Project Manual

for:

Jonata MS- Roof Replacement

301 2nd St., Buellton, CA 93427

for the

Buellton Union School District

301 2nd St., Buellton, CA 93427

Date: March 7, 2024

BEAM Project No.: 230610.3

Consultants:

Building Envelope Consultant:
BEAM Professionals
2600 Tenth Street
Suite 700
Berkeley, CA 94710-2597
Phone: (510) 450-1999

PROJECT MANUAL COVER SHEET AND STAMP PAGE

DOCUMENT 00 00 00 TABLE OF CONTENTS

VOLUME 1

BUELLTON UNION SCHOOL DISTRICT DOCUMENTS - CONTRACT AND GENERAL PROVISIONS

BIDDING AND CONTRACT REQUIREMENTS

VOLUME 2

TECHNICAL SPECIFICATIONS by BEAM Professionals

END OF SECTION

SECTION 02 41 00 DEMOLITION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Furnishing all labor, materials, and equipment necessary for demolition, dismantling, cutting, and alterations as indicated, specified, and required for completion of the Contract, as applicable. Includes items such as the following:
   a. Protecting existing work to remain.
   b. Hazardous material identification and removal.
   c. Utility service and termination.
   d. Removing debris and equipment.
   e. Removal of items indicated on Drawings.
   f. Landscape and sprinkler demolition and reinstall.
   g. Disposal of material.

B. Related Sections:
1. Section 01 50 00: Temporary Facilities and Controls.
2. Section 01 57 13: Erosion control.
3. Section 01 74 19: Construction Waste Management and Disposal.
4. Section 02 21 00: Surveys.

C. Regulatory Requirements:
1. Conform to applicable jurisdictional authority regulations and codes for disposal of debris.
2. Coordinate clearing work with utility companies.
3. Maintain emergency access ways at all times.
4. Contractor shall comply with all applicable laws and ordinances regarding hazardous materials, including contaminated soils, hazardous material transformers, and similar materials or components.

1.3 SUBMITTALS:

A. Schedule: Submit a detailed sequence of demolition and removal work, including dates for shutoff, capping, and continuance of utility services.

B. Procedures: Submit written procedures documenting the proposed methods to be used to control dust and noise.

1.4 EXISTING CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

B. Conduct demolition to minimize interference with adjacent structures or items to remain.

Maintain protected egress and access at all times.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 EXISTING CONDITIONS

A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during Work, notify Architect promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.

B. Conduct demolition to minimize interference with adjacent structures or items to remain. Maintain protected egress and access at all times.

3.2 PROTECTION

A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.

B. In accordance with generally accepted construction practices, Contractor shall be solely and completely responsible for working conditions at the jobsite, including safety of all persons and property during performance of the Work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Safety precautions prevent damage to existing elements identified to remain or to be salvaged and prevent injury to the public and workmen engaged onsite. Demolish roofs, walls, and other building elements in such a manner that demolished materials fall within foundation lines of building. Do not allow demolition debris to accumulate onsite. Pull down hazardous work at end of each day; do not leave standing or hanging overnight, or over weekends:
   1. Protect existing items that are not indicated to be altered. Protect utilities designated to remain from damage.
   2. Protect trees, plant growth, and features designated to remain as final landscaping as shown on Drawings.
   3. Protect bench marks from damage or displacement.

D. Trees: Carefully protect existing trees that are to remain. Provide temporary irrigation as necessary to maintain health of trees.

E. Fire Safety: Contractor shall conform to Chapter 33 of the California Fire Code (CFC), "Fire Safety During Construction and Demolition," at all times during the construction process. A copy of this chapter can be provided.

F. Any construction review of Contractor's performance conducted by the geotechnical Engineer is not intended to include review of the adequacy of Contractor's safety measures in, on, or near the construction site.

G. Surface Drainage: Provide for surface drainage during period of construction in a manner to avoid creating nuisance to adjacent areas. Contractor shall make a reasonable effort on a

daily basis to keep all excavations and the site free from water during entire progress of Work, regardless of cause, source, or nature of water.

H. Adjacent streets and sidewalks shall be kept free of mud, dirt, or similar nuisances resulting from earthwork operations.

I. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

3.3 EXAMINATION

A. Examine conditions of work in place before beginning Work; report defects.

B. Report existence of hazardous materials or unsafe structural conditions.

3.4 PREPARATION

A. Scheduling:
1. General: Coordinate and schedule demolition work as required by Owner and as necessary to facilitate construction progress.

B. Hazardous Materials:
1. General: Identify chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations, and notify such jurisdictional agencies as may be required. Collect and legally dispose of such materials at official disposal locations away from the site.
2. Asbestos: If asbestos or materials containing asbestos are encountered, stop work immediately and contact Owner. Do not proceed with demolition until directed by Owner.

C. Utility and Service Termination:
1. Locate and identify existing utility, service, and irrigation system components affected by Work of this Contract. Review existing record Drawings, conduct site investigations, contact Underground Service Alert and other qualified cable/pipe/line locator services, and implement all other means necessary to define the location of underground systems.
2. Prior to beginning any demolition, properly disconnect all water, gas, and electrical power supply at appropriate disconnect locations. Obtain all necessary releases and approvals from serving utility companies.
3. Prior to demolition or disconnect, obtain Owner’s approval that such system does not impact facilities or systems beyond the extent of this Contract.
4. Mark location of disconnected systems. Identify and indicate stub-out locations on Project record documents.

D. Verify that existing plant life and features designated to remain are tagged or identified.
1. Architect will mark the features, trees, and shrubs to remain within the construction area. Contractor shall not commence clearing and grubbing operations until authorized by Owner and all protective measures are in place.

E. Coordinate the time and duration of all system disconnects with Owner.

3.5 DEMOLITION

A. General Requirements:
1. Clear areas required for access to site and execution of Work, including pavement,

structures, foundations, vegetation, trash, and debris.
2. Coordinate with Owner the time of day and route to remove demolished materials from premises.
3. Remove demolished materials from site as work progresses. Upon completion of work, leave areas of work in clean condition.
4. Remove all buried debris, rubble, trash, or other material not deemed suitable by the geotechnical Engineer.
5. Fill all voids or excavations resulting from clearing, demolition, or removal of vegetation with specified fill material.

B. Fixture and Equipment Removal:
1. Remove existing fixtures and equipment as identified and shown on Drawings and required by Architect.
2. Verify all service connections to fixtures and equipment designated for removal have been properly disconnected.
3. Remove all conductors from conduit at all abandoned circuits.

3.6 UTILITY AND BUILDING SERVICES REMOVAL AND RE-INSTALLATION

A. Where crossing paths and potential points of interference with existing utility services are shown or can be reasonably inferred from surface conditions or evidence of subsurface systems, such as meter boxes, vaults, relief vents, cleanouts, and similar components:
1. Review all Contract Documents showing crossing paths and potential points of interference.
2. Pot-hole or determine by other means the accurate depth and location of such utilities.
3. Incorporate all costs required to complete work under this Contract, including additional trenching, re-routing of existing and new utilities, and all means necessary to construct work under this Contract.
4. No additional cost to Owner will be allowed for work necessary to accommodate utility conflicts where such crossing paths are shown on Contract Drawings or can be reasonably inferred from surface conditions or components.

B. Remove all conductors from conduit at all abandoned electrical circuits.

C. Seal off ends of all piping, drains, and other components as directed by Architect and serving utility.

D. Where necessary to maintain service to existing utility and building systems, relocate or redirect all conduit and conductors, piping, drains, and associated system components:
1. Re-circuit all electrical as required.
2. Re-circuit all landscape irrigation valving and control systems as required.
3. Temporarily terminate landscape system components in approved boxes or with approved caps, suitable for re-connection or extension.
4. Extend or otherwise modify all site drainage systems, including catch basins, drain inlets, and piping. Fine grade to maintain proper drainage flow pattern to drains.

E. Demolish structure in an orderly and careful manner:
1. Use of explosives prohibited.

3.7 SITE PAVEMENT REMOVAL

A. Remove sidewalk and curb where required for new construction as specified and as indicated on the Drawings:
1. Remove all paving by saw-cutting.
2. Remove concrete paving and curbing at locations shown on Drawings. Locate closest

adjacent expansion or weakened plane joint to define start of removal or saw-cutting.

B. Remove asphalt concrete paving areas where required for new construction as specified and as indicated on the Drawings:
   1. Remove all paving by saw-cutting.
   2. Remove paving assembly as required to expose subgrade.

3.8 LANDSCAPE AND IRRIGATION SYSTEMS DEMOLITION AND RENOVATION

A. Clearing, Grubbing, and Planting Demolition:
   1. Remove grass and grass roots to a minimum depth of two inches (2”) below existing grade.
   2. Remove all shrubs, plants, and other vegetation within the area of the work unless designated to remain. Grub and remove all roots of all vegetation to a depth of 24 inches below existing grade.
   3. Remove only those trees that are specifically designated for removal, or as shown on the Drawings, within the construction area. Remove all stumps. Remove root ball and root systems larger than one inch (1”) in diameter to a depth of two feet (2’) below existing or finished grades, whichever is lower, and a minimum of five feet (5’) beyond the edge of paving, structure, wall, or walkway.
   4. Hand cut existing tree roots over one inch (1”) in diameter as necessary for trenching or other new construction. Apply multiple coats of emulsified asphalt sealant especially made for horticultural use on cut or damaged plant tissues to cut faces and adjacent surfaces. Cover exposed roots with wet burlap to prevent roots from dying out until backfilling is complete.
   5. Disking and mixing of vegetation, trash, debris, and other deleterious materials with surface soils prior to grading is not permitted.
   6. Remove all buried debris, organic material, rubble, trash, or other material not deemed suitable by the geotechnical Engineer.
   7. Fill all voids or excavations resulting from clearing, demolition, or removal of vegetation with fill material in compliance with Section 31 00 00: Earthwork.
   8. Selected equipment of such sizes and capacities that the existing environment is disturbed as little as possible, and to afford ease of mobility within limited and relatively confined work areas. Make every effort to preserve the topography in its natural state.
   9. Keep drains, catch basins, surface drainage courses, and related drainage system components clear of debris and construction materials.
   10. Remove irrigation piping and appurtenances as necessary within area of work, unless noted otherwise to remain. Replace irrigation piping and appurtenances to irrigate new and/or existing landscaping. Contractor shall be responsible for temporary landscape irrigation until such time that irrigation system is restored and operational.

3.9 DISPOSAL

A. Demolished materials become property of the Contractor and shall be removed from premises, except those items specifically listed to be retained by Owner.

B. Dispose of all demolished material, trash, debris, and other materials not used in the work in accordance with the regulations of jurisdictional authority.

C. It is required that all materials that are of a recyclable nature, be transported to a suitable legal recycling facility instead of a dump or refuse facility (unless they are one-in-the same).

D. Burning and Burying of Materials: **Not allowed**.

E. Haul Routes:

1. Obtain permits as required by jurisdictional agencies. Establish haul routes in advance; post flagmen for the safety of the public and workmen.
2. Keep streets free of mud, rubbish, etc. Assume responsibility for damage resulting from hauling operations; hold Owner free of liability in connection therewith.

F. Remove demolished materials and debris from site on a daily basis.

3.10 CLEANING

A. Upon completion of work of this Section, promptly remove from the working area all scraps and debris.

B. Clean excess material from the surface of all remaining paved surfaces and utility structures.

C. Power wash all concrete surfaces to remove stains, dried mud, tire marks, and rust spots.

END OF SECTION 02 41 00

SECTION 04 20 10 PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. All labor, materials, and equipment necessary to install all aspects of Portland cement plaster assembly.

B. See Appendix A for Hazardous Materials Section

1.2 RELATED DOCUMENTS

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

1.3 SUMMARY

A. This section specifies application process of Portland cement and covers crack repair, reinforcement, and priming to receive acrylic protective coating system.

B. Related Sections:
1. Section 07 62 00 – Sheet Metal Flashing and Trim
2. Section 07 95 00 – Expansion Control
3. Section 09 90 00 – Exterior Painting

C. References
1. ASTM C150 – Portland Cement
2. ASTM C847 – Standard Specification for Metal Lath
3. ASTM C1032 – Woven Wire Plastic Base
4. ASTM C933 – Welded Wire Lath
5. ASTM C144 / C897 – Aggregate for Job-Mixed Portland Cement-Based Plaster
6. ASTM C926 – Application of Portland Cement-Based Plaster
7. ASTM C1063 – Installation of Lathing and Furring for Portland Cement Based Plaster
8. PCA (Portland Cement Association) – Plaster (Stucco) Manual
9. SMA Details and Bulletins

1.4 ASSEMBLY DESCRIPTION

A. General: Portland cement plaster is comprised of a water-resistive barrier, optional sheathing, lath, scratch, brown coats, and a finish coat. Minimum nominal ¾ inch cement thickness.

B. Application Methods: The plaster may be applied by hand tools or machine pumps but must have sufficient force to adhere to the substrate.

C. Framing shall have a deflection of L/360 or stiffer.

D. Fire Rated assemblies shall be per the test report or special instructions.

1.5 SUBMITTALS

A. Comply with Section 01 33 00 - Submittal Procedures.

B. Product Data: All product data sheets, evaluation reports, details, and warranty information that pertain to the project in accordance with Section 01 30 00 Submittal Procedures.

C. Samples: Submitted upon request.

D. Samples of the primer and/or finish coat shall be of an adequate size as required to represent each color and texture to be utilized on the project and produced using the same techniques and tools required to complete the project. No sample shall be less than 12” by 12”.

E. Retain approved samples at the construction site throughout the application process.

F. Submit a unit square foot price for a “Stucco Crack Reduction System.”

1.6 QUALITY ASSURANCE

A. Installer Qualification: Use only a prequalified / certified installer with documented project experience of at least 2 years of experience similar to size and complexity of project.

B. Manufacturer: All component materials shall be SMA approved and shall be distributed by authorized dealers.

C. Plastering Contractor: Shall specialize in lath and plaster contracting, document experience of at least 2 years, and follow SMA published recommendations or provide certificates to demonstrate stucco knowledge.

D. Provide proof of current contractor’s license and bond where required.

E. Mock-up: On site, fabricate a panel approximately 20sqft to demonstrate quality of finished wall system inclusive of multiple sized crazing, crack, and spalling repair, wall coating, paint, and joint sealant application. Install panel where directed by architect/engineer. Maintain panel as a standard of quality for all repairs and subsequent installations.

F. Mock-up shall represent construction using the same quality/techniques to be utilized on the project.

G. Retain approved mock-up at job site throughout the application process.

H. Contractor shall acknowledge the SMA technical Bulletins and agree to follow same

I. Submit letter at completion that the lath and plaster is installed per SMA recommendations.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver all materials to the construction site in their original, unopened packaging

with labels intact.

B. Inspection: Inspect the materials upon delivery to assure that specified products have been received. Report defects or discrepancies to the responsible party according to the construction documents; do not use reported material for application.

C. Storage: Store all products per manufacturer's recommendations. Generally, store materials in a cool, dry location; away from direct contact with the ground and/or concrete; out of direct sunlight; and protect from weather and other damage.

1.8 PROJECT CONDITIONS

A. Environmental Requirements: Follow product manufacturer's recommendations for environmental conditions and surface preparation.

B. Temperatures: Before, during, and following the application of the portland cement plaster, the ambient and surface temperatures must remain above 40 degrees F (4 C) for a minimum period of 24 hours. Protect stucco from uneven and excessive evaporation, especially during hot, dry and/or windy weather. Protect the portland cement plaster from freezing for a period of not less than 24-hours after set has occurred.

C. Substrates: Prior to installation, inspect the wall for surface contamination or other defects that may adversely affect the performance of the materials, and shall be free of residual moisture. Do not apply the portland cement plaster to substrates whose temperature are less than 40 degrees F (4 C) or contain frost or ice.

D. All wood-based products covered shall be dry and have a moisture content below 19% DO NOT COVER WET FRAMING.

E. Inclement Weather: Protect applied material from deleterious effects until cured or dry.

F. Existing Conditions: Contractor shall walk the project prior to starting work and notify the architect or owner's representative of any deficiencies that will negatively impact the plaster assembly. Do not proceed until remedied.

1.9 SEQUENCING AND SCHEDULING

A. Sequencing: Coordinate the installation of the lath and portland cement plaster with all other construction trades.

B. Plastering contractor shall advise architect of control/expansion joint layout concerns.

C. Staffing: Provide sufficient manpower and proper supervision to ensure continuous operation, free of cold joints, scaffolding lines, curing, variations in texture, etc.

1.10 WARRANTY

A. Warranty: Submit documentation on all products. At completion of work, contractor shall provide a written warranty documentation for the assembly, and/or repairs, and products used.

B. Contractor's Warranty:

C. Contractor shall adhere to SMA guidelines for 3-coat Portland cement plaster.

D. Contractor shall warrant the stucco work and related work to be free from defects in workmanship and materials, and that the installation and/or repairs will be and remain watertight, for a period of two (2) years from date of Substantial Completion.

E. Defects shall include, but not be limited to:
   1. Leaking water within building or construction.
   2. Becoming loose from substrate.

1.11 MAINTENANCE

A. The following materials shall be presented to the owner following the application of the work:
   1. One container of finish for each color and texture utilized on the project.
   2. Supply a maintenance program for Owners O&M manual as required.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. SMA Manufacturers: Must be from the current list on SMA website under appropriate category.

2.2 SCRATCH AND BROWN COAT (BASECOAT)

A. Cement: A portland cement complying with ASTM C150 or Plastic cement complying with ASTM C1328.

B. Sand:
   1. Field mixes shall comply with ASTM C-926 and must have sand that is clean and free from deleterious amounts of loam, clay, silt, soluble salts, and organic matter. Sampling and testing shall comply with ASTM C144 or C897.
   2. An “engineered performance mix” by an SMA manufacturer is acceptable with appropriate approvals (ICC ES, IAPMO or Interek report).

C. Water: Clean and potable without foreign matter.

D. An optional SMA approved admixture may be added to impart increased tensile, bond, flexural strength, and/or accelerate hydration.
   1. Bonding agents
   2. Fibers

2.3 LATH

A. Woven-Wire Lath: Nominal No. 17 gauge (0.058 inch), 1.5-inch opening, galvanized steel complying with ASTM C1032.

B. Welded Wire: Nominal No. 16 gauge (0.065 inch), 2-inch-by-2-inch opening, or No. 17 gauge 1 ½ by 1 ½ inch opening, galvanized steel complying with ASTM C933.

2.4 STUCCO CRACK REDUCTION SYSTEM. REFER TO SMA WEBSITE FOR MORE INFORMATION

A. Mesh: Alkali resistant, minimum 4.0 oz., woven glass fiber fabrics.

B. Base coat: must be compatible with mesh and finish coats. Select SMA manufacturer and follow manufacturer's recommendations.

2.5 PRIMER

A. Consult with selected SMA manufacturer for primer coat.

2.6 FINISHES

A. Portland cement-based blended stucco finish: See SMA list.

B. Color and Texture: Color and texture to be selected by District and verified by Project Designer.

2.7 MIXES

A. Portland Cement Plaster Basecoats:
   1. Prescriptive Method: Ratios and Mix Design shall be per ASTM C926. Contractor shall select one of the following mixes (sand is per combined volume of cements):
      a. Portland Cement 1 part
         Masonry Cement 1 part
         Sand 3 ½ to 4 ½ parts per Cement
         Fibers Maximum 3 oz per batch
      b. Portland Cement 1 part
         Lime (type S) ¼ to ½ part
         Sand 3 to 4 parts per cement & Lime
         Fibers Maximum 3 oz per batch
      c. Plastic Cement 1 part
         Sand 3 ½ to 4 ½ parts per cement
         Fibers Maximum 3 oz per bag plastic cement

   2. Engineered Method: Pre-mix blends or silos per SMA manufacturer.

B. Finish Coats: Mixing and tinting instructions are contained in the appropriate product data sheets by the SMA Manufacturer.

PART 3 - EXECUTION

3.1 INSPECTION

A. Prior to the application of the portland cement plaster basecoat the plastering contractor shall ensure that:
   1. Surface and site conditions are ready to receive work.
   2. Grounds and Blocking: Verify that the items within the walls for other sections of work have been installed.
   3. Notify architect/owner of any defects that may impact the finished assembly. Proceed as directed.

B. Substrates:
   1. Acceptable substrates must be sound, secure, and suitable for lath and plaster.
   2. Substrates and adjacent materials must be dry and clean. Substrate surface must be

flat, free of protrusions or planar irregularities greater than ¼-nch in 10-feet (6mm in 3m).

C. Flashings: All flashing around windows, at deck attachments, utility penetrations, roof lines, etc. and all kick-out flashing must be properly installed prior to application of portland cement plaster. Notify owner if flashings are missing, proceed as directed.

D. Unsatisfactory conditions or concerns shall be reported to the general contractor and/or builder and/or architect and/or owner. Do not proceed until directed in writing by architect or general contractor.

3.2 SURFACE PREPARATION

A. Substrate/Framing: inspect all work prior to starting lath and plastering. Notify Project Designer of any issues impacting performance, proceed as directed.

B. Surrounding Areas: Protect surfaces near the work of this section from damage, disfiguration, and overspray. Mask off all dissimilar materials.

3.3 INSTALLATION

A. General: Refer to the 2022 California Building Code, all applicable city and county of San Francisco amendments, ASTM C926, ASTM C1063, and/or the appropriate manufacturer's product data sheet for additional installation requirements and recommendations of the SMA.

