SECTION 024119
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

B. Referenced Sections:
1. Section 017419 Construction Waste Management.

1.2 MATERIALS OWNERSHIP

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

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

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

1.3 INFORMATIONAL SUBMITTALS

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

B. Schedule of selective demolition activities with starting and ending dates for each activity.

C. Predemolition photographs or video.

1.4 CLOSEOUT SUBMITTALS

A. Inventory of items that have been removed and salvaged.

1.5 FIELD CONDITIONS

A. Owner will occupy building throughout selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

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

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

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

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

1. Maintain fire-protection facilities in service during selective demolition operations.

G. Arrange selective demolition schedule so as not to interfere with Owner's operations.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

C. Inventory and record the condition of items to be removed and salvaged.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, electrical, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

3.3 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
4. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
6. Dispose of demolished items and materials promptly Comply with requirements in Section 017419 "Construction Waste Management and Disposal."

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities. Sections of site access must be maintained at all times; coordinate operations with Owner.

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.5 CLEANING

A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 040120
MASONRY RESTORATION AND CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 and 02 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Repairing brick and stone masonry, including replacing damaged units as indicated on the Drawings.
2. Repointing joints with mortar.
3. Repointing joints with sealant.
4. Providing embedded flashing materials and miscellaneous masonry accessories.
5. Providing new helical wall ties to connect multiple wythes of masonry or other wall construction together, and helical stitching ties installed in mortar bed joints for crack stabilization.
6. Cleaning exposed masonry surfaces (clay face brick, natural limestone, polished granite).
7. High Performance Masonry coating on parapet walls (roof side).
8. Replacing steel window and door lintels.
9. Providing mourning buttons.
10. Providing cable management hangers.

1.3 UNIT PRICES

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

1.4 DEFINITIONS

A. Very Low-Pressure Spray: under 100 psi (690 kPa).

B. Low-Pressure Spray: 100 to 400 psi (690 to 2750 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

C. Medium-Pressure Spray: 400 to 600 psi (2750 to 5510 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

D. High-Pressure Spray: 800 to 1200 psi (5510 to 8250 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

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

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to masonry repair including, but not limited to, the following:

    a. Verify masonry repair specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
    b. Materials, material application, sequencing, tolerances, and required clearances.
    c. Pre-construction testing requirements.
    d. Testing and inspection requirements.
    e. Quality-control program.
    f. Construction waste management plan.
    g. Coordination with building occupants.
    h. Coordination with window replacement/Window Contractor (under separate contract).

1.6 SEQUENCING AND SCHEDULING

A. Order replacement materials at earliest possible date, to avoid delaying completion of the Work.

B. Work Sequence: Perform brick masonry repair work in the following sequence, which includes work specified in this and other Sections:

1. Remove tower masonry, salvaging any sound face brick for reuse.
2. Rout mortar joints in face brick to a minimum depth of 3/4” or two-times joint width.
3. Repair masonry, including replacing existing masonry with new and/or salvaged masonry materials. Bricks with hairline cracks less than 1/16” wide may remain in place.
4. Install helical wall ties, to anchor new face brick to back-up brick. Space ties in diamond pattern @ 16” oc maximum horizontal spacing, and 16” vertical spacing, and within 4” of cracked bricks, and within 4” of end of new replacement bricks. Provide 8mm (5/16” min, 3/8” max diameter) x 195mm (7.6” min, 8”max) ties in walls.
5. Repoint mortar and sealant joints in lifts not to exceed 1/4" and tooled when “thumb print” hard.
6. Clean brick and stone masonry.
7. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include recommendations for applications and use. Include test data substantiating that products comply with requirements.

B. Samples for Initial Selection: For the following:

1. Colored Mortar: Submit sets of mortar that will be left exposed in the form of sample mortar strips, 6 inches (150 mm) long by 1/2 inch (13 mm) wide, set in aluminum or plastic channels.

    a. Have each set contain a close color range of at least six of different mixes of colored sands and cements that produce a mortar matching existing, cleaned mortar when cured and dry.
    b. Submit with precise measurements on ingredients, proportions, gradations, and source of colored sands from which each Sample was made.

2. Sand Types Used for Mortar: Minimum 8 oz. (240 mL) of each in plastic screw-top jars.
3. Patching Compound: Submit sets of patching compound Samples in the form of plugs (patches in drilled holes) in sample units of masonry representative of the range of masonry colors on the building.

    a. Have each set contain a close color range of at least six Samples of different mixes of patching compound that matches the variations in existing masonry when cured and dry.

C. Samples for Verification:

1. Each type of brick unit to be used for replacing existing units. Include sets of Samples to show the full range of shape, color, and texture to be expected. For each brick type, provide straps or panels containing at least four bricks. Include multiple straps for brick with a wide range.
2. Each type of limestone unit to be used for replacing or providing new units.
3. Each type of patching compound in the form of briquettes, at least 3 inches (75 mm) long by 1-1/2 inches (38 mm) wide. Document each Sample with manufacturer and stock number or other information necessary to order additional material.
4. Accessories: Each type of accessory and miscellaneous support.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For brick and stone masonry repair specialists including field supervisors and workers.

B. Preconstruction Test Reports: For existing bricks and replacement bricks.

C. Restoration Program: For each phase of restoration process, provide detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of restoration work, including protection of surrounding materials on building and Project site.

1. If materials and methods other than those indicated are proposed for any phase of restoration work, provide a written description, including evidence of successful use on comparable projects, and a testing program to demonstrate the effectiveness for this project.

D. Cleaning Program: Prepare a written cleaning program that describes cleaning process in detail, including materials, methods, and equipment to be used; protection of surrounding materials; and control of runoff during operations. Include provisions for supervising worker performance and preventing damage.

1. If materials and methods other than those indicated in Section 2.10 and 3.5 are proposed for any phase of cleaning work, add a written description of such materials and methods, including evidence of successful use on comparable projects and demonstrations to show their effectiveness for this Project.

1.9 QUALITY ASSURANCE

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

1. At Contractor's option, work may be divided between two specialist firms: one for cleaning work and one for repair work.
2. Field Supervision: Restoration specialist firms shall maintain experienced full-time supervisors on Project site during times that masonry restoration and cleaning are in progress.
3. Restoration Worker Qualifications: Persons who are experienced and specialize in restoration work of types they will be performing.

B. Chemical Manufacturer Qualifications: A firm regularly engaged in producing masonry cleaners that have been used for similar applications with successful results, and with factory-trained representatives who are available for consultation and Project-site inspection and assistance at no additional cost to Owner.

