elevators (45 days) includes Elevator Inspector review.
    f. 211300 Wet Pipe Sprinkler Systems (45 days) includes Fire Marshal review.
    g. 233600 Temperature and Airflow Control System (21 days)
    h. 281300 Access Control System (21 days)
    i. 282300 Video Surveillance (21 days)
    j. 283111 Addressable Fire-Alarm System (45 days) includes Fire Marshal review.
4. Resubmittal Review: Allow 15 days for review of each resubmittal.

D. Resubmittals: Make resubmittals in same form as initial submittal.
1. Note date and content of previous submittal.
2. Note date and content of revision in Submittal Identification Formand clearly indicate extent of revision. Provide responses to Architect’s review comments as appropriate to address concerns raised. Annotate the product data sheets, shop drawings, calculations, etc. to clearly indicate compliance with the original specification requirements and to demonstrate compliance with review comments.

3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

E. Delegated Design Services Certification: In addition to other required submittals, submit digitally-signed PDF electronic file paper copies of certificate, signed and sealed by the responsible design professional.

F. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities.

G. Use for Construction: Establish and maintain access to eBuilder so that all submittals are available for use on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.7 CONTRACTOR'S REVIEW OF SUBMITTALS

A. Contractor's Review of Submittals: Prior to submission to Architect for review, Contractor shall certify that submittals have been reviewed and approved. Note corrections and field dimensions. Mark each submittal with a uniform approval stamp including the name of the reviewer and the date of the Contractor's approval and sign each submittal. Submittals without stamp and signature will not be reviewed and will be returned. Electronic signatures are acceptable. Contractor's submittal approval shall certify the following actions by Contractor:
   1. Field measurements have been determined and verified.
   2. Conformance with requirements of Contract Drawings and Specification is confirmed.
   3. Catalog numbers and similar data are correct.
   4. Work being performed by various subcontractors and trades is coordinated.
   5. Field construction criteria have been verified, including confirmation that information submitted has been coordinated with the work being performed by others for the University and actual site conditions.
   6. All deviations from requirements of Drawings and Specifications have been identified and noted.
   7. All notes and dimensions by Contractor shall be in the color green.
   8. Submittals not certified by being stamped and signed by Contractor electronically on the Submittal Identification Form will be returned without action, as will submittals which, in the Architect's opinion, have not been adequately reviewed and coordinated by Contractor.

B. Changes in Work: Changes in the Work shall not be authorized by submittal review actions. No review action, implicit or explicit, shall be interpreted to authorize changes in the Work. Changes shall only be authorized by separate written direction from the University, in accordance with the Contract General Conditions.

1.8 REVIEW OF SUBMITTALS BY ARCHITECT AND UNIVERSITY

A. Review of Submittals by University and Architect: Submittals shall be a communication aid between Contractor and Architect by which interpretation of Contract Documents requirements may be confirmed in advance of construction.

1. Reviews by University, Architect and Architect's consultants shall be only for general conformance with the design concept of the Project and general compliance with the information given in the Drawings and Specifications.
2. The Architect's review shall not be construed as an "approval," or to relieve the Contractor(s) and material suppliers of responsibility for errors or omissions in the submitted documents.
3. Acceptance of a specific item does not include acceptance of the assembly of which the item is a component.
4. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each submittal, mark to indicate action taken, and return promptly via the web-based software (e-Builder) system.

B. Architect's Review Action: Architect will mark each submittal with a uniform, self-explanatory action.
   1. Submittal will be appropriately marked as follows to indicate the action taken:
      a. Action 1: APPROVED (no exceptions taken) Means fabrication, manufacture, or construction may proceed providing submittal complies with Contract Documents.
      b. Action 2: APPROVED AS NOTED (make corrections noted; no resubmission required): Means fabrication, manufacture, or construction may proceed providing submittal complies with Architect's notations and Contract Documents. (Note: If Contractor cannot comply with notations, make revisions and resubmit.)
      c. Action 3: APPROVED AS NOTED, SUBMIT CORRECTED COPY (make corrections noted; submit corrected copy): Means fabrication, manufacture, or construction may proceed; however, submittal did not fully demonstrate full extent of all conditions, details and coordination with other surrounding work and therefore requires additional information and rework as noted. Resubmit shop drawings for final Action 1 or 2. Should Contractor proceed with fabrication, manufacturing or construction, it shall do so at its own risk.
      d. Action 4: REVISE & RESUBMIT (rejected, revise and resubmit): Means submittal does not comply with design intent of Contract Documents. Do not use submittals stamped Action 4. Make revisions and resubmit.
      e. Action 5: REJECTED (rejected, submit specified item): Means submittal varies from specified item or system specified in Contract Documents and is not acceptable for use on the project. Do not use submittals stamped Action 5. Make revisions and resubmit.
      f. Action 6 (resubmit with related assembly items): Means submittal of related assembly item(s) are required in conjunction with the submittal for proper review.
      g. Action 7: NOT REVIEWED (No Action): Means documents have not been reviewed by Architect and submittal is returned to Contractor for several possible reasons: submittal not requested, submittal not complete, Submittal Transmittal form is not included, submittal not coordinated, or submittal bears no resemblance to design intent.
      h. Action 8: ACKNOWLEDGED (Record Submittals): Specifications require certain information and calculations be submitted for record purposes only. Such submittals will not be acted upon, stamped or returned to Contractor.
   2. Do not permit submittals marked "Rejected, Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.
   3. Note: Any work performed prior to receiving a fully approved submittal shall be done at the Contractor's risk and shall be subject to being replaced if Contract requirements are not met.

C. University's Review Action: The Architect will upload the reviewed submittal into eBuilder, and the status of the submittal will be indicated as appropriate in eBuilder. The University will review the submittal and coordinate comments with the Architect.

D. Final Review Action: The Architect will then incorporate final comments and upload the submittal in eBuilder for use by the Contractor, marking the final action for the submittal. The final action will be selected from the standard list in the eBuilder Submittal Module, as follows:
   1. 1. No Exceptions Taken - Submission appears to comply with the CD's. Work can proceed.
   2. 2a. Note Markings/Attachments - Submission will appear to comply with CD's when noted comments are incorporated. Work can then proceed.
   3. 2b. Note Markings/Resubmit For Record – Submission will appear to comply with CD's when noted comments are incorporated. Work can then proceed. Resubmit corrected copy.
   4. 3. Amend & Resubmit – Submission has deficiencies which cannot be easily be field corrected and does not comply with the CD's. Work cannot proceed. Amend & Resubmit.
   5. 4. Submission has fundamental deficiencies and does not comply with CD's. Work cannot proceed. Resubmit.
   6. 5. Received. No Action Required – Used for submittals which do not require review.

E. Contractor Action: The Contractor will be notified through eBuilder that the submittal is ready for his action. The Contractor shall incorporate all review comments and resubmit if so indicated by the eBuilder and Architect's actions and markings.

F. Contract Requirements:
   1. Review actions by Architect and Architect's consultants shall not relieve the Contractor from compliance with requirements of the Contract Drawings and Specifications.
   2. Acceptance of submittals with deviations shall not relieve Contractor from responsibility for additional costs of changes required to accommodate such deviations.
   3. Deviations included in submittals without prior acceptance will be considered an exception from review of submittals whether noted or not on returned copy.
   4. No review action, implicit or explicit, shall be interpreted to authorize changes in the Work. Changes shall only be authorized by separate written Change Order or Field Instruction, in accordance with the Contract General Conditions.
   5. When professional certification of performance criteria of materials, systems or equipment is required by Contract Documents, the Architect shall be entitled to rely upon accuracy and completeness of such calculations and certifications.

G. Resubmittals: Subject to same terms and conditions as original submittal.
   1. UMB will not accept excessive resubmittals.
   2. Should excessive resubmittals be required, Contractor may be subject to reimburse the University for Architect's accounts for time spent in processing additional resubmittals at their contractual hourly rate.

1.9 SUBMITTAL REQUIREMENTS

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

1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data, and identify submittal separately from rest of Shop Drawings.
2. Mark each submittal to show which products and options are applicable Clearly indicate all aspects of the proposed items, including material selections and all options specified. Failure to indicate such details could result in the submittal being returned as incomplete.
3. Include the following information, as applicable:
    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.
4. For equipment, include the following in addition to the above, as applicable:
    a. Wiring diagrams that show factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

B. Shop Drawings: Prepare and submit Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.
1. Preparation: Fully illustrate requirements as shown in the Contract Documents. Include the following information, as applicable:
    a. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.
2. e-Builder: Submit one PDF copy of each submittal, capable of being printed as a full-size drawing.

C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Sample Identification: Permanently attach label on unexposed side of Samples that includes the following:
    a. Project name and submittal number.
    b. Generic description of Sample.
    c. Product name and name of manufacturer.
    d. Sample source.
    e. Number and title of applicable Specification Section.
    f. Specification paragraph number and generic name of each item.
3. Paper Transmittal: Provide paper transmittal and include complete submittal information indicated. Include image file illustrating Sample characteristics, and Sample Identification information for record.

4. e-Builder: Prepare paper transmittal in PDF form, and upload to website-Builder. Enter required data in site-Builder to fully identify submittal.
5. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
6. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
    a. Number of Samples: Submit one full set 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.
7. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
    a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample set\; remainder will be returned. Retain one returned Sample set as a project record Sample.
        1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
        2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.

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

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

G. Certificates:

1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:
1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
    a. Name of evaluation organization.
    b. Date of evaluation.
    c. Time period when report is in effect.
    d. Product and manufacturers' names.
    e. Description of product.
    f. Test procedures and results.
    g. Limitations of use.
7. Corrective Action Report: Testing agency shall submit written documentation of any defects found and any corrective action taken, or proposed solutions.

1.10 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
   1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
   1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013000

SECTION 013110 - SCHEDULES AND REPORTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for schedules, reports, and critical path method scheduling required for proper performance of the Work, including:

1. Submittal schedule.
2. Schedule of inspections and tests.
3. Daily construction reports.
4. Material location reports.
5. Field correction reports.
6. Special reports.

1.2 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of schedules and reports with performance of other construction activities.

1.3 DEFINITIONS

A. Critical Path Method (CPM): A method of planning and scheduling a construction project where activities are arranged based on activity relationships and network calculations determine when activities can be performed and the critical path of the Project.

B. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall project duration.

C. Network Diagram: A graphic diagram of a network schedule, showing the activities and activity relationships.

D. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path.
2. Predecessor activity is an activity that must be completed before a given activity can be started.

E. Event: An event is the starting or ending point of an activity.

F. Milestone: A key or critical point in time for reference or measurement.

G. Float is the measure of leeway in activity performance. Accumulative float time belongs to the University.

1. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
2. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned project completion date.

1.4 QUALITY ASSURANCE

A. The Contractor's Consultant: Retain a consultant to provide planning, evaluating, and reporting by CPM scheduling.

B. The Consultant shall be a recognized specialist, acceptable to the University, who is an expert in CPM scheduling and reporting.

C. The Consultant shall have computer facilities that are capable of delivering detailed network diagrams within 48 hours of request.

D. In-House Option: The University may waive the requirement to retain a consultant if the Contractor can demonstrate that:

1. The Contractor has the computer equipment required to produce CPM network diagrams.
2. The Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques.

E. Program: Use a computer software program for network analysis that has been developed specifically to manage CPM construction schedules and is acceptable to the University.

F. Standards: Comply with procedures contained in AGC's "Construction Planning & Scheduling."

1.5 PRELIMINARY NETWORK DIAGRAM

A. Preliminary Network Diagram: Submit a preliminary network diagram within fourteen (14) days of the Notice to Proceed. The preliminary network diagram shall outline activities for the first sixty (60) days of construction. Include a skeleton diagram for the remainder of the Work with the preliminary diagram.

1. Include each significant construction activity. Coordinate each activity in the network with other activities. Schedule each construction activity in proper sequence.
2. Indicate completion of the Work on the date established for Substantial Completion, unless the University agrees otherwise.

B. Cash Requirement Prediction: With submittal of the preliminary network diagram, include a preliminary cash requirement prediction based on indicated activities.

C. Distribution: Distribute the preliminary network diagram to parties involved in construction activities that are scheduled early, including the University and the University.

1.6 CPM SCHEDULE

A. Prepare the Contractor's Construction Schedule using the network analysis diagram system known as the critical path method (CPM). Follow procedures outlined in AGC's "Construction Planning & Scheduling."

1. Proceed with preparation of the network diagram immediately following Notice to Proceed.
2. Follow the steps necessary to complete development of the network diagram in sufficient time to submit the CPM Schedule so it can be accepted for use no later than sixty (60) days after commencement of the Work.
3. Conduct educational workshops to train and inform key project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.

4. Establish procedures for monitoring and updating the CPM Schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates. Use "one working day" as the unit of time.

B. CPM Schedule Preparation: Prepare a list of all activities involved in the Project. Include a list of activities required to complete the Work. No single activity shall exceed fifteen (15) work days. Provide the best data available for generation of the network diagram and the CPM Schedule.

1. Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities.
2. Indicate estimated times for the following activities to be performed:
   a. Preparation and processing of submittals.
   b. Purchase of materials.
   c. Delivery.
   d. Fabrication.
   e. Installation.
3. Treat each story or separate area as a separate numbered activity for principal elements of the Work.
4. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.

C. Processing: Enter prepared data on the processing system. Process data to produce output data or a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM Schedule within the limitations of Contract Time.

D. Format: Display the full network on a single sheet of stable transparency, or other reproducible media, of sufficient width to show data clearly for the entire construction period.

1. Mark the critical path. Locate the critical path near the center of the network; locate paths with the most float near the edges.
2. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

E. Initial Issue: Prepare the initial issue of the CPM Schedule network diagram from a listing of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports to show the following:

1. The Contractor or subcontractor and Work or activity.
2. Description of the activity.
3. Principal events of that activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in working days (maximum limit is fifteen (15) work days for construction activity).
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the Schedule of Values).

F. Value Summaries: Prepare two (2) cumulative value listings, sorted by finish dates.

1. In first listing, tabulate the following:
   a. Activity number.
   b. Early finish date.
   c. Dollar value.
   d. Cumulative dollar value.

2. In second listing, tabulate the following:
   a. Activity number.
   b. Late finish date.
   c. Dollar value.
   d. Cumulative value.
3. In subsequent issues of both listings, substitute actual finish dates for activities completed as of listing date.
4. Prepare listing for ease of comparison with payment requests; coordinate timing with progress meetings.
   a. In both value summary listings, tabulate "actual percent complete," and "cumulative value completed" with total at bottom.
   b. Submit value summary printouts following each regularly scheduled progress meeting.

1.7 CPM SUBMITTALS

A. Submittal and Distribution: Submit three (3) copies of the initial issue of the tabulations and network to the University for acceptance. When authorized, distribute copies to the separate contractors, subcontractors and suppliers or fabricators, and others identified by the Contractor with a need-to-know schedule responsibility.

1. Post copies in the Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.
3. Submit copies of each computer-produced report to the University.

B. Schedule Updating: Revise the schedule immediately after each meeting or other activity, where revisions have been recognized or made. Issue the updated schedule at each project meeting and submit with application for payment. Requests for payment will not be made without an updated CPM schedule.

1.8 SUBMITTAL SCHEDULE

A. After development and acceptance of the Contractor's CPM Schedule, prepare a complete schedule of submittals. Submit the schedule within ten (10) days of the date required for submittal of the Contractor's CPM Schedule.

1. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values and the list of products as well as the Contractor's Construction Schedule.

B. Prepare the schedule in chronological order. Provide the following information:

1. Scheduled date for the first submittal.
2. Related Section number.
3. Submittal category.
4. Name of the subcontractor.
5. Description of the part of the Work covered.
6. Latest scheduled date for the University’s review/approval.

C. Distribution: Upon final approval of the University, print and distribute copies to the University, University, subcontractors, and other parties required to comply with submittal dates indicated.

1. Post copies in the Project meeting room and temporary field office.

2. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned part of the Work and are no longer involved in construction activities.

D. Schedule Updating: Revise the schedule after each meeting or other activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.9 SCHEDULE OF INSPECTIONS AND TESTS

A. Prepare a schedule of inspections, tests, and similar services required by the Contract Documents. Submit the schedule within thirty (30) days of the date established for commencement of the Work.

B. Form: The schedule shall be in tabular form and shall include, but not be limited to, the following:

1. Specification Section number.
2. Description of the test.
3. Identification of applicable standards.
4. Identification of test methods.
5. Number of tests required.
6. Time schedule or time span for tests.
7. Entity responsible for performing tests.
8. Requirements for taking samples.
9. Unique characteristics of each service.

C. Distribution: Distribute the schedule to the University, and each party involved in performance of portions of the Work where inspections and tests are required.

D. Schedule Updating: Revise the schedule after each meeting or other activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.10 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at the site. Submit duplicate copies to the University at weekly intervals:

1. List of subcontractors at the site.
2. List of separate contractors at the site.
3. Approximate count of personnel at the site.
4. High and low temperatures, general weather conditions.
5. Accidents.
6. Meetings and significant decisions.
7. Unusual events (refer to special reports).
8. Stoppages, delays, shortages, and losses.
9. Meter readings and similar recordings.
10. Emergency procedures.
11. Orders and requests of governing authorities.
12. Change Orders received, implemented.
13. Services connected, disconnected.
14. Equipment or system tests and startups.
15. Partial Completions, occupancies.
16. Substantial Completions authorized.

B. Material Location Reports: At weekly intervals, prepare a comprehensive list of materials delivered to and stored at the site. The list shall be cumulative, showing materials previously reported plus items

recently delivered. Include with the list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from the site. Submit copies of the list to the University at weekly intervals.

1.11 SPECIAL REPORTS

A. General: Submit special reports directly to the University within one day of an occurrence. Submit a copy to other parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at the site, prepare and submit a special report. List the chain of events, persons participating, response by the Contractor's personnel, an evaluation of the results or effects and similar pertinent information. Advise the University in advance when such events are anticipated or predictable.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 013110

SECTION 013516 - ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes special procedures for alteration work.

