



SPECIFICATIONS - ISSUE FOR BID

WVC Facilities Building
Saratoga, CA
26 May 2026

SGH Project 257152.00



Date Signed: 05/26/2026

PREPARED FOR
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Saratoga, CA 95070

PREPARED BY
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pages

SPECIFICATIONS

036401	EPOXY INJECTION	1 – 4
071800	TRAFFIC COATING	1 – 9
076200	SHEET METAL FLASHING AND TRIM	1 – 9
079100	WATER REPELLENTS SEALER	1 – 6
079200	EXTERIOR JOINT SEALANTS	1 – 13

SECTION 036401

EPOXY INJECTION

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

- A. Scope: Furnish all materials, tools, equipment, appliances, transportation, labor and supervision required to repair cracks by the injection of an epoxy resin adhesive.
- B. Qualifications:
 - 1. Applicator's qualifications: Applicator shall have a minimum of five years of experience in structural repair using injection of epoxy resin adhesive.
 - 2. Workman's qualifications: Workmen engaged in the epoxy injection process shall have satisfactorily completed a program of instruction in the methods of restoring concrete structures utilizing the specific epoxy injection process indicated. The program shall include methods for permanently repairing damaged concrete structures, the technical aspects of correct material selection and use, and the operation, maintenance and troubleshooting of equipment.

PART 2 – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Epoxy resin adhesive: Epoxy resin adhesive shall be a two-part epoxy recommended by the manufacturer for use in pressure injection.
 - 1. Acceptable Manufacturer: Kemko 170 LP Paste Bonder by ChemCo Systems or approved equal.

2.02 SURFACE SEAL

- A. Description: The surface seal material is a temporary material used to confine the injection adhesive in the fissure during injection and cure.
- B. Properties: The surface seal material shall have adequate strength to hold injection fittings firmly in place and to resist injection pressures adequately to prevent leakage during injection and be removed for installation of sealant joint over backer rod at the exterior face of the CMU.

C. Equipment for Injection

1. Type: The equipment used to meter and mix the two injection adhesive components and inject the mixed adhesive into the crack shall be portable, positive-displacement-type pumps with an interlock to provide positive ratio control of exact proportions of the two components at the nozzle. The pumps shall be electric or air powered and shall provide in-line metering and mixing.
2. Discharge pressure: the injection equipment shall have automatic pressure control capable of discharging the mixed adhesive at any pre-set pressure up to 160 ± 5 psi and shall be equipped with a manual pressure control override.
3. Ratio tolerance: the equipment shall have the capability of maintaining the volume ratio for the injection adhesive prescribed by the manufacturer of the adhesive within a tolerance of $\pm 5\%$ by volume at any discharge pressure up to 160 psi.
4. Automatic shut-off control: the injection equipment shall be equipped with sensors on both the component a and b reservoirs that will automatically and immediately stop the machine when either reservoir becomes dry.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Surfaces adjacent to cracks or other areas of application shall be cleaned of dirt, dust, grease, oil, efflorescence, or other foreign matter detrimental to the bond of the epoxy injection surface seal system.
- B. Entry ports shall be provided along the crack at the manufacturer's recommended intervals.
- C. Surface seal material shall be applied to the face of the crack between the entry ports. For through cracks, surface seal shall be applied to both faces.
- D. The surface seal material shall gain adequate strength before proceeding with the injection.

3.02 EPOXY INJECTION

- A. Injection of the epoxy adhesive shall begin at the lowest entry port and continue until there is an appearance of epoxy adhesive at the next entry port adjacent to the entry port being pumped.

- B. When epoxy adhesive travel is indicated by appearance at the next adjacent port, injection shall be discontinued on the entry port being pumped, and epoxy injection shall be transferred to the next adjacent port where epoxy adhesive has appeared.
- C. Perform epoxy adhesive injection continuously until cracks are completely filled.
- D. If port-to-port travel of epoxy adhesive is not indicated, the work shall be stopped immediately and the engineer notified.

3.03 FINISHING

- A. When cracks are completely filled, epoxy adhesive shall be cured for sufficient time to allow removal of surface seal without any draining or runback of epoxy material from cracks.
- B. Surface seal material and injection adhesive runs or spills shall be removed from concrete surfaces. Remove surfacing material.
- C. The face of the crack shall be finished flush to the CMU and sealed with sealant over backer rod, refer to Division 7 Section Exterior Joint Sealant.

3.04 QUALITY CONTROL

- A. Pressure test of injection equipment:
 - 1. Method: The mixing head of the injection equipment shall be disconnected, and the two adhesive component delivery lines shall be attached to the pressure check device. The pressure check device shall consist of two independent valved nozzles capable of controlling flow rate and pressure by opening and closing the valve. There shall be a pressure gauge capable of sensing the pressure build-up behind each valve. The valves on the pressure check device shall be closed, and the equipment shall be operated until the gauge pressure on each line reads 160 psi. The pumps shall be stopped and the gauge pressure shall not drop below 150 psi within 2 minutes.
 - 2. Frequency of pressure test: the pressure test shall be run for each injection unit at the beginning of the work each day and after every break in the work of one hour or longer.
- B. Ratio test of the injection equipment
 - 1. Method: The mixing head of the injection equipment shall be disconnected, and the two adhesive components shall be pumped simultaneously through the ratio check device. The ratio check device shall consist of two independent valved nozzles capable of controlling back pressure by opening or closing the valve. There shall be a pressure gauge capable of sensing the

back pressure behind each valve. The discharge pressure shall be adjusted to 160 psi for both adhesive components. Both adhesive components shall be simultaneously discharged into separate calibrated containers. The amounts discharged into the calibrated containers simultaneously during the same time period shall be compared to determine that the volume/discharge conforms to the manufacturer's recommended ratio for applicable material.

C. Proof of ratio and pressure test

1. At all times during the course of the work, the contractor shall keep complete and accurate records of the tests specified above. The test records shall be made available to the structural engineer.
2. In addition, the structural engineer, at any time and without prior notification, may request the contractor to conduct the tests specified above in the presence of the engineer.

