PROJECT MANUAL COVER SHEET AND STAMP PAGE

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COUNTY DOCUMENTS - Provided by the County of Yolo

VOLUME 2

TECHNICAL SPECIFICATIONS by BEAM Professionals

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SECTION 01 11 00 SUMMARY OF WORK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Conditions of the contract and Division 1, as applicable, apply to this Section.

1.2 SCOPE OF WORK

A. **Base Project** – Building A, 500 Jefferson Blvd, West Sacramento, CA 95605

Roof Area A1

Contractor to remove all existing roofing materials from all pipe flashings and curb locations down to below level of new required seal. Remove/replace all roofing materials that show evidence of dry rot. Once complete, install new decking and insulation to match the existing roof height.

Remove abandoned HVAC and curb and replace framing, infill with new decking using correct nailing pattern to match existing. Provide 2” of rigid insulation. Raise perimeter nailers if needed to match finished roof height. Demo any areas of the roof sheathing that show evidence of dry-rot. Re-install existing (or new at curbs required to be raised) all curbs, piping, conduit, and gas lines. Curbs shall have a finished height no less than 10" above Finished adjacent roof height.
Repair all EPDM skirt flashings at HVAC units that provide direct pathways for water to enter below units. Clean and prep substrate to receive new roofing system.

Eliminate all areas of ponding before mechanically attaching 2” Polyiso insulation. Fully Adhered 1/2" primed DensDeck board, followed by fully-adhering new specified 80-mil PVC membrane with all new associated metals.

Clean rust and other loose materials from existing gutters and downspouts then prime and paint to match existing adjacent low roof area gutters and downspouts. Tie-in existing gutters to new roofing with compatible 3-course material.

Apply liquid flashing at any and all parapets which are less than or equal to 4” in height

B. **Add Alternate #1** – 4” wide PVC tape to be heat welded to the roofing material at 5-ft from roof perimeter, see 07 72 00 Roof accessories for additional indications.

1.3 SALVAGED MATERIALS

A. Owner may salvage all items deemed reusable or necessary to keep for items to be demolished prior to the start of demolition and construction.

B. Contractor shall remove and turn over additional items to the Owner, as directed.

C. Contractor shall demolish, remove and salvage all other items of demolished work.

1.4 CONTRACTS AND USE OF SITE

A. Contractor Use of Premises:
1. Confine operations at site to areas permitted by:
   a. Law
   b. Ordinances
   c. Permits
   d. Contract Documents
2. Do not unreasonably encumber site with materials or equipment.
3. Assume full responsibility for protection and safekeeping of products stored on premises.
4. Obtain and pay for use of additional storage or work areas as needed for operations.
5. Contractor shall establish secured staging area for work and coordinate and provide for safe passage and exit from building areas during construction, as determined by County and City officials.
6. Contractor shall coordinate all construction activities with Owner.
7. Owner reserves the right to perform construction operations with its own forces or to employ separate contractors on portions of the Project. Contractor shall coordinate with this work in terms of providing site access, work space, and storage space, cooperation of work forces, scheduling, and technical requirements.
8. Coordinate all utility shutdowns with Owner and, as required, with local utility companies, prior to commencement of shutdown.

B. Owner Occupancy:
1. Partial Owner Occupancy: The Owner reserves the right to place and install equipment in completed areas of the building, prior to Substantial Completion provided that such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.
2. A Certificate of Substantial Completion will be executed in accordance with conditions of the Contract.
3. Contractor shall obtain a Certificate of Occupancy from local building officials prior to Owner occupancy.
4. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy the Owner will provide operation and maintenance of mechanical and electrical systems in occupied portions of the building.
5. Prior to partial Owner occupancy, emergency and life safety systems shall be fully operational. Emergency and life safety systems include, but are not limited to, fire sprinkler systems, fire alarm systems, and emergency egress devices. For emergency exiting purposes, the path of travel shall be clearly delineated and functional. If required, temporary barricades shall separate on-going construction from occupied spaces as allowed by the governing agency holding jurisdiction over the Project. Required inspections and tests shall have been successfully completed. Upon occupancy the Owner will provide operation and maintenance of emergency and life safety systems in occupied portions of the building.

C. Owner-Furnished Items:
1. The Owner may provide items to the Contractor for installation in accordance with manufacturer's recommendations and instructions.
2. The Owner will arrange and pay for delivery of Owner-furnished items in accordance with the Contractor's Construction Schedule, and will inspect deliveries for damage.
3. If Owner-furnished items are damaged, defective or missing, through no fault of the Contractor, the Owner will arrange for replacement.
4. The Contractor is responsible for designating the delivery dates of Owner-furnished items in the Contractor's Construction Schedule and for receiving, unloading and handling Owner-furnished items at the site. The Contractor is responsible for

protecting Owner-furnished items from damage, including damage from exposure to elements, and to repair or replace items damaged as a result of his operations.

D. Coordination with Owner's Forces or Owner's Contractors:
   1. Provide site access, space allocation, scheduling, scheduling coordination, coordination of work forces and coordination of technical requirements with contractors that may be selected and employed by Owner to perform work simultaneously and in conjunction with the Work, which may include, but shall not be limited to the following, as applicable to the Project:
      a. Materials Inspection and Testing Agency
      b. HVAC Testing, Adjusting, Balancing Agency
      c. Energy Management System Contractor
      d. Data and Cabling System Contractor
      e. Telephone System Contractor
      f. Modular Furniture Installer
      g. Lighting and Sound
      h. Surveying

1.5 PROTECTION OF EXISTING PROPERTY

A. Contractor shall provide and maintain adequate protection of all Owner's existing property during duration of Project.

B. Contractor shall verify location of all existing underground pipelines on site with the owner of such pipelines and authorities having jurisdiction and shall provide and maintain adequate protection of all such pipelines during duration of Project.

C. Protection of Trees:
   1. Provide wood barricades around trees and shrubs at their dripline in traffic areas to protect them from construction operations until Substantial Completion, or until barricade removal is directed by Designer or Record.

PART 2 PRODUCTS

2.1 MATERIALS

A. Refer to Specification Sections.

PART 3 EXECUTION

3.1 CONSTRUCTION SCHEDULE

A. Please refer to volume 1 specification documents for timeline requirements and expectations of schedule.

END OF SECTION 01 11 00

SECTION 02 41 13 – SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Partial demolition of existing building(s) as required to accommodate including, but not limited to:
   1. New Roofing, flashing and related work.
   2. Removal of existing mechanical, electrical, and plumbing items and associated utilities indicated or required, except for electrical work performed by Owner.

1.2 SUBMITTALS

A. Submit the following items.
   1. Itemized Demolition Schedule.
   2. Detail all demolition methods to be used.

1.3 PERMITS

A. Procure and pay for all necessary permits or certificates required to complete the work specified. Make any and all required notifications and comply with all applicable Federal, State and local ordinances.

1.4 QUALITY ASSURANCE

A. Provide at least one (1) person who shall be present and in charge of the Demolition Work at all times and who shall be thoroughly familiar with all phases of all work performed under this Section.

B. Comply with all pertinent codes and regulations applying to this work. Where cutting or modifications are to be made to existing fire-rated construction, provide temporary closures of fire-resistive materials as required to maintain fire rating until such time as permanent fire-rated improvements are completed.

1.5 JOB CONDITIONS

A. Use all means necessary to prevent the spread of dust during performance of this work. Provide additional clean filters for the existing air handling system serving those areas to remain to protect them from construction dust.

B. Use all means necessary to protect the existing building to remain from all types of damage, including fire, water damage, and unnecessary interruption of utility services. In the event of damage of any kind, immediately make all repairs and replacements necessary to the approval of the Owner at no additional cost to the Owner.

C. Motor-driven equipment shall have functional mufflers.

D. Visit the site and examine the existing structure. Note all conditions as to the character and extent of work involved.

1.6 PRE-INSTALLATION CONFERENCE

A. Refer to Section 01 13 11 – Project Coordination.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide all barricades, shoring, and bracing necessary to protect the tenants, workmen, and Public from danger. Barricades shall be sufficiently designed to protect and or exclude the public from all hazards.

B. All other materials, not specifically described but required for proper completion of Work of this Section, shall be as selected by the Contractor subject to the approval of the Owner.

2.2 DEMOLITION WORK

A. Perform demolition work in manner so as to allow Owner's safe use of existing facility.

B. Perform demolition work in order to maintain Owner's construction schedule.

2.3 REMOVAL OF ROOF MATERIAL AND DECKING

A. Roofing debris shall not be permitted to fall on adjoining roof deck in masses to exceed safe carrying capacity of decks. Existing roofs and decks shall be properly protected with plywood under area to be demolished.

B. Structural or load-supporting members shall not be cut or removed adjacent to existing structures to remain until all loads carried by members have been removed or adequately supported.

C. The Contractor shall take all precautions necessary to ensure the safety of the building occupants and workers.

2.4 REMOVAL OF PARTITIONS, COLUMNS AND STRUCTURE

A. Masonry walls or other sections of masonry shall not be permitted to fall on floors of building in masses to exceed safe carrying capacity of floors. Existing floors shall be properly protected with plywood on both sides of a partition to be demolished.