B. Related Sections:
   1. Section 024119 “Selective Demolition” for general demolition requirements and demolition/salvage schedule.

1.2 DEFINITIONS

A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.

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

C. Design Reference Sample: A sample that represents the Architect's prebid selection of work to be matched; it may be existing work or work specially produced for the Project.

D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.

F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.

G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.

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

I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.

J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.

K. Retain: To keep existing items that are not to be removed or dismantled.

L. Strip: To remove existing finish down to base material unless otherwise indicated.

1.3 COORDINATION

A. Alteration Work Subschedule: A construction schedule coordinating the sequencing and scheduling of alteration work for entire Project, including each activity to be performed, and based on Contractor's Construction Schedule. Secure time commitments for performing critical construction activities from separate entities responsible for alteration work.

1. Schedule construction operations in sequence required to obtain best Work results.
2. Coordinate sequence of alteration work activities to accommodate the following:

    a. Owner's continuing occupancy of portions of existing building.
    b. Owner's partial occupancy of completed Work.
    c. Other known work in progress.
    d. Tests and inspections.

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

B. Pedestrian and Vehicular Circulation: Coordinate alteration work with circulation patterns within Project building(s) and site. Some work is near circulation patterns and adjacent to restricted areas. Circulation patterns cannot be closed off entirely and in places can be only temporarily redirected around small areas of work. Access to restricted areas may not be obstructed. Plan and execute the Work accordingly.

1.4 PROJECT MEETINGS FOR ALTERATION WORK

A. Preliminary Conference for Alteration Work: Before starting alteration work, conduct conference at Project site.

1. Attendees: In addition to representatives of Owner, Architect, and Contractor, testing service representative, specialists, and chemical-cleaner manufacturer(s) shall be represented at the meeting.
2. Agenda: Discuss items of significance that could affect progress of alteration work, including review of the following:

    a. Alteration Work Subschedule: Discuss and finalize; verify availability of materials, specialists' personnel, equipment, and facilities needed to make progress and avoid delays.
    b. Fire-prevention plan.
    c. Owner continuing operations requirements.
    d. Noisy Work requirements.
    e. Governing regulations.
    f. Areas where existing construction is to remain and the required protection.
    g. Hauling routes.
    h. Sequence of alteration work operations.
    i. Storage, protection, and accounting for salvaged and specially fabricated items.

j. Existing conditions, staging, and structural loading limitations of areas where materials are stored.
k. Qualifications of personnel assigned to alteration work and assigned duties.
l. Requirements for extent and quality of work, tolerances, and required clearances.
m. Embedded work such as flashings and lintels, special details, collection of waste, protection of occupants and the public, and condition of other construction that affects the Work or will affect the work.

3. Reporting: Record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.

B. Coordination Meetings: Conduct coordination meetings specifically for alteration work at biweekly intervals. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Attendees: In addition to representatives of Owner, Architect, and Contractor, each specialist, supplier, installer, and other entity concerned with progress or involved in planning, coordination, or performance of alteration work activities shall be represented at these meetings. All participants at conference shall be familiar with Project and authorized to conclude matters relating to alteration work.

2. Agenda: Review and correct or approve minutes of previous coordination meeting. Review other items of significance that could affect progress of alteration work. Include topics for discussion as appropriate to status of Project.

a. Alteration Work Subschedule: Review progress since last coordination meeting. Determine whether each schedule item is on time, ahead of schedule, or behind schedule. Determine how construction behind schedule will be expedited with retention of quality; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities are completed within the Contract Time.
1) Review and coordinate construction activities relative to University and Medical Center continuing operations with the UMB Project Manager and Facilities staff.

b. Schedule Updating: Revise Contractor's Alteration Work Subschedule after each coordination meeting where revisions to schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.

c. Review present and future needs of each entity present, including review items listed in the "Preliminary Conference for Alteration Work" Paragraph in this article and the following:

1) Interface requirements of alteration work with other Project Work.
2) Status of submittals for alteration work.
3) Access to alteration work locations.
4) Effectiveness of fire-prevention plan.
5) Quality and work standards of alteration work.
6) Change Orders for alteration work.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.5 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property.

1. Carefully dismantle and salvage each item or object in a manner to prevent damage and protect it from damage, then promptly deliver it to Owner where directed.

1.6 INFORMATIONAL SUBMITTALS

A. Alteration Work Subschedule:

1. Submit alteration work subschedule within 30 days of date established for commencement of alteration work.

B. Preconstruction Documentation: Show preexisting conditions of adjoining construction and site improvements that are to remain, including finish surfaces, that might be misconstrued as damage caused by Contractor's alteration work operations.

C. Alteration Work Program: Submit 30 days before work begins.

D. Fire-Prevention Plan: Submit 30 days before work begins.

1.7 QUALITY ASSURANCE

A. Specialist Qualifications: An experienced firm regularly engaged in specialty work similar in nature, materials, design, and extent to alteration work as specified in each Section and that has completed a minimum of five recent projects with a record of successful in-service performance that demonstrates the firm's qualifications to perform this work.

1. Field Supervisor Qualifications: Full-time supervisors experienced in specialty work similar in nature, material, design, and extent to that indicated for this Project. Supervisors shall be on-site when specialty work begins and during its progress. Supervisors shall not be changed during Project except for causes beyond the control of the specialist firm.

B. Alteration Work Program: Prepare a written plan for alteration work for whole Project, including each phase or process and protection of surrounding materials during operations. Show compliance with indicated methods and procedures specified in this and other Sections. Coordinate this whole-Project alteration work program with specific requirements of programs required in other alteration work Sections.

1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.

C. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during

each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.

D. Safety and Health Standard: Comply with ANSI/ASSE A10.6.

1.8 STORAGE AND HANDLING OF SALVAGED MATERIALS

A. Salvaged Materials for Reinstallation:

1. Repair and clean items for reuse as indicated.
2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
3. Secure stored materials to protect from theft.
4. Protect items from damage during transport and storage.
5. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.

B. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.

1.9 FIELD CONDITIONS

A. Survey of Existing Conditions: Record existing conditions that affect the Work by use of preconstruction photographs.

1. Comply with requirements specified in Section 013800 "Construction Photographs."

B. Discrepancies: Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.

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

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration work.

1. Use only proven protection methods, appropriate to each area and surface being protected.
2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration work is being performed.
3. Erect temporary barriers to form and maintain fire-egress routes.
4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during alteration work.
5. Contain dust and debris generated by alteration work, and prevent it from reaching the public or adjacent surfaces.
6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
8. Provide supplemental sound-control treatment to isolate demolition work from other areas of the building.

B. Temporary Protection of Materials to Remain:

1. Protect existing materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration work program.

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

D. Utility and Communications Services:

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

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

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

F. Existing Roofing: Prior to the start of work in an area, install roofing protection for full extent of existing roofing exposed to construction activities and traffic.

1. Repair all roof damage caused by construction activities.

3.2 PROTECTION FROM FIRE

A. General: Follow fire-prevention plan and the following:

1. Comply with NFPA 241 requirements unless otherwise indicated. Perform duties titled "Owner's Responsibility for Fire Protection."

2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.

    a. If combustible material cannot be removed, provide fire blankets to cover such materials.

B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:

1. Obtain Owner's approval for operations involving use of open-flame or welding or other high-heat equipment. Notify Owner at least 72 hours before each occurrence, indicating location of such work.
2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:

    a. Train each fire watch in the proper operation of fire-control equipment and alarms.
    b. Prohibit fire-watch personnel from other work that would be a distraction from fire-watch duties.
    c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
    d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 60 minutes after conclusion of work in each area to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
    e. Maintain fire-watch personnel at each area of Project site until 60 minutes after conclusion of daily work.

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

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

3.3 PROTECTION DURING APPLICATION OF CHEMICALS

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

B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in alteration work program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.

C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.

D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.

E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.4 GENERAL ALTERATION WORK

A. Have specialty work performed only by qualified specialists.

B. Ensure that supervisory personnel are present when work begins and during its progress.

C. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation photographs. Comply with requirements in Section 013800 "Construction Photographs."

D. Perform surveys of Project site as the Work progresses to detect hazards resulting from alterations.

E. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.

1. Do not proceed with the work in question until directed by Architect.

END OF SECTION 013516

SECTION 013800 - CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for construction photographs for the following types of projects:

1. Campus renovation projects.

1.2 CONTRACTOR REQUIREMENTS

A. The CONTRACTOR shall make arrangements to have a series of construction photographs taken of the construction site utilizing their personnel with a digital camera.

B. The CONTRACTOR shall maintain an up-to-date electronic file of the photographs in numerical order per month in an XL spread sheet format as follows:

1. The XL spread sheet shall include a header with the UM Project Name and Project Number. Under the header include columns for “Photo #”, “Date” “Location on Project Site”, “View of the Photo” “Description” and “Photograph”. For Example:
   a. Photo #1
   b. 6-5-12
   c. Roof Level
   d. Looking East
   e. Roof Flashing at Stair Tower
   f. Photograph

1.3 SUBMITTALS

A. Monthly: Submit construction photographs, electronically, in “pdf” file format to the University Project Manager (PM) monthly with the application for payment.

1. Organize the electronic “pdf” files as indicated in paragraph 1.3 above.
2. Pre-construction photographs shall be submitted with the first application for payment.

1.4 PHOTOGRAPHIC REQUIREMENTS

A. The CONTRACTOR shall take a series of construction photographs to document conditions at the project site and during various stages of construction as follows:

1. Pre-Construction Photographs: Prior to the start of construction take photographs of the project site and adjacent areas as follows:

   a. New Projects: Take photographs in sufficient number to show existing conditions adjacent to the work areas before starting work. Where applicable, take photographs of existing buildings either on or adjoining the property in sufficient detail to record accurately the physical conditions at the start of construction.

   b. Campus Renovation Projects: Take photographs in sufficient number to show existing conditions adjacent to the work areas, to indicate pre-construction damage

to existing walls, partitions, insulation, previous work that was not completed, and/or missing materials before starting work.

2. Construction Progress Photographs:

   a. Take project photographs, in accordance with requirements indicated, to best show the status of construction and progress since taking previous photographs.

   b. Frequency: Take photographs monthly, coinciding with the cutoff date associated with each Application for Payment.

   c. Vantage Points: Comply with the University's directions concerning desired vantage points for shots.

3. Record Photograph Files:

   a. At the end of the project submit a complete set of record photographs, organized in Excel spreadsheets on a CD-R in a full size jewel case to the University. Label the CD-R and the jewel case with the UM project, UM Project Number, contents on the CD, and the submission date.

4. Post Construction Photographs:

   a. After the project has completed if the A/E, the CONTRACTOR, and/or other contractors would like to have a series of post construction photographs taken of the project site they must submit a written request to the University PM. The PM will contact the contact the appropriate University representatives to gain approval and the set up a time for the photographs to be taken. Post construction photographs will not be allowed without the approval of the end usurer or their representative.

END OF SECTION 013800

SECTION 014000 - QUALITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Administrative and procedural requirements for quality-control services.
   2. Mockup requirements.

B. Quality-control services include inspections, tests, and related actions, including reports, performed by Contractor, by independent agencies, and by governing authorities. They do not include contract enforcement activities performed by the University.

C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.

D. Related Sections:
   3. Section 010200 “Allowances” for structural load testing allowance.
   4. Section 078100 “Applied Fireproofing” for preconstruction adhesion testing and testing required by the IBC.
   5. Section 079200 “Joint Sealants” for preconstruction adhesion testing.

1.2 DEFINITIONS

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

B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

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

   1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

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

   1. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as part of permanent construction, consisting of multiple products, assemblies, and subassemblies.

E. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

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

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

1.3 RESPONSIBILITIES

A. Contractor Responsibilities: Unless otherwise indicated as the responsibility of another identified entity, Contractor shall provide inspections, tests, and other quality-control services specified elsewhere in the Contract Documents and required by authorities having jurisdiction. Costs for these services are included in the Contract Sum.

2. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Contractor's responsibility, the Contractor may perform testing by its own workforce. The Contractor shall employ and pay a qualified independent testing agency to perform quality-control services for the following list of testing requirements: Costs for these services are included in the Contract Sum.
   a. Mockup window testing.
   b. Applied fireproofing adhesion testing.
   c. Joint sealant adhesion testing.
   d. Load testing of existing shelf angles.
   e. Masonry quality control testing required per Section 042000-3.10 “Field Quality Control”.

B. Retesting: The Contractor is responsible for retesting where results of inspections, tests, or other quality-control services prove unsatisfactory and indicate noncompliance with Contract Document requirements, regardless of whether the original test was Contractor's responsibility.

1. The cost of retesting construction, revised or replaced by the Contractor, is the Contractor's responsibility where required tests performed on original construction indicated noncompliance with Contract Document requirements.

C. Associated Services: Cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:

1. Provide access to the Work.
2. Furnish incidental labor and facilities necessary to facilitate inspections and tests.
3. Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
4. Provide facilities for storage and curing of test samples.
5. Deliver samples to testing laboratories.
6. Provide the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
7. Provide security and protection of samples and test equipment at the Project Site.

D. Duties of the Testing Agency: The independent agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual Sections shall cooperate with the University and the Contractor in performance of the agency's duties. The testing agency shall provide qualified personnel to perform required inspections and tests.

1. The agency shall notify the University and the Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. The agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.
3. The agency shall not perform any duties of the Contractor.

E. Coordination: Coordinate the sequence of activities to accommodate required services with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

1. The Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.

1.4 SUBMITTALS

A. Unless the Contractor is responsible for this service, the independent testing agency shall submit a certified written report, in duplicate, of each inspection, test, or similar service to the University. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection, test, or similar service through the Contractor.

1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
2. Report Data: Written reports of each inspection, test, or similar service include, but are not limited to, the following:
    a. Date of issue of report.
    b. Project title and number.
    c. Name, address, and telephone number of testing agency.
    d. Dates and locations of samples and tests or inspections.
    e. Names of individuals making the inspection or test.
    f. Designation of the Work and test method.
    g. Identification of product and Specification Section.
    h. Complete inspection or test data.
    i. Test results and an interpretation of test results.
    j. Ambient conditions at the time of sample taking and testing.
    k. Comments or professional opinion on whether inspected or tested Work complies with Contract Document requirements.
    l. Name and signature of laboratory inspector.
    m. Recommendations on retesting.

1.5 MOCKUP REQUIREMENTS

A. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by Architect.
3. Notify Architect seven days in advance of dates and times when mockups will be constructed.

4. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed to perform same tasks during the construction at Project.
5. Demonstrate the proposed range of aesthetic effects and workmanship.
6. Obtain Architect's approval of mockups before starting corresponding work, fabrication, or construction.
    a. Allow seven days for initial review and each re-review of each mockup.

7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
8. Demolish and remove mockups when directed unless otherwise indicated.

B. Integrated Exterior Mockups: Construct integrated exterior mockup as indicated on Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials. Comply with requirements in "Mockups" Paragraph.

C. Refer to Schedule of Mockups at the end of this Section.

1.6 QUALITY ASSURANCE

A. Qualifications for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, that are prequalified as complying with the American Council of Independent Laboratories' "Recommended Requirements for Independent Laboratory Qualification" and that specialize in the types of inspections and tests to be performed.

1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the state where the Project is located.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes. Comply with Contract Document requirements for Division 1 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities, and protect repaired construction.

C. Repair and protection is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

3.2 SCHEDULE OF MOCKUPS

A. Mockup #1 – Typical Building Corner

a. Prior to whole-sale production of Work and after submittal approval, construct an in-situ mockup of a typical masonry corner reconstruction for Architect’s approval. Mockup shall be reviewed, in part, to verify material selections, to coordinate with existing conditions, to assess aesthetics, and to set a benchmark for quality. All mockups shall incorporate

representative components of the full extent of rehabilitation shown in the Drawings. The location and extent of the in-situ mockup shall be selected by the Architect and consist of the following:

1. Step 1: Remove the existing brick veneer by the required width, one story tall (between shelf angles) and as required above/below the existing shelf angles to allow for required load testing. Complete all demolition and preparation activities required for new construction.

    a) Perform load testing on existing shelf angles as required per the structural drawings.

    b) Apply specified corrosion-resistant coating to exposed shelf angle surfaces per the structural drawings.

2. Step 2: Apply fireproofing to structural column for review/approval before proceeding to next step. Include any structural elements that must be anchored to column prior to fireproofing installation.

    a) Perform fireproofing adhesion testing.

3. Step 3: Install any supplemental masonry backup and related reinforcing. Install structural wall framing for review before proceeding to the next step.

4. Step 4: Install insulation, sheathing, air/water barrier membrane, wall ties, and all flashings for review before proceeding further.

5. Step 5: Install masonry veneer and sealant joints for review.

    a) Perform sealant adhesion testing.

B. Mockup #2 – Typical Pier

a. Prior to whole-sale production of Work and after submittal approval, construct an in-situ mockup of a typical masonry pier reconstruction for Architect's approval. Mockup shall be reviewed, in part, to verify material selections, to coordinate with existing conditions, to assess aesthetics, and to set a benchmark for quality. All mockups shall incorporate representative components of the full extent of rehabilitation shown in the Drawings. The location and extent of the in-situ mockup shall be selected by the Architect and consist of the following:

1. Step 1: Remove the existing brick veneer by the required width, one story tall (between shelf angles). Complete all demolition and preparation activities required for new construction.

2. Step 2: Apply fireproofing to structural column for review/approval before proceeding further. Include any structural elements that must be anchored to column prior to fireproofing installation.

    a) Perform fireproofing adhesion testing.

3. Step 3: Install any supplemental masonry backup and related reinforcing. Install structural wall framing for review before proceeding further.

4. Step 4: Install insulation, sheathing, air/water barrier membrane, wall ties, and all flashings for review before proceeding further.

5. Step 5: Install masonry veneer and sealant joints for review.

    a) Perform sealant adhesion testing.