END OF SECTION

SECTION 071800

TRAFFIC COATING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and provisions of the Contract, including the General and Supplementary Conditions, and Division 1 of these Specifications, apply to the work in this Section.

1.02 WORK INCLUDED

A. Section Includes:

- 1. Traffic coatings for use at exterior spaces (not over occupied space) as indicated on the project drawings.

B. Related Requirements:

- 1. Division 07 Section "Sheet Metal Flashing and Trim."
- 2. Division 07 Section "Joint Sealants."

1.03 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site prior to beginning work but after approval of a complete submittal.

- 1. Review coating requirements including surface preparation, substrate condition and pretreatment, minimum curing period, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.
- 2. Installer, Architect, waterproofing consultant, manufacturer's technical representative, and other installers whose work penetrates or interfaces with waterproofing or may affect its quality shall meet at the project site to coordinate related requirements and waterproofing work.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's complete technical and installation literature for all materials of complete waterproofing systems.

- B. Safety Data Sheets (SDS): For storage at project site.
- C. Shop Drawings: Submit installation details for waterproofing system to show details at the intersection of horizontal and vertical surfaces, and at penetrations in membrane systems.
 - 1. Submit plans showing the type and extent of the traffic coating systems.
 - 2. Submit for typical and nontypical conditions, including out-of-scope work of Project. Manufacturer's standard data sheets are not acceptable for Shop Drawings.
 - 3. Indicate and identify materials to be incorporated in the work, dimensions, thickness of each material and system, and relationships to adjacent construction including out-of-scope work.
- D. Certification by manufacturer that products supplied comply with requirements indicated that limit the amount of VOCs in coating products.
- E. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects in the past seven years with project names and addresses, names and addresses of Architect/Engineers and owners, and other information specified.
- F. Sample warranty forms from the manufacturer of the waterproofing system and the Contractor, and provide manufacturer's written approval that the proposed system will be eligible for the warranty once installed.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed high-performance coating system applications similar in material and extent to those indicated for Project and whose work has a record of successful in-service performance.
- B. Manufacturer Qualifications: Company specializing in the production of coating system with a minimum of ten years documented continuous experience in the manufacture of high-performance coating products and employing experienced in-house technical and field observation personnel qualified to provide expert technical support.
- C. Materials: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer. Accessory materials shall be approved by the primary waterproofing manufacturer.

- D. Mockups: Provide a full-coat mockup for adhesion testing. Architect will select mockup location.
 - 1. Install mockup to set quality standards for each type of installation.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Approved mockups shall serve as a standard for workmanship throughout the project.

- E. Field Adhesion Testing:
 - 1. Provide two samples for all combinations of coating and substrates (e.g., coating to concrete, coating to CMU wall, etc.) for adhesion testing one week prior to membrane installation. Provide Owner and Architect with one week's notice prior to adhesion tests.

1.06 FIELD INSPECTION SERVICES

- A. Manufacturer's technical representative shall provide the following inspections of the membrane application:
 - 1. Job-start inspection at the beginning of each phase of the project, to review special detail conditions and substrate preparation.
 - 2. Final punch-list and warranty inspection to confirm completeness of all punch-list items and surfacing.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and Acceptance Requirements: Deliver materials in manufacturer's original packaging with label indicating pertinent information identifying the item.
- B. Storage and Handling Requirements: Store materials in accordance with manufacturer's instructions in a protected dry location off ground. Do not open packaging nor remove labels until time of installation.

1.08 ENVIRONMENTAL CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85%, or when temperatures are less than 5°F above dewpoint.

1. Do not apply waterproofing in snow, rain, fog, or mist, or when such weather conditions are imminent during application and curing period.
- B. Maintain adequate ventilation during application and curing of waterproofing materials.

1.09 PROTECTION

- A. Against Loads: Protect work of this Section against concentrated loads and any other loads or equipment that would damage the materials or work.
- B. Take and maintain necessary preventative measures to protect work of this Section from damage until Project is accepted.
- C. Do not allow waste products containing petroleum, grease, acid, solvents, vegetable or mineral oil, animal oil, animal fat, etc., or direct steam venting to come into direct contact with the membrane unless approved by manufacturer's chemical resistance chart.
- D. Rejection of Damaged Work:
 1. Damaged materials or work will be rejected.
 2. Rejected materials or work must be immediately removed and replaced with new materials.

1.10 WARRANTY

- A. Contractor's Guarantee: Guarantee all work under this Section in a document stating that if, within five years after the Date of Substantial Completion of the Work, any of the work of this Section is found to be defective or not in accordance with the Contract Documents, the Contract shall, at its sole cost and expense, correct it promptly after receipt of written notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition.
- B. Manufacturer's Warranty: Provide the membrane manufacturer's standard five-year material warranty with optional five-year rider extension.

PART 2 – PRODUCTS

2.01 SYSTEMS

- A. Pedestrian traffic coating for UV-exposed exterior spaces not over occupied space: Peda-Gard by Neogard, or approved equal.

2.02 MATERIALS

- A. General: Provide applicable accessories noted below for each traffic coating system used.
- B. Primer: As recommended by coating manufacturers for applicable substrates.
- C. Flashing Tape: 100% solids formulation of synthetic resins, thermoplastics and non-curing rubber (non-butyl) with a built-in primer, bonded to a woven polyester backing.
 - 1. As recommended by coating manufacturer.
- D. Reinforcing Fabric: Tietex stitch-bonded polyester fabric designed for use in reinforcing urethane coatings.
 - 1. As recommended by coating manufacturer.
- E. Sealant (for Substrate Preparation): As recommended by coating manufacturer.
- F. Aggregate: Uniformly graded hard aggregate having a minimum hardness of 6.5 or greater on Mohs Hardness Scale.
 - 1. Pedestrian: 12/20 mesh or as recommended by coating manufacturer.
- G. Base Coat: Single-component, moisture-cured aromatic urethane designed for use as a waterproofing membrane base coat for pedestrian and vehicular traffic-bearing surfaces.
- H. Wear Coat: Single-component, moisture-cured aromatic urethane designed for use as a waterproofing membrane for pedestrian and vehicular traffic-bearing surfaces.
- I. Finish Coat/Top Coat: As recommended by coating manufacturer for the traffic coating system.
- J. Concrete Patching Material: Two component, general purpose, 100% solids epoxy resin designed as a high-strength material for use as a concrete patching mortar.
 - 1. As recommended by coating manufacturer.
- K. Miscellaneous materials such as cleaning agents, adhesives, reinforcing fabric, backer rod, deck drains, etc., shall be compatible with the specified traffic coating system.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the Contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.
- B. 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.