B. Provide temporary shoring or bracing wherever necessary for the protection of occupants, workmen, walls, partitions, roofs, floors and structure to remain.

C. Structural or load-supporting members shall not be cut or removed adjacent to existing structures to remain until all loads carried by members have been removed or adequately supported.

D. No masonry walls shall be removed until it has been determined that the walls to be removed do not support the roof. To determine this, all adjacent materials such as finish ceilings shall be removed to provide adequate views of existing structure. Provide temporary shoring as needed. The Contractor shall take all precautions necessary to ensure the safety of the demolition workers and all occupants of the building.

E. No demolition will be allowed above, below, adjacent to or near any occupied areas of the building.

F. Where access holes in existing ceilings or removal of existing ceilings are required, minimize the access in order to minimize the repair work and repair or replace removed or damaged work to match adjacent undamaged work.

G. Cut and tooth new openings in masonry where required, of correct size to permit installation of frames and anchors for new doors.

PART 3 - EXECUTION

3.1 DEMOLITION

A. Before commencing the Work of this Section, verify with the Owner that all items to be removed by the Owner have been removed. Schedule the work in a careful manner with all necessary consideration for the Public and the Owner. All items of existing equipment and materials or any other item of value to the Owner shall be salvaged by the Owner prior to demolition.

B. All material removed under this Contract, which is not to be salvaged or reused, shall become the property of the Contractor and be promptly removed from the site. At all times use movable debris boxes, covered, to convey the material through the building. Do not store or permit debris to accumulate on the site. Dumpsters shall not overflow and shall be emptied on a regular basis. Remove all debris from the building premises and leave the construction site "Clean" each day. All debris shall be dumped in an approved disposal facility and all fees for this shall be paid by the Contractor. Contractor is responsible for completely removing all demolished materials from the site and disposing of them in accordance with all local, State and Federal Regulations. If Contractor fails to remove debris promptly, Owner reserves the right to have debris removed at Contractor’s expense.

C. Conduct operations so as not to interfere with adjacent occupied spaces, roads, streets, drives, walks, service lines and the like.

D. Keep all pedestrian areas clear for passage at all times.

3.2 PROTECTION OF STRUCTURES, PROPERTY

A. Execute demolition work to ensure adjacent property is not damaged from falling debris or other causes.

B. Take precautions to guard against movement, settlement, or be liable for such movement, settlement, or collapse; repair promptly such damage when so ordered.

C. Repair damage to Owner’s property or any other person or persons on or off premises by reason of required work.

END OF SECTION 02 41 13

SECTION 06 10 00 – ROUGH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. All rough carpentry items including, but not limited to:
   1. Wood blocking for support of items supported on or recessed into wood framing or requiring wood blocking for support.
   2. Wood cants, nailers, curbs, and other items associated with roofing work.
   3. Miscellaneous framing items and plywood sheathing.

1.2 RELATED WORK

A. All Sections of Work supported on or recessed into wood framing or requiring wood blocking for support, such as wall trim, wall cabinets, handrails, lockers, toilet compartments, toilet and bath accessories, markerboards, tackboards, projection screens, fire extinguisher cabinets, etc., as applicable to the Project.

1.3 SUBMITTALS

A. Product Data: Manufacturer’s data on wood treatment materials.

1.4 STANDARDS AND GRADING

A. All lumber used structurally shall be graded and marked with grade and trademark of a lumber grading organization approved by the Architect, except that a certification of grade from such a grading organization may be accepted in lieu of grade and trademarks when approved by Architect. Trademark of manufacturer shall also appear on each piece.

B. Each piece of plywood used structurally shall carry the American Plywood Association trademark.

C. Grading Rules: Conform with all applicable requirements of American Lumber Standards "Simplified Practice Recommendations R-16" and to grading rules of manufacturer's association under whose rules the lumber is produced.

D. Reference Standards: Conform with all requirements.
   1. U.S. Dept. of Commerce Product Standards (PS)
   2. American Plywood Association (APA)
      a. Standards and Construction Guide
   3. American Wood Preservers Association (AWPA)
      a. Standards, as they apply.
   4. Architectural Woodwork Institute (AWI)
      a. "Quality Standards"
   5. National Woodwork Manufacturers’ Association (NWMA)
      a. Standards
   6. Western Wood Products Association (WWPA)
      a. Manual

PART 2 PRODUCTS

2.1 MATERIALS

A. Lumber:
1. Treated No. 2, S4S Southern Yellow Pine, #1 kiln dried.
   a. Comply with NWMA Standards
   b. Use for blocking, stripping, grounds, cants and miscellaneous wood items in contact with concrete, roofing, or exposed to the weather.
2. No. 2, S4S Southern Yellow Pine: Use for framing, blocking, stripping and miscellaneous concealed interior lumber not exposed to concrete, roofing weather or moisture, when FRS lumber is not required by building code.
3. Fire Retardant No, 2, S4S Southern Pine: Refer to Fire Retardant Treatment below. Use for framing, plates and blocking in all walls and partitions where required by building code or noted on drawings.

B. Plywood:
1. General: Comply with APA Standards.
2. APA A-D, Group 1 Interior used where appearance of only one side is exposed to view for interior locations. Use for wall liner at MDF/IDF closets and telephone boards in mechanical and telephone rooms where shown or required. 3/4 inch thick unless required or shown otherwise. Paint as scheduled in Section 09 91 00.
3. Exterior plywood, Group 1, APA rated sheathing. Use where miscellaneous plywood is exposed to concrete, weather, or at roof construction as sheathing.
4. Fire Retardant Treated Plywood: Refer to Fire Retardant Treatment below. Use when required by building code or noted on drawings.
5. Underlayment: If shown or required, APA rated Sturdi-floor, exterior grade, tongue and groove edges.

C. Rough Hardware:
1. Nails, Spikes, and Staples: Galvanized for exterior locations, high humidity locations, and treated wood; plain finish for other interior locations: Size and type to suit application. Do not use to resist “pull-out” loads.
2. Bolts, Nuts, Washers, Lags, and Screws: Medium carbon steel; size and type to suit application. Galvanize for exterior locations, high humidity locations, and treated wood. Plain finish for other interior locations.
3. Fasteners: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry and concrete. Bolts or power activated type for anchorage to steel.

D. Wood Treatment:
1. Preservative Treatment (Concealed Conditions):
   a. Micronized Copper Quaternary (MCQ): Pressure impregnate preservative to net retention of 0.25 lbs./cu.ft., in plant licensed by manufacturer in accordance with the following standards:
      1) Preservative Treatment Standard: AWPA P5
      2) Structural Lumber Treatment Standard: AWPA C31
      3) Plywood Treatment Standard: AWPA C9
   b. Brush two (2) coats of preservative on bored or sawn surfaces of treated lumber.
   c. Provide Quality Mark Stamp on treated wood for identification.
   d. Fasteners: Metal fasteners in contact with preservative treated wood shall be G-90 galvanized, minimum, or stainless steel in accordance with manufacturer’s instructions. No uncoated steel shall come in contact with preservative wood.
   e. ACQ and CCA preservatives not permitted.
   f. Acceptable Manufacturers: Osmose “MicroPro” Smart Sense; or Architect approved equal.

E. Fire Retardant Treatment:
   1. Lumber shall be pressure-impregnated with non-combustible fire retardant chemicals in accordance with U.L. FRS Fire Hazard Classification. All lumber must be dried following treatment in accordance with AWPA Standard C20.
   2. Plywood shall be pressure-impregnated with non-combustible fire retardant chemicals in accordance with U.L. FRS Fire Hazard Classification. All plywood must be dried following treatment in accordance with AWPA Standards C27.

PART 3 EXECUTION

3.1 GENERAL

A. Wood Framing:
   1. Framing and blocking shall be accurately cut and fitted true to line and levels, avoiding shims and wedges.
   2. Spiking and nailing shall be done using largest size spikes and nail practicable.
   3. Unless otherwise shown, use 2 inch by 4 inch wood studs spaced 16 inches o.c. with 4 inch face perpendicular to direction of wall or partition. Provide single bottom plate and double-top plates 2 inches thick by width of studs.
   4. Bolt nailers and blocking to steel, masonry or concrete members with bolts or proportionate strength of members attached from each end, except as otherwise noted on plans.
   5. Provide blocking, bucks and framing as necessary and for other trades as required.
   6. Drill lumber accurately for bolts and fit all bolts with suitable washers.
   7. Perimeter wood blocking to be attached 2’-0” staggered with 1/2” galvanized bolts through both nailers.
   8. Screws are to be used for perimeter edge nailers. No nailing permitted.

B. Plywood:
   1. Install plywood over framing in accordance with instruction of American Plywood Association Construction Guide Form No. E30C.

C. Install underlayment plywood as shown in accordance with instructions of American Plywood Association. Space panel joints and edges 1/32 inch. Fill and sand panel edge joints, surface roughness, and damaged or open areas. Nail with 4d ring-shank nails spaced at six (6) inches at edges and eight (8) inches in field each way.

