University of California Hastings College of the Law

200 McAllister Street Infrastructure Improvement Projects

200 McAllister Street
San Francisco, CA 94102

MKThink Project # 491-404
ITB #78-0160

August 08, 2017

UC HASTINGS
COLLEGE OF THE LAW
EST. 1878

PROJECT MANUAL

University of California Hastings College of the Law

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San Francisco, CA 94102

MKThink Project # 491-404
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Owner:
University of California
Hastings College of the Law
200 McAllister St.
San Francisco, CA 94102

Architect of Record:
MKThink
Roundhouse One
1500 Sansome St.
San Francisco, CA 94111
(415) 402-0888

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1.01 **MK**Think PROJECT NUMBER: 491-404

1.02 PROJECT NAME AND LOCATION

University of California
Hastings College of the Law
200 McAllister Street Infrastructure
Improvement Projects
200 McAllister Street
San Francisco, CA 94102

1.03 OWNER

University of California
Hastings College of the Law
Facilities Manager
200 McAllister Street
San Francisco, CA 94102

1.04 ARCHITECT

MKThink
Roundhouse One
1500 Sansome St.
San Francisco, CA 94111
(415) 402-0888

1.05 BID SUBMISSION: Owner's address.

END OF SECTION 00 1000

SECTION 005000 - STANDARD FORM OF AGREEMENT

1.01 Not used (Reference Introductory Pages).

END OF SECTION 005000

SECTION 006000 - BONDS AND CERTIFICATES

1.01 Not used (Reference Introductory Pages).

END OF SECTION 006000

SECTION 006110 - CONSENT OF SURETY

1.01 Not used (Reference Introductory Pages).

END OF SECTION 006110

SECTION 006250 - CERTIFICATE OF SUBSTANTIAL COMPLETION

1.01 AIA Document G704-2000, Certificate of Substantial Completion shall be issued by the Architect at a time determined by the Architect. A copy of the document is bound with this Project Manual.

END OF SECTION 006250

SECTION 007000 – GENERAL CONDITIONS

1.01 Not used (Reference Introductory Pages).

END OF SECTION 007000

SECTION 008000 – SUPPLEMENTARY CONDITIONS

1.01 Not used (Reference Introductory Pages).

END OF SECTION 008000

SECTION 009000 - ADDENDA AND MODIFICATIONS

1.01 Not used (Reference Introductory Pages).

END OF SECTION 009000

1.01 SCHEDULE SUBMISSION WITH BID

A. Submit a construction schedule for the Project using Microsoft Project.

B. Schedule Format: Indicate each significant construction activity separately. Indicate the estimated time duration for each activity, sequence requirements, sequence of elevations or locations, and relationship of each activity in relation to other activities using the Critical Path Method (CPM) schedule.

C. Process data to produce output data or a computer-drawn, time-scaled network. Produce the Critical Patch Method (CPM) schedule within the limitations of the Contract Time.

1.02 BID QUALIFICATIONS SUBMISSION WITH BID

A. Submit three (3) project examples completed within the last five (5) years with similar scope of work.

B. Sample Format: Indicate scope of work, project team, project timeline, and total construction cost. Provide references for each project sample submitted.

1.03 DEPARTMENT OF INDUSTRIAL RELATIONS (DIR) CERTIFIED

A. Contractor must be DIR Certified in order for their bid to be accepted.

B. Contractor to submit DIR certification number with bid.

1.04 PROGRESS SCHEDULE

A. Project Progress Schedule: During construction, submit updated CPM schedule during each progress meeting with the Owner, Owner's Representative, and Architect.

B. The Undersigned hereby agrees to provide the Owner, Owner's Representative, and Architect the construction schedule showing the proposed schedule of Work items and their anticipated completion times.

1.05 CONTRACTOR'S GENERAL CONDITIONS

A. The Undersigned hereby agrees that the General Conditions for the Project includes, but is not limited to, the Terms and Conditions stated in General Conditions provided by the Owner.

B. Contractor shall comply with the provisions of applicable California law, including but not limited to, Sections 1770, et seq, of the Labor Code of the State of California

C. All contractors should be aware that the Project is fully occupied during construction. This condition will require the Work area(s) to be continuously cleaned for the safety of both the tenants and contractors. Should the Work areas not be kept clean in a satisfactory manner, the Owner reserves the right to stop all Work. The Undersigned hereby agrees that the General Conditions for the Project includes, but is not limited to, the following:

1. Coordination for obtaining permits, except plan check fees and building permit cost.
2. Telephone.
3. Toilets (use of building toilets is forbidden).

4. Temporary power.
5. Water (Drinking).
6. Gasoline.
7. Travel.
8. Safety/Equipment.
9. Fines & penalties.
10. Warranty.
11. Punch list items.
12. Glass breakage.
13. Debris Boxes/Containers.
14. Trucking.
15. CPM Schedules and Three-Week Look-ahead Activities-Locations Schedule.
16. Computers and equipment rental.
17. Postage/Delivery.
18. Plans/Printing.
19. Field office supplies.
20. Field office equipment.
21. Miscellaneous materials.
22. Construction Aids/Small tools.
23. Project sign.
24. Forklift rental.
25. Truck rental.
26. Trailer /storage rental.
27. Miscellaneous equipment rental/Repair.
28. Temporary fence.
29. Temporary lighting.
30. Temporary heating.
31. Temporary security to prevent building intrusions through construction staging.
32. Temporary pedestrian protection canopy and temporary stairs.
33. Egress for occupants: Emergency exit paths.
34. Motorized lifts, scaffolding, or other access system to building exterior for Work.
35. Occupant assistance for relocate furniture, removal and re-hang window coverings, and the like.
36. Hoisting other than forklift and scaffold.
37. Testing supports as specified in the technical sections.
38. Daily Progressive Cleanup.
39. Clean Up Final (both exterior and Interiors of building as necessary).
40. Project Closeout.

C. Contractor's Supervision

1. Include cost of Project Supervision in the cost of General Conditions.

2. The Project should be properly staffed and that there is sufficient field staff in which to administer the Project and to properly coordinate the Work with the Owner. tThe contractors are hereby advised that they will be required to coordinate with the Owner for all notices to building tenants and make all arrangements for entry to tenant space. The Undersigned hereby agrees that the supervision provided for this Project includes one (1) part-time Project Manager and one (1) full-time on-site Project Superintendent.

3. Changes in Project Manager and Project Superintendent are not allowed without a written approval from the Owner.

4. The Project Manager and Project Superintendent should attend weekly progress meetings with the Owner, Owner's Representative, and Architect for construction updates and coordination. Provide update CPM Schedules for the Owner and Architect at the meetings.

5. The Contractor shall provide full access for and accompany the Architect to conduct initial identification of the necessary repairs at each locations of Work. The Project Manager or Project Superintendent shall accompany the Architect for the repair work identification visit.

6. The Contractor shall record and maintain records of actual repairs performed under allowance quantities. The record of actual repairs will be verified jointly by the Architect and the Contractor during the punchlist visit before means of access (eg. ladder, etc.) will be removed. The Project Manager or Project Superintendent shall accompany the Architect for the repair work verification/punchlist visit. Provide a minimum of seven (7) days advance notice to the Architect prior to the punchlist.

D. The fees for the following items will be provided by the Owner. Contractor shall provide coordination and facilitation:

1. Building permit cost.
2. Plan check fees.

2.01 GENERAL BID AGREEMENTS (See Bid Pricing)

END OF BID FORM

PART 1 GENERAL

1.01 APPLICABLE CODES AND STANDARDS

A. All Work shall meet or exceed the requirements of the current California Building Code as amended by the local jurisdiction. References to code all pertain to the most current version at the time of the dating of the Drawings or the signing of the Agreement. Nothing in the Drawings or Specifications is to be interpreted as requiring or permitting Work that is contrary to these rules, regulations, and codes. Where the Drawings or Specifications exceed the standard set by the regulatory agencies the provisions of the Drawings and Specifications shall take precedence over said laws, codes, rules, and regulations.

B. All applicable Federal, State, and local laws, and the rules and regulations of governing utility districts and the various other authorities having jurisdiction over the construction and completion of the Project including the latest rules and regulations of the State Fire Marshall, Cal-OSHA and the State Safety Orders, and the California Labor Code shall apply to the Contract throughout, and they shall be deemed to be included in the Contract the same as though printed in these Specifications.

C. It is Contractor's responsibility to conform to all applicable Federal, State and local laws, and as well as rules and regulations regarding hazardous materials in the performance of the Façade Access Upgrade Project.

D. This Section is provided as information only. Architect is not responsible to check and ensure that the Contractor perform Work in compliance with all Federal, State, local laws, rules, and regulations.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 010600

PART 1 GENERAL

1.01 PROJECT INDENTIFICATION

A. Project Name: University of California, Hastings College of the Law
Infrastructure Improvement Projects

B. Project Location: 200 McAllister Street, San Francisco, CA 94102.

C. MK Think Project Number: 491-404

D. ITB 78-0160

E. Owner: University of California, Hastings College of the Law, 200 McAllister Street, San Francisco, CA 94102.

E. Architect: MK Think, Roundhouse One, 1500 Sansome St, San Francisco, CA 94111.

1.02 SCOPE OF WORK

A. The Work required to be performed by the Contractor consists of constructing and completing the "Project", as defined and specified in the General Conditions, in accordance with the Specifications and all applicable provisions of the Contract Documents.

B. The Work includes furnishing all labor, tools, equipment, appliances, materials, transportation, and services and in performing all operations necessary for and properly incidental to the construction and completion of the Project.

C. Work under this Contract includes:

1. Thoroughly examine Specifications, site of Work and conditions under which all Work will be performed before submitting a proposal. Area cannot be worked, waterproofed, repaired, or installed with products as specified shall be brought to the Owner’s and Architect’s attention immediately in writing. No changes to this Specification will be accepted.

   a. Starting of Work without notification of unacceptable conditions will be considered acceptance of such conditions by Contractor.

   b. The Contractor shall replace unsatisfactory Work caused by improper installation of Work including its preparation procedure and other related procedures, or defective Work materials, as directed by the Architect at no additional cost.

2. Pre-document the (E) conditions of the Work areas, including the (E) cement plaster wall, windows, louvers, mechanical units, utility pipes, conduits, and affected interior unit/space prior to the Façade Access Anchor replacement work.

3. Carefully cut and dispose of the (E) Façade Access Anchors above the roofing or provide suggested alternative design to render (E) Façade Access Anchors unusable.

4. Carefully remove and dispose of the (E) cement plaster finish and associated accessories (metal lath, J–mold, corner–aid, wire-ties, weep screed, etc.) around the proposed Façade Access Anchors penetrations through the penthouse walls. Peel back (E) weather resistive barrier (WRB/Building Paper) for the tie-on with (N) self adhered membrane (SAM) with primer as required by the manufacturer. Include a layer of sacrificial building paper between SAM and cement plaster finish.

5. Install (N) Façade Access Anchors per Structural and Façade Access Drawings on to structural deck and structural walls of penthouse.

6. Detail around (N) Façade Access Anchors per Architectural Drawings on the roofing and cement plaster finish. Seal around each window washer anchorage penetration through the penthouse with backer rod and sealant. Patch roofing and cement plaster as needed (See Allowances).

7. Provide (N) elastomeric coating on wall panels of (E) penthouse where cement plaster was patched from cement plaster control joint to control joint to match (E).

8. Install (N) emergency generator.

9. Install (N) transfer switches (2)

10. Provide and install: transformers, switchgear & panels, cabling, branch wiring, power to equipment, fire pump recon., elevator recon., HVAC recon., rework power to wall/floor outlets, power to window washing receptacles.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 011000

PART 1 GENERAL

1.01 ACCESS TO SITE AND USE OF PREMISES

A. The Contractor shall confine his operations at the site to only those indicated areas necessary to perform the Work. Work zone limits may be established by the Owner.

B. All access to building interiors must be arranged through the Owner or Owner's Representative. Cooperate with Owner to minimize conflicts and facilitate Owner usage. Keep driveways and entrances serving premises clear and available to Owner and Owner's Representative.

1.02 PROTECTION

A. Maintain existing building in a weather tight condition throughout construction period.

B. Protect building and its occupants during construction period. Utmost consideration must be given to Owner.

1.03 WORK RESTRICTIONS

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

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

B. Hours of Work shall be limited to 7:00 AM to 5:00 PM, Monday to Friday only.

C. Noise caused by Work cannot occur prior to 8:00 AM, unless otherwise permitted by the Owner. The Use of personal stereos is prohibited anywhere in or around buildings.

D. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor air intakes.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 011400

PART 1 GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to the Contractor. Materials and equipment specified in the Contract Documents by allowances include installation. If necessary, additional requirements will be issued by Change Order.

2. Types of allowances include the following:

a. Lump-sum allowances.

b. Unit-cost allowances.

c. Quantity allowances.

d. Contingency allowances.

e. Testing and inspecting allowances.

1.02 SELECTION AND PURCHASE: At earliest date after Contract award, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

1.03 SUBMITTALS

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

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

C. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

D. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.04 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.05 UNUSED MATERIALS: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted. If requested by Architect, prepare and deliver unused material to Owner's storage space when it is not economically practical to return the material for credit. Otherwise, disposal of unused material is Contractor's responsibility.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 EXAMINATION: Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to Manufacturer for replacement.

3.02 PREPARATION: 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.

3.03 SCHEDULE OF ALLOWANCES: Allowance quantities are as specified in the Bid Form, hereby incorporated as part of this Specification.

END OF SECTION 012100

PART 1 GENERAL

1.01 DEFINITIONS: Alternates are amount stated on the Bid Form for certain defined Work that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

A. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate the alternate into the Work. No other adjustments are made to the Contract Sum.

1.02 PROCEDURES: Modify or adjust affected adjacent Work as necessary to completely integrate Work of the alternate into Project. Include as part of each alternates, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate. Execute accepted alternates under the same conditions as other Work of the Contract.

1.03 SUBMISSION REQUIREMENTS: Submit alternatives identifying the effect on adjacent or related components.Alternatives quoted on Bid Forms will be reviewed and accepted or rejected at the Owner's option. Accepted alternatives will be identified in the Owner-Contractor Agreement.

1.04 SCHEDULE OF ALTERNATES: Alternates are as specified in the Bid Form hereby incorporated as part of this Specification.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 012300

PART 1 GENERAL

1.01 MINOR CHANGES IN THE WORK: Architect will issue supplemental instructions authorizing Minor Changes in the Work on AIA Document G710.

1.02 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work.

B. Contractor-Initiated Proposals: Contractor may propose changes by submitting a request for a change to Architect. Include a statement outlining reasons for the change.

C. Submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change. Include quantities of products and unit costs, labor, total amount of purchases and credits to be made, overhead, profit, taxes, insurance and bonds, delivery charges, equipment, trade discounts, updated Contractor's Construction Schedule. Use available total float before requesting an extension of the Contract Time. Comply with requirements in Section 016000 - “Product Requirements” and Section 013200 “Construction Progress Documentation”.

D. Proposal Request Form: Use AIA Document G709 for Proposal Requests. Use AIA Document G701 for Change Order proposals. Sample copy is included in Section 009000 - “Addenda and Modifications”.

1.03 ALLOWANCES

A. Allowance Adjustment: Base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. Include installation costs in purchase amount only. Submit substantiation of a change in Scope of Work related to unit-cost allowances. Owner reserves the right to establish the quantity of Work-In-Place.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents. Submit claims within twenty-one (21) days of receipt of the Change Order or Construction Change Directive authorizing Work to proceed. Owner will reject claims submitted later than allowable days. Do not include indirect expense in the Change Order cost amount unless the nature or extent of Work has changed from what could have been foreseen from the Contract Documents. No change to Contractor's indirect expense is permitted within the same scope and nature as originally indicated.

1.04 CHANGE ORDER PROCEDURES

A. Owner-Initiated Proposal Requests: Upon receipt of a Proposal Request issued by the Architect, Contractor will prepare and submit an estimate for such Work within five (5) working days.

B. Stipulated Sum/Price Change Order: Based on Proposal Request or Notice of Change and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by Architect.

C. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in the Contract Conditions. Architect will determine the change allowable in Contract Sum/Price and Contract Time.

D. Maintain detailed records of Work done on percentage of completion basis, documented on the Drawings and with appropriate backup material. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

E. AIA Document G701 Change Order: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

1.05 CONSTRUCTION CHANGE DIRECTIVE: Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714, which instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Maintain detailed records on a time and material basis of Work. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.06 DOCUMENTATION OF CHANGE IN CONTRACT SUM/PRICE AND CONTRACT TIME: Maintain detailed records of Work done on a time and material and unit cost basis. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the Work. Document each quotation for a change in cost or time with sufficient data to allow evaluation of the quotation. Include date of claim, dates and times Work was performed, wage rates paid, receipts for products, equipment.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 012500

PART 1 GENERAL

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

1.02 PROCEDURES

A. Include all necessary material, plus cost for delivery, preparation, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: Refer to individual Specification Sections for Work that requires establishment of unit prices.

C. Owner reserves the right to reject Contractor's measurement of Work-In-Place that involves use of established unit prices and to have this Work measured by independent survey.

D. List of Unit Prices: Refer to Bid Form, hereby incorporated as part of this Specification.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 012700

PART 1 GENERAL

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

1.02 SCHEDULE OF VALUES:

A. Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including Application for Payment forms with Continuation Sheets.

1. Submit the Schedule of Values to the Architect, Owner and/or other persons/entities requested by the Owner, no later than seven (7) days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items. Include Project identification: Name, address, Project number, submittal date, Contractor's name and address.

1. Schedule of Values shall indicate Specification Section and Change Orders (numbers), and dollar value (Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total one hundred percent (100%)).

2. Provide a breakdown of the Contract Sum to facilitate continued evaluation of Applications for Payment and progress reports. Round amounts to nearest whole dollar, total shall equal the Contract Sum.

3. Provide a separate line item for: (1) Each part of the Work where materials purchased or fabricated and stored. Include evidence of insurance or bonded warehousing for storage if required; (2) Initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work; (3) Each allowance; and (4) Total cost and proportionate share of general overhead and profit for each item.

4. Update and resubmit the Schedule of Values before the next Applications for Payment to reflect any changes.

1.03 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous certified and paid applications and payments. The date for each progress payment and the period of Work covered by each payment are indicated in the Agreement between Owner and Contractor.

B. Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.

C. Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

D. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Submit three (3) signed and notarized original copies of each Application for Payment to the Architect. One (1) copy shall include lien releases and waivers and similar attachments, as required by Contract Documents.

F. Submit each Application for Payment with waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment. Submit partial waivers on each item for amount requested, before deduction for retainage, on each item. When an application shows completion of an item, submit final or full waivers. Owner reserves the right to designate which entities involved in the Work must submit waivers. Submit waivers of lien on forms, executed in a manner acceptable to Owner.

G. Administrative actions and submittals that must precede with submittal of first Application for Payment include: (1) List of subcontractors; (2) Schedule of Values; (3) Contractor's Construction Schedule; (4) Products list; (5) Schedule of unit prices; (6) List of Contractor's principal consultants; (7) Copies of building permits; (8) Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work; (9) Certificates of insurance and insurance policies; (10) Performance and payment bonds; and (11) Data needed to acquire Owner's insurance.

H. After issuing the Certificate of Substantial Completion, submit an Application for Payment showing one hundred percent (100%) completion for portion of the Work claimed as substantially complete. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

I. Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following: (1) Evidence of completion of Project closeout requirements; (2) Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid; (3) Updated final statement, accounting for final changes to the Contract Sum; (4) AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims"; (5) AIA Document G706A, "Contractor's Affidavit of Release of Liens"; (6) AIA Document G707, "Consent of Surety to Final Payment"; (7) Evidence that claims have been settled; (8) Final, liquidated damages settlement statement.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 012900

PART 1 GENERAL

1.01 COORDINATION

A. Coordinate construction operations included in various Sections of the Specifications to ensure efficient, maximum accessibility, and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, which depend on each other for proper installation, connection, and operation. If necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination.

B. Coordinate scheduling and timing of required administrative procedures to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include: (1) Preparation of Contractor's Construction Schedule; (2) Preparation of the Schedule of Values; (3) Installation and removal of temporary facilities and controls; (4) Delivery and processing of submittals; (5) Progress meetings; (6) Pre-Installation conferences; (7) Project closeout activities.

C. Coordinate with the Building Engineer and the Owner to ensure that proper utilities are in place for the operation of equipment used in the Work. Contractor shall be responsible for design, construction and operation of modifications to the building utilities as required for a successful installation.

D. Coordinate completion and clean up of Work of separate Sections in preparation for Substantial Completion; and access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.02 SUBMITTALS: Submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities and telephone numbers

1.03 PROJECT MEETING: Schedule and conduct meetings and conferences.

A. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.

B. Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned within three (3) days of the meeting.

C. Architect will schedule a pre-construction conference before starting construction. Agenda for pre-construction conference includes:

(1) Designation of responsible personnel;
(2) Execution of Owner-Contractor Agreement;
(3) Submission of executed bonds and insurance certificates;
(4) Distribution of Contract Documents;
(5) Preparation of Record Documents;
(6) Construction schedule;
(7) Phasing;
(8) Critical Work sequencing;
(9) Procedures for processing field decisions and Change Orders;
(10) Procedures for processing Applications for Payment;
(11) Submittal procedures;
(12) Use of the premises;
(13) Owner's requirements and continuing occupancy during construction;
(14) Responsibility for temporary facilities and controls;

(15) Parking availability;
(16) Office, Work, and storage areas;
(17) Equipment deliveries and priorities;
(18) First aid;
(19) Security;
(20) Progress cleaning;
(21) Working hours; and
(22) Closeout procedures.

D. Conduct a Pre-Installation Conference at Project site before each construction activity and each mock-up activity that requires coordination with other construction. Do not proceed with installation if the conference cannot be successfully concluded. Agenda for Pre-Installation Conference includes:

(1) Related Change Orders;
(2) Deliveries;
(3) Submittals;
(4) Review of mock-ups;
(5) Possible conflicts;
(6) Compatibility problems;
(7) Time schedules;
(8) Weather limitations;
(9) Manufacturer's written recommendations;
(10) Warranty requirements;
(11) Acceptability of substrates;
(12) Temporary facilities and controls;
(13) Space and access limitations;
(14) Regulations of authorities having jurisdiction;
(15) Testing and inspecting requirements;
(16) Required performance results; and
(17) Protection of construction and personnel.

E. Conduct progress meetings at regular intervals. Agenda for progress meeting includes:

(1) Review minutes of previous meetings;
(2) Review of Work progress;
(3) Field observations, problems, and decisions;
(4) Identification of problems that impede planned progress;
(5) Review of submittals schedule and status of submittals;
(6) Maintenance and review of the current Contractor's Construction Schedule;
(7) Corrective measures to regain projected schedules;
(8) Maintenance of quality, Work standards, and progress cleaning;
(9) Effect of any proposed changes on schedule and coordination;
(10) Deliveries, access, and site utilization;
(11) Temporary facilities and controls;
(12) Work hours; and
(13) Hazards and risks.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 013100

PART 1 GENERAL

1.01 SUBMITTALS

A. Preliminary Construction Schedule: Submit two (2) printed copies within seven (7) days of date established for commencement of the Work.

B. Contractor's Construction Schedule: Submit two (2) printed copies of schedule to show entire schedule for entire construction period. Submit within thirty (30) days of date established for the Notice to Proceed.