3.02 PREPARATION

- A. Condition of Surfaces: Surfaces to receive membrane shall be free of defects or conditions that will interfere with or prevent a satisfactory installation of waterproofing systems. Verify the standard surface texture is in accordance with ICRI's CSP3-CSP4.
- B. Project Conditions: Proceed with installation of materials only when substrate conditions are in compliance with the manufacturer's requirements.
- C. Contaminants: Surfaces shall be thoroughly cleaned and shall be free of water, dew, frost, dust, dirt, oil, grease, concrete curing compounds, laitance, and other foreign matter.
- D. Repairs: Voids, cracks, holes, and other damaged surfaces shall be repaired before application of waterproofing systems. Substrate shall be smooth and sound with no gaps or voids in excess of 0.25 in. All concrete fins must be ground flush. Patch with specified concrete patching material mixed at a ratio of one part mixed epoxy to four parts approved blended aggregates.
 - 1. At CMU wall to receive traffic coating, fill mortar joints to be flush with wall patching mortar approved by traffic coating manufacturer.
- E. Other Work: Installation of other work passing through or concealed by waterproofing shall be complete and approved before starting work of membrane installation.
- F. Do not install waterproofing in standing water.
- G. All surfaces to receive waterproofing membrane must be dry, without any appearance of dampness.

3.03 INSTALLATION –TRAFFIC COATINGS

A. General

1. Application of all waterproofing systems shall be sequenced with other trades.
2. Waterproofing systems shall be installed to provide a monolithic, watertight system.
3. Comply with waterproofing manufacturer's installation instructions and product recommendations unless more stringent requirements are specified herein.
4. The installation of this waterproofing membrane shall be accomplished in the presence of, or with the advice of the manufacturer's technical representative.

B. Crack Reinforcement

1. Visible hairline cracks (less than 1/32 in. in width) in concrete and cold joints shall be cleaned, primed as required and treated with thoroughly mixed base coat material a minimum distance of 2 in. on each side of the crack to yield a total thickness of 30 dry mils.
2. Large cracks (greater than 1/32 in. in width) shall be routed and sealed with manufacturer-approved sealant. Sealant shall be applied to inside area of crack only, not applied to deck surface. Detail sealed cracks with thoroughly mixed base coat material a distance of 2 in. on each side of crack to yield a total thickness of 30 dry mils.

C. Control Joints

1. Seal control joints equal to or less than 1 in. in width with sealant. Depending on the width-to-depth ratio of the joint, backing material and a bond breaker may be required. Install sealants in accordance with ASTM C 1193 and manufacturer's instructions. Detail sealed joints with thoroughly mixed base coat material a distance of 2 in. on each side of the joint to yield a total thickness of 30 dry mils.

D. Flashing Tape

1. Install flashing tape and reinforcing fabric at penetrations, drains, changes in plane, and where indicated on the drawings and/or where required by the manufacturer prior to the application of base coat.

E. Primer Application

1. Mix and apply one coat of primer at the rate recommended by the manufacturer. Apply base coat over primer within the time frame recommended by the manufacturer.

F. Pedestrian Coating Application: Seed and Lock Method

1. Base Coat: Thoroughly mix base coat material and apply at the rate recommended by the manufacturer, to yield 18 dry mils (or required thickness by coating manufacturer). Extend base coat over cracks and control joints which have received detail treatment.
2. Wear Coat: Thoroughly mix wear coat and apply at the rate recommended by the manufacturer, to yield 8 dry mils (or required thickness by coating manufacturer), and immediately broadcast aggregate, evenly distributed, into wet coating at the rate recommended by the manufacturer. When dry, remove excess aggregate.
 - a. Do not broadcast aggregate at vertical surfaces and horizontal surfaces that serves as a substrate for sealant over backer rod.
3. Topcoat: Thoroughly mix topcoat material and apply at the rate recommended by the manufacturer to yield 9 dry mils (or required thickness by coating manufacturer).

3.04 CLEANING

- A. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by the manufacturer of the affected construction.
- B. At the end of each work day, remove unused materials, debris, and containers from the site.
- C. Construction Waste Management:
 1. At the end of each work day, recycle or dispose of unused material, debris, and containers in accordance with Division 01 Section "Construction Waste Management and Disposal."

3.05 PROTECTION

- A. Protect waterproofing membrane in accordance with manufacturer's recommendations. Repair damage in accordance with manufacturer's recommendations.

3.06 FIELD QUALITY CONTROL

- A. Inform Architect in writing on a daily basis of any of the following events. State the specific location of each occurrence.
 - 1. Leakage through the finished waterproofing installation.
 - 2. Damage by other trades.
- B. Arrange for manufacturer's technical representative and Owner's Inspector to inspect base surface prior to installation, all phases of installation, and completed installation to assure conformance with manufacturer's specifications.
- C. Provide Manufacturer Representative Report stating that the waterproofing has been inspected and is acceptable.

END OF SECTION 071800

SECTION 076200

SHEET METAL FLASHING AND TRIM

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and provisions of the Contract, including the General and Supplementary Conditions, and Division 01 of these Specifications, apply to the work in this Section.

1.02 WORK INCLUDED

- A. Section Includes:
 - 1. Metal flashing and counterflashing.
 - 2. Metal hoods over penetration clusters.
 - 3. All other sheet metal shown in the drawings.
- B. Related Sections include the following:
 - 1. Division 07 Section "Traffic Coatings."
 - 2. Division 07 Section "Joint Sealants."

