SECTION 079020 - GARAGE WATERPROOFING SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section includes the following:

1. Protective concrete sealer system.
2. Elastomeric traffic deck coating system.
3. Vertical membrane system
4. Slab and deck control joint sealant system.
5. Structural expansion joint system.
6. Architectural building joint sealing system

1.2 RELATED WORK

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

B. Related Sections include the following:

1. Division 3 Section "Cast-in-place Concrete".
2. Division 3 Section "Concrete Rehabilitation".
3. Division 32 Section "Pavement Markings".

1.3 ACTION SUBMITTALS

A. General: Submit the following in accordance with the Conditions of the Contract and Division 1 Specification sections.

B. Product Data: For each product indicated.

C. A detailed statement describing the deck waterproofing system to be installed, as well as the installation methods to be employed, shall be submitted for approval prior to installation. Literature, details, samples, shop drawings, warranties, etc., shall be included in the submittal as requested.

1.4 INFORMATION SUBMITTALS

A. General: Submit the following in accordance with the Conditions of the Contract and Division 1 Specification sections.

B. A manufacturer's written acceptance and approval of the intended system applicator shall be required.

C. Qualification Data: For Installer and testing agency.

D. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.

E. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that products comply with requirements.

F. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of waterproofing systems required for this Project.

B. Source Limitations: Obtain each type of product through one source from a single manufacturer.

C. A site inspection shall be made by applicator prior to commencing installation of the system for purposes of reviewing related conditions affecting performance requirements of this specification.

D. All products described in this section must be used with adequate ventilation and personal protection. Refer to the Material Safety Data Sheet which accompanies each product shipment for detailed health and safety information prior to use.

E. At Architect’s option, Testing Agency shall take one core from each trial section per Section 3.3.C to test for sealer effectiveness in accordance with ASTM C642. Such cores will then serve as “base cores” for which the remainder of sealer application will be tested. At Architect’s direction, additional cores shall be taken randomly for testing comparison with the “base cores”.

F. Preconstruction 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 ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
5. 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.

G. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period preceding the Notice to Proceed with the Work.
   1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
   2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
   3. Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
   4. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

H. Mockups: Build mockups incorporating products, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:

   1. Joint sealants in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.
   2. Joint sealants - Provide two 4’ long mockups for each joint sealant and each substrate.
   3. Deck coating systems - Provide two 4’x4’ mockups for each deck coating system and each substrate.
   4. Vertical membrane system – 100 sf for each type
   5. Structural expansion joint system – 6 lf for each type, including transition details.
   6. Expansion joint nosing material - Provide two mockups of size required for adhesion testing for each nosing material and each substrate.

I. Preconstruction Field-Adhesion and Slip Resistance Testing: Before installing elastomeric sealants, deck coating, and expansion joint nosing material, perform field tests as follows:

   1. Locate field test mockup where indicated or, if not indicated, as directed by Architect.
   2. Conduct field-adhesion tests for each application indicated below:

      a. Each type of elastomeric sealant indicated and the applicable joint substrates.
      b. Each type of nonelastomeric sealant indicated and the applicable joint substrates.
      c. Each type of deck coating indicated and the applicable substrates.
      d. Each type of expansion joint nosing material indicated and the applicable substrates.
   3. Conduct field slip resistance tests for each application indicated below:
      a. Each type of deck coating indicated and the applicable substrates.
   4. Notify Architect seven days in advance of dates and times when tests will be performed.
   5. Arrange for tests to take place with product manufacturer's technical representative present.
   6. Refer to Field Quality Control under Part 3 for additional requirements.

J. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 PERFORMANCE REQUIREMENTS

A. Provide products that establish and maintain watertight and airtight continuous waterproofing system without staining or deteriorating joint substrates.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Apply waterproofing systems within the range of ambient and substrate temperatures recommended in writing by manufacturer. Do not apply waterproofing systems to damp or wet substrates, when temperatures are below 40 deg F, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F above dew point.