C. Field Condition Reports: Submit two (2) copies at time of discovery of differing conditions.

D. Special Reports: Submit two (2) copies at time of unusual event.

E. Distribute copies of approved schedule to Architect, Owner, and related parties.

1.02 COORDINATION: Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, payment requests, and other required schedules and reports. Secure time commitments for performing the Work from parties involved. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 PRODUCTS

2.01 CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.

B. Treat each separate area or each installation/application Work as a separate numbered activity for each principal element of the Work. Include procurement process activities for long lead items as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

C. Include review times indicated in Section 013300 "Submittal Procedures" in schedule.

D. Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

E. Include constraints as follows in schedule, and show how the sequence of the Work is affected: (1) Work by Owner; (2) Products ordered in advance; (3) Owner-Furnished Products; (4) Work Restrictions; and (5) Work Stages, that include subcontract awards, submittals, purchases, mock-ups, sample testing, deliveries, and installation.

F. Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

G. For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis to demonstrate the effect of the proposed change on the overall Project schedule.

2.02 PRELIMINARY CONSTRUCTION SCHEDULE: Submit preliminary horizontal bar-chart-type construction schedule. Indicate each significant construction activity separately.

2.03 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a Gantt-chart-type, Contractor's Construction Schedule. Indicate each significant construction activity separately. Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities.

B. Submit updated schedule with each Application for Payment to reflect actual construction progress and activities. Update and resubmit schedule for every Change Order and Construction Change Directive.

2.04 FIELD CONDITION REPORTS: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare a detailed report. Submit with a Request For Information (RFI). Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.05 SPECIAL REPORTS: Submit special reports directly to Owner within one (1) day of an occurrence. Distribute copies of report to parties affected by the occurrence. When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 EXECUTION

Not Used

END OF SECTION 013200

PART 1 GENERAL

1.01 SUMMARY: This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous Submittals.

1.02 DEFINITIONS

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

B. Informational Submittals: Written information that does not require Architect's approval.

1.03 SUBMITTAL PROCEDURES

A. Transmit each Submittal with cover sheet. Apply Contractor's stamp, signed or initialed, certifying that review, verification of Products required, field dimensions, and coordination of information are in accordance with the requirements of Contract Documents.

B. Allow enough time for Submittal review and re-Submittals. Time for review shall commence on Architect's receipt of Submittal. Architect reserves the right to withhold action on a Submittal requiring coordination with other Submittals until related Submittals are received.

1. Allow fifteen (15) days for initial review of each Submittal. Allow additional time if processing must be delayed to permit coordination with subsequent Submittals. Architect will advise Contractor when a Submittal being processed must be delayed for coordination.

2. Allow twenty-one (21) days for initial review of each item that requires concurrent review by Architect's consultants, Owner, or other parties.

C. Place title block on each Submittal for identification. Indicate name of firm which prepared each Submittal on title block. Include Project name, date, name and address of Contractor, subcontractor, supplier, Manufacturer, Number and title of appropriate Specification Section, and each product name and title, including model number and other identifications.

D. Provide a minimum 4-inches by 5-inches space beside title block to record Contractor's review and approval markings and action taken by Architect. Use only final Submittals with mark indicating action taken by Architect in connection with construction.

E. Transmit each Submittal using a separate sheet transmittal form. Architect will return Submittals, without review from sources other than Contractor.

PART 2 PRODUCTS

2.01 ACTION SUBMITTALS

A. Submit four (4) copies of each Submittal. Architect will return two (2) copies to the Contractor and one (1) copy to the Owner. Retain one (1) returned copy as a Project Record Document.

B. Product Data: Collect information into a single Submittal for each element of construction and type of product. If information must be specially prepared for Submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.

1. Include: (1) Manufacturer's written recommendations; (2) Manufacturer's product specifications; (3) Manufacturer's installation instructions; (4) Standard color charts; (5) Manufacturer's catalog cuts; (6) Standard product operating and maintenance manuals; (7) Compliance with recognized trade association standards and testing agency standards; and (8) Notation of coordination requirements.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data. Submit three (3) black-line prints of each submittal. Submit four (4) prints where prints are required for operation and maintenance manuals. Architect will return three (3) copies. Mark up and retain one (1) returned print as a Project Record Drawing.

1. Include: (1) Dimensions; (2) Identification of products; (3) Fabrication and installation drawings; (4) Roughing-in and setting diagrams; (5) Shop-work manufacturing instructions; (6) Schedules; (7) Design calculations; (8) Compliance with specified standards; and (9) Notation of coordination requirements and dimensions established by field measurement.

D. Comply with requirements in Section 013100 "Project Management and Coordination".

E. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work. Submit for review of kind, color, pattern, and texture.

1. Comply with requirements in Division 1 Section 014000 "Quality Requirements" for mock-ups.

2. Attach label on unexposed side that includes the following: (1) Generic description of Sample; (2) Product name or name of manufacturer; (3) Sample source.

3. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

4. Submit three (3) separate sets of Samples of each item or the number of Samples specified in individual Specification Sections. Architect will return two (2) copies. Mark up and retain one (1) returned Sample set as a Project Record Sample. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.

5. Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity.

6. Mock-ups or 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.

F. Comply with requirements in: (1) Section 013200 "Construction Progress Documentation" for Contractor's Construction Schedule; and (2) Section 012900 "Payment Procedures" for Application for Payment and Schedule of Values.

G. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design.

2.02 INFORMATIONAL SUBMITTALS

A. Submit two (2) copies of each submittal. Provide a notarized statement that includes signature of entity responsible for preparing written statement, reports, and certification.

B. Comply with requirements in: (1) Section 014000 "Quality Requirements." for Test and Inspection Reports; and (2) Section 013200 "Construction Progress Documentation." for Contractor's Construction Schedule.

C. Qualification Data: Demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.

D. Certificates, on Manufacturer's letterhead: (1) Product and Material Certificates certifying that product complies with requirements; (2) Installer Certificates certifying that Installer complies with requirements and, where required, is authorized for this specific Project; (3) Manufacturer Certificates certifying that Manufacturer complies with requirements. Include evidence of manufacturing experience where required.

E. Welding Certificates: Certifying that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

F. Reports by a qualified testing agency or Manufacturer, indicating and interpreting test results of material for compliance with requirements: (1) Material Test Reports; (2) Preconstruction Test Reports for tests performed before installation of product; (3) Compatibility Test Reports for compatibility tests performed before installation of product, include recommendations for primers and substrate preparation needed for adhesion; (4) Field Test Reports for tests performed either during installation of product or after product is installed in its final location; and (5) Product Test Reports for tests performed by Manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

G. Maintenance Data: written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section 01770 "Closeout Procedures".

H. Design Data: Written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads.

I. Manufacturer's Instructions: Written or published information that documents Manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include preparation of substrates, required substrate tolerances, sequence of installation or erection, required installation tolerances, required adjustments, and recommendations for cleaning and protection.

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

K. Material Safety Data Sheets.

PART 3 EXECUTION

3.01 CONTRACTOR'S REVIEW: Review each Submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect. Stamp each Submittal with a uniform, approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that Submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.02 ARCHITECT'S ACTION

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

B. Action Submittals: Architect will review each Submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each Submittal with an action stamp and will mark stamp appropriately to indicate action taken.

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

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

END OF SECTION 013300

PART 1 GENERAL

1.01 SUMMARY: This Section includes administrative and procedural requirements for quality assurance and quality control. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1.02 DEFINITIONS

A. Quality-Assurance Services: Services performed before and during Work execution to guard against defects and ensure that proposed construction complies with requirements.

B. Quality-Control Services: Services performed during and after Work execution to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mock-ups: Full-size, physical example assemblies to illustrate finishes and materials; to verify selections made under Sample submittals; to review construction, coordination or testing; and to establish the standard by which the Work will be judged. They are not Samples.

D. Testing Agency: An entity engaged to perform specific tests, inspections, or both.

1.03 SUBMITTALS

A. Qualification Data for testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications by a recognized authority.

B. Submit certified written reports that include: (1) Date of issue; (2) Project title and number; (3) Name, address, and telephone number of testing agency; (4) Dates and locations of tests or inspections; (5) Environmental conditions during test; (6) Description of the test and inspection method; (7) Identification of product and Specification Section; (8) Test and inspection results and state whether the Work complies with Contract Documents; (9) Name and signature of laboratory inspector.

C. Submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.04 QUALITY ASSURANCE

A. Fabricator: A firm experienced in producing products and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Manufacturer’s Representative: An authorized representative of Manufacturer who is trained and approved by Manufacturer to inspect installation of Manufacturer's products.

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

D. Manufacturer: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.

E. Professional Engineer: A professional Engineer who is legally qualified to practice in jurisdiction at Project's location and who is experienced in providing engineering services of the kind indicated.

F. Testing Agency: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.

G. Preconstruction Testing: Performed by testing agency, compliance with specified requirements for performance and test methods. Testing agency submit a certified written report of each test to Architect with copy to Contractor. Contractor responsibilities include:

1. Provide test specimens representative of proposed construction. Provide sizes and configurations of assemblies to adequately demonstrate capability of product.

2. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.

3. Fabricate and install test assemblies using installers perform the same tasks for Project.

4. When testing is completed, remove assemblies; do not reuse materials on Project.

H. Mock-ups: Install mock-ups at the site as required by individual Specifications Sections. Before installing portions of the Work requiring mock-ups, build mock-ups and comply with the following requirements:

1. Build mock-ups in location and of size indicated or as directed by Architect.

2. Notify Architect seven (7) days in advance of date when mock-ups will be constructed.

3. Demonstrate the proposed range of aesthetic effects and workmanship.

4. Obtain Architect's approval of mock-ups before starting Work, fabrication, or construction.

5. Remove and reapply / reinstall mock-ups until they are approved by Architect.

6. Maintain mock-ups undisturbed as a standard for judging the completed Work.

7. Approved mock-up may become part of the completed Work if undisturbed at time of Substantial Completion.

8. Demolish and remove mock-ups when directed, unless otherwise indicated.

9. Coordinate with other related Work.

1.05 QUALITY CONTROL

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions and workmanship, to produce Work of specified quality. Comply fully with Manufacturer's instructions, including handling, storage, application, and other steps in sequence. Should Manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

B. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship. Comply with current local, State, and Federal regulations and requirements. Perform Work with Lead Safe Practices.

C. Perform Work by persons qualified to produce workmanship of specified quality and to assure finished Work of first class quality and durability. All materials shall be applied evenly with proper film thickness and free of runs, rags, skips and other defects. All Work shall be done under favorable weather conditions and suitably protected from the weather recommended by the Manufacturer.

D. Contractor Responsibilities: Provide quality-control services specified and required by authorities having jurisdiction.

1. If indicated as Contractor's responsibility, engage a qualified testing agency to perform services. Contractor shall not employ the same entity engaged by Owner.

2. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

3. Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.

4. Provide retesting and re-inspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.

5. Notify Owner, Architect, testing agencies, and each involved party where and when the tests and inspections will be performed.

E. Owner may engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.

1.06 REFERENCES: Conform to reference standard by date of issue current on date of Construction Documents, unless specified otherwise in relevant Specification Section.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 REPAIR AND PROTECTION: On completion of testing and inspecting, repair damaged construction and restore substrates and finishes. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services. Comply with the Contract Document requirements for Section 017310 "Cutting and Patching".

END OF SECTION 014000

PART 1 GENERAL

1.01 DEFINITIONS: Basic Contract definitions are included in the Conditions of the Contract

A. "Approved": Architect's action on Contractor's submittals, applications, and requests, It is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

B. "Directed": A command by Architect. "Requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."

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

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

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

F. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, installing, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

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

H. "Installer": Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations. "Carpentry" does not imply that activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter"; and does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.

I. "Experienced": "Experienced" means having successfully completed a minimum of five (5) previous projects similar in size and scope to this Project; and having complied with requirements of authorities having jurisdiction.

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

1.02 SCHEDULE OF REFERENCES

ACI	American Concrete Institute
AGC	Associated General Contractors of America
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
CRSI	Concrete Reinforcing Steel Institute
FM	Factory Mutual System
FS	Federal Specification
ICBO	International Conference of Building Officials

NAAMM	National Association of Architectural Metal Manufacturers
NCMA	National Concrete Masonry Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SSPC	Steel Structures Painting Council
UL	Underwriters' Laboratories, Inc.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 014200

PART 1 GENERAL

1.01 USE CHARGES

A. Cost or use charges for temporary facilities are not chargeable to Owner or Architect and shall be included in the Contract Sum.

B. Water Service and Electric Power Service: Use water from Owner's existing water system and electric power without metering and without payment of use charges.

1.02 QUALITY ASSURANCE: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," NFPA 241, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

PART 2 PRODUCTS

2.01 MATERIALS: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended. Provide chain-link fencing and potable water.

2.02 EQUIPMENT: Provide mobile unit field offices, potable UL rated fire extinguishers that comply with NFPA 10 and NFPA 241, and self-contained toilet units.

PART 3 EXECUTION

3.01 INSTALLATION: Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Maintain and modify as required. Do not remove until facilities are no longer needed.

3.02 TEMPORARY UTILITY INSTALLATION

A. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use. Where outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.

B. Sanitary Facilities: Provide temporary self-contained toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.

C. Wash Facilities: Install wash facilities supplied with potable water for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.

D. Drinking-Water Facilities: Provide bottled-water, drinking-water units.

E. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner. Provide receptacle outlets, waterproof connectors, power cords adequate for connection of power tools and equipment. Provide warning signs at power outlets other than 110 to 120 V.

F. Lighting: Provide temporary lighting that provides adequate illumination for traffic conditions and for safety and security purposes.

G. Telephone Service: Provide temporary telephone service throughout construction period for common-use facilities used by all personnel engaged in construction activities. Provide a telephone and answering machine for superintendent's use in making and receiving telephone calls when away from field office.

3.03 SUPPORT FACILITIES INSTALLATION

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

B. Install signs where indicated to inform public and persons seeking entrance to Project.

C. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Provide information on destination of each type of waste material and means to be used to dispose of all waste materials. Comply with Section 017000 "Execution Requirements" for progress cleaning requirements.

D. Storage and Fabrication Sheds: Approval of on site storage shall be obtained from the Owner. All protection and security shall be the Contractor’s responsibility. The Owner cannot guaranty that the requested area will be provided and will not be responsible any related cost impact.

E. Lifts and Hoists: Provide facilities for hoisting materials and personnel.

F. Existing Elevator and Stair Usage: Use of Owner's existing elevators will be permitted, as long as stairs and elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use.

G. Parking: Utilize street parking at Contractor’s expense. Obtain city permits for exclusive on-street parking if required. Do not allow vehicle parking in existing fire lanes, loading dock, or on landscaped areas and sidewalk.

H. Scaffolding: Ensure proper permission, certification, and safety standards. Provide all scaffolding equipment, set-up, operation, maintenance, and removal. All building exits and sidewalk around the buildings must remain accessible and clear at all times. Comply with OSHA regulations.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise.

B. Before construction operations begin, install portable chain-link enclosure fence with lockable entrance gates. Prevent public, dogs, and other animals from easily entering construction areas. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

C. Comply with standards and code requirements for erecting structurally adequate barricades. Where appropriate and needed, provide lighting, including flashing red or amber lights.

D. Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.

E. Provide fire extinguishers. Comply with NFPA 241. Class A stored-pressure water-type extinguishers. Store combustible materials in containers in fire-safe locations. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Prohibit smoking in hazardous fire-exposure areas. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

F. Provide all protection necessary to protect the tenants of the building, the public, and the property, including adjacent properties, from damage as a result of the Work in this Section. Provide continuous protection of all public and private property including automobiles from damage during the Work.

3.05 OPERATION, TERMINATION, AND REMOVAL: To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses. Maintain facilities in good operating condition until removal. Remove each temporary facility when need for its service has ended. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Section 017700 "Closeout Procedures".

END OF SECTION 015000

PART 1 GENERAL

1.01 DEFINITIONS

A. Products: New material, machinery, components, equipment, fixtures, and systems forming the Work. Items purchased for incorporating into the Work and for Project. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.

1. Named Products: Identified by Manufacturer's product name, including model number listed in manufacturer's literature, which is current as of date of the Contract Documents.

2. New Products: Items that have not previously been incorporated into Project. Products salvaged or recycled from other projects are not considered new products.

3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

4. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by Manufacturer to Owner.

D. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by Manufacturer's warranty or to provide more rights for Owner.

1.02 SUBMITTALS

A. Product List: Within thirty (30) days after date of commencement of the Work, submit two (2) copies of completed product list. Include Manufacturer's name, product names, and Specification Section number and title. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule. Submit Include a written explanation for omissions of data and for variations from Contract requirements.

B. Substitution Requests: Submit two (2) copies of each request for consideration. Include Specification Section number and title and Drawing numbers and titles. Use CSI Form 13.1A or Contractor’s form similar to CSI Form. Obtain CSI Form from the Architect.

1. Include:

a. Show compliance with requirements for substitutions. Detailed comparison of significant qualities of proposed substitution with those of the Work specified.

b. Indicating why specified material or product cannot be provided.

c. Samples, Product Data, including drawings and descriptions of products and fabrication and installation procedures.

d. Material test reports and Research/evaluation reports evidencing compliance with requirements, regulations, and codes.

e. Effects on Contract Time and Contract Sum. Unit cost data of the proposed substitution.

f. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. Architect's Action: Architect may request additional information. Architect will notify Contractor of acceptance or rejection of proposed substitution within fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.

a. Form of Acceptance: Change Order.

b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

1.03 QUALITY ASSURANCE: If a dispute arises between contractors over concurrently selectable, but incompatible products, Architect will determine which products shall be used.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

B. Transport and handle products in accordance with Manufacturer's instructions. Deliver products to Project site in Manufacturer's original sealed container with labels, stock number, date of manufacturer, application instructions, and instructions for handling, storing, unpacking, protecting, and installing.

C. Store products under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation. Coordinate location with Owner. Comply with product manufacturer's written instructions for storage.

1.05 PRODUCT WARRANTIES

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

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Comply with requirements in Section 017700 "Closeout Procedures".

PART 2 PRODUCTS

2.01 PRODUCT OPTIONS

A. Provide products that comply with the Contract Documents, which are new and undamaged at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation.

2. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

3. If products accompanied by the term "as selected," Architect will make selection. If products are accompanied by the term "match sample," Sample is Architect's.

4. If products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one (1) of the products listed that complies with requirements.

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

2. Visual Selection Specification: Where Specifications include the phrase "as selected from Manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements. Architect will select color, pattern, or texture from Manufacturer's product line

3. Refer to individual Specification Sections and "Allowance" provisions in Division 1 for allowances that control product selection and for procedures required for processing such selections.

2.02 PRODUCT SUBSTITUTIONS

A. Architect will consider requests for substitution if received within sixty (60) days after the Notice to Proceed. Requests received after that time may be considered or rejected.

B. If the following conditions are not satisfied, Architect will return requests without action:

1. When a specified product becomes unavailable through no fault of the Contractor.

2. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional Owner’s responsibilities of compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

3. Requested substitution: (1) Does not require extensive revisions to the Contract Documents; (2) Is consistent with the Contract Documents and will produce indicated results; (3) Will not adversely affect Contractor's Construction Schedule; (4) Has received necessary approvals of authorities having jurisdiction; (5) Has been coordinated with other portions of the Work; and (6) Provides specified warranty.

4. Substitution request is fully documented and properly submitted.

C. A request for substitution constitutes a representation that the Contractor: (1) Has determined that it meets or exceeds the quality level of the specified product; (2) Will provide the same warranty for the Substitution as for the specified product; (3) Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner; and (4) Waives claims for additional costs or time extension, which may subsequently become apparent.

D. Substitutions will not be considered when the proposed substitution does not serve the best interest of the Owner in the opinion of the Architect.

2.03 COMPARABLE PRODUCTS: Submit with the following, in addition to other required submittals:

A. 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.

B. Detailed comparison of significant qualities of proposed product with those named in the Specifications.

C. Evidence that proposed product provides specified warranty.

D. Samples, if requested.

PART 3 EXECUTION

Not Used

END OF SECTION 016000

PART 1 GENERAL

1.01 SUBMITTALS: For professional engineer, submit Qualification Data to demonstrate their capabilities and experience.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 EXAMINATION

A. The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning Work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

B. Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Do not interrupt utilities serving facilities occupied by Owner or occupants unless approved by the Owner with written permission. Notify Owner not less than two (2) days in advance of proposed utility interruptions.

B. Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication.

C. Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.03 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated. Make vertical Work plumb and make horizontal Work level. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

B. Comply with Manufacturer's written instructions and recommendations for installing products in applications indicated. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

C. Do not use tools or equipment that produce harmful noise levels. Do not use products, cleaners, and installation materials that are considered hazardous.

D. Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work. Allow for building movement, including thermal expansion and contraction. Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

3.04 PROGRESS CLEANING

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

B. Do not hold materials more than seven (7) days during normal weather or three (3) days if the temperature is expected to rise above 80 deg F.

C. Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work. Remove liquid spills promptly. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

D. Keep installed Work clean. Clean installed and exposed surfaces according to written instructions of Manufacturer or Fabricator of product installed, using recommended cleaning materials that are not hazardous to health or property. Remove debris from concealed spaces before enclosing the space.

E. Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

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

3.05 PROTECTION OF INSTALLED CONSTRUCTION: Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion. Comply with Manufacturer's written instructions for temperature and relative humidity.

3.06 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Comply with requirements in Section 017310 "Cutting and Patching".

B. Restore permanent facilities used during construction to their specified condition. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017000

PART 1 GENERAL

1.01 DEFINITIONS

A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair Work required to restore surfaces to original conditions after installation of other Work.

1.02 SUBMITTALS: Coordinate procedures at least ten (10) days before the time cutting and patching will be performed, requesting approval to proceed.

A. Include in Cutting and Patching Proposal: (1) Describe area or locations scheduled for Work; (2) Describe anticipated Changes, if any; (3) Indicate when cutting and patching will be performed; (4) List utilities that cutting and patching procedures will disturb or affect; (5) Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure. Coordinate Work with Architect; (6) List products to be used and firms or entities that will perform the Work.

B. Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory Work.

1.03 QUALITY ASSURANCE

A. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio. Do not cut and patch the operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. The elements include:

1. Water, moisture, or vapor barriers.

2. Membranes and flashings.

3. Exterior curtain-wall construction.

4. Equipment supports.

5. Piping, ductwork, vessels, and equipment.

6. Noise- and vibration-control elements and systems.

B. Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

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

PART 2 PRODUCTS

2.01 MATERIALS: Comply with requirements specified in other Sections of these Specifications. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.

PART 3 EXECUTION

3.01 EXAMINATION: Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed. Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.02 PREPARATION: Provide temporary support of Work to be cut. Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for exposed portions during cutting and patching operations. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.03 PERFORMANCE

A. Employ skilled workers to perform cutting and patching. Cut existing construction for installation of other components or performance of other construction, and subsequently patch to restore surfaces to their original condition.

B. Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction.

1. Use hand or small power tools designed for sawing and 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. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

3. Concrete Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.

4. Proceed with patching after construction operations requiring cutting are complete.

C. Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.

1. Test and inspect patched areas after completion to demonstrate integrity of 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. Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

4. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

5. Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.

6. Patch components in a manner that restores enclosure to a weathertight condition.

D. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 017310

PART 1 GENERAL

1.01 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and re-installed.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and re-install them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and re-installed.

1.02 MATERIALS OWNERSHIP: Except for items or materials indicated to be reused, salvaged, re-installed, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

1.03 SUBMITTALS

A. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience.

B. Submit statement that indicates the measures proposed for dust-control and noise-control. After selective demolition is complete, submit a list of items that have been removed and salvaged. Schedule of Selective Demolition Activities, indicate:

1. Detailed sequence of selective demolition and removal Work, with starting and ending dates for each activity.

2. Interruption of utility services.

3. Coordination for shutoff, capping, and continuation of utility services.

4. Use of elevator and stairs.

5. Locations of temporary partitions and means of egress, including for other tenants affected by selective demolition operations.

6. Coordination of Owner's continuing occupancy of portions of existing building.

1.04 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction. Comply with ANSI A10.6 and NFPA 241.

C. Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination". Review methods and procedures related to selective demolition, Include: (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 (4) Review requirements of Work performed by other trades that rely on substrates exposed by selective demolition operations.

1.05 PROJECT CONDITIONS: Conduct selective demolition so Owner's operations will not be disrupted. Provide not less than seventy-two (72) hours' notice to Owner of activities that will affect Owner's operations. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct without written permission from the Owner. Owner assumes no responsibility for condition of areas to be selectively demolished. Storage or sale of removed items or materials on-site will not be permitted.

A. Hazardous materials are present in building to be selectively demolished. Examine report on the presence of hazardous materials and to become aware of locations where hazardous materials are present. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

1.06 WARRANTY: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. If possible, retain original Installer or fabricator to patch the exposed Work that is damaged during selective demolition.

PART 2 PRODUCTS

2.01 REPAIR MATERIALS: Use repair materials identical to existing materials. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible. Use materials whose installed performance equals or surpasses that of existing materials. Comply with material and installation requirements specified in individual Specification Sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Survey existing conditions, utilities to be disconnected and capped, and conditions correlate with requirements indicated to determine extent of selective demolition required. Inventory and record the condition of items to be removed and re-installed, and removed and salvaged.

B. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the extent of conflict. Promptly submit a written report to Architect. Engage a Professional Engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of structure or adjacent structures. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.02 UTILITY SERVICES: Do not interrupt services indicated to remain and protect them against damage during selective demolition operations unless authorized in writing by Owner and authorities having jurisdiction. Provide at least seventy-two (72) hours' notice to Owner if shutdown is required. Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished. Arrange to shut off indicated utilities with utility companies.

3.03 PREPARATION

A. Dangerous Materials: Drain, purge, or otherwise remove, collect, and legally dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

B. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Protect existing site improvements, appurtenances, and landscaping to remain.

C. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain. Provide temporary weather protection to prevent water leakage and damage to structure and interior areas. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.

D. Provide and maintain shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

3.04 POLLUTION CONTROLS

A. Comply with governing environmental-protection regulations for dust-control. Do not use water when it may damage existing construction. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas. Use chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. 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.

3.05 SELECTIVE DEMOLITION

A. Demolish and remove existing construction only within the indicated extent. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations of each floor before disturbing the next lower level.

B. Neatly cut openings and holes plumb, square, and true to dimensions required. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces. Temporarily cover openings to remain.

C. 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. Maintain adequate ventilation when using cutting torches.

D. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.

E. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

F. Comply with Building Manager's requirements for using and protecting elevators, stairs, walkways, loading docks, building entries, and other building facilities during selective demolition operations.

G. Removed and Salvaged Items: Comply with the following: (1) Clean salvaged items; (2) Pack or crate items after cleaning. Identify contents of containers; (3) Store items in a secure area until delivery to Owner; (4) Transport items to Owner's storage area designated by Owner; and (5) Protect items from damage during transport and storage.

H. Removed and Re-installed Items: Comply with the following: (1) Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment; (2) Pack or crate items after cleaning and repairing. Identify contents of containers; (3) Protect items from damage during transport and storage; and (4) Re-install items in locations indicated. Comply with installation requirements for new materials and equipment.

I. Existing Items to Remain: Protect construction indicated to remain, clean items, and reinstalled in their original locations after selective demolition operations are complete. Comply with installation requirements for existing items.

J. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.

K. Roofing: Remove no more existing roofing than can be covered in one (1) day by new roofing. Refer to applicable Division 7 Section for new roofing requirements.

3.06 PATCHING AND REPAIRS

A. Comply with Section 017310 "Cutting and Patching." Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

B. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to Manufacturer's written recommendations. Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

C. Where walls that are demolished extend one (1) finished area into another, patch and repair surfaces in the new space. Provide an even surface of uniform finish color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials. Comply with installation requirements specified in other Specifications Sections.

D. Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces. Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

E. Test and inspect patched areas after completion to demonstrate integrity of installation.

3.07 DISPOSAL OF DEMOLISHED MATERIALS: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site. Do not burn demolished materials without permission from the Owner. If burning is allowed, provide full-time monitoring for burning materials until fires are extinguished. Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION 017320

PART 1 GENERAL

1.01 FORM OF SUBMITTALS: Bind in 8-1/2 x 11 inch D-side 3-ring binders with durable plastic covers. Identify each binder with typed or printed title WARRANTIES with title of Project; name, address and telephone number of Contractor; and name of responsible company principal. Separate each warranty with index tab sheets. Provide full information, using separate typed sheets as necessary. List Subcontractor, Supplier, and Manufacturer, with name, address, and telephone number of responsible principal.

1.02 PREPARATION OF SUBMITTALS: Obtain warranties executed in duplicate by responsible Subcontractors, suppliers, and manufacturers. Warranties should be obtained within ten (10) days of the completion of a task, but they should not be dated until the Date of Substantial completion is determined. Verify that documents are in proper form, contain full information, and are notarized. Co-execute submittals when required. Retain warranties until time specified for submittal.

1.03 TIME OF SUBMITTALS: Make other Submittals within ten (10) days after Date of Substantial Completion, prior to final Application for Payment. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten (10) days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 017400

PART 1 GENERAL

1.01 SUBSTANTIAL COMPLETION

A. Before requesting inspection for determining date of Substantial Completion, complete the following.

1. Prepare a list of items to be completed and corrected (punch list).

2. Advise Owner of pending insurance changeover requirements.

3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

4. Prepare and submit Project Record Documents, operation and maintenance manuals.

5. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with Manufacturer's name and model number where applicable.

6. Complete final cleaning requirements, including paint touchup, repair, and restore marred exposed finishes to eliminate visual defects.

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

1.02 FINAL COMPLETION

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect review. Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures" and for identifying total adjusted Contract Sum, previous payments, and sum remaining due.

2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect.

3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

4. Instruct Owner's personnel in operation, adjustment, and maintenance of products.

5. Provide submittals to Architect that are required by governing or other authorities or this Specification.

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

1.03 LIST OF INCOMPLETE ITEMS (PUNCH LIST): Architect will prepare punch lists for the Project. Contractor shall schedule with the Architect for each punch listing. Contractor shall notify the Architect at least fourteen (14) days in advance of the date for conducting each punch list.

A. Scaffolding, rigs (swing stages), or devices necessary for Architect to conduct punch list shall remain in use until the completion of punch listing, completion of correction for the punched items, completion of re-checking for punched items by the Architect, and as well as final punch listing.

1.04 PROJECT RECORD DOCUMENTS

A. Comply with requirements stated in Section 017810 Project Record Documents. Maintain on site, one (1) set of all the record documents; record actual revisions to the Work.

B. Record Specifications: Submit one (1) copy of Project's Specifications, including addenda and contract modifications. Mark copy to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

C. Record Drawings: Maintain and submit one (1) set of Contract Drawings and Shop Drawings. Mark Record Prints to show the actual installation where installation varies from that shown originally.

D. Record Product Data: Submit one (1) copy of each Product Data submittal. Mark one (1) set to indicate the actual product installation where installation varies substantially from that indicated in Product Data.

E. Miscellaneous Record Submittals: Records required by other Specification Sections and submittal in connection with actual performance of the Work.

1.05 OPERATION AND MAINTENANCE MANUALS: Assemble a complete set of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

A. Include (1) Manufacturer's information, including list of spare parts; (2) Name, address, and telephone number of Installer or supplier; (3) Maintenance procedures; (4) Maintenance and service schedules; (5) Maintenance record forms; (6) Copies of maintenance service agreements; (7) Copies of warranties and bonds; and (8) Identify each binder with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.

1.06 WARRANTIES: Comply with requirements stated in Section 017400 “Warranty Submittals.” Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 PRODUCTS

2.01 MATERIALS: For progress and final cleaning, use cleaning materials and agents recommended by Manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 EXECUTION

3.01 DEMONSTRATION AND TRAINING: Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system. Schedule training with Owner, through Architect, with at least seven (7) days' advance notice.

3.02 FINAL CLEANING: Provide final cleaning prior to final inspection. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations. Employ experienced workers or professional cleaners for final cleaning. Comply with Manufacturer's written instructions.

A. Complete the following cleaning operations, whichever is applicable, before requesting inspection for certification of Substantial Completion:

1. Clean Project site, yard, and grounds, in areas disturbed by construction activities.

2. Clean exterior surfaces exposed to view; remove temporary tapes, stains and foreign substances affected by the Work.

3. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

4. Remove tools, construction equipment, machinery, and surplus material from Project site.

5. Clean exposed 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.

6. Remove debris and surface dust from limited access spaces.

7. Sweep concrete floors broom clean in unoccupied spaces.

8. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.

9. Clean transparent materials, including mirrors and glass in doors and windows. Replace chipped or broken glass and other damaged transparent materials.

10. Remove labels that are not permanent.

11. Touch-up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

12. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.

B. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

PART 1 GENERAL

1.01 SUBMITTALS: Contractor to submit three (3) copies of: (1) Record Drawings sets of marked-up Record Prints. Contractor will initial and date each print and mark whether general scope of changes, additional information recorded; (2) Record Specifications of Project's Specifications, including addenda and contract modifications; and (3) Record Product Data of each Product Data submittal.

PART 2 PRODUCTS

2.01 RECORD DRAWINGS

A. Record Prints: Maintain the Contract Drawings and Shop Drawings. Mark Record Prints to show the actual installation where installation varies from that shown originally. Use other colors to distinguish between changes for different categories of the Work at the same location. If Shop Drawings are marked, show cross-reference on the Contract Drawings. Accurately record information in an understandable drawing technique.

B. Include: (1) Dimensional changes to Drawings; (2) Revisions to details shown on Drawings; (3) Changes made by Change Order or Construction Change Directive; (4) Changes made following Architect's written orders; (5) Details not on the original Contract Drawings; (6) Field records for variable and concealed conditions; and (7) Record information on the Work that is shown only schematically.

C. Prepare new Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation. Integrate newly prepared Record Drawings into Record Drawing sets.

D. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

2.02 RECORD SPECIFICATIONS: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications. Record the name and model number of products, including substitutions and product options selected, name of Manufacturer, Supplier, Installer, and other information necessary to provide a record of selections made. Note related Change Orders, Record Drawings, and Product Data where applicable.

2.03 RECORD PRODUCT DATA: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal. Include significant changes in the product delivered to Project site and changes in Manufacturer's written instructions for installation. Note related Change Orders, Record Drawings, and Product Data where applicable.

2.04 MISCELLANEOUS RECORD SUBMITTALS: Records required by other Specification Sections and submittal in connection with actual performance of the Work.

PART 3 EXECUTION

3.01 RECORDING AND MAINTENANCE: Post modifications to Project Record Documents as they occur. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order, clean, and legible condition. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 017810

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies cast-in-place concrete at the following locations:

1. Patching at new window washing anchors.

B. Section Includes:

1. Concrete reinforcement.

2. Concrete curing.

C. Provide all labor, materials, tools, equipment, transportation, and services necessary for, or incidental to the execution of the concrete work and related items as shown on the Drawings, specified herein, and as identified by the Architect/Engineer in the field.

1.03 REFERENCE STANDARDS

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; American Concrete Institute International; 2010.

B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2002).

C. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete; American Concrete Institute International; 1998 (Reapproved 2004).

D. ACI 301 - Specifications for Structural Concrete; American Concrete Institute International; 2010.

E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.

F. ACI 308R - Guide to Curing Concrete; American Concrete Institute International; 2001 (Reapproved 2008).

G. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2011.

H. ACI 347 - Guide to Formwork for Concrete; American Concrete Institute International; 2004.

I. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.

J. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Billet-Steel Bars for Concrete Reinforcement; 2012.

K. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.

L. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2012a.

M. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2013.

N. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.

O. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.

P. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2012.

Q. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

R. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete; 2009.

S. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.

T. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2012.

U. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2011.

V. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2013.

W. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures; 2012.

1.04 SUBMITTALS

A. General: Prepare and submit specified submittals in accordance with "Conditions of the Contract" and Division 1 Submittals Sections.

B. Product Data: Include material descriptions, chemical composition, physical properties, test data, and mixing and application instructions. Include Manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties.

1. Material List: An inclusive list of required materials. Indicate each material and cross-reference the specific material, finish system, and application. Identify each material by Manufacturer's catalog number and general classification.

2. Manufacturer's Information: Technical information including label analysis and instructions for handling, storing, and applying each material.

3. Include Material Safety Data Sheets, if applicable.

C. Mix Design: Submit proposed concrete mix design.

D. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:

1. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

a. Concrete materials.

b. Reinforcing materials.

c. Admixtures.

E. Submit Qualification Data of firms and persons specified in the “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information.

F. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

G. Warranty: Submit manufacturer warranty and ensure forms have been completed in UC Hastings’ name and registered with Manufacturer.

1.05 QUALITY ASSURANCE

A. Perform Work of this Section in accordance with ACI 301 and ACI 318.

B. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

C. Maintain one (1) copy of each document on site.

D. Installer Qualifications: An experienced installer who has completed concrete work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1. Company specializing in performing the Work of this Section with minimum five (5) years of experience.

2. Workers: Thoroughly skilled and specially trained in the techniques applying specified products and materials. Applicators shall be able to demonstrate acceptable level of skill for review and acceptance by the Architect.

E. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the Work of this Section.

F. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

G. Source Limitations: Obtain each type of cement of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

H. All Work shall be subject to acceptance by the Owner and Architect. All Work that does not comply with the intent of the Specifications shall be corrected by the Contractor.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in Manufacturer's original and unopened containers, labeled with type and name of products and manufacturers, and bearing labels include the following information:

1. Manufacturer's brand name and stock number.

2. Product name or title of material.

3. Directions for storage and handling instructions and precautions.

4. Date of manufacture and shelf life.

5. Mixing and application instructions.

6. VOC content.

B. Comply with Manufacturer's written instructions for minimum and maximum temperature requirements and other conditions for storage.

C. Store materials in a clean, dry location protected from exposure to direct sunlight. In storage areas, maintain environmental conditions within range recommended in writing by Manufacturer.

D. Store cementitious materials off the ground, under cover, and in a dry location.

E. Store aggregates, covered and in a dry location, where grading and other required characteristics can be maintained and contamination avoided.

F. Environmental requirements: Proceed with Work of this Section only when existing and forecasted weather conditions will permit the application to be performed in accordance with the Manufacturer's recommendations.

G. Safety: Refer to all applicable data, including, but not limited to MSDS sheets, PDS sheets, Product labels, specific instructions for specific personal protection requirements.

H. Remove all materials, including cloths, tarps, and empty containers from the area of Work at the close of each day.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable Federal, State, and local regulatory requirements including flame and smoke rating requirements for finishes.

B. Flammable Liquids serve all current regulation regarding flammable liquids such as posting “No Smoking” signs. Allow no open flames, welding, or other ignition sources in the Work.

C. Conform to all applicable laws, codes, and regulations for disposal of all materials, debris, and containers.

1.08 COORDINATION

A. Coordinate the Work of this Section with interfacing and adjoining Work for proper sequencing of each installation.

B. Cease operations immediately if Work area appears to be in danger and notify the Architect/Engineer. Do not resume operations until conditions have been corrected.

C. It is the Contractor's responsibility to protect building interiors and assemblies from damage throughout the Work.

D. Protect existing utility lines and services, whether indicated or not.

E. Exercise care to protect all existing Work, which is to remain. Any such Work that is damaged shall be repaired to the satisfaction of the Architect/Engineer at no additional charge to the Owner.

F. Wear suitable protective eyewear, headgear, ear and hand protection when handling equipment, debris, and during off-loading.

G. Provide barriers against unauthorized foot traffic into the work area.

H. Provide warning signs indicating construction areas.

1.09 WARRANTY

A. See Section 017800 "Closeout Submittals", for additional warranty requirements.

B. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace concrete that does not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two (2) years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M Grade 60 (420).

1. Type: Deformed billet-steel bars.

B. Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain type.

C. Reinforcement Accessories:

1. Tie Wire: Annealed, minimum 16 gage (1.5 mm).

2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.02 CONCRETE MATERIALS

A. Cement: ASTM C150, Type I - Normal Portland type.

B. Fine and Coarse Aggregates: ASTM C 33.

C. Lightweight Aggregate: ASTM C 330.

D. Fly Ash: ASTM C618, Class C or F.

E. Silica Fume: ASTM C1240, proportioned in accordance with ACI 211.1.

F. Water: Clean and not detrimental to concrete.

G. Fiber Reinforcement: Alkali-resistant polypropylene complying with ASTM C1116/C1116M.

1. Fiber Length: 0.25 inch (6 mm), nominal.

2.03 ADMIXTURES

A. General: Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Chemical Admixtures: Provide admixtures certified by Manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

C. Air Entrainment Admixture: ASTM C260.

D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.

E. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.

F. Retarding Admixture: ASTM C494/C494M Type B.

G. Water Reducing Admixture: ASTM C494/C494M Type A.

2.04 ACCESSORY MATERIALS

A. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.

1. ASTM C1107/C1107M; Grade A, B, or C.

2.05 BONDING AND JOINTING PRODUCTS

A. Slab Isolation Joint Filler: 1/2 inch (13 mm) thick, height equal to slab thickness, with removable top section that will form 1/2 inch (13 mm) deep sealant pocket after removal.

1. Material: Closed-cell, non-absorbent, compressible polyethylene or polymer foam in sheet form.

B. Slab Contraction Joint Device: Preformed linear strip intended for pressing into wet concrete to provide straight route for shrinkage cracking.

2.06 CURING MATERIALS

A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.

B. Moisture-Retaining Sheet: ASTM C171.

1. Polyethylene film, clear, minimum nominal thickness of 0.0040 in. (0.10 mm).

2. White-burlap-polyethylene sheet, weighing not less than 10 oz/per linear yd, 40 inches wide (305 grams per sq. meter).

C. Water: Potable, not detrimental to concrete.

2.07 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Proportioning Structural Lightweight Concrete: Comply with ACI 211.2 recommendations.

C. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.

1. For trial mixtures method, employ independent testing agency acceptable to McGinnis Chen Associates, Inc. for preparing and reporting proposed mix designs.

D. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by Manufacturer.

E. Fiber Reinforcement: Add to mix at rate of 1.5 pounds per cubic yard (0.89 kg per cubic meter), or as recommended by Manufacturer for specific project conditions.

F. Normal Weight Concrete:

1. Compressive Strength, when tested in accordance with ASTM C39/C39M at twenty-eight (28) days: 3,000 pounds per square inch (20.7 MPa).

2. Total Air Content: Four percent (4%), determined in accordance with ASTM C173/C173M.

3. Maximum Slump: 4 inches (100 mm).

G. Structural Lightweight Concrete:

1. Compressive Strength, when tested in accordance with ASTM C39/C39M at twenty-eight (28) days: 3,000 pounds per square inch (20.7 MPa).

2. Total Air Content: Three percent (3%), determined in accordance with ASTM C173/C173M.

3. Maximum Slump: 3 inches (75 mm).

2.08 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.

2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.

3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

4. Fiber Reinforcement: Batch and mix as recommended by Manufacturer for specific project conditions.

B. Transit Mixers: Comply with ASTM C94/C94M.

1. When air temperature is above 90 deg F, reduce mixing and delivery time to sixty (60) minutes.

2.09 CONCRETE FINISH

A. Cast new concrete to match color and texture of adjacent concrete.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with Work of this Section.

3.02 PREPARATION

A. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with Manufacturer's instructions.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

C. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

3.05 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

1. Normal concrete: Not less than seven (7) days.

3.06 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article. Perform tests according to ACI 301.

B. The Contractor for Work under this Section shall maintain a Quality Control program specifically to verify compliance with this Specification.

C. Provide free access to concrete operations at Project site and cooperate with appointed firm.

D. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during operations:

1. Owner may engage a qualified independent testing agency to sample material being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in presence of Contractor.

2. Testing agency shall perform tests for characteristics specified, using applicable referenced testing procedures or, if not referenced, using tests cited in Manufacturer's product data.

3. Owner may direct Contractor to stop application if test results show materials being used do not comply with requirements. Contractor shall remove non-complying materials from Project site, pay for testing, and reapply surfaces with rejected materials. If necessary, Contractor may be required to remove rejected materials from previously applied surfaces.

E. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

F. Compressive Strength Tests: ASTM C39/C39M. For each test, mold and cure three (3) concrete test cylinders. Obtain test samples for every 100 cu yd (76 cu m) or less of each class of concrete placed.

G. Perform one (1) slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional Work with specified requirements.

3.07 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

B. Repair or replacement of defective concrete will be determined by the McGinnis Chen Associates, Inc. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of McGinnis Chen Associates, Inc. for each individual area.

3.08 CLEANING

A. Cleanup: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. Collect waste material that may constitute a fire hazard, place in closed metal containers and remove daily from site.

C. Remove spills from adjacent surfaces. Restore to original condition or replace with new materials to the satisfaction of the Architect.

D. Contractor shall replace all materials in kind that are damaged during Work of this Section.

E. Provide continuous dust control to protect all areas of the Work.

F. Legally dispose of debris in accordance with local, State, and Federal regulations.

G. Upon completion of Work, remove all debris and surplus items from the site, and leave all areas and building components in an acceptable condition for the remaining Work.

H. Clean off excess products as the Work progresses. Do not scratch or damage adjacent finished surfaces.

3.09 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

B. Protect Work of other trades from damage. Correct damage by cleaning, repairing, replacing, and recoating as approved by Architect. Leave in an undamaged condition.

END OF SECTION 033000

1.00 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following applications:

1. Patch existing Built-Up Roofing at removed and new Façade Access Anchors.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the Work with other Sections referencing this Section.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by the built-up roofing manufacturer to install Manufacturer's product and that is eligible to receive Manufacturer's special warranty.

1.05 WARRANTY

A. Roofing Applicator Warranty: Two (2) years from date of Substantial Completion.

B. Roofing Manufacturer’s Warranty: Ten (10) years from date of Substantial Completion.

2.00 PRODUCTS

2.01 BUILT-UP ROOFING MANUFACTURERS (FOR REPAIR)

A. Subject to compliance with requirements.

B. Built-Up Roofing System: Asphalt cold-applied roofing system. Provide roofing repair products by Johns Manville – 4GLC.

3.00 EXECUTION

3.01 EXAMINATION

A. Inspect surfaces that will receive the new roofing system to make sure they are clean, smooth, sound, properly prepared, and free of moisture, dirt, debris, or other contamination.

B. Verify that existing built-up roofing is properly fastened to substrate, or if needed, properly repair per NRCA’s Repair Manual for Low-Slope Membrane Roof Systems.

C. Verify that all roof penetrations, mechanical equipment, cants, edge metal, and other on-roof items are in place and secure.

D. Verify slope to drain.

E. Verify that all critical areas around the immediate vicinity of the spray area are suitably protected.

F. Verify all roof drains are clean and in working order.

G. Verify that all air conditioning and air intake vents are suitably protected or closed.

H. Proceed with installation only after unsatisfactory conditions have been corrected. See requirements specified in “Project Conditions” article.

3.02 PREPARATION

A. The surface must be clean, sound, dry and free of any materials that would inhibit proper adhesion of the sealant. Achievement of this condition may require the use of industrial cleaner, scraping, power brooming, vacuuming or other means, and shall always be performed observing responsible trade practices. In any case, any existence of talc or other separator agents on the built-up or bitumen roofing is not acceptable.

B. All blisters shall be cut, dried out, re-adhered and sealed with roofing adhesive/mastic as described in Section 3.03.C.

C. All loose seams and wall termination of existing roof system shall be fastened down and sealed with roofing adhesive/mastic. Sealant must seal fasteners as well.

D. After the existing built-up roofing substrate is properly repaired and cleaned, perform adhesion tests per the procedures as required by the sealant manufacturer.