1.03 REFERENCE STANDARDS

- A. AAMA - American Architectural Manufacturers Association
 - 1. 605 - Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
- B. ASTM - American Society for Testing and Materials
 - 1. A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. B32 - Standard Specification for Solder Metal.
 - 3. B749 - Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products.

4. D4586 - Standard Specification for Asphalt Roof Cement.
- C. AWS – American Welding Society
- D. SMACNA – Sheet Metal and Air Conditioning Contractors National Association, Inc.
1. Architectural Sheet Metal Manual.
- E. SSPC – The Society for Protective Coatings
1. Paint 12 - Paint Specification No. 12: Cold-Applied Asphalt Mastic (Extra Thick Film).
- 1.04 SYSTEM DESCRIPTION
- A. Performance Requirements
1. Work of this Section shall physically protect roofing and other items as indicated from damage that would permit water leakage to building interior.
 2. Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement and exposure to weather without failing.
 - a. Temperature Change (Range): 120°F, ambient; 180°F, material surfaces.
- 1.05 SUBMITTALS
- A. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop-and field-assembled work. Include the following:
1. Submit for typical and non-typical conditions of Project. Manufacturer's standard data sheets and/or Architectural Drawings are not acceptable for Shop Drawings.
 2. Identification of material, thickness, weight, and finish for each item and location in Project.
 3. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions, as well as all associated termination bars for the expansion joint systems.

4. Detail for joining, supporting, and securing sheet metal flashing and trim, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 5. Details of termination points and assemblies, including fixed points.
 6. Details of special conditions.
 7. Details of connections to adjoining work.
 8. Detail formed flashing and trim at a scale of not less than 1-1/2 in. per 12 in.
- B. Samples for Initial Selection: for each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes for involving color selection.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size as indicated below:
1. Sheet Metal Flashing: 12 in. long by actual width of unit, including finished seam and required profile. Include fasteners, cleats, clips, closures, and other attachments.
 2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 in. long and in required profile. Include fasteners and other exposed accessories.
 3. Coping: Complete, with corner condition and legs a minimum of 12 in. long. Provide typical moving and non-moving joints.
 4. Accessories and Miscellaneous Materials: Full-size sample.

1.06 PREINSTALLATION MEETING

- A. Preinstallation Conference: Conduct conference at Project site approximately two weeks prior to scheduled commencement of sheet metal installation and after approval of a complete submittal, including shop drawing submittals. Foremen from each trade involved in system installation shall be present during the conference.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company regularly engaged in manufacturing and marketing of products specified in this Section.
- B. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and

- whose work has resulted in joint sealant installations with a record of successful in-service performance, and with a minimum of five years of experience.
- C. Verify that joint backing and release tapes are compatible with sealants specified for each location.
 - D. Preconstruction Field Adhesion Testing: Refer to Division 7 Section Exterior Joint Sealants.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Sheet Metal Flashing and Trim Materials
 - 1. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 316, dead soft, fully annealed; 24 gauge except as otherwise indicated.
 - a. Finish: 4 (polished directional satin).
 - b. Surface: Smooth, flat, as approved by Architect.
- B. Surface Reglet and Counterflashing: As manufactured by Fry Reglet, "Type SM", or equal.
- C. Miscellaneous Materials and Accessories
 - 1. Solder and Flux: For use with steel, provide 50 - 50 tin/lead solder, ASTM B32, with rosin flux. Re-melted or reworked solder will not be permitted.
 - 2. Fasteners: Same metal as flashing/sheet metal or other noncorrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.
 - 3. Bituminous Coating: SSPC Paint 12, solvent-type bituminous mastic, nominally free of sulfur, compounded for 15 mil dry film thickness per coat.
 - 4. Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gauge required for performance.
 - 5. Miscellaneous Materials: Fasteners, sealant tape, butyl sealant, roofing cement, and other materials as required.

2.02 FABRICATION

A. Shop Assembly

1. Design and fabricate work in accordance with SMACNA, unless otherwise indicated.
2. As far as practicable, form and fabricate sheet metal in shop. Where on-site fabrication is required, provide work equal to shop quality. Additionally, identify bulk materials from which items are field fabricated by manufacturer's trademark printed or embossed at frequent intervals.
3. Reproduce accurately profiles and bends indicated.
4. Provide profiles with interactions that are sharp, even and true; with plane surfaces free from buckles and waves; and seams that follow direction of water flow.
5. Reinforce correctly for strength and appearance.
6. Cut, fit, and drill sheet metal as required to accommodate related, adjacent or adjoining work.
7. Exposed Edges of Sheet Metal: Fold, bend or return exposed edges of sheet metal. Raw edges will not be permitted.
8. Form pieces in longest practical lengths.

B. Sheet Metal Joints

1. Provide a minimum 8 in. back plate at laps.
2. Mechanically fasten for strength and fully solder watertight all non-moving joints, miters, saddles and terminations.
3. Where positive joining is required, weld in accordance with applicable AWS standards.
4. Turn lock joints on exposed surfaces in direction of flow.