B. Do not proceed with installation of waterproofing systems under the following conditions:
   1. Do not apply waterproofing systems in snow, rain, fog, or mist, or when such weather conditions are imminent during the application and curing period. Apply only when frost-free conditions occur throughout the depth of substrate.
   2. Contaminants capable of interfering with adhesion have not yet been removed from substrates.
   3. Where conditions exist that do not meet the manufacturer's requirements for applications indicated.
   4. Where conditions exist that can cause off gassing of the waterproofing systems.

C. Do not install waterproofing systems until items that penetrate the waterproofing have been installed.

1.8 WARRANTY

A. The system manufacturer and the approved applicator shall furnish a written performance joint warranty that, subject to certain specific exclusions as described in such joint warranty, the system provided will be free of defects related to workmanship or material deficiency. The following conditions shall be specifically covered under the joint warranty:

   1. Cohesive or adhesive failure of materials.
   2. Weathering deficiencies resulting in failure of the system to provide its intended function.
   3. Abrasion or tear failure of the system resulting from normal traffic use. (Abrasive maintenance equipment, truck and construction traffic are not normal traffic use and related problems are exempted from the warranty.)
   4. Joint Warranty Period: Refer to Section **1.8.C.1** below for joint warranty period requirements, with the exception of concrete sealer.

B. The system manufacturer and the approved applicator shall submit to the Owner for approval a detailed joint warranty statement consistent with the terms of this specification prior to construction. The approved joint warranty shall represent the sole warranty statement and warrant obligation for the project relating to this trade. Where an apparent conflict is found to exist with respect to the warranty language of this section and the detailed warranty statement, the more stringent warranty requirement shall supersede and control.

C. Special Manufacturer and Installer Joint Warranty: Manufacturer's standard form in which the Manufacturer and Installer jointly agree to furnish and repair or replace the product(s) that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Joint Warranty Period for all products listed in Part 2 of this Section, unless noted otherwise: Five years from date of Substantial Completion.

D. Special joint warranty specified in this article exclude deterioration or failure from the following:

1. Movement caused by structural settlement or errors attributable to design or construction resulting in stresses exceeding the manufacturer's written specifications for elongation and compression.
2. Disintegration from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide waterproofing systems including backings, and other related materials that are compatible with one another and with substrates under conditions of service and application, as demonstrated by the system manufacturer, based on testing and field experience.

B. 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.

C. Protective Concrete Sealer System:

1. Acceptable concrete sealers are listed below. Application rates and solids content shall be in accordance with certified test results on the NCHRP 244 performance criteria.
2. Four Inch Cube Tests: 75% effective in reducing water absorption when compared to an untreated control sample.

3. Southern Exposure Tests: 90% effective in reducing chloride ion content when compared to an untreated control sample.
4. The following materials are approved for usage under this section:

    a. 100% Solids Content:

        1) "Iso-Flex 618 - 100 CRS", LymTal International Inc.
        2) "Protectosil BH-N 100", Evonik Industries.
        3) "MasterProtect H 1000 or H 1001", BASF Building Systems.
        4) “Planiseal WR 100”, Mapei Corporation.
        5) "Baracade Silane 100", Euclid Chemical.
        6) "Sealmaster 100%", Kelmar Waterproofing Systems, Technical Barrier System, Inc.
        7) "Klere-Seal 9100-S", Pecora Corporation.
        8) “Sikagard 705L", Sika Corporation.
5. Apply Sealer to the following locations:

    a. Slab-on-grade and supported levels within the parking deck with the exception of areas that receive a coating or finish.
    b. Concrete approach drives within the construction limits.
    c. Cementitious repair patches, when surface treatment is specified as penetrating sealer.

D. Elastomeric Traffic Deck Coating:

1. Traffic deck coating systems specified herein shall be complete systems of compatible materials. Components of systems shall include a base membrane, a traffic topping and all sealants, primers, flashing, aggregates and miscellaneous materials as required by the manufacturer to complete the system.
2. Traffic deck coating systems shall meet the following slip resistance requirements:

    a. Coefficient of friction not less than 0.85 when tested under wet conditions.
    b. Variation in slip resistance test results not greater than +/- 0.10.
    c. Refer to Field Quality Control under Part 3 for additional requirements.
3. Aggregates: Aggregate type, size and gradation as recommended by system manufacturer and as needed to meet or exceed slip resistance requirements. Comply with ACI 503.3.