3.03 BUILT-UP ROOFING INSTALLATION, PATCHING

A. Perform built-up roofing membrane repair according to roofing manufacturer's written instructions and applicable recommendations of NRCA's "the NRCA Repair Manual for Low-Slope Membrane Roof System of Built-up Roofing."

1. Install roofing system BU-4-LC, according to roof assembly identification matrix and roof assembly layout illustrations in NRCA's "The NRCA Repair Manual for Low-Slope Membrane Roof System of Built-up Roofing" and requirements in this Section.

B. Install roofing membrane according to roofing manufacturer's written instructions and applicable recommendations of NRCA's "Quality Control Guidelines for the Application of Built-up Roofing" and as follows:

1. Deck Type: L (Light Weight Concrete).

2. Base Sheet: 1

3. Number of Ply Sheets: 2.

4. Surfacing Type: M (mineral-granule-surfaced cap sheet).

5. Mineral-granule-surfaced cap sheet is in addition to number of ply sheets specified.

C. For patching, perform the following repair procedure:

1. Remove debris, contaminants, aggregate or loose surfacing from the surface of the membrane or flashing to be repaired. The area to be prepared should extend a minimum of 18 inches beyond the perimeter of the defect to provide an ample clean work area on which to install the patch and tie it into the existing roof membrane.

2. If the membrane surface has been flood coated and aggregate embedded, carefully spud the aggregate free from the surface and sweep clean.

3. If water infiltration is suspected, inspect the insulation and deck for damage. Remove wet or damaged insulation and repair or replace as required. Properly attach or adhere new, dry insulation consistent with thickness of the existing insulation and compatible with the other roof system components.

4. Prime the surface of the membrane with asphalt primer and allow to dry.

5. Install the same numbers of plies as were removed (a minimum of 2 plies) in cold-applied adhesive. Extend the bottom ply at least 6 inches beyond the area to be repaired and each succeeding plies at least 3 inches beyond the previous ply.

6. As an alternative, 2 plies of modified bitumen sheet may be installed by suitable cold adhesive.

7. Install liquid-applied flashing on new penetrations through BUR roofing.

3.06 FIELD QUALITY CONTROL

A. Manufacturer’s Field Services: Inspection by the coating manufacturer's representative shall be made to verify the proper installation of the system. Any areas that do not meet the minimum standards for application as specified herein shall be corrected at the Contractor's expense. Manufacturer's inspection or verification shall not constitute acceptance of responsibility for any improper application of material.

3.07 PROTECTING AND CLEANING

A. Correct deficiencies in or remove built-up roofing that does not comply with requirements, repair substrates, and repair or reinstall roofing to a condition free of damage and deterioration prior to acrylic roof coating installation.

B. Provide all protection necessary to protect the tenants of the building, the public, and the property, including adjacent properties, from damage as a result of the Work in this Section.

C. Provide continuous protection of all public and private property including automobiles from damage during the Work.

D. Protect Work of other trades from damage. Correct damage by cleaning, repairing, replacing, and recoating as approved by Architect. Leave in an undamaged condition.

END OF SECTION 075000

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Modified bituminous roofing membrane, conventional application.

B. Insulation, flat and tapered.

C. Base flashings.

D. Roofing cant strips, accessories, and walkway pads.

1.02 RELATED REQUIREMENTS

A. Section 076200 - Sheet Metal Flashing and Trim: Counter-flashings, reglets, and copings.

B. Section 077200 - Roof Accessories: Roof Hatch.

C. Section 079200 – Joint Sealants

1.03 REFERENCE STANDARDS

A. ASTM C728 - Standard Specification for Perlite Thermal Insulation Board; 2013.

B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.

C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.

D. ASTM D41/D41M - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing; 2011.

E. ASTM D312 - Standard Specification for Asphalt Used in Roofing; 2000 (Reapproved 2006).

F. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012)e1.

G. ASTM D4601/D4601M - Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing; 2004 (Reapproved 2012)e1.

H. ASTM D6163 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements; 2000 (Reapproved 2008).

I. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011.

J. FM DS 1-28 - Wind Design; Factory Mutual Research Corporation; 2007.

K. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; National Roofing Contractors Association; Fifth Edition, with interim updates.

L. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of associated flashings and counter-flashings installed by other Sections.

1.05 PERFORMANCE REQUIREMENTS

A. General: Install a watertight, modified bituminous membrane roofing and base flashing system with compatible components that do not permit the passage of liquid water and will withstand wind loads, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer, based on testing and field experience.

C. Roofing System Design: Provide a roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist the factored design uplift pressures calculated according to SPRI's "Wind Load Design Guide for Fully Adhered and Mechanically Fastened Roofing Systems."

1. Corner Design Uplift Pressure: 180 lb/sq. ft

2. Perimeter Design Uplift Pressure: 120 lb/sq. ft.

3. Field-of-Roof Design Uplift Pressure: 90 lb/sq. ft.

4. Safety Factor: 1.5.

D. Energy Performance: Provide roofing system with initial Solar Reflectance not less than 0.70 and Thermal Emittance not less than 0.75 when tested according to Cool Roof Rating Council's CRRC-1.

1.06 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide Manufacturer's catalog data for membrane and bitumen materials, base flashing materials, insulation, and surfacing. Include data substantiating that materials comply with requirements. Include Manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties.

1. Material List: An inclusive list of required materials. Indicate each material and cross-reference the specific material, finish system, and application. Identify each material by Manufacturer's catalog number and general classification.

2. Manufacturer's Information: Technical information including label analysis and instructions for handling, storing, and applying each material.

3. Include Material Safety Data Sheets.

4. Specimen copy of warranty – material and labor and Contractor's warranty per Division 1.

5. Dimensional shop drawings, which shall include: plans, sections, details, and attachments to other Work, for the following:

a. Outline of roof and roof size.

b. Roofing membrane and membrane terminations. Indicate insulation pattern, overall membrane layout, cover board, field seam locations, joint or termination detail conditions, and location of fasteners.

c. Crickets, saddles, and tapered edge strips, including slopes.

d. Profile details of flashing methods for penetrations and terminations.

C. Shop Drawings: Indicate setting plan for tapered insulation.

D. Samples for Verification

1. 12-by-12-inch square of base felt.

2. 12-by-12-inch square of cap sheet.

3. 12-by-12-inch square of flashing sheet.

4. 12-by-12-inch square of compatible sheathing paper, if required by Manufacturer.

E. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by Manufacturer to install roofing system.

F. Submit Qualification Data of firms and persons specified in the “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information.

1. For products required to be installed by workers approved by product manufacturers, include letters of acceptance by product manufacturers certifying that Installers are approved to apply their products.

G. Product Certificates: Signed by Manufacturers certifying that products furnished comply with requirements and are recommended by Manufacturer for uses indicated.

1. Provide roofing manufacturer’s product certificate of analysis including product identification, dimensions, mass, and physical and mechanical properties.

H. Maintenance Data: To include in maintenance manuals. Identify substrates and types of products applied. Include recommendations for periodic inspections, cleaning, care, maintenance, and repair.

I. Submit Manufacturer’s certification of products subject to VOC compliance that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

J. Warranties: Sample of special warranties.

K. Maintain One (1) copy of each document on-site.

L. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roof installation.

M. Submittals Prior to Project Close-out:

1. Electronic Product Identification: The roof membrane base and finish plies shall have radio frequency identification (RFID) chips encapsulated within each roll. The RFID chips shall enable wireless, non-contact scanning identification through a standard ultra-high frequency (UHF) scanning device to identify information contained in a Certificate of Analysis (COA) from the testing laboratory of the primary roofing materials manufacturer. The COA information shall identify that the physical and mechanical properties of the roofing membrane components. Testing shall be in accordance with the parameters published in ASTM D 5147 and ASTM D 7051 and indicate quality assurance/quality control data as required to meet the specified properties. A separate record for each production run of material shall indicate the following information:

a. Material type

b. Lot number

c. Production date

d. Dimensions and Mass (indicate the lowest values recorded during the production run);

- Roll length
- Roll width
- Selvage width
- Total thickness
- Thickness at selvage (coating thickness)
- Weight

e. Physical and Mechanical Properties;

- Low temperature flexibility
- Peak load
- Ultimate Elongation
- Dimensional stability
- Compound Stability
- Granule embedment
- Resistance to thermal shock (foil faced products)

1.07 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual and Manufacturer's instructions.

1. Maintain one (1) copy on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum ten (10) years of documented experience.

C. Installer Qualifications: Company specializing in performing the Work of this Section with minimum five (5) years documented experience, and approved by Manufacturer.

D. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the Work of this Section.

E. Arrange for Manufacturer Representative to inspect conditions prior to installation and the completed Works. Submit Manufacturer's letter confirming that the installation is in substantial conformance with the product specified.

F. Source Limitations: Obtain all components for roofing system from single roofing system manufacturer.

G. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method indicated below by UL, FM, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-Test Exposure: Class A; complying with ASTM E 108, for application and slopes indicated.

2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing system is a part.

H. Give a minimum of seven (7) days notice to the Owner, Architect, and Manufacturer prior to commencing any Work and notify both parties on a daily basis of any change in Work schedule.

I. Preliminary Roofing Conference below is suggested for large or complicated installations. Revise timing during construction to suit Project.

J. Pre-installation Conference below is recommended with or without preliminary roofing conference above. Coordinate with Division 1 Section "Project Meetings."

K. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section 01310 "Project Management and Coordination."

1. Meet with Owner, Architect, testing and inspecting agency representative, roofing Installer; roofing system manufacturer's representative, and installers whose Work interfaces with or affects roofing, including installers of roofing accessories and roof-mounted equipment.

2. Review methods and procedures related to roofing installation, including Manufacturer's written instructions.

3. Examine the substrate conditions and finishes for compliance with requirements, including flatness and attachment to structural members.

4. Review structural loading limitations of deck during and after roofing.

5. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing.

6. Review governing regulations and requirements for insurance, certifications, and inspection and testing, if applicable.

7. Review temporary protection requirements for roofing system during and after installation.

8. Review roof observation and repair procedures after roofing installation.

9. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.

L. All Work shall be subject to acceptance by the Owner and Architect. All Work that does not comply with the intent of the Specifications shall be corrected by the Contractor.

M. Agency Approvals: The proposed roof system shall conform to the following requirements. No other testing agency approvals will be accepted.

1. Underwriters Laboratories Class 90 acceptance of the proposed roofing system (including mopping asphalt or cold adhesive) without additional requirements for gravel or coatings.

2. Factory Mutual Approval Standard 4470 listing for the proposed membrane system. The roof membrane configuration shall be approved by FM Global for Class 1-SH (severe hail) exposure. The roof shall be approved by FM Global for minimum 1-49 wind uplift construction.

3. The roof membrane system shall be eligible to achieve 1 credit point, according to SS Credit 7.2 Heat Island Effect-Roof as recorded in LEED 2009 for New Construction and Major Renovations.

4. The roof membrane system shall meet the approval requirements of the U.S. EPA Energy Star program.

1.08 DELIVERY, STORAGE, AND HANDLING

A. All products delivered to the job site shall be in the original unopened containers or wrapping.

1. Manufacturer's brand name and stock number.

2. Product name or title of material.

3. Directions for storage and handling instructions and precautions.

4. Date of manufacture and shelf life.

5. Mixing and application instructions.

6. Color name and number.

7. VOC content.

B. Deliver products in Manufacturer's original containers, dry, undamaged, with seals and labels intact.

C. Store materials out of direct exposure to the elements. Store roll goods on a clean, flat and dry surface. All material stored on the roof overnight shall be stored on pallets. Rolls of roofing must be stored on ends. Store materials on the roof in a manner so as to preclude overloading of deck and building structure. Store materials such as solvents, adhesives and asphalt cutback products away from open flames, sparks or excessive heat. Cover all material using a breathable cover such as a canvas. Polyethylene or other non-breathable plastic coverings are not acceptable.

D. Do not leave unused felts and other sheet materials on the roof overnight or when roofing work is not in progress, unless protected from weather and moisture, and unless maintained at a temperature exceeding 50 deg F.

E. Deliver and store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer.

F. Protect roofing insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

1. Any material that is found to be damaged, or stored in any manner other than that stated above will be automatically rejected, removed, and replaced at the Contractor's expense.

2. Safety: Refer to all applicable data, including, but not limited to MSDS sheets, PDS sheets, Product labels, specific instructions for specific personal protection requirements.

3. Ventilation: General ventilation is recommended; zero VOC materials do not generate harmful or flammable vapors. Secondary materials may present hazards to be addressed.

4. Take precautionary measures and store in UL listed storage locker to protect from fire hazards and spontaneous combustion.

5. Remove all materials, including cloths, tarps, and empty containers from the area of Work at the close of each day.

1.09 REGULATORY REQUIREMENTS

A. Conform to applicable Federal, State, and local regulatory requirements including flame and smoke rating requirements for finishes.

B. Flammable Liquids serve all current regulation regarding flammable liquids such as posting “No Smoking” signs. Allow no open flames, welding, or other ignition sources in the Work.

1. Conform to all applicable laws, codes, and regulations for disposal of all materials, debris, and containers.

2. Materials shall be VOC Compliant.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with roofing work only when existing and forecasted weather conditions permit roofing to be installed according to Manufacturer’s written instructions and warranty requirements.

B. Safety: Familiarize every member of the application crew with all fire and safety regulations recommended by OSHA, NIOSH, NRCA and other industry or local governmental groups. Workers shall wear a long sleeve shirt with long pants and work boots. Workers shall use only butyl rubber or nitrile gloves when mixing or applying PMMA products. Safety glasses with side shields are required for eye protection. Use local exhaust ventilation to maintain worker exposure below the published Threshold Limit Value (TLV). If the airborne concentration poses a health hazard, becomes irritating or exceeds recommended limits, use a NIOSH approved respirator in accordance with OSHA Respirator Protection requirements published under 29 CFR 1910.134. The specific type of respirator will depend on the airborne concentration. A filtering face piece or dust mask is not acceptable for use with this product if TLV filtering levels have been exceeded.

C. Do not apply waterproofing materials during precipitation or in the event there is a probability of precipitation during application. Take adequate precautions to ensure that materials, applied membrane, and building interiors are protected from possible moisture damage or contamination.

D. Provide protection against staining and mechanical damage for newly applied waterproofing and adjacent surfaces throughout this Project.

E. Prevent access by the public to materials, tools, and equipment during the course of the Project.

F. Remove all debris daily from the Project site and take to a legal dumping area authorized to receive such materials.

1.11 WARRANTY

A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace roofing system that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Three (3) years from date of Substantial Completion.

C. Standard Roofing Manufacturer's System Warranty: Submit a written labor and material warranty, without monetary limitation, signed by roofing system manufacturer agreeing to promptly repair leaks in the roofing system, including but not limited to, roofing membrane, base flashings, separation/base sheet, rigid insulation, cover board, Manufacturer’s accessories, e.g. expansion joint cover, fascia flashing, roof drain, etc., resulting from defects in materials or workmanship for the following warranty period:

1. Warranty Period for Roofing System: Twenty (20) years and shall be issued at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Membrane Materials:

1. Siplast Paradiene 20 TG/30 FR CR TG: www.siplast.com.

2. Substitutions: See Section 016000 - Product Requirements.

2.02 ROOFING

A. Modified Bituminous Roofing: Two-ply membrane, with insulation.

B. Roofing Assembly Requirements: A roof membrane assembly consisting of two (2) plies of a prefabricated, reinforced, homogeneous Styrene-Butadiene-Styrene (SBS) block copolymer modified asphalt membrane, applied over a prepared substrate. Both reinforcement mats shall be impregnated/saturated and coated each side with an SBS modified bitumen blend and coated on one (1) side with a torch grade SBS bitumen blend adhesive layer. The adhesive layer shall be manufactured using a process that embosses the surface with a grooved pattern to provide optimum burn-off of the plastic film and to maximize application rates. The cross sectional area of the sheet material shall contain no oxidized or non-SBS modified bitumen. The roof membrane base and finish plies shall have radio frequency identification (RFID) chips encapsulated within each roll of modified bitumen material. The RFID chips shall enable wireless, non-contact scanning identification through a standard ultra-high frequency (UHF) scanning device to identify the product name, lot number, and manufacturing date. The roof system shall pass 500 cycles of ASTM D 5849 Resistance to Cyclic Joint Displacement (fatigue) at 14° F (-10° C). Passing results shall show no signs of membrane cracking or interply delamination after 500 cycles. The roof system shall pass 200 cycles of ASTM D 5849 after heat conditioning performed in accordance with ASTM D 5147. The assembly shall possess waterproofing capability, such that a phased roof application, with only the modified bitumen base ply in place, can be achieved for prolonged periods of time without detriment to the watertight integrity of the entire roof system.

1. Siplast Paradiene 20 TG/30 CR FR TG torchable roof system

   a. Modified Bitumen Base and Stripping Ply: Siplast; Paradiene 20 - torchable grade: www.siplast.com

      1) Thickness (avg): 114 mils (2.9 mm) (ASTM D 5147)

      2) Thickness (min): 110 mils (2.8 mm) (ASTM D 5147)

      3) Weight (min per 100 ft² of coverage): 76 lb (3.7 kg/m²)

      4) Maximum filler content in elastomeric blend: 35% by weight

      5) Low temperature flexibility @ -15° F (-26° C) - PASS (ASTM D 5147)

      6) Peak Load (avg) @ 73° F (23° C): 30 lbf/inch (5.3 kN/m) (ASTM D 5147)

      7) Peak Load (avg) @ 0° F (-18° C): 75 lbf/inch (13.2 kN/m) (ASTM D 5147)

      8) Ultimate Elongation (avg.) @ 73° F (23° C): 50% (ASTM D 5147)

      9) Dimensional Stability (max): 0.1% (ASTM D 5147)

      10) Compound Stability (min): 250° F (121° C) (ASTM D 5147)

      11) Approvals: UL Class listed, FM Approved (products shall bear seals of approval)

      12) Reinforcement: fiberglass mat or other meeting the performance and dimensional stability criteria

   b. Modified Bitumen Finish Ply: Siplast; Paradiene 30 CR FR - torchable grade: www.siplast.com

      1) Thickness (avg): 110 mils (2.8 mm) (ASTM D 5147)

      2) Thickness at selvage (coating thickness) (avg): 98 mils (2.5 mm) (ASTM D 5147)

3) Thickness at selvage (coating thickness) (min): 94 mils (2.4 mm) (ASTM D 5147)

4) Weight (min per 100 ft² of coverage): 75 lb (3.6 kg/m²)

5) Maximum filler content in elastomeric blend: 35% by weight

6) Low temperature flexibility @ -15° F (-26° C): PASS (ASTM D 5147)

7) Peak Load (avg) @ 73° F (23° C): 30 lbf/inch (5.3 kN/m) (ASTM D 5147)

8) Peak Load (avg) @ 0° F (-18° C): 75 lbf/inch (13.2 kN/m) (ASTM D 5147)

9) Ultimate Elongation (avg.) @ 73° F (23° C): 55% (ASTM D 5147)

10) Dimensional Stability (max): 0.1% (ASTM D 5147)

11) Compound Stability (min): 250° F (121° C) (ASTM D 5147)

12) Solar Reflectance: = 0.70% (ASTM D 1549)

13) Thermal Emittance: = 0.80% (ASTM D 1371)

14) Approvals: UL Class listed (product shall bear seals of approval)

15) Reinforcement: fiberglass mat or other meeting the performance and dimensional stability criteria

16) Surfacing: white synthetic chips

C. Flashing: Catalyzed Acrylic Resin Flashing System: A specialty flashing system consisting of a liquid-applied, fully reinforced, multi-component acrylic membrane installed over a prepared or primed substrate. The flashing system consists of a catalyzed polymethyl methacrylate primer, basecoat and topcoat, combined with a non-woven polyester fleece. The use of the specialty flashing system shall be specifically approved in advance by the membrane manufacturer for each application.

1. Parapro 123 Flashing System by Siplast

D. Flashing Membrane Assembly: A flashing membrane assembly consisting of a prefabricated, reinforced, Styrene-Butadiene-Styrene (SBS) block copolymer modified asphalt membrane with a continuous, channel-embossed metal-foil surfacing. The finish ply shall conform to ASTM D 6298 and the following physical and mechanical property requirements.

1. Siplast Veral flashing system, aluminum finish

a. Cant Backing Sheet and Flashing Reinforcing Ply: Siplast; Paradiene 20 SA: www.siplast.com

1) Thickness (avg): 102 mils (2.6 mm) (ASTM D 5147)

2) Thickness (min): 98 mils (2.5 mm) (ASTM D 5147)

3) Weight (min per 100 ft² of coverage): 72 lb (3.5 kg/m²)

4) Maximum filler content in elastomeric blend: 35% by weight

5) Low temperature flexibility @ -15° F (-26° C): PASS (ASTM D 5147)

6) Peak Load (avg) @ 73° F (23° C): 30 lbf/inch (5.3 kN/m) (ASTM D 5147)

7) Peak Load (avg) @ 0° F (-18° C): 75 lbf/inch (13.2 kN/m) (ASTM D 5147)

8) Ultimate Elongation @ 73° F (23° C): 50% (ASTM D 5147)

9) Dimensional Stability (max): 0.1% (ASTM D 5147)

10) Compound Stability (min - sheet): 250° F (121° C) (ASTM D 5147)

11) Compound Stability (min – adhesive coating): 212° F (100° C) (ASTM D 5147)

12) Approvals: UL Class listed, FM Approved (products shall bear seals of approval)

13) Reinforcement: fiberglass mat or other meeting the performance and dimensional stability criteria

14) Back Surfacing: polyolefin film

b. Metal-Clad Modified Bitumen Flashing Sheet: Siplast; Veral Aluminu: www.siplast.com

1) Thickness (avg): 150 mils (3.8 mm) (ASTM D 5147)

2) Thickness (min): 146 mils (3.7 mm) (ASTM D 5147)

3) Weight (min per 100 ft² of coverage): 96 lb (4.6 kg/m²)

4) Coating Thickness – back surface (min): 40 mils (1 mm) (ASTM D 5147)

5) Maximum filler content in elastomeric blend: 35% by weight

6) Low temperature flexibility @ 0° F (-18° C): PASS (ASTM D 5147)

7) Peak Load (avg) @ 73° F (23° C): 85 lbf/inch (15 kN/m) (ASTM D 5147)

8) Peak Load (avg) @ 0° F (-18° C): 180 lbf/inch (31.7 kN/m) (ASTM D 5147)

9) Ultimate Elongation @ 73° F (23° C): 45% (ASTM D 5147)

10) Tear-Strength (avg): 120 lbf (0.54 kN) (ASTM D 5147)

11) Dimensional Stability (max): 0.2% (ASTM D 5147)

12) Compound Stability (min): 225° F (107° C) (ASTM D 5147)

13) Cyclic Thermal Shock Stability (maximum): 0.2% (ASTM D 6298)

14) Approvals: UL Approved, FM Approved (products shall bear seals of approval)

15) Reinforcement: fiberglass scrim mat or other meeting the performance and dimensional stability criteria

16) Surfacing: aluminum metal foil

2.03 BITUMINOUS MATERIALS

A. Mastics: An asphalt cutback mastic, reinforced with non-asbestos fibers, used as a base for setting metal flanges conforming to ASTM D 4586 Type II requirements.

1. Product: Siplast; PA-1021 Plastic Cement by Siplast: www.siplast.com

B. Primer: An asphalt/solvent blend meeting ASTM D 41, South Coast Air Quality District and Ozone Transport Commission requirements.

1. Product: Siplast; PA-917 LS Primer by Siplast: www.siplast.com

2.04 DECK SHEATHING AND COVER BOARDS

A. Cover Board: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 1/4 inch (6 mm) thick.

1. Products:

a. Georgia-Pacific DensDeck Prime: www.densdeck.com.

b. Substitutions: See Section 016000 - Product Requirements.