END OF SECTION 06 10 00

SECTION 07 54 23 – PVC MEMBRANE ROOFING SYSTEM

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 SECTION INCLUDES

A. Providing the entire roofing assembly, including, but not limited to:
   1. Wood nailers (Refer to this Section and Section 06 10 00)
   2. Fully adhered thermoplastic single-ply membrane roofing
   3. Flashings, including sheet metal perimeter edge (fascia) (Refer this Section and Section 07 62 00)
   4. Walkway pads, expansion joints, and other work incidental to, the complete and proper installation of a watertight roofing system as shown on the drawings or specified herein, and in accordance with all applicable requirements of the Contract Documents.

B. It is the intent of this Section that the Work shall:
   1. Provide a watertight facility.
   2. Conform to all applicable building code requirements and of authorities having jurisdiction.
   3. Include Section 07 62 00, as part of the Work of this Section; and be performed by a single source contractor.

1.3 RELATED WORK

A. All Sections of Work relating to the roofing system, including mechanical, plumbing and electrical items penetrating the roof system.

1.4 REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. A 385, Practice for Providing High-Quality Zinc Coatings (Hot-Dip)
   2. D 471, Resistance to water absorption
   3. D 751, Method of Testing Coated Fabrics
   4. D 1149 Ozone resistance
   5. D 1204 Linear Dimensional Change
   6. D 2137 Brittleness point, max,
   7. D 4637/6878 (annex A1) Thickness over scrim
   8. E 96 Water vapor permeance, Perms
   9. E 903 Solar Reflectance (albedo X 100), %
   10. G 151/154 Accelerated weathering
   11. FTM 101C method 2031 Puncture resistance

B. ASCE-7 Wind uplifts requirements for geographical area.

C. National Roofing Contractors Association (NRCA)
   1. Roofing and Waterproofing Manual (Latest Edition)

D. Single-Ply Roofing Institute (SPRI)

E. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
   1. Architectural Sheet Metal Manual (Latest Edition)

F. Underwriters' Laboratories (UL)
   1. Fire Hazard Classifications

G. California Building Code (CBC)

1.5 PERFORMANCE REQUIREMENTS

A. General Requirements: Provide an installed thermoplastic single ply roofing system, flashing and related work that is watertight and will not permit the passage of liquid water, able to withstand wind loads, thermally induced movement and exposure to weather without failure.

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

C. Roofing System Design: Comply with ANSI/SPRI "Wind Design Standard Practice for Roofing Assemblies" for the following ground roughness exposure and system design:
   1. Check for geographical exposure (i.e. Exposure B: City, suburban areas, towns and wooded terrain.)
   2. Fully Adhered thermoplastic single-ply membrane roofing.

D. Underwriter's Laboratories Inc. (UL)
   1. UL RMSD – Current Roofing Materials and Systems Directory
   2. UL Fire Resistance of Roofing Coverings Materials

E. Exterior Fire Exposure Classification: Class A, ASTM E 108, for application and slopes shown.

F. American Architectural Manufacturer's Association (AAMA)

G. Occupational Safety and Health Administration (OSHA)

H. 2019 California Building Code (CBC)

1.6 SUBMITTALS

A. Product Data: Manufacturer's printed instructions, tested assemblies, schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, adhesive, and accessories to be used in the Work.

B. Certifications:
   1. Manufacturer's written certification that installer is approved and licensed to install specified roofing system. **(Submit a copy with Proposal Form)**
   2. Manufacturer's affidavits that materials used in Project contain no asbestos.
   3. Installer shall submit resume and project experience list for proposed system for Project Manager and job site superintendent.
   4. Installer shall submit written certification that there are no undocumented workers being employed by them or any subcontractor on this project and that covers all workers on this project by workmen's compensation.
   5. Installer shall submit list of all subcontractors with evidence of subcontractor's insurance coverage in compliance with contract requirements.

6. Manufacturer's written certification of approval / acceptance of these specifications and details.

C. Referenced Standards: Two (2) copies of each referenced standard and retain approved copies at site.

D. Shop Drawings: Furnish from copies of the Manufacturer's literature or from copies of NRCA "Roofing and Waterproofing Manual", (Latest Edition).
1. Furnish for approval any proposed details, which differ from those, included with this proposal package. All proposed details shall first be approved in writing by roofing manufacturers prior to submitting to Roof Consultant for approval.
2. Furnish detail project sequencing, staging, material loading, manpower plans, and project construction schedule for approval.

E. Samples:
1. Furnish copy of sample warranty that is to be issued upon project completion.
2. Furnish samples of roof membrane.
3. Furnish sample of metal edge to be installed.

F. Upon Substantial Completion of Work, submit the following to Roof Consultant for his submission to Owner:
1. Manufacturer's Warranty: Manufacturer's written warranty as specified.
2. Contractor's Warranty: Contractor's written warranty as specified.
3. Maintenance Procedures: Three (3) copies of Manufacturer's printed instructions for Owner's use regarding care and maintenance of roof.
4. Affidavits of non-asbestos for material.
5. Affidavits from material manufacturers, suppliers and sub-contractors for release of liens.
6. Refer to Division 1 Specifications for additional requirements of close-out documents.

1.7 INSPECTIONS / TESTS

A. The Roof Consultant's and Manufacturer's representative shall at all times have access to the job site and work areas. The contractor will provide proper and safe facilities for such access and inspection.
1. Roof Consultant Observations: The Roof Consultant will be providing periodic inspections throughout the duration of the project. Roof Consultant's Representative shall be required to inspect after completion of each major phase of construction for approval.
2. Manufacturer Inspections:
   a. An inspection shall be made by a representative of the material manufacturer **three (3) times a month** during performance of Work to ensure that said project is installed in accordance with the Manufacturer's specifications and illustrated details. Written reports by the manufacturer shall be turned over to the Roof Consultant, on each Monday following the prior week.
   b. The authorized material Manufacturer's field representative shall be responsible for:
      1) Keeping the Roof Consultant's representative informed after periodic inspections as to the progress and quality of the work observed.
      2) Calling to the attention of the contractor those matters observed which are considered to be in violation of the contract requirements.
      3) Reporting to the Roof Consultant's representative, in writing, any failure or refusal of the contractor to correct unacceptable practices called to his attention.

4) Confirming, after completion of the work and based on his observation and test, that he has observed no application procedures in conflict with these specifications.

B. Any failure by the Roof Consultant's or Manufacturer's Representative to detect, pinpoint, or object to any defect or noncompliance of these specifications of work in progress or completed work shall not relieve the contractor, or reduce, or in any way limit, his responsibility of full performance of work required of him under these specifications.

C. Roof Consultant may require tests and inspections as necessary to verify quality of roofing materials and workmanship. Laboratory tests will be performed in accordance with ASTM standard procedures.
1. Owner will select testing laboratory and will pay for Work required by testing laboratory.
2. Re-tests for work which fail initial tests or inspections shall be paid by contractor.
3. **Non-compliance with contractor requirements will result in the Roof Consultant / Owner to assign full time quality control and will be subject to reimbursement by the construction manager/contractor.**

1.8 QUALITY ASSURANCE

A. Installer:
1. Installer shall have approval by manufacturer of accepted roofing system for application and issuance of specified warranty for a minimum of three (3) years. Proof of license agreement dated at least three years prior to date of bid opening.
2. Installer shall be an experienced single firm specializing in the type of roofing and sheet metal work specified, with a minimum of five (5) years of previous successful experience on projects similar in size and scope.
3. Installer shall be certified and approved by manufacturer and licensed to install specified roofing system.
4. No subcontracting of sheet metal fabrication or installation will be accepted. Installer must have a sheet metal shop on the company premises.
5. Installers shall have a competent Superintendent, who is not actually performing roofing work, on site at all time while work is in progress, with full authority to act on behalf of the Installer as his agent.
6. All workmen shall be covered by Workmen's Compensation insurance (verify upon request) and thoroughly experienced in the particular class of work upon which employed. Use of undocumented workers will not be tolerated - No Exceptions.
7. Installer shall ensure that base fastener pull out resistance tests on existing decks were performed and approved by Roof Consultant and coordinated with Roofing Consultant prior to starting roofing application.
8. Roofing installer must have reached the highest level of qualifications from the Manufacturer they are providing material for (i.e. Master Select installer).

B. Regulatory Requirements:
1. Classification by Underwriters' Laboratories, Inc. as a Class A roof covering.
2. Roofing system shall be installed in accordance with ASCE-7 wind uplift requirements as indicated by SEOR (if applicable) for geographical location exposure C, 115 MPH 3-second gust wind speed zone and risk category III. Wind-resistance loads listed below have a safety factor of 2.0 incorporated in the calculation.
   a. Zone 1 Field – 38.6 psf
   b. Zone 2 Perimeter (Within 8'-0" of perimeter edge) – 64.6 psf
   c. Zone 3 Corner (Within 8'x8' of corner edges) – 97.4 psf
3. Follow local, state, and federal regulations of safety standards and codes. Refer to applicable building code for roofing system installation requirements and limitations.