    a. Oven-dried, washed, angular shaped silica sand, flint, basalt or aluminum oxide aggregate applied in wear coats with minimum Mohs scale hardness as follows:

        1) Silica sand: 7 minimum
        2) Flint: 7 minimum
        3) Basalt: 7 minimum
        4) Aluminum oxide: 9 minimum
    b. Aluminum oxide powder applied in seal coat.
4. The following urethane deck coating systems are approved for usage under this section subject to compliance with requirements:

    a. Two-Component Urethane Systems:

1) "Autogard FC", Neogard, Division of Jones-Blair.
2) "Iso-Flex 750U", LymTal International Inc.
3) "MasterSeal Traffic 2500", BASF Building Systems.
4) “Mapefloor Parking Deck System – Mapefloor PU 400LV/Finish 415 NA/Finish 450”, Mapei Corporation.
5) "Pecora-Deck 800 FC", Pecora Corporation.
6) “Qualideck Vehicular Traffic Bearing Membrane System”, Advanced Polymer Technology Corporation.
7) "Sikalastic 720/745", Sika Corporation.
8) "Kelmar Merdek", Technical Barrier System, Inc.

b. Single-Component Urethane Systems:

1) “Autogard”, Neogard, Division of Jones-Blair.
2) “Isoflex 760 UVC”, LymTal International Inc.
3) “Masterseal Traffic 1500” BASF Building Systems.
4) “Pecora deck 800”, Pecora Corporation.
5) “Sikalastic 710/715/735 AL System”, Sika Corporation.

c. Application rates for medium and heavy duty systems: rates are for bidding purposes and are to be confirmed in the field using a 100 sf mockup.

1) Primer: 0.33 gal. minimum per 100 sf (300 sq. ft. maximum per gal.)
2) Polyurethane base coat: 1.33 gal. minimum per 100 sf (75 sq. ft. maximum per gal.)
3) Polyurethane wear coat: 0.5 gal. minimum per 100 sf (200 sq. ft. maximum per gal.)
4) Broadcast aggregate into wear coat: 15 lbs. minimum per 100 sq. ft. to excess
5) 2nd Polyurethane wear coat (*for heavy duty systems*): 0.75 gal. minimum per 100 sf (133 sq. ft. maximum per gal.)
6) 2nd Broadcast aggregate into wear coat (*for heavy duty systems*): 15 lbs. minimum per 100 sq. ft. to excess
7) Polyurethane seal coat: 0.75 gal. minimum per 100 sf (133 sq. ft. maximum per gal.).

d. Where indicated, use medium-duty system for stalls and heavy-duty system for the drive and turning lanes. Where indicated, use heavy-duty system above occupied spaces and at speed ramps. Average coating thickness exclusive of aggregate:

1) Medium duty system: 46 dry mils
2) Heavy duty system: 58 dry mils

e. Use aromatic seal coat on lower tiers and 100% aliphatic seal coat on top tier.
f. Apply Urethane System to the following areas:

1) At areas over occupied spaces, conditioned spaces, rooms with equipment and as shown on the Drawings.

E. Vertical membrane system (anti-carbonation crack-bridging coating):

1. Vertical membrane systems specified herein shall be complete systems of compatible materials. Components of systems shall include a base membrane and all sealants,

primers, flashing, aggregates and miscellaneous materials as required by the manufacturer to complete the system.

2. The following vertical membrane systems are approved for usage under this section:

    a. "Sikagard 550W Elastic" and "Sikagard 552W Primer", Sika Corporation.
    b. "TammsCoat" and “Tamms HP Primer”, Euclid Chemical.
    c. Or Equal.

3. Application rates: rates are for bidding purposes and are to be confirmed in the field using a 100 sf mockup.

    a. Primer: 0.31 gal. minimum per 100 sf (320 sq. ft. maximum per gal.)
    b. Base Material: 16 mils minimum dry film thickness (applied in two coats of 8 mils minimum dry film thickness)

4. Apply vertical membrane system to the following areas:

    a. At areas shown on the Drawings or as required during the construction in accordance with Engineer’s directives.