C. Mockups:
1. Prepare brick and stone masonry repair and cleaning as follows to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation. Prepare mockups on existing walls under same weather conditions to be expected during remainder of the Work, to be reviewed by Architect and Owner:
    a. Masonry Repair: Repair an area approximately 36 inches high by 48 inches wide for each type of masonry material indicated to be rebuilt or replaced.
        1) Include one area with full brick replacement [CN-2], and one area with brick patching [CN-3] as indicated on the drawings.
        2) Include one area each of limestone dutchman and crack repair [CN-8A].
    b. Cleaning: Clean an area approximately 25 sq. ft. in area for each type of clay masonry and surface condition. Refer to Section 2.10 and 3.5 for cleaning protocol. Refer to existing field installed masonry mockup for benchmark cleaning requirements.
    c. Pointing: Rake out joints in two separate areas approximately 36 inches high by 72 inches wide for each type of repointing required and repoint one of the two areas.

d. High Performance Masonry Coating: Test a minimum 4ft. by 4ft. area on each type of masonry. Use the manufacturer's application instructions. Let test area protective treatment cure before review. Keep test panels available for comparison throughout the protective treatment project.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on brick masonry as follows:

1. Provide test specimens as indicated and representative of proposed materials and existing construction.
2. Replacement Brick: Test each proposed type of replacement brick according to sampling and testing methods in ASTM C67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction).
3. Existing Brick: Test each type of existing brick indicated for replacement according to testing methods in ASTM C67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction). Carefully remove five existing units from locations designated by Architect. Take testing samples from these units.

1.11 DELIVERY, STORAGE, AND HANDLING

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

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

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

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

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

F. Handle bricks to prevent overstressing, chipping, defacement, and other damage.

1.12 FIELD CONDITIONS

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

B. Temperature Limits: Repair brick masonry only when air temperature is between 40 and 90 deg F (4 and 32 deg C) and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.

C. Cold-Weather Requirements: Comply with the following procedures for masonry repair unless otherwise indicated:

1. When air temperature is below 40 deg F (4 deg C), heat mortar ingredients, masonry repair materials, and existing masonry walls to produce temperatures between 40 and 120 deg F (4 and 49 deg C).
2. When mean daily air temperature is below 40 deg F (4 deg C), provide enclosure and heat to maintain temperatures above 32 deg F (0 deg C) within the enclosure for seven days after repair.

D. Hot-Weather Requirements: Protect masonry repairs when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F (32 deg C) and above unless otherwise indicated.

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

2.2 MASONRY MATERIALS

A. Building Brick: ASTM C62, of same vertical dimension as face brick, for masonry work concealed from view.

1. Grade SW where in contact with earth.
2. Grade SW, MW, or NW for concealed backup.

2.3 CLAY FACE BRICK

A. General: Contractor to use salvaged face brick to greatest extent possible. If salvaged brick quantities do not allow for completion of Work, provide new face brick in shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
   1. Clay Face Brick: Facing brick complying with ASTM C 216. Field tan face brick blend to match existing buildings.

   2. Type, Grade, Style, and Size to be confirmed per pre-construction brick testing.
   3. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C 67.
   4. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."

2.4 MORTAR MATERIALS AND MIXES

A. Provide separate mortar materials for brick masonry and limestone repair work. A mortar analysis is available for review by Contractor.

B. Brick Mortar: Portland Cement-Dry Hydrated Lime-Sand mortar, ASTM C 270 Type N.
   1. Portland Cement: ASTM C150/C150M, Type I or Type II, may be used for cold-weather construction; white or gray, or both where required for color matching of mortar.
      a. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C114.
   2. Hydrated Lime: ASTM C207.
   3. Mortar Sand: ASTM C144.
      a. Exposed Mortar: Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
      b. Colored Mortar: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.

C. Limestone Mortar: Lime-Sand mortar.
   1. Hydrated Lime: ASTM C207.
      a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         1) Lancaster Lime Works.
         2) US Heritage Group.
         3) Edison Coatings.
   2. Mortar Sand: ASTM C144.
      a. Exposed Mortar: Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.

D. Mortar Proportions: Mix mortar materials in the following proportions:

   1. Pointing Mortar for Brick: Match existing mortar in content and color. Final mortar selection shall be reviewed in conjunction with brick testing; new mortar to be of a weaker compressive strength than brick masonry. Assume 1-part Portland cement, 1 part

lime, 5 parts sand. Confirm through laboratory test of existing mortar and submit proposed mix for approval.

2. Pointing Mortar for Stone: Match existing mortar in content and color. Assume 1-part lime, 2 parts sand. Confirm through laboratory test of existing mortar and submit proposed mix for approval.

E. Mortar Pigments: ASTM C 979/C 979M, compounded for use in mortar mixes, and having a record of satisfactory performance in masonry mortars. Pigments shall be obtained from a single lot; check lot number to ensure consistent color.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Davis Colors.
b. Lanxess Corporation, Bayferrox.
c. Solomon Colors, Inc.

F. Water: Potable.

G. Do not use admixtures in mortar.

H. Measurements and mixing: Measure cementitious and aggregate material in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. To avoid over sanding, mortar sand to be added in a damp, loose condition. Mix materials in a clean, mechanical batch mixer.

1. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding any water. The mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 1-2 hours. Add remaining water in small portions until reaching mortar of the desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

2. Lime putty-sand mortar should be mixed in a vertical shaft mixer.

2.5 MANUFACTURED REPAIR MATERIALS

A. Patching Compound: Single-component, cementitious, mineral-based mortar patching compound.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Cathedral Stone, Jahn Restoration Techniques and Research, cementitious patching M70 Stone Restoration Mortar, or product as recommended by manufacturer.

2. Use formulation that is vapor and water permeable (equal to or more than the substrate), exhibits low shrinkage, has lower modulus of elasticity than bricks being repaired, and develops high bond strength to all types of masonry.
3. Use formulation having working qualities and retardation control to permit forming and sculpturing where necessary.
4. Formulate patching compound in colors and textures to match each limestone unit being patched. Provide sufficient number of colors to enable matching of the color, texture, and variation of each unit.

B. Metal attachments for setting Dutchman: all wires, pine, anchors, and bars shall be stainless steel, Type 302 and 304. Provide anchors as follows:
1. 1/8" diameter round stock, stainless steel wire with turned-up ends for small veneers.
2. 1/4" or 3/8" diameter round stock, stainless steel rod for direct pinning and drop dowels.
3. The quantity of individual attachments shall not be less than two for small dutchman; and one attachment every two square feet for larger panels.
4. All attachments shall be fastened by mechanical locking, in addition to appropriate adhesives and mortars.
5. Adhesives for attaching anchors and for direct pinning, where permitted, shall be held in place with a high strength, two component, adhesive anchoring system. Product to be Sika AnchorFix-2, or equal product compatible with limestone patching compound.