C. Laboratory Testing and Samples:
   1. Roof Consultant may require tests and inspections as necessary to verify quality of roofing materials and workmanship. Laboratory tests will be performed in accordance with ASTM procedures.
   2. Owner will select testing laboratory and will pay for Work required by testing laboratory. Installer shall assume all costs for extraction and patch of all samples.
   3. Re-tests for work which fail initial tests or installer shall pay inspections.
   4. Installer shall correct all deficiencies in accordance with manufacturers recommended procedures at no cost to Owner.

D. Installation:
   1. Unless otherwise indicated, the materials to be used in this specification are those specified and denote the type, quality, performance, etc. required. All proposals shall be based upon the use of the specified material.
   2. Install materials in accordance with the manufacturer's current published application procedures and the general recommendations of the National Roofing Installer's Association.
   3. It will be the installer's responsibility to obtain and/or verify any necessary dimensions by visiting the job site, and the installer shall be responsible for the correctness of it. Any drawings supplied are for reference only.
   4. Installer shall plan and conduct the operations of the work so that each section started on one day is complete, details installed and thoroughly protected and in watertight condition before the close of work for that day.
   5. Materials will be securely fastened in place in a watertight, neat and workmanlike manner. All workmen shall be thoroughly experienced in the particular class of work upon which employed. Work shall be performed in accordance with these specifications and shall meet the approval in the field of the Roof Consultant.
   6. All waste materials, rubbish, etc., shall be removed from the Owner's premises as accumulated. Rubbish shall be carefully handled to reduce the spread of dust, and shall be deposited at an approved disposal site. At completion, all work areas shall be left broom clean and all installers' equipment and materials removed from the site.

1.9 PRE-INSTALLATION CONFERENCE

A. Refer to Section 01 13 11 – Project Coordination.

1.10 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials in Manufacturer's original unopened packaging with all tags and labels intact and legible. Carton and can labels, shall indicate appropriate warnings, storage conditions, lot numbers, and usage instructions. Handle and store materials and equipment in such a manner as to avoid damage. The proper storage of materials is the sole responsibility of the contractor. Materials damaged in shipping or storage shall not be used. Wet or damaged roofing materials shall be discarded, removed from job site, and replaced with new materials prior to application.

B. Manufacturer's packaging and / or roll plastic is not acceptable for exterior storage. Tarpaulin with grommets shall be accepted minimum for exterior coverings. All materials stored, as above shall be minimum of four (4) inches off the substrate, and the tarpaulin tied off with rope.

C. Products liable to degrade as a result of being frozen shall be maintained above 40□ F in heated storage.

D. Moisture sensitive products shall be maintained in dry storage areas or properly covered. Roofing insulation and felts must always be covered or stored in a dry area when not being used.

E. 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.

1.11 WARRANTY

A. Roofing Manufacturer: Warrant the roofing and associated Work for 20 years from date of Substantial Completion as follows:
   1. The warranty shall be a No Dollar Limit (NDL) / no penal sum type, with total replacement cost.
   2. The warranty shall guarantee the entire roof system and associated work against defective materials and workmanship of installation, with NO exclusion for ponding water.
   3. The roof system including roofing insulation, flashing, penetrations, wall flashings, metal work, labor, and material shall be guaranteed against failure of workmanship and materials. Repair of the system, including materials and labor, shall be done at no cost to the Owner.
   4. Submit four (4) original executed copies of the Warranty / Guarantee.

B. Roofing Installer: Jointly with any sub installers employed by him, shall guarantee the work required and performed under this contract will be free from defects in workmanship and materials, and that the building will be and remain waterproof for a five (5) year warranty period, after the Roof Consultant accepts the work as substantially complete. The warranty shall be in approved notarized written form, to obligate the Installer, and sub installers, to make good the requirements of the warranty.

C. Make arrangements with the materials manufacturer to provide the required warranty. Final warranty shall be submitted to Owner at time of Substantial Completion.

D. Submit attached Installer's Warranty and Sub installer's Guarantee forms at Project Closeout.

PART 2 PRODUCTS

2.1 GENERAL

A. The components of the roof system are intended to be products of a single manufacturer as required providing the specified system warranty. Products not manufactured by the Roofing Manufacturer, but are required in the roofing assembly, will be recognized by the Roofing Manufacturer and covered under the Manufacturer's warranty.

B. Install all materials in accordance with Manufacturer's current written specifications, details and instructions. Deviations shall not be made without prior written approval from the Manufacturer and the Owner's Representative. Should any specifications or details conflict with the Contract Documents, submit to Owner the recommended alternative that provides the best long term moisture protection and complies with Manufacturer's warranty requirements for approval.

2.2 ROUGH CARPENTRY

A. All nailers, cants and wooden curbs shall be No. 2 or better treated lumber selected to meet design details and field dimensions and requirements of Section 06 10 00, Rough Carpentry. **MCQ and MCA only.**

2.3 ROOFING SHEET METAL

A. Refer to Section 07 62 00, Roof Related Sheet Metal.

2.4 APPROVED MANUFACTURERS

A. Unless noted otherwise, specifications are based on products of manufacturers listed below. Manufacturers whose products meet or exceed the specifications, who have manufactured and installed roof materials and systems of the type specified for a minimum of ten (10) years, and who maintains a single source responsibility for the total roofing system, as described herein, may apply for approval as a substitution in accordance with Division 01 requirements regarding substitutions. The following approved manufacturers:
   1. **Sika Sarnafil,** Canton, MA; (800) 451-2504
   2. **Carlisle, Inc.**, Carlisle, PA; (800) 479-6832
   3. **Soprema**, Wadsworth, OH; (800) 356-3521

B. All materials shall be manufactured, specified, or accepted in writing by membrane manufacturer issuing the warranty. Proposed materials shall ensure full system warranty from said manufacturer. Installer shall be an installer licensed by the manufacturer.

C. Samples of all materials used on the project, which are not supplied by the membrane manufacturer, shall be submitted to the membrane manufacturer for written approval prior to starting work.

D. All materials used on the project shall be asbestos free.

2.5 ROOF MEMBRANE ASSEMBLY

A. Polyvinyl Chloride Sheet: Uniform, flexible sheet formed from polyvinyl chloride, complying with ASTM D 4434, of the following type, thickness, and exposed face color:
   1. Classification Type III, polyester-reinforced Thermoplastic.
   2. Thermoplastic Polymer Thickness: Overall Min. 80 mils; Over Scrim Min. 27 mils
   3. FM Approved
   4. UL Class A.
   5. Exposed Face Color: White
   6. 3-Year SRI, 74 minimum.

B. Approved Material:
   1. **Sarnafil Product**: Sarnafil G 410-80 EnergySmart
   2. **Carlisle Product**: Sure-Flex PVC 80-mil Min
   3. **Soprema Product**: Sentinel G200 80-mil

2.6 ROOF INSULATION

A. All insulation shall be approved in writing by the membrane manufacturer as to thickness, type, and manufacturer. All insulation must be approved for the specific application, with UL and FM approval.

B. Polyisocyanurate Roof Insulation: Shall comply with ASTM C1289 Type II, Class 1, Grade 2 (20 psi minimum compressive strength). Insulation shall be surfaced on both sides with a

non-asphaltic non-organic coated fiberglass facers. Thickness shall be a minimum 3.5" over all conditioned air space, see drawings for details.

1. Approved product:
   a. **Sarnafil Product**: SarnaTherm CG-20psi
   b. **Carlisle Product**: InsulBase PolyISO
   c. **Soprema Product**: Sopra-ISO

C. Recover Board: Glass-Faced Gypsum Roof Board equal to UL rated Type X "Dens Deck Prime" as produced by Georgia-Pacific. Board sizes shall be 48" x 96" x 1/4" or as indicated on drawings for roof assembly. Provide as required by manufacture recommendation primer for Roof System. Approved substitute, SECUROCK by USG.

D. Tapered Polyisocyanurate Insulation: Shall comply with ASTM C1289 Type II, Class 1, Grade 2 (20 psi minimum compressive strength) Insulation shall be surfaced on both sides with a non-asphaltic non-organic coated fiberglass facers. Board sizes shall be 48"x48" sloped/cut to 1/4 inch per foot slope or as indicated on drawings for roof assembly.

1. Approved product:
   a. **Sarnafil Product**: SarnaTherm CG-20psi
   b. **Carlisle Product**: InsulBase PolyISO
   c. **Soprema Product**: Sopra-ISO

E. Tapered Edge Strip: 1-1/2 inches to 0 inches, 18 inches x 48 inches, install at all roof drains, expansion joints, curbs, projections, crickets, saddles and base flashings. Approved material shall be as manufactured by Cant Products or pre-approved equal.

2.7 ACCESSORIES

A. General: Furnish auxiliary materials recommended by Roofing System Manufacturer for intended use and compatible with membrane roofing materials.

