Permit Submittal
1/10/18

UNLV Carlson Education Building Re-roof

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LAS VEGAS, NV 89154

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UNLV Carlson Education Bldg. Re-Roofing
Permit Submittal Specifications 01/10/18

END OF TABLE OF CONTENTS

SECTION 024100
ROOF DEMOLITION AND CLEANUP

PART 1 – GENERAL

1.1 DESCRIPTION

A. Provide all labor, materials, equipment, and tools to remove the existing roofing system and all associated flashings for the specified Work as designated in the specifications and on the drawings.

B. Provide for the proper disposal of all existing materials to be removed as designated in the specifications and on the drawings.

C. Provide for the cleanup of excess materials, equipment, tools, construction debris, etc., as required to maintain the project site in a neat and orderly condition.

1.2 SCHEDULING

A. Coordinate the roof preparation work with the new roofing work in such a manner as to keep the new insulation and roofing materials, building, and building interior unconditionally dry and watertight.

B. Coordinate all work with the Owner to minimize any disruptions of the Owner's operations.

PART 2 – PRODUCTS

2.1 CLEANERS

A. Cleaners used in conjunction with surface preparation work shall meet local code requirements for runoff water quality.

PART 3 - EXECUTION

3.1 Protection of Surfaces

A. Contractor shall take all precautions during roof removal to protect the building and adjacent surfaces from being soiled or damaged.

B. Contractor shall restore to original condition any damage caused during the Work performed.

C. Keep roof surface clean of any material or debris that might prevent proper drainage.

D. At start of each workday, drains located within daily work area shall be temporarily plugged to prevent debris from entering into the drain. Plugs to be removed at the end of each workday. All drain plugs shall be removed prior to any rainfall or inclement weather. Do not allow water to build up or pond at any time.

E. Prior to tear-off, verify that all soil pipes, flues, steel members, and other similar penetrations are secured to the building structure. Coordinate removal or securement of all unsecured penetrations prior to the start of roof demolition.

F. Take measures to prevent odors, fumes or vapors of any kind from entering occupied spaces.

G. Contractor shall provide interior protection, do not allow debris or materials to enter or fall into occupied or unoccupied spaces. Any dust or debris resulting from the Work shall be cleaned up at the Contractors expense.

H. Prevent newly installed work from becoming soiled, damaged, or otherwise affected.

3.2 DEBRIS HANDLING

A. No material shall be dropped to any point lying outside the exterior walls of the structure, unless otherwise approved in writing by the Owner's representative.

B. On all buildings over 20 feet in height, debris shall be transported using a fully enclosed receptacle that is mechanically lowered. A fully enclosed trash chute may also be used where appropriate for height.

C. Chutes may be job fabricated or pre-manufactured. Pre-manufactured chutes shall be set up and used in accordance with manufacturer's instructions. Chutes shall be designed and constructed of such strength as to eliminate failure for any reason, including impact of materials or debris loaded therein.
D. All material chutes or sections of chutes at an angle greater than 45 degrees from the horizontal shall be entirely enclosed.

3.3 DISPOSAL

A. Properly dispose of all debris on a daily basis.
B. Do not store debris on roof unless otherwise directed by the Owner. Contractor shall not overstress the roof deck.
C. All debris shall be stored in containers approved by the Owner's Representative, and removed from the roof on a daily basis.
D. Keep Owner's property clean of any construction debris. Site shall be left broom clean on a daily basis.

3.4 PREPARTION OF SURFACES

A. The extent of preparation of surfaces is listed in each Section and on the drawings. Summary of Work:
B. The existing roof deck shall be properly prepared and cleaned prior to installation of new roof. At a minimum, prepare all surfaces as required by the manufacturer of materials to be applied over the substrate. Contractor's commencement of work over substrate conditions is evidence of acceptance of substrate conditions.
C. The attachment of steel and wood decks shall be enhanced prior to installation of new roof system as specified.
D. Damaged or deteriorated decks/substrates shall be properly replaced/repaired to match existing construction.
E. Allow existing deck to properly dry. Contractor shall not install new roof system over existing wet deck.

3.5 CLEANUP

A. Throughout the duration of the project, retain all stored materials and equipment in an orderly arrangement allowing maximum access, not impeding drainage or traffic and providing the required protection of materials.
B. Weekly, and more often if necessitated by job conditions, Contractor shall inspect all arrangements of materials stored on site and restack, tidy and resecure as required.
C. Contractor shall clear the construction areas and shall provide for the removal of all construction debris from the site. Contractor shall not allow the accumulation of scrap, debris, waste material and other items not required for construction of the work. Contractor shall provide storage of all items awaiting removal from the project site, observing all requirements for fire protection and protection of the surrounding site.
D. Daily and more often if necessitated by job conditions, Contractor shall inspect the site and pick up all scrap, debris and waste material. Contractor shall remove such items promptly, leaving the construction area and site clean daily. Debris shall not be left on the roof overnight.
E. Contractor shall be responsible to assure that his subcontractors have properly removed and disposed of all debris relating to their contract.
F. At least twice each month and more often if directed by the Owner, Contractor shall completely remove all scrap, debris and waste materials from the project site. Contractor shall maintain the site in a neat and orderly condition at all times.
G. At the completion of the contract, Contractor shall remove from the project site all equipment, tools, excess materials, etc., related to his contract. Contractor shall be responsible to assure that his subcontractors have properly removed from the project site all equipment, tools, excess materials, etc., related to their contract.
H. Contractor shall be responsible for returning all areas set aside for staging and storage to their original condition.