C. Soldering

1. Neatly solder exposed surfaces.
2. Pre-tin edges minimum 1-1/2 in. both sides prior to soldering.

3. Solder and seal metal joints. After soldering, remove flux. Wipe and wash solder joints clean.
 4. Apply coating finishes to sheet metal post soldering where flashing is to be exposed.
- D. Expansion and Contraction of Sheet Metal Runs
1. General: Provide loose locking slip joint of maximum 8 ft from external and internal corners, maximum 24 ft length of straight runs, unless manufacturer recommends more frequent interval, and one at center of runs less than 20 ft, but more than 8 ft, unless specified otherwise following herein.
- E. Provide the following items of materials and minimum gauges as indicated on the Drawings:
1. Cleats: Formed of same metal as that being anchored, with size, shape, and quantity as required to secure flashing and sheet metal work in place.
 2. Base Flashing, Counter Flashing and Roof Penetration Flashing
 - a. Formed with 3/4 in. locked and soldered seams, assembled into units not longer than 16 ft.
 - b. Join units with 3/4 in. wide loose locked seams filled with soft-grade silicone base compound, before units are assembled.
 - c. Miter corners and joints by riveted or locked and soldered joints.
 3. End Dams, Saddle Flashings and other Transition Flashings: 24 Ga. minimum stainless steel unless noted otherwise in the Drawings.
 - a. Mechanically fastener and solder saddle flashings with 6 in. minimum flanges at all planes. Provide at all flashing terminations and transitions.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely into place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coating, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
 - 1. Coat back side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Conform with procedures and methods of installation and applicable details shown and described in SMACNA Manual.
- D. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 ft with no joints allowed within 24 in. of corners or intersections. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 in. deep, filled with elastomeric sealant concealed within joints.
- E. Seal joints with elastomeric sealant as required for watertight construction. Comply with recommendations of ASTM C 1193 and section 079200 "Joint Sealants".
- F. Where installation requires fabrication at the Project site, conform to applicable requirements of Article titled "Fabrication" in this Section.
- G. Install standard catalog products in accordance with manufacturer's instructions, unless otherwise indicated.
- H. Install work watertight; ensure that items are installed in true and accurate alignment with other items and related work, that joints are accurately fitted, that corners are reinforced and that exposed surfaces are free of dents. Set flashings in full and continuous bed of compatible sealant. Comply with recommendations of ASTM C 1193 and Specification Section 079200 "Joint Sealants" for adhesion and compatibility testing.
- I. Apply flashing compound at slip joints or wherever metal-to-metal contact occurs and movement may be anticipated to occur.

3.02 FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements 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. Clean exposed metal surfaces for uniform oxidation and weather exposure; neutralize flux materials; clean off excess solder and sealants; and remove strippable films, if any.
- C. Laps: Provide 8 in. back plate at all flashing side laps. Provide gap between lengths as required to accommodate thermal movement.
- D. Seams: Solder all seams watertight. Solder corner joints and saddle joints watertight.

3.03 ADJUSTING

- A. Replace damaged material with new.

3.04 SCHEDULE

- A. Fabricate sheet metal items in thickness or weight needed to comply with SMACNA requirements but not less than that listed below for each application and metal.

1. Counterflashing: 24 gauge.
2. Penetration Flashing Hoods: 24 gauge.

- B. All buried or partially buried flashings shall be stainless steel.

3.05 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 in. in 20 ft on slope and location lines as indicated and within 1/8 in. offset of adjoining faces and of alignment of matching profiles.

3.06 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.

- E. 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.

END OF SECTION 076200

SECTION 071900

WATER REPELLENT SEALER

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and provisions of the Contract, including the General and Supplementary Conditions, and Division 1 of these Specifications, apply to the work in this Section.

1.02 WORK INCLUDED

- A. Section includes penetrating water-repellent treatments for the following surfaces:
 - 1. Cast-in-place concrete.
 - 2. Concrete masonry unit (CMU).
 - 3. Other areas as noted in the contract documents.
- B. Related Requirements:
 - 1. Division 07 Section "Exterior Sealant Joints."

1.03 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site approximately two weeks prior to scheduled commencement of water repellent sealer installation and after approval of a complete submittal, including shop drawing submittals of adjacent work. Foremen from each trade involved in system installation shall be present during the conference.
- B. SUBMITTALS
- C. Product Data: For each type of product.
 - 1. Include manufacturer's printed statement of VOC content.
 - 2. Include manufacturer's recommended number of coats for each type of substrate and spreading rate for each separate coat.
- D. Coordinate "Qualification Data" Paragraph below with qualification requirements in Section 014000 "Quality Requirements" and as may be supplemented in "Quality Assurance" Article.

- E. Qualification Data: For Applicator.
- F. Product Certificates: For each type of water repellent.
- G. Preconstruction Test Reports: For water-repellent-treated substrates as part of project mockup. Manufacturer to provide observation reports.
- H. Field quality-control reports by water repellent sealer manufacturer.
- I. Sample Warranty: For each warranty specified in this Section.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company regularly engaged in manufacturing and marketing of products specified in this Section.
- B. Applicator Qualifications: An experienced installer who has specialized in installing water repellents for similar scopes as indicated for this Project and whose work has resulted installations with a record of successful in-service performance, and with a minimum of five years of experience.

1.05 IN-PLACE MOCKUP AND MOCKUP WATER TESTING

- A. Mockups: Prepare one mockup of each required water repellent on each type of substrate required to demonstrate aesthetic effects, for preconstruction testing, and to set quality standards for materials and execution.
 - 1. Locate mockup on surfaces where directed by Engineer, for Ownership and Engineer (SGH) to review.
 - a. Size: Entire width of one bay of CMU between CMU pilasters at North Building West Elevation.
- B. Water Testing: Test repaired CMU wall in general accordance with ASTM E1105 Procedure A at 0 differential pressure for 45 minutes.
- C. Acceptance Criteria:
 - 1. No water leakage shall be observed by the Engineer on the interior to be deemed a pass test.
 - 2. Repair mockups until a result acceptable to the Owner is achieved at no additional cost to the Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Engineer specifically approves such deviations in writing.

4. Completed mockups shall be protected during the work as standards for the remainder of the installation.
5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.06 FIELD CONDITIONS

- A. Limitations: Proceed with application only when the following existing and forecasted weather and substrate conditions permit water repellents to be applied according to manufacturers' written instructions and warranty requirements:
 1. Revise subparagraphs below for specific material required or if manufacturer has established different limitations.
 2. Ambient temperature is above 40°F (4.4°C) and below 100°F (37.8°C) and will remain so for 24 hours.
 3. Substrate is not frozen and substrate-surface temperature is above 40°F (4.4°C) and below 100°F (37.8°C).
 4. Rain, fog, snow, or relative humidity in excess of 75% is not predicted within three hours of application.
 5. Windy conditions do not exist that might cause water repellent to be blown onto vegetation or surfaces not intended to be treated.