C. Granite Patching Compound: provide two-part granite patching system, utilizing an epoxy paste adhesive to reset the crack, and a cementitious mortar patching compound finish.
1. High-modulus, high-strength, structural, non-abrasive epoxy paste adhesive.
a. Manufacturers: Subject to compliance with requirements, provide products by Sika, Sikadur Injection Gel, or product as recommended by manufacturer.
2. Cementitious repair mortar, hydrated lime mortar, with mortar pigments to match existing black granite base. See manufacturers above for Limestone mortar.

2.6 JOINT SEALANTS

A. General:

1. Colors: Provide colors of exposed sealants to match colors of mortar adjoining installed sealant unless otherwise indicated.

B. Joint-Sealant Backing:

1. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin) or Type B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
2. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended in writing 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. Coordinate paragraphs in this article with "Joint-Sealant Schedule" Article.

C. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.

1. Location: Limestone Coping, misc. wall-mounted equipment penetrations
2. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant, low modulus; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
3. Products: Subject to compliance with requirements, provide one of the following:

    a. Pecora Corporation; 890NST.
    b. Dow Corning, Dowsil 790.
    c. BASF, MasterSeal NP 150

D. Urethane Joint Sealants

1. Location: Roof Counterflashing, Lintel flashing
2. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT
3. Products: Subject to compliance with requirements, provide one of the following:

    a. Pecora Corporation; Dynatrol I-XL.
    b. Sika Corporation; Sikaflex 1A.
    c. Tremco Incorporated; Dymonic.

2.7 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Stainless Steel: ASTM A 240/A 240M or ASTM A 666, Type 304, 0.016 inch (0.40 mm) thick.
2. Fabricate continuous flashings in sections 96 inches (2400 mm) long minimum, but not exceeding 12 feet (3.7 m). Provide splice plates at joints of formed, smooth metal flashing.
3. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.
4. Metal Sealant Stop: Fabricate from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.
5. Metal Expansion-Joint Strips: Fabricate from stainless steel to shapes indicated.

B. Solder and Sealants for Sheet Metal Flashings:

1. Solder for Stainless Steel: ASTM B 32, Grade Sn60 or Grade Sn96, with acid flux of type recommended by stainless-steel sheet manufacturer.
2. Elastomeric Sealant: ASTM C 920, chemically curing urethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and remain watertight.

C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

D. Termination Bars for Flexible Flashing: Stainless steel bars 0.075 inch by 1 inch (1.90 mm by 25 mm).

2.8 HELICAL WALL TIES

A. Post-installed helical ties for use in masonry/concrete base materials shall be feature radial fins formed on the steel wire via cold rolling process suitable to support and resist structural demand loading by means of tension, compression or a combination of both.

B. Material: Type 304 or 316 Stainless Steel as specified for the Project conditions.

C. Manufacturers:

1. Simpson Strong-Tie: ‘Heli-Tie’ 3/8” x 8”
2. Mitek ‘Spiralok’: 8mm x 195 mm
3. Helifix ‘DryFix’: 8mm x 195 mm

D. Helical ties shall be installed using the manufacturer’s accessories and recommended installation equipment.

2.9 CLEANING MATERIALS

A. Water: Potable.

B. Hot Water: Where required water heated to a temperature of 140 to 160 deg F (60 to 71 deg C).

C. Detergent Cleaner - General Cleaning of Environmental Deposits, Mold, Mildew, and Algae: D/2 Biological Solution shall be used. D/2 is biodegradable, pH neutral, and contains no chlorine or acids. Products containing chlorine or acids shall not be used. D/2 Biological Solution is available nationwide; for a distributor in your region see the D/2 website www.d2bio.com or call (917) 693-7441.
1. Natural bristle brushes
2. Soft, clean rags
3. Clean, potable water
4. Rubber gloves
5. Eye and skin protection

6. Low-pressure applicator, such as pump sprayer or electric/battery powered sprayer, Pressure washers using 600 psi or less

D. Solvent Cleaner: Cleaning of Coatings and Sealant Deposits: CITRA-SOLV by ATCO International. keepintouch@citrasolv.com, 800-343-6588.
1. Rubber or neoprene gloves
2. Safety glasses - Do not get in eyes, on skin, or on clothing.
3. Wear chemical protective clothing.
4. Wash hands thoroughly after handling.
5. Disperse or ventilate the area with fresh air.
6. Remove all sources of ignition.
7. Beware of vapors accumulating to form explosive concentrations.
8. Absorb spill with inert material (e.g., dry sand or earth), and dispose of in accordance with applicable regulations.
9. Flush thoroughly with fresh, tepid water for 15 minutes.
10. Discard contaminated clothing and footwear or wash before reuse.
11. If skin irritation occurs: Get medical advice/attention.

2.10 HIGH PERFORMANCE COATING

A. Vapor permeable, high solids, UV stable, waterproof coating to be applied to clay brick masonry.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. PROSOCO, Inc.; BMC II
b. BASF; MasterProtect C350.
2. Tinting: provide manufacturer’s compatible colorant system. Color to be selected from manufacturer’s standard range.
3. Accessories: provide manufacturer’s compatible patching compound and base coat.

2.11 STEEL LINTELS

A. Material: Angles ASTM A36-G60, hot-dip galvanized. Apply hot-dip process per ASTM A123 Standard.

2.12 ACCESSORY MATERIALS

A. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, glazed masonry, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Building Restoration Products, Inc.; LM 130 Acid Shield.
b. Price Research, Ltd.; price Mask
c. PROSOCO, Inc.; Sure Klean Strippable Masking

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

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

D. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing the work involved.
2. Minimal possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could leave residue on surfaces.