2.05 INSULATION

A. Acceptable Insulation Types - Tapered Application: Any of the types specified.

1. Tapered perlite board covered with uniform thickness polyisocyanurate board.

2. Uniform thickness polyisocyanurate board covered with tapered perlite board.

B. Perlite Board Insulation: Expanded perlite mineral aggregate, ASTM C728, with the following characteristics:

1. Tapered Board: Slope as indicated; minimum thickness 1 inch (25.4 mm); fabricate of fewest layers possible.

2. Uniform Thickness Board: Minimum thickness 1 inch (25.4 mm); fabricate of fewest layers possible.

3. Board Edges: Square.

4. Manufacturers:

a. GAF; EnergyGuard: www.gaf.com.

b. Johns Mansville; Fesco Board: www.jm.com.

5. Substitutions: See Section 016000 - Product Requirements.

C. Polyisocyanurate Board Insulation: Rigid cellular foam, complying with ASTM C1289, Type I, aluminum foil both faces; Class 1, non-reinforced foam core, and with the following characteristics:

1. Compressive Strength: 16 psi (110 kPa)

2. Tapered Board: Slope as indicated; minimum thickness 1 inch (25.4 mm); fabricate of fewest layers possible.

4. Uniform Thickness Board: Minimum thickness 1 inch (25.4 mm); fabricate of fewest layers possible.

5. Products:

a. Siplast Paratherm: www.siplast.com.

6. Substitutions: See Section 016000 - Product Requirements.

2.06 ACCESSORIES

A. Cant and Edge Strips: Perlite board, compatible with roofing materials; cants formed to 45-degree angle.

B. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.

1. Length as required for thickness of insulation material and penetration of deck substrate, with metal washers.

C. Sealant: A moisture-curing, non-slump elastomeric sealant designed for roofing applications. The sealant shall be approved by the roof membrane manufacturer for use in conjunction with the roof membrane materials. Acceptable types are as follows:

1. Siplast; PS-304 Elastomeric Sealant by Siplast: www.siplast.com

D. Walktread: A prefabricated, puncture resistant polyester core reinforced, polymer modified bitumen sheet material topped with a ceramic-coated granule-wearing surface.

1. Siplast; Paratread Roof Protection Material; www.siplast.com

a. Thickness: 0.217 in (5.5 mm)

b. Weight: 1.8 lb/ft² (8.8 kg/m²)

c. Width: 30 in (76.2 cm)

2.07 WOOD-PRESERVATIVE TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry material after treatment to a maximum moisture content of nineteen percent (19%) for lumber and fifteen percent (15%) for plywood. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.

D. Application: Treat all rough carpentry contact with the ground and at all horizontal surfaces, unless otherwise indicated.

2.08 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following.

1. Blocking.
2. Filler.
3. Cants.
4. Nailers.
5. Furring.
6. Grounds.
7. Shims.
8. Exterior wood trim.

B. For items of dimension lumber size, provide Construction, or No. 2 Grade lumber with fifteen percent (15%) maximum moisture content and of the following species:

1. Hem-fir or Hem-fir (north); WCLIB, or WWPA.
2. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
3. Western woods; WCLIB or WWPA.

C. For concealed boards, provide lumber with fifteen percent (15%) maximum moisture content and any of the following species and grades:

1. Hem-fir or hem-fir (north); Construction or No. 2 Common Grade; NLGA, WCLIB, or WWPA.
2. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common Grade; NeLMA, NLGA, WCLIB, or WWPA.
3. Western woods; Construction or No. 2 Common Grade; WCLIB or WWPA.

D. For exposed boards, provide lumber with fifteen percent (15%) maximum moisture content and of the following specie and grade:

1. Hem-fir or Hem-fir (north), Superior or C & Btr Finish Grade; WCLIB, or WWPA.
2. Spruce-pine-fir (south) or Spruce-pine-fir, D Select Grade; NELMA, NLGA, WCLIB, or WWPA.
3. Western red cedar, A Grade; WWPA.

E. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 Grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

F. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other Work.

G. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

H. Wood Nailers: Treated wood nailers shall be installed at the perimeter of the entire roof and around such other roof projections and penetrations as specified on the Project Drawings. Height of the nailers shall be matched to that of the insulation thickness being used.

1. Wood nailers shall be treated for fire and rot resistance (wolmanized or osmose treated), #2 or better lumber. Creosote or asphaltic-treated lumber is not acceptable.

2. Wood nailers shall conform to Factory Mutual's Loss Prevention Data 1-49.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions under which roofing will be applied, with Installer present, for compliance with requirements.

1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are properly clamped into position.

2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at roof penetrations and terminations and match the thicknesses of insulation required.

3. Verify that wood nailer strips are located perpendicular to roof slope and are spaced according to requirements of roofing system manufacturer.

4. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16-inch out of plane relative to adjoining deck.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean substrate of dust, debris, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no Work is taking place or when rain is forecast.

C. Secure Base Sheet to Prepared Substrate: Lay the base sheet over entire area to be roofed, lapping sides 3 inches and ends 6 inches. Using the specified fasteners, fasten each sheet every 7 1/2-inches through laps and stagger fasten the remainder of the sheet in 2 rows on nominal 12-inch centers with fasteners in each row on 10-inch centers. Increase the fastening pattern by 70% at the perimeter of the roof and 160% at the corners.

3.03 INSULATION INSTALLATION

A. Attachment of Insulation:

1. Mechanically fasten insulation to deck in accordance with roofing manufacturer's instructions and Factory Mutual requirements.

B. Place tapered insulation to the required slope pattern in accordance with Manufacturer's instructions.

C. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

D. At roof drains, use factory-tapered boards to slope down to roof drains over a distance of 24 inches (600 mm).

E. Do not apply more insulation than can be covered with membrane in same day.

3.04 COVER BOARD INSTALLATION

A. Attachment of Cover Board:

1. Mechanically fasten Cover Board to deck in accordance with roofing manufacturer's instructions and Factory Mutual requirements.

B. Lay boards with edges in moderate contact without forcing. Cut coverboards to fit neatly to perimeter blocking and around penetrations through roof.

C. Do not apply more cover board than can be covered with membrane in same day.

3.05 ROOF MEMBRANE INSTALLATION GENERAL

A. Install modified bituminous membrane roofing system according to roofing system manufacturer's written instructions and applicable recommendations of NRCA/ARMA's "Quality Control Recommendations for Polymer Modified Bitumen Roofing."

1. Install roofing system according to applicable specification plates of NRCA's "The NRCA Roofing and Waterproofing Manual."

B. Start installation of modified bituminous membrane roofing in presence of roofing system manufacturer's technical personnel.

C. Cant Strips: Install and secure preformed 45-degree cant strips at junctures of roofing membrane system with vertical surfaces or angle changes greater than 45 degrees.

D. Shingling Plies: Install modified bituminous membrane roofing system with ply sheets shingled uniformly to achieve required number of membrane plies throughout. Shingle in direction to shed water.

E. Cooperate with inspecting and testing agencies engaged or required to perform services for installing modified bituminous membrane roofing system.

F. Coordinate installing roofing system components so insulation and roofing plies are not exposed to precipitation or left exposed at the end of the workday or when rain is forecast.

1. Provide cutoffs at end of each day's Work to cover exposed ply sheets and insulation with a course of coated felt with joints and edges sealed.

2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.

3. Remove and discard temporary seals before beginning Work on adjoining roofing.

G. Substrate-Joint Penetrations: Prevent roofing debris from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

H. Membrane Protection: Provide protection against staining and mechanical damage for newly applied roofing and adjacent surfaces throughout this Project.

I. Debris Removal. Remove all debris daily from the Project site and take to a legal dumping area authorized to receive such materials.

J. Site Condition. Complete, to the owner's satisfaction, all job site clean-up including building interior, exterior and landscaping where affected by the construction.

3.06 MODIFIED BITUMINOUS MEMBRANE INSTALLATION

A. Membrane Application: Apply roofing in accordance with roofing system manufacturer's instructions and the following requirements. Application of roofing membrane components shall immediately follow application of base sheet and insulation as a continuous operation.

B. Aesthetic Considerations: An aesthetically pleasing overall appearance of the finished roof application is a standard requirement for this Project. Make necessary preparations, utilize recommended application techniques, apply the specified materials (i.e. granules, metallic powder), and exercise care in ensuring that the finished application is acceptable to the Owner.

C. Priming: Prime metal flanges, including flashing jacks, edge metal, lead drain flashings, and concrete and masonry surfaces with a uniform coating of ASTM D 41 asphalt primer.

D. Kettles and Tankers: Kettles and tankers shall be equipped with accurate, fully readable thermometers. Do not heat asphalt to or above its flash point. Avoid heating at or above FBT, should conditions make this impractical, heading must be no more than 25° F below the EVT and no more than 25° F above the EVT.

E. Asphalt Temperatures: If the EVT information is not provided, the following asphalt temperature shall be observed. Maximum heating temperature shall be 525° F. Minimum application temperature shall be 400° F.

F. Asphalt Moppings: Ensure that all moppings do not exceed a maximum of 25 lb/square. Mopping shall be total in coverage, leaving no breaks or voids.

G. Membrane Adhesive Application: Membrane adhesive can be applied by roller, squeegee or spray unit. Apply cold adhesive in a smooth, even, continuous layer without breaks or voids. Utilize an application rate of 2 to 2 1/2 gal/sq over irregular or porous substrates. Utilize an application rate of 1 1/2 to 2 gal/sq for interplay applications. Double the adhesive application rate over granule surfaces.

H. Bitumen Consistency: Cutting or alterations of bitumen, primer, and sealants will not be permitted.

I. Roofing Application: Apply all layers of roofing free of wrinkles, creases or fishmouths. Exert sufficient pressure on the roll during application to ensure prevent of air pockets.

1. Fully bond the base ply to the prepared substrate, utilizing minimum 3-inch side and end laps. Apply each sheet directly behind the torch applicator. Cut dog ear angles on underlying end laps at the finish edge and the overlapping selvage edges. Using a clean towel, apply top pressure to top seal T-laps immediately following sheet application. Stagger end laps a minimum of 3 feet.

2. Fully bond the finish ply to the base ply, utilizing minimum 3-inch side and end laps. Apply each sheet directly behind the torch applicator. Stagger end laps of the finish ply a minimum of 3-feet. Cut dog ear angles on underlying end laps at the finish edge and the overlapping selvage edges. Using a clean trowel, apply top pressure to top seal T-laps immediately following sheet application. Stagger side laps of the finish ply a minimum 12-inches from side laps in the underlying base ply. Stagger end laps of the finish ply a minimum 3-feet from end laps in the underlying base ply.

3. Maximum sheet lengths and special fastening of the specified roof membrane system may be required at various slope increments where the roof deck slope exceed 1/2-inch per foot. The Manufacturer shall provide acceptable sheet lengths and the required fastening schedule for all roofing sheet applications to applicable roof slopes.

J. Granule Embedment: Broadcast mineral granules over all bitumen overruns on the finish ply surface, while the bitumen is still hot or the adhesive is soft, to ensure a monolithic surface color.

K. Flashing Application: Cut the cant backing sheet into 12-inch widths and peel the release film from the back of the sheet. Set the sheet into place over the primed substrate extending 6-inches onto the field of the roof area and 6-inches up the vertical surface utilizing minimum 3-inch laps. Set the non-combustible cant into place dry, prior to installation of the roof membrane base ply. Flash walls and curbs using the reinforcing sheet and the metal foil flashing membrane. After the base ply has been applied to the top of the cant, prime the base ply surfaces to receive the reinforcing sheet. Fully adhere the reinforcing sheet, utilizing minimum 3-inch side laps onto the primed base ply surface and up the primed wall or curb to the desired flashing height. After the final roofing ply has been applied to the top of the cant, prepare the surface area that is to receive flashing coverage by torch heating granular surfaces or by application of asphalt primer, allowing primer to dry thoroughly. Torch-apply the metal foil-faced flashing into place using 3-foot widths (cut off the end of roll) always lapping the factory selvage edge. Extend the flashing sheet a minimum of 4-inches beyond the toe of the cant onto the prepared surface of the finished roof and up the wall or curb to the desired flashing height. Exert pressure on the flashing sheet during application to ensure complete contact with the vertical/horizontal surfaces, preventing air pockets. This can be accomplished by using a damp sponge or shop rag. Check and seal all loose laps and edges. Nail the top edge of the flashing on 9-inch centers.

1. Cant backing sheet must be installed in all torch-applied flashing details. Cut the cant backing sheet into 12-inch wide widths and peel the release film from the back of the sheet. Set the sheet into place extending 6-inches onto the field of the roof and 6-inches up onto the primed surface utilizing minimum 3-inch laps.

2. The reinforcing sheet must extend over all areas to receive the torch-applied metal foil flashing layer (in lieu of the 3-inches above the cant as indicated above). Paradiene 20 SA is recommended for this application.

L. Catalyzed Acrylic Resin Flashing System: Install the liquid-applied primer and flashing system in accordance with the membrane system manufacturer's printed installer's guidelines and other applicable written recommendations as provided by the Manufacturer.

M. Water Cut-Off: At end of day's Work, or when precipitation is imminent, construct a water cut-off at all open edges. Cut-offs can be built using asphalt or plastic cement and roofing felts, constructed to withstand protracted periods of surface. Cut-offs must be completely removed prior to the resumption of roofing.

N. Sealant: Apply a smooth continuous bead of the specified sealant at the exposed finish ply edge transition to metal flashings incorporated into the roof system.

3.07 SURFACING

A. Install walkway pads by setting in hot bitumen. Set joints 6-inches (150 mm) apart.

3.08 FIELD QUALITY CONTROL

A. Site Condition: Leave all areas around job site free of debris, roofing materials, equipment and related items after completion of Project.

B. Notification of Completion: Notify the Manufacturer by means of Manufacturer's printed Notification of Completion form of job completion in order to schedule a final inspection date.

C. Final Inspection/Post-Installation Meeting: Hold a meeting at the completion of the Project, attended by all parties that were present at the pre-job conference. A punch list of items required for completion shall be compiled by the Contractor and the Manufacturer's representative. Complete, sign, and mail the punch list form to the Manufacturer's headquarters.

D. Issuance of the Guarantee: Complete all post installation procedures and meet the Manufacturer's final endorsement for issuance of the specified guarantee.

3.09 CLEANING

A. Clean Work and disposal under provisions of Section 017700 "Closeout Procedures."

B. Cleanup: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

C. Collect waste material that may constitute a fire hazard, place in closed metal containers and remove daily from site.

D. Clean off excess products smears adjacent surfaces as the Work progresses by methods and with cleaning materials approved in writing by manufacturers.

E. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction. Restore to original condition or replace with new materials to the satisfaction of the Architect.

F. Contractor shall replace all materials in kind that are damaged during Work of this Section.

G. Provide continuous dust control to protect all areas of the Work.

H. Legally dispose of debris in accordance with local, State, and Federal regulations.

I. Upon completion of the Work, remove all debris and surplus items from the site.

3.10 PROTECTION

A. Protect modified bituminous membrane roofing from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove modified bituminous roofing that does not comply with requirements, repair substrates, reinstall roofing, and repair base flashings to a condition free of damage and deterioration at the time of Substantial Completion and according to warranty requirements.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counter-flashings, and coping.

B. Reglets and accessories.

1.02 RELATED REQUIREMENTS

A. Section 075000 – Built-Up Roofing Repair.

B. Section 079200 - Joint Sealants.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.

B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2010.

C. ASTM B32 - Standard Specification for Solder Metal; 2008.

D. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012)e1.

E. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2009.

F. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meeting: Convene one (1) week before starting Work of this Section.

1.05 SUBMITTALS

A. See Section 013000 “Administrative Requirements”, for submittal procedures.

B. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

1. Material List: An inclusive list of required materials. Indicate each material and cross-reference the specific system and application. Identify each material by Manufacturer's catalog number and general classification.

2. Manufacturer's Information: Technical information including label analysis and instructions for handling, storing, and installing material.

3. Include Material Safety Data Sheets, if applicable.

C. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details. Include the following:

1. Identify material, thickness, weight, and finish for each item and location in Project.

2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.

3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, and attachments to adjoining Work.

4. Do not submit Architectural Drawings. Submit Fabricator’s shop drawings to confirm the actual profiles, shapes, seams, and dimensions of the sheet metal flashing and trim to be installed for the Project.

D. Submit Manufacturer's instructions for correct application of the materials, including special surface preparation procedures and substrate conditions requiring special attention.

E. Samples: Submit one (1) Sample, 12-inches (304.8 mm) in size, illustrating material and fabrication details of typical flashing with cleats and coping.

F. Submit Qualification Data of firms and persons specified in the “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information.

G. Maintenance Data: To include in maintenance manuals. Identify substrates and types of materials installed. Include recommendations for periodic inspections, cleaning, care, maintenance, and repair.

H. Warranty: Sample of special warranty.

I. Maintain one (1) copy of each document on site.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with SMACNA Architectural Sheet Metal Manual requirements and standard details, except as otherwise indicated.

B. Maintain one (1) copy of each document on site.

C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with three (3) years of documented experience.

D. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the Work of this Section.

E. Manufacturer: Company specializing in manufacturing the Products specified in this Section with minimum ten (10) years of experience.

F. Pre-Installation Conference: Conduct conference at Project site to comply with requirements in Section 013100 “Project Management and Coordination”.

G. All Work shall be subject to acceptance by the Owner and Architect. All Work that does not comply with the intent of the Specifications shall be corrected by the Contractor.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Stack materials on platforms or pallets, covered with suitable weather tight and ventilated covering. Slope metal sheets to ensure drainage.

B. Do not store sheet metal materials in contact with other materials that might cause staining, discoloration, denting, or other surface damage.

C. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.

D. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.

E. Environmental requirements: Proceed with Work of this Section only when existing and forecasted weather conditions will permit the application to be performed in accordance with the Manufacturer's recommendations.

F. Take precautionary measures and store in UL listed storage locker to protect from fire hazards and spontaneous combustion.

G. Remove all materials, including cloths, tarps, and empty containers from the area of Work at the close of each day.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 0.028 inch (0.71 mm) thick base metal.

2.02 UNDERLAYMENT

A. Felt Underlayment: ASTM D226, asphalt saturated organic roofing felt, Type II ("No. 30"), non-perforated.

B. Slip Sheet: Rosin sized building paper, 3lb/100 sq. ft.

C. Self-Adhering, High-Temperature Sheet: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.

1. Products:

a. Refer to Section 076500 “Flexible Flashing and Weather Resistive Barriers”.

2.03 ACCESSORIES

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed neoprene sealing washers under heads of exposed fasteners bearing on weather side of metal. Neoprene isolator at washer if stainless steel bolts contact with galvanized steel.

b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

3. Fasteners for zinc-coated (galvanized) Steel Sheet: Series 300 stainless steel.

C. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight. Refer to Section 079200 “Joint Sealants”.

D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

E. Plastic Cement: ASTM D4586, Type I.

F. Solder:

1. For Zinc-Coated (Galvanized) Steel: ASTM B32; Grade Sn50 (50/50) type.

2.04 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. General: Custom fabricate sheet metal flashing to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Shop-fabricate items where practicable.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

2. Obtain field measurements for accurate fit before shop fabrication.

3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.

4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

C. Form sections true to shape, accurate in size, square, and free from distortion or defects.

D. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4-inch in 20-feet (6mm in 6m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with elastomeric sealant concealed within joints.

1. Provide loose locking slip joint of maximum 8-feet from external and internal corners, maximum 24-feet length of straight runs, unless Manufacturer recommends more frequent interval, and one (1) at center of runs less than 20-feet, but more than 8-feet, unless specified otherwise following herein.

2. Size and locate joints, fastenings, reinforcements and supports as required to preclude distortion or displacement due to thermal expansion and contraction. Conceal fastenings wherever possible.

F. Sealed Joints: Form non-expansion, but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations. Refer to Section 079200 “Joint Sealants”.

G. Form pieces in longest possible lengths.

H. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

I. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

J. Hem exposed edges on underside 1/2-inch (13 mm); miter and seam corners. Raw edges will not be permitted.

K. Seams: Form non-moving seams with flat lock seams, except where otherwise indicated. Form seams and seal with elastomeric sealant, unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

L. Fabricate corners from one (1) piece with minimum 18-inch (450 mm) long legs; seam for rigidity, seal with sealant.

M. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessories as required for installation of Work, matching or compatible with material installed, non-corrosive, size and gauge as required for performance.

N. Do not use graphite pencils to mark metal surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.

2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

3. Verify that water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

4. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

5. Verify roofing termination and base flashings are in place, sealed, and secure.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 UNDERLAYMENT INSTALLATION

A. General: Install underlayment as indicated on Drawings.

B. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle-free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller. Cover underlayment within fourteen (14) days.

3.03 INSTALLATION

A. Comply with standards of SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

B. General: Anchor sheet metal coping and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

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

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

3. Space cleats not more than 12-inches (300mm) apart. Attach each cleat with at least two (2) fasteners. Bend tabs over fasteners.

4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.

5. Torch cutting of sheet metal flashing and trim is not permitted.

6. Do not use graphite pencils to mark metal surfaces.

C. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.

2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet or install a course of polyethylene underlayment.

D. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10-feet with no joints within 24-inches (600 mm) of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1-inch (25 mm) deep, filled with sealant concealed within joints.

2. Use lapped expansion joints only where indicated on Drawings.

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

F. Conceal fasteners and expansion provisions where possible in exposed Work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation. Use exposed fasteners only where permitted.

G. Apply plastic cement compound between metal flashings and felt flashings.

H. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

I. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1-inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for fifty percent (50%) movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).

2. Prepare joints and apply sealants to comply with requirements in Section 079200 “Joint Sealants”.

J. Soldered Joints:

1. Clean surfaces to be soldered, removing oils and foreign matter.

2. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.

3. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.04 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual". Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

B. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing per roofing manufacturer's recommendations.

3.05 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such Façade Access Anchors.

B. Openings Flashing in Frame Construction: Install continuous head, sill, penetration and similar flashings to extend 4-inches beyond wall openings.

3.06 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4-inch in 20-feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3mm) offset of adjoining faces and of alignment of matching profiles

3.07 FIELD QUALITY CONTROL

A. See Section 014000 “Quality Requirements”, for field inspection requirements.

B. Inspection will involve surveillance of Work during installation to ascertain compliance with specified requirements.

3.08 CLEANING AND PROTECTION

A. Cleanup: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. Collect waste material that may constitute a fire hazard, place in closed metal containers and remove daily from site.

C. Contractor shall replace all materials in kind that are damaged during Work of this Section.

D. Provide continuous dust control to protect all areas of the Work.

E. Legally dispose of debris in accordance with local, State, and Federal regulations.

F. Upon completion of the Work, remove all debris and surplus items from the site.

G. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

H. Clean and neutralize flux materials. Clean off excess solder.

I. Clean off excess sealants.

J. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in Manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

K. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

L. Protect Work of other trades from damage whether being coated or not. Correct damage by cleaning, repairing, replacing, and recoating as approved by Architect. Leave in an undamaged condition.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roof hatches, manual and automatic operation, including smoke vents.

1.02 REFERENCE STANDARDS

A. 29 CFR 1910.23 - Guarding floor and wall openings and holes; current edition.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used.

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

4. Maintenance requirements.

C. Submit Manufacturer's instructions for correct installation of the materials, including special surface preparation procedures and substrate conditions requiring special attention.

D. Submit Qualification Data of firms and persons specified in the “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information.

E. Product Certificates: For each product, signed by product manufacturer certifying that products furnished comply with requirements and are suitable for the use indicated.