1.07 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agree(s) to repair or replace materials that fail to maintain water repellency specified in "Performance Requirements" Article within specified warranty period.
- B. Installer Warranty: Written waterproofing Installer's warranty, signed by installer covering Work of this Section, for warranty period of two years.

PART 2 – PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Performance: Water repellents shall meet the following performance requirements as determined by preconstruction testing on substrates representing those indicated for this Project.
- B. Water-Vapor Transmission: Comply with one or both of the following:

1. Maximum 10% reduction in water-vapor transmission of treated compared to untreated specimens, according to ASTM E 96/E 96M.
 2. Minimum 85% water-vapor transmission of treated compared to untreated specimens, according to ASTM D 1653.
- C. Durability: Maximum 5 percent loss of water-repellent performance after 2400 hours of weathering according to ASTM G 53 compared to water-repellent-treated specimens before weathering.

2.02 PENETRATING WATER REPELLENTS

- A. Silane, Penetrating Water Repellent: Seal-A-Pore HP by Garland; or approved equal.

2.03 ACCESSORIES

- A. Joint Sealants: See Division 07 Section "Exterior Joint Sealants"
- B. Cementitious Patching Mortar: Compatible product as recommended by water repellent manufacturer.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements and conditions affecting performance of the Work.
1. Verify that surfaces are clean and dry according to water-repellent manufacturer's requirements. Check moisture content in three representative locations by method recommended by manufacturer.
 2. Verify that there is no efflorescence or other removable residues that would be trapped beneath the application of water repellent.
 3. Verify that required repairs are complete, cured, and dry before applying water repellent.
- B. Test pH level according to water-repellent manufacturer's written instructions to ensure chemical bond to silica-containing or siliceous minerals.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. New Construction and Repairs: Allow concrete and other cementitious materials to age before application of water repellent, according to repellent manufacturer's written instructions.
- B. Cleaning: Before application of water repellent, clean substrate of substances that could impair penetration or performance of product according to water-repellent manufacturer's written instructions, and as follows:
- C. Remove oil, curing compounds, laitance, and other substances that inhibit penetration or performance of water repellents.
- D. Protect adjoining work, including mortar and sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live vegetation.
- E. Coordination with Mortar Joints: Do not apply water repellent until mortar for joints adjacent to surfaces receiving water-repellent treatment has been installed and cured.
- F. Coordination with Sealant Joints: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.

3.03 APPLICATION

- A. Comply with manufacturer's written instructions for application procedure unless otherwise indicated. Apply coating of water repellent on surfaces to be treated using spray with a fan-type spray nozzle or brush to the point of saturation. Apply in continuous, uniform coat, ensuring complete coverage without pinholes, gaps, or puddling. Coating shall cover all recessed mortar joints. Apply additional coating as necessary to provide full and continuous coverage. Remove excess material; do not allow material to puddle beyond saturation.

3.04 FIELD QUALITY CONTROL

- A. Testing of Water-Repellent Material: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when water repellent is being applied:
 - 1. Owner will engage the services of a qualified testing agency to sample water-repellent material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.

2. Testing agency will perform tests for compliance of water-repellent material with product requirements.
 3. Owner may direct Contractor to stop applying water repellents if test results show material being used does not comply with product requirements. Contractor shall remove noncomplying material from Project site, pay for testing, and correct deficiency of surfaces treated with rejected materials, as approved by Engineer.
- B. Field Water Testing
1. CMU wall – Two locations, at each location, perform testing in general accordance with ASTM E1105 Procedure A at 0 differential pressure for 45 minutes.
 2. Acceptance Criteria:
 - a. No water leakage shall be observed by the Engineer on the interior to be deemed a pass test.
 - b. In the event of test failure, repair installation and retest until a pass test is achieved, at no additional cost to the Owner. For each test failure, test an additional location at no additional cost to the Owner.
 - c. In the event of two failures after the initial water test, Owner will engage a third-party testing agency to perform 100% testing of walls (or discrete wall elevations) may be performed at the Owner's discretion. Contractor to reimburse Owner cost of testing agency.

3.05 CLEANING

- A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Correct damage to work of other trades caused by water-repellent application, as approved by Engineer.
- B. Comply with manufacturer's written cleaning instructions.

END OF SECTION 071900

SECTION 079200

EXTERIOR JOINT SEALANTS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and provisions of the Contract, including the General and Supplementary Conditions, and Division 1 of these Specifications, apply to the work in this Section.

1.02 WORK INCLUDED

- A. The work of this Section includes providing the necessary labor, materials, equipment, and supervision to perform the following, as shown on the Drawings, and those specified by reference to this Section:

1. Routing and sealing of concrete cracks at foundation wall.
2. Silicone tape repairs at roof skylights.
3. Sealant joints at concrete masonry unit (CMU) walls "control joints" as indicated in the Drawings after epoxy injection.
4. Replacement of weatherseal at existing curtain wall.
5. Replacement of exterior sealant joints, as noted in the contract drawings.

- B. Related Sections include the following:

1. Division 7 Section "Sheet Metal Flashing and Trim."

1.03 REFERENCE STANDARDS

- A. ASTM C 1087 - Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.
- B. ASTM C 1193 - Guide for Use of Joint Sealants.
- C. ASTM C 1248 - Test Method for Staining of Porous Substrate by Joint Sealants.
- D. ASTM C 1311 - Specification for Solvent Release Sealants.
- E. ASTM C 1330 - Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

- F. ASTM E 783 - Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
- G. ASTM E 1105 - Test Method for Field Measurement of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data, guarantees, application recommendations and installation instructions, including cleaning and priming instructions and sealant limitations for each type of material required.
- B. Safety data sheets (SDS) for each product used.
- C. Manufacturer's published data, letter of certification, or certified test laboratory report indicating that each material selected complies or is suitable for the temperatures, movement, and weather conditions that will be encountered during the sealant's service life.
 - 1. Written explanation to decipher code numbers used on material containers to record manufacturing dates.
 - 2. Test reports should be dated within three years of submittal date showing compliance with ASTM C 1564 and the standards C 1564 references.
- D. Samples: Submit the following samples:
 - 1. Initial Sealant Selection: For each product exposed to view, manufacturer's standard bead consists of strips of actual products showing full range of colors available.
 - 2. Extruded Silicone Tape Selection: For each product exposed to view, manufacturer's standard extrusion in color and that matches existing window frames and minimum size as indicated in the drawings.
- E. Evidence of contractor's experience, including project identification for at least three similar projects in the past five years. Contractor shall demonstrate a minimum of ten years of similar experience.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company regularly engaged in manufacturing and marketing of products specified in this Section.