1. Furnish liquid-type auxiliary materials that meet VOC limits of authorities having jurisdictions.

B. Flashing and Flashing Accessories: As recommended by the Thermoplastic sheet Manufacturer's printed instructions for reinforced sheet flashing of same material, type, thickness, and color as sheet membrane.

C. Fasteners: FM Approved corrosion resistant steel screws of the appropriate size for fasteners for roof membrane and insulation attachment and for sheet metal flashing. Fasteners for the membrane shall be supplied by the Thermoplastic Manufacturer and are to be installed as recommended by Thermoplastic Sheet Manufacturer's printed instructions.

1. Shall be Factory Mutual approved and supplied by the manufacturer for the specific application.
2. Fastener for Brick: Shall be 1/4 inch x 2 inches, stainless steel nail, one piece unit, flat head, as manufactured by Rawl Zamac Nailin, or approved equal.
3. Nails: G-90 galvanized or non-ferrous type, size as required to suit application, minimum 11 gauge with 3/8 inch diameter head.

D. Bonding Adhesive: As recommended by Thermoplastic Sheet Manufacturer's printed instructions to develop a bond between the membrane and the substrate to which the membrane is to be attached. Sarnacol Bonding Adhesive or approved substitute.

E. Metal Termination Bars: Manufacturer's standard aluminum bars, approximately 1-inch (25-mm) wide, roll formed and pre-punched.

F. Metal Flashings, Copings, Edge Trim and Accessories: Provide all roofing Manufacturer's metal required for a complete roofing system covered under the Manufacturer's warranty.

G. Sealants: Membrane Manufacturer's approved sealant shall be used to seal penetrations through the membrane system and at miscellaneous sealant applications that come in contact with roof systems components.

H. Liquid Applied Flashings: Two-component polymethyl methacrylate-based (PMMA) material by Roofing Manufacturer. Include in 20 Year NDL warranty.

I. Walkway Pads / Protection Pads: Provide a polyester reinforced, weldable membrane with embossment similar to a chevron pattern.
   1. Provide walk pads shall be installed at point of roof access to each service points of all roof mounted equipment requiring periodic maintenance.
   2. Protection pads shall have rounded corners and extend minimum four (4) inches beyond edge of overlying element.
   3. Provide new protection pads under all pipe supports, at HVAC and mechanical access points, in front of all roof top doors and openings.

J. Miscellaneous Accessories: Provide pourable sealants, performed cone and vent sheet flashings, pre-formed inside and outside corner sheet flashings, T-joint covers, termination reglets, and other accessories as recommended by Roof System Manufacturer for intended use.

K. Other miscellaneous materials shall be of the best grade available and approved in writing by Roof System Manufacturer, prior to use, for the specific application.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Existing Conditions: Examine existing building and new construction to determine existing physical conditions that affect installation of new roofing.

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

C. Environmental Requirements:
   1. Apply roofing in dry weather.
   2. Do not expose roof components and flashing in inclement weather or when it is predicted 30% or more possibility for inclement weather.
   3. When ambient temperature is below 40 degrees Fahrenheit, expose only enough sensitive cements, sealants, and adhesives as required for use within a four-hour period.
   4. Do not expose membrane and accessories to a constant temperature of 180 degrees Fahrenheit.

D. Protection:
   1. Provide special protection and avoid traffic on completed areas of membrane installation.
   2. Restore to original condition or replace work or materials damaged during handling of roof materials.
   3. Take precautions as required to protect adjacent work and structures.

E. Emergency Equipment: Maintain on site equipment necessary to apply emergency temporary edge seal in event of sudden storms or inclement weather.

F. Restrictions:
   1. Comply with General Requirements on use of site.
   2. Smoking is prohibited on all roof areas or in existing buildings.
   3. Maintain facility and all utility services in a functional condition.
   4. Provide sanitary facilities for employees.

3.2 EXAMINATION

A. Examine and verify that receiving substrate surfaces of the structure have no defects or errors, which would result in poor or potentially defective application or cause latent defects in workmanship.
   1. Examine substrate to which roofing material is to be applied to ensure that its condition is satisfactory for roofing application. Do not permit voids greater than 1/4 inch wide in the substrate. Substrates for roofing materials shall be dry and free of oil, dirt, grease, sharp edges, and debris. Inspect substrates, and correct defects before application of thermoplastic sheets.

B. Verify that roofing openings and penetrations are in place and set and braced and that roof drains are properly clamped into position.

C. Do not proceed with installation until unsatisfactory conditions have been corrected. Starting installation shall imply acceptance of surfaces and conditions.

3.3 NAILERS

A. Wooden nailers shall be installed at perimeter edges or drip edges on outside perimeter of building, to match elevation of new roof insulation and recovery board thickness.

B. All Construction: Nailers shall be the same height as the new insulation and recovery board being installed or to existing raised roof edge whichever is applicable. Nailers shall be anchored to resist a pullout force of 300 pounds per linear foot per Factory Mutual Data Sheet 1-49. Fasteners shall be no less than two (2) per nailer, and be spaced at two (2) feet on center maximum. Provide nailers at all penetrations. Raise all curbs, flashing, etc, a minimum of eight (8) inches above the finished surface.

3.4 SUBSTRATE PREPARATION

A. Substrate Surface: Prepare substrate surfaces to insure proper and adequate installation, in strict accordance with the Contract Documents and approved Shop Drawings, or Manufacturer’s requirements.

B. Fill all gaps and voids between substrate components that are wider than 1/4 inch. Fill all gaps with same materials as the substrate.

C. The Membrane Manufacturer shall specify types of substrates that are suitable for use with the bonding adhesive.

D. Protection of Adjacent Areas or Surfaces: Protect adjacent areas or surfaces from damage as a result of the Work of this section. Remove sharp projections.

E. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

F. Complete terminations and base flashings and provide temporary seals to prevent water

from entering completed sections of the roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

G. Tear-off :
1. Tear-off existing roof system down to existing lightweight concrete deck, deck to remain. Remove all associated Flashings and abandoned equipment.
2. Repair / Patch all existing decks as required, due to removal of equipment or deteriorated conditions.
3. Sweep or vacuum all surfaces, removing all loose aggregate and foreign substances prior to commencement of roofing. Ensure dry, smooth surface with no depressions or ponding water. Notify Roof Consultant prior to roofing any areas that may result in ponding water.
4. Trash Chutes: Roofing materials and other discarded materials shall be put into an enclosed trash chute. No material may be thrown off roof. Remove debris daily from roof and from grounds.
5. Refer to phasing plans for flashing of existing curbs now and demolition of existing curbs and penetrations at future dates, flashing of new curbs and penetrations at a future date.

3.5 APPLICATION OF INSULATION

A. General: (As required per roof area)
1. Manufacturer's Instructions: In regard to attachment, the Manufacturer's instructions or specifications shall determine the suitability for an application.
2. Fastener pull out test will be required for verification of condition of the concrete decking and suitability of Manufacturer's metal fasteners
3. Precautions: The surface of the insulation must not be ruptured due to overdriving of fasteners. The surface of the insulation or substrate shall be inspected prior to installation of the thermoplastic roof membrane. The substrate shall be clean, dry and smooth with no excessive surface roughness, contaminated surfaces or unsound surfaces such as broken, delaminated, or damaged insulation boards. Any wet, broken, delaminated, or damaged insulation shall be replaced with new insulation.
4. Thermal insulation boards shall be laid between metal panel ribs, with overall thickness a minimum of ¾" taller than rib. All joints shall be tight and at the roof perimeter and roof penetrations, insulation shall be cut neatly and fitted to reduce openings to a minimum. All openings 1/4 inch or larger shall be filled with insulation.
5. No more insulation shall be installed than can be covered by the completed roof system by the end of the day or the onset of inclement weather.
6. Tapered insulation and crickets, when specified, shall be placed in accordance with the drawings and / or as required NRCA standards.

B. Specified polyisocyanurate recovery board shall be fully adhered to concrete deck meeting Factory Mutual recommendations for wind uplift as dictated by wind zone applicable to location of project.

3.6 INSTALLATION OF PVC MEMBRANE

A. General: Install in strict accordance with manufacturer's latest published requirements, instructions, specifications, and details and approved shop drawings.

B. Over the properly installed and prepared substrate, manufacturer's adhesive shall be poured out of the pail and spread using notched ¼" X ¼" X ¼" rubber squeegees. The adhesive shall be applied at a rate according to manufacturer's requirements. No adhesive is applied to the back of the fleece-backed membrane. ***Do not allow adhesive to skin***

over or surface-dry prior to installation of fleece-backed membrane.

C. The roof membrane is unrolled immediately into the wet adhesive. Adjacent rolls overlap previous rolls by 3 inches. This process is repeated throughout the roof area. Immediately after application into the adhesive, each roll shall be firmly pressed into place with 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 fleece-backed membrane.***

D. Weld cover strips at all seams that do not have a factory selvage edge.

3.7 SEAM INSTALLATION

A. Clean seam areas, overlap sheets, and weld side and end laps of sheets and flashings according to Manufacturer's written instructions to ensure a watertight seam installation. Weld seam as follows:
1. Weld Method: Hot Air

B. Test lap edges with probe to verify seam weld continuity on a daily basis. Perform pull-tests of welded lap seam samples daily and install T-joint patches at all t-joint intersections of membrane and flashing seams.