B. Lath: Apply per manufacturers recommendations:
1. Laps shall occur at horizontal and vertical joints. Attach lath six (6) to seven (7) inches on center along framing supports (studs). Fasteners shall be approved by Project Designer and shall penetrate the applicable substrate by a minimum ¾ inch, or per manufacturer specification.
2. Lath shall lap the flange of accessories by more than 50%.
3. Control Joints: Installed per SMA direction. If lath is discontinuous, substrate framing shall support lath terminations. Notify Project Designer of issues or changes.
4. Contractor shall honor control or expansion joints in substrates.
5. Do not mix lath products on same wall.
6. Avoid excessive laps with expanded metal lath.
7. Do not use rib lath on walls.
8. Use wire nose corner for cement finish, PVC nose for acrylic finish.
9. Lath shall cover more than 75% of solid flanges.

C. Portland Cement Plaster:
1. Per ASTM C926, apply portland cement plaster by hand-troweling or machine-spraying to a nominal thickness of 3/8-inch (9.5mm) for scratch coat. Then apply a second coat to a nominal thickness of 3/8-inch (9.5 mm) brown coat. Total basecoat shall be a nominal ¾ inch thickness.
2. Scratch coat shall substantially cover the lath and be applied with sufficient pressure to encase the lath in cement. Slickers to apply cement plaster are prohibited. Score in a horizontal pattern.
3. Allow to cure 48 hours, or until sufficiently rigid to accept a brown coat.
4. Apply brown coat to fill and complete basecoat. Nominal ¾ inch thickness. Rod to a flat plane. Do not apply to frozen or soft scratch coat. When excess moisture leaves

brown coat, hard float to provide densification per ATSM. Hard floating procedure may be omitted if the "Base coat and Mesh or Stucco crack reduction system is selected.

5. Moist Curing: Provide sufficient moisture by fog or moist curing to permit proper hydration of the cementitious materials. The length of time and most effective procedure for curing will depend on climatic and job conditions. Refer to SMA curing guidelines.

D. Base and Mesh (Crack Reduction System):

1. After brown (basecoat) coat has cured, apply approved polymer enriched cement skim coat to basecoat, then trowel in to fully embed the mesh into skim coat. Ensure skim coat and finish coat are compatible products. A minimum two-inch (51 mm) overlap is required at all mesh joints. This method is highly recommended for smooth trowel finish plaster.

E. Cleaning/Patching/Tolerance:

1. Cleaning: Remove any and all materials used, overspray from adjacent surfaces, and all protective masking.
2. Patch and repair as needed, including but not limited to fog coating, imperfections, and blisters.
3. Cracks shall be repaired per the most current SMA Crack Policy (Technical Bulletin 4)
4. The basecoat of plaster shall be in tolerance:
   a. Residential: Not to exceed ¼ inch in eight (8) feet
   b. Commercial: Not to exceed ¼ inch in ten (10) feet
5. Eye catching variations in color or texture pattern will not be accepted.

F. Finish Coat:

1. General: Mix and apply per manufacturer's product data sheet.
2. Do not apply to soft, contaminated, or frozen basecoat.
3. Avoid applying to excessively hot walls.
4. Verification: Verify the desired color, material, and texture to match the approved sample and/or mock-up prior to installation.
5. Avoid scaffold lines and cold joints.
6. Fog coat (cement finish only) as needed to blend color variations.

G. Protection:

1. Protect applied material from inclement weather until dry and prevent it from freezing for a minimum of 24-hours after set and/or until dry. Refer to manufacturer's product data sheet for additional requirements.

3.4 FIELD QUALITY CONTROL

A. The contractor for work under this section shall maintain a quality control program specifically to verify compliance with this specification.

B. Inspections: A minimum of three (Substrate, Application, and Final) inspections according to the manufacturer's requirements for work requiring a warranty.

C. Mock-Up: Reference subsection 1.6_E above for mock-up requirements.

END OF SECTION

SECTION 06 10 00 ROUGH CARPENTRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes rough carpentry, light hardware, and miscellaneous items of work not included in another Section. This Section also includes:
   1. Structural wood supports, grounds, backing, and blocking required for wood framed structures including but not limited to flooring, wall, roof and ceiling construction.
   2. Backing/blocking for millwork and casework items that are an integral part of wall, floor, and/or ceiling construction.
   3. Backing/Blocking for Mechanical-Plumbing-Electrical work and equipment.
   4. Plywood sheathing.

B. Related Sections:
   1. Section 07 54 23 – PVC Thermoplastic Membrane Roofing
   2. Section 07 72 00 – Roof Accessories
   3. Section 07 72 33 – Roof Hatches
   4. Section 07 72 36 – Smoke Vents

C. Reference Standards:
   1. The following references, codes, and standards are hereby made a part of this Section and carpentry work shall conform to applicable requirements therein except as otherwise specified herein or shown on the Drawings. Nothing contained in the Drawings or these Specifications shall be construed as permitting work that is contrary to code requirements:
      a. Standard Grading and Dressing Rule #16, of the West Coast Lumber Inspection Bureau.
      b. Grading Rules for Western Lumber of the Western Wood Products Association.
      c. Standard Specifications for Grades of California Redwood Lumber of the Redwood Inspection Service.
      d. American Wood Preservers Association (AWPA) Standard C 2-77 Lumber, Timbers, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes.
      e. American Wood Preservers Bureau (AWPB) Quality Control Standards.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Building code: Comply with applicable requirements of CBC Chapter 23 for miscellaneous wood.
   2. Fire retardant treated lumber and plywood by pressure process: Provide products with a flame spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
   3. Level floor finishes to minimum requirement noted CBC Section 11B-302.1.

B. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.

C. Lumber and plywood shall be grade or quality marked by WWPA, WCLIB, APA, AWPB, or by other grading and inspection agencies acceptable to the Architect. Grade marks shall include the designation "S-DRY"(or "MC-15" as applies) where applicable. Grade and quality marks shall not be apparent on surfaces exposed in the finished work.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store kiln dried materials in enclosed areas, protected from moisture and separated from contact with concrete or soil.

PART 2 PRODUCTS

2.1 MATERIALS

A. Temporary Construction: Clean lumber at Contractor's option, rough or smooth, as usage requires.

B. Lumber Not Otherwise Specified or Noted:
1. Douglas fir or larch, graded and grade-marked, according to Reference Standard 1.02 A or B, #1 grade:
    a. Boards: Construction grade.

C. Sill Plates (On Concrete): Construction grade light framing, pressure treated as hereinafter specified; as noted on Plans.

D. Plywood for Walls and Roofs; As Noted On Plans:
1. Unless glue type is otherwise specified, exterior plywood, interior plywood exposed to continuing moisture, and pressure treated plywood shall be fabricated with exterior glue. Plywood with interior glue shall be fully protected from soaking or continuing moisture at all times.

E. Rough Hardware:
1. Nails, spikes, bolts, screws, tacks, and framing connectors of standard manufacture as required. Hot dip galvanize items exposed to moisture or to exterior and those items that are in contact with wood pressure treated with waterborne salts:
    a. Bolts and nuts: ASTM A307, Grade A.
    b. Lag bolts: Fed. Spec. FF-B-561. Pre-drill per CBC.
    c. Nails: Fed. Spec. FF-N-101, common unless otherwise noted or specified.
    d. Joist hangers and framing connectors: Simpson or approved equal, unless otherwise noted.
    e. Power driven fasteners: Hilti, Ramset, or approved equal, each use and fastener type subject to prior approval of Architect.

F. Pressure Treatment (Decay and Termite Prevention):
1. Pressure treat for decay and termite prevention, Douglas fir or larch wood materials that are embedded in or set against concrete.
2. Treat in accordance with Reference Standard 1.02 E and quality mark as per Reference Standard 1.02 F.
3. Treat with any of the following processes at Contractor option. Creosote type preservatives are not permitted:
    a. Penta in an LPG carrier (Cellon) or Penta in Hydrocarbon Solvent-Type D (Dow Process) AWPB LP-4 quality marked.

b. Ammoniacal copper arsenate (ACA) or chromated copper arsenate (CCA) in a water carrier (AWPB LP-2 quality marked).
c. Disodium Octaborate Tetrahydrate (DOT) such as Advance Guard/Hi-bor by Osmose, Inc.
d. Members treated with waterborne salts shall be dried to a moisture content not exceeding 19 percent after treatment.

4. Where possible, precut material before treatment.
5. Holes and cutoffs and handling and storage shall be in accordance with AWPA M-4.
6. Ensure that ferrous metal fastenings and items in contact with wood treated with waterborne salts are hot dip galvanized (1.25 oz. coating) where required by ICC reports.

G. Building Paper and Felt: Kraft waterproof building paper or 15# unperforated asphalt saturated rag felt per CBC Standard 14-1.

H. Framing Connectors: Simpson Strong Tie Corp., or equal.

2.2 MOISTURE CONTENT

A. 19 percent maximum for two times thickness and less; 19 percent maximum for thickness greater than two times and less than four times; and 22 percent maximum for thickness greater than four times.

2.3 SIZES

A. Surfaced to "DRY" sizes. Sizes noted are nominal unless shown as net.

2.4 SURFACING

A. All wood materials exposed in the finished work shall have re-sawn surfaces of clean natural color unless noted or specified otherwise. Concealed framing lumber shall be S4S.

PART 3 EXECUTION

3.1 ERECTION AND INSTALLATION

A. Framing: Conform to CBC where same covers points not indicated on Drawings. Properly lay out framing with pieces closely fitted, accurately plumbed, leveled and aligned, and rigidly secured in place.

B. Except as specifically shown on structural drawings, cutting of all wood, etc. is limited to those cuts permitted by 2022 California Building Code (CBC).

C. Bridging and Blocking: Conform to CBC. Provide two times blocking at intersections of finished surfaces for adequate bearing and at points where required to support fixtures, cabinets, hardware, and other equipment mounted on walls.

D. Plywood (General): Unless more stringent requirements are indicated on the Drawings or required by code, application of plywood shall be in accordance with recommendations of the American Plywood Association.

E. Connections and Fastenings: Conform to CBC. Unless otherwise specified or shown on the Drawings, conform to minimum nailing requirements of CBC. For bolted connections, provide washers under heads and nuts bearing on wood, and draw nuts tight. Retighten before closing in framing. Exercise care in nailing through exposed sheathing and siding

and ensure that fasteners penetrate into framing members

END OF SECTION 06 10 00

SECTION 07 54 23 PVC THERMOPLASTIC MEMBRANE ROOFING – ADHERED FELTBACK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Scope: To install a fully adhered Single Ply Thermoplastic (PVC) Roofing Membrane with flashings and other system components to comprise a roofing system as follows:

B. Related Work: The work includes but is not necessarily limited to the installation of:
1. Adhesive for Flashings
2. Clad Metal
3. Fasteners
4. Metal Flashings
5. Roof Membrane
6. Roof Membrane Flashings
7. Sealants
8. Separation Board
9. Substrate Preparation
10. Tapered/ Rigid Insulation
11. Termination Bars
12. Vapor Barriers
13. Walkways
14. Wood Blocking

C. Related Sections:
1. Section 06 10 00 – Rough Carpentry.
2. Section 07 62 00 – Sheet Metal Flashing and Trim.
3. Section 07 72 00 – Roof Accessories.
4. Section 07 92 00 – Joint Sealants.
5. Section 07 95 00 – Expansion Control.

D. Reference Standards:
1. American Society for Testing and Materials (ASTM):
   a. A385 Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
   b. D570 Water Absorption of Plastics.
   c. D751 Method of Testing Coated Fabrics.
   d. D4434 Poly (Vinyl Chloride) Sheet Roofing.
   e. E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
   f. E108 (Rev. A) Fire Tests of Roof Coatings.
2. ASCE-7 Wind uplifts requirements for geographical area.
3. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual.
4. Single Ply Roofing Institute (SPRI).
5. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) Architectural Sheet Metal Manual.
6. California Building Code (CBC).
7. Underwriter's Laboratories Inc. (UL):
   a. UL RMSD Roofing Materials and Systems Directory, Current Edition.

b. UL 790 Fire Resistance of Roofing Coverings Materials, Current Edition.
c. Exterior Fire Exposure Classification: Class A, ASTM E108, for application and slopes shown.
d. UL 90 Wind uplift requirements.

1.3 DEFINITIONS

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

1.4 SUBMITTALS

A. Submittals shall include the following:
1. Copies of Specification including physical properties.
2. Samples of each primary component to be used in the roof system and the manufacturer's current literature for each component.
3. Written approval by the insulation manufacturer (as applicable) for use and performance of the product in the proposed system.
4. Sample copy of Manufacturer's warranty including no exclusion for ponding water and no time limit shall be assigned to any such ponding water.
5. Sample copy of Applicator's warranty.
6. Dimensioned shop drawings which shall include:
e. Outline of roof with roof size and elevations shown.
f. Profile details of flashing methods for penetrations.
g. Technical acceptance from Manufacturer.
7. Certifications by manufacturers of roofing and insulating materials that all materials supplied comply with all requirements of the identified ASTM and industry standards or practices and requirements of this specification as stated in Section 2.02, A-D and Quality Assurance, Section 1.02.
8. Certification from the membrane manufacturer that the membrane supplied contains at least 36 mils of waterproofing polymers and that the membrane thickness is a minimum of **80** mils, ASTM +/- tolerances do not apply.
9. Certification from the Applicator that the system specified meets all identified code and insurance requirements as required by the Specification.
10. Letter from the proposed manufacturer confirming the number of years it has DIRECTLY manufactured the proposed roof system under the trade names and/or trademarks as proposed.
11. Material Safety Data Sheets (MSDS)

1.5 QUALITY ASSURANCE

A. Membrane Manufacturer must certify that the proposed equal has a membrane thickness equal to the membrane thickness specified, **80** mils thick, without ASTM (+/-) mil tolerances, as such tolerances are not acceptable. The felt backing shall not be included when measuring membrane thickness.

B. Membrane must have at least **80** mils of waterproofing polymers above the reinforcement as documented in the Typical Physical Properties section of the Manufacturer's published Product Data Sheet for **80** mil membranes.

C. Membrane Manufacturer must have a demonstrated performance history of producing thermoplastic membranes no less, in duration of years, than the warranty duration specified.

D. Membrane Manufacturer must provide a list of at least 10 (ten) projects in which the

submitted roofing material has been performing for the specified warranty duration. Membranes with modified formulation changes and undocumented proven performance will not be accepted.

E. Membrane Manufacturer must not require the use of membrane cut edge sealant at any location. This is a maintenance item that the Owner does not accept.

F. Membrane Manufacturer to confirm in writing that they directly manufacture the roofing membrane; private labeled membranes are not acceptable.

G. Membrane Manufacturer must have an established program for recycling membrane at the end of its useful life. Must provide 3 (three) instances in which they have done so.

H. Membrane Manufacturer must have recycled content certification from UL (Underwriters Laboratories) Environment.

I. Membrane Manufacturer must have ISO 14001 Certification and a Responsible Care program in place.

J. All work pertaining to the installation of PVC membrane and flashings must only be completed by Applicator personnel trained and authorized by roofing Manufacturer in those procedures
   1. Upon completion of the installation and the delivery to the Manufacturer, by the Applicator of certification, that all work has been done in strict accordance with the contract specifications and Membrane Manufacturer's requirements, a Technical Service Representative will review the installed roof system.
   2. There is no deviation made from the project specification or the approved shop drawings without prior written approval by the Architect, the Owner's Representative and Roofing Manufacturer.
   3. The installer must have a minimum of 5 years' experience in installing roofing system of this type and nature. Contractor must be certified and approved by the roofing materials Manufacturer.

K. Manufacturer's warranty must have "No Dollar Limit" for the replacement of defective materials and labor with no exclusions for ponding water. Additionally, the warranty shall not obligate the owner to any maintenance requirements or schedule as a condition of the warranty

L. Code Requirements
   1. The applicator shall submit evidence that the proposed roof system meets the requirements of the local building code and has been tested and approved or listed by the following test organizations. These requirements are minimum standards and no roofing work shall commence without written documentation of the system's compliance, as required in the "Submittals" section of this specification.
      h. [Note to Specifier: Select one rating from B. 1.]
   2. Factory Mutual Research Corporation (FM) - Norwood, MA
      i. Class 1-90, 1-245, 1-270, 1-465, 1-990
   3. Underwriters Laboratories, Inc. - Northbrook, IL
      j. Class A assembly

1.6 WARRANTIES

A. Upon successful completion of work the following warranties may be obtained:
   1. Manufacturer Warranty
   2. Roofing Contractor Warranty

B. Manufacturer's System Warranty (only products purchased from the membrane manufacturer are covered under System Warranty): Upon successful completion of the work to the Roofing Manufacturer's and Owner's satisfaction, and receipt of final payment, the twenty (20) Year System Warranty shall be issued. The System Warranty shall provide for the roof membrane, all accessories that comprise a roof system, and contractor labor. The Warranty shall be Non-Prorated provide for No Dollar Limit (NDL) and shall not exclude ponding water and no time limited shall be assigned for any such ponding water during the warranty period. Warranty shall not exclude foot traffic or storage of any kind upon the membrane surface. Warranty shall further not obligate the owner to a maintenance schedule or requirements of any kind as a condition of the warranty.

C. Applicator/Roofing Contractor Warranty: The Applicator shall supply the Owner with a separate two-year workmanship warranty. In the event any work related to roofing, flashing, or metal is found to be within the Applicator warranty term, defective or otherwise not in accordance with the Contract Documents, the Applicator shall repair that defect at no cost to the Owner. The Applicator's warranty obligation shall run directly to the Owner, and a copy shall be sent to the manufacturer.

D. Owner Responsibility: Owner shall notify both the manufacturer and the Applicator of any leaks as they occur during the time period when both warranties are in effect.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. All products delivered to the job site shall be in the original unopened containers or wrappings bearing all seals and approvals.

B. Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.

C. Membrane rolls shall be stored lying down on pallets and fully protected from the weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weldability.

D. All adhesives shall be stored at temperatures between 40º F (5º C) and 80º F (27º C).

E. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.

F. All materials which are determined to be damaged by the Owner's Representative or the manufacturer are to be removed from the job site and replaced at no cost to the Owner.

PART 2 PRODUCTS

2.1 GENERAL

A. Description: One ply PVC membrane adhered over separation board adhered over tapered insulation adhered and mechanically fastened over a level deck.

B. Components of the adhered roof system are to be products of the membrane manufacturer as indicated on the Detail Drawings and specified in the Contract Documents.

C. Components to be used that are other than those supplied or manufactured by the membrane manufacturer may be submitted for review and acceptance by the manufacturer.

1. The manufacturer's acceptance of any other product is only for a determination of compatibility with membrane products and not for inclusion in the manufacturer's warranty.
2. The specifications, installation instructions, limitations, and/or restrictions of the respective manufacturers must be reviewed by the Owner's Representative for acceptability for the intended use with the manufacturer's products.

2.2 MANUFACTURERS

A. PVC membrane roofing is subject to compliance with requirements; provide either the named product or a comparable product by one of the other manufacturers specified:
   1. Carlisle Companies 80 mil single ply PVC Fleeceback (Basis of Design).
   2. Soprema 80 mil single ply PVC Fleeceback.
   3. GAF 80 mil single ply PVC Fleeceback.
   4. Siplast 80 mil single ply PVC Fleeceback.
   5. Or equal (reference Section 01 25 13: Product Substitution Procedures).

2.3 ROOF ASSEMBLY

A. Class A Roofing (Assembly From Bottom Up):
   1. Roof structure:
      a. Plywood roof decking
      b. Vapor Barrier (Refer to Manufacturer Specification)
      c. Mechanically Fastened Rigid Insulation (Min. 1")
      d. Fully Adhered Separation board (1/2" DensDeck Prime).
      e. 80 Mil PVC Fleeceback Membrane.

2.4 MEMBRANE

A. PVC: Carlisle **80** mil single ply fully adhered feltback fiberglass reinforced membrane with a factory-applied integral lacquer coating to repel dirt and sustain reflectivity. Contact Aaron Hill, (415) 371-8098.

B. Membrane shall conform to ASTM D4434-96 (or latest revision), "Standard for Polyvinyl Chloride Sheet Roofing". Classification: Type II, Grade I. **80 mil**

C. Color of Membrane: White

D. Typical Physical Properties:

Parameters	ASTM Test Method	Minimum ASTM Requirement
Reinforcing Material	-	
Overall Thickness, min., inches (mm)	D638	0.072 (1.18)
Tensile Strength, min., psi (MPa)	D638	1500 (10.4)
Elongation at Break, min. (machine x tranverse)	D638	250% / 230%
Seam strength*, min. (% of tensile strength)	D638	75
Retention of Properties After Heat Aging	D3045	-
Tensile Strength, min., (% of original)	D638	90
Elongation, min., (% of original)	D638	90
Tearing Resistance, min., lbf (N)	D1004	10 (45.0)
Low Temperature Bend, -40º F (-40º C)	D2136	Pass
Accelerated Weathering Test (Xenon Arc)	D2565	5,000 Hours
Cracking (7x magnification)	-	None
Discoloration (by observation)	-	Negligible
Crazing (7 x magnification)	-	None
Linear Dimensional Change	D1204	0.10 %
Weight Change After Immersion in Water	D570	± 3.0%
Static Puncture Resistance, 33 lbf (15 kg)	D5602	Pass
Dynamic Puncture Resistance, 7.3 ft-lbf (10 J)	D5635	Pass
Initial Solar Reflectance	E903	0.83
Emissivity	E408, C1371	0.90
Solar Reflective Index (SRI)	E1980	104
Recycled Content (5 & 10 ft. Sheets Only)	8 to 12% PreConsumer/Up to 1% Post Consumer	

*Failure occurs through membrane rupture not seam failure.

2.5 FLASHING MATERIALS

A. Wall/Curb Flashing
   1. Flashing Membrane: A fiberglass reinforced membrane adhered to approved substrate using adhesive. Consult Product Data Sheets for adhesive options and additional information.
   2. PVC Clad Metal: A PVC-coated, heat-weldable sheet metal capable of being formed into a variety of shapes and profiles. Clad is a 25 gauge, G90 galvanized metal sheet with a 20 mil (1 mm) unsupported membrane laminated on one side.