C. Mockup #3 – Typical Window

a. Prior to whole-sale production of Work and after submittal approval, construct an in-situ mockup of the window sealant repairs for Architect's approval. Mockup shall be reviewed, in part, to verify material selections, to coordinate with existing conditions, to assess aesthetics, and to set a benchmark for quality. All mockups shall incorporate representative components of the full extent of rehabilitation shown in the Drawings. The location and extent of the in-situ mockup shall be selected by the Architect and consist of the following:

1. Selected window must include a failed IGU lite that must be replaced as part of the mockup.

2. Install all perimeter sealant joints, wet seals, silicone sheet seals per the project details.

3. Perform adhesion testing of sealants for each substrate material in accordance with manufacturer's instructions and ASTM C1521, Method A for engineered sealant joints to confirm adhesion onto each substrate. Perform one adhesion test in accordance with ASTM C794 for the silicone sheet adhesion to the window frame.

4. Perform water penetration testing on mockup window. No water shall be observed on interior surfaces when testing in accordance with AAMA 501.2 using a hose and calibrated spray nozzle.

END OF SECTION 014000

SECTION 015000 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Requirements:

1. Section 010100 "Summary" for work restrictions and limitations on utility interruptions.
2. Section 013516 "Alteration Project Procedures" for general protection and work procedures for alteration projects.

C. Temporary utilities include, but are not limited to, the following:

1. Water service and distribution.
2. Temporary electric power and light.
3. Temporary heat.
4. Sanitary facilities, including drinking water.

D. Support facilities include, but are not limited to, the following:

1. Field offices and storage sheds.
2. Temporary enclosures.
3. Hoists and temporary elevator use.
4. Temporary project identification signs and bulletin boards.
5. Waste disposal services.
6. Construction aids and miscellaneous services and facilities.

E. Security and protection facilities include, but are not limited to, the following:

1. Temporary pedestrian protection.
2. Barricades, warning signs, and lights.
3. Sidewalk bridge or enclosure fence for the site.
4. Environmental protection.
5. Security cameras and monitoring.

1.1 USE CHARGES

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

1. Use Charges: Cost or use charges for temporary facilities are not chargeable to the University. The University will not accept cost or use charges as a basis of claims for Change Orders.

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

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

1.2 SUBMITTALS

A. Temporary Utilities: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

B. Implementation and Termination Schedule: Within 15 days of the date established for commencement of the Work, submit a schedule indicating implementation and termination of each temporary utility.

C. Site Utilization Plan: Show temporary facilities, pedestrian protection zones, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

   a. If construction is staged in partial swing stage deployments around the perimeter of the building, submit a plan describing the planned sequences and modifications to pedestrian protection, etc. required for each sequence.

D. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.

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

F. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.

G. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
   1. HVAC system isolation schematic drawing.
   2. Protection measures at air intakes.
   3. Location of proposed air-filtration system discharge.
   4. Waste-handling procedures.
   5. Other dust-control measures.

1.3 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:

   1. Building code requirements.
   2. Health and safety regulations.
   3. Utility company regulations.
   4. Police, fire department, and rescue squad rules.

5. Environmental protection regulations.

B. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."

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

1.4 PROJECT CONDITIONS

A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the University, change over from use of temporary service to use of permanent service.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials. If acceptable to the University, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.

B. Lumber and Plywood:

1. For signs and directory boards, provide exterior-type, Grade B-B high-density concrete form overlay plywood of sizes and thicknesses indicated.
2. For fences and vision barriers, provide minimum 3/8-inch- (9.5-mm-) thick exterior plywood.
3. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch- (16-mm-) thick exterior plywood.

C. Paint:

1. For job-built fences, and other exposed lumber and plywood, provide exterior-grade acrylic-latex emulsion over exterior primer.
2. For sign panels and applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer.

D. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of fifteen (15) or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.

E. Water: Provide potable water approved by local health authorities.

F. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide concrete or galvanized-steel bases for supporting posts.

2.2 EQUIPMENT

A. General: Provide new equipment. If acceptable to the University, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.

B. Water Hoses: Provide 3/4-inch (19-mm), heavy-duty, abrasion-resistant, flexible rubber hoses one hundred (100) feet (30 m) long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.

C. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.

D. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.

E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.

F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.

G. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

2.3 TEMPORARY FACILITIES

A. Temporary Offices: Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows, and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.
1. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

a. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
b. Conference room of sufficient size to accommodate meetings of 10 individuals. Furnish room with conference table, chairs, and 4-foot- square tack and marker boards.

c. Drinking water and private toilet.
d. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
e. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

B. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

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

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

3.2 INSTALLATION

A. Use qualified personnel for installation of temporary facilities.

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

C. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

A. General: Coordinate with the University Operations and Maintenance Personnel to install temporary service or connect to existing service. Provide all necessary labor, materials and equipment for connections.

1. Coordinate with the University for a time when service can be interrupted, if necessary, to make connections for temporary services.
2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
3. Obtain easements to bring temporary utilities to the site where the University's easements cannot be used for that purpose.

B. Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.

1. Sterilization: Sterilize temporary water piping prior to use.

C. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period.

Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters, and main distribution switch gear.

1. Install electric power service underground, except where overhead service must be used.
2. Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, ac 20 Ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.

D. Temporary Lighting: When overhead floor or roof deck has been installed, provide temporary lighting with local switching.

1. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.

E. Temporary Heat: Provide temporary heat required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

F. Heating Facilities: Except where the University authorizes use of the permanent system, provide vented, self-contained, LP-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.

G. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.

H. Temporary Telephones: Provide temporary telephone service throughout the construction period for all personnel engaged in construction activities. Install telephone on a separate line for each temporary office and first-aid station.

1. Separate Telephone Lines: Provide additional telephone lines for the following:
   a. Where an office has more than two (2) occupants, install a telephone for each additional occupant or pair of occupants.
   b. Provide a dedicated telephone line for a fax machine in the field office.
   c. Provide a separate line for the University's use.
2. At each telephone, post a list of important telephone numbers.

I. Sanitary facilities include temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.

1. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material.

2. Provide separate facilities for male and female personnel.

J. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.

1. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.

K. Sewers and Drainage: Provide temporary connections to remove effluent that can be discharged lawfully. If drainage facilities cannot be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off-site in a lawful manner.

1. Filter out excessive amounts of soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
2. Connect temporary sewers to the municipal system, as directed by Baltimore City sewer department officials.
3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.

3.4 SUPPORT FACILITIES INSTALLATION

A. Locate field offices, storage sheds, and other temporary construction and support facilities for easy access.

1. Maintain support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the University.

B. Provide incombustible construction for offices, shops, and sheds located within the construction area or within 30 feet (9 m) of building lines. Comply with requirements of NFPA 241.

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

1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of twenty five (25) sq. ft. (2.3 sq. m) or less with plywood or similar materials.
3. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
4. Where temporary wood or plywood enclosure exceeds one hundred (100) sq. ft. (9.2 sq. m) in area, use UL-labeled, fire-retardant-treated material for framing and main sheathing.

D. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

E. Existing Elevator Use: Use of Owner's existing freight elevator will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

1. Access to the freight elevator may be restricted and must be coordinated in advance with the University.

2. Do not load elevators beyond their rated weight capacity.

3. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

F. Traffic Controls: Comply with requirements of the Universiaty and authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.

2. Maintain access for fire-fighting equipment and access to fire hydrants.

G. Parking: On-site parking is not available for construction personnel.

H. Project Identification and Temporary Signs: Prepare project identification and other signs of size indicated. Install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs.

1. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.
2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.

I. Temporary Exterior Lighting: Install exterior lighting so pedestrian protection areas are well lit at all times.

J. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than seven (7) days during normal weather or three (3) days when the temperature is expected to rise above 80°F (27°C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the University.

B. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."

1. Locate fire extinguishers where convenient and effective for their intended purpose.

2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires.
4. Smoking is not permitted anywhere on project sites.
5. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

C. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

D. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.

E. Enclosure Fence: Before construction operations begin, install an enclosure fence with lockable entrance gates. Locate where indicated or enclose the entire site or the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering the site, except by the entrance gates.

1. Provide open-mesh, portable chainlink fencing with posts set in metal or concrete bases.

F. Temporary Egress: Maintain protected temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

G. Pedestrian Protection Covered Walkway: Erect a structurally adequate, protective covered walkway for passage of persons along the adjacent public street. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.

1. Construct covered walkways using scaffold or shoring framing. Provide wood plank overhead decking, protective plywood enclosure walls, handrails, barricades, warning signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage. Extend the back wall beyond the structure to complete the enclosure fence. Paint and maintain in a manner acceptable to the University.

2. Contractor is responsible for design and engineering of covered walkways to ensure adequate overhead protection from falling debris, support of swing stages, etc.

H. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

I. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.

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

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

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

3.6 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.

2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

3. Indicate methods to be used to avoid trapping water in finished work.

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

1. Protect porous materials from water damage.

2. Protect stored and installed material from flowing or standing water.

3. Keep porous and organic materials from coming into prolonged contact with concrete.

4. Remove standing water from decks.

5. Keep deck openings covered or dammed.

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

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.

2. Keep interior spaces reasonably clean and protected from water damage.

3. Periodically collect and remove waste containing cellulose or other organic matter.

4. Discard or replace water-damaged material.

5. Do not install material that is wet.

6. Discard and replace stored or installed material that begins to grow mold.

7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

3.7 OPERATION, TERMINATION, AND REMOVAL

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

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.

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

C. Termination and Removal: Unless the University requests that it be maintained longer, remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the Contractor's property. The University reserves the right to take possession of project identification signs.

2. Remove temporary paving not intended for or acceptable for in the University’s opinion, integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at the temporary entrances, as required by the governing authority.

3. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:
   a. Replace air filters and clean inside of ductwork and housings.
   b. Replace significantly worn parts and parts subject to unusual operating conditions.
   c. Replace lamps burned out or noticeably dimmed by hours of use.

END OF SECTION 015000

SECTION 016000 - MATERIALS AND EQUIPMENT, DELIVERY, STORAGE, AND HANDLING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.

1.2 DEFINITIONS

A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.

1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
    a. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
    b. "Foreign Products," as distinguished from "domestic products," are items substantially manufactured (50 percent or more of value) outside the United States and its possessions. Products produced or supplied by entities substantially owned (more than 50 percent) by persons who are not citizens of, nor living within, the United States and its possessions are also considered to be foreign products.
2. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

1.3 SUBMITTALS:

A. All submittals shall comply with the requirements in Section 013000 “Submittal Procedures”.

1.4 QUALITY ASSURANCE

A. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.

1. When specified products are available only from sources that do not, or cannot, produce a quantity adequate to complete project requirements in a timely manner, consult with the University to determine the most important product qualities before proceeding. Qualities may include attributes, such as visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources producing products that possess these qualities, to the fullest extent possible.

B. Compatibility of Options: When the Contractor is given the option of selecting between 2 or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

C. Foreign Product Limitations: Except under one or more of the following conditions, rovide domestic products, not foreign products, for inclusion in the Work:

1. No available domestic product complies with the Contract Documents.
2. Domestic products that comply with the Contract Documents are available only at prices or terms substantially higher than foreign products that comply with the Contract Documents.

D. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
   a. Name of product and manufacturer.
   b. Model and serial number.
   c. Capacity.
   d. Speed.
   e. Ratings.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
6. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
7. Store products subject to damage by the elements above ground, under cover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION

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

1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and intended use and effect.

2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Where products are accompanied by the term as selected, University will make selection.
4. Where products are accompanied by the term match sample, sample to be matched is University's.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

A. General Compliance Requirements: Compliance requirements for individual products, as indicated in Contract Documents, are multiple in nature and may include generic descriptions, performance requirements, compliance with reference standards, conformance with graphic details and other similar forms and methods of indicating requirements, all of which must be complied with.

B. Procedures for Selecting Products: Contractor's options for selecting products are limited by Contract Document requirements, and are not controlled by industry traditions or procedures experienced by Contractor on previous construction projects.

C. Products specified by Reference Standards, Codes and Regulations: Select from among products which can be shown to comply to referenced documents.

D. Products specified by Naming Products and Manufacturers: Select from among products listed.

E. Products specified by Naming One Manufacturer's Product as the Basis-of-Design with Reference to Other Manufacturers: Select either the specified Basis-of-Design product or an approved comparable product by one of the other named manufacturers.

1. Comply with provisions in Comparable Products Article to obtain approval for use of a comparable product by one of the named manufacturers.

F. Products specified by Naming One Manufacturer's Product and Indicating Option of Selecting Comparable Products by stating or Approved Equivalent or similar language: Select either the specified product or an approved comparable product.

1. Comply with provisions in Comparable Products Article to obtain approval for use of an unnamed comparable product by another manufacturer.

G. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches University's sample. University's decision will be final on whether proposed product matches satisfactorily.

H. Visual Selection Specification: Where Specifications include the phrase as selected from manufacturer's standard colors, patterns, textures or similar phrase, select a product that complies with other specified requirements. University will select color, pattern, and texture.

1. Standard Range: Where Specifications include the phrase standard range of colors, patterns, textures or similar phrase, University will select color, pattern, or texture from manufacturer's product line that does not include premium items.
2. Full Range: Where Specifications include the phrase full range of colors, patterns, textures or similar phrase, University will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Where Basis-of-Design products are specified by name, submit the following, in addition to other required submittals, to obtain approval of a comparable product by one of the named manufacturers:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with the Basis-of-Design product in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, serviceability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of Universities, if requested.
5. Samples, if requested.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS

A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.

1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

B. Install products in accordance with the execution’s sections of the Project Manual.

END OF SECTION 016000

SECTION 016310 - SUBSTITUTIONS

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for handling requests for substitutions made after award of the Contract.

B. Contractor's submittal and University's acceptance of Shop Drawings, Product Data, or Samples not complying with Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval. Substitutions not properly authorized may be considered defective.

1.2 DEFINITIONS

A. Definitions in this Article do not change or modify the meaning of other terms used in the Contract Documents.

B. Substitutions: Changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor after award of the Contract are considered to be requests for substitutions. The following are not considered to be requests for substitutions:

1. Substitutions requested during the bidding period, and accepted by Addendum prior to award of the Contract, are included in the Contract Documents and are not subject to requirements specified in this Section for substitutions.
2. Revisions to the Contract Documents requested by the University or University.
3. Specified options of products and construction methods included in the Contract Documents.
4. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.3 SUBMITTALS

A. Substitution Request Submittal: The University will consider requests for substitution if received within thirty (30) days after issuance of Notice to Proceed. Requests received more than thirty (30) days after issuance of Notice to Proceed may be considered or rejected at the discretion of the University.

1. Submit three (3) copies of each request for substitution for consideration. Submit requests in the form and according to procedures required for change-order proposals.
2. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers.
3. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
    a. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the University and separate contractors, that will be necessary to accommodate the proposed substitution.
    b. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.
    c. Product Data, including Drawings and descriptions of products and fabrication and installation procedures.
    d. Samples, where applicable or requested.

e. A statement indicating the substitution's effect on the Contractor's CPM Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
f. Cost information, including a proposal of the net change, if any in the Contract Sum.
g. The Contractor's certification that the proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
h. The Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
i. Confirmation that the same warranty will be furnished for substitute product as for specified product.

1.5 UNIVERSITY'S ACTION

A. University will review and take appropriate action upon Contractor's request for substitutions.

1. University's action will be taken with reasonable promptness, while allowing sufficient time in University's professional judgement to permit adequate review.
2. University shall be entitled to rely upon adequacy, accuracy, and completeness of data, and certifications prepared by Contractor.
3. If necessary, University will request additional information or documentation for evaluation after initial review of receipt of request for substitution.

PART 2 – PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 016310

SECTION 017000 - CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 SUMMARY

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

1. Inspection procedures.
2. Project record document submittal, including the following:
3. Marked-up copies of Contract Drawings.
4. Marked-up copies of Shop Drawings.
5. Newly prepared drawings.
6. Marked-up copies of Specifications, addenda, and Change Orders.
7. Marked-up Product Data submittals.
8. Record Samples.
9. Field records for variable and concealed conditions.
10. Record information on Work that is recorded only schematically.
11. Operation and maintenance manual submittal.
12. Preparing and submitting operation and maintenance manuals for building operating systems and equipment.
13. Preparing and submitting instruction manuals covering the care, preservation, and maintenance of University products and finishes.
14. Instruction of the University's operating personnel in the operation and maintenance of building systems and equipment.
15. Submittal of warranties.
16. Final cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate Sections the specifications.

C. Environmental Requirements: Conduct cleaning and waste-disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and antipollution regulations.

1. Do not dispose of volatile wastes, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains.
2. Burning or burying of debris, rubbish, or other waste material on the premises is not permitted.

D. Maintenance of Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition. Make documents and Samples available at all times for the University's inspections.

E. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.2 DEFINITIONS

A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the University.

B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the University.

1.3 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the University has benefited from use of the Work through a portion of its anticipated useful service life.

D. University's Recourse: Expressed warranties made to the University are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the University can enforce such other duties, obligations, rights, or remedies.
   1. Rejection of Warranties: The University reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

E. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, the University reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

1.4 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.

   1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete.
      a. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
      b. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
   2. Advise the University of pending insurance changeover requirements.
   3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
   4. Obtain and submit releases enabling the University unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

5. Submit record drawings, maintenance manuals, final project photographs, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra stock, and similar items, including inventory list.
7. Make final changeover of permanent locks and transmit keys to the University. Advise the University's personnel of changeover in security provisions.
8. Complete startup testing of systems and instruction of the University's operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements.
9. Complete final cleanup requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred, exposed finishes.

B. Inspection Procedures: On receipt of a request for inspection, the University will either proceed with inspection or advise the Contractor of unfilled requirements. The University will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The University will repeat inspection when requested and assured that the Work is substantially complete.

2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.5 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.
2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
3. Submit a certified copy of the University's final punch list of items to be completed or corrected, endorsed and dated by the University. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance and will be endorsed and dated by the University.
4. Submit consent of surety to final payment.
5. Submit a final liquidated damages settlement statement.
6. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Reinspection Procedure: The University will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the University.