F. Maintenance Data: To include in maintenance manuals. Include recommendations for periodic inspections, cleaning, care, maintenance, and repair.

G. Warranties: Sample of warranties specified in this Section.

H. Maintain one (1) copy of each document on site

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with Manufacturer’s requirements for preparation of surfaces and material installation instructions.

B. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the Work of this Section.

C. Installer Qualifications: A firm or individual experienced in accessories similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

1. Company specializing in performing the Work of this Section with minimum five (5) years of experience.

D. Manufacturer: Company specializing in manufacturing the Products specified in this Section with minimum ten (10) years of experience. Manufacturer shall have factory-trained representatives who are available for consultation and Project site inspection at no additional cost.

E. Accessories shall be installed in accordance with Manufacturer's directions and printed specifications. Accessories shall be free of defects.

F. Pre-installation Conference:

1. Review requirements for accessory installation including substrate condition, special details, installation procedures, protection, and repairs.

G. All Work shall be subject to acceptance by the Owner and Architect. All Work that does not comply with the intent of the Specifications shall be corrected by the Contractor.

1.03 WARRANTY

A. General: Warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Installer's Warranty: Written and signed Installer's warranty form in which the Installer agrees provide materials and workmanship, and to repair or replace accessories that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Three (3) years from date of Substantial Completion.

C. Manufacturer's Warranty: Written and signed Manufacturer's warranty form in which the Manufacturer agrees to repair or replace accessories that do not comply with the performance and other requirements specified in this Section during the specified warranty period.

1. Warranty Period for Roof Hatch: Five (5) years from date of Substantial Completion.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well – vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and not such damage on the carrier's freight bill of lading.

PART 2 PRODUCTS

2.01 ROOF HATCHES, MANUAL AND AUTOMATIC OPERATION

A. Manufacturers - Roof Hatches:

1. Bilco Company; Type F (ladder access, standard size, solid cover): www.bilco.com.

2. Substitutions: See Section 016000 - Product Requirements.

B. Roof Hatches: Factory-assembled steel frame and aluminum cover, complete with operating and release hardware.

1. Style: Provide flat aluminum covers 11 gage (2.3 mm) with 3-inches (76 mm) beaded flange with formed reinforcing members.

2. Mounting: Provide frames and curbs suitable for mounting on flat roof deck.

3. Size(s): As indicated on drawings; single-leaf style unless indicated as double-leaf.

4. For Ladder Access: Single leaf; 30-inches by 36-inches (762 by 914 mm).

C. Frames/Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.

1. Material: Paint bond G-90 galvanized steel, 14 gage, 0.0747 inch (1.90 mm) thick.

2. Curb shall be formed with a 3-1/2 inches (89mm) flange with a 7/16-inch (11mm) holed provided for securing to the roof deck.

3. Curb shall be equipped with a metal cap flashing of the same gage and material as the curb, fully welded at the corners.

3. Finish: Factory prime paint.

4. Insulation: 1-inch (25 mm) rigid glass fiber, located on outside face of curb.

5. Curb Height: 12-inches (305 mm) from finished surface of roof, minimum.

D. Metal Covers: Flush, insulated, hollow metal construction.

1. Capable of supporting 40 psf (1.92 kPa) live load or 20 psf (0.96 kPa) wind uplift.

2. Material: Galvanized steel; outer cover 14 gage, 0.0747 inch (1.90 mm) thick, liner 22 gage, 0.03 inch (0.76 mm) thick.

3. Finish: Factory prime paint.

4. Insulation: 1-inch (25 mm) rigid glass fiber.

5. Gasket: Neoprene, continuous around cover perimeter.

E. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer.

1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf (475 kPa) load.

2. Hinges: Heavy-duty pintle type.

3. Hold open arm with vinyl-coated handle for manual release.

4. Latch: Upon closing, engage latch automatically and reset manual release.

5. Manual Release: Pull handle on interior.

6. Locking: Padlock hasp on interior.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by Manufacturer for achieving the best result for the substrate under the Project conditions.

3.03 INSTALLATION

A. Install in accordance with Manufacturer's instructions, in manner that maintains roofing weather integrity.

3.04 CLEANING

A. Clean installed Work to like-new condition.

3.05 PROTECTION

A. Protect installed products until completion of Project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 REFERENCE STANDARDS

A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

B. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

C. ASTM D1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; 2007.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the Work with other Sections referencing this Section.

1.04 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.05 SUBMITTALS

A. See Section 013000 “Administrative Requirements”, for submittal procedures.

B. Product Data: For each joint-sealant product specified, include primers, solvents, cleaning compounds, sealants, and other products not specified in this Section but that will be used during the course of this Work: Include Manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties.

1. Material List: An inclusive list of required sealant products. Indicate each material and cross-reference specific sealant and installation. Identify each material by Manufacturer's catalog number and general classification.

2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and installing sealant.

3. Include Material Safety Data Sheets.

4. Provide four (4) sets of Product Data Submittals.

C. Submit Manufacturer's instructions for correct installation of the materials, including special surface preparation procedures and substrate conditions requiring special attention.

D. 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.

E. Samples for Verification: For each type and color of joint sealant required, provide Samples of joint sealants.

1. Provide 1/2-inch-wide sealant joints formed between two (2) 3-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

2. Provide a list of materials and installations for each sealant.

3. Submit four (4) Samples for Architect's review.

F. 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.

G. Submit Qualification Data of firms and persons specified in the “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information.

H. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.

I. Maintenance Data: To include in maintenance manuals. Identify substrates and types of sealant applied. Include recommendations for periodic inspections, cleaning, care, maintenance, and repair of sealant.

J. Submit Manufacturer’s certification that products supplied comply with local regulations controlling use of volatile organic compounds (VOC's).

K. SWRI Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.

L. Compatibility and Adhesion Test Reports: From Sealant Manufacturer indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.

2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

M. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.

N. Warranties: Sample of warranties specified in this Section.

O. Maintain one (1) copy of each document on site.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with SWRI and ASTM requirements for preparation of surface and material installation and in accordance with Sealant Manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Installer Qualifications: A firm or individual experienced in applying sealants, silicone tapes, and pre-formed silicone extrusions, similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance and who is certified by Manufacturer.

1. Company specializing in performing the Work of this Section with minimum five (5) years of experience.

2. Workers: Thoroughly skilled and specially trained in the techniques applying sealants. Installers shall be able to demonstrate acceptable level of skill for review and acceptance by the Architect.

C. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the Work of this Section.

D. Manufacturer: Company specializing in manufacturing the Products specified in this Section with minimum ten (10) years of experience. Manufacturer shall have factory-trained representatives who are available for consultation and Project site inspection at no additional cost.

E. Sealants shall be applied in accordance with Manufacturer's directions and printed specifications. Sealants applied shall be free of defects.

F. Source Limitations: Obtain each type of joint sealant through one (1) source from a single manufacturer, unless otherwise specified.

G. Compatibility and Adhesion Testing: Submit to Joint Sealant Manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use Manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain optimum adhesion of joint sealants to joint substrates.

2. Testing will not be required if Joint Sealant Manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

H. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to joint substrates as follows:

1. Locate test joints where indicated on the Drawings or, if not indicated, as directed by Architect.

a. Conduct field-adhesion tests for each type of sealant and joint substrate indicated.

2. Notify Architect seven (7) days in advance of dates and times when test joints will be erected.

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 in ASTM C 1193.

   b. 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 in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.

5. Evaluation of Pre-construction 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.

I. Mock-ups: After the completion of Preconstruction Field-Adhesion Testing and Evaluation and before installation, install mock-ups for each joint sealant to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Install mock-ups to comply with the following requirements, using materials indicated for the completed Work and to demonstrate performance and constructability and set quality standards for materials and execution:

   1. Joints in mock-ups of assemblies specified in other Sections that are indicated to receive joint sealants, which are specified by reference to this Section.

   2. Install mock-ups in the location and of the size indicated or, if not indicated, as directed by Architect.

   3. Build mock-up under provisions of Section 014000 “Quality Requirements”.

   4. Mock-up may be tested for adhesion.

J. Pre-installation Conference:

   1. Review requirements for sealant installation including substrate condition, special details, installation procedures, protection, and repairs.

K. All Work shall be subject to acceptance by the Owner and Architect. All Work that does not comply with the intent of the Specifications shall be corrected by the Contractor.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles bearing Manufacturer's name and label and the following information:

   1. Manufacturer's brand name and stock number.

   2. Product name or title of material.

   3. Color name and number.

4. Directions for storage and handling instructions and precautions.

5. Mixing instructions for multi-component materials.

6. Date of manufacture, shelf life, and expiration date.

7. Contents by volume, for pigment and vehicle constituents.

8. Curing time.

9. VOC content.

B. Store and handle materials in compliance with Manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

C. Safety: Refer to all applicable data, including, but not limited to MSDS sheets, PDS sheets, Product labels, specific instructions for specific personal protection requirements.

D. Environmental requirements: Proceed with Work of this Section only when existing and forecasted weather conditions will permit the application to be performed in accordance with the Manufacturer's recommendations.

E. Take precautionary measures and store in UL listed storage locker to protect from fire hazards and spontaneous combustion.

F. Remove all materials, including cloths, tarps, and empty containers from the area of Work at the close of each day.

G. Ventilation: General ventilation is recommended; zero VOC materials do not generate harmful or flammable vapors. Secondary materials may present hazards to be addressed.

1.08 REGULATORY REQUIREMENTS

A. Conform to applicable Federal, State, and local regulatory requirements including flame and smoke rating requirements for finishes.

B. Flammable Liquids serve all current regulation regarding flammable liquids such as posting “No Smoking” signs. Allow no open flames, welding, or other ignition sources in the Work.

C. Conform to all applicable laws, codes, and regulations for disposal of all materials, debris, and containers.

D. Sealants shall be VOC Compliant.

E. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.

2. Sealant Primers for Nonporous Substrates: 250 g/L.

3. Sealant Primers for Porous Substrates: 775 g/L.

1.09 PROJECT CONDITIONS

A. Environmental Limitations: 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° F.

2. Adverse weather conditions.

3. When joint substrates are wet.

4. Where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

5. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer or Contract Documents for applications indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.10 WARRANTY

A. General: Warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Installer's Warranty: Written and signed Installer's warranty form in which the Installer agrees provide materials and workmanship, and 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: Three (3) years from date of Substantial Completion.

C. Manufacturer's Warranty: Written and signed Manufacturer's warranty form in which the Manufacturer agrees to repair or replace joint sealants that do not comply with the performance and other requirements specified in this Section during the specified warranty period.

1. Warranty Period for Polyurethane Sealant: Five (5) years from date of Substantial Completion.

2. Warranty Period for Silicone Sealant: Twenty (20) years from date of Substantial Completion.

D. Warranties may exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.

2. Disintegration of joint substrates from natural 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.

1.11 EXTRA MATERIALS

A. Furnish extra materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

1. Sealant: Furnish Owner not less than two (2) unopened cartridges of sealant of each type applied.

2. Label each sealed container with color, type, texture, locations, and the Manufacturer's label.

PART 2 PRODUCTS

2.01 GENERAL

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by Sealant Manufacturer based on testing and field experience.

C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

2.02 JOINT SEALANTS

A. Single-Component Nonsag Neutral-Curing Silicone Sealant:

1. Exposed sealant joints: Provide silicone sealants, ASTM C920, Type S, Grade NS, Class 50, Use NT, G, A, and O, and non-staining. Prime all metal surfaces that are to accept sealant.

2. Application for:

a. Joints in cement plaster.

3. Products:

a. Dow Corning 790 Silicone Weather Barrier Sealant by Dow Corning Corporation.

b. Silpruf LM SCS2700 by General Electric (G.E.) Silicones Company.

c. Spectrem 1 by Tremco.

d. Or approved equivalent.

B. Color:

1. Match the existing adjacent wall color or existing sealant or submit for approval.

2.03 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Close cell or any of the preceding types, as approved in writing by joint sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

2.04 ACCESSORIES

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.

D. Color: Provide color samples or mock-ups on the existing substrate for review by the Owner and Architect.

PART 3 - EXECUTION

3.01 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 joint sealant performance.

B. Verify that joints are clean, dry, sound, smooth, straight and parallel, and otherwise ready to receive joint seals.

C. Verify that joints are of sufficient depth.

D. Verify compatibility with and suitability of substrates.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

F. Verify that all other Work involved with this area, done under other sections, has been completed and accepted by the Architect and General Contractor prior to starting the application.

G. Start of sealant application will be construed as Applicator's acceptance of surface conditions.

H. Test primer for compatibility with substrate materials.

3.02 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, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

a. Exposed Aggregate Pre-Cast Concrete Panels.

b. Concrete.

3. Remove laitance and form-release agents from concrete.

4. Clean nonporous 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. As previously noted in "Miscellaneous Materials" Article, purpose of primers is to improve adhesion of sealant to substrate.

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

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

3.03 INSTALLATION OF JOINT SEALANTS

A. General: Comply with Joint Sealant Manufacturer 's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. 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 type 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 that they are directly in contact and fully wet seal the substrate joints.

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.

4. Sealant is free of air pockets, foreign embedded matter, ridges and sags.

5. Do not use scrap material.

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

1. Remove excess sealant from surfaces adjacent to joints.

2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

4. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.

5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 5C in ASTM C 1193.

a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.04 FIELD QUALITY CONTROL

A. The Contractor for Work under this Section shall maintain a Quality Control program specifically to verify compliance with this Specification.

B. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when sealant is being applied:

1. Owner may engage a qualified independent testing agency to sample sealant being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in the presence of Contractor.

2. Testing agency shall perform tests for characteristics specified, using applicable referenced testing procedures or, if not referenced, using tests cited in Manufacturer's product data.

3. Owner may direct Contractor to stop sealant application if test results show material being used does not comply with specified requirements. Contractor shall remove non-complying sealant from Project site, pay for testing, and reapply the specified sealants.

C. If test results show sealants do not comply with requirements, remove non-complying materials, prepare surfaces, and reapply sealants.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional Work with specified requirements.

E. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed elastomeric sealant joints as follows:

a. Subparagraphs below are examples only. Revise to suit Project.

b. Perform tests for the first 20 feet of joint length for each type of sealant and joint substrate.

2. Method A below is the first of four (4) test methods recommended in Appendix X1.1 in ASTM C 1193. Retain one (1) or more of the other three (3) test methods if more appropriate for Project joint conditions, and include optional text ", as appropriate for type of joint sealant application indicated."

3. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab in Appendix X1 in ASTM C 1193 as appropriate for type of joint sealant application indicated.

a. For joints with dissimilar substrates, verify adhesion to each substrate separately; do this by extending cut along one (1) side, verifying adhesion to opposite side. Repeat procedure for opposite side.

4. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field-adhesion-test log.

5. Inspect tested joints and report on the following:

a. 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 type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

b. Whether sealants filled joint cavities and are free of voids.

c. Whether sealant dimensions and configurations comply with specified requirements.

6. 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 fill, sealant configuration, and sealant dimensions.

7. 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.

F. Evaluation of Field 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.

3.05 CLEANING

A. Cleanup: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. After completing sealants work, clean glass and spattered surfaces. Remove spattered sealant without scratch or damage adjacent finished surfaces.

B. 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.

C. Remove spills from adjacent surfaces. Restore to original condition or replace with new materials to the satisfaction of the Architect.

D. Contractor shall replace all materials in kind that are damaged during Work of this Section.

E. Collect waste material that may constitute a fire hazard, place in closed metal containers and remove daily from site.

F. Provide continuous dust control to protect all areas of the Work.

G. Legally dispose of debris in accordance with local, State, and Federal regulations.

H. Upon completion of the Work, remove all debris and surplus items from the site.

3.06 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 and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original Work.

B. Provide all protection necessary to protect the tenants of the building, the public, and the property, including adjacent properties, from damage as a result of the Work in this Section.

C. Provide continuous protection of all public and private property including automobiles from damage during the Work.

D. Protect Work of other trades from damage. Correct damage by cleaning, repairing, replacing, and recoating as approved by Architect. Leave in an undamaged condition.

END OF SECTION 079200

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes the following:

1. Exterior portland cement plaster for installation over metal lath.

1.02 REFERENCE STANDARDS

A. ASTM C150/C150M - Standard Specification for Portland Cement.

B. ASTM C847 - Standard Specification for Metal Lath.

C. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster.

D. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.

E. NAAMM ML/SFA 920 - Guide Specifications For Metal Lathing and Furring; The National Association of Architectural Metal Manufacturers.

F. PCA EB049 - Portland Cement Plaster/Stucco Manual; Portland Cement Association.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product specified. Include the following:

1. Manufacturer's instructions for correct application of the materials, including preparation procedures, technical data, and tested physical and performance properties.

2. Manufacturer's technical information, including instructions for handling and storing each material.

3. Material Safety Data Sheets, if applicable.

1.04 INFORMATIONAL SUBMITTALS

A. Submit Qualification Data of firms and persons specified in the “Quality Assurance” Article to demonstrate their capabilities and experience.

B. Product Certificates: For each material, signed by manufacturers, certifying that the material comply with requirements, based on comprehensive testing of current product formulations within the last Five (5) years.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual experienced in installing cement plaster system similar in material, design, and extent to those indicated for this Project, whose work has resulted in installations with a record of successful in-service performance.

1. Company specializing in performing the Work of this Section with minimum five (5) years of experience.

B. Manufacturer: Company specializing in manufacturing the Products specified in this Section with minimum Ten (10) years of experience.

C. Pre-installation Conference: Conduct conference at Project Site.

1. Before installing cement plaster system, meet with representatives of authorities having jurisdiction, Manufacturer's technical representative, Owner, Architect, consultants, and other concerned entities. Review requirements for installation. Notify participants at least seven days before conference.

D. All Work shall be subject to acceptance by the Owner and Architect. All Work that does not comply with the intent of the Specifications shall be corrected by the Contractor.

1.06 DELIVERY, STORAGE, AND HANDLING

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

B. Safety: Refer to all applicable data, including, but not limited to MSDS sheets, PDS sheets, Product labels, specific instructions for specific personal protection requirements.

1.07 PROJECT CONDITIONS

A. Comply with ASTM C 926 requirements.

B. Exterior Plasterwork:

1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.

2. Maintain minimum ambient temperature of 50 degrees F (10 degrees C) during installation of plaster and until cured.

3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

C. Factory-Prepared Finishes: Comply with Manufacturer's written recommendations for environmental conditions for applying finishes.

1.08 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace cement plaster system that does not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: One (1) year from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PLASTER MATERIALS

A. Portland Cement, Aggregates, and Other Materials: In accordance with ASTM C926.

B. Premixed portland cement, aggregates, and proprietary ingredients for Scratch and Brown coats: Complying with material requirements of ASTM C926.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. BMI Products; 690 Plaster with Fiber.
   b. Sto Corp.; 108 Powerwall Scratch and Brown.
   c. BASF Construction Chemicals-Building Systems; StuccoBase Premix.

C. Premixed Finish Coat: As recommended by base coat manufacturer.

1. Texture: Match existing finish.

D. Aggregate: Natural Sand, according to ASTM C 897

E. Water: Clean, fresh, potable and free of mineral or organic matter that could adversely affect plaster.

2.02 METAL LATH

A. Expanded-Metal Lath: ASTM C 847 with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Alabama Metal Industries Corporation (AMICO).
   b. California Expanded Metal Products Company (CEMCO).
   c. Clarkwestern Dietrich Building Systems LLC.

2. Diamond Mesh Metal Lath: ASTM C847; self-furring.
   a. Weight: To suit application and as specified in ASTM C841 for framing spacing.

2.03 PLASTER MIXES

A. General: Comply with ASTM C 926 for applications indicated.

B. Over Metal Lath: Three-coat application, mixed and proportioned in accordance with manufacturer's instructions.

C. Premixed Plaster Materials: Mix in accordance with manufacturer's instructions.

D. Mix only as much plaster as can be used prior to initial set.

E. Mix materials dry, to uniform color and consistency, before adding water.

F. Protect mixtures from freezing, frost, contamination, and excessive evaporation.

G. Do not retemper mixes after initial set has occurred.

2.04 ACCESSORIES

A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Zinc-Coated (Galvanized) Accessories:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Alabama Metal Industries Corporation (AMICO).
   b. California Expanded Metal Products Company (CEMCO).
   c. Clarkwestern Dietrich Building Systems LLC.

2. Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 (Z180) zinc coating.

3. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.

4. External-Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.

5. Corneraids: Fabricated from zinc-coated (galvanized) steel.
   a. Small nose corneraid with expanded flanges; use unless otherwise indicated.
   b. Small nose corneraid with perforated flanges; use on curved corners.
   c. Small nose corneraid with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing masonry corners.

6. Casing Beads: Fabricated from zinc-coated (galvanized) steel; square-edged style; with expanded perforated flanges in depth required to suit plaster bases indicated and flange length required to suit applications indicated. Painted to match finish.
   a. Provide weep holes at wall base weep screed.

7. Control Joints: Fabricated from zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.

8. Expansion Joints: Fabricated from zinc-coated (galvanized) steel; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.

9. Two-Piece Expansion Joints: Fabricated from zinc-coated (galvanized) steel; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8 inch (6.34 to 16 mm) wide; with perforated flanges.

2.05 MISCELLANEOUS MATERIALS

A. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter, unless otherwise indicated.

B. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.

C. Waterproofing Sealant: As specified in Division 07 Section "Joint Sealants".

2.06 WEATHER RESISTIVE BARRIER

A. Building Paper: Asphalt-saturated Kraft building paper complying with requirements of ICC-ES AC38 Grade D.

1. Water Penetration Resistance: Withstand a water head of 21 inches (55 cm), minimum, for minimum of 5 hours, when tested in accordance with AATCC 127.

B. Self-Adhered Sheet Membrane (SASM) - Flexible self-adhered membrane, pressure sensitive, composite, water resistant membrane consisting of a pliable, butyl rubber-based adhesive, bonded to a high-density polyethylene film, interleaved with disposable release liner that is removed prior to installation.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Fortifiber Building Systems Group; FortiFlash Butyl.
   b. GCP Applied Technologies; Vycor Pro.
   c. Protecto Wrap Company; Protecto BT-20XL.

C. Penetration & Termination Mastic: As recommended by Manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Metal Lath and Accessories: Verify lath is flat, secured to substrate, and joint and surface perimeter accessories are in place.

3.02 PREPARATION

A. Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, using methods least likely to damage elements retained or adjoining construction.

1. Use hand or small power tools designed for sawing and 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. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

3. Proceed with patching after construction operations requiring cutting are complete.

B. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

C. Prepare solid-plaster bases that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.

3.03 WEATHER RESISTIVE BARRIER INSTALLATION

A. General: Install weather resistive barrier and flexible flashing in the recommended order/sequence as indicated in Manufacturer's installation instructions and the Architectural Drawings.

B. Mechanically Fastened Sheets - On Exterior:

1. Begin instllation at the base of the wall and install sheets shingle-fashion to shed water, with seams generally horizontal. Do not place vertical laps above openings.

2. Overlap seams as recommended by manufacturer, but at least 6 inches.

3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches (305 mm).

4. Attach to framed construction with fasteners extending through sheathing into framing. Space fasteners at 12 to 18 inches (305 to 460 mm) on center along each framing member supporting sheathing.

C. Self-Adhesive Sheets:

1. Install strips, transition membrane, and auxiliary materials according to the manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.

2. Prepare substrate in manner recommended by sheet manufacturer; fill and tape joints in substrate and between dissimilar materials.

3. Prime substrate to recieve membrane at required rate and allow to dry and as required per manufacturer's written instructions.Limit priming to areas that will be convered by flashing membrane in same day. Re-prime areas exposed for longer than 24 hours.