B. Perimeter Edge Metal or Coping Metal
   1. A PVC-coated, heat-weldable sheet metal capable of being formed into a variety of shapes and profiles. Edge Metal / Coping Metal to be 24 gauge, G90 galvanized metal sheet with a 20 mil (0.5 mm) unsupported pvc membrane laminated on one side.

C. Miscellaneous Flashing
   1. Flash: A prefabricated expansion joint cover made from membrane. Flash is designed for securement to wall or horizontal surfaces to span and accommodate the movement of new and existing expansion gaps from 1 inch to 4½ inches (25 mm to 114 mm) across.
   2. Reglet: A heavy-duty, extruded aluminum flashing termination reglet used at walls and large curbs. Reglet is produced from 6063-T5, 0.10 inch - 0.12 inch (2.5 mm - 3.0 mm) thick extruded aluminum. Reglet has a 2¼ inch (57 mm) deep profile and is provided in 10-foot (3 m) lengths. Use prefabricated Reglet mitered inside and outside corners where walls intersect.
   3. Stack: A prefabricated vent pipe flashing made from 0.048 inch (48 mil/1.2 mm) thick membrane.
   4. Circle-"G": Circular 0.048 inch (48 mil/1.2 mm) thick membrane patch welded over T-

joints formed by overlapping thick membranes.

5. Corner: Prefabricated outside and inside flashing corners made of 0.060 inch (60 mil/1.5 mm) thick membrane that are heat-welded to membrane or Clad base flashings.
6. Multi-Purpose Sealant: A sealant used at flashing terminations.
7. StaBond Adhesive: A solvent-based reactivating-type adhesive used to attach membrane to flashing substrate.
8. Low-Rise Foam Adhesive: A two-component polyurethane, low rise expanding foam adhesive used to attach membrane to flashing substrate.
9. Felt: A non-woven polyester or polypropylene mat cushion layer that is necessary behind membrane when the flashing substrates are rough-surfaced or incompatible with the flashing membrane.

2.6 INSULATION AND SEPARATION BOARD

A. Insulation: A rigid polyisocyanurate foam insulation with black mat facers. R-18 minimum for flat roof and an average of R-18 for tapered insulation. Insulation is available in 4 ft x 4 ft (1.2 m x 1.2 m) or 4 ft x 8 ft (1.2 m x 2.4 m) sizes and various thicknesses.

B. Dens-Deck® Prime ½" Separation Board. For parapet wall and direct metal deck applications, use ½" board: A siliconized gypsum, fire-tested hardboard with glass-mat facers. Dens-Deck is provided in a 4 ft x 8 ft (1.2 m x 2.4 m) board size and in thicknesses of 1/4, 1/2 and 5/8 inch (13 mm and 16 mm).

2.7 ATTACHMENT COMPONENTS

A. Membrane Adhesive:

1. Sure-Flex PVC HydroBond adhesive: A water-based adhesive used to attach the membrane to horizontal or near-horizontal substrates. Application rates are as follows:

APPLICATION RATES FOR FELTBACK MEMBRANE						
	Adhesive Rates – Gallons/100 Ft² *(Liters/Meter²)*					**Approximate Sq. Ft./Pail** *(meter²)*
	Substrate		**Membrane**		**Total**	
GP Dens-Deck Prime®	1.50 *(0.61)*	+	0	=	1.50 *(0.61)*	333 *(30.94)*

2. Notes:
   f. There is a significant increase in drying time due to an increase in humidity and/or a decrease in temperature. Do not install when outdoor or substrate temperatures during drying period are expected to fall below 40º F (5º C).
   g. Do not allow Sure-Flex PVC HydroBond adhesive to skin-over or surface-dry prior to installation of membrane.
   h. Use a water-filled, foam-covered lawn roller to consistently and evenly press the membrane into the adhesive layer.

B. Insulation Board Adhesive

1. Low Rise Foam Adhesive: A two component (Part A and B) polyurethane low-rise adhesive for bonding insulation to approved compatible substrates. Consult Product Data Sheets for additional information. Application rates are as follows:

APPLICATION RATES FOR INSULATION		
	Approximate Sq. Ft. *(Meter²)* per Drum Set	
	50 Gal. (189.27 liter) Set	**15 Gal.** (56.78 liter) Set
Wood	8,500 - 9,000 *(789.68 - 836.13)*	2,500 - 2,700 *(232.26 - 250.84)*
Isocyanurate facer	8,500 - 9,000 *(789.68 - 836.13)*	2,500 - 2,700 *(232.26 - 250.84)*

2. Notes:

i. Adhesive must be applied as a continuous layer.
j. Use a water-filled, foam-covered lawn roller to consistently and evenly press insulation into adhesive layer.
k. Storage temperatures in excess of 90° F (32° C) may affect shelf life.
l. If exposed to temperatures below 40° F (5° C), restored to a minimum temperature of 60°F (15° C) before use.
m. Job site conditions may affect performance. LR-2001 adhesive shall not be used if surface and/or ambient temperatures below 40° F (5° C) are expected during application or subsequent curing time.
n. The addition of LR-2001 Catalyst to Part B may be required when temperatures are between 40° F (5° C) and 80° F (27° C).
o. Adhesive shall not be applied to wet or damp surfaces.

C. C. Plate: Used with various Fasteners to attach insulation boards to roof deck. Plate is a 3-inch (75 mm) square or round, 26 gauge stamping of SAE 1010 steel with an AZ 55 Galvalume coating.

D. Plate-HD/CD: Used with Fastener-HD or Fastener-CD10 to attach insulation boards to wood or concrete roof decks. Plate-HD/CD is a 3-inch (75 mm) round stamping of SAE 1010 steel with an AZ 55 Galvalume coating.

E. Fastener No. 12: Number 12 corrosion-resistant fastener used with Plates to attach insulation boards to steel or wood roof decks. Fastener No. 12 has a modified buttress thread, a shank diameter of approximately 0.168 inch (4 mm) and a thread diameter of approximately 0.214 inch (5 mm). The driving head has a diameter of approximately 0.435 inch (11 mm) with a #3 Phillips recess for positive engagement.

F. Fastener-HD: A #14 corrosion-resistant fastener used with Plate-HD/CD to attach insulation boards or with Disc and Bar to attach membrane to structural concrete or wood roof decks. Fastener-HD has a shank diameter of 0.190 inch (4.8 mm), a thread diameter of 0.245 inch (6.2 mm) and a #3 Phillips drive head with a diameter of 0.435 inch (11 mm).

G. Fastener-XP: A #15, heavy-duty, corrosion-resistant fastener used with Plate to attach insulation or Stop and Bar to attach roof membrane to steel or wood roof decks. Fastener-XP has a shank diameter of approximately 0.21 inch (5.3 mm) and the thread diameter is approximately 0.26 inch (6.6 mm). The driving head has a diameter of approximately 0.435 inch (11 mm) with a #3 Phillips recess for positive engagement.

H. Fastener-XPS: A specially designed, heavy-duty, corrosion-resistant fastener used with Stop or Bar to attach roof membrane to steel roof decks. Fastener-XPS has a shank diameter of approximately 0.21 inch (5.3mm) and a thread diameter of approximately 0.26 inch (6.6). The driving head has a diameter of approximately 0.435 inch (11 mm) with a #3 Phillips recess for positive engagement and simplicity of application.

I. Fastener-CD10: A nail-in, corrosion-resistant fastener used with Plate-HD/CD, Stop or Bar to attach insulation or membrane to normal weight concrete roof deck. Fastener-CD10 has a shank diameter of 0.215-inch (5.5 mm), a split diameter of 0.265/0.275 inch (6.7/7.0 mm) and a flat head with a 0.435-inch (11 mm) diameter.

J. Stop: An extruded aluminum, low profile bar used with certain Fasteners to attach to the roof deck or to walls/curbs at terminations, penetrations and at incline changes of the substrate. Stop is a 1 inch (25 mm) wide, flat aluminum bar 1/8 inch (3 mm) thick that has predrilled holes every 6 inches (152 mm) on center.

K. Termination Bar: An FM-approved, heavy-duty, 14 gauge, galvanized or stainless, roll-

formed steel bar used to attach membrane to roof decks. The formed steel is pre-punched with holes every 1 inch (25 mm) on center to allow various Fastener spacing options.

L. Cord: A 5/32-inch (4 mm) diameter, red-colored, flexible thermoplastic extrusion that is welded to the top surface of the membrane and against the side of the Bar, used to hold the membrane in position.

2.8 WALKWAY PROTECTION

A. Tread: A polyester reinforced, 0.096 inch (96 mil/2.4 mm), weldable membrane with surface embossment. Used as a protection layer from rooftop traffic. Tread is supplied in rolls of 39.3 inches (1.0 m) wide and 32.8 feet (10 m) long.

2.9 MISCELLANEOUS ACCESSORIES

A. Aluminum Tape: A 2 inch (50 mm) wide pressure-sensitive aluminum tape used as a separation layer between small areas of asphalt contamination and the membrane and as a bond-breaker under the cover-strip at Clad joints.

B. Sealing Tape Strip: Compressible foam with pressure-sensitive adhesive on one side. Used with metal flashings as a preventive measure against air and wind-blown moisture entry.

C. Multi-Purpose Tape: A high performance sealant tape with used with metal flashings as a preventive measure against air and wind-blown moisture entry.

D. Seam Welder 641mc: 220 volt, self-propelled, hot-air welding machine used to seal long lengths of membrane seams.

E. Perimat Welder: 120 volt, self-propelled, hot-air welding machine used to seal long-lengths of membrane seams along perimeter details.

F. Solvent: A high quality solvent cleaner used for the general cleaning of residual asphalt, scuff marks, etc., from the membrane surface. Solvent is also used daily to clean seam areas prior to hot-air welding in tear off or dirty conditions or if the membrane is not welded the same day it is unrolled.

2.10 MISCELLANEOUS FASTENERS AND ANCHORS

A. All fasteners, anchors, nails, straps, bars, etc. shall be post-galvanized steel, aluminum or stainless steel. Mixing metal types and methods of contact shall be assembled in such a manner as to avoid galvanic corrosion. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins. All concrete fasteners and anchors shall have a minimum embedment of 1¼ inch (32 mm) and shall be approved for such use by the fastener manufacturer. All miscellaneous wood fasteners and anchors used for flashings shall have a minimum embedment of 1 inch (25 mm) and shall be approved for such use by the fastener manufacturer.

2.11 VAPOR BARRIER

A. Carlisle Self Adhered
   1. A self-adhered 32 Mil vapor barrier that can also serve as a temporary roof protection. The top surface is a high-density polyethylene grid laminated between two layers of polyethylene film. A silicone release plastic film covers the self-adhesive back side.

B. Or Approved Equal.

2.12 RELATED MATERIALS

A. Wood Nailer: Treated wood nailers shall be installed at the perimeter of the entire roof and around such other roof projections and penetrations as specified on Project Drawings. Thickness of nailers must match the insulation thickness to achieve a smooth transition. Wood nailers shall be treated for fire and rot resistance (wolmanized or osmose treated) and be #2 quality or better lumber. Creosote or asphalt-treated wood is not acceptable. Wood nailers shall conform to Factory Mutual Loss Prevention Data Sheet 1-49. All wood shall have a maximum moisture content of 19% by weight on a dry-weight basis.

PART 3 EXECUTION

3.1 PRE-CONSTRUCTION CONFERENCE

A. The Applicator, Owner's Representative/Designer and Manufacturer(s) shall attend a pre-construction conference.

B. The meeting shall discuss all aspects of the project including but not limited to:
1. Safety
2. Set up
3. Construction schedule
4. Contract conditions
5. Coordination of the work

3.2 JOB CONDITIONS

A. Membrane materials may be installed under certain adverse weather conditions but only after consultation with the Manufacturer, as installation time and system integrity may be affected.

B. Only as much of the new roofing as can be made weathertight each day, including all flashing and detail work, shall be installed. All seams shall be cleaned and heat welded before leaving the job site that day.

C. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.

D. All surfaces to receive new insulation, membrane or flashings shall be dry. Should surface moisture occur, the Applicator shall provide the necessary equipment to dry the surface prior to application.

E. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.

F. Uninterrupted water stops shall be installed at the end of each day's work and shall be completely removed before proceeding with the next day's work. Water stops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Contaminated membrane shall be replaced at no cost to the Owner.

G. The Applicator is cautioned that certain membranes are incompatible with asphalt, coal tar, heavy oils, roofing cements, creosote and some preservative materials. Such materials shall not remain in contact with the membranes. The Applicator shall consult the

manufacturer regarding compatibility, precautions and recommendations.

H. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the General Contractor/ Construction Manager/ Owner's Representative shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over Felt or plywood over insulation board shall be provided for all new and existing roof areas that receive rooftop traffic during construction.
Prior to and during application, all dirt, debris and dust shall be removed from surfaces either by vacuuming, sweeping, blowing with compressed air and/or similar methods.

I. The Applicator shall follow all safety regulations as required by OSHA and any other applicable authority having jurisdiction.

J. All roofing, insulation, flashings and metal work removed during construction shall be immediately taken off site to a legal dumping area authorized to receive such materials. Hazardous materials, such as materials containing asbestos, are to be removed and disposed of in strict accordance with applicable City, State and Federal requirements.

K. All new roofing waste material (i.e., scrap roof membrane, empty cans of adhesive) shall be immediately removed from the site by the Applicator and properly transported to a legal dumping area authorized to receive such material.

L. The Applicator shall take precautions that storage and/or application of materials and/or equipment does not overload the roof deck or building structure.

M. Flammable adhesives and deck primers shall not be stored and not be used in the vicinity of open flames, sparks and excessive heat.

N. All rooftop contamination that is anticipated or that is occurring shall be reported to the manufacturer to determine the corrective steps to be taken.

O. The Applicator shall verify that all roof drain lines are functioning correctly (not clogged or blocked) before starting work. Applicator shall report any such blockages in writing (letter copy to the manufacturer) to the Owner's Representative for corrective action prior to installation of the roof system.

P. Applicator shall immediately stop work if any unusual or concealed condition is discovered and shall immediately notify Owner of such condition in writing for correction at the Owner's expense (letter copy to the manufacturer).

Q. Site cleanup, including both interior and exterior building areas that have been affected by construction, shall be completed to the Owner's satisfaction.

R. All landscaped areas damaged by construction activities shall be repaired at no cost to the Owner.

S. The Applicator shall conduct fastener pullout tests in accordance with the latest revision of the SPRI/ANSI Fastener Pullout Standard to help verify condition of deck/substrate and to confirm expected pullout values.

T. The adhered membrane shall not be installed under the following conditions without consulting the manufacturer's technical department for precautionary steps:

U. The roof assembly permits interior air to pressurize the membrane underside.

V. Any exterior wall has 10% or more of the surface area comprised of opening doors or windows.

W. The wall/deck intersection permits air entry into the wall flashing area.

X. Precautions shall be taken when using adhesives at or near rooftop vents or air intakes. Adhesive odors could enter the building. Coordinate the operation of vents and air intakes in such a manner as to avoid the intake of adhesive odor while ventilating the building. Always keep lids on unused cans.

Y. Protective wear shall be worn when using solvents or adhesives or as required by job conditions.

3.3 SUBSTRATE CONDITION

A. Applicator shall be responsible for acceptance or provision of proper substrate to receive new roofing materials.

B. Applicator shall verify that the work done under related sections meets the following conditions:
1. Roof drains and/or scuppers have been reconditioned and/or replaced and installed properly.
2. Roof curbs, nailers, equipment supports, vents and other roof penetrations are properly secured and prepared to receive new roofing materials.
3. All surfaces are smooth and free of dirt, debris and incompatible materials.
4. All roof surfaces shall be free of water, ice and snow.

3.4 SUBSTRATE PREPARATION

A. The roof deck and existing roof construction must be structurally sound to provide support for the new roof system. The Applicator shall load materials on the rooftop in such a manner to eliminate risk of deck overload due to concentrated weight. The Owner's Representative shall ensure that the roof deck is secured to the structural framing according to local building code and in such a manner as to resist all anticipated wind loads in that location.

B. Wood Deck:
p. FM approved wood deck - The roof deck shall be minimum 2 inch (50 mm) thick lumber or ¾ inch (19 mm) thick treated plywood. The deck shall conform to FM requirements for Class 1 fire-retardant and rot-resistant wood decks. Deck shall be installed according to FM and local code requirements.
q. Non-FM approved wood deck - The roof deck shall be minimum 1½ inch (25 mm) thick lumber or 15/32 inch (12 mm) thick plywood. Deck shall be installed according to local code requirements. Contact Manufacturer’s Technical for fastening patterns and methods.

3.5 SUBSTRATE INSPECTION

A. A dry, clean and smooth substrate shall be prepared to receive the Adhered roof system.

B. The Applicator shall inspect the substrate for defects such as excessive surface roughness, contamination, structural inadequacy, or any other condition that will adversely affect the quality of work.

C. The substrate shall be clean, smooth, dry, free of flaws, sharp edges, loose and foreign material, oil and grease. Roofing shall not start until all defects have been corrected.

D. All roof surfaces shall be free of water, ice and snow.

E. The membrane shall be applied over compatible and accepted substrates only.

3.6 WOOD NAILER INSTALLATION

A. Install continuous wood nailers at the perimeter of the entire roof and around roof projections and penetrations as shown on the Detail Drawings.

B. Nailers shall be anchored to resist a minimum force of 300 pounds per lineal foot (4,500 Newtons/lineal meter) in any direction. Individual nailer lengths shall not be less than 3 feet (0.9 meter) long. Nailer fastener spacing shall be at 12 inches (0.3 m) on center or 16 inches (0.4 m) on center, if necessary, to match the structural framing. Fasteners shall be staggered 1/3 the nailer width and installed within 6 inches (0.15 m) of each end. Two fasteners shall be installed at ends of nailer lengths. Nailer attachment shall meet this requirement and that of the current Factory Mutual Loss Prevention Data Sheet 1-49.

C. Thickness shall be as required to match substrate or insulation height to allow a smooth transition.

D. Any existing nailer woodwork which is to remain shall be firmly anchored in place to resist a minimum force of 300 pounds per lineal foot (4,500 Newtons/lineal meter) in any direction and shall be free of rot, excess moisture or deterioration. Only woodwork shown to be reused in Detail Drawings shall be left in place. All other nailer woodwork shall be removed.

3.7 INSULATION AND SEPARATION BOARD INSTALLATION

A. Insulation and separation board shall be installed according to insulation manufacturer's instructions.

B. Insulation and separation board shall be neatly cut to fit around penetrations and projections.

C. Install tapered insulation in accordance with insulation manufacturer's shop drawings.

D. Install tapered insulation around drains creating a drain sump.

E. Do not install more insulation board than can be covered with the membrane by the end of the day or the onset of inclement weather.

F. Use at least 2 layers of insulation when the total insulation thickness exceeds 2½ inches (64 mm). Stagger joints at least 12 inches (0.3 m) between layers.

G. Mechanical Attachment
1. Insulation shall be mechanically fastened to the deck with approved fasteners and plates at a rate according to the insulation manufacturer's, FM's and the manufacturer’s recommendations for fastening rates and patterns. The quantity and locations of the fasteners and plates shall also cause the insulation boards to rest evenly on the roof deck/substrate so that there are no significant and avoidable air spaces between the boards and the substrate. Each insulation board shall be installed tightly against the adjacent boards on all sides.
2. Fasteners are to be installed consistently in accordance with fastener manufacturer's

recommendations. Fasteners are to have minimum penetration into structural deck recommended by the fastener manufacturer and the membrane manufacturer.

3. Use fastener tools with a depth locator and torque-limiting attachment as recommended or supplied by fastener manufacturer to ensure proper installation.

H. Low Rise Foam Adhesive

1. Apply using pneumatic spray equipment over properly installed and prepared substrates at a rate according to the manufacturer's requirements. Low Rise Foam Primer may be required prior to application of adhesive if excessive dirt or dust remains on substrate. Contact manufacturer's Technical Department for specific primer requirements. Apply adhesive in a smooth, even coating with no gaps, globs, puddles or similar inconsistencies. Only areas that can be made completely watertight in the same day's operations shall be coated.
2. Allow adhesive to rise up approximately 1/8 inch and set insulation boards into adhesive. Continue to install boards into adhesive. After set-up time has been reached (approx. 5 to 10 minutes, will vary based on temperature and amount of catalyst added) walk insulation boards into adhesive to ensure full embedment. CAUTION: Walking insulation boards in immediately after placement into adhesive may cause slippage/movement until adhesive starts to set up. On roof slopes greater than ½ inch in 12 inches, begin adhering insulation at low point and work upward to avoid slippage. One person should be designated to walk in, trim/slit and apply weight to all insulation boards to ensure adequate securement. For multiple layers of insulation spray adhesive over the base layer once fully secured and follow procedures above for attachment of each insulation layer.
3. Installation Guidelines:
   r. Adhesive must be applied as a continuous layer.
   s. Storage temperatures in excess of 90° F (32° C) may affect shelf life of adhesive.
   t. If exposed to temperatures below 40° F (5° C), restored adhesive to a minimum temperature of 60°F (15° C) before use.
   u. Job site conditions may affect performance. Low Rise Foam adhesive shall not be used if surface and/or ambient temperatures below 40° F (5° C) are expected during application or subsequent curing time.
   v. The addition of Low-Rise Foam Catalyst to Part B may be required when temperatures are between 40° F (5° C) and 80° F (27° C). Refer to table below for approximate amount of catalyst to be added.
   w. Adhesive shall not be applied to wet or damp surfaces.

3.8 INSTALLATION OF ROOF MEMBRANE

A. The surface of the insulation or substrate shall be inspected prior to installation of the roof membrane. The substrate shall be clean, dry, free from debris and smooth with no surface roughness or contamination. Broken, delaminated, wet or damaged insulation boards shall be removed and replaced.