1. Upon completion of reinspection, the University will prepare a certificate of final acceptance. If the Work is incomplete, the University will advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

2. If necessary, reinspection will be repeated.

1.6 QUALITY ASSURANCE

A. Maintenance Manual Preparation: In preparation of maintenance manuals, use personnel thoroughly trained and experienced in operation and maintenance of equipment or system involved.

1. Where maintenance manuals require written instructions, use personnel skilled in technical writing where necessary for communication of essential data.
2. Where maintenance manuals require drawings or diagrams, use draftsmen capable of preparing drawings clearly in an understandable format.

B. Instructions for the University's Personnel: Use experienced instructors thoroughly trained and experienced in operation and maintenance of equipment or system involved to instruct the University's operation and maintenance personnel.

1.7 RECORD DOCUMENT SUBMITTALS

A. General: Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for the University's reference during normal working hours.

B. Record Drawings (As-Builts):

1. Markup Procedure: During construction, maintain a set of blue- or black-line white prints of Contract Drawings and Shop Drawings for Project Record Document (As-Built) purposes.
   a. Mark these Drawings to show the actual installation where the installation varies from the installation shown originally. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later. Items required to be marked include, but are not limited to, the following:
      1) Dimensional changes to the Drawings.
      2) Revisions to details shown on the Drawings.
      3) Revisions to routing of piping and conduits.
      4) Actual equipment locations.
      5) Duct size and routing.
      6) Changes made by change order.
      7) Changes made following the University's written orders.
      8) Details not on original Contract Drawings.
   b. Mark record prints of Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings location.
   c. Mark record sets with red erasable colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
   d. Mark important additional information that was either shown schematically or omitted from original Drawings.
   e. Note change-order numbers, and similar identification.
2. Responsibility for Markup: The individual or entity who obtained record data, whether the individual or entity is the Installer, subcontractor, or similar entity, shall prepare the markup on record drawings.
   a. Accurately record information in an understandable drawing technique.
   b. Record data as soon as possible after obtaining it. Record and check the markup prior to enclosing concealed installations.
   c. At time of Substantial Completion, submit record drawings to the University for the University's records. Organize into sets and bind and label sets for the University's continued use.

C. Record Specifications

1. During the construction period, maintain one copy of the Project Specifications, including addenda and modifications issued, for Project Record Document purposes.
   a. Mark the Specifications to indicate the actual installation where the installation varies from that indicated in Specifications and modifications issued. Note related project record drawing information, where applicable. Give particular attention to substitutions, selection of product options, and information on concealed installations that would be difficult to identify or measure and record later.
      1) In each Specification Section where products, materials, or units of equipment are specified or scheduled, mark the copy with the proprietary name and model number of the product furnished.
      2) Record the name of the manufacturer, supplier, installer, and other information necessary to provide a record of selections made and to document coordination with record Product Data submittals and maintenance manuals.
      3) Note related record Product Data, where applicable. For each principal product specified, indicate whether record Product Data has been submitted in maintenance manual instead of submitted as record Product Data.
   b. Upon completion of markup, submit record Specifications to the University.

D. Record Product Data: Maintain one copy of each Product Data submittal. Note related Change Orders and markup of record drawings and Specifications.

   1. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site and from the manufacturer's installation instructions and recommendations.

   2. Give particular attention to concealed products and portions of the Work that cannot otherwise be readily discerned later by direct observation.
   3. Upon completion of markup, submit three complete sets of record Product Data to the University for the University's records.

E. Record Sample Submitted: Immediately prior to Substantial Completion, the Contractor shall meet with the University and the University's personnel at the Project Site to determine which Samples are to be transmitted to the University for record purposes. Comply with the University's instructions regarding delivery to the University's Sample storage area. Dispose of other samples in a manner specified for disposing surplus and waste materials.

F. Miscellaneous Record Submittals:

   1. Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Immediately prior to Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Submit to the University for the University's records.
      a. Categories of requirements resulting in miscellaneous records include, but are not limited to, the following:
         1) Surveys establishing building lines and levels.
         2) Authorized measurements utilizing unit prices or allowances.
         3) Ambient and substrate condition tests.
         4) Certifications received in lieu of labels on bulk products.
         5) Batch mixing and bulk delivery records.
         6) Testing and qualification of tradesmen.
         7) Documented qualification of installation firms.

8) Load and performance testing.
9) Inspections and certifications by governing authorities.
10) Leakage and water-penetration tests.
11) Fire-resistance and flame-spread test results.
12) Final inspection and correction procedures.

G. Operation and Maintenance Manuals:

1. General Submission Requirements: The University of Maryland (UM) requires operation and maintenance manuals (O&MM) to be submitted in electronic “pdf” file format, by the CM, before substantial completion to the A/E and the University for review.

2. Product Data: All product data and shop drawing “pdf” files submitted during the shop drawing review phase must be complete per the requirements of the bid documents. These files can be either scanned as a “pdf” file or the files can be converted to “pdf” format provided the “pdf” files are clear and readable when either viewed on a computer monitor or printed on 8.5 x 11 or 11 x 17 paper. UM has examples of prints from electronic submittal files that are either acceptable or unacceptable and are available upon request. Contact the University project manager for file examples, if necessary.

3. General File Description: The following description outlines the organization of one (1) electronic O&MM file for each discipline such as, Architectural, Structural, Civil, Mechanical, and Electrical including the minimum documentation that shall be included in each O&MM file for each discipline. Each File shall be arranged as a stack file with bookmarks and a tree structure.

4. Arrangement: Arrange each O&MM file in a similar manner as a hard bound copy would be set up and submitted. For each discipline O&MM file include:

a. Cover: Include the University Project Title, University Project Number, and Date.

b. Table of Contents: Numeric List of each page with page 1 being the Cover Sheet, then each product submittal and shop drawing.

c. Subcontractor List: List each subcontractor by company name, address, contact name and phone number for each approved product data submittal and/or approved shop drawing included in the file.

d. Supplier List: List each manufacturer’s company name, address, contact name and phone number for each approved product data submittal and/or approved shop drawing included in the file.

e. Contractor Warranty Statement: Warranty statement in letter for the project warranty on the letter head of the mechanical contractor.

f. Maintenance Chart: Include a maintenance chart for each piece of equipment or type of material that requires periodic maintenance. List the equipment and parts requiring the maintenance and the time interval.

g. Warranty and Instruction Information: Include any warranty information and/or manufacturers operating and maintenance instructions including replacement part’s list with each product. Each product data submittal, shop drawing, warranty

data, instructions shall be an individual “pdf” file for said data. Include Approved submittal data only.

5. General File Structure Example: Each discipline file structure shall be arranged using the structure example as follows:

   a. Table of Contents: Include the following:
      1) Cover Sheet
      2) Subcontractors List
      3) Suppliers List
      4) Contractor Warranty
      5) Maintenance Charts
      6) Discipline Specific Main Folders and Subfolders Content

6. Discipline O&MM Files: Each discipline O&MM files shall be arranged as follows:
   a. Architectural O&MM file include:
      1) Exterior: Include all submittals related to the Exterior.

   b. Structural O&MM file includes:
      1) Include all submittals related to Structural

7. Discipline System File Name and “pdf” Tree Structure: Each Discipline System fie name and “pdf” tree structure including main folders and sub folders shall be arranged as follows:
   a. File Name: Architectural O&MM
      1) “PDF” Tree Structure – Main Folders
      a) Π Cover Sheet
      b) Π Table of Contents
      c) Π Subcontractor List
      d) Π Suppliers List
      e) Π Contractor Warranty
      f) Π Maintenance Charts
      g) Π Exterior
      h) Π Interior
      i) Π Furnishings
      j) Π Equipment
      k) Π Signage

   b. “PDF” Tree Structure – Main Topic - Sub Folders Example
      a) Π Furnishings
         (1) Π Laboratory Case Work
            (a) Π Approved Product Submittal File Product Data
            (b) Π Case Work Drawings
            (c) Π Manufacturers Warranty
            (d) Π Repeat Above sub folders for each approved product submittal

1.8 INSTRUCTIONS FOR THE UNIVERSITY’S PERSONNEL

A. Prior to final inspection, instruct the University's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Provide instruction at mutually agreed upon times.

1. For equipment that requires seasonal operation, provide similar instruction during other seasons.
2. Use operation and maintenance manuals for each piece of equipment or system as the basis of instruction. Review contents in detail to explain all aspects of operation and maintenance.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES

A. Operation and Maintenance Instructions: Arrange for each Installer of equipment that requires regular maintenance to meet with the University's personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:

1. Maintenance manuals.
2. Record documents.
3. Spare materials.
4. Identification systems.
5. Hazards.
6. Cleaning.
7. Warranties and bonds.
8. Maintenance agreements and similar continuing commitments.

3.2 FINAL CLEANING

A. General: The General Conditions require general cleaning during construction. Regular site cleaning is included in Division 1 Section "Construction Facilities and Temporary Controls."

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion.
    a. Clean the Project Site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and foreign substances.
    b. Sweep paved areas broom clean. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    c. Remove petrochemical spills, stains, and other foreign deposits.

d. Remove tools, construction equipment, machinery, and surplus material from the site.
e. Remove snow and ice to provide safe access to the building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Broom clean concrete floors in unoccupied spaces.
i. Vacuum clean carpet and similar soft surfaces, removing debris and excess nap. Shampoo, if required.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent labels.
l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
    1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean ducts, blowers, and coils if units were operated without filters during construction.
p. Leave the Project clean and ready for occupancy.

C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.

D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the University's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.

1. Where extra materials of value remain after completion of associated Work, they become the University's property. Dispose of these materials as directed by the University.

END OF SECTION 017000

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Requirements:
   1. Section 010100 "Summary of Work" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
   2. Section 010450 "Cutting and Patching" for cutting and patching procedures.
   3. Section 013516 "Alteration Project Procedures" for general protection and work procedures for alteration projects.
   4. Section 015000 "Construction Facilities and Temporary Controls" for temporary protection of existing trees and plants that are affected by selective demolition.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

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

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

D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.3 MATERIALS OWNERSHIP

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

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

   1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.5 INFORMATIONAL SUBMITTALS

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

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure University and Medical Center on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 013800 "Construction Photographs." Submit before Work begins.

1.6 FIELD CONDITIONS

A. University will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so University operations will not be disrupted.

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

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.7 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with University and Medical Center operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

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

D. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.

1. Comply with requirements specified in Section 013800 "Construction Photographs."
2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

3.3 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

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

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

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

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

3.4 SELECTIVE DEMOLITION, GENERAL

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

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

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

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

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

3.7 CLEANING

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

3.8 SELECTIVE DEMOLITION SCHEDULE

A. Remove:
1. Designated existing face brick in excess of the amount required for reinstallation.
2. Failed insulated glass unit (IGU) lites in windows.
3. All accessible sealant joints.

B. Remove, Salvage, and Reinstall: Remove and salvage existing face brick whole and intact, in sufficient quantities as required for areas designated for repair/replacement with salvaged existing brick. See Section 010200 “Allowances”.

C. Existing to Remain: All existing brick not specifically designated for removal. All window and entrance frames are to remain. All IGU lites are to remain if seals are intact.

END OF SECTION 024119

SECTION 030140 – MAINTENANCE OF PRECAST CONCRETE

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The Contract Requirements and the General Requirements (Division 1) of the Contract for Construction are hereby made a part of this Section.

1.2 SCOPE OF WORK

A. Work includes, but is not limited to, providing all labor, materials, equipment, and supervision to accomplish the following concrete repair work in accordance with the Drawings and Specifications. Locations of repairs are shown on the Drawings and as identified by the Engineer on site.

1. Repair areas of spalled and/or delaminated concrete with concrete repair materials at the following locations:

a. Exposed faces of precast concrete spandrel panels.

1.3 REFERENCES

A. The following references are incorporated into these Specifications. Specific requirements from each reference that are necessary to execute the work described in this specification shall be managed on a case-by-case basis. These written Specifications take precedence over incorporated references. The references included in the Specifications refer to the most recent revision of the publication. The Contractor shall have the following references at the project site at all times and shall be familiar with the reference contents.

1. ACI 301 – Specifications for Structural Concrete
2. ACI 304R – Guide for Measuring, Mixing, Transporting, and Placing Concrete – and as specified
3. ACI 305R – Guide to Hot Weather Concreting
4. ACI 306R – Guide to Cold Weather Concreting
5. ACI 308R – Guide to Curing Concrete
6. ACI 309R – Guide for Consolidation of Concrete
7. ICRI Guideline No. 310.1R – Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion
8. ICRI Guideline No. 310.2R – Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair
9. CRSI – Placing Reinforcing Bars Recommended Practices

1.4 ACTION SUBMITTALS

A. Specialty repair concrete mix proportions and mixing procedures, and application and curing procedures.

B. Concrete placement, curing, and protection procedures

C. Product Data: for curing compound, stainless steel pins, and other accessories

1.5 INFORMATIONAL SUBMITTALS

A. Subcontractors' qualifications

B. Properly labeled samples and manufacturer's data sheets for all materials to be used

C. Manufacturer's MSDS sheets for all materials to be used

D. Certifications (in time to prevent delay in the work) by the producers of the materials that all materials supplied comply with all the requirements of the appropriate ASTM and ACI Standards.

E. Repair-sequence plans showing the proposed sequence of repairs. Plans shall show areas of work, shall include a schedule of time, and shall be coordinated with other proposed repair work.

1.6 QUALITY CONTROL AND QUALITY ASSURANCE

A. The Contractor shall conduct a quality control program that includes, but is not limited to, the following:

1. Inspection of all materials to ensure conformity to contract requirements and that all materials are new and undamaged.
2. Establishment of procedures for executing the work.
3. Inspecting all surface preparation prior to repair material application.
4. Inspecting all reinforcement for placement in plan and elevation.
5. Inspection of work in progress to ensure that work is being done in accordance with established procedures, manufacturer's instructions, specific Engineer instructions, if given, or recommended practices as given in the references of Para. 1.3.
6. Inspection and sounding of all work completed, including visually examining all repairs for cracking and sounding all repairs to check for debonding.

B. Qualifications

1. The Contractor and its site superintendent shall have at least 5 yrs experience supervising the installation of similar concrete repairs.

C. Preinstallation Conference

1. Attend a preinstallation conference to be held with a representative of the Owner, Engineer, Contractor's field superintendent, foreman, and other trades involved to discuss the conduct of the work of this Section.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

E. Mockup: Install concrete repair mockup at one sample location proposed by the Contractor and approved by the Engineer and Architect. The mockup will be used to establish both the technical and aesthetic standards for the remainder of the project. The Contractor shall coordinate with the repair material manufacturer to furnish repair materials that match the color and texture of the existing concrete to the satisfaction of the Architect and Engineer, within the limitations of the manufacturer's proprietary materials.

1.7 TECHNICAL SUPPORT

A. The Contractor shall arrange with the materials manufacturer or distributor to have the services of a competent field representative at the work site prior to any mixing of components to instruct the work crews in the proper mixing and application procedures. The representative shall remain at the job site after work commences and continue to instruct until the representative, the Contractor, and the Owner are satisfied that the crew has mastered the technique of installing the systems successfully.

1. The manufacturer's field representative must be fully qualified to perform the work and shall be subject to the approval of the Owner.
2. The Contractor shall be completely responsible for the expense of the services of the required manufacturer's field representative and the contract price shall include full compensation for all costs in connection therewith.

1.8 GENERAL PROCEDURES

A. Work only in areas permitted by the Owner-approved schedules and sequence plans.

B. Remove all tools, buckets, and materials from work areas and store neatly at a central location daily at the end of work.

C. Do not stockpile materials, debris, or equipment on the building roof or penthouse appurtenances.

D. Construction loads shall not exceed 20 lbs per sq ft.

E. Deliver materials clearly marked with legible and intact labels with manufacturer's name and brand name and identifying contents of containers.

F. Store materials in areas where temperatures conform to manufacturer's recommendations and instructions.

G. Protect the building and its contents from all risks associated with the work in this Section. Schedule and execute all work without exposing adjacent building areas to water, dust, and debris, or materials used by this Contractor. Protect adjacent areas from damage. Repair all damage as a result of the work of this Section to its condition at the start of work, or if such cannot be determined, to its original condition. Clean all stains by approved means.

H. Protect the work from damage such as impact, marring of the surfaces, and other damage.

I. Compliance with OSHA and all other safely laws and regulations is the exclusive responsibility of the Contractor, subcontractors, suppliers, consultants, and workforce.

1.9 BASIS OF PAYMENT

A. All work of this Section will be paid for at the Contract unit prices multiplied by the actual work quantities more or less than the allowances included in the base bid. For each item, include all work, accessories, miscellaneous steel, and other related items associated with the repair. Actual work quantities shall be based on the following units of measurement.

1. Measure partial-depth concrete repair in sq ft. See Specification Section 010200 – Allowances for quantity information.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Specialty Repair Mortar for Partial-Depth Repairs:

1. MasterEmaco N 420 CI by BASF Corporation Building Systems, Shakopee, Minnesota.
2. SikaQuick VOH, by Sika Corporation, Lyndhurt, New Jersey
3. US Thin Patch VO by US Concrete Products, Timonium, Maryland
4. Approved equivalent.

B. Reinforcement

1. Welded wire reinforcement shall conform to ASTM A185, epoxy coated in accordance to ASTM A884

C. Tie Wire: No. 16 gauge annealed, plastic coated

D. Concrete Patching Pins: Stainless steel, 10 mm diameter

1. Dryfix helical anchors, by Helifix, Streetsboro, Ohio
2. Spira-lok helical tie, by Blok-lok, Woodbridge, Ontario, Canada
3. CTP Concrete Stitch-Tie, by Construction Tie Products, Michigan City, Indiana
4. Approved equivalent

E. Curing compound, meeting the following requirements:

1. Compliant with ASTM C309

a. Type 1
b. Class A or B
c. Water-based
d. UV-resistant

2.2 MIX PROPORTIONS

A. Specialty Repair Mortar:

1. Proportion and mix specialty repair mortar in accordance with the manufacturer's written instructions. Do not add more water than the maximum amount indicated by the manufacturer.
2. Extended specialty repair mortar with aggregate for specific repair depths in accordance with the manufacturer's recommendations, including all restrictions on reactive aggregate.