4. Remove release liner and position membrane carefulling before placing agianst surface.

5. Lap sheets shingle-fashion to shed water and seal laps air tight.

6. Once sheets are in place, press firmly into substrate with resilient hand roller; ensure that all laps are firmly adhered with no gaps or fishmouths.

7. Use same material, or other material approved by sheet manufacturer for the purpose, to seal to adjacent construction and as flashing.

8. Seal around all penetrations with termination mastic/sealant, membrane counter-flashing or other procedure in accordance with material manufacturer's instructions, ensuring chemical compatibility amongst adjoining materials.

3.04 INSTALLING METAL LATH

A. Expanded-Metal Lath: Install according to ASTM C 1063.

1. On Solid Surfaces, Not Otherwise Furred: Install self-furring diamond-mesh lath.

B. Metal lath shall be discontinued at the control joints or expansion joints according to ASTM C 1063, No. 7.10.1.4.

3.05 INSTALLING ACCESSORIES

A. Install according to ASTM C 1063 and at locations indicated on Drawings.

B. Reinforcement for External Corners:

1. Install lath-type external-corner reinforcement at exterior locations.

3.06 PLASTER APPLICATION

A. Apply premixed plaster in accordance with manufacturer's instructions.

B. General: Apply plaster in accordance with ASTM C926.

1. Do not deviate more than plus or minus 1/8 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed on surface.

2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.

C. Three-Coat Application Over Metal Lath:

1. Apply first coat to a nominal thickness of 3/8 inch (9 mm).

2. Apply second coat to a nominal thickness of 3/8 inch (9 mm).

3. Apply finish coat to a nominal thickness of 1/8 inch (3 mm).

D. Moist cure base coats.

E. Apply second coat immediately following initial set of first coat.

F. After curing, dampen previous coat prior to applying finish coat.

G. Avoid excessive working of surface. Delay troweling as long as possible to avoid drawing excess fines to surface.

H. Moist cure finish coat for minimum period of 48 hours.

3.07 PLASTER REPAIRS

A. Cut, patch, replace, and repair plaster as necessary to accommodate other work and to restore cracks, dents, and imperfections. Repair or replace work to eliminate blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.08 PROTECTION

A. Provide continuous protection of all public and private property including automobiles from damage during the Work.

B. Protect work of other trades from damage. Correct damage by cleaning, repairing, replacing, and recoating as approved by Architect. Leave in an undamaged condition.

C. Remove temporary protection and enclosure of other work. Promptly remove plaster from doorframes, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION 09 2400

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes surface preparation and application of elastomeric coatings to the following surfaces:

1. Cement Plaster Repair.

B. Related Sections include the following:

1. Section 079200 - Joint Sealants

1.02 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference: Conduct a Pre-Installation Conference at the Project site meeting at least one (1) week prior to the start of the Work of this Section; require attendance by all affected installers.

1. Before installing coatings, meet with representatives of Manufacturer's Technical Representative, Architect, and other concerned entities. Review requirements for coatings. Notify participants at least seven (7) days before conference.

B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.04 PERFORMANCE REQUIREMENTS

A. Provide elastomeric coating systems with the following properties as determined by test methods indicated:

1. Performance requirements described in subparagraphs below are listed in MPI 113. Revise to suit Project or to establish other criteria.

2. Revise first subparagraph below, if necessary, to reference test method ASTM D 412 instead of ASTM D 2370 to establish percent of elongation at break. Many manufacturers use ASTM D 412 to establish percent of elongation at break. See Evaluations for discussion of performance standards.

3. Elongation: Not less than one hundred percent (100%) with a tensile strength of 200 psi and not less than eighty-eight percent (88%) recovery after 1 hour and ninety percent (90%) recovery after 24 hours when tested according to ASTM D 2370 using parameters established by MPI 113.

4. Accelerated Weathering: No cracking, peeling, blistering, chalking, or visual deterioration after 1000 hours when tested according to procedures in ASTM G 155.

5. Low-Temperature Flexibility: No crack formation when tested according to ASTM D 1737.

6. Moisture-Vapor Transmission: Not less than 2.0 perms according to ASTM D 1653.

7. Wind-Driven Rain Resistance: No water penetration according to procedures in FS TT-C-555.

8. Minimum Solids Content by Volume: Not less than forty-five percent (45%).

1.05 SUBMITTALS

A. General: Prepare and submit specified submittals in accordance with "Conditions of the Contract" and Division 1 Submittals Sections.

B. Product Data: For each elastomeric coating system specified, include crack fillers, block fillers, and primers: Include Manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference the specific coating, finish system, and application. Identify each material by Manufacturer's catalog number and general classification.

2. Manufacturer's Information: Technical information including label analysis and instructions for handling, storing, and applying each coating material.

3. Include Material Safety Data Sheets, if applicable.

C. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of actual substrate.

1. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.

2. Submit four (4) Samples on the following substrates for Architect's review of color, texture, and sheen only:

a. Provide 6-inch square Samples of each color, texture, and sheen.

D. Product Certificate: For each elastomeric coating material, signed by manufacturers, certifying that the products of this Section meet or exceed specified requirements, based on comprehensive testing of current product formulations within the last three (3) years.

E. Submit Qualification Data of firms and persons specified in the “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information.

1. For products required to be installed by workers approved by product manufacturers, include letters of acceptance by product manufacturers certifying that installers are approved to apply their products.

F. Manufacturer's Instructions: Submit Manufacturer's instructions for correct application of the materials, including special surface preparation procedures and substrate conditions requiring special attention.

G. Maintenance Data: To include in maintenance manuals. Identify substrates and types of elastomeric coatings applied. Include recommendations for periodic inspections, cleaning, care, maintenance, and repair of coatings.

H. Submit Manufacturer’s certification that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

I. Warranty: Submit Manufacturer warranty and ensure that forms have been completed in Owner's name and registered with Manufacturer.

J. Maintenance Materials: Furnish the following for Owner's use in maintenance of Project.

1. Furnish extra elastomeric coating materials from same production run as materials applied and in quantities described below. Package materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to Owner.

a. Quantity: Furnish Owner with five (5) one-gallon containers of each color and finish of elastomeric coating materials applied. Quantity to be verified by the Owner.

b. Label each sealed container with color, type, texture, locations, and the Manufacturer’s label.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section, with not less than documented experience. Manufacturer shall have factory-trained representatives who are available for consultation and Project site inspection at no additional cost.

B. Applicator Qualifications: A firm or individual experienced in applying elastomeric coating systems similar in material and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance and who is certified by Manufacturer.

1. Company specializing in performing the Work of this Section with minimum five (5) years of experience.

2. Workers: Thoroughly skilled and specially trained in the techniques applying coatings. Applicators shall be able to demonstrate acceptable level of skill for review and acceptance by the Architect.

C. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the Work of this Section.

D. Coating materials shall be evenly coated in accordance with Manufacturer’s directions and printed specifications. Finish surfaces shall be free of runs, sags, skips, and other defects.

E. The specification of the number of coats is a minimum requirement. If full coverage is not provided with the specified number of coats, additional coats shall be applied to achieve the required finish.

F. Source Limitations: Obtain crack fillers, block fillers, primers, and other undercoat materials from same manufacturer as finish coats.

G. Fire-Test-Response Characteristics:

1. Fire-response testing was performed by UL, ITS, or another independent testing and inspecting agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.

H. Copies of Documents at Project Site: Maintain at the Project site a copy of each referenced document that prescribes execution requirements.

I. All Work shall be subject to acceptance by the Owner and Architect. All Work that does not comply with the intent of the Specifications shall be corrected by the Contractor.

1.07 MOCK-UP

A. Wall Surfaces: Prepare Samples on at least 10 sq. ft. of cement plaster wall surface.

B. Locate where directed.

C. Apply mock-up according to requirements for the completed Work. Provide required sheen, color, and texture on each surface.

D. Mock-up shall be tested for adhesion per the Manufacturer’s requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in Manufacturer's original, unopened packages and containers bearing Manufacturer's name and label, and the following information:

1. Manufacturer's brand name and stock number.

2. Product name or title of material.

3. Directions for storage and handling instructions and precautions.

4. Date of manufacture and shelf life.

5. Mixing and application instructions.

6. Contents by volume, for pigment and vehicle constituents.

7. Thinning instructions (if permitted).

8. Color name and number.

9. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue. Maintain environmental conditions within range recommended in writing by Manufacturer.

1. Protect elastomeric coating materials from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

C. Safety: Refer to all applicable data, including, but not limited to MSDS sheets, PDS sheets, Product labels, specific instructions for specific personal protection requirements.

D. Ventilation: General ventilation is recommended; zero (0) VOC materials do not generate harmful or flammable vapors. Secondary materials may present hazards to be addressed.

E. Environmental requirements: Proceed with Work of this Section only when existing and forecasted weather conditions will permit the application to be performed in accordance with the Manufacturer's recommendations.

F. Take precautionary measures and store in UL listed storage locker to protect from fire hazards and spontaneous combustion.

G. Remove all materials, including cloths, tarps, and empty containers from the area of Work at the close of each day.

1.09 REGULATORY REQUIREMENTS

A. Conform to applicable Federal, State, and local regulatory requirements including flame and smoke rating requirements for finishes.

B. Flammable Liquids serve all current regulation regarding flammable liquids such as posting “No Smoking” signs. Allow no open flames, welding, or other ignition sources in the Work.

C. Conform to all applicable laws, codes, and regulations for disposal of all materials, debris, and containers.

D. Exterior coating materials shall be VOC Compliant.

1.10 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 90 deg F, unless otherwise permitted by Manufacturer's written instructions.

B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds eighty-five percent (85%); or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before starting or continuing coating operation.

1.11 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. General: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

C. Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric coating that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period for Elastomeric Coatings: Correct defective Work within a three (3) year period after Date of Substantial Completion.

D. Elastomeric Coating Warranty: Manufacturer's standard form in which Manufacturer agrees to repair or replace elastomeric coatings that do not comply with requirements or that deteriorate during the specified warranty period.

1. Warranty Period for Elastomeric Coatings: Provide ten (10) year Manufacturer warranty from date of substantial completion.

2. Deterioration of elastomeric coatings includes, but is not limited to, the following:

   a. Adhesive or cohesive failures.

   b. Abrasion or tearing failures.

   c. Surface crazing or spalling.

   d. Blistering, running, peeling, scaling, streaks, fading, or stains.

   e. Intrusion of water, oils, gasoline, grease, salt, deicer chemicals, or acids into substrate.

PART 2 PRODUCTS

2.01 GENERAL

A. Products: Subject to compliance with requirements.

B. Material Compatibility: Provide crack fillers, block fillers, primers, elastomeric finish-coat materials, and related materials that are compatible with one another and substrates indicated under conditions of service and application, as demonstrated by Manufacturer based on testing and field experience.

C. Material Quality: Provide Manufacturer's best-quality elastomeric coating materials that are factory formulated, and are recommended by Manufacturer for the application indicated. Material containers not displaying Manufacturer's product identification are not acceptable.

   1. Proprietary Names: Use of Manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other Manufacturers. Furnish Manufacturer's material data and certificates of performance of proposed substitutions.

D. Block Fillers: Apply block fillers as recommended by the Manufacturer to concrete or cementitious surfaces at a rate to ensure complete coverage with pores filled.

E. Color: Match existing color. To be selected and approved in writing by the Owner.

2.02 ELASTOMERIC COATING

A. High solids silicone elastomeric coating.

   1. GE; SEC2400 SilShield: Minimum two (2) coats. Finish dry film thickness of 10 mils.

   2. Or approved equivalent.

B. Color: To be chosen from Manufacturer's selection by Architect and Owner.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Manufacturer representative and Applicator present, for compliance with requirements for coating application. Comply with procedures specified in PDCA P4.

1. For the record, prepare written report, endorsed by Applicator, listing conditions detrimental to performance.

2. Verify compatibility with and suitability of substrates.

3. Proceed with coating application only after unsatisfactory conditions have been corrected and surfaces are thoroughly dry.

4. Verify that substrates are visibly dry and free of moisture. Test for moisture by method recommended in writing by Manufacturer.

5. Verify that all other Work involved with this area, done under other Sections, has been completed and accepted by the Architect and General Contractor prior to starting the waterproofing application.

6. Start of coating application will be construed as Applicator's acceptance of surface conditions

B. Verify that sealant work is in place and cured.

C. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify Architect about anticipated problems when using coatings specified over substrates primed by others.

3.02 PREPARATION

A. Power wash surfaces that will be coated in order to remove existing loose coating, dirt, and foreign impurities prior to the application of the coating. Clean and prepare surfaces to be painted according to Manufacturer’s written instructions for each particular substrate condition and as specified.

B. Remove hardware and hardware accessories, plates, machined surfaces, light fixtures, and similar items already installed that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating. General:

1. After completing coating operations, re-install items removed, using workers skilled in trades involved.

C. Cleaning: Before applying coatings or other surface treatments, clean substrates according to Manufacturer's written recommendations to produce clean, dust-free, dry substrate. Clean substances that could impair bond of coating systems. Remove oil and grease before cleaning.

1. Schedule cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.

2. Remove oil and grease before cleaning.

3. Clean all surfaces to remove dirt, oil, grease, oxidation, rust, loose and scaling paint, mildew, or any other contaminated surface as follows: hand or mechanical wire brush, scrape and spot sand where required to remove all loose materials.

4. Remove all existing coatings that are loose, blistered, flaking, peeling or otherwise in unacceptable condition to receive paint to a sound, firm, well adhered surface suitable for re-coating.

5. Repair and fill minor defects such as protruding nails, nail holes, cracks, gaps, and blemishes.

D. Surface Preparation: Clean and prepare surfaces to be painted according to Manufacturer's written instructions for each particular substrate condition and as specified.

E. Mask off adjoining surfaces not receiving coatings and substrate penetrations to prevent spillage, leaking, and migration of coatings.

F. Material Preparation: Mix and prepare materials according to coating manufacturer's written instructions.

1. Maintain containers used in mixing and applying elastomeric coatings in a clean condition, free of foreign materials and residue.

2. Stir materials before application to produce a mixture of uniform density. Stir as required during application. If surface film forms, do not stir film into material. If necessary, remove film and strain coating material before using.

3. If Manufacturer permits thinning, use only thinners recommended by Manufacturer, and only within recommended limits.

G. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match color of finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.03 APPLICATION

A. General: Apply elastomeric coatings after the substrate is cleaned, free of existing loose coating, dust and foreign impurities, and fully dried. Apply elastomeric coatings according to Manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Colors, surface treatments, and finishes are indicated in coating schedule.

2. Do not paint over conditions detrimental to formation of a durable coating film, such as dirt, rust, scale, grease, moisture, and scuffed surfaces.

3. Provide finish coats compatible with primers used.

B. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

C. Scheduling Coating: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. Number of coats and film thickness required are same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by Manufacturer.

2. If undercoats or other conditions show through final coat, apply additional coats until coating film is of uniform finish, color, and appearance. Ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.

3. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until coating has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat does not cause undercoat to lift or lose adhesion.

D. Application Procedures: Apply elastomeric coatings by brush, roller, or spray according to Manufacturer's written instructions.

1. Brushes: Use brushes best suited for material being applied.

2. Rollers: Use professional-quality quick-release rollers of carpet, velvet back, or high-pile sheep's wool covers with a 1- to 1-1/4-inch nap as recommended by Manufacturer for material and texture required.

3. Spray Equipment: Use airless spray equipment with orifice size as recommended by Manufacturer for material and texture required.

E. Minimum Coating Thickness: Apply each material no thinner than Manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness as recommended by Manufacturer.

1. Wherever spray application is used, apply each coat to provide equivalent hiding of brush-applied coats. Do not double back with spray equipment, building up film thickness of two (2) coats in one (1) pass.

F. Block Fillers: Apply block fillers to concrete or cementitious surface at a rate to ensure complete coverage with pores filled.

G. Prime Coats: If recommended by Manufacturer, apply a primer to material being coated before applying finish coats.

H. Brush Application: Brush-out and work brush coats into surfaces in an even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw glass lines and color breaks.

I. Roller Application: Keep cover wet at all times; do not dry roll. Work in sections. Lay on required amount of material, working material into grooves and rough areas; then level material, working it into surface.

J. Spray Application: Use spray equipment for application only when permitted by Manufacturer's written instructions and authorities having jurisdiction.

K. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or recoat work not complying with specified requirements.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. The contractor for Work under this Section shall maintain a Quality Control program specifically to verify compliance with this Specification.

C. Inspections: A minimum of three (3) (Substrate, Application and Final) inspections, by an approved Manufacturer's representative, will be required on all Work requiring a warranty.

D. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during coating operations:

1. Owner may engage a qualified independent testing agency to sample coating material being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in presence of Contractor.

2. Testing agency shall perform tests for characteristics specified, using applicable referenced testing procedures or, if not referenced, using tests cited in Manufacturer's product data.

3. Testing agency shall verify thickness of coatings during coating application.

4. Testing agency will perform appropriate tests for the following characteristics as required by Owner:

a. Elongation.

1) Accelerated weathering.

2) Low-temperature flexibility.

3) Moisture-vapor transmission.

4) Wind-driven rain resistance.

5) Minimum solids content by volume.

6) Adhesion strength to the existing coating.

b. Owner may direct Contractor to stop coating application if test results show materials being used do not comply with requirements. Contractor shall remove non-complying materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. If necessary, Contractor may be required to remove rejected materials from previously coated surfaces if, on recoating with specified materials, the two (2) coatings are not compatible.

E. If test results show coating materials do not comply with requirements, remove non-complying materials, prepare surfaces, and reapply coatings.

F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional Work with specified requirements.

G. Contractor to provide maintenance guidelines to Owner for elastomeric coatings as part of close-out procedures.

3.05 CLEANING

A. Clean off adjacent surfaces including doorframes, louvers, sheet metal flashing, etc.

1. After completing coating work, clean glass and spattered surfaces. Remove spattered coatings by washing, scraping, or other methods, being careful not to scratch or damage adjacent finished surfaces.

B. Collect waste material that may constitute a fire hazard, place in closed metal containers and remove daily from site.

C. Clean off excess coatings smears adjacent surfaces as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of coatings.

D. Remove spills from adjacent surfaces. Restore to original condition or replace with new materials to the satisfaction of the Architect.

E. Contractor shall replace all materials in kind that are damaged during Work of this Section.

F. Provide continuous dust control to protect all areas of the Work.

G. Legally dispose of debris in accordance with local, State, and Federal regulations.

H. Upon completion of the Work, remove all debris and surplus items from the site.

3.06 PROTECTION

A. Protect Work of other trades from damage whether being coated or not. Correct damage by cleaning, repairing, replacing, and recoating as approved by Architect. Leave in an undamaged condition.

B. Provide "Wet Paint" signs to protect newly coated finishes. Remove temporary protective wrappings provided by others to protect their Work after completing coating operations.

1. After construction activities of other trades are complete, touch-up and restore damaged or defaced coated surfaces. Comply with procedures specified in PDCA P1.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Louvers.

1.02 REFERENCE STANDARDS

A. AAMA 2605-98 - High Performance Organic Coatings on Architectural Extrusions and Panels.

B. AMCA 500-L - Test Methods for Louvers.

C. AMCA 511 - Certified Ratings Program for Air Control Devices.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

C. Project Record Documents: Record actual locations of air outlets and inlets.

D. Submit Qualification Data of firms and persons specified in the “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information.

E. Product Certificates: For each type of louver and accessory, signed by product manufacturer of certifying that products furnished comply with requirements and are suitable for the use indicated.

F. Maintenance Data: To include in maintenance manuals. Include recommendations for periodic inspections, cleaning, care, maintenance, and repair of louver.

G. Shop Drawings: Submit shop drawings indicating materials, construction, dimensions, accessories, and installation details.

H. Samples: Submit sample of louver to show frame, blades, bird screen, gutters, downspouts, vertical supports, sill, accessories, finish, and color.

I. Warranties: Sample of warranties specified in this Section.

J. Maintain one (1) copy of each document on site.

1.04 QUALITY ASSURANCE

A. Louvers licensed to bear AMCA Certified Ratings Seal. Ratings based on tests and procedures performed in accordance with AMCA 511 and comply with AMCA Certified Ratings Program. AMCA Certified Ratings Seal applies to air performance and water penetration ratings.

B. Perform Work in accordance with Manufacturer’s requirements for preparation of surfaces and material installation instructions.

C. Installer Qualifications: A firm or individual experienced in installing louvers similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance and who is certified by Manufacturer.

1. Company specializing in performing the Work of this Section with minimum two (2) years of experience.

D. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the Work of this Section.

E. Manufacturer: Company specializing in manufacturing the Products specified in this Section with minimum ten (10) years of experience. Manufacturer shall have factory-trained representatives who are available for consultation and Project site inspection at no additional cost.

F. Louvers shall be installed in accordance with Manufacturer’s directions and printed specifications. Louvers shall be free of defects.

G. Source Limitations: Obtain each type of louver through one (1) source from a single manufacturer, unless otherwise specified.

H. Mock-ups: Install mock-ups for each type of louver to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Install mock-ups to comply with the following requirements, using materials indicated for the completed Work and to demonstrate performance and constructability and set quality standards for materials and execution:

1. Install mock-ups in the location and of the size indicated or, if not indicated, as directed by Architect.

2. Build mock-up under provisions of Section 014000 - Quality Requirements.

I. Pre-installation Conference:

1. Review requirements for louver installation including substrate condition, special details, installation procedures, protection, and repairs.

J. All Work shall be subject to acceptance by the Owner and Architect. All Work that does not comply with the intent of the Specifications shall be corrected by the Contractor.

1.05 WARRANTY

A. General: Warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Installer's Warranty: Written and signed Installer's warranty form in which the Installer agrees provide materials and workmanship, and to repair or replace louvers that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Three (3) years from date of Substantial Completion.

C. Manufacturer's Warranty: Written and signed Manufacturer's warranty form in which the Manufacturer agrees to repair or replace louvers that do not comply with the performance and other requirements specified in this Section during the specified warranty period.

1. Warranty Period for Roof Hatch: One (1) year from date of Substantial Completion.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in Manufacturer's original packaging. Store materials in a dry, protected, well – vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and not such damage on the carrier's freight bill of lading.

B. Storage: Store materials in a dry area indoors, protected from damage and in accordance with Manufacturer's instructions.

C. Handling: Protect materials and finishes during handling and installation to prevent damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Carnes Company HVAC: www.carnes.com.

B. Ruskin: www.ruskin.com.

C. Architectural Louvers: www.archlouvers.com

D. Substitutions: See Section 016000 - Product Requirements.

2.02 LOUVERS

A. Louvers on East Side of Penthouse:

1. Type: Stationary Horizontal Drainable Blades:

a. Frame:

1) Material: Extruded aluminum, Alloy 6063-T5.

2) Wall Thickness: 0.125 inch (3.2 mm), nominal.

3) Depth: 4-inches (102 mm).

4) Downspouts and caulking surfaces.

b. Blades:

1) Style: Drainable.

2) Material: Extruded aluminum, Alloy 6063-T5.

3) Wall Thickness: 0.125 inch (3.2 mm), nominal.

4) Angle: 45 degrees.

5) Centers: 4-inches (102 mm), nominal.

c. Bird Screen:

1) Material: Aluminum, 1/2-inch mesh x 0.063 inch (13 mm mesh x 1.6 mm), intercrimp.

2) Frame: Removable, rewireable.

d. Gutters: Drain gutter in head frame and each blade.

e. Downspouts: Downspouts in jambs to drain water from louver for minimum water cascade from blade to blade.

f. Vertical Supports: Hidden vertical supports to allow continuous line appearance up to 120 inches (3,048 mm).

g. Sill: Steeply angled integral sill eliminating areas of standing or trapped moisture where mold or mildew may thrive and effect indoor air quality.

2. Finish:

a. Clear Anodize Finish:

1) Comply with Aluminum Association AA-C22A41. Clear anodize finish 215-R1.