B. Sure-Flex HydroBond Adhesive:

1. Over the properly installed and prepared substrate, Sure-Flex PVC HydroBond adhesive shall be poured out of the pail and spread using notched ¼ inch x ¼ inch x ¼ inch (6 mm x 6 mm x 6 mm) rubber squeegees. The Sure-Flex PVC HydroBond adhesive shall be applied at a rate according to the manufacturer's requirements. No adhesive is applied to the back of the felt back membrane. **Do not allow adhesive to skin-over or surface-dry prior to installation of felt back membrane.**

2. The felt back roof membrane is unrolled immediately into the wet Sure-Flex PVC HydroBond adhesive. Adjacent rolls overlap previous rolls by 3 inches (75 mm). This process is repeated throughout the roof area. Immediately after application into adhesive, each roll shall be pressed firmly into place with a water-filled, foam-covered lawn roller by frequent rolling in two directions. **Do not allow adhesive to skin-over**

or surface-dry prior to installation of feltback membrane.

3. Weld membrane cover strips at all felt back membrane seams that do not have a factory selvage edge.
   x. Notes:
      1) Sure-Flex PVC HydroBond adhesive shall not be used if temperatures below 40º F (5º C) are expected during application or subsequent drying time.
      2) No adhesive shall be applied in seam areas. All membrane shall be applied in the same manner.

C. Membrane Installation:
1. Position and unroll successive sheets of felt back membrane and align to provide a minimum 3 inch (76 mm) wide overlap.
2. Fold adjacent sheet in half lengthwise to expose substrate area. Fold selvage Sheet edges (along the length of the sheets) under the membrane to prevent overspray onto weld area. Adhere membrane that will be bottom side of the weld first. This will protect the selvage edge from being contaminated by setting into Low Rise Foam adhesive.
3. Spray Low Rise Foam adhesive onto the substrate and allow to rise approximately 1/8 inch (45.7 cm).
4. Place membrane into Low Rise Foam adhesive and roll with water filled, foam covered lawn roller to set into adhesive.
5. Fold remaining sheets lengthwise to expose additional substrate area adjacent to area previously adhered.
6. Apply Low Rise Foam adhesive to substrate and continue process described above until all sheets are adhered.
7. Hot-air weld all seams.

3.9 HOT-AIR WELDING OF SEAM OVERLAPS

A. General
1. All seams shall be hot-air welded. Seam overlaps should be 3 inches (75 mm) wide when automatic machine-welding and 4 inches (100 mm) wide when hand-welding, except for certain details.
2. Welding equipment shall be provided by or approved by the manufacturer. All mechanics intending to use the equipment shall have successfully completed a training course provided by a Technical Representative prior to welding.
3. All membrane to be welded shall be clean and dry.

B. Hand-Welding: Hand-welded seams shall be completed in two stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding.
1. The back edge of the seam shall be welded with a narrow but continuous weld to prevent loss of hot air during the final welding.
2. The nozzle shall be inserted into the seam at a 45-degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow," the hand roller is positioned perpendicular to the nozzle and pressed lightly. For straight seams, the 1½ inch (40 mm) wide nozzle is recommended for use. For corners and compound connections, the ¾ inch (20 mm) wide nozzle shall be used.

C. Machine Welding
1. Machine welded seams are achieved using automatic welding equipment. When using this equipment, the manufacturer’s instructions shall be followed and local codes for electric supply, grounding and over current protection observed. Dedicated circuit house power or a dedicated portable generator is recommended. No other equipment shall be operated off the generator.
2. Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.

D. Quality Control of Welded Seams
   1. The Applicator shall check all welded seams for continuity using a rounded screwdriver. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark grey material from the underside of the top membrane. On-site evaluation of welded seams shall be made daily by the Applicator to locations as directed by the Owner's Representative or a manufacturer's representative. One inch (25 mm) wide cross-section samples of welded seams shall be taken at least three times a day. Correct welds display failure from shearing of the membrane prior to separation of the weld. Each test cut shall be patched by the Applicator at no extra cost to the Owner.

3.10 MEMBRANE FLASHINGS

A. All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and the manufacturer. Approval shall only be for specific locations on specific dates. If any water enters under the newly completed roofing, the affected area shall be removed and replaced at the Applicator's expense. Flashing shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces. Use caution to ensure adhesive fumes are not drawn into the building.

B. Adhesive for Membrane Flashings
   1. Over the properly installed and prepared flashing substrate, adhesive shall be applied according to instructions found on the Product Data Sheet. The adhesive shall be applied in smooth, even coats with no gaps, globs or similar inconsistencies. Only an area which can be completely covered in the same day's operations shall be flashed. The bonded sheet shall be pressed firmly in place with a hand roller.
   2. No adhesive shall be applied in seam areas that are to be welded. All panels of membrane shall be applied in the same manner, overlapping the edges of the panels as required by welding techniques.

C. Install Stop/Bar/Cord according to the Detail Drawings with approved fasteners into the structural deck at the base of parapets, walls and curbs. Stop is required by the manufacturer at the base of all tapered edge strips and at transitions, peaks, and valleys according to the manufacturer's details.

D. The manufacturer's requirements and recommendations and the specifications shall be followed. All material submittals shall have been accepted by the manufacturer prior to installation.

E. All flashings shall extend a minimum of 8 inches (0.2 m) above roofing level unless otherwise accepted in writing by the Owner's Representative and the Technical Department.

F. All flashing membranes shall be consistently adhered to substrates. All interior and exterior corners and miters shall be cut and hot-air welded into place. No bitumen shall be in contact with the membrane.

G. All flashing membranes shall be mechanically fastened along the counter-flashed top edge with Stop at 6-8 inches (0.15-0.20 m) on center.

H. Flashings shall be terminated according to the manufacturer's recommended details.

I. All flashings that exceed 30 inches (0.75 m) in height shall receive additional securement.

3.11 METAL FLASHINGS

A. Metal details, fabrication practices and installation methods shall conform to the applicable requirements of the following:
   1. Factory Mutual Loss Prevention Data Sheet 1-49 (latest issue).
   2. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - latest issue.

B. Metal, other than that provided by the manufacturer, is not covered under the warranty.

C. Complete all metal work in conjunction with roofing and flashings so that a watertight condition exists daily.

D. Metal shall be installed to provide adequate resistance to bending to allow for normal thermal expansion and contraction.

E. Metal joints shall be watertight.

F. Metal flashings shall be securely fastened into solid wood blocking. Fasteners shall penetrate the wood nailer a minimum of 1 inch (25 mm).

G. Airtight and continuous metal hook strips are required behind metal fascia's. Hook strips are to be fastened 12 inches (0.3 m) on center into the wood nailer or masonry wall.

H. Counter flashings shall overlap base flashings at least 4 inches (100 mm).

I. Hook strips shall extend past wood nailers over wall surfaces by 1½ inch (38 mm) minimum and shall be securely sealed from air entry.

3.12 CLAD METAL BASE FLASHINGS/EDGE METAL

A. All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and the manufacturer. Acceptance shall only be for specific locations on specific dates. If any water enters under the newly completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Applicator's expense.

B. Clad metal flashings shall be formed and installed per the Detail Drawings.
   1. All metal flashings shall be fastened into solid wood nailers with two rows of post galvanized flat head annular ring nails, 4 inches (100 mm) on center staggered. Fasteners shall penetrate the nailer a minimum of 1 inch (25 mm).
   2. Metal shall be installed to provide adequate resistance to bending and allow for normal thermal expansion and contraction.

C. Adjacent sheets of Clad shall be spaced ¼ inch (6 mm) apart. The joint shall be covered with 2 inch (50 mm) wide aluminum tape. A 4-inch minimum (100 mm) wide strip of flashing membrane shall be hot-air welded over the joint.

D. Flashing membrane shall be applied over the top of the wood nailer before installing the edge/ coping clad metal.

3.13 WALKWAY INSTALLATION

A. Tread Walkway: Roofing membrane to receive the Tread Walkway shall be clean and dry. Place chalk lines on deck sheet to indicate location of Walkway. Apply a continuous coat of 2170 adhesive to the deck sheet and the back of Walkway in accordance with manufacturer's technical requirements and press Walkway into place with a water-filled,

foam-covered lawn roller. Clean the deck membrane in areas to be welded. Hot-air weld the entire perimeter of the Walkway to the membrane deck sheet. Check all welds with a rounded screwdriver. Re-weld any inconsistencies. **Important:** Check all existing deck membrane seams that are to be covered by Walkway with rounded screwdriver and reweld any inconsistencies before Walkway installation. Do not run Walkway over Bars.

3.14 VAPOR BARRIER INSTALLATION

A. Re-roofing with Removal of Existing Roofing
   1. Install Self-Adhered vapor retarder over a clean and dry substrate per manufacturer's recommendations. Do not install when it is raining, snowing, or on wet / humid surfaces. Install in temperatures 32 degrees F (0 degrees C) and above. The use of a primer is required on the following substrates: wood, concrete, lightweight concrete, gypsum boards and decks, and Dens Deck boards.
      y. Begin application at the bottom of the slope. Unroll Sarnavap Self-Adhered onto the substrate without adhering for alignment. Overlap each preceding sheet by 3 in. (75 mm) lengthwise following the reference line and by 6 in. (150 mm) at each end. Stagger end laps by at least 12 in. (300 mm). Do not immediately remove the silicone release sheet.
      z. Once aligned, peel back a portion of the silicone release sheet and press the membrane onto the substrate for initial adherence. Hold Sarnavap Self-Adhered tight and peel back the release sheet by pulling diagonally.
      aa. Use a 75 lbs. (34 kg) roller to press Sarnavap Self-Adhered down into the substrate including the laps. Finish by aligning the edge of the roller with the lower end of the side laps and rolling up the membrane. Do not cut the membrane to remove air bubbles trapped under the laps. Squeeze out air bubbles by pushing the roller to the edge of the laps.

3.15 TEMPORARY CUT-OFF

A. All flashings shall be installed concurrently with the roof membrane in order to maintain a watertight condition as the work progresses. All temporary water stops shall be constructed to provide a 100% watertight seal. The stagger of the insulation joints shall be made even by installing partial panels of insulation. The new membrane shall be carried into the water stop. The water stop shall be sealed to the deck and/or substrate so that water will not be allowed to travel under the new or existing roofing. The edge of the membrane shall be sealed in a continuous heavy application of sealant as described in Section 2.10. When work resumes, the contaminated membrane shall be cut out. All sealant, contaminated membrane, insulation fillers, etc. shall be removed from the work area and properly disposed of offsite. None of these materials shall be used in the new work.

B. If inclement weather occurs while a temporary water stop is in place, the Applicator shall provide the labor necessary to monitor the situation to maintain a watertight condition.

C. If any water enters under the newly completed roofing, the affected area shall be removed and replaced at the Applicator's expense.

3.16 COMPLETION

A. Prior to demobilization from the site, the work shall be reviewed by the Owner's Representative and the Applicator. All defects noted and non-compliances with the Specifications or the recommendations of the manufacturer shall be itemized in a punch list. These items must be corrected immediately by the Applicator to the satisfaction of the Owner's Representative and the manufacturer prior to demobilization.

B. All Warranties referenced in this Specification shall have been submitted and have been accepted at time of contract award.

END OF SECTION 07 54 23

SECTION 07 56 00 FLUID APPLIED ROOF COATING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. The new roof coating system shall consist of a liquid applied waterproofing membrane, flashings, and finish layers as specified herein as roof repair and maintenance.

B. Work shall include, but is not limited to, the following:
1. Preparation of existing (new), built-up roof, and all flashing substrates to be repaired.
2. Liquid applied acrylic roof coating.
3. All related materials and labor required to complete specified waterproofing necessary to receive specified manufacturer's warranty.

C. Related Sections:
1. Section 01 10 00 – Summary
2. Section 07 62 00 – Sheet Metal Flashing and Trim
3. Section 07 72 00 – Roof Accessories
4. Section 07 92 00 – Joint Sealants

D. Reference Standards:
1. American Society of Civil Engineers:
   a. ASCE 7 Minimum Design Loads for Buildings and Other Structures.
2. American Standard of Testing Methods (ASTM):
   a. ASTM C836 Standard Specification for High Solids Content, Cold Liquid applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
   b. ASTM C920 Standard Specification for Elastomeric Joint Sealants
   c. ASTM D1079 Standard Terminology Relating to Roofing and Waterproofing.
3. American National Standards Institute (ANSI):
   a. ANSI/SPRI FX-1 Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
   b. ANSI/SPRI IA-1 Standard Field Test Procedure for Determining the Mechanical Uplift Resistance of Insulation Adhesives over Various Substrates.
4. Factory Mutual (FM):
   a. FM 4435 Edge Systems Used With Low Slope Roofing Systems.
   b. FM 4450 Class I Insulated Steel Roof Decks.
   c. FM 4470 Single-Ply, Polymer-Modified Bitumen Sheet, Built-up Roof (BUR), and liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof deck Construction.
   d. FM 4474 Evaluating the Simulated Wind Uplift Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures.
5. National Roofing Contractors Association (NRCA):
   a. The National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual (Current Edition) Glossary.
6. Underwriter's Laboratories Inc. (UL):
   a. UL 790 Standard for Safety Standard Test Methods for Fire Tests of Roof Coverings.

b. UL 1256 Standard for Safety Fire Test of Roof Deck Constructions.

1.3 SUBMITTALS

A. Product Data Sheets: Submit manufacturer's product data sheets, installation instructions, and/or general requirements for each component.

B. Safety Data Sheets: Submit manufacturer's safety data sheets (SDS) for each component.

C. Sample warranty from the manufacturer and Contractor.

D. Provide roof plan and representative detail drawings.

E. Submit a letter from the roofing manufacturer indicating the Contractor is an authorized applicator.

F. Warranty: Provide manufacturer's and Contractor's warranties upon Project completion.

1.4 PERFORMANCE REQUIREMENTS

A. Wind Uplift Resistance:
1. Performance testing shall be in accordance with FM 4474, FM 4450, FM 4470, UL 580 or UL 1897:
   a. Roof system design pressures: Calculated in accordance with ASCE 7, or applicable standard, for the specified roof system attachment requirements.

B. Roof Slope: Finished roof slope for liquid applied membrane surfaces shall be 1/4 inch per foot (2%) minimum for roof drainage or as allowed under current existing conditions for this patch and repair roof or by applicable building and jurisdictional codes for roof assembly.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:
1. Manufacturer shall have 20 years of manufacturing experience.
2. Manufacturer shall have trained technical service representatives employed by the manufacturer, independent of sales.
3. Manufacturer shall provide site visit reports in a timely manner.

B. Contractor Qualifications:
1. Contractor shall be authorized by the manufacturer to install specified materials prior to the bidding period through satisfactory Project completion.
2. Applicators shall have completed projects of similar scope using same or similar materials specified.
3. Contractor shall provide full time, onsite foreman experienced with the specified roofing from beginning through satisfactory Project completion.
4. Applicators shall be skilled in the application methods for all materials.
5. Contractor shall maintain a daily record onsite, documenting material installation and related Project conditions.
6. Contractor shall maintain a copy of all submittal documents onsite, available at all times for reference.

C. Substrate Evaluation:
1. Contractor shall evaluate substrate moisture content and adhesion of materials to

substrate throughout the work and record with daily inspection reports or other form of reporting acceptable to the Owner or his designated representative:

a. Moisture content: Evaluate substrate moisture content to determine acceptability for application of the specified liquid applied materials. Moisture testing shall be performed by means suitable to the Project application, or by testing substrate relative humidity (RH) in accordance with ASTM F2170 when needed, required, or if substrate moisture content is in question.
b. Adhesion: Evaluate soundness and surface preparation of existing material substrates. Prepare representative areas using specified methods complete with applied primer and coating membrane. Test for minimum acceptable tensile bond strength values as required in accordance with ASTM D4541. Evaluate all areas where existing roofing appears to differ in appearance or consistency, if multiple areas are involved in the scope of work, evaluate each area with a minimum of three (3) tests for every 1,000 square feet or as required by Project conditions.

1.6 WARRANTY

A. The Contractor shall guarantee the workmanship and shall provide the Owner with the Contractor's warranty covering workmanship for a period of two (2) years from completion date.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Refer to each product data sheet or other published literature for specific requirements.

B. Deliver materials and store them in their unopened, original packaging, bearing the manufacturer's name, related standards, and any other specification or reference accepted as standard.

C. Protect and store materials in a dry, well-vented, and weatherproof location. Only materials to be used the same day shall be removed from this location. During cold weather, store materials in a heated location, removed only as needed for immediate use.

D. Properly dispose of all product wrappers, pallets, cardboard tubes, scrap, waste, and debris. All damaged materials shall be removed from jobsite and replaced with new, suitable materials.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Single Source Manufacturer:
1. All coating materials shall be manufactured by a single supplier with 20 years or more roofing and waterproofing manufacturing history in the US.
2. Comply with the manufacturer's requirements as necessary to provide the specified warranty.

B. Acceptable Manufacturer:
1. CARLISLE COMPANIES, located in Phoenix, AZ; Tel: 800-479-6832; Website: www.carlislesyntec.com.
2. Acceptable alternate manufacturers must be reviewed by the Design Project Manager.

2.2 ACRYLIC COATINGS

A. X-Trenda Coat Classic Coating is a 100% acrylic, single-component, water-based, premium quality elastomeric coating for spray, brush, or roller application. This product is designed to provide protection for a wide range of building surfaces such as roofs, vertical walls, and masonry. It is excellent for waterproofing and restoring existing roof systems. X-Tenda Coat Classic Acrylic coating is applied in multiple coats, with a minimum base coat (BC) and a topcoat (TC) for finishing. X-Tenda Coat Classic TC can be used as a top or base coat. X-Tenda Coat Classic BC can be used as a base coat but is not recommended as the top finish coat.

2.3 ACCESSORIES

A. Primers:
   1. X-Tenda Coat Epoxy Primer, X-Tenda Coat Acrylic General Purpose Primer (Blac), X-Tenda Coat Bleed Block Primer (Red) and X-Tenda Coat TPO Primer are all acceptable for use with this restoration coating system.

B. Other Carlisle Products and Related Products:
   1. X-Tenda Coat Classic Acrylic Mastic, X-Tenda Coat Classic Acrylic, X-Tenda Coat Micro Fiber, X-Tenda Coat Reinforcing Fabric and X-Tenda Coat Membrane Cleaner are used with this restoration coating.
   2. Granules, Rollers with 1/2” Nap, Brushes, 2,000 psi rated power washer, Detergent

PART 3 EXECUTION

3.1 EXAMINATION

A. General:
   1. Safety Data Sheets (SDS) must always be on location during transportation, storage, and application of materials. The applicator shall follow all safety regulations as recommended by OSHA, and/or other agencies having jurisdiction.
   2. Comply with building owner requirement for onsite material storage and campus regulations. Place dumpster and other equipment in areas which have been designated by the building owner.
   3. The worksite must be kept in an organized and in orderly fashion. All waste products must be removed and disposed of in accordance with local ordinances.

3.2 SURFACE INSPECTION

A. The assessment and examination of the existing roof system to be restored shall be performed by the Carlisle authorized roofing applicator or Carlisle technical representative. The assessment and examinations shall focus on the condition of the roof surface applicator or Carlisle technical representative. The assessment and examinations shall focus on the condition of the roof surface applicator or Carlisle technical representative. The assessment and examinations shall focus on the condition of the roof surface and the components to be restored.

B. When in-depth investigation is needed to assess the entire existing roof assembly. A roof consultant shall be obtained by the building owner to conduct such investigation. Investigation shall identify all necessary system repairs prior to commencing restoration work.

3.3 SUBSTRATE PREPARATION

A. Do not commence with surface repairs unless all system related issues and imperfections have been addressed by the building owner and their design representative.

B. Clean and prepare surface to receive the restoration coating. Remove all dirt, loose and flaking particles, grease, oil, laitance, pollution fallout, and other contaminants that may interfere with proper adhesion.

3.4 SURFACE REPAIR AND DETAIL WORK

A. Refer to Carlisle Technical Manual for Restoration Coating Surface repairs and detail work.

3.5 COATING APPLICATION

A. Do not apply coating if weather conditions will not permit complete cure (24-hour period) before rain, dew, fog or freezing temperatures occur.

B. Using a high-pressure compressed air or an air blower, blow all dust, dirt, and other contaminants off the treated roof surfaces.

3.6 CLEAN UP

A. Allow coating to dry before subjecting the surface to traffic. Drying conditions will vary depending on temperature and humidity levels. Consult the specific Product Data Sheets for estimated cure time.

B. When applicable, provide owner representative with instructions on accessing the roof following the coating application.

3.7 ROOF WALKWAYS

A. Refer to Carlisle Technical Manual for Restoration Coating Roof Walkways.

END OF SECTION 07 56 20

SECTION 07 62 00 SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. It is the intent of this Section that the work shall:
   1. Conform to all applicable DSA and building code requirements.
   2. Include all shop and field formed sheet metal work shown on Drawings, specified, or required, including, but not limited to:
      a. Roof penetration sleeves, collars, hood, and umbrella counterflashing.
      b. Metal counterflashing.
      c. Expansion joint.
      d. Metal perimeter edge.
      e. Gutters, downspouts, splash blocks and splash pans.
      f. One-way roof moisture relief vents.
      g. Metal gravity vents.
      h. Metal heat exhaust vents.
      i. Sanitary vent pipes.
      j. Pipe box.
      k. Copings, trim, and miscellaneous sheet metal accessories.