E. Weep Vent Products:

1. Location: Limestone Coping (see note CN-1 on drawings).

a. Product: Provide product by manufacturer as noted, or equivalent, Masonry Technologies, Inc. (MTI), Stone Cavity Weep (SCV 5012).
b. Description: Forms the bottom side of the bed joint of mortar to create tunnels/channels that reach from the face of the masonry unit (full depth stone 3 inches (76 mm)minimum 10 inches (254 mm) maximum) into the cavity at the backside of full depth stone veneer or into the vertical drainage plane (the rainscreen drainage plane) created by 10MM Sure Cavity (SCMM 2516 or SCMM 2532)
c. Materials: High impact polystyrene sheets, 0.024 inch (0.61 mm) thick, formed with corrugations.
d. Weep Legs: 2-1/4 inches (57 mm) wide at 9-1/2 inches (242 mm) on center.
e. Continuous Belt Width: 1 inch (25 mm).
f. Overall Width: 12 inches (305 mm).
g. Length: 25 feet (7.62 m).
h. Squared - Channel Depth: 3/16 inch (4.76 mm).
i. Color: Translucent.
j. Performance Criteria:

1) Fungi Resistance: No Growth; ASTM C 1338.
2) Ultra-violet (UV) Exposure: No Cracking, checking, crazing, erosion or other characteristics that might affect performance; ASTM G 154.

2. Location: Head Joints at Windows and Door Lintels (Brick)

a. Product: Provide product by manufacturer as noted, or equivalent, Masonry Technologies, Inc. (MTI), Head Joint Weeps (HJW 3845).
b. Description: 3/8-inch x 3/8-inch spacer installed in each head joint of brick or limestone course laid dry on a flashing system that covers a steel lintel.
c. Materials: Acetac, 0.24 inch (0.6 mm) thick.

1) Width: 3/8 inch (9.5 mm).
2) Height: 3/8 inch (9.5 mm).
3) Length: 4 1/2 inches (114mm) to 9 inches (228 mm).
4) Color: Light gray.

3. Location: Head Joints at Window and Door Lintels (Limestone)

a. Product: Provide product by manufacturer as noted, or equivalent, Masonry Technologies, Inc. (MTI), Concealed Steel Lintel/Shelf Angle Weep System (CLW 9040).
b. Description: Forms the bottom side of the bed joint of mortar and the front nose of the bed joint of mortar to create tunnels/channels from behind the lip of a lip limestone at the front of the steel lintel into the vertical void.
c. Materials: High impact polystyrene sheets, 0.024 inch (0.61 mm) thick, formed with corrugations and bent into L-Shape, 5 inches (127 mm) or less on one leg by 9 inches (229 mm) or less on other leg.

1) Length: 4 feet (1.2 m).
2) Curved - Channel Depth: 1/8 inch (3.25 mm).

d. Performance Criteria:

1) Fungi Resistance: No Growth; ASTM C 1338.
2) Ultra-violet (UV) Exposure: No Peeling, chipping, cracking, flaking, pitting, crazing, erosion or other deleterious effects were observed under a 5X magnification; ASTM G 154.

2.13 MOURNING BUTTONS

A. Provide tabs in locations as indicated on drawings for the purpose of hanging mourning bunting and/or flags. Final product selection shall be coordinated with City.
1. Product: Amerock Essential'Z Stainless Steel 1-1/4 in (32mm) Diameter Knog BP262000SS, or equal stainless-steel product as selected by City.
2. Install using masonry anchors, to be located grout joints and not installed through limestone or face brick.

2.14 EXTERIOR CABLE MANAGEMENT

A. Provide stainless steel cable management J-hooks and bridle rings, for exterior in locations as indicated on drawings.

1. Product: 2-inch Type 316 stainless steel J-hook with integral retainer bar, rounded edges, data sensitive for use with fiber optic and CAT5E/6/7 cables, minimum 80 cable capacity.
    a. Basis of Design: Garvin, J-Cable Support Hook JHK-32SS
2. Product: 2-inch stainless steel bridle ring, loop/screw mount, with wire harness, compatible with data sensitive cable.
    a. Basis of Design: Garvin, Bridle Ring BR-200NPWH

PART 3 - EXECUTION

3.1 PROTECTION

A. Prevent mortar from staining face of surrounding masonry and other surfaces.

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

B. Protect existing surface-mounted equipment, conduit, wiring/cable to remain. Provide temporary supports where required to allow for installation of masonry work.

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

1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of restoration and cleaning work.

D. Comply with chemical cleaner manufacturer’s written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical cleaning solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

1. Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless cleaners being used will not damage adjacent surfaces. Use materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer’s written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
2. Keep wall wet below area being cleaned to prevent streaking from runoff.
3. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
4. Neutralize and collect alkaline and acid wastes for disposal off Owner’s property.
5. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

3.2 BRICK REMOVAL AND REPLACEMENT

A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated or are to be reused. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

1. When removing single bricks, remove material from center of brick and work toward outside edges.

B. Support and protect remaining masonry that surrounds removal area.

C. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition. Coordinate with new flashing, reinforcement, and lintels, which are specified in this Section.

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

E. Remove in an undamaged condition as many whole bricks as possible.

1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
3. Store brick for reuse. Store off ground, on skids, and protected from weather.
4. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.

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

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

H. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.

1. Maintain joint width for replacement units to match existing joints.
2. Use setting buttons or shims to set units accurately spaced with uniform joints.

I. Lay replacement brick with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter ends with enough mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. (30 g/194 sq. cm per min.) Use wetting methods that ensure that units are nearly saturated, but surface is dry when laid.

1. Install helical ties through mortar joints of new units at 16” x 16” diamond pattern spacing.
2. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork

3. Rake out mortar used for laying brick before mortar sets according to Section 040120.64 "Brick Masonry Repointing." Point at same time as repointing of surrounding area.
4. When mortar is hard enough to support units, remove shims and other devices interfering with pointing of joints.

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

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

3.3 LIMESTONE MASONRY PATCHING

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

1. Units indicated to be patched in the Drawings.
2. Units with holes.
3. Units with chipped edges or corners. Patch chipped edges or corners measuring more than 3/4 inch (19 mm) in least dimension.
4. Units with small areas of deep deterioration. Patch deep deteriorations measuring more than 3/4 inch (19 mm) in least dimension and more than 1/4 inch (6 mm) deep.

B. Remove and replace existing patches unless otherwise indicated or approved by Architect.

C. Remove deteriorated material and remove adjacent material that has begun to deteriorate. Carefully remove additional material so patch does not have feathered edges but has square or slightly undercut edges on area to be patched and is at least 1/4 inch (6 mm) thick, but not less than as recommended in writing by patching compound manufacturer.

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

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

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

G. Place patching compound in layers as recommended in writing by patching compound manufacturer, but not less than 1/4 inch (6 mm) or more than 2 inches (50 mm) thick. Roughen surface of each layer to provide a key for next layer.