F. Slab and Deck Control Joint Sealant System:

1. Sealants specified under this section shall be a complete system of compatible materials designed to produce waterproof, traffic-bearing control joint seals as detailed in the drawings. Primers, backer rods and related miscellaneous materials shall be used as recommended by the manufacturer.
2. All materials specified herein shall be unmodified polyurethanes containing no adulterants and shall meet the standards defined in federal specification ASTM C920, Type M or S, Class 25, self-leveling and non-sag sealants.
3. The following materials are approved for usage under this section:

    a. Sealant for Horizontal (Non-Cove) Joints:

        1) "Iso-Flex 880GB/881/830", LymTal International Inc.
        2) "Dynatred", Pecora Corporation.
        3) "MasterSeal SL 2", BASF Building Systems.
        4) "THC900/THC901" or "Vulkem 45 SSL", Tremco, Inc.
        5) "Sikaflex-2C SL", Sika Corporation.

    b. Sealant for Vertical and Cove joints:

        1) "Iso-Flex 881/830", LymTal International Inc.
        2) "Dymeric 240FC", Tremco, Inc.
        3) "Sikaflex-2C NS", Sika Corporation.
        4) "Dynatrol II", Pecora Corporation.
        5) "MasterSeal NP 2", BASF Building Systems.

4. Apply Sealant System to all joints as noted on Drawings

G. Structural Expansion Joint Sealing Systems:

1. The expansion joint sealing system shall be a complete system of compatible materials designed to produce waterproof, traffic bearing expansion joint seals as detailed on Drawings.

    a. Nosing, traffic plates, blockout fillers, bond breakers, primers and miscellaneous materials required for installation shall be recommended by the system manufacturer.

2. Ribbed Extruded Elastomeric Expansion Joint System.

    a. The following extruded elastomeric seal systems are used singularly or in combination as detailed on the drawings and are approved for usage under this section:

        1) "Thermaflex TCR Series Expansion Joint Sealing System", Emseal Corporation.
        2) "ZB Series Expansion Joint System", C/S Group.
        3) "MM LokCrete Membrane System", MM Systems Corporation.
        4) "Iso-Flex J Series Winged Expansion Joint System", LymTal International, Inc.
        5) "Wabo ME Series Expansion Joint System", Watson Bowman Acme, BASF The Chemical Company.
        6) "CS Series Chambered Seal System", Balco, Inc.
        7) "Polycrete CR Series Membrane System", Erie Metal Specialties.
        8) "Vulkem WF Series Vehicular Expansion Joints", Tremco, Inc.

    b. Approved extruded elastomeric expansion joint sealing systems shall meet the following requirements:

        1) The expansion joint seal shall be heavy-duty, impact absorbing extruded rubber membrane gland with ribbed and perforated flanges capable of resisting heavy duty traffic.
        2) The exposed surface shall be non-metallic, slip/skid resistant and resistant to ultra-violet rays and chemicals.
        3) Seal gland shall be heat weldable to ensure continuity of seal throughout.
        4) The polyurethane elastomeric concrete nosing shall be reinforced with compatible aggregates for compressive strength and abrasion-resistance while preserving its flexibility during joint movements.
        5) The elastomeric gland shall be fully embedded in the concrete nosing thereby encapsulating the perforated flanges and creating watertight seal throughout.
        6) Joint Seal Directional Changes - At all changes in direction provide seals with factory heat welded splices such as 90° corners, tees and crosses. The seal shall extend a minimum of 2’-0” in each direction from the factory splice. Only straight, butt splice connections shall be allowed on the jobsite following manufacturers written instructions. All factory and field fused connections shall incorporate bonding of the complete seal profile. This includes fusing of all internal and external web configurations.

c. Use ribbed extruded elastomeric expansion joint system at the transition joint between slab-on-grade and structural slab at the ground tier and as shown on the Drawings.