B. Related Sections:
   1. Section 06 10 00 – Rough Carpentry
   2. Section 07 54 23 – PVC Thermoplastic Membrane Roofing
   3. Section 07 72 00 – Roof Accessories
   4. Section 07 72 33 – Roof Hatches
   5. Section 07 72 36 – Smoke Vents
   6. Section 07 92 00 – Joint Sealants
   7. Section 07 95 00 – Expansion Control

C. Reference Standards:
   1. ASTM International (ASTM):
      a. A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
      b. B32 Standard Specification for Solder Metal.
      c. C1107 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
   2. National Association of Architectural Metal Manufacturers (NAAMM).
   3. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual.
   4. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) Architectural Sheet Metal Manual.

1.3 SUBMITTALS

A. Product Data:
   1. Manufacturer’s specifications and other data needed to prove compliance with specified requirements.
   2. Manufacturer’s installation instructions.

B. Shop Drawings: Indicating sizes, configurations, and details of attachment to related and adjacent work, materials, and finishes.

C. Samples:
1. Full range of finish colors for Architect's selection.
2. 12-inch long sample of each specified item with approved finish.
3. Provide full size mockup of all shop built assemblies.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Fabricator and installer of roof related flashing and accessories shall be the same as the membrane roof installer.

B. Comply with governing codes and regulations of authorities having jurisdiction.

C. Installation Conference:
1. Refer to Section 01 31 00: Project Management and Coordination.

1.5 WARRANTY

A. Manufacturer's Product Warranty:
1. Manufacturer's standard 20-year Kynar 500 or Hylar 5000 finish warranty signed by the manufacturer, with guarantee covering any failure of the fluoropolymer finish during the warranty period.
2. Failure is defined to include, but is not limited to, deterioration of finish, such as fading, discoloring, peeling, cracking, corroding, etc.
3. Correction may include repair or replacement of failed product.

B. Roofing Contractor’s Warranty:
1. Contractor shall warrant the sheet metal work and related work to be free from defects in workmanship and materials, and that the metal flashings will be and remain watertight, for a period of five (5) years from date of Substantial Completion.
2. Defects shall include, but not be limited to:
a. Leaking water or bitumen within building or construction.
b. Becoming loose from substrate.
c. Loose or missing parts.
d. Finish failure as defined above.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store materials in accordance with manufacturer's instructions.

B. Handle and store materials and equipment in such a manner as to avoid damage.

C. No storage of materials shall be permitted on roof areas other than those materials that are to be installed the same day. Any exception must be in written form. Do not place materials or equipment in such a manner as to overload structure.

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Manufacturers named within specification are approved for use on the Project providing:
1. Their products meet or exceed the specifications.
2. Company has a minimum of five (5) years’ experience manufacturing products of the

type specified.

3. Products have been tested in conjunction with roofing membrane system as an assembly and as such has obtained the same approval and rating as the roofing membrane system.
4. Products are approved for use by the roofing membrane manufacturer.

B. Approved Manufacturers:
1. Carlisle Companies, Phoenix, AZ; (800) 479-6832
2. Soprema, Wadsworth, OH; (800) 356-3521
3. GAF Wayne, NJ; (800) 766-3411
4. Siplast, Inc., Irving, TX; (800) 922-8800
5. Or approved equal.

C. Substitutions shall be in accordance with Division 01 requirements regarding substitutions.

2.2 SHEET METAL MATERIALS

A. General Requirements: Roofing sheet metal system shall have been tested in conjunction with roofing membrane system as an assembly and have the same approval and rating as the roofing membrane system.

B. Prefinished Aluminum Sheet:
1. Precoated type, aluminum conforming to Fed. Spec. QQ-A-250, ASTM B209.
2. Finish: Kynar 500, color as selected by Architect from manufacturer's standard colors.
3. Thickness: Minimum 0.040 inch, except as otherwise indicated.

C. NOTE: Galvanized sheet metal not allowed. Provide either stainless steel or kynar coated aluminum or mill finish aluminum (such as plaster accessories).

D. Sheet Lead: Four (4) pound minimum for use at roof drains and soil stacks.

E. Stainless Steel: Type 302/304 Soft Temper, No. 2D finish. Minimum thickness 24 gauge, except as otherwise noted.

2.3 FASTENERS

A. Same metal as flashing/sheet metal or other noncorrosive metal or as noted below.

B. Exposed fasteners shall be self-sealing and gasketed for weathertight installation (ZAC type).

C. Match finish of exposed heads with material being fastened.

D. Mechanical Fasteners:
1. Nails: Stainless steel ring shank, minimum 1-1/2 inch in length with 1/2-inch diameter head.
2. Washers: Steel washers with bonded rubber sealing gasket.
3. Screws: Self-tapping sheet metal type of stainless steel or compatible with material being fastened, with hooded integral EPDM washers (ZAC type).
4. Rivets: Stainless steel and cadmium plated material, closed end type of sizes recommended by sheet metal manufacturer to suit application.

E. Clips: Continuous cleat (coping/fascia). Minimum 20-gauge, G-90 galvanized, stainless steel, or aluminum. Match material of coping/fascia and provide one (1) gauge heavier.

2.4 RELATED MATERIALS

A. Solder: ASTM B32, alloy grade 58, 50 percent tin, 50 percent lead.

B. Flux:
1. Phosphoric acid type, manufacturer's standard:
   a. For use with steel or copper: Rosin flux.
   b. For use with stainless steel: Acid-chloride type flux, except use rosin flux over tinned surfaces.

C. Underlayment:
1. 48 mil minimum, non-reinforced, homogeneous, waterproof, impermeable elastomeric sheeting manufactured by Nervastral, Inc. or Lexus Co.

D. Adhesives: Type recommended by flashing sheet manufacturer seaming and adhesive application of flashing sheet to ensure adhesion and watertightness.

E. Metal Accessories: Sheet metal clips, straps, anchoring devices, clamps, and similar accessories required for the complete installation of work, matching or compatible with material being installed, non-corrosive, and size and gauge recommended by installer to suit application and performance.

F. Sealant:
1. Type A:
   a. Type: One-part, non-sag, moisture-curing polyurethane sealant.
   b. Approved products/manufacturers:
      1) Chem-Calk 900, manufactured by Bostik Construction Products Division.
      2) Vulkem 921, manufactured by Mameco International, Inc.
      3) Dynatrol I, manufactured by Pecora Corporation.
      4) NP 1, manufactured by Sonneborn Building Products.
      5) Approved equal.
2. Type B:
   a. Type: One-part, neutral-curing, medium-modulus silicone sealant for sealing metal to metal surfaces, i.e. metal edge, cover plates, etc.
   b. Approved products/manufacturers:
      1) Chem-Calk 1200, manufactured by Bostik Construction Products Division.
      2) 795 Silicone Building Sealant, manufactured by Dow Corning Corporation.
      3) 895 Silicone, manufactured by Pecora Corporation.
      4) Omniseal, manufactured by Sonneborn Building Products
      5) Spectrem 2, manufactured by Tremco Incorporated.
      6) Approved equal.

G. Grout - Pitch Pans:
1. Type: Quick-setting, non-shrink, non-metallic, high strength formula complying with ASTM C1107.
2. Approved products/manufacturers:
   a. Sure Grip High Performance Grout, manufactured by Dayton Superior Corporation.
   b. Premier Quick-Trim, manufactured by L & M Construction Chemicals, Inc.
   c. Masterflow, manufactured by Master Builders, Inc.
   d. Sonnogrout 10K, manufactured by Sonneborn Building Products.
   e. Approved equal.

H. Pitch Pan Filler:
1. Type: Pourable polyurethane sealer, approved by roofing system manufacturer.
2. Approved products/manufacturers:
   a. Quick Pitch Sealer, manufactured by U.S. Intec.

b. SPM Pourable Sealer, manufactured by Johns Manville.
c. Approved equal.

I. Termination Bar:
1. Material: Extruded aluminum bar with flat profile.
2. Size: 1/8-inch thick by one-inch (1") wide with factory punched 1/4-inch by 3/8-inch oval holes spaced six inches (6") on center.
3. Approved product/manufacturer:
a. TB 125, manufactured by TruFast Corp.
b. Approved equal.

J. Pipe Hangers and Supports: Refer to Section 07 72 00: Roof Accessories.

K. Splash Blocks: Concrete type, of size and profiles indicated; minimum 3,000 psi compressive strength at 28 days, with minimum five percent (5%) air entrainment. Use at locations where roof drainage dumps on ground.

L. Splash Pans: 22-gauge stainless steel, of size and profiles indicated. Use at locations where roof drainage discharges over adjoining, lower roof level(s).

M. One-Way Moisture Relief Vents: Shall be fabricated from spun aluminum as recommended by roofing manufacturer.

2.5 FABRICATION

A. Except as otherwise indicated, fabricate work in accordance with SMACNA Architectural Sheet Metal Manual and other recognized industry practices and reviewed shop drawings. Form all flashings, receivers, and counterflashings in accordance with standards set forth in the NRCA roofing manual and SMACNA.

B. Comply with manufacturer's installation instructions and recommendations.

C. Unless noted otherwise, fabricate perimeter edge/fascia, scuppers, gutters, downspouts, copings, counterflashings, wind clips, and trim from pre-finished aluminum sheet steel.

D. Shop fabricate work to greatest extent possible. Fabricate inside and outside corners for metal edges, counterflashing, and coping caps of equal length – minimum two-foot (2') lengths.

E. Fabricate items to size and dimensions as indicated on the Drawings. Limit single-piece lengths to ten feet (10').

F. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work sufficient to permanently prevent leakage, damage, or deterioration of the work.

G. Integrate flashing in a manner consistent with detailing. Form work to fit substrates.

H. Make angle bends and folds for interlocking metal with full regard for expansion and contraction to avoid buckling or fullness in metal after installation.

I. Fabricate items with straight lines, sharp angles, smooth curves, and true levels. Avoid tool marks, buckling, and oil canning.

J. Fold back edges on concealed side of exposed edge to form hem.

K. Unless noted otherwise, lap joints minimum one inch (1”). Rivet and solder joints on parts that are to be permanently and rigidly assembled.

L. Seams:
1. Wherever possible, fabricate non-moving seams in sheet metal with flat-lock seams and end joints.
2. Pre-finished galvanized steel: Seal pre-finished metal seams with rivets and silicone sealant.
3. Metal other than aluminum: Tin edges to be seamed, form seams, and solder.

M. On Kynar 500 or Hylar 5000 pre-finished metal, surface sand metal flanges prior to applying any primers. Prime all metal in contact with bituminous material.

N. Back-paint all concealed metal surfaces with bituminous paint where expected to be in contact with cementitious materials or dissimilar metals.

O. Expansion Provisions: Where lapped or bayonet type expansion provisions in work cannot be used or would not be sufficiently waterproof or weatherproof, form expansion joints of intermeshing hooked flanges, not less than one-inch (1”) deep filled with mastic sealant concealed within joints.

2.6 FABRICATED ITEMS

A. Metal Flashings (Minimum ten-foot [10’] lengths):
1. Through wall receiver tray: Minimum 24-gauge stainless steel, through wall receivers shall not extend past the face of the exterior veneer more than 3/4 inch.
2. Counterflashing: Minimum 24-gauge stainless steel.

B. Wind Clips: Minimum 24-gauge stainless steel (or match material of counterflashing), one-inch (1”) wide by length to engage counterflashing a minimum of 1/2 inch. To be installed at all wall flashings and at curb flashing lengths longer than five feet (5’).

C. Roof Penetrations:
1. Umbrella counterflashing: Two-piece construction of minimum 24-gauge stainless steel, fabricated in accordance with Drawings or Project requirements.
2. Pitch pans:
   a. 24-gauge stainless steel.
   b. Fabricate to provide installed minimum clear inside perimeter dimension of two inches (2”) on each side of penetrating element.
   c. Fabricate pans to at least six inches (6”) above the finished roof membrane and with 1/4-inch hem at top edge and with four-inch (4”) flanges. Round all corners of flange.
   d. Fabricate metal bonnets for all pans, no exceptions. Fabricate bonnets with metal compatible with metal to which bonnet is to be attached. On beams and other steel, weld in place bonnets fabricated from 1/4-inch steel plate. Draw band bonnets fabricated from 22-gauge stainless steel may be used on circular projections.

D. Metal Edge:
1. Minimum 0.040-inch thick pre-finished aluminum formed in maximum ten-foot (10’) lengths, with six-inch (6”) wide cover plates of same profile, four-inch (4”) flange, maximum seven-inch (7”) fascia, 3/4-inch gravel stop.
2. Provide expansion slip joints at maximum 20 feet on center.
3. Shop fabricate all interior and exterior corners. Fabricate exterior corners with 18-inch minimum to four-foot (4’) maximum legs. Lap, rivet, and seal prior to delivery to jobsite.

4. Fabricate to sizes and dimensions as indicated on Drawings with a minimum one-inch (1”) coverage past top of wall. Refer to SMACNA Fig. 2-5A.
5. Provide mock-up for Architect’s approval prior to fabrication.

E. Continuous Cleats: Continuous strips, same material and profile, minimum one (1) gauge heavier of item to which cleats attach.

F. Vent Hoods, Sleeves, Penetration Flashings, and Accessories: Minimum 24-gauge stainless steel, or as shown or directed otherwise.

G. Angle Termination Bar: Aluminum pressure bar 1/8 inch by one inch (1”).

H. Vent Pipe Flashing: Four (4) pound lead. Provide proper size to fold down inside of pipe a minimum of one inch (1”).

I. Roof Drain Flashing: Four (4) pound lead, minimum 30 inches by 30 inches.

J. Coping:
1. Minimum 0.040-inch thick pre-finished aluminum, with six-inch (6”) wide cover plates of same profile.
2. Fabricate as outlined in SMACNA; Refer to Figure 3-4 A.
3. Provide tapered substrate to slope to one (1) side, and cover with waterproof membrane.
4. Install with continuous cleat one (1) side and fasten other side.

K. Gutters/Downspouts/Collector Heads:
1. Gutters and downspouts: Minimum 0.040-inch thick pre-finished aluminum formed in maximum ten-foot (10’) lengths, with six-inch (6”) wide cover plates. Minimum five-inch by six-inch (5” x 6”) box gutter (verify size meets rainfall data per SMACNA).
2. Gutter/downspout straps: Minimum 0.040-inch thick pre-finished (match color) aluminum. Hem both sides.
3. Gutter supports: Minimum 0.040-inch thick pre-finished (match color) aluminum hemmed around 1/8-inch galvanized bent steel bracket.
4. Gutter screen: Stainless steel 1/4-inch diamond wire screen enclosed in a pre-finished frame.
5. Collector heads: Minimum 0.040-inch thick pre-finished (match color) aluminum. As outlined in SMACNA; Refer to Figure 1-25F and Figure 1-28 with alternate Section A-A.

L. Pipe Box Cover: 24-gauge stainless steel.

M. Heat Exhaust Curbs and Hoods: 22-gauge stainless steel.

N. Expansion Joint Cover: Minimum 24-gauge stainless steel (provide pre-finished metal at perimeter edge end termination.)

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify substrates are smooth and clean to extent required to perform sheet metal work.

B. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set in place.

C. Verify that reglets, nailers, cants, and blocking to receive sheet metal are in place and free of concrete and soil.

D. Do not start work until conditions are satisfactory.

3.2 PREPARATION

A. Field measure site conditions prior to fabrication work.

B. Install starter and edge strips and cleats before starting installation.

3.3 INSTALLATION

A. Install sheet metal with lines, arises, and angles sharp and true, and plane surfaces free from objectionable wave, warp, or buckle. Exposed edges of sheet metal shall be folded back to form 1/4-inch hem on concealed side from view. Finished work shall be free from water retention and leakage under all weather conditions. Pre-fabricated corners or transitions are required at changes in direction, elevation, or plane and at intersections. Locate field joints not less than 12 inches, nor more than three feet (3') from actual corner. Laps shall be one inch (1"), riveted and soldered at following locations:
1. Pre-fabricated corners.
2. Transitions.
3. Changes in direction, elevation, and plane.
4. At intersections.

B. Anchor units of work securely in place to prevent damage or distortion from wind or buckling. Provide for thermal expansion of metal units; conceal fasteners wherever possible; and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight and weatherproof.

C. Install fabricated sheet metal items in accordance with manufacturer's installation instructions and recommendations and with SMACNA Architectural Sheet Metal Manual.

D. Separations: Provide for separation of metal from dissimilar metal or corrosive substrates by coating concealed surfaces with zinc chromate, bituminous coating, or other permanent separation at locations of contact as recommended by manufacturer or fabricator. Do not use materials that are incompatible with roofing system.

E. Continuous Cleat: At exposed edges of perimeter edge, fascias, cap flashings, and where required, attach continuous cleat at six inches (6") on center with appropriate fasteners.

F. Gravel Guard/Fascia:
1. Install with expansion joints ten feet (10') o.c., 1/2-inch expansion leeway, with cover plate.
2. Set in asphalt mastic and fasten into nailer at three inches (3") o.c. staggered.
3. Buff sand Kynar surface of flange and prime.
4. Strip in flange with specified stripping plies set in hot bitumen extending three inches (3") from outer edge of flange to at least three inches (3") inward towards gravel stop. Provide finish stripping ply of modified bitumen base ply in hot bitumen extending six inches (6") from the outer edge of the flange and butt base of gravel stop.

G. Counterflashing:
1. Do not use surface mount counterflashing except as noted in Drawings.
2. Set in through wall with receiver and spring lock counterflashing, as detailed in Drawings and to NRCA roofing manual, SMACNA standards.

3. Coordinate installation of through-wall flashing with the masonry contractor.
4. Seal through-wall in conjunction with masonry wall waterproofing.
5. Install wind clips 30 inches o.c. at all counterflashing over five feet (5') in length.

H. Pitch Pans, Metal Flanges:
1. Apply mastic under pitch pan or metal flashing flange at least 1/2 pound per linear foot.
2. Prime all metal flanges with asphalt primer prior to flashing installation.
3. Clean all projections enclosed in pitch pans in any manner suitable and coated with a rust inhibitive coating as approved by the Architect. Coating shall be allowed to dry prior to pitch pan fill.
4. Fill base of pitch pans with grout or cementitious binder and allow to cure.
5. Top Finish Fill: Self-leveling, one-part urethane; at least two inches (2") to top of pitch pan sides.
6. Strip in pitch pan flanges with two (2) strips of specified stripping plies set in hot bitumen extending three inches (3") from the outer edge of the flange to at least three inches (3") inward toward base of pitch pan. Provide finish stripping ply of SBS modified bitumen membrane in hot bitumen extending six inches (6") from the outer edge of the flange and butt to base of pitch pan.

I. Sanitary Vent Stacks:
1. Prime top and bottom flanges of lead flashing sleeve. Set flange in uniform troweling of plastic roof cement. Prime top side of flange to receive strip-in membrane.
2. Fold lead sleeve down inside of pipe a minimum of one inch (1"). Apply a continuous bead of sealant on inside of pipe prior to folding lead sleeve.

J. Roof Drains:
1. After membrane installation, prime bottom of lead flashing sheet and set in uniform bed of plastic roof cement at specified locations.
2. Extend lead flashing into drain bowl or pipe a minimum of two inches (2") and over top of piping/bowl connection, if possible. Apply a continuous bead of specified Type A sealant, at intersection of pipe and drain bowl.
3. If drain bowl and pipe connection is contaminated with bituminous material, strip-in area with three-coursing of plastic roof cement and fabric.
4. Prime top of lead flashing sheet to receive strip-in membrane.

K. Gutters/Downspouts:
1. Install gutters as detailed.
2. Install downspouts plumb and level and attached to columns or wall with straps located at top and bottom of downspout and maximum ten feet (10') on center.
3. Install splash pad or block under discharge port of downspouts. Install splash pan over a protection (walkway) pad for downspouts located at roof level.
4. End caps, downspout outlets, gutter and downspout straps, support brackets, and joint fasteners to be manufactured to suit profile and dimension of gutter and downspout.
5. Install all anchoring devices as outlined in SMACNA.
6. Expansion joints: Lap or butt type per SMACNA, locate every 50 linear feet.

L. Expansion Joint:
1. Construct wood curbs as shown on Drawings and as outlined in the NRCA and SMACNA manuals.
2. Install underlayment, form envelope, and secure underlayment to curb. Fill envelope with compressible insulation.
3. Securely fasten expansion joint cover to curb with grommeted fasteners spaced six inches (6") on center.
4. Taper expansion joint down at the metal edge.

M. Coping:

1. Install wood nailers as shown on Drawings.
2. Install metal cleats with appropriate fasteners spaced six inches (6”) on center.
3. Install underlayment over the wood substrate. Lap ends minimum of six inches (6”) and secure membrane in place. Seal laps with appropriate adhesive.
4. Install metal coping allowing 1/2-inch spaces between segments. Lock coping onto cleat and install appropriate fasteners through the interior fascia spaced 24 inches on center in enlarged holes.
5. Install cover plate centered over coping joint in continuous beads of specified Type B sealant, placed approximately one inch (1”) from cover edges. Refer to SMACNA for alternate joints as required by length.
6. Install appropriate fastener through neoprene washer and cover plate between coping segments.
7. Accommodate building wall expansion joints by terminating coping joints and cleats either side of expansion joint. Do not run coping or cleats continuous across joints. Install coping cover plate to span across joint and lap coping on each side of joint a minimum of four inches (4”). Fasten cover plate on one (1) side of joint only (provide wall flashing membrane up and over parapet wall in accordance with manufacturer’s detail).

3.4 CLEANING AND PROTECTION

A. Remove flux and residual acid immediately by neutralizing with baking soda and washing with clean water. Leave work clean of stains.

B. Remove scraps and debris and leave work area clean.

C. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes. Paint areas where finish is damaged on pre-finished metal by painting with a compatible paint in color to match undamaged finish.