1. Simple Details: Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of the stone. Shape and finish surface before or after curing, as determined by testing, to best match existing stone.
2. Carved Details: Build patch up 1/4 inch (6 mm) above surrounding stone and carve surface to match adjoining stone after patching compound has hardened.

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

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

J. Patching Bricks:

1. Remove loose material from masonry surface. Carefully remove additional material so patch does not have feathered edges but has square or slightly undercut edges on area to be patched and is at least 1/4 inch (6 mm) thick, but not less than recommended in writing by patching compound manufacturer.
2. Mask adjacent mortar joint or rake out for repointing if patch extends to edge of brick.
3. Mix patching compound in individual batches to match each unit being patched. Combine one or more colors of patching compound, as needed, to produce exact match.
4. Rinse surface to be patched and leave damp, but without standing water.
5. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
6. Place patching compound in layers as recommended in writing by patching compound manufacturer, but not less than 1/4 inch (6 mm) or more than 2 inches (50 mm) thick. Roughen surface of each layer to provide a key for next layer.
7. Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of brick. Shape and finish surface before or after curing, as determined by testing, to best match existing brick.
8. Keep each layer damp for 72 hours or until patching compound has set.
9. Remove and replace patches with hairline cracks or that show separation from brick at edges, and those that do not match adjoining brick in color or texture.

3.4 HELICAL WALL TIES EXAMINATION AND INSTALLATION

A. Examine supporting base materials and environmental conditions. Do not begin installation until base materials have been properly prepared

B. Unless otherwise specified, do not drill holes or commence helical wall tie installations in concrete or masonry until the concrete, mortar, or grout base materials have achieved their full design strength.

C. Installation: Installations shall conform to the Manufacturer’s Published Installation Instructions (MPII) or to alternative procedures specified in the Contract Documents. Installation procedures specified in the Contract Documents shall superseded procedures in the MPII.

1. For Wall Tie applications:

a. Drill all holes for helical ties using carbide-tipped drill bits of the diameter specified in the Contract Documents or otherwise recommended in the MPII. Drill holes with rotohammer setting set as specified in the Contract Documents or otherwise recommended in the MPII. It is suggested to use rotation only mode for soft or hollow materials.
b. Identify position of bed joint reinforcement, reinforcing steel and/or other embedded items prior to drilling holes for ties. Exercise care in drilling to avoid damaging existing reinforcing or embedded items. Notify the registered Design

Professional of Record if reinforcing steel or other embedded items are encountered during hole drilling procedures.

c. Drill holes for helical wall ties accurately and squarely without excessive drill bit wobble at locations and spacing specified in the Contract Documents. Drill holes perpendicular to base material, unless otherwise specified.

d. Drill holes continuously and to the specified embedment depth through all facing and back-up base materials to be tied together.

e. Install helical ties into holes pre-drilled in base materials using the manufacturer's recommended installation tool.

f. Position correct end of helical tie into the manufacturer's installation tool set in an SDS-Plus rotohammer and drive the helical tie into the pre-drilled hole with the rotohammer set in hammer mode. Drive the helical tie into the base material until the helical tie is countersunk beyond the facing base-material surface as specified or to the depth permitted by the installation tool. Install specified patch / repair material to match existing finish surface material.

g. Where the helical tie manufacturer recommends use of special tools for installation of ties, such tools shall be used, unless otherwise specifically permitted by the registered Design Professional of Record

D. Field Testing:

1. Helical tie installations shall be tested during construction by qualified field technicians acceptable to the Owner and registered Design Professional of Record using properly calibrated, manufacturer-recommended, proprietary testing equipment when such field testing is specified under the Contract.
    a. Owner shall engage a testing agency to provide pull tests to the minimum tensile strength of 72-pounds per anchor. Testing agency to pull a minimum of (6) sacrificial anchors installed by Contractor at various locations.
2. Contact manufacturer for additional information related to field testing.
3. Testing agency to provide pull test data to Structural Deign Professional of Record for review.

3.5 CLEANING MASONRY

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

B. Use only those cleaning methods indicated for each masonry material and location.

1. Brushes: Do not use wire brushes or brushes that are not resistant to chemical cleaner being used. Use natural-fiber brushes only.
2. Spray Equipment: Use spray equipment that provides controlled application at volume and pressure indicated, measured at nozzle. Adjust pressure and volume to ensure that cleaning methods do not damage surfaces, including joints.

    a. Equip units with pressure gages.

b. For water-spray application, use fan-shaped spray that disperses water at an angle of 25 to 50 degrees.
c. High-pressure water-spray application is not acceptable for this Project.
d. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F (60 and 71 deg C) at flow rates indicated.

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

D. Perform additional general cleaning, paint and stain removal, and spot cleaning of small areas that are noticeably different when viewed so that cleaned surfaces blend smoothly into surrounding areas.

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

F. Water Application Methods:

1. Water-Soak Application: Where required soak masonry surfaces by applying water continuously and uniformly to limited area for time indicated. Apply water at low pressures and low volumes in multiple fine sprays using perforated hoses or multiple spray nozzles. Erect a protective enclosure constructed of polyethylene sheeting to cover area being sprayed.
2. Water-Spray Applications: Unless otherwise indicated, hold spray nozzle at least 6 inches (150 mm) from masonry surface and apply water in horizontal back-and-forth sweeping motion, overlapping previous strokes to produce uniform coverage.

G. Chemical-Cleaner Application Methods: Apply chemical cleaners to masonry surfaces according to chemical-cleaner manufacturer's written instructions; use brush application. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.

H. Detergent Cleaner - General Cleaning of Environmental Deposits, Mold, Mildew, and Algae: D/2 Biological Solution
1. Pre-wet surface with water under mains pressure.
2. Apply undiluted D/2 by scrubbing into the surface with a stiff, nylon-bristled brush.
3. Reapply D/2 as the masonry dries by scrubbing with D/2 and a stiff-bristled brush.
4. Rinse surface after 15-minute dwell time with water under mains pressure.
5. Repeat at heavily soiled areas with scrubbing with a stiff, nylon-bristled brush and water, and rinse again.

I. Solvent Cleaner: Cleaning of Coatings and Sealant Deposits: CITRA-SOLV by ATCO International.
1. Remove brittle material build-up by dry scraping.
2. Rub scraped surface with a rag saturated with solvent.

3. Rub solvent-dampened area with a dry rag to remove residues of solvent and loosened material.
4. Repeat rubbing and drying until the surface is as clean as possible.
5. Dry scrape the edges of brick again to remove heavier deposits.
6. Repeat process of wiping with solvent and drying.
7. Wipe clean surface with a rag dampened with water then wiped with a dry rag.
8. Sprayed surface with water using a spray bottle, then wipe with a dry rag.