C. Repair tears, voids, and lapped seams in roofing that does not meet requirements.

3.8 FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrate according to roofing system Manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of flashing sheet at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with sheet flashing as recommended by Manufacturer.

D. Clean seam areas, overlap seams, and firmly roll flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.

E. Test lap edges with probe to verify seam weld continuity. Apply lap sealant, if required by roofing manufacturer, and seal exposed edges of sheet flashing terminations per Manufacturer's requirements.

F. Terminate and seal top sheet flashings and mechanically anchor to substrate through termination bars.

3.9 METAL FLASHINGS, COPINGS, EDGE TRIM AND ACCESSORIES INSTALLATION

A. General: Secure metal flashings accessories at roof edges according to FM Loss Prevention Data Sheet 1-49 for specified wind zone.

3.10 QUALITY CONTROL

A. Roofing Installer: On-site evaluation welded seams shall be made by the Contractor to locations as directed by the Owner's representative or PVC Manufacturer's technical representative. Two-inch wide cross-section samples shall be taken three times a day minimum through completed seams. Correct welds shall display failure from shearing of the

membrane prior to separation of weld. The Contractor at no extra charge to the Owner shall patch each test cut. Test seam samples shall be label with location of seam cut, date of seam cut, and retain for Owner's representative or PVC Manufacturer's technical representative for test cut inspection.

B. Manufacturer's Quality Control Inspection: The Manufacturer's Technical Representative shall review the on-going work on a minimum of three times every 30 calendar days. All defects noted non-compliance with the Contract Documents or the recommendations of the Thermoplastic Manufacturer should be itemized in a punch list. These items must be corrected immediately by the Contractor to the satisfaction of the Owner's Representative and the thermoplastic manufacturer.

3.11 PROTECTING AND CLEANING

A. Protect sheet membrane roofing from damage and wear during remainder of construction period.

B. Immediately remove all spots, smears, stains, residues, adhesives, etc., from the Work of this Section and / or upon adjacent areas or surfaces, which result from the Work of this Section.

C. Upon completion of the Work of this Section, dispose of, away from the Site, all debris, trash, containers, residue, roofing remnants and scraps which results from the Work of this Section.

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

E. Overnight Seal / Water Cut-Off:
   1. Over Night Seal: Shall be performed according to accepted roofing practice as outlined in the NRCA Roofing Manual.
   2. Water Cut-Off: At the end of day's work or when precipitation is imminent, construct a water cut-off at all open edges. Cut-offs can be built using asphalt or plastic cement and roofing felts, constructed to withstand protracted periods of service. Cut-offs must be completely removed prior to resumption of roofing.

3.12 ACCEPTANCE

A. Prior to demobilization from the site, the Owner / Project Manager, Roof Consultant and Installer shall review the work. All defects noted noncompliance with the Contract Document or the recommendations of the PVC Manufacturer should be itemized in a punch list. These items must be corrected immediately by the Contractor prior to demobilization to the satisfaction of the Owner / Project Manager, and the PVC Manufacturer.

B. Notify Roof Consultant and Owner 48 hours in advance of the date and time of inspection.

C. All warranties as required for the project of this specification shall be submitted for approval prior to final payment.

END OF SECTION 07 54 23

SECTION 07 62 00 – ROOF RELATED SHEET METAL

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 SECTION INCLUDES

A. It is the intent of this Section that the Work shall:
   1. Conform to all applicable building code requirements and of authorities having jurisdiction;
   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 and hood and umbrella counterflashing
      b. Metal counterflashing
      c. Expansion joint
      d. Roof drains
      e. Scuppers
      f. Metal perimeter edge
      g. Gutters, Downspouts, Splash Blocks and Splash Pans
      h. One-way roof moisture relief vents
      i. Metal gravity vents
      j. Metal heat exhaust vents
      k. Sanitary vent pipes
      l. Pipe box
      m. Copings, trim and miscellaneous sheet metal accessories.
   3. Be part of the Work of Section 07 54 23, Polyvinyl Chloride Membrane Roofing System; and
   4. Be performed by a single source contractor.

1.3 RELATED WORK

A. Section 07 54 23 – Polyvinyl Chloride (PVC) Membrane Roofing System

B. Section 07 72 00 – Roof Accessories

C. All Sections of Work relating to or affecting the roofing system, including mechanical, plumbing and electrical items.

1.4 REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. A525, Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
   2. A526, Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality
   3. A527, Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality
   4. A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
   5. B32, Specification for Solder Metal

6. C1107, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)

B. ASCE-7 Wind uplifts requirements for geographical area.

C. National Roofing Contractors Association (NRCA)
1. Roofing and Waterproofing Manual (Latest Edition)

D. Single-Ply Roofing Institute (SPRI)
1. ANSI/SPRI ES-1

E. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
1. Architectural Sheet Metal Manual (Latest Edition)

F. Underwriters' Laboratories (UL)
1. Fire Hazard Classifications

G. California Building Code (CBC)

1.5 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, 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 inches long sample of each specified item with approved finish.
3. Provide full-size mockup of all shop-built assemblies.
4. Documentation of Wind uplift requirements for Roof Edge for specific project location
   a. Wind Calculator available online

1.6 QUALITY ASSURANCE

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

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

C. ANSI / SPRI ES-1: Install sheet metal edge flashings and copings to comply with requirements of ANSI / SPRI ES-1 for minimum of up to 115 MPH wind speed zone and wind resistance loads.

1.7 INSTALLATION CONFERENCE

A. Refer to Section 5-10 Weekly Job Meetings of the Front End Documents

1.8 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.

1.9 WARRANTY

A. Manufacturer's Product Warranty:
1. Manufacturer's standard 30 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 not be limited to:
   a. Deterioration of finish, such as fading, discoloring, peeling, cracking, corroding, etc.
3. Wind Warranty
   a. Non-Coastal: up to 160 MPH Blow Off Resistance, 20 Year
4. Correction may include repair or replacement of failed product as outlined in Warranty Documents
5. Finish warranty and wind warranty shall be delivered by Roofing Contractor to Owner at the conclusion of project as part of project close-out documents.

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

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: **Metal Era, Inc.**, which is located at: 1600 Airport Rd.; Waukesha, WI 53188; Toll Free Tel: 800-558-2162; Tel: 262-549-6900; Fax: 800-373-9156; Email: request info (info@metalera.com); Web: www.metalera.com

B. Substitutions: Before proposal date upon roof consultant approval.

C. 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; and
4. products are approved for use by the roofing membrane manufacturer.

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 Galvanized Sheet Steel:
1. Commercial quality ASTM A527 G-90 hot-dip galvanized coating designation.
2. Thickness: Except as otherwise indicated, minimum 24 gauge. SMACNA recommendations shall govern.
3. Finish: Kynar 500 or Hylar 5000 in color as selected by Architect from manufacturer's standard colors.

C. Membrane Clad Sheet Steel:
1. Commercial quality ASTM A527 with G-90 hot-dip galvanized coating designation.
2. Thickness: Except as otherwise indicated, minimum 24 gauge. SMACNA recommendations shall govern.
3. Finish: PVC coating as per Membrane Manufacturer’s requirements.

D. Stainless Steel: ASTM A167, 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 non-corrosive metal or as noted below.

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

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

D. Mechanical Fasteners:
1. Nails: Ring shank, minimum 1-1/2 inches 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:
1. Cleat (coping / fascia): Minimum 22 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. At expansion joints: to be used as bellow; 48 mil minimum, non-reinforced,

homogeneous, waterproof, impermeable elastomeric sheeting manufactured by Nervastral, Inc. or Lexsuco.

2. At wood blockings: Self-Adhered Flexible Flashing: 40-mil, rubberized asphalt adhesive reinforced flashing with a high density cross laminated polyethylene film. Provide compatible substrate primer as instructed by manufacturer.

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, 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: “Chem-Calk 900” manufactured by **Bostik Construction Products Division**, “Vulkem 921” manufactured by **Mameco International, Inc.**, “Dynatrol I” manufactured by **Pecora Corporation**, “MasterSeal NP 1” manufactured by BASF, or 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: “Chem-Calk 1200” manufactured by **Bostik Construction Products Division**, ”795 Silicone Building Sealant” manufactured by **Dow Corning Corporation**, “895 Silicone” manufactured by **Pecora Corporation**, “Omniseal” manufactured by **Sonneborn Building Products**, or approved equal.

G. Termination Bar:
1. Material: Stainless steel or extruded aluminum bar with lipped profile.
2. Size: 1/8 inch thick by one (1) inch wide with factory punched 1/4 inch x 3/8 inch oval holes spaced at six (6) inches on center.
3. Approved Product / Manufacturer: “TB 125” manufactured by **TruFast Corp.**, or approved equal.

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

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

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

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. Shop fabricate through-wall, counterflashings, expansion joint metal and wind clips to greatest extent possible.