3. Bolt-Down, Extruded Elastomeric Seal Expansion Joint System.

a. The following extruded elastomeric seal systems are used singularly or in combination as detailed on the drawings and are approved for usage under this section:

1) "Wabo Elastoflex Expansion Joint System", Watson Bowman Acme, BASF The Chemical Company.
2) "MM Elastolok Membrane System", MM Systems Corporation.
3) "Iso-Flex Dura-Block System", LymTal International, Inc.
4) "RB Series Heavy-Duty Rubber Block System", Balco, Inc.

b. Approved bolt-down extruded elastomeric expansion joint sealing systems shall meet the following requirements:

1) The expansion joint seal shall be heavy duty, shock absorbing steel reinforced anchor block capable of resisting heavy duty traffic. No exceptions to this requirement will be considered.
2) The exposed surface shall be non-metallic, slip/skid resistant and resistant to ultra-violet rays and chemicals.
3) Seal gland shall be heat weldable to ensure continuity of seal throughout.
4) The elastomeric seal shall be mechanically bolted down to the concrete surface beneath using epoxy anchors over a continuous, full width bedding compound creating watertight seal throughout.
5) Joint Seal Directional Changes - At all changes in direction provide seals with factory heat welded splices such as 90° corners, tees and crosses. The seal shall extend a minimum of 2'-0" in each direction from the factory splice. Only straight, butt splice connections shall be allowed on the jobsite following manufacturers written instructions. All factory and field fused connections shall incorporate bonding of the complete seal profile. This includes fusing of all internal and external web configurations.

c. Use bolt-down extruded expansion joint system strictly at joints within the garage superstructure at the top tier where the joints would be exposed to snow plows and as shown on the Drawings.

H. ARCHITECTURAL BUILDING JOINT SEALING SYSTEM

1. The expansion joint sealing system shall be a complete system of compatible materials designed to produce waterproof joint seals as detailed on Drawings.

a. Bond breakers, primers and miscellaneous materials required for installation shall be recommended by the system manufacturer.

2. Expansion Joint Sealing System.

   a. The following joint sealing systems are used singularly or in combination as detailed on the drawings and are approved for usage under this section:

      1) "Colorseal Joint Sealing System", Emseal Joint Systems Ltd.
      2) "Evazote Phyzite System", Capital Services.
      3) "Everlastic Wide Joint Seal", Williams Products, Inc.
      4) "MM Color Joint/ESS or SIF Series", MM Systems Corporation.
      5) "Wabo Seismic WeatherSeal Colorable Expansion Joint System", Watson Bowman Acme, BASF The Chemical Company.
      6) "BCSW Series Pre-compressed Seal System", Balco Inc.
      7) "CS Series Foam Seal System", Erie Metal Specialties.
      8) "VF Series Expansion Joint System", C/S Group.
      9) “Willseal Seismic”, Willseal LLC.

2.3 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, 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, select from the following types:

   1. Type C (closed-cell material with a surface skin).
   2. Type O (open-cell material)
   3. Type B (bicellular material with a surface skin)

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 GENERAL

A. All work shall be installed in strict accordance with system manufacturer's recommendations employing trained installers utilizing proper tools and equipment and working under the direct supervision of a technically competent and experienced supervisor. An authorized technical representative shall attend a pre-installation conference, be present for the first day of installation and provide a minimum of three field inspection reports to the Architect during the duration of the installation.

B. All surfaces related to work under this section shall be inspected by the applicator prior to commencing work. Any conditions discovered which render the substrate unsuitable shall be reported and satisfactorily corrected prior to installation of the specified system.

C. Coordinate and verify that related work items meet the following requirements:

1. All surfaces shall be clean, dry and of sound substrate at time of application. Surfaces shall be provided free of voids, ridges and sharp projections.
2. Concrete surface finishes shall be subject to approval of the applicator.
3. Concrete surfaces shall be water cured or cured with a compatible curing compound as recommended by the manufacturer.
4. Concrete surfaces shall have cured for an acceptable period as recommended by the system manufacturer for the various components of the applicable system.

D. Environmental Conditions:

1. System application shall be at temperatures as recommended by the system manufacturer.
2. The deck surface shall be dry at time of application according to ASTM D4263, Standard Test Method for Indicating Moisture in Concrete.
3. Provide adequate ventilation in accordance with system manufacturer's recommendations during installation of the deck waterproofing system.