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

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

K. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.6 FINAL CLEANING

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

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

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

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

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

3.7 REPOINTING MASONRY

A. Rake out and repoint 100 percent of mortar joints in Project area.

B. Rake out joints as follows:

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

a. Cut out mortar by hand with chisel and mallet. Do not use power-operated grinders without Architect's written approval based on submission by Contractor of a satisfactory quality control program and demonstrated ability of operators to use tools without damaging masonry. Quality control program shall include provisions for supervising performance and preventing damage due to worker fatigue.

C. Point joints as follows:

1. Rinse masonry-joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen masonry-joint surfaces before pointing.
2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
3. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than 3/8 inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing bricks have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar over edges onto exposed masonry surfaces or to featheredge mortar.
4. When mortar is thumbprint hard, tool joints to match original appearance of joints. Remove excess mortar from edge of joint by brushing.
5. Cure mortar by maintaining in a damp condition for at least 72 hours.

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

3.8 PREPARATION AND INSTALLATION OF JOINT SEALANTS.

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove laitance and form-release agents from concrete.
2. 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.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

D. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

E. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

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

G. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

H. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.9 HIGH PERFORMANCE COATING APPLICATION

A. Surfaces should be sound, clean, and free of all bond-inhibiting contaminants.

B. Repair any holes, spalled, and damaged substrate. Allow appropriate cure time prior to coating.

C. Remove any protruding accessories and smooth out surface irregularities.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.

B. Notify inspectors in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

3.11 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials shall be used for reinstallation to greatest extent possible. Where additional materials remain following completion of work, excess masonry materials are Contractor's property.

B. Masonry Waste: Refer to Section 017419 Construction Waste Management and Disposal.

END OF SECTION 040120

SECTION 053100

STEEL DECK

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Steel roof deck.
   2. Structural steel plates and angles.
   3. Steel deck accessories.
   4. Bearing plates and angles.

1.2 SUBMITTALS

A. Shop Drawings:
   1. Indicate decking plan, support locations, projections, openings and reinforcement, pertinent details, and accessories.

B. Product Data: Submit deck profile characteristics and dimensions, structural properties, and finishes.

C. Design Data: Submit structural calculations for loadings and stresses of steel deck, framing and connections.

D. Manufacturer's Certificates: Certify that Products meet or exceed specified requirements.

E. Welders Certificates: Certify welders AWS qualification within the previous 12 months.

F. Test Reports: Submit reports indicating results of quality control inspections and testing.

1.3 QUALITY ASSURANCE

A. Calculate structural properties of metal deck in accordance with AISI Specification for the Design of Cold-Formed Steel Structural Members.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five years documented experience.

B. Installer: Company specializing in performing the work of this Section with minimum five years documented experience.

C. Design deck layout, spans, fastening, and joints under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

D. Code Required Special Inspection and Testing:
   1. Welding: One of the following.
      a. Current American Welding Society (AWS) Certified Welding Inspector.
      b. Current AWS Certified Welding Educator.
      c. Current AWS Certified Welding Engineer or Current American Welding Society/American Institute of Steel Construction (AWS/AISC) Certified Steel Structure Inspector.
   2. Nondestructive Testing of Welds:
      a. Current Nondestructive Testing Level II or III (Magnetic Particle Testing, Liquid Penetrate Testing, Ultrasonic Testing or Radiographic Testing)
         1) Level II personnel shall be qualified in accordance with the American Society of Nondestructive Testing (ASNT) document SNT-TC-IA (current edition). Level II certification as determined by a Level III examiner is required for each category.
         2) Level III Examiner shall be certified by ASNT unless all level II personnel have a current ASNT Central Certification Program certification. Only then will in-house designation of Level III nondestructive testing personnel be permitted.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Cut plastic wrap to encourage ventilation.

B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 - PRODUCTS

2.1 STEEL DECK

A. Galvanized Steel: ASTM A653/A653M, structural steel sheet, G60 zinc coating.

B. Bearing Plates: ASTM A36/A36M steel, unfinished.

C. Welding Materials: AWS D1.1 and AWS D1.3 to suit materials being welded.

D. Galvanizing Repair Paint: SSPC-Paint 20.

E. Touch-Up Primer: Match shop primer.

2.2 ROOF DECK FABRICATION

A. Metal Deck: Configured as follows:
   1. Sheet Metal:
      a. Concealed Locations: Galvanized sheet steel.

2. Span Design: Single.
3. Minimum Metal Thickness Excluding Finish: as noted on Drawings.
4. Nominal Height: 1-1/2 inch, fluted profile.
5. Formed Sheet Width: 32 inch.
6. Side Joints: Lapped.
7. Flute Sides: Plain vertical face.

2.3 STRUCTURAL-STEEL MATERIALS

A. Channels and Angles: ASTM A36/A36M. Hot-dip Galvanized G60.

B. Structural Plates: ASTM A36/A36M, unless noted on the drawings as ASTM-A572/A572M. Hot-dip Galvanized G60.

C. Welding Electrodes: Comply with AWS requirements.

D. BOLTS, CONNECTORS, AND ANCHORS
1. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers.
   a. Finish: Hot-dip zinc coating.
   b. Use at exterior locations, when embedded in masonry or as noted on the Structural drawings.
2. Threaded Rods: ASTM A 36/A 36M.
   a. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
   b. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
   c. Finish: Hot-dip zinc coating.

2.4 DECK ACCESSORY FABRICATION

A. Deck Accessories: Metal closure strips, wet concrete stops, cover plates, gage to match deck gage, galvanized sheet steel; of profile and size as indicated.

B. Fasteners: corrosion-resistant, hexagonal washer head; self-drilling, carbon steel screws, No. 10 minimum diameter.

C. Weld Washers: Mild steel, galvanized, 3/4 inch outside diameter, 1/8 inch thick.

D. Rod Screens: Modular composite mesh sleeves for masonry fastenings, diameter to be sized per anchor/rod size. Basis of Design Hilti HIT-SC.

E. Anchor Adhesive: Injectable hybrid mortar adhesive for use with anchors and screens, ICC-ES approval. Basis of Design Hilti HY-270.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify field conditions are acceptable and are ready to receive work.

3.2 INSTALLATION

A. Erect metal deck in accordance with SDI Design Manual.

B. Bear decking on steel supports with 1-1/2 inch minimum bearing. Align and level.

C. Place deck panels on supporting framing and adjust to final position with ends accurately aligned and bearing on supporting framing before being permanently fastened. Do not stretch or contract side lap interlocks.