D. Prime soldered area of phosphatized metal after cleaning to prevent rusting.

E. Paint metal flashings that have been soiled with bitumen with aluminized paint.

F. Clean other work damaged or soiled by work of this Section.

G. Protect finished work from damage.

END OF SECTION 07 62 00

SECTION 07 72 00 ROOF ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
1. Roof curbs.
2. Equipment supports.

B. Related Sections:
1. Section 06 10 00 – Rough Carpentry.
2. Section 07 54 23 – PVC Thermoplastic Membrane Roofing.
3. Section 07 62 00 – Sheet Metal Flashing and Trim.
4. Section 07 72 00 – Roof Hatches
5. Section 07 72 36 – Smoke Vents
6. Section 07 92 00 – Joint Sealants
7. Section 07 95 00 – Expansion Control

1.3 SUBMITTALS

A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details for roof accessories. Show layouts of roof accessories including plans and elevations. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other work.

C. Coordination Drawings:
1. Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
a. Size and location of roof accessories specified in this Section.
b. Method of attaching roof accessories to roof or building structure.
c. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.

D. Warranty: Provide manufacturer’s standard warranty.

1.4 QUALITY ASSURANCE

A. Sheet Metal Standard: Comply with SMACNA's Architectural Sheet Metal Manual details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

B. Mockups: Refer to Section 07 62 00: Sheet Metal Flashing and Trim.

C. All work must conform to California Building Code.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Pack, handle, and ship roof accessories properly labeled in heavy-duty packaging to prevent damage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Specifications are based on products of named manufacturers. Other manufacturers must have a minimum of five (5) years experience manufacturing products meeting or exceeding the specifications and comply with Division 1 requirements regarding substitutions to be considered.

2.2 METAL MATERIALS

A. Galvanized Steel Sheet: ASTM A653/A653M, G90 (Z275) coated.

B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, AZ50 (AZM150) coated.

C. Aluminum Sheet: ASTM B209, alloy and temper recommended by manufacturer for type of use and mill finish.

D. Aluminum Extrusions and Tubes: ASTM B221, alloy and temper recommended by manufacturer for type of use, mill finished.

E. Stainless-Steel Shapes or Sheet: ASTM A240/A240M or ASTM A666, Type 304 or Type 316, No. 2D finish.

F. Steel Shapes: ASTM A36/A36M, hot-dip galvanized to comply with ASTM A123/A123M, unless otherwise indicated.

G. Steel Tube: ASTM A500, round tube, baked-enamel finished.

H. Galvanized Steel Tube: ASTM A500, round tube, hot-dip galvanized to comply with ASTM A123/A123M.

I. Galvanized Steel Pipe: ASTM A53/A53M.

2.3 MISCELLANEOUS MATERIALS

A. Glass-Fiber Board Insulation: ASTM C726, one inch (25 mm) thick.

B. Polyisocyanurate Board Insulation: ASTM C1289, one inch (25 mm) thick.

C. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, not less than 1-1/2 inch (38 mm) thick.

D. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15 mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

E. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by roof accessory manufacturer. Match finish of

exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners.

F. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.

G. Elastomeric Sealant: ASTM C920, polyurethane sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

H. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, and heavy bodied for hooked-type expansion joints with limited movement.

I. Roofing Cement: ASTM D4586, non-asbestos, fibrated asphalt cement designed for trowel application or other adhesive compatible with roofing system.

2.4 ROOF SAFETY LADDER

A. Furnish and install where indicated on plans the LAD503 Roof Safety Ladder. Refer to the Manufacturer for additional information. See approved manufacturer below:

1. O’keefe’s Incorporated, https://okeeffes.com/

B. Performance Characteristics:

1. O’Keefe’s Incorporated Ladder Type 503
2. High parapet access with platform and return.
3. Ladder to be fastened on wall and on opposite side of parapet.
4. Ladder to be min 4” offset from grade/finish floor
5. Ladder shall satisfy the requirements of OSHA 29 CFR 1910.29 and shall meet OSHA strength requirements with a factor of safety of two.
6. Corrosion resistant construction with a five-year warranty.

C. Posts and Rails: Tubular Schedule 40 Aluminum Pipe/Rail, minimum 1-1/4” (32mm). Refer to manufacturer for specifications.

D. Hardware: Mounting brackets shall be minimum 3/8” (9mm) thick extruded aluminum. Refer to manufacturer for specifications.

2.5 ROOF SKYLIGHTS

A. Furnish and install where indicated on plans the Fixed Double Dome Acrylic Skylight. Refer to the Manufacturer for additional information. See approved manufacturer below:

1. Velux USA, https://veluxusa.com/
2. Or approved equal

B. Performance Characteristics:

1. Double Domed Acrylic Pane.
2. Glazing to be clear over white acrylic.
3. Exterior color to be neutral gray.
4. Encapsulated inner frame to be thermally broken.
5. Corrosion resistant construction with a five-year warranty.

C. Curb Flashing: 24 Gauge Aluminum. Refer to manufacturer for specifications.

D. Fasteners: Neoprene washered fasteners. Refer to manufacturer for specifications.

2.6 PREFABRICATED ROOF CURBS

A. Frames:
   1. Material: ASTM A 653 G90 hot-dipped galvanized steel.
      d. Minimum 18 gauge, and as engineered by manufacturer.
      e. Minimum 18 gauge for curbs supporting HVAC units
      f. Minimum 20 gauge for expansion joint curbs.
   2. Corners: Mitered and welded (welds are micro sealed and prime painted after fabrication). Bolted connections not accepted.
   3. Base Plates: Integral to frame and welded.
   4. Internally reinforced with galvanized 1 inch by 1 inch by 12 gauge angles for curbs exceeding 3 foot length. Reinforce internal bulkhead at equipment curbs to support lateral loads.
   5. Wood Nailers: Factory installed, pressure treated. Size and width as suitable for support of items installed on curbs.

B. Insulation: Factory installed 1-1/2 inch thick three-pound density fiberglass insulation.

C. Curb Height: Minimum 8 inch above finished roof.

D. Construct curbs to match roof slope with plumb and level top surface for mounting mechanical equipment.

E. Gasketing: 1/4 inch thick, one (1) inch wide at roof top units.

F. Counterflashing: 24 gauge stainless steel

G. Counterflashing Cap: Stainless steel.

H. Cants:
   1. Non-canted curb style installs either under or on top of metal decks with insulation.
   2. Unless specified otherwise, cants are not required on single ply roofs. Refer to Plans and Section 07 54 20 – PVC Thermoplastic Roof Membrane for proper detailing.

I. All insulated roof curbs shall be structural and shall include calculations signed and sealed by a registered Structural Engineer. Refer to installation drawings for any additional structural requirements. If curbs do not span a minimum of two bar joists, only two angles will be required. Coordination mechanical equipment weight loading on the roof with Structural Engineer.

J. Approved Manufacturers:
   1. Custom Curb, Inc.
   2. Roof Products, Inc.

2.7 PIPE SUPPORTS

A. Gas Pipe Supports:
   1. Lines less than 3” OD: (non-penetrating)
      a. Provide strut and hanger type support with recycled plastics and carbon black for UV protection bases (10 inches x 16 inches x 3 inches; 6 lbs. each); Model Type 10-RAH-8 with strut, roller hanger and hold down clips for lines 2-1/2

inches and smaller

2. Lines 3” OD or larger: (non-penetrating)
   b. Provide strut and hanger type support with recycled plastics and carbon black for UV protection bases (18 inches x 16 inches x 3 inches; 10 inches x 16 inches x 3 inches; minimum 6 lbs. each); Model Type Model 8H-CP (Miro) with hanger and roller chair
3. Approved Manufacturers:
   c. Miro Industries, Inc.
   d. Portable Pipe Hanger, Inc.
   e. MAPA Products
   f. Architectural approved equal

B. Electrical Conduit / Condensate Lines:
1. Lines less than 3” OD: (non-penetrating)
   g. Provide strut type support with recycled plastics and carbon black for UV protection bases (10 inches x 16 inches x 3 inches; 6 lbs. each), Model Type 16-Base Strut-8
2. Lines 3” OD or larger: (non-penetrating)
   h. Provide strut and hanger type support with recycled plastics and carbon black for UV protection bases (18 inches x 16 inches x 3 inches; 10 inches x 16 inches x 3 inches; minimum 6 lbs. each); Model Type Model 8H-CP (Miro) with hanger
3. Approved Manufacturers:
   i. Miro Industries, Inc.
   j. Portable Pipe Hanger, Inc.
   k. MAPA Products
   l. Architectural approved equal

C. Chill Water Lines/Freon line sets:
1. Lines less than 3” OD: (non-penetrating)
   a. Provide strut and hanger type support with recycled plastics and carbon black for UV protection bases (10 inches x 16 inches x 3 inches; 6 lbs. each); Model Type 10-RAH-8 with strut, roller hanger and hold down clips for lines 2-1/2 inches and smaller,
2. Lines 3” OD or larger: (non-penetrating)
   a. Provide strut and hanger type support with recycled plastics and carbon black for UV protection bases (18 inches x 16 inches x 3 inches; 10 inches x 16 inches x 3 inches; minimum 6 lbs. each); Model Type Model 8H-CP (Miro) with hanger and roller chair
3. Approved Manufacturers:
   a. Miro Industries, Inc.
   b. Portable Pipe Hanger, Inc.
   c. MAPA Products
   d. Architectural approved equal

2.8 SEISMIC SUPPORT CURB

A. Equipment / Gas lines / Electrical Conduit / Condensate Lines / Etc. positive connection to structure. Unistrut welded to two (2) 10 gauge bent plates equally spaced across 4x6 wood blocking/support curb. Plates set on neoprene isolationpad over galvanized metal cap of flashed into roof system as detailed on drawings and similar to outline of equipment support curb of NRCA guidelines.

2.9 ROOF TO ROOF EXPANSION JOINT

A. Stainless Steel expansion joint covers on new wood curbs, as detailed on drawings and outlined the NRCA and SMACNA manual.

2.10 RETROFIT ROOF DRAINS

A. Retrofit Roof Drains: “Hercules RetroDrain” as manufactured by OMG, Inc. or Architect approved equal.
   1. Size: To match existing roof drain sizes.
   2. Compliance:
      a. ANSI / SPRI RD-1.
      b. ULC / ORD-C790.4.
   3. Drain Body:
      a. Material: 1-piece, 11-gauge (0.125-inch) spun aluminum.
      b. Flange: 17-1/2-inch diameter.
   4. Drain Stem Length: 12 inches
   5. Flange Includes: Six 2-1/2-inch-long aluminum studs.
   6. Sump Area: Depressed.

B. Strainer Dome:
   1. Material: Cast aluminum.
   2. Height: 7.25 inches.
   3. Outside Base Diameter: 9.77 inches.

C. Clamping Ring:
   1. Material: Cast aluminum.
   2. Gravel Stop Height: 1.2 inches.
   3. Drainage Slots: 18 V-shaped.
   4. Bosses: 6, to accept studs on flange.

D. Backflow Seal:
   1. Compression Seal: Watertight, “U-Flow” mechanical seal.
   2. Material: Polyamide and EPDM rubber.
   3. Required for Activation: “U-Flow” screwdriver.

E. Hardware:
   1. Locknuts: 6, stainless steel, for studs.
   2. Screws: 3, stainless steel, to attach strainer to clamping ring.

F. Overflows:
   1. At overflow locations; provide overflow collar extension
   2. Constructed of spun aluminum

PART 3 EXECUTION

3.1 INSTALLATION

A. Seismic Support Curbs: Install support line for positive connection to structure of each (new and existing) gas line, electrical conduit, condensate line, mechanical ductwork, freon line sets, etc running across new roof system.
   1. Spacing: Shall not exceed twenty (20) feet on center. Curb not to exceed twelve (12) inches from any change in direction or elevation. Along with any additional locations indicated on drawings.

2. Piping containing liquid to be supported on roller accessories similar to specified for gasline pipe support. Install hold down clips or guides to ensure piping to stay in contact with roller support or Unistrut.

B. Non-Penetrating pipe supports: Install roof accessory in accordance with manufacturer's printed instructions and approved shop drawings.
   1. Spacing not to exceed six (6) feet on center between seismic support curbs. With in twelve (12) inches from any change in direction or elevation not supported by seismic curb.
   2. Provide roof manufacture protection pad below each support, tacked in place with approved mastic or adhesive.
   3. Install hold down clips or guides to ensure piping to stay in contact with roller support or Unistrut.

3.2 CLEANING

A. Clean exposed surfaces according to manufacturer's written instructions.

END OF SECTION 07 72 00

SECTION 07 72 33 ROOF HATCHES

PART 1 GENERAL

1.1 SUMMARY

A. Work Included: Provide factory-fabricated ladder safety posts.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data.

B. Shop Drawings: Submit shop drawings including profiles, accessories, location, adjacent construction interface, and dimensions.

C. Warranty: Submit executed copy of manufacturer's standard warranty.

1.3 QUALITY ASSURANCE

A. Manufacturer: A minimum of 5 years experience manufacturing similar products.

B. Installer: A minimum of 2 years experience installing similar products.

C. Manufacturer's Quality System: Registered to ISO 9001 Quality Standards including in-house engineering for product design activities.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

1.5 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

PART 2 PRODUCTS

2.1 ROOF HATCH

A. Basis of Design Manufacturer: **The BILCO Company**, P.O. Box 1203, New Haven, CT 06505, Phone: 1-800-366-6530, Fax: 1-203-535-1582, Web: www.bilco.com.

B. Basis of Design: Type S Roof Hatch, 36 inch by 30 inch Counter balanced roof hatch. One-hand operations, fully gasketed and insulated. Minimum eight inch high curb with self-flashing system to be incorporated into building flashing system and roofing material specified elsewhere.

C. Performance characteristics:

1. Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m2) with a maximum deflection of 1/150th of the span and a maximum design pressure of +/- 100 PSF (488 kg/m2) with a design factor of 2 for galvanized steel (Type S-20) and aluminum (Type S-50) roof hatches or 20 psf (97 kg/m2) for stainless steel (Type S-90) roof hatches or roof hatches with an aluminum cover and galvanized steel curb (Type S-40).
2. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
3. Operation of the cover shall not be affected by temperature.
4. Entire hatch shall be weather tight with fully welded corner joints on cover and curb.
5. Galvanized steel (Type S-20) and aluminum (Type S-50) roof hatches shall have a valid Notice of Acceptance (NOA) by Miami-Dade County Product Control Section. The hatches shall have product approval (FL) by Florida Building Council regarding compliance to Florida Building Code

D. Finishes: Factory finish shall be mill finish aluminum.

2.2 ROOF HATCH SAFETY RAILING SYSTEM

A. Basis of Design Manufacturer: **The BILCO Company**, P.O. Box 1203, New Haven, CT 06505, Phone: 1-800-366-6530, Fax: 1-203-535-1582, Web: www.bilco.com.

B. Basis of Design: Roof Hatch Safety Railing System Model RL2-S. Refer to Manufacturer, The BILCO Company, for additional information.

C. Performance characteristics:

1. High visibility safety yellow powder coat paint finish.
2. Hatch rail system shall attach to the cap-flashing of the roof hatch and shall not penetrate any roofing material.
3. Hatch rail system shall satisfy the requirements of OSHA 29 CFR 1910.29 and shall meet OSHA strength requirements with a factor of safety of two.
4. Corrosion resistant construction with a five-year warranty.
5. Hinged gate shall ensure continuous barrier around the roof hatch.
6. Self-closing gate hinge and positive latching system provided with hatch rail system.

D. Posts and Rails: 1-1/4” (32mm) 6061 T6 schedule 40 aluminum pipe

E. Hardware: Mounting brackets shall be 3/8” (9mm) thick extruded aluminum. Pivoting post guides with compression fittings and latching mechanism shall be cast aluminum. Self-closing hinges and all fasteners shall be type 316 stainless steel.

2.3 ROOF HATCH TELESCOPING SAFETY POST SYSTEM

A. Furnish and install where indicated on plans the Ladder Safety Post. The ladder safety post shall be pre-assembled from the manufacturer. See approved manufacturers below:

1. The BILCO Company, www.bilco.com
2. Nystrom Company, www.nystrom.com
3. Or approved equivalent

B. Performance characteristics:

1. Tubular post shall lock automatically when fully extended.
2. Safety post shall have controlled upward and downward movement.

3. Release lever shall disengage the post to allow it to be returned to its lowered position.
4. Post shall have adjustable mounting brackets to fit ladder rung spacing up to 14" (356mm) on center and clamp brackets to accommodate ladder rungs up to 1-3/4" (44mm) in diameter.

C. Post: Shall be manufactured of high strength square tubing. A pull up loop shall be provided at the upper end of the post to facilitate raising the post.

D. Material of construction: Shall be steel; or Type 304 stainless steel; or aluminum.

E. Balancing spring: A stainless steel spring balancing mechanism shall be provided to provide smooth, easy, controlled operation when raising and lowering the safety post.

F. Hardware: All mounting hardware shall be Type 316 stainless steel.

G. Finishes: Factory finish shall be yellow powder coat steel; or hot dip galvanized steel; or mill finish stainless steel; or mill finish aluminum.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install products in strict accordance with manufacturer's instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.

B. Test units for proper function and adjust until proper operation is achieved.

Repair finishes damaged during installation.
Restore finishes so no evidence remains of corrective work.

3.3 ADJUSTING AND CLEANING

A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish.

END OF SECTION 07 72 33

SECTION 07 72 36 SMOKE VENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Provide factory-fabricated double-leaf automatic smoke vents.

B. Related Sections:
   1. Section 06 10 00 – Rough Carpentry.
   2. Section 07 62 00 – Sheet Metal Flashing and Trim.
   3. Section 07 72 00 – Roof Accessories.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product data.

B. Shop Drawings: Submit shop drawings including profiles, accessories, location, fusible links, adjacent construction interface, and dimensions.

C. Warranty: Submit executed copy of manufacturer's standard warranty.

1.4 QUALITY ASSURANCE

A. Manufacturer: A minimum of five (5) years' experience manufacturing similar products.

B. Installer: A minimum of two (2) years' experience installing similar products.

C. Manufacturer's Quality System: Registered to ISO 9001 Quality Standards including in-house engineering for product design activities.

1.5 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five (5) years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: Type DSH Automatic Roof Smoke Vent by The BILCO Company, P.O. Box 1203, New Haven, CT 06505, 1-800-366-6530, Fax: 1-203-535-1582, Web: www.bilco.com.

2.2 AUTOMATIC ROOF FIRE VENT

A. Basis of Design Manufacturer: **The BILCO Company**, P.O. Box 1203, New Haven, CT 06505, Phone: 1-800-366-6530, Fax: 1-203-535-1582, Web: www.bilco.com.

B. Basis of Design: Type DSH-4866A Roof Smoke Vent, Double Door, 11 gauge mill finish aluminum cover with red primered 14 gauge steel curb, 165F fuse, UL 793 and UL 790 Class A Listed.

C. Performance characteristics:

1. Cover shall be 11 gauge aluminum with a mill finish.
2. Cover liner shall be 18 gauge aluminum with a mill finish.
3. Frame shall be 14 gauge G-90 galvanized steel with a bonded paint finish.
4. Cover construction shall be brakeformed, hollow-metal design with 2 inch (50mm) concealed fiberglass insulation, 3 inch (76mm) beaded, overlapping flange, fully welded at corners, and internally reinforced for 40psf (195 kg/m2) live load.
5. Curb and base flange shall be 14 gauge galvanized steel with red oxide primer finish.
6. Gasket shall be extruded EPDM rubber gasket permanently adhered to the curb.
7. Hinge shall be heavy-duty pintle hinge, zince plated and chromate sealed.
8. Latch shall be positive hold/release mechanism controlled by a single UL-listed 165°F (74°C) fusible link with a separate latching point for each cover. Designed to hold the covers closed against a 90 psf (438kg/m2) wind uplift force. Provided with interior and exterior pull release cables to manually open vent covers.
9. Hardware to be gas springed have a powder coated outer tube and chromate plated inner rod. All other hardware is zinc plated/chromate sealed or galvanized
10. Operation, when released, high performance gas springs open covers against a 10 psf (49kg/m2) snow/wind load and lock covers in the open position. Gas springs have integral dampers to assure a controlled rate of cover opening and have a cyclic durability of 50,000 cycles.
11. UL listings are to comply with 793 and 790 Class A (burning brand test).

D. Finishes: Factory finish shall be mill finish aluminum.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install products in strict accordance with manufacturer’s instructions and approved submittals. Locate unit level, plumb, and in proper alignment with adjacent work:
1. Test units for proper function and adjust until proper operation is achieved.
2. Test fusible link and install replacement fusible link after testing.
3. Repair finishes damaged during installation.
4. Restore finishes so no evidence remains of corrective work.

3.3 ADJUSTING AND CLEANING

A. Clean exposed surfaces using methods acceptable to the manufacturer that will not damage finish.

END OF SECTION 07 72 36

SECTION 07 92 00 JOINT SEALANTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
1. Control and expansion joints on exposed interior and exterior surfaces.
2. Perimeter joints between wall surfaces and frames of interior and exterior doors and openings.
3. Joints between plumbing fixtures and adjoining walls, floors, and counters.
4. Joints indicated or as necessary.
5. Accessories necessary for a complete installation.