E. Protect all work areas from traffic until fully cured.

3.2 EXAMINATION

A. Examine joints indicated to receive waterproofing system, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting product performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PROTECTIVE CONCRETE SEALER SYSTEM

A. Clean surfaces to be treated in accordance with the system manufacturer's recommendations. Acceptable methods include sweeping, blowing, vacuuming, pressure washing, water blasting, acid etching, sand blasting, or shot blasting as required to remove all laitance and surface contaminants to insure proper penetration and/or adhesion of the sealer.

B. Seal all joints prior to general surface treatment.

C. Select and install a test section prior to general application to verify installation procedures, application rates, adhesion, penetration and condition of the finished surface.

D. Concrete sealer shall be applied in accordance with system manufacturer's recommendation at the same rates and solids contents as tested against the criteria established in NCHRP 244.

E. Materials shall be applied by pressure sprayer, spray bar or roller.

F. Application rate shall be 125 sq. ft. per gallon for a 40% silane sealer and 200 sq. ft. per gallon for a 100% silane sealer.

G. Unsatisfactory results rejected under Section 1.5.E shall be grounds for rejection of sealer and sealer application or sealer reapplication using an approved product shall be completed at no additional cost to the Owner.

H. Sealer shall not be applied until concrete has fully cured but no earlier than 14 days after concrete has been poured. Striping shall not be placed until full cure of concrete sealer (generally, 14 days @ 70 degrees or higher) or bituminous pavement (generally, 30 days @ 45 degrees or higher) has been obtained.

3.4 ELASTOMERIC TRAFFIC DECK COATING SYSTEM

A. All traffic deck coatings are to be applied to acceptable clean, dry, sound substrates. Clean surfaces to be treated in accordance with the system manufacturer's recommendations. Acceptable methods include sweeping, blowing, vacuuming, pressure washing, water blasting, acid etching, sand blasting, or shot blasting as required to remove all laitance and surface contaminants to insure proper adhesion of the deck coating.

B. Select and install a test area prior to general application to establish procedures, verify adhesion, slip resistance, and acceptable appearance.

C. Surface preparation shall produce a surface profile matching CSP 4, 5 or 6 per ICRI 03732, as required to meet the requirements of the selected deck coating. Sweep and vacuum roughened surface to remove debris followed by low-pressure water cleaning. Coordinate surface preparation with the surface preparation for the corrosion-inhibiting treatment and vapor drive coating, as applicable.

D. Notify Architect 7 days prior to completion of the surface preparation. Meet with the Architect and manufacturer's representative to review surface preparation, joint preparation, adhesion test results, and crack preparation, as applicable. All joint and crack preparation shall be included in the cost of the traffic deck coating system.

1. Seal all underlying control and construction joints.
2. Cracks grater than 1/16"
    a. All static cracks shall be routed (V-groove) and gravity fed with a polymer sealer. Fill cracks with oven-dried sand before applying the polymer sealer per the manufacturer's requirements. After application of the polymer sealer, broadcast dry silica sand to refusal evenly over the crack.
    b. All dynamic cracks shall be routed (U-groove) and receive bond breaker and sealant as detailed.
3. Detail all joints and cracks, including cracks less than 1/16", with liquid flashing a distance of 3" on each side of the joint/crack to yield a total thickness of 30 dry mils. All dynamic cracks and joints, cracks and joints 1" and wider, and all precast double tee joints shall receive reinforcing fabric embedded in the liquid flashing detail strip. The reinforcing fabric shall be compatible with the selected deck coating system and shall prevent the deck coating system from cracking due to thermal and dynamic movement of the crack or joint. However, the reinforced detail strip is not expected to prevent cracking of the deck coating system if there are structural deficiencies that causes excessive movement, such as broken double tee connections.

E. Other detailing work including sealing around drains, penetrations, curb, column and wall bases, etc., shall be accomplished in accordance with system manufacturer's recommendations prior to general application.

F. Provide a grid system marked on the deck surface to designate the area for which a container of material must be used evenly applied to obtain the desired average dry mil film thickness. A wet mil gauge shall also be used to randomly verify that mil thickness at application is consistent with system manufacturer's recommendations.