D. Fasten deck to steel support members at ends and intermediate supports with 5/8 inch puddle welds or mechanical fasteners at 12 inches on center maximum, at bearing ends and parallel with deck flute and at every other transverse flute.

E. No weld washers for steel 22 gage or thicker.

F. Perform welding procedures in accordance with AWS D1.1.

G. Mechanically fasten or weld side laps at 24 inches on center maximum, see Drawings for special conditions.

H. Reinforce steel deck openings from 6 to 18 inches in size with 1-3/4 x 1-3/4 x 1/4 inch steel angles. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld or mechanically attach to deck at each flute.

I. Support deck side edges with pour stop.

J. Install 6 inch minimum wide sheet steel cover plates, of same thickness as decking, where deck changes direction. Fusion weld or mechanically attach 12 inches on center maximum.

K. Install sheet steel closures and angle flashings to close openings between deck and walls, columns, and openings.

L. Immediately after welding deck and other metal components in position, coat welds, weld blooms, burned areas, and damaged surface coating, with touch-up prime paint per ASTM A 780.

3.3 FIELD QUALITY CONTROL

A. Perform field special inspections and testing for in accordance with applicable code and this section.

Verification and Inspection	Continuous	Periodic	Referenced Standard	IBC Reference
4. Material verification of weld filler materials				
a. Identification markings to conform to AWS specification in the approved construction documents			AISC 360, Section A3.5	
b. Manufacturer's certificate of compliance required				
5. Inspection of welding				
a. Structural steel				
5) Floor and roof deck welds		X	AWS D1.3	

B. Welding: Inspect welds in accordance with AWS D1.1.
   1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
   2. Visually inspect all welds.

C. Correct defective welds.

D. Material verification of cold-formed steel deck per AISC 360 Section M5.5

E. Verification of proper installation of mechanical fasteners per specifications.

END SECTION 053100

SECTION 075216

STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Styrene-butadiene-styrene (SBS)-modified bituminous membrane roofing system.
2. Roof insulation.
3. Roof-edge specialties and trim.
4. Rough Carpentry for wood nailers and blocking.

B. Related Sections:
1. Section 053100 “Steel Deck” for metal deck and miscellaneous steel.

1.2 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:

1. Roof edge specialties and membrane terminations.
2. Tapered insulation, including slopes.
3. Roof plan showing orientation of steel roof deck and orientation of roofing, fastening spacings, and patterns for mechanically fastened roofing.

C. Samples for Verification:
1. Roof edge metal, color chart for selection and metal sample for verification.

D. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Submit evidence of meeting performance requirements.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Submit evidence of compliance with performance requirements.

2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

C. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

D. Sample Warranties: For manufacturer's special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

B. Inspection Report and Punchlist: Contractor and roofing system manufacturer’s post-installation punchlist of open items. Copy of roofing system manufacturer's inspection report of completed roofing installation.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty. Qualified installer must have held such approval or license for a minimum of five years.

B. Manufacturer Qualifications: A qualified manufacturer that has FMG approval for roofing system identical to that used for this Project.

C. Acceptable Products: Obtain components for membrane roofing system approved by membrane roofing manufacturer. Provide secondary or accessory products which are acceptable to the manufacturer of the primary roofing products.

D. Project Acceptance: Submit a completed manufacturer's application for roof guarantee form along with shop drawings of the roofs showing all dimensions, penetrations, and details. The form shall contain all the technical information applicable to the project including deck types, roof slopes, base sheet and/or insulation assemblies (with method of attachment, and fastener type), and manufacturer's membrane assembly proposed for installation. The project must receive approval, through this process, prior to shipment of materials to the project site.

1.7 PERFORMANCE REQUIREMENTS

A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

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

C. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.

D. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.

E. Energy Performance: Provide roofing system with initial Solar Reflectance Index not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

F. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.

1. Corner Uplift Pressure: 50.6 lbf/sq. ft. (kPa/sq. m)>.
2. Perimeter Uplift Pressure: 33.6 lbf/sq. ft. (kPa/sq. m)>.
3. Field-of-Roof Uplift Pressure: 20.0 lbf/sq. ft. (kPa/sq. m)>.

G. FM Approvals' Listing: Manufacture and install roof-edge specialties that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with FM Approvals' markings.

H. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C) material surfaces.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

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

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.
1. Warranty Period: 20 years from date of Substantial Completion.

B. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MULTI-PLY SBS-MODIFIED BITUMEN ROOFING SYSTEM

A. Source Limitations: Obtain components including roof insulation, fasteners, perimeter metal flashing and edge systems, for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

B. Roofing Membrane Assembly Description: A cold-applied, roof membrane assembly consisting of two plies of a prefabricated, reinforced, homogeneous Styrene-Butadiene-Styrene (SBS) block copolymer modified asphalt membrane, applied over a prepared substrate. Reinforcement mats shall be impregnated/saturated and coated each side with SBS modified bitumen blend.

C. Manufacturers: Basis of Design system Siplast; Paradiene 20/30 roof system.

1. Provide basis of design product, or equal product by one of the following:

a. Soprema; Sopralene/Elastophane roof system.
b. Johns Manville; DynaLastic 180 roof system.

D. Roofing Membrane Base and Stripping Ply: Roofing Membrane Sheet: ASTM D 6163, Grade S, Type I, SBS-modified asphalt sheet (reinforced with glass fibers) or ASTM D 6164/D 6164M, Grade S, Type I, SBS-modified asphalt sheet (reinforced with polyester fabric); smooth surfaced; suitable for application method specified.

1. Basis of Design: Siplast; Paradiene 20.
2. Provide basis of design product, or equal product listed below:

a. Soprema; Sopralene 180 Sanded 2.2.
b. Johns Manville; Dynalastic 180 Smooth.

E. Granule-Surfaced Roofing Cap Sheet/ Finish Ply: ASTM D 6163, Grade G, Type I, SBS-modified asphalt sheet (reinforced with glass fibers) or ASTM D 6164/D 6164M, Grade G, Type I, SBS-modified asphalt sheet (reinforced with polyester fabric) granule surfaced; suitable for application method specified.

1. Basis of Design: Siplast; Paradiene 30.

a. Top Ply Surfacing: Ceramic granule finish, standard #A-720 Bone White color.

2. Provide basis of design product, or equal product listed below:

a. Soprema; Elastophene FR GR.
b. Johns Manville; Dynalastic

2.2 BASE FLASHING MATERIALS

A. Backer Sheet: ASTM D 6163, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers) or ASTM D 6164/D 6164M, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with polyester fabric; smooth surfaced; suitable for application method specified.