2) Apply finish following chemical etching and pretreatment.

3) Minimum Thickness: 0.7 mils (0.018 mm), 60 minute anodizing process.

b. Prime Coat:

1) Apply alkyd prime coat following chemical cleaning and pretreatment.

2) Primer preparation for field painting.

3. Products:

a. Carnes Company HVAC; FPBB D: www.carnes.com.

b. Ruskin; ELF445DX: www.ruskin.com.

c. Architectural Louvers; E4DS: www.archlouvers.com

d. Substitutions: See Section 016000 - Product Requirements.

B. Louvers on West Side of Penthouse:

1. Type: Stationary Wind Driven Rain Resistant Drainable Blades:

a. Performance Data:

1) Performance Ratings: AMCA licensed.

a. Based on testing 48-inch by 48-inch (1219 mm by 1219 mm) size unit in accordance with AMCA 500.

2) Free Area: Forty percent (40%), nominal.

3) Free Area Size: 6.33 sf (.59 sm).

4) Maximum Recommended Air Flow through Free Area: 759 feet per minute (3.9 m/s).

5) Air Flow: 4804 cubic feet per minute (136 cu. m/min).

6) Maximum Pressure Drop: 0.15 inches w.g. (.037 kPa).

7) Wind Driven Rain Resistance: Based on testing 39-inch by 39-inch (1. m by 1. m) core area, 41-inch by 44-inch (1.04 m by 1.11 m) nominal size unit in accordance with AMCA 500-L.

a. 50 mph (80 kph) wind velocity, 8-inches/hr (203 mm/hr) rainfall rate.

b. Core Velocity: 296 fpm (1.5 m/second).

c. Water Resistance Effectiveness: 99.3 percent (AMCA Class A)

d. Design Load: Incorporate structural supports required to withstand wind load of:

i. 20 lb/sf (0.96 kPa).

ii. Per Code

iii. Louvers shall be factory engineered to withstand the specified seismic loads.

e. Minimum design loads shall be calculated to comply with ASCE – 7, or local requirements of Authority Having Jurisdiction.

f. Frame:

1) Frame Depth: 4-inches (100 mm).

2) Material: Extruded aluminum, Alloy 6063-T6.

3) Wall Thickness: 0.081 inch (2.1 mm), nominal.

g. Blades:

1) Style: Drainable Horizontal.

2) Material: Extruded aluminum, Alloy 6063-T6.

3) Exterior Wall Thickness: 0.063 inch (1.6 mm), nominal.

h. Bird Screen:

1) Material: Aluminum,1/2-inch mesh x 0.063 inch (13 mm mesh x 1.6 mm), intercrimp.

2) Frame: Removable, rewireable.

i. Gutters: Drain gutter in head frame and each blade.

j. Downspouts: Downspouts in jambs to drain water from louver for minimum water cascade from blade to blade.

k. Vertical Supports: Hidden vertical supports to allow continuous line appearance up to 120-inches (3,048 mm).

l. Sill: Steeply angled integral sill eliminating areas of standing or trapped moisture where mold or mildew may thrive and effect indoor air quality.

2. Finish:

a. Clear Anodize Finish:

1) Comply with Aluminum Association AA-C22A41. Clear anodize finish 215-R1.

2). Apply finish following chemical etching and pretreatment.

3) Minimum Thickness: 0.7 mils (0.018 mm), 60 minute anodizing process.

b. Prime Coat:

1) Apply alkyd prime coat following chemical cleaning and pretreatment.

2) Primer preparation for field painting.

3. Products:

a. Carnes Company HVAC; FRWB D: www.carnes.com.

b. Ruskin; EME420MD: www.ruskin.com.

c. Architectural Louvers; E4DS: www.archlouvers.com

d. Substitutions: See Section 016000 – Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Inspect areas to receive louvers. Notify the Architect of conditions that would adversely affect the installation or subsequent utilization of the louvers. Do not proceed with installation until unsatisfactory conditions are corrected.

B. If opening preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean opening thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by Manufacturer for achieving the best result for the substrate under the Project conditions.

3.03 INSTALLATION

A. Install louvers at locations indicated on the Drawings and in accordance with Manufacturer's instructions.

B. Install louvers plumb, level, in plane of wall, and in alignment with adjacent Work.

C. Install joint sealants as specified in Section 079200 – Joint Sealants.

D. Apply field topcoat within six (6) months of application of shop prime coat. Apply field topcoat as specified in Section 099653 – Elastomeric Coatings.

3.04 CLEANING

A. Cleanup: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. Contractor shall replace all materials in kind that are damaged during Work of this Section.

C. Collect waste material that may constitute a fire hazard, place in closed metal containers and remove daily from site.

D. Provide continuous dust control to protect all areas of the Work.

E. Legally dispose of debris in accordance with local, State, and Federal regulations.

F. Upon completion of the Work, remove all debris and surplus items from the site.

G. Clean louver surfaces in accordance with Manufacturer's instructions.

H. Touch-up, repair or replace damaged products before Substantial Completion.

3.06 PROTECTION

A. Provide all protection necessary to protect the tenants of the building, the public, and the property, including adjacent properties, from damage as a result of the Work in this Section.

B. Provide continuous protection of all public and private property including automobiles from damage during the Work.

C. Protect work of other trades from damage. Correct damage by cleaning, repairing, replacing, and recoating as approved by Architect. Leave in an undamaged condition.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes packaged engine-generator sets for emergency power supply with the following features:

1. Diesel engine.
2. Unit-mounted cooling system.
3. Unit-mounted control and monitoring.
4. Outdoor Enclosure.

B. Related Sections include the following:

1. Section 26 36 00 "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine-generator sets.

1.03 DEFINITIONS

A. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of packaged engine generator indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. In addition, include the following:

1. Thermal damage curve for generator.
2. Time-current characteristic curves for generator protective device.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Dimensioned outline plan and elevation drawings of engine-generator set and other components specified.
2. Design Calculations: Signed and sealed by a qualified professional engineer. Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
3. Vibration Isolation Base Details: Signed and sealed by a qualified professional engineer. Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include base weights.

4. Wiring Diagrams: Power, signal, and control wiring.

1.05 INFORMATIONAL SUBMITTALS

A. Manufacturer Seismic Qualification Certification: Submit certification that day tank, engine-generator set, batteries, battery racks, accessories, and components will withstand seismic forces defined in Section 26 05 48 "Vibration and Seismic Controls for Electrical Systems." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Qualification Data: For testing agency.

C. Source quality-control test reports.

1. Certified summary of prototype-unit test report.
2. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
3. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.
4. Report of sound generation.
5. Report of exhaust emissions showing compliance with applicable regulations.
6. Certified Torsional Vibration Compatibility: Comply with NFPA 110.

D. Field quality-control test reports.

E. Warranty: Special warranty specified in this Section.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:

1. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.

1.07 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: One for every 10 of each type and rating, but no fewer than one of each.

2. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.
3. Filters: One set each of lubricating oil, fuel, and combustion-air filters.

1.08 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

1. Maintenance Proximity: Not more than four hours' normal travel time from Installer's place of business to Project site.
2. Engineering Responsibility: Preparation of data for vibration isolators and seismic restraints of engine skid mounts, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 200 miles of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.

C. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL), and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

D. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

F. Comply with ASME B15.1.

G. Comply with NFPA 37.

H. Comply with NFPA 70.

I. Comply with NFPA 110 requirements for Level 1 emergency power supply system.

J. Comply with UL 2200.

K. Engine Exhaust Emissions: Comply with applicable state and local government requirements.

L. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

1.09 PROJECT CONDITIONS

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:

1. Notify Construction Manager no fewer than two 14 days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Construction Manager's written permission.

B. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: 5 to 40 deg C.
2. Relative Humidity: 0 to 95 percent.
3. Altitude: Sea level to 1000 feet.

1.10 COORDINATION

A. Coordinate size and location of concrete bases for package engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.11 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 5 years from date of Substantial Completion.

1.12 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Generac Power Systems Inc. 350kw .8pf generator or a comparable product by one of the following:

1. Kohler Co.; Generator Division.

2. Onan/Cummins Power Generation; Industrial Business Group.

2.02 ENGINE-GENERATOR SET

A. Factory-assembled and -tested, engine-generator set.

B. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation

C. Engine Exhaust Emissions: Comply with EPA Tier 2 requirements and applicable state and local government requirements

D. Mounting Frame: Maintain alignment of mounted components without depending on concrete foundation; and have lifting attachments.

1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and generator-set center of gravity.

E. Capacities and Characteristics:

1. Power Output Ratings: Nominal ratings as indicated, with capacity as required to operate as a unit as evidenced by records of prototype testing.
2. Output Connections: Three-phase, four wire.
3. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.

F. Generator-Set Performance:

1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.
2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
7. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
8. Start Time: Comply with NFPA 110, Type 10, system requirements.

2.03 ENGINE

A. Fuel: Fuel oil, Grade DF-2.

B. Rated Engine Speed: 1800 rpm.

C. Maximum Piston Speed for Four-Cycle Engines: 2250 fpm.

D. Lubrication System: The following items are mounted on engine or skid:

1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

E. Engine Fuel System:

1. Main Fuel Pump: Mounted on engine. Pump ensures adequate primary fuel flow under starting and load conditions.
2. Relief-Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.

F. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity.

G. Governor: Mechanical.

H. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine-generator-set mounting frame and integral engine-driven coolant pump.

1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
3. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
5. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.

    a. Rating: 50-psig maximum working pressure with coolant at 180 deg F, and noncollapsible under vacuum.
    b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

I. Muffler/Silencer: Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.

1. Minimum sound attenuation of 25 dB at 500 Hz.
2. Sound level measured at a distance of 10 feet from exhaust discharge after installation is complete shall be 85 dBA or less.

J. Air-Intake Filter: Standard-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.

K. Starting System: 24-V electric, with negative ground.

1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in Part 1 "Project Conditions" Article.
2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
3. Cranking Cycle: As required by NFPA 110 for system level specified.
4. Battery: Adequate capacity within ambient temperature range specified in Part 1 "Project Conditions" Article to provide specified cranking cycle at least three times without recharging.
5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
6. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 10 deg C regardless of external ambient temperature within range specified in Part 1 "Project Conditions" Article. Include accessories required to support and fasten batteries in place.
7. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
8. Battery Charger: Current-limiting, automatic-equalizing and float-charging type. Unit shall comply with UL 1236 and include the following features:

    a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
    b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg C to plus 60 deg C to prevent overcharging at high temperatures and undercharging at low temperatures.
    c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
    d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
    e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
    f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

2.04 FUEL OIL STORAGE

A. Comply with NFPA 30.

B. Base-Mounted Fuel Oil Tank: Factory installed and piped, complying with UL 142 fuel oil tank. Features include the following:

1. Tank level indicator.
2. Leak detection system for secondary containment.
3. Capacity: Fuel for 16 hours' continuous operation at 100 percent rated power output.
4. Vandal-resistant fill cap.
5. Containment Provisions: Double wall UL 142 listed. Comply with requirements of authorities having jurisdiction.

2.05 CONTROL AND MONITORING

A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down generator set.

B. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the generator set. Mounting method shall isolate the control panel from generator-set vibration.

C. Indicating and Protective Devices and Controls: As required by NFPA 110 for Level 1 system, and the following:

1. AC voltmeter.
2. AC ammeter.
3. AC frequency meter.
4. DC voltmeter (alternator battery charging).
5. Engine-coolant temperature gage.
6. Engine lubricating-oil pressure gage.
7. Running-time meter.
8. Ammeter-voltmeter, phase-selector switch(es).
9. Generator-voltage adjusting rheostat.
10. Fuel tank derangement alarm.
11. Fuel tank high-level shutdown of fuel supply alarm.
12. Generator overload.

D. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.

E. **C**onnection to Data Link: A separate terminal block, factory wired to Form C dry contacts, for each alarm and status indication is reserved for connections for remote monitoring of indications to building management system.

F. Common Remote Audible Alarm: Comply with NFPA 110 requirements for Level 1 systems. Include necessary contacts and terminals in control and monitoring panel.

1. Overcrank shutdown.
2. Coolant low-temperature alarm.
3. Control switch not in auto position.
4. Battery-charger malfunction alarm.
5. Battery low-voltage alarm.

G. Remote Alarm Annunciator: Comply with NFPA 99. An LED labeled with proper alarm conditions shall identify each alarm event and a common audible signal shall sound for each alarm condition. Silencing switch in face of panel shall silence signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.

1. Provide (1) four remote alarm annunciators. Location for annunciator shall be as follows:
   a. Security Office in building adjacent to fire alarm remote annunciator.

H. Remote Emergency-Stop Switch: Flush; wall mounted, unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

1. Locate emergency stop switch at loading dock across from the generator.

2.06 GENERATOR OVERCURRENT AND FAULT PROTECTION

A. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 100 percent rated; complying with NEMA AB 1 and UL 489.

1. Tripping Characteristic: Designed specifically for generator protection.
2. Trip Rating: Matched to generator rating.
3. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
4. Mounting: Adjacent to or integrated with control and monitoring panel.

2.07 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

A. Comply with NEMA MG 1.

B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.

C. Electrical Insulation: Class H or Class F.

D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.

E. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.

F. Enclosure: Dripproof.

G. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified.

1. Adjusting rheostat on control and monitoring panel shall provide plus or minus 5 percent adjustment of output-voltage operating band.

H. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.

I. Subtransient Reactance: 12 percent, maximum.

2.08 OUTDOOR GENERATOR-SET ENCLOSURE

A. Description: Vandal-resistant, sound-attenuating, weatherproof steel housing, wind resistant up to 100 mph (160 km/h). Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.

B. Description: Prefabricated or pre-engineered galvanized-steel-clad, integral structural-steel-framed, Level 2 sound enclosure (75dBA at 23ft.), erected on concrete foundation.

1. Structural Design and Anchorage: Comply with ASCE 7 for wind loads up to 100 mph (160 km/h).
2. Seismic Design: Comply with seismic requirements in Section 260548.16 "Seismic Controls for Electrical Systems."
3. Hinged Doors: With padlocking provisions.
4. Space Heater: Thermostatically controlled and sized to prevent condensation.
5. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine-generator-set components.
6. Muffler Location: Within enclosure.

C. Engine Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for 2 hours with ambient temperature at top of range specified in system service conditions.

1. Louvers: Fixed-engine, cooling-air inlet and discharge. Storm-proof and drainable louvers prevent entry of rain and snow.
2. Automatic Dampers: At engine cooling-air inlet and discharge. Dampers shall be closed to reduce enclosure heat loss in cold weather when unit is not operating.
3. Housing shall be equipped with vertical air discharge scoop.
4. Ventilation: Provide temperature-controlled exhaust fan interlocked to prevent operation when engine is running.

2.09 VIBRATION ISOLATION DEVICES

A. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.

1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to wind loads or if weight is removed; factory-drilled baseplate bonded to 1/4-inch- thick, elastomeric isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
2. Outside Spring Diameter: Not less than 80 percent of compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.10 FINISHES

A. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

2.11 SOURCE QUALITY CONTROL

A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.

1. Tests: Comply with NFPA 110, Level 1 Energy Converters and with IEEE 115.

B. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:

1. Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.
2. Full load run.
3. Maximum power.
4. Voltage regulation.
5. Transient and steady-state governing.
6. Single-step load pickup.
7. Safety shutdown.
8. Report factory test results within 10 days of completion of test.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine-generator performance.

B. Examine roughing-in of piping systems and electrical connections. Verify actual locations of connections before packaged engine-generator installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Comply with packaged engine-generator manufacturers' written installation and alignment instructions and with NFPA 110.

B. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.

C. Install packaged engine generator with restrained spring isolators having a minimum deflection of 1 inch on concrete base. Secure sets to anchor bolts installed in concrete bases. Concrete base construction is specified in Section 26 05 48 "Vibration and Seismic Controls for Electrical Systems."

D. Install Schedule 40, black steel piping with welded joints and connect to engine muffler. Piping shall be same diameter as muffler outlet. Flexible connectors and steel piping materials and installation requirements are specified in Section 23 21 13 “Hydronic Piping."

1. Install condensate drain piping to muffler drain outlet full size of drain connection with a shutoff valve, stainless-steel flexible connector, and Schedule 40, black steel pipe with welded joints. Flexible connectors and piping materials and installation requirements are specified in Section 23 21 13 “Hydronic Piping."

E. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.03 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping and specialties.

B. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow service and maintenance.

C. Connect engine exhaust pipe to engine with flexible connector.

D. Connect fuel piping to engines with a gate valve and union and flexible connector.

E. Ground equipment according to NEC.

3.04 IDENTIFICATION

A. Identify system components according to Section 26 05 53 "Identification for Electrical Systems."

3.05 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.

C. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and Inspections:

1. Perform tests recommended by manufacturer and each electrical test and visual and mechanical inspection for "AC Generators and for Emergency Systems" specified in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, single-step full-load pickup test.
3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.

a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
c. Verify acceptance of charge for each element of the battery after discharge.
d. Verify that measurements are within manufacturer's specifications.

4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.
6. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding 40-inch wg. Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.
7. Exhaust Emissions Test: Comply with applicable government test criteria.
8. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
9. Harmonic-Content Tests: Measure harmonic content of output voltage under 25 percent and at 100 percent of rated linear load. Verify that harmonic content is within specified limits.
10. Noise Level Tests: Measure A-weighted level of noise emanating from generator-set installation, including engine exhaust and cooling-air intake and discharge, at four locations on the property line, and compare measured levels with required values.

E. Coordinate tests with tests for transfer switches and run them concurrently.

F. Test instruments shall have been calibrated within the last 12 months, traceable to standards of NIST, and adequate for making positive observation of test results. Make calibration records available for examination on request.

G. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

H. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

I. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

J. Remove and replace malfunctioning units and retest as specified above.

K. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

L. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

M. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each power wiring termination and each bus connection. Remove all access panels so terminations and connections are accessible to portable scanner.

1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan 11 months after date of Substantial Completion.
2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
3. Record of Infrared Scanning: Prepare a certified report that identifies terminations and connections checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.06 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators. Refer to Section 01 77 00 "Closeout Procedures."

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes transfer switches rated 600 V and less, including the following:

1. Automatic transfer switches.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.

1. Single-Line Diagram: Show connections between transfer switch, power sources, and load.

1.04 INFORMATIONAL SUBMITTALS

A. Manufacturer Seismic Qualification Certification: Submit certification that transfer switches accessories, and components will withstand seismic forces defined in Section 26 05 48 "Vibration and Seismic Controls for Electrical Systems." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.05 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:

1. Features and operating sequences, both automatic and manual.
2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain a service center capable of providing training, parts, and emergency maintenance repairs within a response period of less than eight hours from time of notification.

B. If an independent testing agency is required, see Section 014000 "Quality Requirements" for general testing and inspecting agency qualification requirements. If additional control is needed, use first paragraph below to specify 29 CFR 1910.7 or other more specific criteria (e.g., NETA). 29 CFR 1910.7 defines a nationally recognized testing laboratory as it applies to testing and inspecting for safety, and lists, labels, or accepts equipment and materials that meet certain OSHA criteria.

C. Source Limitations: Obtain automatic transfer switches through one source from a single manufacturer.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. Comply with NEMA ICS 1.

F. Comply with NFPA 70.

G. Comply with NFPA 99.

H. Comply with NFPA 110.

I. Comply with UL 1008 unless requirements of these Specifications are stricter.

1.07 FIELD CONDITIONS

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by others unless permitted under the following conditions and then only after arranging to provide temporary electrical service:

1. Notify Construction Manager no fewer than 14 days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Construction Manager's written permission.

1.08 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Section 03 30 00 "Cast-in-Place Concrete."

PART 2 - PRODUCTS

2.01 MANUFACTURED UNITS

A. Contactor Transfer Switches:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Emerson; ASCO Power Technologies, LP.
   b. Generac Power Systems, Inc.
   c. GE Zenith Controls.
   d. Onan/Cummins Power Generation; Industrial Business Group.
   e. Russelectric, Inc.

2.02 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

A. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.

B. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.

C. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.

D. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.

E. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.

F. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
   1. Switch Action: Double throw; mechanically held in both directions.
   2. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.

G. Neutral Switching. Where four-pole switches are indicated, provide neutral pole switched simultaneously with phase poles.

H. Battery Charger: For generator starting batteries.

1. Float type rated 10 A.
2. Ammeter to display charging current.
3. Fused ac inputs and dc outputs.

I. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels shall have communication capability matched with remote device.

J. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, either by color-code or by numbered or lettered wire and cable tape markers at terminations. Color-coding and wire and cable tape markers are specified in Section 26 05 53 "Identification for Electrical Systems."

1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.

K. Enclosures: General-purpose NEMA 250, Type 1, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.03 AUTOMATIC TRANSFER SWITCHES

A. Comply with Level 1 equipment according to NFPA 110.

B. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.

C. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.

D. Signal-Before-Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval is adjustable from 1 to 30 seconds.

E. In-Phase Monitor: Factory-wired, internal relay controls transfer so it occurs only when the two sources are synchronized in phase. Relay compares phase relationship and frequency difference between normal and emergency sources and initiates transfer when both sources are within 15 electrical degrees, and only if transfer can be completed within 60 electrical degrees. Transfer is initiated only if both sources are within 2 Hz of nominal frequency and 70 percent or more of nominal voltage.

F. Automatic Transfer-Switch Features:

1. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 75 percent. In field adjust ATS2 to pickup at 90 percent and dropout at 85 percent.
2. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second. In filed adjust AST2 to 4 seconds
3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup

voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.

4. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 15 minutes to automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
5. Test Switch: Simulate normal-source failure.
6. Switch-Position Pilot Lights: Indicate source to which load is connected.
7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.

    a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
    b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."

8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
9. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.
10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.
11. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.
12. Engine-Generator Exerciser: Required only in ATS1. Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory settings are for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:

    a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
    b. Push-button programming control with digital display of settings.
    c. Integral battery operation of time switch when normal control power is not available.

2.04 SOURCE QUALITY CONTROL

A. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Design each fastener and support to carry load indicated by seismic requirements and

according to seismic-restraint details. See Section 26 05 48 "Vibration and Seismic Controls for Electrical Systems."

B. Floor-Mounting Switch: Anchor to floor by bolting.

1. Concrete Bases: 4 inches high, reinforced, with chamfered edges. Extend base no more than 4 inches in all directions beyond the maximum dimensions of switch, unless otherwise indicated or unless required for seismic support. Construct concrete bases according to Section 26 05 29 "Hangers and Supports for Electrical Systems."

C. Annunciator and Control Panel Mounting: Flush in wall, unless otherwise indicated.

D. Identify components according to Section 26 05 53 "Identification for Electrical Systems."

E. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

3.02 CONNECTIONS

A. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.

B. Ground equipment according to NEC.

C. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

3.03 FIELD QUALITY CONTROL

A.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
3. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.

    a. Check for electrical continuity of circuits and for short circuits.
    b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
    c. Verify that manual transfer warnings are properly placed.
    d. Perform manual transfer operation.

4. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.

a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
b. Simulate loss of phase-to-ground voltage for each phase of normal source.
c. Verify time-delay settings.
d. Verify pickup and dropout voltages by data readout or inspection of control settings.
e. Test unit functional modes and related automatic transfer-switch operations.
f. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.

5. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.

a. Verify grounding connections and locations and ratings of sensors.

C. Coordinate tests with tests of generator and run them concurrently.

D. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

E. Remove and replace malfunctioning units and retest as specified above.

F. Prepare test and inspection reports.

G. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switch. Remove all access panels so joints and connections are accessible to portable scanner.

1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.
2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
3. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.04 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment as specified below. Refer to Section 01 77 00 "Closeout Procedures"

B. Coordinate this training with that for generator equipment.

END OF SECTION