B. Bonding Grout for Specialty Repair Mortar

1. Bonding grout for specialty repair mortar shall be in accordance with the manufacturer's written requirements, or as required by the Engineer.

2.3 EQUIPMENT

A. Mixing Equipment

1. Mix specialty repair mortar using equipment and procedure recommended by the material manufacturer.

B. Concrete Removal Equipment:

1. Use concrete saws, chipping hammers, and other concrete removal equipment and cutting tools appropriate for the work and approved by the Engineer.
2. At repair areas, do not use chipping hammers heavier than normal 15 lb class.

PART 3 - EXECUTION

3.1 LOCATION OF REPAIR AREAS

A. The Contractor is responsible for visually inspecting all precast spandrel panel surfaces and sounding suspect surfaces, as required to discover and repair all deteriorated concrete as directed by the Engineer and in accordance with the requirements of the Drawings and Specifications.

1. Concrete shall be considered "unsatisfactory" when it exhibits weakness due to crazing, cracking, spalling, volume change, disintegration, erosion, scaling, popping, delamination, unbonding, etc.
2. Concrete shall be considered satisfactorily "sound" when it "rings" under the hammer blow and resists chipping in a manner equal to virgin original concrete in the structure that has not exhibited deterioration.

3.2 CONCRETE REMOVAL AND SURFACE PREPARATION FOR CONCRETE REPAIRS

A. For all concrete removal activities, install sound barriers if necessary to maintain a noise level acceptable to the Owner.

B. Do not cut, nick, bend, or damage reinforcing steel or embedded panel anchorages. All damage will be repaired at no cost to the Owner.

C. Provide 1/2 in. deep saw-cut edges around the perimeter of the repair area, normal to the face of the surrounding concrete. The saw cuts shall form polygons that have 90° corners and enclose the deteriorated area. Make saw cuts after determining actual concrete cover over reinforcement or embedded panel anchorages. Do not cut into reinforcement. Reduce depth of saw cut over reinforcement as required

D. Remove all spalled and/or delaminated concrete in the area to be repaired. Remove additional loose, delaminated, or otherwise unsound concrete within the repair area to maximum depth of 1-1/2 in. Notify the Structural Engineer if the depth of unsound concrete exceeds 1-1/2 in. Roughen concrete surface to a minimum amplitude of 1/8 in.

E. Remove all loose particles and deleterious materials from the exposed sound concrete, exposed reinforcing bars, and accessories by sandblasting. Clean reinforcing bars to SSPC-6, commercial blast finish, or better.

F. Install stainless steel pins as shown on the Drawings and as directed by the Engineer.

3.3 MORTAR PLACEMENT FOR PARTIAL-DEPTH REPAIRS

A. Spray the surface with water to ensure that the substrate is saturated surface dry (SSD) with no standing water.

B. Provide a thin coat of the mixed material thoroughly onto the surface to ensure sufficient bonding.

C. Before the bond coat dries, thoroughly compact the mortar onto the substrate and around supplemental stainless steel pins.

D. The specialty repair mortar can be applied in single lifts up to 2 in. If multiple lifts are used, lightly rake the surface of each lift after initial set and before applying subsequent lifts.

E. If the material sags during application, completely remove the specialty repair mortar and properly reprime the existing substrate and reapply the mortar at a reduced thickness.

F. Finish the specialty repair mortar by striking off with a straight edge and close with a steel trowel. Do not overwork the complete surface

G. Provide adequate labor, equipment, and materials to ensure that the mortar for each repair is placed within the manufacturer’s limit on time between mixing and placing of repair material

H. Place specialty repair mortar in accordance with the manufacturer’s written instructions. Provide a means of accurately measuring the amount of water introduced to the mix. Follow manufacturer’s written directions for addition of water.

3.4 CURING SPECIALTY MORTAR/CONCRETE REPAIRS

A. Cure specialty repair mortars in accordance with the material manufacturer’s written instructions for curing with a curing compound.

B. After the finishing operation is completed, promptly apply curing compound to the concrete surface.

C. Apply one coat of the approved curing compound in accordance with the manufacturer's written instructions.

D. Appearance of plastic shrinkage cracks due to inadequate finishing and curing shall be cause for rejecting the affected work.

E. All finished concrete surfaced shall be protected from damage.

3.5 REMOVAL OF SURFACE DEPOSITS

A. Stains, efflorescence, fins, and other surface deposits resulting from the work of this Section that are objectionable to the Engineer shall be removed by methods acceptable to the Engineer.

END OF SECTION 030140

SECTION 040110 - MASONRY CLEANING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cleaning the following:

1. Unit masonry surfaces.

1.2 ALLOWANCES

A. Allowances for cleaning masonry are specified in Section 010200 "Allowances."

1.3 DEFINITIONS

A. Very Low-Pressure Spray: Under 100 psi.

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

C. Medium-Pressure Spray: 400 to 800 psi; 4 to 6 gpm.

D. High-Pressure Spray: 800 to 1200 psi; 4 to 6 gpm.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SEQUENCING AND SCHEDULING

A. Work Sequence: Perform masonry-cleaning work in the following sequence:

1. Remove plant growth.
2. Inspect for open mortar joints. Where repairs are required, delay further cleaning work until after repairs are completed, cured, and dried to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean masonry surfaces.
5. Where water repellents are to be used on or near masonry, delay application of these chemicals until after cleaning.

B. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units according to masonry repair Sections. Patch holes in mortar joints according to masonry repointing Sections.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

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

1.7 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.

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

1.8 FIELD CONDITIONS

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

B. Clean masonry surfaces only when air temperature is 40 deg F and above and is predicted to remain so for at least seven days after completion of cleaning.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS

A. Water: Potable.

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

C. Detergent Solution, Job Mixed: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal. of solution required.

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

E. Nonacidic Gel Cleaner: Manufacturer's standard gel formulation, with pH between 6 and 9, that contains detergents with chelating agents and is specifically formulated for cleaning masonry surfaces.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dumond Chemicals, Inc.; Safe n' Easy Ultimate Stone and Masonry Cleaner.
b. Price Research, Ltd.; Price Marble Cleaner-Gel.
c. PROSOCO, Inc.; Sure Klean 942 Limestone & Marble Cleaner.

F. Nonacidic Liquid Cleaner: Manufacturer's standard mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone, brick, aluminum, plastics, and wood.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ABR Products, Inc.; Building Wash 3.
b. Cathedral Stone Products, Inc.; D/2 Biological Solution.
c. Diedrich Technologies Inc., a division of Sandell Construction Solutions; Diedrich 910PM Polished Marble/Granite Cleaner.
d. Price Research, Ltd.; Price Non-Acid Masonry Cleaner.
e. PROSOCO, Inc.; Stand Off All Surface Cleaner.

2.2 PAINT REMOVERS

A. For Graffiti/tar/coatings removal: Solvent-Type Paste Paint Remover: water-rinseable, solvent-type paste or gel formulation, for removing paint from masonry.

1. Products:

a. PROSOCO, Inc.; Sure Klean Fast Acting Stripper, or pre-approved equal.

2.3 ACCESSORY MATERIALS

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

1. Products: Subject to compliance with requirements, provide the following:

a. PROSOCO, Inc.; Sure Klean Strippable Masking, or pre-approved equal.

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.
2. Do not apply chemical solutions during winds of enough force to spread them to unprotected surfaces.
3. Neutralize alkaline and acid wastes before disposal.
4. Dispose of runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

3.2 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 cleaner spray application, use low-pressure tank or pump suitable for 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 Application Methods:

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

G. Cleaner Application Methods: Apply cleaners to masonry surfaces according to cleaner manufacturer's written instructions; use brush or spray application. Do not spray apply at pressures exceeding 50 psi. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.

H. 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.

I. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.3 PRELIMINARY CLEANING

A. Removing Plant Growth: Completely remove visible plant, moss, and shrub growth from 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.
    a. Repeat application up to two times if needed.

3. Remove asphalt and tar with solvent-type paste paint remover.
    a. Apply paint remover only to asphalt and tar by brush without prewetting.
    b. Allow paint remover to remain on surface for 10 to 30 minutes.
    c. 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 Solvent-Type Paste Paint Remover:

1. Remove loose and peeling paint using low -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 -pressure spray to remove chemicals and paint residue.

C. Paint Removal with Covered, Solvent-Type Paste Paint Remover:

1. Remove loose and peeling paint using low -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 -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 hot water applied by low, medium, or high-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. 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.
3. Rinse with hot water applied by low, medium, or high-pressure spray to remove mold, mildew, and algae remover and soil.
4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

C. Nonacidic Gel Chemical Cleaning:

1. Wet surface with cold water applied by low-pressure spray.
2. Apply gel cleaner in 1/8-inch thickness by brush, working into joints and crevices. Apply quickly and do not brush out excessively, so area is uniformly covered with fresh cleaner and dwell time is uniform throughout area being cleaned.

3. Let cleaner remain on surface for period established by mockup.
4. Remove bulk of gel cleaner.
5. Rinse with hot water applied by low, medium, or high-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. Nonacidic Liquid Chemical Cleaning:

1. Wet surface with cold water applied by low-pressure spray.
2. Apply cleaner to surface in two applications by brush or low-pressure spray.
3. Let cleaner remain on surface for period established by mockup.
4. Rinse with hot] water applied by low, medium, high-pressure spray to remove chemicals and soil.
5. 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.

3.6 FINAL CLEANING

A. Clean adjacent nonmasonry surfaces of spillage and debris. Use detergent and soft brushes or cloths.

B. Remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

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

END OF SECTION 040110

SECTION 040120.63 - BRICK MASONRY REPAIR

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The Contract Requirements and the General Requirements (Division 1) of the Contract for Construction are hereby made a part of this Section.

1.2 SUMMARY

A. Provide all labor, materials, equipment, services, accessories, and supervision necessary to furnish and install work of this Section, complete and functional as indicated in the Contract Documents and as specified herein. The scope of work in this section includes, but is not limited to, the following:

1. Repair in place brick masonry scheduled to remain. Refer to Section 042000 for brick masonry scheduled to be reconstructed.
2. Remove existing deteriorated mortar and point existing mortar joints at all elevations. Provide an allowance for joint repointing as indicated in Specification Section 010200 – Allowances.
3. Remove existing cracked or spalled brick masonry units and replace in-kind with new brick masonry at all elevations. Provide an allowance for brick removal and replacement as indicated in Specification Section 010200 – Allowances.
4. Provide remedial helical anchors as required by the Structural Drawings. Provide an allowance as indicated in Specification Section 010200 – Allowances.

1.3 RELATED WORK UNDER OTHER SECTIONS

A. Refer to other Divisions of these specifications to determine the type and extent of work therein affecting the work of this trade, whether or not such work is specifically mentioned in this Section.

B. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Section 024119 – Selective Demolition
2. Section 042000 – Unit Masonry
3. Section 079200 – Joint Sealants

C. Coordinate and work in cooperation with the other trades employed on the project by sequencing and promptly completing the work of this Section as required to meet the project schedule and so as not to impede other trades. Coordinate the work of this Section with other trades to implement the intent of the Drawings and Specifications. Coordinate with other trades to help ensure proper sequencing for assemblies, to maximize efficient use of scaffolding, to minimize disruption to the building, and to avoid unnecessary traffic over areas of completed work.

1.4 REFERENCE STANDARDS

A. In general, follow recommendations and procedures of the following standards and publications, except where these Contract Documents (project specifications and drawings) are more stringent:

1. Brick Industry Association (BIA, formerly Brick Institute of America).
2. Indiana Limestone Institute of America.
3. American Concrete Institute/American Society of Civil Engineers/The Masonry Society:

    a. ACI 530-05/ASCE 5-13/TMS402-13 – Building Code Requirements for Masonry Structures.
    b. ACI 530.1-05/ASCE 6-13/TMS 602-13 – Specification for Masonry Structures.

4. ASTM International (ASTM):

    a. As referenced or specified herein

1.5 PREINSTALLATION MEETING

A. Preinstallation Conference: conduct at Project Site.

1.6 ACTION SUBMITTALS

A. Product Data: For each item, submit information on the component materials, including the following:

1. Manufacturer's literature for all materials specified or proposed for use on the project, properly labeled and referenced to the appropriate Specification Section.
2. Manufacturer’s current installation instructions and written requirements, including instructions for handling, storage, substrate preparation, mix proportions, mixing procedures, placement, and curing the specified/ approved materials.
3. Material Safety Data Sheets (MSDS) for each material where appropriate.
4. Certifications by the producers of the materials that all materials supplied comply with all the requirements of the referenced standards and that all materials are suitable for their intended purpose, except where the material is labeled with such certification by the producers of the materials.

B. Shop Drawings: Submit shop drawings showing the distribution of remedial brick veneer anchors on all elevations. Include distances to windows and other perimeter conditions.

C. Proposed mortar mix and proportions for site-mixed mortar.

D. Cold-Weather and Hot-Weather work plans. Develop plan(s) in accordance with ACI 530.1 / TMS 602 and as recommended by “Cold and Hot Weather” Technical note published by the Brick Institute of America. Include all provisions that will be taken into account for Cold and Hot Weather and specify temperature restrictions.

E. Submit materials, methods, or details where the Contractor proposes to deviate from the Contract plans or specifications, if any.

1.7 INFORMATIONAL SUBMITTALS

A. Samples: Provide samples of each material specified or proposed for use on this project, properly labeled and referenced to the appropriate Specification Section.

B. Cleaning Procedures: For general cleaning and for each staining type identified, submit written procedures for proposed masonry cleaning. Include procedures for protecting building occupants, pedestrians, and the work and for containing and disposing of effluent. Include information on product concentration, dwell time, and application method.

C. Sample warranty.

1.8 PROJECT CONDITIONS

A. Comply with Owner's requirements for access, working hours, use of Owner's facilities, and other limitations.

B. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit installation according to industry standards, manufacturer's written instructions, and warranty requirements.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with the requirements of Section 016000 Materials & Equipment, Delivery, Storage & Handling.

B. Store masonry on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

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

D. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.10 QUALITY ASSURANCE

A. All work shall be performed by trained and authorized personnel skilled in the restoration process and the operations indicated.

B. Conduct a quality control program that includes the following, in part:

1. Inspect conditions and material to ensure conformity with the Contract requirements.
2. Inspect work in progress to ensure that the work complies with established procedures, approved mockups, and the Contract requirements.

3. Inspect completed and any corrected work to ensure its compliance with the Contract requirements.

C. Check the progress of masonry work at least twice each workday to verify that the repointing and replaced masonry is properly installed in accordance with the Drawings, Specifications, referenced standards, and applicable mockups.

D. Provide a copy of all applicable Drawings, including Shop Drawings and Specifications at the site during all work.

1.11 MOCKUPS

A. Work in conjunction with related Sections and trades to construct mockups as required by the Architect. Mockup locations will be determined by the Owner and the Architect. This Section includes a brief description of the mockup scope. Include all required temporary protection. Perform all necessary work to complete comprehensive mockups as required below.

1. Brick Pointing Mockup

a. A 2 ft x 2 ft area of brick pointed and finished. Provide raked mortar joints to match the texture and joint profile of the existing mortar joints.
b. Sample must be aged two weeks and cleaned before being reviewed for approval.

2. Brick Replacement Mockup

a. Replacement in kind of three (minimum) adjacent representative damaged/cracked brick masonry units. Provide raked mortar joints to match the texture and joint profile of the existing mortar joints.
b. Sample must be aged two weeks and cleaned before being reviewed for approval.

B. Do not begin work on the mockup until all applicable submittals have been approved.

C. Notify the Architect and Structural Engineer at least seven days before starting work on the mockup. Make provisions for the Architect to be present during construction and to observe each step of the mockups.

D. The mockups will be used to establish both technical and aesthetic standards for the project. Reconstruct the mockups as many times as necessary to meet the Owner’s approval, without additional cost to the Owner or delay in the project schedule. Do not start work until the Architect has approved the mockups.

E. Reproduce the approved mockup accurately in the remainder of construction using identical materials, mixtures, and quality of workmanship. Maintain approved mockup panel in a cleaned and finished condition throughout the duration of the project. Mockups will be used to measure standards of workmanship, finish, texture, and color. Mockups also will be used as a standard for completed work. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless the Owner specifically approves such deviations in writing.

F. Protect the mockups for the remainder of the project. The approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.12 WARRANTY

A. Provide a written guarantee stating that if, within 2 yrs after the Date of Substantial Completion of the Work, any part of the work installed under this Section is found to be defective or not in accordance with the Contract Documents, the Contractor shall correct it promptly after receipt of a written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. In addition, it shall state that the Contractor shall bear all costs incurred by the Owner, including reasonable attorney's fees, to enforce compliance with the obligations of this guarantee. The obligation of these Guarantees shall run directly to the Owner, may be enforced by the Owner against the Contractor, shall survive the termination of the Contract, and shall not be limited by conditions other than this contract. Provide the guarantee in a form and with terms acceptable to the Owner (submit a sample for approval as noted above).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Obtain each type of material from a single manufacturer for the duration of the project.

2.2 MORTAR MATERIALS

A. The materials and mortar in this section are specified for use as pointing mortar, for masonry facade repairs, and as a parge coat.

B. Water: Clean, potable.

C. Mason's Sand: ASTM C144, fineness modulus 2.0 to 2.5. Select sand to match color, size, and texture of original mortar sand.

D. Hydrated Lime: ASTM C207, Type "S."

E. Portland Cement: ASTM C150, Type I (white and gray, non-staining), low alkali (equivalent alkalis less than 0.6% when tested in accordance with /ASTM C114). Color as required to match existing mortar.