D. Fabricate items to size and dimensions as indicated on the drawings. Limit single-piece lengths to twelve (12) feet for prefabricated pieces and ten (10) feet for shop fabricated pieces.

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

F. Integrate flashing in a manner consistent with membrane waterproofing detailing. Form work to fit substrates.

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

H. Fabricated items will have straight lines, sharp angles, smooth curves, and true levels. Avoid tool marks, buckling, and oil canning.

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

J. Unless noted otherwise, lap joints minimum three (3) inch. Lap joints to have sealant installed as per details, to maintain watertight condition, inside and outside corners and elevation changes to be riveted and soldered.

K. 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.

L. 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.

M. Backpaint all concealed metal surfaces with bituminous paint where expected to be in contact with cementitious materials or dissimilar metals.

N. 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 (1) inch deep filled with mastic sealant concealed within joints.

2.6 FABRICATED ITEMS

A. Metal Flashings:
1. Through-Wall/Saw-Cut Receiver: Minimum 24 gauge stainless steel formed in maximum ten (10) foot lengths, through wall receivers shall not extend past the face of the exterior veneer more than 3/4”.
2. Counterflashings: Minimum 24 gauge prefinished steel, formed in maximum ten (10) foot lengths.

B. Wind Clips: Minimum 24 gauge prefinished steel, one (1) inch 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 5 feet.

C. Roof Penetrations:
1. Umbrella Counterflashing: Two-piece construction of minimum 22 gauge prefinished steel, fabricated in accordance with drawings or project requirements.

D. Metal Edge / Fascia:
1. Perma-Tite System 200 Fascia for thermoplastic roof systems: Decorative metal fascia with continuous formed rail.
   a. Construction:
      1) Fascia metal gauge
         a) 24 gauge galvanized steel.
      2) Finish:
         a) Kynar-500 color as selected by the Architect from roof edge manufacturer's standard colors.
      3) Formed Rail: Shall be continuous 20 gauge galvanized steel at 12'-0" standard lengths with pre-punched slotted holes and 6" stainless steel springs at 4'-0" on center.
2. Thermoplastic Version
   a. Model:
      1) FA-80 (8.25" Face)
   b. Performance:
      1) 20-year, 180 mph Wind Warranty.
      2) Tested per ANSI / SPRI ES-1 FM 4435 Standard to a design pressure of 200 psf to comply with the California Building Code.

E. Metal Coping
1. Perma-Tite Coping
   a. Construction:
      1) Metal:
         a) 24 gauge galvanized steel.
      2) Finish:
         b) Kynar-500 color as selected by the Architect from roof edge manufacturer's standard colors.
   b. Coping Cap: Length of 12'-0", widths to 24" manufactured to job requirements. True radii may be built to template.
   c. Coping Vertical Face and Back Leg: 2 ¼" to 12 ½" manufactured to job requirements.
   d. Concealed Splice Plates: 8" wide. Finish to match finish of coping cap with factory applied dual non-curing sealant strips.
   e. Anchor / Support Cleat: 20 gauge pre-punched galvanized cleat with stainless steel spring mechanically locked to cleat normally 12" wide at 4'-0" on center. Mechanically fastened as indicated and detailed.
   f. Fasteners: 1 ½" stainless steel with driver.
   g. Performance:
      1) 20-Year, 120 mph Wind Warranty
      2) Tested per ANSI / SPRI ES-1 Standard to comply with the California Building Code.

F. Continuous Cleats (where applicable): Continuous strips, same material and profile, minimum one gauge heavier of item which cleats attach.

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

H. Angle Termination Bar: Aluminum pressure bar 1/8 inch x one (1) inch.

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 (3) feet from actual corner. Laps shall be one (1) inch, riveted and soldered at following locations:
1. pre-fabricated corners;
2. transitions;
3. changes in direction, elevation, and plane; and
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 which 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.
1. Ensure approved fasteners are used throughout the project.
2. Ensure fasteners are installed in manufacturer pre-punched holes on rails, extrusions, clips and cleats.
3. Ensure sufficient amount of water block is applied where appropriate to prevent leaking under rails/extrusions. **Contractor is responsible for remedying for total length of workmanship warranty if water block is not installed appropriately.**

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 which are incompatible with roofing system.

E. Cleat: At exposed edges of perimeter edge, fascias, cap flashings, and where required, attach cleat with appropriate fasteners supplied by roof edge manufacturer. Install cleat so

fascia extends a minimum of 1 inch below top of exterior wall finish.

F. Counterflashing:
1. Do not use surface mount counterflashing except as noted in drawings.
2. Set in through wall / saw-cut 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 at 30 inches o.c. at all counterflashing over five (5) feet in length.

G. 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 (1) inch. Apply a continuous bead of sealant on inside of pipe prior to folding lead sleeve.

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 which 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 GENERAL REQUIREMENTS

A. Drawings and Conditions of Contract, including General and Supplementary Conditions and Division 1 Administration Sections, apply to this Division.

1.2 INSTALLATION RESPONSIBILITY

A. In addition to the items normally a part of this Section, coordinate the installation of roof accessory curbs and pipe flashing and equipment supports that may be specified elsewhere.

B. See Summary of Work for Alternate #1 and Alternate #2 Descriptions.

C. Coordinate the work specified herein with the following Work:
1. Roofing
2. Roofing sheet metal
3. Mechanical equipment
4. Plumbing

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

1.4 DELIVERY, STORAGE, AND HANDLING

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

1.5 WARRANTY

A. Warranty the Work specified herein for one (1) year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

B. Defects shall include, but not be limited to, the following:
1. Noticeable deterioration of finish
2. Leakage of water into the building or within the construction.

C. Rooftop supports – 5 year limited warranty.

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 PRE-FABRICATED ROOF CURBS

A. Frames:
   1. Material: ASTM A 653 G90 hot-dipped galvanized steel.
      a. Minimum 18 gauge, and as engineered by manufacturer.
      b. Minimum 18 gauge for curbs supporting HVAC units
      c. 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 10 inches 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. 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 joists, only two angles will be required. Coordination mechanical equipment weight loading on the roof with Structural Engineer.

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

2.3 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)
      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 Manufacturer:
      a. Miro Industries, Inc.
      b. Portable Pipe Hanger, Inc.
      c. MAPA Products
      d. Architectural approved equal

B. Electrical Conduit / Condensate Lines:
   1. Lines less than 3” OD: (non-penetrating)
      a. 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)
      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
   3. Approved Manufacturer:
      a. Miro Industries, Inc.
      b. Portable Pipe Hanger, Inc.
      c. MAPA Products
      d. 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 Manufacturer:
      a. Miro Industries, Inc.
      b. Portable Pipe Hanger, Inc.
      c. MAPA Products
      d. Architectural approved equal

2.4 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 isolation pad over galvanized metal cap of flashed into roof system as detailed on drawings and similar to outline of equipment support curb of NRCA guidelines.

2.5 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.

2.6 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 (6) 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: Six (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: Six (6), stainless steel, for studs.
   2. Screws: Three (3), stainless steel, to attach strainer to clamping ring.

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

2.7 VISIBILITY TAPE SAFETY ZONE DEMARCATION

A. **Alternate #1** – Manufacturer-provided or acceptable, compatible 2” wide self-adhered safety tape for demarcation of a safe distance from roof perimeter edge where no parapet exists that meets minimum 18” code requirement.

B. **Alternate #2** – Manufacturer-provided or acceptable, compatible 4” wide PVC welded tape

for demarcation of a safe distance form roof perimeter edge where no parapet exists that meets minimum 18” code requirement.

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 support by seismic curb.
   2. Provide roof manufacturer protection pad below each support, tacked in place with approved mastic or adhesive.
   3. Install hold-down clips or guides to ensure piping maintains 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 HATCH SLIDER

PART 1 GENERAL

1.1 SUMMARY

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

B. Related Sections:

1. Div 03 – Concrete- Cast-in- Place
2. Div 04 – Concrete- Unit Masonry
3. Div 05 – Metal- Structural Steel Framing

1.2 SUBMITTALS

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

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation instructions.

B. Shop Drawings: Provide shop drawings showing layout, profiles, and product components, including anchorage, hardware, and finishes. Include dimensional plans, applicable material specifications, elevations and sections detailing mounting and connections.

1. Contractor to provide manufacturer with field measurements and mounting structure prior to commencement of shop drawings.

C. Calculations: Upon signed finalization and approval of dimensions, mounting location material and configuration, and load requirements;

1. Submit calculations by a qualified engineer, to verify roof hatch's ability to withstand the design loading.

1.3 QUALITY ASSURANCE

A. Manufacturer: A minimum of 5 years experience manufacturing similar products. Must demonstrate compliance and certification of a Quality Management System administered by the International Organization for Standardization (ISO). Documentation of current certification status to be provided upon request.

B. Welder Qualifications: Welders Certified in accordance with American Welding Society Procedures for applicable material used in production of specified product.