G. Broadcast clean, dry aggregate into wear coats and mix slip resistant powder into seal coat as needed to meet slip resistance requirements.

H. Application shall be by squeegee, roller and power sprayer.

I. Install the Elastomeric Traffic Deck Coatings in accordance with a "wear-rated" heavy duty system per Section 2.2. D.

3.5 SLAB AND DECK CONTROL JOINT SEALANT SYSTEM

A. All sealants are to be applied to clean, dry, sound substrates. Follow system manufacturer's recommendations for cleaning and preparation of joints. Tooled control joints provided by the Goldblatt Groover #06-314-M7 shall be prepared by grinding with V- shaped wheel prior to sealing.

B. Select and install a test section prior to general application to verify adhesion and acceptable appearance.

C. Backer rods, bond breakers and primers shall be used in accordance with system manufacturer's recommendations.

D. Care shall be taken to completely fill joints without overflowing the joint or smearing adjacent surfaces.

E. Exposed joints shall be filled with sealant and tooled to a slightly recessed configuration to avoid direct contact with wheel traffic.

F. Sealant shall not be applied until after concrete curing procedures has been completed (normally at least 7 days after concrete has been poured).

3.6 STRUCTURAL EXPANSION JOINT SEALING SYSTEM

A. General:
   1. Submit product data of expansion joint system to be used.
   2. Coordinate expansion joint system with other related work before installation of such work.
   3. Provide 6-inch vertical return upwards at column or wall termination as applicable.

B. Installation of the Ribbed and Perforated Elastomeric Expansion Joint System.
   1. Provide blockouts in the concrete surface, of sufficient width and depth to receive the specified system, to be formed at the expansion joint by the concrete contractor.
   2. Layout the extruded gland at maximum length possible and set the gap dimension according to the manufacturer's recommended installation temperature. Embed glands fully in the polymeric concrete nosing including perforations.
   3. Fill concrete blockouts with approved polymeric nosing material flush to the top of the extruded gland and the driving surface.
   4. Install secondary seal where applicable.

C. Installation of the Bolt-Down Elastomeric Expansion Joint System.

   1. Provide blockouts in the concrete surface, of sufficient width and depth to receive the specified system, to be formed at the expansion joint by the concrete contractor.
   2. Install the anchor bolts at proper spacing and set the gap dimension according to the manufacturer's recommended installation temperature. Seal all gaps including boltholes using heat weldable sealing gland.

3. Fill concrete blockouts with approved polymeric nosing material flush to top of the metal edge anchor strips and the driving surfaces.

3.7 ARCHITECTURAL BUILDING JOINT SEALING SYSTEM

A. General:
   1. Submit product data of expansion joint sealing system to be used.
   2. Coordinate expansion joint sealing system with other related work before installation of such work.

B. Installation of the Architectural Building Joint Sealing System
   1. Place and adhere the joint sealing system in the joints in accordance with procedures recommended by the system manufacturer, taking care to make the surface flush with the surface of the adjacent structure.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform the field tests and inspections.

B. Joint Sealant Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

   1. Extent of Testing: Test mockups and completed elastomeric sealant joints as follows:

      a. Perform 2 tests for each mockup.
      b. Perform 10 tests for the first 1000 feet of joint length for each type of elastomeric sealant and joint substrate.
      c. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor.
   2. Test Method: ASTM C 1193, Appendix X1.1.

      a. As appropriate for type of joint-sealant application indicated, test joint sealants according to one of the following:

         1) Method A, Field-Applied Sealant Joint Hand Pull Tab
         2) Method B, Exposed Surface Finish Hand Pull Tab
         3) Method C, Field-Applied Sealant Joint Hand Pull Flap
         4) Method D, Water Immersion.
      b. For joints with dissimilar substrates, verify adhesion to each substrate separately; do this by extending cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
   3. 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.
   4. 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.

5. 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.
6. 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.

C. Deck Coating Field-Adhesion Testing: Field test deck coating adhesion to substrates as follows:

1. Extent of Testing: Test mockups and completed deck coatings as follows:

a. Perform 2 tests for each mockup.
b. Perform 6 tests for the first 10,000 square feet of deck coating for each type of deck coating and substrate.
c. Perform 1 test for each 10,000 square feet of deck coating thereafter, but not less than 1 test per floor.