- B. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint sealant installations with a record of successful in-service performance, and with a minimum of five years of experience.
- C. Verify that joint backing and release tapes are compatible with sealants specified for each location.
- D. Preconstruction Field Adhesion Testing: Before installing sealants at the in-place mockup, field-test their adhesion to joint substrates as follows:
 - 1. Perform adhesion pull-tests after sealant has fully cured, twenty-one days at a minimum temperature of 50°F. Test joints shall be performed in a location not visible to the public or as approved by the Owner.
 - 2. Conduct field tests for each type of sealant, silicone tape and joint substrate shown in the Drawings.
 - 3. Notify Owner seven days in advance of dates and times when test joints will be erected.
 - 4. Perform sealant adhesion field test per manufacturer's recommendations (e.g., with manufacturer representative present conducting adhesion test(s)).
 - 5. Acceptable application is indicated by 1) cohesive failure without adhesive failure and 2) adequate measurable sealant joint or fillet profile.

1.06 IN-PLACE MOCKUP AND MOCKUP WATER TESTING

- A. Coordinate in place mockup installation and testing with Owner.
- B. Perform mockup(s) for each type of sealant and joint at locations indicated in the drawings for Ownership and SGH to review.
- C. Install mockups at least twenty-one days before examination and approval by the Owner.
- D. Mockup water testing:
 - 1. Test repaired curtain wall and skylight weatherseals by nozzle test in accordance with AAMA 501.2.
 - 2. Test repaired CMU wall sealant joints by nozzle test in accordance with AAMA 501.2.
- E. Acceptance Criteria:

1. No water leakage shall be observed by the Engineer on the interior to be deemed a pass test.
2. Repair mockups until a result acceptable to the Owner is achieved at no additional cost to the Owner.
3. Completed mockups shall be protected during the work as standards for the remainder of the installation.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multi-component materials.
- 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.

1.08 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with installation of joint sealants when ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
- B. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.
- C. Protect the sealant from rain while curing. Do not install sealants if rain is imminent.

1.09 GUARANTEE / WARRANTY

- A. Provide two-year installer warranty; twenty-year manufacturer warranty.
- B. Include coverage of installed sealants and accessories that fail to achieve airtight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 – PRODUCTS

2.01 SILICONE JOINT SEALANTS

- A. Curtain Wall Silicone Sealant

1. Provide silicone sealants that comply with ASTM C-920, of type that are high-performance, single component (Type S), non-sag (Grade NS), neutral-cured, Class 50, non-traffic (Use NT), and non-staining.
 2. Product(s):
 - a. Dowsil 795, as manufactured by Dow; or equal.
 - b. Primer(s) as recommended by the manufacturer for each application.
 3. Application:
 - a. Replacement of weatherseal at existing curtain wall
 4. Color: As selected by Owner from standard colors.
- B. Silicone Sealant
1. Provide silicone sealants that comply with ASTM C-920, of type that are high-performance, single component (Type S), non-sag (Grade NS), neutral-cured, Class 50, non-traffic (Use NT), and non-staining.
 2. Product(s):
 - a. Dowsil Corning 795 or 791, as manufactured by Dow; or equal.
 - b. Primer(s) as recommended by the manufacturer for each application.
 3. Application:
 - a. Sealant for setting silicone tape (see "Extruded Silicone")
 - b. Sealant for exterior sealant joints at CMU walls.
 - c. Sealant for concrete cracks.
 4. Color: As selected by Owner from standard colors.

2.02 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. Backer Rod: ASTM C 1330 Type C of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance. Oversize backer rods 30% to 50% larger than joint width, or approved equal.
- C. Bond-Breaker Tape: Polyethylene pressure-sensitive tape recommended by sealant manufacturer to suit the application.

2.03 EXTRUDED SILICONE

- A. Extruded silicone and silicone sealant must be from the same manufacturer.
- B. Silicone Tape: Preformed low modulus silicone extrusion.
 - 1. Product: Dow Dowsil 123 Silicone Seal or equal.
 - 2. Color: Match glazing.

2.04 ACCESSORIES

- A. Compatibility: Provide 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.
- B. 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.
- C. 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 with joint substrates.
- D. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Inspect areas involved in the Work to establish the extent of Work, access, and need for protection of surrounding construction.

- B. 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.
- C. Provide additional joint preparation, beyond that outlined in the Specifications, as required by sealant manufacturer and Owner's recommendations based on mockups and field adhesion tests.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Rout larger than hairline (>1/32 in.) cracks in the concrete to a minimum width of 1/2 in. for installation of sealant joint.
- B. 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 existing sealant and mortar as close to the joint edges as possible from joints scheduled to be completely resealed.
 - 2. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints, old joint sealants, old glazing, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 3. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
 - 5. Clean joint substrates using the two-cloth cleaning method with isopropanol alcohol (IPA). The two-rag wipe method consists of a solvent wipe followed by a dry cloth wipe. Multiple cleanings may be required to properly clean a substrate in accordance with the joint sealant manufacturer's written instructions.
- C. Joint Priming: Prime joint substrates where recommended in writing by sealant manufacturer, based on preconstruction joint-sealant-substrate tests, or prior experience. Apply primer to comply with joint sealant manufacturer's written

instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

- 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 PREFORMED SILICONE

- A. General: Comply with preformed silicone manufacturer's written installation instructions for products and applications indicated including surface preparation, unless specifically noted otherwise in this Specification.
- B. Solvent wipe nonporous substrates.
- C. Sealant: Apply bead of silicone sealant at perimeter of boot 3/8 in. wide by 1/4 in. thick min. inside masking tape.
- D. Install silicone boot within 5 min. of sealant application, press silicone boot into wet sealant. Apply consistent pressure to provide uniform adhesion.
- E. Remove any masking tape along joint within 10 minutes of tooling liquid sealant. Avoid contaminating adjacent surfaces with excess sealant. Remove all traces of smears and droppings on metal or glass surfaces promptly, using a solvent recommended by the sealant manufacturer that will not damage or discolor the building surfaces. Remove smears and droppings on porous surfaces by mechanical means after the initial cure of the sealant.
- F. Coordinate work to prevent contamination of fresh sealant by dust or other debris.