B. Related Sections:
1. Section 07 54 23 – PVC Thermoplastic Membrane Roofing
2. Section 07 62 00 – Sheet Metal Flashing and Trim
3. Section 07 72 00 – Roof Accessories
4. Section 07 72 33 – Roof Hatches
5. Section 07 72 36 – Smoke Vents
6. Section 07 95 00 – Expansion Control

1.3 SUBMITTALS

A. Product Data:
1. Technical data for each joint sealant product. Data to indicate elasticity and durability of each joint sealant product. Submit written certification from manufacturers of sealants attesting products are suitable for use indicated, verified through in-house testing laboratory:
   a. Written certification from manufacturers of joint sealants attesting that products comply with specification requirements and suitable for use indicated verified through manufacturers testing laboratory within the past 36 months or since most recent reformulation, whichever is most recent:
      1) Complete instructions for handling, storage, mixing, priming, installation, curing, and protection of each type of sealant.
      2) Manufacturer's letter, clearly indicating proposed lot numbers of each sealant supplied and expiration date sequence.
2. Recycled Content:
   a. Indicate recycled content; indicate percentage of pre-consumer and postconsumer recycled content per unit of product.
   b. Indicate relative dollar value of recycled content product to total dollar value of product included in Project.
   c. If recycled content product is part of an assembly, indicate the percentage of recycled content product in the assembly by weight.
   d. If recycled content product is part of an assembly, indicate relative dollar value of recycled content product to total dollar value of assembly.
3. Local/regional materials:
   a. Sourcing location(s): Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the Project site.

b. Manufacturing location(s): Indicate location of manufacturing facility; indicate distance between manufacturing facility and the Project site.
c. Product value: Indicate dollar value of product containing local/regional materials; include materials cost only.
d. Product component(s) value: Where product components are sourced or manufactured in separate locations, provide location information for each component. Indicate the percentage by weight of each component per unit of product.

4. VOC data: Submit manufacturer's product data for sealants. Indicate VOC limits of the product. Submit MSDS highlighting VOC limits.
5. Submit environmental data in accordance with Table 1 of ASTM E2129 for products provided under work of this Section.

B. Samples:
1. Provide color samples from full manufacturer's full range for each type of sealant specified for Architect's review.

C. Certificates and Reports:
1. Product Certificates: Manufacturer's product certificate for each kind of joint sealant and accessory.
2. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
3. Product test reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
4. Preconstruction compatibility and adhesion test reports:
a. From sealant manufacturer, indicating the following:
1) Materials forming joint substrates and sealant backings have been tested for compatibility and adhesion with sealants.
2) Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
5. Preconstruction field adhesion test reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified.
6. Field adhesion test reports: For each sealant application tested.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:
1. Firm having minimum five (5) years' documented experience and specializes in the installation of sealants:
a. Exposed sealant work (sealants used for air and weatherseals external at perimeter, metal panel to panel joints) shall be performed by a single (i.e. one) firm specializing in the installation of sealants who has successfully produced work comparable to Project.
b. Concealed sealant work (sealants that are internal to skylights and providing an air seal) shall be the responsibility of the subcontractor providing erection of the respective system.

B. Source Limitations: Obtain each type of joint sealant from a single manufacturer.

C. Product Testing:
1. Test joint sealants using a qualified testing agency:
a. Testing agency qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.
b. Test according to SWRI Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion

under cyclic movement, adhesion in peel, and indentation hardness.

D. Environmental Requirements:
   1. Toxicity/IEQ:
      a. Comply with applicable regulations regarding toxic and hazardous materials:
         1) VOC content of interior sealants - sealants and sealant primers complying with limits for VOC content for SCAQMD when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
            a) Sealants: 250 g/L.
            b) Sealant primers for nonporous substrates: 250 g/L.
            c) Sealant primers for porous substrates: 775 g/L.
      b. Sealants containing aromatic solvents, fibrous talc, formaldehyde, halogenated solvents, mercury, lead, cadmium, chromium and their compounds, are not permitted.

1.5 WARRANTY

A. Written warranty, signed by installer agreeing to repair or replace elastomeric joint sealant work that has failed to provide a weathertight system within specified warranty period:
   1. Warranty period: Five (5) years from date of Substantial Completion.

B. Written warranties (weatherseal and stain resistance), signed by sealant manufacturer agreeing to furnish joint sealants to repair or replace those that fail to provide airtight and watertight joints, or fail in adhesion, cohesion, abrasion resistance, stain resistance, weather resistance, durability, or appear to deteriorate in manner not specified in the manufacturer's data as an inherent quality of the material within specified warranty period:
   1. Warranty period: Five (5) years from date of Substantial Completion.

C. Warranties specified exclude deterioration or failure of sealants from:
   1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
   2. Disintegration of joint substrates from natural causes exceeding design specifications.
   3. Mechanical damage caused by individuals, tools, or outside agents.
   4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

1.6 DELIVERY, STORAGE, AND HANDLING

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

B. Store and handle materials in compliance with manufacturer’s written instructions to prevent deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

PART 2 PRODUCTS

2.1 MATERIALS

A. Compatibility: Provide joint sealants, backings, and related materials compatible with one another and with joint substrates under conditions of service and application, as stated by sealant manufacturer’s published data, and as substantiated by the manufacturer for each application through testing.

B. Liquid Applied Sealants: Comply with ASTM C920 and requirements indicated for each liquid applied sealant specified, including those referencing ASTM C920 classifications for type, grade, class, and uses related to exposure and joint substrates.

C. Stain Test Response Characteristics: For sealants in contact with porous substrates, provide nonstaining products that have undergone testing according to ASTM C1248 and do not stain porous joint substrates.

D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

E. Colors: For fully concealed joints, provide standard color of sealant that has the best overall performance characteristics for the application shown. For exposed joints, submit color samples to Architect for approval, from manufacturer's full line of standard colors.

F. Manufacturer's Representative: Use sealant produced by manufacturer who agrees to send a qualified technical representative to site upon request for the purpose of rendering advice concerning the recommended installation of manufacturer's materials.

G. Sealants: Self-leveling compounds for horizontal joints in pavements and non-sag compounds elsewhere except as shown or specified.

H. Silicone Sealant:
1. Comply with ASTM C920, Type M, Grade NS, Class 25; use NT, M, A and O:
    a. Use: Typical joints between masonry, metals, glass, and plastics (two-part silicone sealants).
    b. Properties:
        1) Performance: Non-stain, non-bleed, non-streaking to sealed and adjacent substrates. The minimum pli value after seven (7) day immersion shall not be less than 13 when tested in strict accordance with ASTM C794 Adhesion and Peel.
        2) Cure system and oil content: Neutral cure system specifically manufactured with controlled oil content to eliminate oil migration into sealed substrates and residue rundown over and onto adjacent substrates.
    c. Product and manufacturer: Dow Corning; 756 Silicone Building Sealant - HP with Additive.

I. Silicone Sealant:
1. ASTM C920, Type S, Grade NS, Class 50, for Use NT:
    a. Use: Typical joints between masonry, metals, glass, and plastics (single component sealants).
    b. Properties:
        1) Performance: Non-stain, non-bleed, non-streaking to sealed and adjacent substrates.
        2) Cure system and oil content: Neutral cure system specifically manufactured with controlled oil content to eliminate oil migration into sealed substrates and residue rundown over and onto adjacent substrates.
    c. Product and manufacturer:
        1) BASF Building Systems; Omniseal 50.
        2) Dow Corning Corporation; 756 SMS, 791, 795, 995 as applicable.
        3) GE Advanced Materials, Silicones; SilGlaze II SCS2800, SilPruf NB SCS9000, SilPruf SCS2000, or UltraPruf II SCS2900 as applicable.
        4) Pecora Corporation, as applicable.
        5) Sika Corporation, Construction Products Division; SikaSil-C995.
        6) Tremco, as applicable.

7) Comparable product.

J. Polyurethane Sealants:
1. ASTM C920, Type M, Grade NS, Class 25; use NT, M, A and O:
   a. Use: Typical Wall and floor joints (two-part polyurethane sealants). Use at concrete joints.
   b. Properties:
      1) Performance: Non-stain, non-bleed, non-streaking to sealed and adjacent substrates.
   c. Products and manufacturers:
      1) BASF Building Systems; Sonolastic NP-2.
      2) Pecora Corporation; Dynatred.
      3) Sika Corporation, Construction Products Division; Sikaflex 2c NS or Sikaflex 2c NS TG as applicable.
      4) Tremco, as applicable.
      5) Comparable product.

K. Two-Part Polyurethane Sealants:
1. ASTM C920, Type M, Grade NS, Class 50; use NT, M, A and O:
   a. Use: Typical Wall and floor joints (two-part polyurethane sealants).
   b. Properties:
      1) Performance: Non-stain, non-bleed, non-streaking to sealed and adjacent substrates. The minimum pli value after seven (7) day immersion shall not be less than 13 when tested in strict accordance with ASTM C794 Adhesion in Peel.
   c. Products and manufacturers:
      1) BASF Construction Chemicals; NP 2.
      2) Pecora Corporation, as applicable.
      3) Schnee-Morehead, Inc.; Permathane SM 7200.
      4) Sika Corporation, Inc.; Sikaflex - 2c NS TG.
      5) Tremco, as applicable.
      6) Comparable product.

L. Mildew Resistant Silicone Sealant:
1. ASTM C920, Type S, Grade NS, Class 25, Use NT, Substrate uses G, A, and O; and containing fungicide for mildew resistance; acid curing:
   a. Use: One-part mildew-resistant silicone, formulated with fungicide for sealing interior joints of nonporous substrates around ceramic tile, plumbing fixtures, and showers.
   b. Products - provide one of the following:
      1) BASF Building Systems; Omniplus.
      2) Dow Corning; 786 Mildew Resistant Silicone Sealant.
      3) GE Silicones; Sanitary SCS 1700.
      4) Pecora Corporation, as applicable.
      5) Sika Corporation, Inc., as applicable.
      6) Tremco, as applicable.
      7) Comparable product.

M. Latex Sealant:
1. Non-elastomeric, one-part, non-sag, paintable latex sealant that is recommended for exposed applications on the interior. Complying with ASTM C834, Type OP (opaque sealants):
   a. Products are subject to compliance with requirements; provide one of the following:
      1) BASF; Sonolastic Sonolac.
      2) Pecora Corporation; AC-20 + Silicone.
      3) Sika Corporation, Inc., as applicable.

4) Tremco, as applicable.
5) Comparable product.

N. Acoustical Joint Sealant:
1. Non-sag, paintable, non-staining latex sealant complying with ASTM C834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90:
   a. Products are subject to compliance with requirements; provide one of the following:
      1) BASF, as applicable.
      2) Pecora Corporation; AC-20 FTR or AIS-919.
      3) Sika Corporation, Inc., as applicable.
      4) Tremco, as applicable.
      5) USG Corporation; SHEETROCK Acoustical Sealant.
      6) Comparable product.

O. Sealant Backing:
1. Provide sealant backings that are non-staining, compatible with joint substrates, sealants, primers, and joint fillers, and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing:
   a. Cylindrical sealant backings: Preformed, compressible, resilient, non-staining, non-waxing, non-extruding backings of flexible plastic foam complying with ASTM C1330, and of type indicated below. Select shape and density of cylindrical sealant backings in consultation with the manufacturer for proper performance in specific condition of use in each case.
   b. Type C - closed cell polyethylene foam material with surface skin, nonabsorbent to liquid water and gas, non-outgassing in unruptured state; provide one of the following:
      1) BASF, as applicable.
      2) HBR Closed Cell Backer Rod; Nomaco, Inc.
      3) Pecora Corporation, as applicable.
      4) Sonolastic Closed-Cell Backer-Rod; BASF Construction Chemicals.
      5) Tremco, as applicable.
      6) Comparable product.

P. Window Glazing:
1. Product Description: Ready to use glazing compound that may be used for face glazing wood or metal sash on existing windows. It is a knife-grade consistency allows for smooth, easy applications. Stick tightly to glass and sash and resists sagging, shrinking and cracking. Follow manufacturers suggested uses.
2. This product is NOT to be used on plastic windowpanes, porcelainized steel insulating panels or any insulated glass units with organic seals, stained or leaded glass. Any window pain over 48 inches in any direction.
3. Listed manufacturer:
   a. Dap 33 Glazing compound.
   b. Approved equal.

Q. Miscellaneous Materials:
1. Primer: Material recommended, as verified through compatibility and adhesion testing, by joint sealant manufacturer for the substrates indicated to be sealed.
2. Cleaners for nonporous surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way and formulated to promote optimum adhesion of sealants with joint substrates.
3. Masking tape: Non-staining, non-absorbent material compatible with joint sealants and that will not stain nor mar the finish of surface adjacent to joints to which it is applied.

4. Cork joint filler: Resilient and non-extruding, ASTM D1752, Type II.
5. Bond breaker tape: Polyethylene, TFE fluorocarbon, or plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Environmental Limitations:
   1. Do not proceed with installation of joint sealants under the following conditions:
      a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 degrees F (4.4 degrees C).
      b. When joint substrates are wet. Should joints or backing materials become wet, remove and replace backing material with new.

B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

3.2 EXAMINATION

A. Examine joints indicated to receive joint sealants for compliance with requirements for joint configuration, installation tolerances, and conditions affecting sealant performance. Proceed with installation after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Surface Cleaning of Joints:
   1. Clean out joints immediately before installing joint sealants to comply with the recommendations of joint sealant manufacturer and requirements:
      a. Remove foreign material from joint substrates interfering with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), existing joint sealants, oil, grease, water, surface dirt, and frost.
      b. Clean concrete, masonry, unglazed surfaces of tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil free compressed air.
      c. Remove laitance and form-release agents from concrete.
      d. Clean metal, glass, porcelain enamel, glazed surfaces of tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming (Elastomeric Sealants Only): Prime joint substrates where recommended in writing by joint sealant manufacturer, based on prior testing and experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

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

adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.4 INSTALLATION

A. Silicone Glazing Sealants: Refer to Section 08 80 00: Glazing.

B. Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

C. Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants applicable to materials, applications, and conditions indicated.

D. Sealant Backings:
   1. Install sealant backings to support sealants during application and at position necessary to produce cross sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability:
      a. Do not leave gaps between ends of sealant backings. Trim for tight fit around obstructions or elements penetrating the joint.
      b. Do not stretch, twist, puncture, or tear sealant backings.
      c. Remove absorbent sealant backings that become wet before sealant application and replace with dry sealant backings.
      d. Install bond breaker tape behind sealants where backings are not used between sealants and back of joints.

E. Weeps and Vents: Install weeps and vents into joints at the same time sealants are being installed. Locate weeps and vents spaced recommended by sealant manufacturer and the window and curtain wall fabricator and erector. Do not install weeps and vents at outside building corners. Do not install vents at horizontal joints immediately below shelf angles, sills, and through wall flashings.

F. Sealants:
   1. Install sealants by proven techniques resulting in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at same time sealant backings are installed:
      a. Apply sealants in depth in accordance with manufacturer's recommendations and recommended general proportions and limitations.
      b. Apply elastomeric sealants, in joints not subject to traffic or abrasion, to a depth equal to 50 percent of the joint width, but not less than 1/4 inch (6 mm) and not more than 1/2 inch (13 mm).
      c. Apply non-elastomeric sealants to a depth approximately equal to the joint width.

G. Tooling of Non-Sag Sealants:
   1. Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform, beads to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces. Tool exposed surfaces of sealants to the profile shown, or if none is shown, tool slightly concave:
      a. Use masking tape to protect adjacent surfaces of recessed tooled joints.
      b. Provide a slight wash on horizontal joints where horizontal and vertical surfaces meet.
      c. Against rough surfaces or in joints of uneven widths avoid the appearance of

excess sealant or compound by locating the compound or sealant well back into joint wherever possible.

H. Installation of Preformed Silicone Sealant System:
1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch (10 mm). Hold edge of sealant bead 1/4 inch (6 mm) inside masking tape.
3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.

I. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.

J. Acoustical Sealant Installation: At sound rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer written recommendations.

3.5 FIELD QUALITY CONTROL

A. Field Adhesion Testing:
1. Field test exterior wall joint sealant adhesion to joint substrates:
   a. Extent of testing - test completed and cured sealant joints:
      1) Perform ten (10) tests for the first 1,000 feet (300 m) of joint length for each kind of sealant and joint substrate.
      2) Perform one (1) test for each 1,000 feet (300 m) of joint length thereafter or one (1) test per each floor per elevation.
2. Test method: Test joint sealants according to Method A, Field Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
3. Inspect tested joints and report on the following:
   a. Whether sealants filled joint cavities and are free of voids.
   b. Whether sealant dimensions and configurations comply with specified requirements.
   c. Whether sealants in joints connected to pulled out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer field adhesion hand pull test criteria.
4. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure original sealant surfaces are clean

and new sealant contacts original sealant.

B. Evaluation of Field Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.6 SITE ENVIRONMENTAL PROCEDURES

A. Indoor Air Quality: Provide temporary ventilation during work. Coordinate interior application of sealants with interior finishes schedule.

3.7 CLEANING AND PROTECTION

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

B. Protect joint sealants during and after curing from contact with contaminating substances and from damage so sealants are without deterioration or damage at time of Substantial Completion. If, despite protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

END OF SECTION 07 92 00

SECTION 07 95 00 EXPANSION CONTROL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes the following:
   1. Expansion and seismic joint systems for building exteriors

B. Related Sections:
   1. Section 07 62 00 – Sheet Metal Flashing and Trim
   2. Section 07 92 00 – Joint Sealants

1.3 DEFINITIONS

A. Nominal Joint Width: The width of the expansion joint opening as specified in the project documents, at which the expansion joint will be constructed, and the cover will be installed

B. Maximum Joint Width: The widest expansion joint width which the joint cover is required to accommodate without damage to its components

C. Minimum Joint Width: The narrowest expansion joint width which the joint cover is required to accommodate without damage to its components

D. Movement Capability: The amount of movement in a single direction (open or close), given as a percentage of the nominal joint width, that the joint cover is required to accommodate without damage to its components

E. Lateral Shear: Movement horizontally and parallel to the expansion joint

F. Vertical Shear: Movement vertically and parallel to the expansion joint

1.4 SUBMITTALS

A. Submission must be made within fifteen (15) working days of the contract award to avoid project delay.

B. Submittals shall contain the following as required for each specified system
   1. Shop Drawings showing complete fabrication details for all joint covers, including required anchorage to surrounding construction, recesses, blocking, backing, and connections between similar and dissimilar joint cover assemblies
   2. Manufacturer’s product data including product details, installation instructions, maintenance and cleaning instructions, Safety Data Sheets, and LEED documentation
   3. Certificates, copies of independent test reports, or research reports showing compliance with fire resistance rating and other specified performance requirements
   4. Two (2) complete sets of color chips representing manufacturer’s full range of available colors and patterns
   5. Three (3) 6” (152mm) samples of the specified systems

1.5 QUALITY ASSURANCE

A. Manufacturer: Obtain joint cover assemblies through one source from a single manufacturer.

1. Manufacturer shall have a third party certified ISO 9001 quality management system.

a. The manufacturer shall have documented management and control of the processes that influence the quality of its products

b. The manufacturer shall have documented management and control of the processes that influence the quality of its customer service.

2. Manufacturer shall have a minimum of ten (10) years of experience in the fabrication of joint cover assemblies.

B. Installer: All products listed in this section shall be installed by a single installer with demonstrated experience in installing products of the same type and scope as specified. Installer shall be insured and licensed as required by agencies within the project's jurisdiction.

C. Coordination

1. Submittals shall be completed and approved prior to fabrication and shipment of material to the jobsite.

2. Schedule for the work of this section shall be planned to allow sufficient time for manufacturer's production and delivery scheduling.

3. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful and proper installation.

4. Coordinate installation of exterior joint assemblies to ensure that transitions are watertight.

5. Verify product types, quantities, dimensions, and attachment methods shown on shop drawings against field conditions prior to releasing materials for fabrication by the manufacturer.

6. Communicate necessary changes on the manufacturer's shop drawings

1.6 WARRANTY

A. Submit manufacturer's warranty that materials furnished will perform as specified for a period of not less than five (5) years when installed in accordance with manufacturer's recommendations.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary protective cover on anodized aluminum, stainless steel, and bronze finished surfaces.

B. Deliver joint covers to jobsite in clean, unopened crates of sufficient size and strength to protect materials during transit.

C. Store components in original containers in a clean, dry location.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Expansion Joint Systems are subject to compliance with requirements; provide either the named product or a comparable product by one of the other manufactures specified:
   1. EMSEAL – A Sika Company; www.usa.sika.com
   2. INPRO – Expansion Joint Systems; www.inprocorp.com

B. Furnish and install as noted in specifications and as indicated on drawings as manufactured by **EMSEAL**; or **INPRO**

C. Substitutions: Submit proposed substitutions in writing to the architect not less than 10 days before bids are due. Submit samples and product data to demonstrate acceptability of proposed substitute. Acceptance will be by addendum.

2.2 MATERIALS

A. Metals
   1. Aluminum extrusions: ASTM B221, alloys 6063-T5, 6005A-T6, 6061-T6
   2. Aluminum plate and sheet: ASTM B209, alloys 6061-T6, 5052-H32
   3. Steel: ASTM A36 Plate
   4. Stainless steel: ASTM A666, type 304
   5. Bronze extrusions: ASTM B455, alloy C38500
   6. Bronze sheet and plate: ASTM B36, C28000 Muntz metal

B. TPO Vinyl: 90 Shore A, ASTM D2240

C. Silicone: ASTM D 2000 4GE 709 M

D. Water Barrier: Flexible EPDM, Class I, ASTM D4637, 45 mils thick (minimum)

E. Standard fasteners required for assembly and installation shall be included

F. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating.

2.3 FINISHES

A. Aluminum
   1. Exterior Walls and Roofs:
      a. AA-M10 (As fabricated, unspecified)
      b. High-Performance Organic Coating (Kynar or Trinar)
   2. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating

PART 3 EXECUTION

3.1 EXAMINATION

A. Installer shall examine conditions under which work is to be performed and shall notify the contractor in writing of unsatisfactory conditions. Installer shall not proceed until all unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.2 PREPARATION

A. Prepare surfaces using methods recommended by the manufacturer for achieving the required results within project conditions.

B. Corner blockouts should be square, level, free of spalling or laitance, and meet the dimensions shown on shop drawings. Repairs should be made using appropriate materials as recommended by concrete repair material manufacturer, based on project-specific conditions.