F. Mortar: ASTM C270, Type N. Proportions by volume 1:1:6 (portland cement: hydrated lime: mason's sand). Do not use ground limestone, masonry cements, or prepared masonry mortar mixes. Use the same brands of cement and lime, and the same source of sand throughout the project, for each mix. Do not use any admixture except those called for herein without written approval by the Architect and Structural Engineer.
   1. Select sand and use combination of white and gray Portland cement to match existing mortar appearance. Sand and necessary ratio of white : gray cement to be determined at pointing mockup.

2.3 BRICK IN-KIND REPLACEMENT

A. To the greatest extent practical, use existing brick salvaged during selective demolition at primary repair locations indicated on the Structural Drawings that matches size and texture of existing brick to remain for brick replacements on all elevations.

B. If salvaged brick is not available, provide new masonry that meets the criteria specified in Section 042000 – Unit Masonry and matches the texture and size of the adjacent brick for in-kind replacements.

2.4 TIES AND ANCHORS

A. Remedial Brick Veneer Anchors: Provide remedial brick veneer anchors to attach brick to concrete masonry backup. Provide remedial anchors as indicated on the Structural Drawings and as directed by the Structural Engineer. Ties shall be stainless steel (Type 304 or 316) and 8 mm diameter.

1. Helical anchors, DryFix by Helifix, Streetsboro, Ohio.
2. Spira-lok, by Blok-lok, Woodbridge, Ontario, Canada.
3. CTP Concrete Stitch-Tie, by Construction Tie Products, Michigan City, Indiana.
4. Approved equivalent.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify all site conditions and dimensions by field measurements in consideration for special conditions associated with repairs to existing construction prior to the development of shop drawings for submittals, material purchase, fabrication or delivery. Notify the Architect and Structural Engineer immediately of any inconsistency between the conditions found and those shown in the Contract Drawings. The Architect and Structural Engineer will determine what modifications or additional repairs are necessary. Consider the special conditions associated with repairs to existing construction when measuring for shop drawings.

3.2 GENERAL PROCEDURES

A. Masonry workmanship shall comply with all applicable recommendations of the Brick Industry Association (BIA, formerly the Brick Institute of America) and the Indiana Limestone Institute of America, except as modified below. Report any damage to new or existing flashing within the work area to the Architect, and provide for repairs by appropriately skilled mechanics at no cost to the Owner.

B. Conduct all masonry work in a neat and workmanlike manner to prevent staining any surface with mortar or other spills. Avoid dropping mortar on completed masonry work or other elements of the building. If mortar drops or spills, spot-clean immediately using a sponge and clean water.

C. Protect uncompleted work whenever it is not being performed using well-fastened waterproof coverings.

D. Hot Weather (above 90°F): Protect the masonry and mortar from direct sunlight and exposure to wind to prevent rapid evaporation of water in the mortar before, during, and after installation. Do not execute work without implementing hot-weather procedures as described in the approved Hot-Weather Work Plan.

E. Cold Weather (below 40°F): Do not work in average daily temperatures below 40°F without providing cold weather protection as described in the approved Cold-Weather Work Plan and outlined in the table below. Continue to operate heaters overnight with appropriate supervision as outlined. Do not use heaters that produce oily deposits on the masonry. If any oily deposits occur, consult with the Architect to determine how best to remove oily deposits, and remove at the Contractor's expense.

Tempera-ture	Work in Progress		Completed Work
	Mortar and Grout	Assemblage	Assemblage
Above 40°F	No Requirements	No Requirements	No Requirements
40°F to 32°F	Heat sand and mixing water during mixing to produce mortar temperature between 40°F and 120°F. Maintain above freezing while in use. Grout does not require heated materials unless temperature is below 32°F.	No Requirements.	Protect masonry with a weather-resistive cover for 24 hrs after construction. Completely cover masonry when temperature is less than 32°F.
32°F to 25°F	Heat sand and mixing water during mixing to produce mortar temperature between 40°F and 120°F. Maintain above freezing while in use. Heat grout aggregates and water to product temperature between 70°F and 120°F. Maintain above freezing while in use.	No requirements	Protect masonry with a weather-resistive cover for 24 hrs after construction. Completely cover masonry when temperature is less than 32°F.
25°F to 20°F	Heat during mixing to between 40°F and 120°F. Maintain above freezing while in use. Heat masonry to minimum of 40°F prior to grouting.	Use heat sources on both sides of wall. Provide wind breaks when velocity is over 15 mph.	Completely cover masonry with insulated blanket for 24 hrs after construction. Extend time to 48 hrs for grouted masonry.
Below 20°F	Heat during mixing to between 40°F and 120°F. Maintain above freezing while in use. Heat masonry to minimum of 40°F prior to grouting.	Provide an enclosure and use heat sources to maintain temperature above 32°F within the enclosure.	Provide an enclosure and use heat sources to maintain temperature above 32°F within the enclosure. Extend time to 48 hrs for grouted masonry.

3.3 MORTAR MIXES

A. Measurement: Measure cementitious and aggregate material in a dry condition by volume or equivalent weight. Measure materials with an approved device, not by shovel.

B. For pointing only, use pre-hydrated mortar prepared as follows: Mix materials in a clean mechanical batch mixer. Thoroughly mix cementitious and aggregate materials together before adding any water. 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 1 hr. Add remaining water in small portions until desired consistency (somewhat stiffer than bed mortar) is reached. Use within 1 hr of final mixing. Do not re-temper or use partially hardened materials.

C. Do not use admixtures of any kind, unless specifically approved by the Architect and Structural Engineer.

3.4 MORTAR REMOVAL

A. Procedure for removing mortar shall be verified through successful completion of mockup and approval by Architect.

B. Remove existing mortar by hand or with power tools such that masonry is not overcut, joints enlarged, or existing joint reinforcement is damaged during mortar removal process. Architect and Structural Engineer will disallow use of power tools if evidence is found that mortar joints are being overcut or enlarged, or if existing joint reinforcement is being cut or damaged. If using power tools, cut down the center of the joint with power tools, and then remove remaining mortar with hand tools. Do not chip or cut into adjacent masonry. Do not overcut the masonry. Do not chip or cut into masonry; prevent joint enlargement. Replace masonry damaged by this work at no additional cost to the Owner.

C. Remove mortar from joints to depths equal to 2-1/2 times their width, but not less than 5/8 in. Remove additional mortar as necessary to leave no cavities in the existing mortar and remove all deteriorated mortar.

D. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and exposed masonry sides for contact with pointing mortar.

3.5 POINTING

A. Rinse joint surfaces with water to remove dust and mortar particles. Time application of rinsing so that, at time of pointing, excess water has evaporated or run off and joint surfaces are damp but free of standing water.

B. Apply mortar in successive layers until a uniform depth is formed. Compact each layer thoroughly and allow to become thumbprint-hard before applying next layer. Allow at least 24 hrs to pass between successive stages of mortar application to allow for mortar shrinkage between stages.

C. After joints are filled to a uniform depth, place remaining pointing mortar in successive layers of no greater than 1/2 in. depth. Fully compact each layer and allow to become thumbprint-hard before applying the next layer. Take care not to spread mortar over edges and onto exposed face.

D. When final layer of mortar is thumbprint-hard, tool joints with profile to match the appearance of the existing adjacent mortar joints.

E. Cure mortar by maintaining in a damp condition for not less than 72 hrs. Keep masonry covered with tarpaulins and use a fog spray periodically to maintain moist conditions under the cover. Do not wash the newly pointed mortar with a stream of water.

F. Finished joints should match existing adjoining joints in texture, tooling, size, and profile.

3.6 INSTALLATION OF ANCHORS

A. Install remedial anchors according to the manufacturer's current written installation instructions, and any modifications made during the mockup phase, if necessary.

B. Install remedial anchors in brick masonry to remain. Space remedial brick veneer anchors as specified in the Structural Drawings and as directed by the Structural Engineer.

1. Locate remedial anchors at T-joints in the masonry.
2. Point anchor hole in mortar joints to match texture and profile of adjacent mortar.

C. Complete installation of veneer anchors prior to performing masonry repairs.

3.7 MASONRY REMOVAL

A. Refer to Section 024119 – Selective Demolition for general demolition procedures.

B. Remove cracked or spalled brick masonry units to be replaced by new units of matching color, size, and texture to existing.

C. Sawcut all mortar joints between masonry units to be removed and units scheduled to remain before attempting to remove any masonry. Remove whole brick only to allow masonry repairs to "tooth-in" and blend with existing masonry to remain. Do not damage or chip units of masonry scheduled to remain, and units scheduled for salvage and reuse. Do not sawcut beyond immediate areas of brick removal. Do not break bond between mortar and units scheduled to remain, or crack any masonry in areas to remain. Use care during removal to minimize the amount of removal and to maximize the reuse of salvaged masonry.

D. Limit the extent of masonry removal to prevent any adverse effects on the structural soundness or weather resistant integrity of the existing masonry. Do not remove sections of brick masonry longer than 3 ft and as limited by existing conditions. Where adjacent areas must be repaired sequentially, do not remove intermediate piers until new piers are installed and have cured for three days. The Contractor shall repair any areas suffering any adverse effects as a result of this work; repairs shall be in accordance with these Specifications and to the satisfaction of the Architect and Structural Engineer.

E. Support and protect remaining masonry that was supported by removed brick masonry.

F. Remove dust and loose mortar from existing masonry at junctions with new masonry. Dampen surrounding surfaces to be in contact with new masonry, but do not allow any standing water or puddles to form.

3.8 MASONRY REPAIRS

A. Lay all brick masonry plumb and true, with uniform and level joints and with all face coursing and joint widths to match existing. Place bricks with full, well-compacted, solidly filled mortar joints. Butter ends of all masonry units with sufficient mortar so that the buttered face is completely covered with mortar and some mortar will ooze out when the unit is placed. At closure bricks, butter all sides of all surfaces of brick to be placed and of abutting surfaces of in-place brick. Do not break bond between mortar and masonry units, once laid, in any way.

B. Tooth new or salvaged brick masonry neatly into adjacent existing masonry to minimize the visibility of the transition between existing masonry to remain and repair locations. Lay the masonry following the original coursing and pattern and within the tolerances defined for new masonry in Section 042000.

3.9 MASONRY CLEANING

A. Conduct all masonry work in a neat and competent manner, to prevent staining any surface with mortar or other spills. Avoid dropping mortar on completed work or other elements of the building. If mortar drops or spills on a nonporous material, spot clean immediately using a sponge and clean water. Brush down recently installed exposed masonry units with a soft bristle brush while mortar is hard enough not to smear, but soft enough not to bond tightly to the face of the units.

B. Clean all masonry work promptly after curing by wetting surfaces and washing with a stiff bristle brush to produce a clean and unmarred appearance. Begin cleaning with clean water only, without chemical cleaners. If water alone with a scrub brush is not successful, as determined by the Architect, use an approved cleaning compound. Dilute the compound with the maximum amount of water that will allow proper cleaning, as approved by the Architect.

C. Test the cleaning compound in a small inconspicuous area before beginning full scale cleaning. Cover all existing exposed metal, glass, and other areas as required before cleaning the masonry with any cleaning compounds. Do not use metal scrapers to clean the masonry. Rinse repeatedly with clean water after cleaning to remove all traces of mortar and debris. Protect all exterior finishes, including glass and aluminum, from any damage or staining caused by this work.

D. Ensure that building components, people, completed adjacent work, adjacent property, automobiles, and plant life are protected from all cleaning operations, including wind drift. Collect runoff and direct the water to predetermined, approved drainage paths.

END OF SECTION 040120.63

SECTION 040120.64 - BRICK MASONRY REPOINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Repointing joints with mortar.

B. Related Requirements:

1. Section 040120.63 “Brick Masonry Repair” for masonry repair requirements.

1.2 ALLOWANCES

A. Allowances for repointing brick masonry are specified in Section 012100 "Allowances."

1.3 DEFINITIONS

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

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to repointing brick masonry including, but not limited to, the following:
   a. Materials, material application, sequencing, tolerances, and required clearances.
   b. Quality-control program.
   c. Coordination with building occupants.

1.5 SEQUENCING AND SCHEDULING

A. Work Sequence: Perform brick masonry repointing 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 masonry.
5. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
6. Repair masonry, including replacing existing masonry with new masonry materials.
7. Rake out mortar from joints to be repointed.

8. Point mortar and sealant joints.
9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
10. Where water repellents are to be used on or near masonry work, delay application of these chemicals until after pointing and cleaning.

B. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units according to Section 040120.63 "Brick Masonry Repair." Patch holes in mortar joints according to "Repointing Masonry" Article.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

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

B. Shop Drawings:

1. Include plans, elevations, sections, and locations of repointing work on the structure.
2. Show provisions for expansion joints or other sealant joints.
3. Show locations of scaffolding and points of scaffolding in contact with masonry. Include details of each point of contact or anchorage.

C. Samples for Initial Selection: For the following:

1. Pointing Mortar: Submit sets of mortar for pointing in the form of sample mortar strips, 6 inches long by 1/4 inch wide, set in aluminum or plastic channels.

    a. Have each set contain a close color range of at least three Samples of different mixes of colored sands and cements that produce a mortar matching existing, cleaned mortar when cured and dry.
    b. Submit with precise measurements on ingredients, proportions, gradations, and source of colored sands from which each Sample was made.
2. Include similar Samples of accessories involving color selection.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For field supervisors and brick masonry repointing specialists.

B. Preconstruction Test Reports: For existing masonry units and mortar.

C. Quality-control program.

1.8 QUALITY ASSURANCE

A. Brick Masonry Repointing Specialist Qualifications: Engage an experienced brick masonry 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 masonry is insufficient experience for masonry repointing work.

1. Field Supervision: Brick masonry repointing specialist firms shall maintain experienced full-time supervisors on Project site during times that brick masonry repointing work is in progress.

B. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising performance and preventing damage.

C. Mockups: Prepare mockups of brick masonry 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 for each type of repointing required, and repoint one of the areas.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

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

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

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

1.10 FIELD CONDITIONS

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

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

C. Cold-Weather Requirements: Comply with the following procedures for mortar-joint pointing unless otherwise indicated:

1. When air temperature is below 40 deg F, heat mortar ingredients and existing masonry walls to produce temperatures between 40 and 120 deg F.

2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for seven days after pointing.

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

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

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

2.2 MORTAR MATERIALS

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

B. 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.

C. Water: Potable.

2.3 MORTAR MIXES

A. The repointing mortar mix shall be compatible with the existing mortar and face brick, and shall be governed by the results of a historic mortar analysis.

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

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

C. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.Do not use admixtures in mortar unless otherwise indicated.

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

E. Mixes: Mix mortar materials in the following proportions:
   1. Pointing Mortar by Type: ASTM C 270, Proportion Specification, Type N unless otherwise indicated; with cementitious material limited to mortar cement.

PART 3 - EXECUTION

3.1 PROTECTION

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

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

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

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

3.2 MASONRY REPOINTING, GENERAL

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

3.3 WIDENING JOINTS

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

B. Location Guideline: Where an existing masonry unit abuts another or the joint is less than 1/8 inch, widen the joint for length indicated and to depth required for repointing after obtaining Architect's approval.

C. Carefully perform widening by cutting, grinding, routing, or filing procedures demonstrated in an approved mockup.

D. Widen joint to width equal to or less than predominant width of other joints on building. Make sides of widened joint uniform and parallel. Ensure that edges of units along widened joint are in alignment with joint edges at unaltered joints.

3.4 CONTROL OF ABSORPTION RATE

A. Absorption rate is dependent upon the properties of the original host masonry and mortar, climate conditions, and the condition of the historic masonry. Masonry conditions and moisture levels will vary from one location to another in a historic structure. Evaluate existing conditions to determine methods for absorption control.

3.5 REPOINTING MASONRY

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

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

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, 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 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.
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 masonry, allow mortar to harden at least 30 days before beginning cleaning work.

3.6 FINAL CLEANING

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

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

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

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

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

3.7 FIELD QUALITY CONTROL

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

B. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.

C. Notify inspectors and Architect in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors and Architect have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

END OF SECTION 040120.64

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Face brick.
3. Mortar and grout.
4. Steel reinforcing bars.
5. Masonry-joint reinforcement.
6. Ties and anchors.
7. Embedded flashing.
8. Miscellaneous masonry accessories.

B. Related Sections:
1. Section 010200 “Allowances” for face brick unit cost allowance.
2. Section 072713 “Modified Bituminous Sheet Air Barriers” for air/water barrier system flashing components.

1.2 ALLOWANCES

A. Face brick is part of the Face Brick Allowance.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For the following:
1. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples for Initial Selection: For each type and color of the following:
1. Clay face brick, in the form of straps of five or more bricks.

2. Colored mortar.
3. Weep holes/cavity vents.

D. Samples for Verification: For each type and color of the following:
1. Clay face brick, in the form of on-site mockups, with mortar and weeps.

1.6 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Qualification Data: For testing agency.

C. Material Certificates: For each type and size of the following:

1. Masonry units.

a. Include material test reports substantiating compliance with requirements.
b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
c. For exposed brick, include test report for efflorescence according to ASTM C 67.
d. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
2. Cementitious materials. Include name of manufacturer, brand name, and type.
3. Mortar admixtures.
4. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
5. Grout mixes. Include description of type and proportions of ingredients.
6. Reinforcing bars.
7. Joint reinforcement.
8. Anchors, ties, and metal accessories.

D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

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

C. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with mockup requirements in Section 014000 "Quality Control" for mockups.

1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 36 inches long by 36 inches high by full thickness.
2. Clean one-half of exposed faces of panels with masonry cleaner indicated.
3. Protect approved sample panels from the elements with weather-resistant membrane.
4. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
    a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.

5. Where masonry is to match existing, erect sample panel adjacent and parallel to existing surface.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

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

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, securely cover a minimum of 24 inches down face next to unconstructed wythe, and hold cover in place.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. 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 TMS 602/ACI 530.1/ASCE 6.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

1. Masonry Cement is not allowed on this project.

2.2 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.