3.04 GENERAL SEALANT INSTALLATION

- A. Perform preparation, installation, and testing in accordance with the referenced standards, manufacturer's published product data, and approved written recommendations by the sealant manufacturer's field representative, except as otherwise stated in this Section.
 - 1. Use materials best suited to installation as recommended by sealant manufacturers. Provide sealants essential in maintaining continued integrity of a watertight, weathertight barrier.
 - 2. Apply sealant within recommended temperature ranges. Consult manufacturer when sealant cannot be applied within the recommended temperature ranges.

- B. Form joints as detailed on Drawings, concave, unless shown otherwise, and free of air pockets, embedded matter, ridges, and sags.
- C. Use appropriate masking tape to protect adjacent surfaces.

3.05 SEALANT JOINT CONSTRUCTION

- A. Sealant joints shall contain bond-breaker tape, backer rod, or other approved means to allow the sealant to stretch freely while the joint moves, unless specifically detailed. Avoid three-sided adhesion in joints. Follow manufacturers' current written guidelines for installation unless specifically noted in this Section.
- B. Inspect joints for proper width and report immediately noncompliance with the Specifications in writing to the Owner prior to application of sealant so that adjustments can be made to provide proper joint sizes before joint is sealed.

3.06 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 of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. At fillet (triangular) joints, extend the sealant at least 3/8 in. onto the substrate beyond and parallel to the bond breaker tape or backer rod and at least 3/8 in. onto the substrate perpendicular to the tape or rod, unless detailed otherwise. The minimum thickness between the edge of the tape or rod and the surface of the sealant joint shall be 1/4 in.
- D. At butt joints, the centerline depth of joint shall be one-half of joint width, with minimum depth of 1/4 in. and maximum depth of 1/2 in.
- E. 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 install backer rod until primers have completely dried. Install clean, dry backer rod into joint openings against dry substrates.
 - 2. Do not touch with fingers or otherwise contaminate the substrate surfaces while inserting the backer rod.
 - 3. Do not leave gaps between ends of sealant backings. Butt ends tightly. Do not twist rods together.

4. Do not stretch, twist, puncture, or tear sealant backings. Remove any rod containing punctures or tears, and solvent-clean the surfaces again.
 5. Change rod sizes as frequently as is required by the variation in the joint width. Provide a full range of rod sizes at the site of sealant work. Rods shall be at least 2 ft long.
 6. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials. Replace any backer rod not sealed over by the end of each day, and solvent-clean surfaces again.
- F. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.
- G. Install sealants by proven techniques to comply with the following and at the same time backings are installed:
1. Inspect each cartridge or container of sealant before use and verify that the production date is within six months of the date of application. Remove sealant more than six months old from the site.
 2. Mask exposed surfaces along joint before applying sealant.
 3. Recheck correct backer rod positioning before applying sealant.
 4. Place sealants so they directly contact and fully wet joint substrates.
 5. Completely fill the recesses provided for each joint configuration.
 6. Produce uniform cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
 7. Avoid contaminating adjacent surfaces with excess sealant.
 8. Coordinate Work to prevent contamination of fresh sealant by dust or other debris.
- H. Tooling of 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 sealants from surfaces adjacent to joint.
 2. Do not use any liquid for tooling.

3. Provide a smooth, uniform finished surface.
4. Remove masking tape within 10 minutes of tooling sealant.

3.07 FIELD QUALITY CONTROL

A. Field Adhesion Testing: Field-test joint-sealant adhesion to joint substrates as follows.

1. Perform adhesion pull tests after sealant has fully cured, twenty-one days at a minimum temperature of 50°F.
2. Cut sealant across joint and cut a 3 in. long tab along the sides of the joint. Mark a 1 in. segment at the base of the sealant tab. Grasp the remaining 2 in. of the tab and pull the sealant at 90° to the surface.
3. Acceptable application: cohesive failure (tearing within itself) with no adhesive (debonding) failure, and adequate sealant joint or fillet profile.
4. If the sample debonds, the sealant manufacturer shall make written recommendations regarding changes in surface preparations or primers. Submit recommendations to the Owner for approval.
5. Repeat sealant adhesion trials as required to produce an acceptable application.
6. 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 from voids.
 - c. Whether sealant dimensions and configurations comply with specified requirements.
7. 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.

8. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.
 9. Test Frequency
 - a. Perform five tests at first 1,000 lf (or less) of applied sealant at each substrate type and one test for each 1,000 lf of applied silicone seal thereafter or a maximum of ten total tests spread throughout the extents of the building.
 - (1) For seals applied between dissimilar materials, test both sides of joint.
- B. Field Water Testing
1. Curtain wall weather seals – 100 lf of joints, tested in accordance with AAMA 501.2.
 2. CMU wall sealant joints – 100 lf of joints, tested in accordance with AAMA 501.2.
 3. Acceptance Criteria:
 - a. No water leakage shall be observed by the Engineer on the interior to be deemed a pass test.
 - b. In the event of test failure, repair installation and retest until a pass test is achieved, at no additional cost to the Owner. For each test failure, test an additional 50 lf of sealant joints at no additional cost to the Owner.
 - c. In the event of multiple subsequent failures, 100 percent testing of all sealant joints may be performed at the Owner's discretion.
 - d. Field water testing location shall not be same location as the mockup.
- C. Protection
1. 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.

2. 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 the original work.

END OF SECTION 079200