C. Concrete repair material must be applied and allowed to cure in accordance to the manufacturer of the product recommendations and instructions.

D. Clean dirt, debris, and other contaminants from both the blockout and joint opening

E. Mask areas adjacent to the joint as required to achieve neat, clean joint lines. Remove masking prior to the curing process.

3.3 INSTALLATION

A. Install expansion and seismic joint covers in accordance with the manufacturer's instructions.

B. Centering bars shall be fully engaged with base members.

C. Locate fasteners at interval recommended by manufacturer as shown on shop drawings.

D. Fire-rated joint covers: Install fire rated covers in accordance with requirements of applicable fire rated product. Install fire barriers and flame sealant as shown on shop drawings and in accordance with installation instructions.

E. Water barrier: Install water barriers at exterior joints and where called for on shop drawings. Provide drainage fittings where called for on shop drawings.

3.4 PROTECTION AND CLEANING

A. Protect the installation from damage by work of other sections.

B. Where required, remove and store cover plates and install temporary protection over joints and re-install cover plates prior to substantial completion of work.

C. Do not remove protective coverings until finish work in adjacent areas is complete.

D. Prior to project closeout, clean exposed surfaces with a suitable cleaner as recommended by manufacturer.

END OF SECTION 07 95 00

SECTION 09 90 00 EXTERIOR PAINTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Surface preparation and field painting of exposed items and surfaces.
   2. Field preparation and painting of factory primed metal products and fabrications.
   3. Accessories necessary for a complete installation.

B. Related Sections:
   1. Section 04 20 10 – Portland Cement Plaster
   2. Section 07 62 00 – Sheet Metal Flashing and Trim
   3. Section 07 95 00 – Expansion Control

1.3 DEFINITIONS

A. Standard coating terms defined in ASTM D16 apply:
   1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
   2. Eggshell refers to low sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
   3. Satin refers to a slightly higher sheen than eggshell and more reflective and durable finish and is less lustrous than semi-gloss.
   4. Semigloss refers to medium sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
   5. Full gloss refers to high sheen finish with a gloss range more than 70 when measured at a 60-degree meter

1.4 SUBMITTALS

A. Product Data:
   1. Submit technical data and information for block fillers, primers, paints, and coatings, including label analysis and instructions for handling, storing, and applying each coating material proposed for use:
      a. Indicate manufacturer's instructions for special surface preparation procedures, substrate conditions requiring special attention.
      b. Material List: Provide inclusive list of required coating materials. Indicate each material and cross reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number, series, and general classification.
      c. Submit Zero VOC compliant products only.

B. Samples:
   1. Submit for each type of paint system and in each color and gloss of topcoat:
      a. Provide stepped samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit

until required sheen, color, and texture are achieved.

b. Provide list of material and application for each coat of each sample. Label each sample as to location and application.

c. Submit samples on following substrates for review of color and texture only:

1) Concrete: Provide two 4-inch square samples for each color and finish.

2) Concrete Masonry: Provide two 4" x 8" samples of masonry, with mortar joint in the center, for each finish and color.

3) Painted Wood: Provide two 12-inch square samples of each color and material on hardboard.

4) Ferrous and Nonferrous Metals: Provide two 4-inch square samples of flat metal and two 8-inch-long samples of solid metal for each color and finish.

C. Product List: Submit list of including each paint system, color, and location of application. Use same product and location designations indicated in Finish Schedule.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with Federal and local toxicity and air quality regulations and with Federal requirements on content of for heavy metals including but not limited to: lead and mercury. Do not use solvents in paint products that contribute to air pollution.
2. Performance and Durability:
   a. ASTM D16 Standard Test Method for Load Testing Refractory Shapes at High Temperatures.
   b. ASTM D2486 Standard Test Method for Scrub Resistance of Interior Wall Paint.
   c. ASTM D2805 Standard Test Method for Hiding Power of Paints by Reflectometry.
   d. ASTM D4828 Standard Test Method for Practical Washability of Organic Coatings.

B. Applicator Qualifications: A firm or individual having minimum 5 years documented experience in applying paints and coatings similar in material, design, and extent to those indicated.

C. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

1.6 WARRANTY

A. Written warranty signed by the manufacturer and the installer in which the manufacture and installer agree to repair or replace paint and primers that fail within specified warranty period:

1. Failures include, but are not limited to, the following:
   a. Flaking or delamination of paint with the substrate.
   b. Rust, scale, similar imperfections due to improper surface preparation.
   c. Thinning or watering of paint beyond that considered acceptable of paint manufacturer.
   d. Failure to achieve dry film thickness (DFT) recommended by manufacturer for each coat in a paint system.
   e. Deterioration or loss of color of paint beyond normal weathering.
2. Warranty Period: One year from date of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 degrees F (7 degrees C):

1. Maintain containers in clean condition, free of foreign materials and residue.

2. Remove rags and waste from storage areas daily.

PART 2 PRODUCTS

2.1 MATERIALS

A. Subject to compliance with requirements, provide first quality, 100% acrylic, commercial or industrial products of one of the specified manufacturers. Residential products are not permitted:
   1. Proprietary Names:
      a. Paint Schedule is based on a single manufacturer for convenience. Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that named products are required to the exclusion of comparable products of specified manufacturers. Furnish product technical data, including per cent solids by weight and volume; VOC content limits and emissions data; and certificates of performance for comparable paint products of specified manufacturer.
   2. Acceptable Paint Manufacturers:
      a. Sherwin-Williams Co.
      b. Vista Paint.
      c. Benjamin Moore & Co.
      d. Dunn Edwards.
      e. Dulux; Theater Black.

B. Material Compatibility: Provide each paint system including block fillers, primers, and finish coats, that are compatible with one another and with substrates indicated under conditions of service and application, demonstrated by manufacturer based on testing and field experience.

C. Material Quality: Provide manufacturer's best quality commercial paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint material containers not displaying manufacturer's product identification will not be acceptable. Residential quality paint products are not permitted.

D. Accessories: Materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

E. Patching Materials: Latex filler compatible with paint systems.

F. Fastener Head Cover Materials: Latex filler.

G. Theater Black: No Exceptions or alternates.

2.2 SOURCE QUALITY CONTROL

A. Testing of Paint Materials:
   1. Owner reserves the right to invoke to engage the services of a qualified testing agency to sample paint materials:
      a. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to site, samples may be taken at the site. Samples will be identified, sealed, and certified by testing agency.

b. Testing agency will perform tests for compliance with product requirements.
c. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Apply waterborne paints when temperatures of surfaces to be painted and surrounding air are between 50 degrees F and 90 degrees F (10 degrees and 32 degrees C).

B. Do not thin or add water to water-based paints, including water-based alkyds.

C. Weather Conditions:
1. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
2. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 degrees F (3 degrees C) above dew point; or to damp or wet surfaces.
3. Minimum Application Temperatures for Water based Paints: Between 50 degrees F (10 degrees C) and 90 degrees F (32 degrees C).

D. Apply solvent thinned paints when temperatures of surfaces to be painted and surrounding air are between 45 degrees F. and 95 degrees F (7 degrees F and 35 degrees C):
1. Minimum Application Temperature for Varnish Finishes: 65 degrees F (18 degrees C) for interior or exterior, unless required otherwise by manufacturer's instructions.
2. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

E. Provide lighting level of 80-foot candles (860lx) measured mid-height at substrate surface.

F. Labels: Do not paint over Underwriters Laboratories, Factory Mutual, other code required labels, or equipment name, identification, performance rating, or nomenclature plates.

3.2 EXTRA MATERIALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents:
1. Paint: 2 percent, but not less than 1 gallon (3.8 L) of each material and color applied.

3.3 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for maximum moisture content and conditions affecting performance of the work.

B. Test substrates after repairing and cleaning substrates but prior to application of paint and coatings:
1. Maximum moisture content of substrates, when measured with an electronic moisture

meter as follows:
a. Concrete: 12 percent.
b. Fiber Cement Board: 12 percent.
c. Wood: 15 percent.
d. Gypsum Board: 12 percent.
e. Plaster: 12 percent.

2. Test cementitious and plaster cement/stucco for alkalinity (pH).

C. Gypsum Board Substrates: Verify taped joints are tapes and finishing compound is sanded smooth.

D. Plaster Substrates: Verify plaster has fully cured. Verify existing plaster is in good condition and can receive new paint coating.

E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
1. Verify previously painted surfaces can be stripped to bare substrate, repaired if necessary, and prepared to receive new paint system consisting of primer and two top coats at a minimum:
a. Where previously painted surfaces have failed to accept new paint systems. Determined cause of failure and take corrective measures to ensure each surface accepts new paint system. Failure of new paint system is not permitted.

F. Commence paint application after correcting unsatisfactory conditions and surfaces are dry. Application of coating indicates applicator’s acceptance of surfaces and conditions.

3.4 PREPARATION

A. Coordination of Work:
1. Review work in which primers are provided to ensure compatibility of the total system for various substrates. Notify Architect of anticipated problems when using materials specified over substrates primed by others:
a. Preprimed Substrates: Inspect existing conditions in which primers are factory applied to ensure compatibility of the total system for each substrate. Notify Architect of anticipated problems when using the materials specified over factory primed or preprimed substrates.
b. Existing Painted Surfaces: Inspect previously painted surfaces to ensure compatibility of the existing paints with new paint system for each substrate. Notify Architect of anticipated problems.
c. Correct defects and clean surfaces affecting bond with paint system. Remove existing paints exhibiting loose surface defects showing signs of rust, scale, or delamination.
d. Seal marks which may bleed through surface finishes.

B. Surface Preparation:
1. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified. Provide barrier coats over incompatible primers or remove and reprime. If removal is impractical or impossible because of size or weight of item, provide surface applied protection before surface preparation and painting:
a. Remove hardware and hardware accessories, plates, lighting fixtures, and similar items that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface applied protection before surface preparation and painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

b. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface applied protection if any.
c. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
d. Clean and prepare surfaces to receive paint according to manufacturer's written instructions for each substrate condition and as specified. Provide barrier coats over incompatible primers, existing paint or coating, or remove and reprime.
e. Correct defects and clean surfaces affecting bond with paint or coating system. Remove existing coatings exhibiting loose surface defects. Seal marks which may bleed through surface finishes.

C. Cleaning:
1. Before applying paint or surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning. Schedule cleaning and painting so dust and contaminants from the cleaning process will not fall on wet, newly painted surfaces:
a. Remove incompatible primers, including factory applied primers, and reprime substrate with compatible primers or apply barrier coat as necessary to produce paint systems indicated.
b. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
c. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
d. Remove existing grease and oil residue from any metals to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
e. If any Galvanized Metal Substrates are found, notify Project Designer/Owner to determine if item will be removed/replaced by the contractor under the contract.
f. Aluminum Substrates: Remove surface oxidation.

D. Mildew and Mold Removal: Remove mildew and mold by high power washing (pressure range of 1500 to 4000 psi) with solution of trisodium phosphate and bleach. If substrate is too soft for high power washing, scrub substrate with solution. Rinse with clean water and allow surface to dry.

E. Protective Coverings: Provide protections for duration of the work, including covering furnishings and decorative items. Protect and mask adjacent finishes and components against damage, marking, overpainting, and injury. Clean and repair or replace damage caused by painting.

F. Renovated Surfaces:
1. Clean surface free of loose dirt and dust. Except at gypsum board surfaces, remove existing paint and coatings to bare substrate and prepare substrates to receive new paint system. Test substrate to verify it will bond with primer and receive new paint system without failure. If test fails, clean surface to base substrate and apply barrier coat. Retest to verify surface will accept new paint system:
a. Remove surface film preventing proper adhesion and bond.
b. Wash glossy paint with a solution of sal soda and rinse thoroughly.
c. Remove loose, blistered, and defective paint and varnish; smooth edges with sandpaper.
d. Clean corroded iron and steel surfaces.
e. Repair and blend into portland cement plaster.
f. Prime bare surfaces.
g. Tone varnished surfaces with stain bringing to uniform color.
h. If existing surfaces cannot be put in acceptable condition for finishing by customary

cleaning, sanding, and puttying operations, notify Owner and do not proceed until correcting unsatisfactory conditions.

G. Cementitious Substrates:
1. Prepare concrete surfaces to receive paint. Remove efflorescence, chalk, dust, dirt, grease, oils, release agents, mold, mildew, and existing paint. Roughen as necessary to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation:
   a. Use abrasive blast cleaning methods if recommended by paint manufacturer.
   b. Do not paint surfaces if moisture content or alkalinity of surfaces exceeds that permitted in manufacturer's written instructions:
      1) Determine alkalinity and moisture content of surfaces by performing appropriate pH testing. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct condition prior to application of paint.
      2) Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m).
      3) Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation after substrates have obtained percent relative humidity level recommended by paint manufacturer.
      4) Perform additional moisture tests when recommended by manufacturer. Proceed with installation when moisture content complies with that permitted in manufacturer's written instructions.
      5) Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water. Allow to thoroughly dry.

H. Ferrous Metals:
1. Clean ungalvanized ferrous metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC recommendations:
   a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC SP6 / NACE No. 3.
   b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
   c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.

I. Galvanized Ferrous Metal Substrates (Where Existing – NO NEW GALVANIZED ITEMS ARE ALLOWED): Clean galvanized surfaces with nonpetroleum based solvents leaving surface free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

J. Shop Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC PA1 for touching up shop primed surfaces.

K. Aluminum Substrates: Clean surfaces to remove oil, grease, surface oxidation, and contaminants in accordance with SSPC SP1 Solvent Cleaning. Lightly abrade surface with a nonmetallic pad.

L. Plaster / Stucco Substrates:
1. Remove contaminants, release agents, curing compounds, efflorescence, chalk, mold,

mildew, and similar deterrents. Spot patch existing plaster to eliminate blisters, buckles, excessive crazing, and to check cracking, dry outs, efflorescence, sweat outs, and similar deflects the prevent plaster from bonding with paint or coatings. Sand or texture repair or patch to match adjacent finish and to remove trowel marks and arises: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

a. Deep Cracks: Clean out and fill deep cracks with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
b. Do not paint surfaces if moisture content or alkalinity of surfaces exceeds that permitted in manufacturer's written instructions. Test for alkali using litmus paper.
c. Allow patching and repair compounds to set and cure before painting.

M. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.

N. Wood Substrates:
1. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
2. Sand surfaces that will be exposed to view and dust off.
3. Prime, stain, or seal wood to be painted. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
4. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
5. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

O. Preparation of Substrates for Wallcovering:
1. Prime and seal substrate with release coat in accordance with wallcovering manufacturer's recommendations for substrate:
a. Assure compatibility with product of wall covering manufacturer.
b. Fill indentations in substrate and prime with opaque white primer before applying release coat.
c. Apply release coat in accordance with manufacturer's recommendations.

P. Barrier Coat: Provide barrier coats over incompatible primers or remove and reprime. Notify Owner in writing of anticipated problems using specified finish coat material over previously coated substrates.

Q. Material Preparation:
1. Mix and prepare paint materials according to manufacturer's written instructions:
a. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
b. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
c. Do not use thinners for water-based paints.
d. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.5 APPLICATION

A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated:
   1. The term *exposed surfaces* include areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned tube radiation, and similar components are in place. Extend coatings in these areas to maintain system integrity and provide desired protection.
   2. Use applicators and techniques suited for paint and substrate indicated.
   3. Provide finish coats compatible with primers.
   4. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   5. Paint exposed surfaces (top, bottom, sides, edges, underneath). If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces:
      a. Field painting of exposed surfaces include bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory applied final finish.
      b. Areas visible when permanent or built in fixtures, grilles, convector covers, covers for finned tube radiation, and similar components are in place.
      c. Extend coatings in areas, as required, to maintain system integrity and provide desired protection.
   6. Paint interior surfaces of ducts with a flat, non-specular black paint where visible through registers or grilles.
   7. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   8. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
   9. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
   10. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or surface imperfections. Cut in sharp lines and color breaks.
   11. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
   12. Provide finish coats compatible with primers used.
   13. Sand lightly between each succeeding enamel or varnish coat.

B. Items not to Receive Paint: Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

C. Applicators:
   1. Apply paints and coatings by brush, roller, spray, or applicators recommended by manufacturer:
      a. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
      b. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool recommended by manufacturer for material and texture required.
      c. Spray Equipment: Use airless spray equipment with orifice size recommended by manufacturer for material and texture required.

D. Minimum Coating Thickness:
   1. Apply paint materials no thinner than manufacturer's recommended spreading rate to

achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer:
a. Measure film thickness on magnetic surfaces by use of Elcometer thickness gauge and on nonmagnetic surfaces by pit gauge or Tooke Gauge.

E. Application:
1. Apply first coat to surfaces that have been cleaned, pretreated, or prepared for painting as soon as practicable after preparation and before subsequent surface deterioration:
a. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.
b. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished after removing rust and scale and priming or touching up surface sand if acceptable to topcoat manufacturers.
c. If undercoats, stains, or conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive dry film thickness equivalent to that of flat surfaces.
d. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried and cured to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

F. Mechanical and Electrical Work:
1. Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces:
a. Clean, prep, prime, and paint to match louvers, grilles, covers, and access panels on mechanical and electrical components.
b. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets visible through grilles and louvers with one coat of flat black paint, to visible surfaces. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
c. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
d. Concealed Members: Wherever steel and metal parts to receive paint are built into and concealed by construction, paint as specified for exposed parts so finish painting is complete before members are concealed.

G. Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Painting is limited to items exposed in equipment rooms and occupied spaces:
a. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
b. Prime and paint uninsulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, heat exchangers, tanks, ductwork, conduit, switchgear, and paintable insulation except where items are prefinished.
c. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets visible through grilles and louvers with one coat of flat black paint, to visible surfaces. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
d. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
e. Color code equipment, piping, conduit, and exposed duct work in accordance with requirements indicated. Color band and identify with flow arrows, names, and

numbering.

f. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

H. Prime Coats: Before applying finish coats, apply prime coat, recommended by manufacturer, to material required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or defects due to insufficient sealing.

I. Finish Coats:

1. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance without bleed through:
   a. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or surface imperfections is not acceptable.
   b. Transparent (Clear) Finishes: Use multiple coats to produce glass smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections. Provide satin finish for final coats.

J. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

K. Touch Up:

1. Touch up marred, scraped, and blemished areas of surfaces which were factory primed or previously coated:
   a. Prepare and touch up scratches, abrasions, and blemishes and remove foreign matter before proceeding with succeeding coats.
   b. Touch up marred, scraped, and blemished areas of factory primed or previously coated surfaces.
   c. Feather touch up coating overlapping minimum 2 inches onto adjacent unblemished areas producing smooth, uniform surface.
   d. As soon after erection and installation as possible, touch up fasteners, welded surfaces and surroundings, field connections, and areas on which shop coat has been abraded or damaged with specified primer before corrosion and other damage occurs from exposure.

3.6 FIELD QUALITY CONTROL

A. Dry Film Thickness (DFT) Testing:

1. Tests for dry film thickness may be determined by using a Tooke Scale and micro groover, an electronic scanner, or the Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness:
   a. Contractor shall touch up and restore painted surfaces damaged by testing.
   b. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.7 CLEANING AND PROTECTION

A. It is of the upmost important to SFUSD that the site remains in a safe, clean, and well-maintained condition. At the end of each day, leave the site ready to use by staff and students. Protect staff and students and the learning environment throughout the work.

B. Cleanup: At the end of each day, remove empty cans, rags, rubbish, and discarded paint materials from site. After completion of painting work, clean glass and paint spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. Provide *Wet Paint* signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work. After related work is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

E. At completion of painting activities, touch up and restore damaged or defaced painted surfaces.

F. Waste Management: Legally dispose of unused paint and paint containers in accordance with manufacturer's recommendations and environmental regulations.

PART 4 SCHEDULES

A. The following is a schedule of typical painted items and does not specifically include every item that is to receive paint but should establish type and quality of finish for all items normally included in a complete paint job.

B. Exterior Surfaces (Note: Exterior surfaces are divided into two (2) different categories, based upon color and level of graffiti resistance required. System 1 will be used when standard earthtone colors or neutral colors are specified, and System 2 will be used when bright colors [primary reds, yellows, and oranges] are specified and/or when a graffiti resistant coating is required):
   1. Galvanized Metal (where existing – **no** new galvanized metal is allowed):
      a. Surface Preparation: Acid etch galvanized surfaces that have not weathered at least six (6) months prior to beginning painting operations. Krud Kutter Metal Clean and Etch.
      b. Primer: One (1) coat Ultrashield ULDM00 DTM Gray Primer.
      c. Finish: Two (2) coats Ultrashield ULSH40 Low Sheen High Performance Acrylic Urethane.
      d. Finish: Two (2) coats US Coatings RustGrip 2300 1-2 Mils DFT.
   2. Un-galvanized Metal:
      a. Primer: One (1) coat Ultrashield ULDM00 DTM Gray Primer.
      b. Finish: Two (2) coats Ultrashield ULSH40 Low Sheen High Performance Acrylic Urethane.
   3. Concrete and CMU:
      a. Primer/Finish: (2) coats Eff-Stop Premium ESPR00 Masonry Primer / (2) coats US Coatings AquaGrip 2600 3-5 Mils DFT.
   4. Wood (Includes plywood siding and wooden trim):
      a. Primer: One (1) coat EZ-Prime EZPR00 Exterior Wood Primer.
      b. Finish: Two (2) coats Spartashield SSHL60 100% Acrylic Gloss.
   5. Fiber-Cement Materials:

a. Primer: One (1) coat Eff-Stop Premium ESPR00 Masonry Primer.
b. Finish: Spartashield SSHL60 100% Acrylic Gloss.

C. Paint Types: Match existing adjacent finish type.

END OF SECTION 09 90 00