2. Test Method: ASTM D7234.
3. Inspect deck coating for bubbles, voids, aggregate distribution, and for application complying with specified requirements. Record results in a field-adhesion-test log.
4. Inspect deck coating preparation, installation, and testing. Record results in a log and report on the following:

a. Dates when surface preparation was performed.
b. Type of surface preparation.
c. If surface contaminants such as engine oil were present on the slab prior to surface preparation and cleaning.
d. If surface contaminants remain on the slab after surface preparation and cleaning.
e. Relative humidity of the slabs prior to application of deck coatings.
f. Time, date, temperature, precipitation, relative humidity, and sun exposure when deck coatings were installed. Note if conditions changed during the installation.
g. Type of materials used for deck coating installation and wait times between each application.
h. Deck coating dry mil thickness and if the thickness complies with specified requirements.
i. Test dates, test locations, and adhesion results (whether deck coating failed to adhere to substrates or tore cohesively).
j. Names of persons who performed surface preparation, who performed relative humidity testing, who installed deck coatings, and who performed adhesion tests.

5. Repair deck coatings pulled from test area by applying new deck coating following same procedures used originally. Ensure that original surfaces are clean and that new deck coating overlaps original deck coating.

D. Deck Coating Field Slip Resistance Testing: Field test deck coating slip resistance as follows:

1. Extent of Testing: Test mockups and completed deck coatings as follows:

    a. Perform 2 tests for each mockup.
    b. Perform 6 tests for the first 10,000 square feet of deck coating for each type of deck coating.
    c. Perform 1 test for each 10,000 square feet of deck coating thereafter, but not less than 1 test per floor..
2. Test Method:

    a. ANSI/NFSI B101.1 - Test Method for Measuring Wet Static Coefficient of Friction (SCOF) of Common Hard-Surface Floor Materials
3. Inspect deck coating for variations in aggregate distribution. Locate tests at areas with high density of aggregate and with low density of aggregate. Record results in a log and report on the following:

    a. Test method, test dates, test locations, and slip resistance results.
    b. Names of person who performed tests.
    c. Type of deck coating and aggregate.
    d. Application rates of deck coating system components.
    e. Approximate area (square feet) of deck coating that exhibits a low density of aggregate, an average density of aggregate, and a high density of aggregate.
4. Repair deck coating test area, if damaged during testing, by applying new deck coating following same procedures used originally. Ensure that original surfaces are clean and that new deck coating overlaps original deck coating.

E. Expansion Joint Nosing Material Field-Adhesion Testing: Field test nosing material adhesion to substrates as follows:

1. Extent of Testing: Test mockups as follows:

    a. Perform 2 tests for each mockup.
2. Test Method: ASTM D7234.
3. Inspect nosing material preparation, installation, and testing. Record results in a log and report on the following:

    a. Dates when surface preparation was performed.
    b. Type of surface preparation.
    c. If surface contaminants such as engine oil were present on the slab prior to surface preparation and cleaning.
    d. If surface contaminants remain on the slab after surface preparation and cleaning.
    e. Relative humidity of the slabs prior to application of nosing material.
    f. Time, date, temperature, precipitation, relative humidity, and sun exposure when expansion joints were installed. Note if conditions changed during the installation.
    g. Type of materials used for nosing material installation and wait times between each application.
    h. Test dates, test locations, and adhesion results (whether nosing material failed to adhere to substrates or tore cohesively).
    i. Names of persons who performed surface preparation, who performed relative humidity testing, who installed nosing material, and who performed adhesion tests.

4. Remove nosing material mockup after testing and prepare the substrate for installation of the expansion joint. Repair the substrate if necessary.

F. Evaluation of Field Test Results: Products not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove products that fail to adhere to substrates during testing or to comply with other requirements. Reapply mockups and retest until test results prove products comply with indicated requirements. Do not use products that fail to adhere to substrates during testing.

3.9 CLEANING

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

3.10 PROTECTION

A. Protect waterproofing systems during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so systems 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 products immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079020