B. Granule-Surfaced Flashing Sheet: ASTM D 6163, Grade G, Type II, SBS-modified asphalt sheet (reinforced with glass fibers) or ASTM D 6164/D 6164M, Grade G, Type II, SBS-modified asphalt sheet (reinforced with polyester fabric) granule surfaced; suitable for application method specified.

1. Basis of Design: Siplast; Paradiene 40 FR.

a. Top Ply Surfacing: Ceramic granule finish, standard #A-720 Bone White color.

2. Provide basis of design product, or equal product listed below:

a. Soprema; Sopralene 180 Sanded 2.2.
b. Johns Manville; Dynalastic 180.

2.3 ROOF SPECIALTIES

A. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet (3.6 m) and a continuous metal receiver with integral drip-edge cleat to engage fascia cover. Provide matching corner units.

1. Manufacturer: provided by roof membrane manufacturer; basis of design product Siplast; Paraguard roof specialties.
2. Metallic-Coated Steel Sheet Fascia Covers: Zinc-coated (galvanized) steel, nominal 22ga thickness.

    a. Surface: Smooth, flat finish.
    b. Finish: Two-coat fluoropolymer.
    c. Color: As selected by Architect from manufacturer's full range. Color to match existing limestone coping (clean).

3. Corners: Factory mitered and continuously welded.
4. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
5. Receiver: Manufacturer's standard material and thickness for use with fascia cover.
6. Fascia Accessories: Fascia extenders with continuous hold-down cleats.

B. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation.

2.4 ROOF INSULATION

A. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 closed cell, rigid polyisocyanurate foam core material, integrally laminated between glass fiber facers. Insulation to be provided by roofing membrane manufacturer as part of a complete roofing system.

B. Tapered Insulation: ASTM C 1289, Type II, Class 1, Grade 2. Provide factory-tapered insulation boards fabricated to slope of 3/16 inch per 12 inches, unless otherwise indicated. Minimum thickness of tapered insulation at any point as indicated on Drawings.

C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

D. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

E. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer

2.5 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.

B. Asphalt Primer: ASTM D 41/D 41M.

C. Cold-Applied Adhesive: Roofing system manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with roofing membrane and base flashings, conforming to ASTM D4479.

D. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.

E. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

F. Roofing Granules: Ceramic-coated roofing granules, No. 11 screen size with 100 percent passing No. 8 (2.36-mm) sieve and 98 percent of mass retained on No. 40 (0.425-mm) sieve, color to match roofing.

2.6 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat all rough carpentry unless otherwise indicated.

E. Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.

1. Provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or of Type 304 stainless steel.

F. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with roofing system manufacturer's written instructions.

B. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

C. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of light weight fill.
3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 5 Section "Steel Deck."
4. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane relative to adjoining deck.
5. Proceed with installation only after unsatisfactory conditions have been corrected.
6. Asphaltic Primer: Prime metal and concrete and masonry surfaces with a uniform coating of the specified asphalt primer.

3.2 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the work day.

B. Install tapered insulation under area of roofing to conform to slopes indicated.

C. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches (68 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.

1. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.

D. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.

1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

E. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

F. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

G. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

3.3 ROOFING MEMBRANE INSTALLATION

A. Install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."

B. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.

C. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system.

D. Coordinate installing roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets with a course of coated felt set in roofing cement with joints and edges sealed.
2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
3. Remove and discard temporary seals before beginning work on adjoining roofing.

E. Use manufacturer’s recommended cleaner/solvent, wipe flashing membrane surfaces to be lapped with field membrane. Allow the surface to dry for a minimum of t minutes before continuing work.

3.4 BASE PLY INSTALLATION

A. Install (1) one ply of 80 mill membrane in 25 lb. per sq. of bitumen shingled uniformly to achieve one ply throughout over the prepared substrate. Shingle in proper direction to shed water on each large area of roofing.

B. Lap ply sheet ends eight inches. Stagger end laps twelve inches minimum.

C. Extend plies two inches beyond top edges of cants at wall and projection bases.

D. Install base flashing ply to all perimeter and projection details.

3.5 TOP PLY - MODIFIED MEMBRANE APPLICATION

A. The modified membrane shall then by solidly bonded to the base ply with specified asphalt at the rate of 25 to 30 lbs. per 100 square feet.

B. The roll must push a puddle of asphalt in front of it with asphalt slightly visible at all side laps. Care should be taken to eliminate air entrapment under the membrane.

C. Apply pressure to all seams to ensure that the laps are solidly bonded to substrate.

D. Subsequent rolls of modified shall be installed across the roof as above with a minimum of 4" side laps and 8" end laps. The end laps shall be staggered. The modified membrane shall be laid in the same direction as the underlayers but the laps shall not coincide with the laps of the base layers.

E. Apply asphalt no more than five feet ahead of each roll being embedded.

F. Extend membrane 2" beyond top edge of all cants in full moppings of the specified asphalt as shown on the drawings.

3.6 FLASHING AND STRIPPING INSTALLATION

A. Install base flashing over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions.

B. Extend base flashing up walls or parapets a minimum of 8 inches (200 mm) above roofing membrane and 4 inches (100 mm) onto field of roofing membrane.

C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.

D. Install roofing cap-sheet stripping where metal flanges and edgings are set on roofing according to roofing system manufacturer's written instructions.

E. The entire sheet of flashing membrane must be solidly adhered to the substrate.

F. Seal all vertical laps of flashing membrane with a three-course application of Flashing Bond and fiberglass mesh.

3.7 ROOF SPECIALTIES AND COUNTERFLASHING INSTALLATION

A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.

3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet (3.6 m) with no joints within 18 inches (450 mm) of corners or intersections unless otherwise indicated on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate not less than recommended by manufacturer to achieve maximum pull-out resistance.

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F (4 deg C).

3.8 FIELD QUALITY CONTROL

A. Notification Of Completion: Notify the manufacturer by means of manufacturer's printed Notification of Completion form of job completion in order to schedule a final inspection date

B. Final Inspection: Hold a meeting at the completion of the project, attended by all parties that were present at the pre-job conference. A punch list of items required for completion shall be compiled by the Contractor and the manufacturer's representative. Complete, sign, and mail the punch list form to the manufacturer's headquarters

3.9 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

D. Uncured resin is considered a hazardous material. Unused resin must be catalyzed and cured prior to disposal.

E. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

END OF SECTION 075216