B. System components shall resist specified dead, wind, and seismic loads, building movements, thermally induced movement, moisture movements, and exposure to weather without failure, excessive deflection, or infiltration of air and water into building interior beyond specified limits. All system components and joints must accommodate a maximum temperature change (range) or 120° F, ambient; 180° F, material surfaces. Expansion, control and isolation joints shall be provided around new masonry to accommodate movement in masonry work.

2.3 UNIT MASONRY, GENERAL

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

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. CMUs: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi.
2. Density Classification: Normal weight.

2.5 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units.

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.

3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Face Brick: Facing brick complying with ASTM C 216.

1. Products: Subject to compliance with requirements, provide the following, or a pre-approved equivalent product, as determined by Architect:

   a. Design Intent: Replacement brick must be identical in size and physical characteristics to the existing brick. Color and texture are intended to be similar to the existing brick but will not be required to match exactly. Architect and Owner will require review of samples of multiple brick (and mortar) options on-site prior to making a final selection.

2. Grade: SW.
3. Type: FBX.
4. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3350 psi.
5. Initial Rate of Absorption: Less than 30 g/30 sq. in.per minute when tested per ASTM C 67.
6. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
7. Size (Actual Dimensions): Match existing.
8. Application: Use where brick is exposed in new construction, unless otherwise indicated.
9. Color and Texture: TBD – see design intent statement above.

2.6 MORTAR AND GROUT MATERIALS

A. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

B. Mortar Cement: ASTM C 1329.

1. Products: Subject to compliance with requirements, provide the following:

   a. Argos; Superbond Mortar Cement

   b. Lafarge North America Inc; Lafarge Mortar Cement.

   c. Workrite Cements, A Division of York Building Products; Colored Mortar Cement.

C. Colored Cement Product: Packaged blend made from mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

D. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

E. Aggregate for Grout: ASTM C 404.

F. Water: Potable.

2.7 REINFORCEMENT

A. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A 951/A 951M.

1. Interior Walls: Mill-galvanized carbon steel.
2. Exterior Walls: Hot-dip galvanized carbon steel.
3. Wire Size for Side Rods: 0.148-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch diameter.
5. Spacing of Cross Rods: Not more than 16 inches o.c.
6. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

2.8 TIES AND ANCHORS

A. General: Ties and anchors shall extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
1. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304.
2. Stainless-Steel Sheet: ASTM A 666, Type 304.
3. Stainless-Steel Bars: ASTM A 276 or ASTM A 666, Type 304.

C. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

D. Slotted Base Plate and Wire Tie Type Anchor:
1. Basis-of-Design Product: Hohmann and Barnard, Inc.; DW-10.
2. Fasteners:
   a. Attachment to Light Gauge Steel Studs: 1/4 inch diameter stainless steel self-drilling, self tapping screws.
   b. Attachment to CMU Substrate: Hilti Kwik-con II, 1/4 inch diameter stainless steel screw for concrete and brick and concrete masonry, length to provide 1 inch minimum embedment.

E. Remedial Masonry Veneer Anchors:
1. Basis-of-Design Product: Helifix, a Division of Halfen USA, Inc.: DryFix 5/16 inch diameter stainless steel helical anchors.
2. Plug Mortar Mix: Type N, color to match adjacent.

2.9 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Stainless Steel: ASTM A 240/A 240M, Type 304, 0.016 inch thick.
2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
3. Extend through-wall flashing continuous from exposed drip edge to the backup wall.
4. Provide prefabricated flashing corners with 6-inch minimum long legs along length of flashing to allow for flashing thermal movement.
5. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
6. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
7. Provide fully soldered end dams.

B. Application: Unless otherwise indicated, use the following:

1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge or flexible flashing with a metal drip edge.
4. Where flashing is fully concealed, use flexible flashing unless noted otherwise.
   a. Where flexible flashing must span across wall cavity, support with supplemental metal flashing.

C. Solder and Sealants for Sheet Metal Flashings:

1. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.

D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.10 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from closed-cell neoprene. ½ inch thick with tear strip.
1. Basis-of-Design Product: Hohmann & Barnard, Inc.; Closed Cell Neoprene Sponge.

B. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

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

1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.

a. Products: Subject to compliance with requirements, provide one of the following:
   1) Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
   2) Heckmann Building Products, Inc; No. 85 Cell Vent..
   3) Hohmann & Barnard, Inc; Quadro-Vent.

2.11 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Diedrich Technologies, Inc.
   b. EaCo Chem, Inc.
   c. PROSOCO, Inc.

2. Chemical applicator must be trained and equipment approved by chemical manufacturer.

2.12 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
   1. For reinforced masonry, use Type S.
   2. For exterior brick veneer and for other applications where another type is not indicated, use Type N.

D. Pigmented Mortar: Use colored cement product.

1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Application: Use pigmented mortar for exposed mortar joints.

E. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 3000 psi.
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

4. Where grout cells are less than 4 inches in diameter, fine grout shall be used.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Verify that substrates are free of substances that impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested according to ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.

B. Lay hollow brick as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With entire units, including areas under cells, fully bedded in mortar at starting course on footings.

C. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

F. Cut joints flush where indicated to receive waterproofing unless otherwise indicated.

3.6 COMPOSITE MASONRY

A. Bond wythes of composite masonry together using one of the following methods:

1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.

    a. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) ties.

2. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.

    a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
    b. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties.

B. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.

C. Corners: Provide interlocking masonry unit bond in each wythe and course at corners unless otherwise indicated.

1. Provide continuity with masonry-joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.

D. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:

1. Provide individual metal ties not more than 16 inches o.c.
2. Provide continuity with masonry-joint reinforcement by using prefabricated T-shaped units.
3. Provide rigid metal anchors not more than 24 inches o.c. If used with hollow masonry units, embed ends in mortar-filled cores.

3.7 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

3.8 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

A. Form control joints in concrete masonry using one of the following methods:

1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

B. Form expansion joints in brick as follows:

1. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."

2. Remove mortar droppings from expansion joints as the wall is erected.

C. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.9 FLASHING, WEEP HOLES, AND CAVITY VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 4 inches, and 1-1/2 inches into the inner wythe[Form 1/4-inch hook in edge of flashing embedded in inner wythe.
3. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products to form weep holes.
2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 24 inches o.c. unless otherwise indicated.
4. Trim wicking material flush with outside face of wall after mortar has set.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.11 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

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

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

3.12 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The Contract Requirements and the General Requirements (Division 1) of the Contract for Construction are hereby made a part of this Section.

1.2 SCOPE OF WORK

A. Work includes, but is not limited to, providing all labor, materials, equipment, and supervision to accomplish the following cold-formed metal framing work in accordance with the Drawings and Specifications. Locations of work are shown on the Drawings and as identified by the Engineer on site:

1. Exterior non-load bearing wall framing.
2. Light gauge accessories and attachments.

B. Related Requirements:

1. Section 061600 “Sheathing”
2. Section 072100 “Thermal Insulation”
3. Section 078100 “Applied Fireproofing”

1.3 REFERENCES

A. Follow the recommendations and procedures of the following standards and publications, except where these Contract Documents (project Specifications and Drawings) are more stringent.

1. AISI S100-12 – North American Specification for the Design of Cold-Formed Steel Structural Members.

2. AISI S200-12 – North American Standard for Cold-Formed Steel Framing – General Provisions.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of cold-formed steel framing product and accessory.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate framing, bridging, accessories, connection details, and attachment to adjoining work.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.

1. Steel sheet.
2. Power-actuated fasteners.
3. Mechanical fasteners.
4. Masonry and concrete screws.
5. Vertical deflection clips.
6. Miscellaneous structural clips and accessories.

D. Research Reports: For non-standard cold-formed steel framing, from ICC-ES.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code – Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code – Sheet Steel."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. ClarkDietrich Building Systems

B. MarinoWARE

C. S.A. Halec Ironworks

D. Super Stud Building Products, Inc.

2.2 COLD-FORMED STEEL FRAMING, GENERAL

A. Member designations and properties are based on Steel Stud Manufacturers Association (SSMA) standards. Framing supplied to the Project shall equal or exceed the properties indicated by SSMA for a particular member designation, subject to approval by the Architect and Structural Engineer.

B. Steel Sheet: ASTM A 1003, Structural Grade, Type H, zinc-coated, of grade and coating weight as follows:

1. Grade: ST50H
2. Coating: G90

C. Steel Sheet for Deflection Clips: ASTM A 653, structural steel, zinc-coated, of grade and coating as follows:

1. Grade: 50
2. Coating: G90

2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, punched, with stiffened flanges of size and thickness as indicated on the Structural Drawings.

B. Steel Track: Manufacturer's standard U-shaped steel track, unpunched, with unstiffened flanges of size and thickness as indicated on the Structural Drawings.

C. Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web. Size, gauge, and connection requirements as indicated on the Structural Drawings.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ClarkDietrich
b. MarinoWARE
c. S.A. Halec Ironworks
d. Simpson Strong-Tie Co., Inc.
e. SCAFCO Steel Stud Company

D. Slotted Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track with vertically slotted holes; unpunched, with unstiffened flanges, of size, gauge, and deflection gap as indicated on the Structural Drawings.

2.4 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003, Structural Grade, Type H, zinc-coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated on the Structural Drawings, as follows:

1. Bridging
2. Anchor clips
3. End clips

2.5 ANCHORS, CLIPS, AND FASTENERS

A. Concrete and Masonry Screws: Provide 1/4 in. diameter screw-type fasteners suitable for installation into concrete and hollow or grouted concrete masonry substrates. Install in accordance with the manufacturer’s written instructions with a minimum embedment of 1 in. unless otherwise noted. Provide screws manufactured by one of the following:

1. Hilti, Inc.
2. Simpson Strong-Tie, Inc.
3. ITW Buildex/Tapcon

B. Powder-Actuated Fasteners: Provide 0.157 in. diameter fasteners suitable for installation into concrete and structural steel substrates manufactured by one of the following:

1. Hilti, Inc.
2. Simpson Strong-Tie, Inc.
3. Ramset

C. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head type: Low-profile head beneath sheathing, manufacturer’s standard elsewhere.
2. Size: As indicated on the Structural Drawings

D. Steel Plates and Angles: ASTM A36, hot-dip galvanized according to ASTM A123.

E. Welding Electrodes: Comply with AWS standards.

F. All fasteners shall be of compatible material.

2.6 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A780.

B. Shims: Load bearing, high-density multimonomer plastic, and non-leaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

2.7 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing as indicated on the Structural Drawings and the approved Shop Drawings. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to the Structural Drawings and the approved Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 in. in 10 ft and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 in. from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 in.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

C. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled. All dimensions shall be field-verified prior to fabrication.

B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened. All framing components shall be cut squarely for attachment to perpendicular members or as required for an angular fit against abutting members. Members shall be positively held in place until properly fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

D. Install framing members in one-piece lengths. Splices are not permitted.

E. For fasteners, provide the following minimum spacing, edge distance, and embedment unless otherwise noted or detailed.

FASTENER TYPE	SPACING (IN.)	EDGE DISTANCE (IN.)	EMBEDMENT (IN.)
Screws	1	0.75	N/A
PAFs (Steel)	1.5	0.5	0.25
PAFs (Concrete)	1.5	3	1
Concrete/Masonry Screws	3	1.5	1

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Install insulation, specified in Section 072100 "Thermal Insulation," as indicated on the Architectural Drawings.

H. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

I. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 in. in 10 ft and as follows:

1. Space individual framing members no more than plus or minus 1/8 in. from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as indicated on the Structural Drawings. Field-verify stud spacing, which shall not exceed 16 in.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg slotted deflection tracks and/or deflection clips as indicated on the Structural Drawings and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on the approved Shop Drawings. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor, Architect, and Structural Engineer.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Sheathing joint and penetration treatment.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
   1. For air-barrier and water-resistant glass-mat gypsum sheathing, include manufacturer's technical data and tested physical and performance properties of products.

1.3 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 WALL SHEATHING

A. Glass-Mat Gypsum Sheathing: ASTM C 1177/1177M.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. CertainTeed Corporation; GlasRoc.
   b. Georgia-Pacific Building Products; Dens-Glass Gold.
   c. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.
   d. United States Gypsum Company; Securock.

2. Type and Thickness: Regular, 1/2 inch thick.

2.2 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
   1. For wall and parapet sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

B. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.

1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C 1002.
2. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C 954.

2.3 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.

D. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.
1. Fasten gypsum sheathing to cold-formed metal framing with screws.

2. Install panels with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
3. Install panels with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Seal sheathing joints according to sheathing manufacturer's written instructions.
1. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION 061600

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Glass-fiber blanket insulation.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of product indicated.

B. Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET

A. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:

   1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
   2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

B. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      a. CertainTeed Corporation; CertaPro.
      b. Guardian Building Products, Inc.
      c. Johns Manville; a Berkshire Hathaway company.

d. Knauf Insulation.
e. Owens Corning.

2. Application: Exterior metal stud walls, where indicated.

2.2 ACCESSORIES

A. Insulation for Miscellaneous Voids:

1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
2. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.2 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically to flanges of metal studs.
4. Provide sheet metal strapping, mesh, or similar method to support the interior face of the insulation and retain the insulation firmly in the stud cavity and against the exterior sheathing.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..

3.3 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072713 - MODIFIED BITUMINOUS SHEET AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes self-adhering, vapor-permeable, modified bituminous sheet air barriers.

B. Related Requirements:

1. Section 061600 "Sheathing" for wall sheathings and wall sheathing joint-and-penetration treatments.

1.2 DEFINITIONS

A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

C. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.

B. Shop Drawings: For air-barrier assemblies.

1. Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
2. Include details of interfaces with other materials that form part of air barrier.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer. Include list of ABAA-certified installers and supervisors employed by the Installer, who work on Project.

B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with air barrier.

C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Remove and replace liquid materials that cannot be applied within their stated shelf life.

B. Protect stored materials from direct sunlight.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.
2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes,

penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 2357.

2.3 SELF-ADHERING SHEET AIR BARRIER

A. Modified Bituminous Sheet: 40-mil- thick, self-adhering sheet consisting of 36 mils of rubberized asphalt laminated to a 4-mil- thick, cross-laminated polyethylene film with release liner on adhesive side and formulated for application with primer or adhesive that complies with VOC limits of authorities having jurisdiction.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Carlisle Coatings & Waterproofing Inc; Fire Resist 705.
   b. GCP Applied Technologies; W.R. Grace & Co.; Perm-A-Barrier VPS Wall Membrane (Basis-of-Design product).
   c. Henry Company; Blueskin VP160.
   d. W.R. Meadows, Inc; Air-Shield SMP.

2. Physical and Performance Properties:
   a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
   b. Tensile Strength: Minimum 4000 psi; ASTM D 412, Die C.
   c. Ultimate Elongation: Minimum 300 percent; ASTM D 412, Die C.
   d. Puncture Resistance: Minimum 40 lbf; ASTM E 154.
   e. Water Absorption: Maximum 0.15 percent weight gain after 48-hour immersion at 70 deg F; ASTM D 570.
   f. Vapor Permeance: Minimum 10 perms; ASTM E 96/E 96M, Water Method.
   g. Pull Adhesion: Minimum 15 lb/sq. inch to primed glas-mat gypsum sheathing, minimum 12 lb/sq. inch to primed CMU, when tested according to ASTM D 4541 as modified by ABAA.
   h. Peel Adhesion at minimum temperature: Minimum 5 pli to primed glas-mat gypsum sheathing, minimum 4 pli to air barrier membrane, minimum 2.5 pli to primed CMU per ASTM D903.
   i. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
   j. UV Resistance: Can be exposed to sunlight for 30 days according to manufacturer's written instructions.

2.4 ACCESSORY MATERIALS

A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier membrane.

B. Primer: Liquid waterborne primer recommended for substrate by air-barrier material manufacturer.
1. Basis-of-Design Product: GCP Applied Technologies; Perm-A-Barrier WB Primer.
2. VOC Content: 10 g/L or less.

C. Penetration and Termination Sealant: Two-part elastomeric, trowel grade sealant approved by manufacturer for application.
1. Basis-of-Design Product: GCP Applied Technologies; Bituthene Liquid Membrane

D. Transition Flashing Membrane: Self-adhered membrane comprised of rubberized asphalt integrally bonded to cross-laminated high-density polyethylene film.
   1. Basis-of-Design Product: GCP Applied Technologies; Perm-A-Barrier Wall Membrane
   2. Thickness: 0.040 in. minimum.

E. Through-Wall Flashing Membrane: Self-adhered membrane comprised of rubberized asphalt integrally bonded to 0.008 in. thick cross-laminated high-density polyethylene film,
   1. Basis-of-Design Product: GCP Applied Technologies; Perm-A-Barrier Wall Flashing.
   2. Thickness: 0.040 in. minimum in combination with a metal drip edge.

F. Metal Drip Through-Wall Flashing: Stainless steel flashing with a formed drip that projects past the face of the cladding and upturned back leg,
   1. Basis-of-Design Product: Hohmann & Barnard; MFL – Metal Flashing.

G. Termination Bar: stainless steel.
   1. Basis-of-Design Product: Hohmann & Barnard; T1- Termination Bar.

H. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, 0.0250 inch thick, and Series 300 stainless-steel fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

   1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
   2. Verify that concrete has cured and aged for minimum time period recommended by air-barrier manufacturer.
   3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
   4. Verify that masonry joints are flush and completely filled with mortar.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. Bridge and cover isolation joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with overlapping modified bituminous strips.

G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 INSTALLATION

A. Install modified bituminous sheets and accessory materials according to air-barrier manufacturer's written instructions and according to recommendations in ASTM D 6135.

1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous air-barrier sheet produced for low-temperature application. Do not install low-temperature sheet if ambient or substrate temperature is higher than 60 deg F.

B. Prepare, treat, and seal inside and outside corners according to ASTM D 6135.

C. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations with termination mastic and according to ASTM D 6135.

D. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier sheet on same day. Reprime areas exposed for more than 24 hours.

1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

E. Apply and firmly adhere modified bituminous sheets horizontally over area to receive air barrier. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure airtight installation.