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 ten (10) years from the date of shipment. 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 MANUFACTURER

A. Basis-of-Design Manufacturer: Model SRH Slidewise™, Fully assembled Sliding Roof Hatch including hatch frame, hatch panel, and hatch hardware by **PS Industries Inc.**, 1150 South 48th Street, Grand Forks, ND 58201, 1-877-446-1519, Web: www.psindustries.com. Comply with the following:

2.2 EQUIPMENT

A. The Slidewise™ is a low profile, corrosion resistant aluminum hatch for ladder access to roofs. Unlike traditional tip-up hatches, the Slidewise™ Roof Hatch opens horizontally, eliminated the effect of wind. It provides a safer access point for personnel and reduces maintenance cost from wind damage.

Model/Opening Size Dimensions:

SRH MODEL #	OPENING SIZE DIMS		SHIPPING WEIGHT
	WIDTH	LENGTH	
SRH-3030A	30”	30”	114 lbs.
SRH-3630A	36”	30”	120 lbs.
SRH-3636A	36”	36”	131 lbs.

2.3 MATERIALS

A. A. Hatch Panel: Nominal 2” thickness, fabricated from an internal welded aluminum framework. Sheeting to be aluminum, factory bonded in place. Integrated, full length pull handle, interior and exterior. Panel to be constructed as one (1) piece.

B. B. Hatch Panel Insulation: Rigid polystyrene between internal framing members, full depth of panel cavity. Nominal R-Value = 10.

C. C. Track and Frame: Unitized track mounting frame. Hatch operates on four (4) aluminum rollers with double sealed stainless steel ball bearings.

D. Weatherseals to be compressible rubber type, full perimeter, and field replaceable.

1. Material: UV Resistant EPDM bulb seal.

E. Lock/Latch: Deadbolt, keyed exterior and keyed interior. Provided with small format construction core.

F. Hardware/Fasteners: Corrosion resistant, Stainless Steel type 18-8.

G. Finish: All exposed surfaces to be mill finish aluminum, no paint applied.

H. Options:

1. Curb: Four-sided 16-gauge formed galvannealed steel, 12” in height. Curb to have formed flange for securing to roof structure. Insulation shall be 1” fiberboard, Nominal R-Value = 5.
2. OSHA Compliant Safety Railing System: Four-sided railing system providing permanent protection for guarding roof hatch opening. Includes self-closing safety gate at entry, to ensure no openings are left unprotected, and integrated horizontal grab bars.
3. Deadbolt: Keyed exterior with interior thumb turn. Provided with small format construction core.

I. Placards: Factory mounted, danger labels with graphic fall hazard symbols.

J. Labeling: Factory mounted, decal labels for product identification.

2.4 FABRICATION

A. Fit and factory assemble items in largest practical sections, for shipment to site.

B. Fabricate items with joints tightly fitted and secured.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until mounting substrates have been properly prepared.

B. If substrate preparation is the responsibility of another subcontractor, notify Architect of uncompleted preparation before proceeding.

C. Inspect opening for compliance with manufacturer requirements. Verify open conditions are within required tolerances

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's installation instructions, "Approved for Construction" drawings, shipping, handling, and storage instructions, and product carton instructions for installation.

B. Product must be installed level, square, plumb, and rigid.

C. Tolerances: All dimensional requirements must be in accordance with manufacturer's installation instructions and "Approved for Construction" drawings.

D. Verify all anchorage is in accordance with manufacturer's installation instructions and

applicable data sheets.

E. Inspect weatherseal for damage, wear, and adhesion. Replace compromised weatherseals immediately.

3.4 FIELD QUALITY CONTROL

A. Field Testing:

1. Installer to operate and field verified products including the sealing surfaces to assure that they maintain contact at the correct sealing points.
2. Installer to verify that rollers and locking assemblies operate freely and correctly.

3.5 CLEANING

A. Touch-up, repair or replace damaged products or components before Substantial Completion.

B. Clean all sealing surfaces.

3.6 PROTECTION

A. Protect installed products until completion of project.

END OF SECTION 07 72 33

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 06 10 00: Selective Demolition.
2. Section 07 62 00: Roof Related Sheet Metal.
3. Section 07 72 00: Roof Accessories.
4. Section 09 90 00: Painting and Coating.

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. VOC data: Submit manufacturer’s product data for sealants. Indicate VOC limits of the product. Submit MSDS highlighting VOC limits.
3. 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 weather-seals 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 (weather-seal 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) 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) 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) 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) 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) 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) **USG Corporation**; SHEETROCK Acoustical Sealant.
      5) 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) 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. Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

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

C. 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.

D. 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.

E. 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.

F. 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.

G. 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.

H. 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.

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 09 90 00 PAINTING AND COATING

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

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. Chemical Components of Interior Paints and Coatings:
   1. Provide products complying with limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and SCAQMD Rule1113:
      a. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
      b. Restricted Components: Paints and coatings shall not contain components restricted by the EPA and the SCAQMD.

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

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

G. Fastener Head Cover Materials: Latex filler.

H. 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. Masonry (Clay and CMUs): 12 percent.
      d. Wood: 15 percent.
      e. Gypsum Board: 12 percent.
      f. 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. Spray Textured Ceiling Substrates: Verify surfaces are dry.

F. 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.

G. Commence paint and coating 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. Galvanized Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
      e. 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.
c. Clean concrete floors to receive paint or coating with a 5 percent solution of muriatic acid or etching cleaner. Flush floors with clean water to remove acid; neutralize with ammonia, rinse, allow to dry; vacuum before painting.

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: 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. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

M. 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, dryouts, 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.

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

O. 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.

P. Pipe Covering and Insulation: Clean to remove loose, foreign, and objectionable material before applying sealing coat.

Q. 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.

R. 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.

S. 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* includes 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. 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.
g. 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. Block Fillers: Apply block fillers to concrete masonry block at rate to ensure complete coverage with pores filled.

I. 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.

J. 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.

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

L. 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 microgroover, 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 the AISD that the sites remain 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:
      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.
   6. Parking Line and Driveway Paint: Vin-L-Stripe VSZM10 Zone Marking Paint Yellow.
   7. All piping in mechanical rooms shall be painted in their entirety, in the following colors: Aristoshield ASHL70 High-Gloss Enamel:
      a. Gas lines: Orange
      b. Domestic cold water: White
      c. Domestic hot water: Pink
      d. Heating hot water: Red
      e. Condenser water: Green
      f. Chilled water: Blue

C. Interior Surfaces:
   1. Galvanized Metal:
      a. Primer: One (1) coat Ultrashield Galvanized Metal Primer ULGM00.
      b. Finish: Two (2) coats Aristoshield ASHL50 Semi-Gloss Enamel.
   2. Shop-Primed Ferrous Metals (Use for metal doors and frames and miscellaneous metal items):
      a. Shop coat by others.
      b. One (1) coat over Steel: Bloc-Rust Premium BRPR00 Rust Preventative Primer; Aluminum: Ultrashield Galvanized Metal Primer ULGM00.
      c. Two (2) coats Aristoshield ASHL50 Semi-Gloss Enamel.
   3. Gypsum Wallboard:
      a. Primer: One (1) coat Vinylastic Premium VNPR00 Acrylic Wall Sealer.
      b. Finish: Two (2) coats Spartawall Premium SWLL30 Acrylic Latex Eggshell.
   4. Primer Concrete and CMU (Enamel):
      a. One (1) coat Smooth Blocfil Premium SBPR00 100% Acrylic Block Filler.
      b. Finish: Two (2) coats Premium SWLL50 Acrylic Latex Semi-Gloss.
   5. Wood (Painted):
      a. Primer: Interkote Premium IKPR00 100% Acrylic Enamel Undercoater.
      b. Finish: Aristoshield ASHL50 Semi-Gloss Enamel.
   6. Wood (Stained):

a. Stain: Gemini Craftsman Collection Wiping Stain CCW Water-Based Series.
b. Finish (First Coat): WB-0230 Gemini Titanium Clear Urethane Satin
c. Finish (Second Coat): Gemini WB-0230 Gemini Titanium Clear Urethane Satin.

7. Gypsum Wallboard (Epoxy) – Kitchens, bathrooms, laboratories, etc.:
   a. Primer: One (1) coat US Coatings AquaGrip 2600 2-3 Mils DFT.
   b. Finish: Two (2) coats US Coatings AquaGrip 2600 3-5 Mils DFT per coat.
8. CMU (Epoxy) - Kitchens, bathrooms, laboratories, etc.:
   a. Primer: Two (2) coats Smooth Blocfil Premium SBPR00 100% Acrylic Block Filler.
   b. Finish: Two (2) coats US Coatings AquaGrip 2600 3-5 Mils DFT.
9. Pipe and fittings, including but not limited to copper and brass, at kitchen areas (but excluding aluminum, stainless steel, nickel and chrome plated pipe and fittings):
   a. Primer: One (1) coat; US Coatings RustGrip 2300 1-2 Mils DFT.
   b. Finish: Two (2) coats bright aluminum paint, US Coatings UreGrip 3000 VOC 2-3 Mils DFT per coat.

D. Paint Types: Refer to the Finish Schedule in the Drawings.

END OF SECTION 09 90 00