1. Apply sheets in a shingled manner to shed water without interception by any exposed sheet edges.
2. Roll sheets firmly to enhance adhesion to substrate.

F. Apply continuous modified bituminous sheets over accessory strips bridging substrate cracks, construction, and contraction joints.

G. CMU: Prior to installing wall ties, install air-barrier sheet horizontally against the CMU beginning at base of wall. Align top edge of air-barrier sheet immediately below protruding masonry ties or joint reinforcement or ties, and firmly adhere in place.

1. Overlap horizontally adjacent sheets a minimum of 2 inches and roll seams.
2. Continue the membrane into all openings in the wall, such as doors and windows, and terminate at points to maintain an airtight barrier that is not visible from interior.

H. Seal top of through-wall flashings to air-barrier sheet with an additional 6-inch- wide, counterflashing strip.

I. Seal exposed edges of sheet at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

J. Install air-barrier sheet and accessory materials to form a seal with adjacent construction and to maintain a continuous air barrier.

1. Coordinate air-barrier installation with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.

K. Connect and seal exterior wall air-barrier membrane continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

L. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.

1. Transition Strip: Roll firmly to enhance adhesion.

M. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous penetrations of air-barrier membrane with foam sealant.

N. Repair punctures, voids, and deficient lapped seams in air barrier. Slit and flatten fishmouths and blisters. Patch with air-barrier sheet extending 6 inches beyond repaired areas in all directions.

O. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.4 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than the manufacturer’s recommended time limit, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed Work, using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 072713

SECTION 078100 - APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes sprayed fire-resistive materials.

B. Related Sections:
   1. Section 014000 “Quality Control” for general requirements for testing and inspection and for mockup requirements.

1.2 DEFINITIONS

A. SFRM: Sprayed fire-resistive materials.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

   1. Review products, design ratings, restrained and unrestrained conditions, densities, thicknesses, bond strengths, and other performance requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Framing plans or schedules, or both, indicating the following:

   1. Extent of fireproofing for each construction and fire-resistance rating.
   2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
   3. Minimum fireproofing thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates.

C. Evaluation Reports: For fireproofing, from ICC-ES.

D. Preconstruction Test Reports: For fireproofing applied to existing primer.

E. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.

B. Mockups: Build in-place mockups to set quality standards for materials and execution and for preconstruction testing. Refer to Section 014000 “Quality Control” for mockup requirements.

1. Build mockup of each type of fireproofing and different substrate as shown on Drawings, in conjunction with in-place mockups required for other trades.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on field mockups of fireproofing.

1. Field Mockup: As indicated in Section 014000 “Quality Control”.
2. Provide test specimens and assemblies representative of proposed materials and construction.

B. Preconstruction Adhesion and Compatibility Testing: Test for compliance with requirements for specified performance and test methods.

1. Bond Strength: Test for cohesive and adhesive strength according to ASTM E 736. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
2. Density: Test for density according to ASTM E 605. Provide density indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
3. Verify that manufacturer, through its own laboratory testing or field experience, attests that primers or coatings are compatible with fireproofing.
4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, obtain applied-fireproofing manufacturer's written instructions for corrective measures including the use of specially formulated bonding agents or primers.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is 44 deg F or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.

B. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.

B. Source Limitations: Obtain fireproofing from single source.

C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Steel members are to be considered unrestrained unless specifically noted otherwise.

D. Asbestos: Provide products containing no detectable asbestos.

2.2 SPRAYED FIRE-RESISTIVE MATERIALS

A. Sprayed Fire-Resistive Material: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Carboline Company; RPM International; Pyrolite 15.
   b. Grace Construction Products; W.R. Grace & Co. -- Conn; Grace Construction Products; Monokote MK-6 Series.
   c. Isolatek International, Inc.; Cafco 300.
   d. Pyrok, Inc.; Pyrok-MD.
   e. Southwest Fireproofing Products Co.; Type 5GP.

2. Bond Strength: Minimum 150-lbf/sq. ft. cohesive and adhesive strength based on field testing according to ASTM E 736.
3. Density: Not less than density specified in the approved fire-resistance design, according to ASTM E 605.
4. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E 605, whichever is thicker, but not less than 0.375 inch.
5. Combustion Characteristics: ASTM E 136.
6. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   a. Flame-Spread Index: 10 or less.
   b. Smoke-Developed Index: 10 or less.

7. Compressive Strength: Minimum 10 lbf/sq. in. according to ASTM E 761.
8. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.
9. Deflection: No cracking, spalling, or delamination according to ASTM E 759.
10. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
11. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. in 24 hours according to ASTM E 859.

12. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G 21 or rating of 10 according to ASTM D 3274 when tested according to ASTM D 3273.
13. Finish: Spray-textured finish.

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by fireproofing manufacturer.

C. Bonding Agent: Product approved by fireproofing manufacturer.

D. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required, according to fire-resistance designs indicated and fireproofing manufacturer's written instructions. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive fireproofing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design.

1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.
2. Verify that objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
3. Verify that substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.

B. Conduct tests according to fireproofing manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.

B. Clean substrates of substances that could impair bond of fireproofing.

C. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.

D. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fireproofing. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.3 APPLICATION

A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fireproofing work.

B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.

D. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.

E. Spray apply fireproofing to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.

F. Extend fireproofing in full thickness over entire area of each substrate to be protected.

G. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.

H. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.

I. Cure fireproofing according to fireproofing manufacturer's written instructions.

J. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.

K. Finishes: Where indicated, apply fireproofing to produce the following finishes:

1. Spray-Textured Finish: Finish left as spray applied with no further treatment.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Test and inspect as required by the IBC**,** Subsection 1705.13, "Sprayed Fire-Resistant Materials."

B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.

C. Fireproofing will be considered defective if it does not pass tests and inspections.

1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

D. Prepare test and inspection reports.

3.5 CLEANING, PROTECTING, AND REPAIRING

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Protect fireproofing, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fireproofing is without damage or deterioration at time of Substantial Completion.

C. As installation of other construction proceeds, inspect fireproofing and repair damaged areas and fireproofing removed due to work of other trades.

D. Repair fireproofing damaged by other work before concealing it with other construction.

E. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 078100

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Nonstaining silicone joint sealants.
   2. Silicone sheet seals.

B. Related Requirements:
   1. Section 014000 “Quality Control” for preconstruction adhesion testing associated with mockups.
   2. Section 088000 “Glazing” for glazing sealants and accessories.
   3. Section 321373 "Concrete Paving Joint Sealants" for sealing joints in paved roads, parking lots, walkways, and curbing.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

   1. Joint-sealant application, joint location, and designation.
   2. Joint-sealant manufacturer and product name.
   3. Joint-sealant formulation.
   4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each kind of joint sealant, for tests performed by a qualified testing agency.

B. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

C. Field-Adhesion-Test Reports: For each sealant application tested.

D. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

B. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
2. Conduct field tests for each kind of sealant and joint substrate.
3. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.

a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

4. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
5. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.7 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period for Silicones: 20 years from date of Substantial Completion.
2. Warranty Period for Urethanes: Five years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content: Sealants and sealant primers shall comply with the following:
1. Architectural sealants shall have a VOC content of 250 g/L or less.
2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
3. Sealants and sealant primers for nonporous substrates shall have a VOC content of 775 g/L or less.

C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 NONSTAINING SILICONE JOINT SEALANTS

A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.

B. Silicone, Nonstaining, S, NS, 100/50, T, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Dow Corning Corporation; 790.
   b. Pecora Corporation; 890.
   c. Sika Corporation, Construction Products Division; SikaSil-C990.
   d. Tremco Incorporated; Spectrem 1.

C. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Dow Corning Corporation; Dowsil 791 Weatherproofing Sealant.
   b. Pecora Corporation; 864NST.
   c. Tremco Incorporated; Spectrem 2.

2.3 SILICONE SHEET SEALS

A. Preformed, ultra-low modulus, silicone elastomer extrusion, plus 200 percent and minus 75 percent movement capability.

1. Products: Subject to compliance with requirements, provide the following:
   a. Basis-of-Design Product: Dow Corning Corporation; Dowsil 123 Silicone Seal.

2.4 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
1. Basis-of-Design Product: Nomaco; Sof Rod.

C. Quarter Round Fillet Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
1. Basis-of-Design Product: Nomaco; HBR.

D. Bond-Breaker Tape: 0.006 inch thick polyethylene adhesive-backed on one side, width as required.
1. Basis-of-Design Product: 3M; BondBreaker Tape 8891.

2.5 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.

d. Glazed surfaces of ceramic tile.

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

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

3.3 INSTALLATION OF JOINT SEALANTS – RECESSED JOINTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

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

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

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

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

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

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.
4. Provide flush joint profile at locations indicated on Drawings according to Figure 8B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated on Drawings according to Figure 8C in ASTM C 1193.

a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

   a. Perform 4 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
   b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

   a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect tested joints and report on the following:

   a. Whether sealants filled joint cavities and are free of voids.
   b. Whether sealant dimensions and configurations comply with specified requirements.
   c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

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

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in vertical surfaces.

1. Joint Locations:
   a. Control and expansion joints in unit masonry.
   b. Joints between masonry and precast concrete panels.
   c. Joints between different materials listed above.
   d. Perimeter joints between materials listed above and frames of doors, windows, and louvers.
   e. Control and expansion joints in overhead surfaces.
   f. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, nonstaining, S, NS, 100/50, NT.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Silicone sheet seals for window / storefront frame restoration.

1. Joint Locations:
   a. Exterior window frame joinery.

2. Sheet Seal: Preformed silicone sheet extrusion.

3. Joint Sealant for Silicone Sheet Bed Seals: Silicone, nonstaining, S, NS, 50, NT, by same manufacturer as silicone sheet seal.

4. Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 079513.16 - EXTERIOR EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes exterior building expansion joint cover assemblies.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for expansion joint cover assemblies.

B. Shop Drawings: For each expansion joint cover assembly.

1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams showing entire route of each expansion joint.
2. Where expansion joint cover assemblies change planes, provide isometric or clearly detailed drawing depicting how components interconnect.

C. Samples: For each exposed expansion joint cover assembly and for each color and texture specified, full width by 6 inches long in size.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each fire-resistance-rated expansion joint cover assembly, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.4 QUALITY ASSURANCE

A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockup of typical expansion joint cover assembly as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves 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.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Furnish units in longest practicable lengths to minimize field splicing.

B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Expansion joint cover assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

B. Expansion Joint Design Criteria:

1. Type of Movement: Thermal and Wind sway.

a. Nominal Joint Width: Match Existing
b. Minimum Joint Width: Match Existing
c. Maximum Joint Width: Match Existing

2.3 EXTERIOR EXPANSION JOINT COVERS

A. Exterior Metal-Plate Joint Cover: Assembly consisting of sliding metal cover plate in continuous contact with gaskets mounted on metal frames fixed to sides of joint gap.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Construction Specialties, Inc.; AFWC-X Series (Basis-of-Design product).
   b. Pre-Approved Equal matching existing.

2. Application: Wall to wall (corner).
3. Installation: Surface mounted.
4. Exposed Metal:
   a. Aluminum: Finish to match existing.

2.4 MATERIALS

A. Aluminum: ASTM B 221, Alloy 6063-T5 for extrusions; ASTM B 209, Alloy 6061-T6 for sheet and plate.

1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.

B. Stainless Steel: ASTM A 240/A 240M or ASTM A 666, Type 304 for plates, sheet, and strips.

C. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.

D. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.

2.5 ACCESSORIES

A. Moisture Barriers: Manufacturer's standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.

1. Provide where indicated on Drawings.

B. Manufacturer's stainless-steel attachment devices. Include anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces where expansion joint cover assemblies will be installed for installation tolerances and other conditions affecting performance of the Work.

B. Notify Architect where discrepancies occur that will affect proper expansion joint cover assembly installation and performance.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.

B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion joint cover assemblies.

3.3 INSTALLATION

A. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.

B. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.

1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
4. Install frames in continuous contact with adjacent surfaces.

a. Shimming is not permitted.

5. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.

C. Seals: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.

1. Provide in continuous lengths for straight sections.
2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

D. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.

E. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.

F. Moisture Barrier Drainage: If indicated, provide drainage fitting and connect to drains.

3.4 CONNECTIONS

A. Transition to Roof Expansion Joint Covers: Coordinate installation of exterior wall expansion joint covers with existing roof expansion joint covers.

3.5 PROTECTION

A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.

B. Protect the installation from damage by work of other Sections.

END OF SECTION 079513.16

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Glass for glazed aluminum windows.
2. Glass for glazed aluminum storefronts.
3. Glazing sealants and accessories.

1.2 DEFINITIONS

A. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

B. Interspace: Space between lites of an insulating-glass unit.

1.3 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples:
1. Glass: For each type of glass product. 12 inches square.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

D. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For glass.

B. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Mockups: As required in Section 014000 “Quality Control”, window mockup must include a replacement IGU to confirm match with existing IGU lites.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.10 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
   1. Obtain coated glass from single run from single manufacturer.

B. Subject to compliance with requirements, provide product by one of the following:
   1. Berkowitz, JE, LP.
   2. Guardian Glass for North America.
   3. PPG Industries, Inc.
   4. Viracon, Inc.

C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.

   1. Design Wind Pressures: As indicated on Drawings.
   2. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
   3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
   1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
   2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
   3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IgCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.

1. Minimum Glass Thickness for Exterior Lites: 6 mm.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3. Heat-soak tested in accordance with EN 14179-1.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2. Basis-of-Design Product: Match Existing

B. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2. Basis-of-Design Product: Match Existing

C. Coated Vision Glass: ASTM C 1376.
1. Basis-of-Design Product: Match Existing

2.5 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190. Sealed IGU assemblies shall comply with ASTM E744, Class A.

1. Sealing System: Dual-stage hermetic seal, with manufacturer's standard primary and secondary sealants.
2. Spacer: Stainless steel.

2.6 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
    a. Design intent: Match existing.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Products: Subject to compliance with requirements, provide the following, or approved equal:
    a. Basis-of-Design Product: Dow Corning Corporation; Dowsil 791 Weatherproofing Sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Glazing Gaskets: Factory molded corners, complying with ASTM C864. Silicone or material that provides for adhesion for silicone sealant.

2.8 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.5 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.6 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

3.7 INSULATING GLASS SCHEDULE

A. Glass Type IG-1: Low-E-coated, clear insulating glass.
1. Design Intent: IGU units identical in appearance and performance to the existing-to-remain IGU’s.
2. Overall Unit Thickness: 1 inch.
3. Minimum Thickness of Each Glass Lite: 6 mm.

4. Outdoor Lite: Float glass – Match existing. Heat-strengthened or Fully tempered as required.
5. Interspace Content: Argon.
6. Indoor Lite: Float glass – Match existing. Heat-strengthened or Fully tempered as required.
7. Low-E Coating: To match existing.
8. Center of Glass U-Factor: Match existing, 0.38 maximum.
9. Visible Light Transmittance: Match existing.
10. Solar Heat Gain Coefficient: Match existing, 0.40 maximum.

END OF SECTION 088000

SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of high-performance coating systems on the following substrates:

1. Exterior Substrates:
   a. Galvanized metal.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.
   1. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product indicated.

C. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.

D. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.4 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Benjamin Moore & Co.
   2. PPG Architectural Finishes, Inc.
   3. Sherwin-Williams Company (The).
   4. Tnemec Company, Inc. (Basis-of-Design)

B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Interior High-Performance Coating Schedule for the coating category indicated.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

A. Material Compatibility:

   1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
   3. Products shall be of same manufacturer for each coat in a coating system.

B. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
   1. Primers, Sealers, and Undercoaters: 200 g/L.
   2. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: 250 g/L.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

   1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

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

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

D. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for coating and substrate indicated.

B. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.

1. Contractor shall touch up and restore coated surfaces damaged by testing.
2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Galvanized-Metal Substrates (Existing steel shelf angles): A protective corrosion-inhibiting coating shall be applied to all accessible surfaces of existing steel relieving angles exposed during the course of brick removal and replacement work. The coating system shall include a primer coat and top coat with a stripe coat applied at welds, bends in the structural steel, leading edges, and other similar discontinuities.

1. Prime Coat: Zinc-Rich Epoxy Primer
   a. Basis-of-Design Product: Tnemec Company, Inc.; Series 1

2. Topcoat and Stripe Coats: Polyamide Epoxy, Satin.
   a. Basis-of-Design Product: Tnemec Company, Inc.: Hi-Build Epoxoline, Series 66HS.

END OF SECTION 099600

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.

B. Related Requirements:

1. Section 079200 "Joint Sealants" for sealing nontraffic and traffic joints in locations not specified in this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Paving-Joint-Sealant Schedule: Include the following information:
1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

1.4 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 COLD-APPLIED JOINT SEALANTS

A. Single-Component, Self-Leveling, Silicone Joint Sealant for Concrete: ASTM D 5893/D 5893M, Type SL.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Crafco Inc., an ERGON company; RoadSaver Silicone SL.
      b. Dow Corning Corporation; 890-SL.
      c. Pecora Corporation; 300 SL.

B. Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant for Concrete: ASTM C 920, Type M, Grade P, Class 25, for Use T.
   1. Products: Subject to compliance with requirements, provide the following:
      a. Pecora Corporation; Urexpan NR-200.

2.3 JOINT-SEALANT BACKER MATERIALS

A. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.

2.4 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.

   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, 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.

3.2 INSTALLATION OF JOINT SEALANTS

A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

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

C. Install joint-sealant backings to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint-sealant backings.
2. Do not stretch, twist, puncture, or tear joint-sealant backings.
3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:

1. Place joint sealants so they fully contact 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 Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements 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 joint sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.3 CLEANING AND PROTECTION

A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.

B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

3.4 PAVING-JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Joints within concrete paving.

1. Joint Location:
   a. Joints between concrete paving and building wall.

2. Joint Sealant: Single-component, self-leveling, silicone joint sealant or multicomponent, pourable, urethane, elastomeric joint sealant.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION 321373