I. Contractor shall repair damage and remove stains caused by work in this specification from walls, walkways and driveway.

END OF SECTION

SECTION 030100

MAINTENANCE OF CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Concrete crack repair.
B. Related Sections:
   1. Section 033000 - Cast-In-Place Concrete.

1.2 REFERENCES

A. ASTM International:
   1. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
   2. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
   3. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
   4. ASTM C33 - Standard Specification for Concrete Aggregates.
   5. ASTM C109/C109M - Standard Test Method for Compressive strength of Hydraulic Cement Mortars (Using 2-in. or (50 mm) Cube Specimens).
   6. ASTM C150 - Standard Specification for Portland Cement.
   7. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
   8. ASTM C293 - Standard Test Method for Flexural Strength of Concrete (Using Simple Beam With Center-Point Loading).
   9. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
   10. ASTM C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
   11. ASTM C1042 - Standard Test Method for Bond Strength of Latex Systems Used With Concrete By Slant Shear.
   12. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.
   13. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics.
   14. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Submittal procedures.
B. Product Data: Submit product standards, physical and chemical characteristics, technical specifications, limitations, maintenance instructions, and general recommendations regarding each material.
C. Manufacturer’s Instructions: Submit mixing instructions.
D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Section 017700 - Execution and Closeout Requirements: Closeout procedures.
B. Project Record Documents: Accurately record actual locations of structural reinforcement repairs and type of repair.
C. Operation and Maintenance Data: Procedures for submittals.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with Clark County of Nevada Public Work's standard.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three (3) years documented experience.
B. Applicator: Company specializing in concrete repair with minimum three (3) years documented experience and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Product storage and handling requirements.
B. Comply with instructions for storage, shelf life limitations, and handling.

PART 2 - PRODUCTS

2.1 EPOXY ADHESIVE INJECTION MATERIALS

A. Furnish materials as indicated on contract drawings.

2.2 EPOXY MORTAR MATERIALS

A. Furnish materials as indicated on contract drawings.
B. Aggregate: Type recommended by mortar manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 013000 - Administrative Requirements: Coordination and project conditions.
B. Verify surfaces are ready to receive work.

3.2 PREPARATION

A. Flush out cracks and voids with water to remove laitance and dirt and allow drying following manufacturer’s recommendations.
B. Clean concrete surfaces of dirt, laitance, corrosion, or other contamination; wire brush using water; rinse surface and allow drying following manufacturer’s recommendations.
C. Provide temporary entry ports spaced to accomplish movement of fluids between ports; no deeper than depth of crack to be filled or port size diameter no greater than thickness of crack. Provide temporary seal at concrete surface to prevent leakage of adhesive following manufacturer’s recommendations.

3.3 INJECTION - EPOXY RESIN

A. Inject epoxy resin adhesive into prepared ports under pressure using equipment appropriate for particular application.
B. Begin injection at lower entry port and continue until adhesive appears in adjacent entry port. Continue from port to port until entire crack is filled.
C. Remove temporary seal and excess adhesive.
D. Clean surfaces adjacent to repair and blend finish.

3.4 APPLICATION - EPOXY MORTAR

A. Trowel apply mortar mix to average thickness of as per manufacturer’s recommendations.
B. For patching honeycomb, trowel mortar onto surface, work mortar into honeycomb to bring surface flush with surrounding area. Finish trowel surface to match surrounding area.
C. Cover exposed steel reinforcement with epoxy mortar, feather edges to flush surface.

3.5 FIELD QUALITY CONTROL

A. Section 014500 - Quality Requirements: Testing, inspection and analysis requirements.
B. Test concrete as indicated on contract drawings.

END OF SECTION

SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete for the following:
   1. Slabs on grade.
   2. Wall and Column Footings.

1.2 REFERENCES

A. American Concrete Institute:
   1. ACI 301 - Specifications for Structural Concrete.
   2. ACI 305 - Hot Weather Concreting.
   3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
   4. ACI 308.1 - Standard Specification for Curing Concrete.
   5. ACI 318 - Building Code Requirements for Structural Concrete.

B. ASTM International:
   1. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
   2. ASTM C33 - Standard Specification for Concrete Aggregates.
   3. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
   4. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
   5. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
   6. ASTM C150 - Standard Specification for Portland Cement.
   7. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
   8. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
   9. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
   10. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
   11. ASTM C685/C685M - Standard Specification for Concrete Made By Volumetric Batching and Continuous Mixing.
   12. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
   13. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Submittal procedures.
B. Product Data: Submit data on joint devices, attachment accessories and admixtures.
C. Design Data:
   1. Submit concrete mix design for each concrete strength type. Submit separate mix designs when admixtures are required for the following:
      a. Hot and cold weather concrete work.
      b. Air entrained concrete work.
   2. Identify mix ingredients and proportions, including admixtures.

3. Identify chloride ion content of admixtures and whether or not chloride was added during manufacture.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Accurately record actual locations of embedded utilities and components concealed from view in finished construction.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 318.
B. Conform to ACI 305 when concreting during hot weather.
C. Conform to ACI 306.1 when concreting during cold weather.
D. Acquire cement and aggregate from one source for Work.
E. Perform Work in accordance with Clark County of Nevada Public Work's standard.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Section 016000 - Product Requirements: Environmental conditions affecting products on site.
B. Maintain concrete temperature after installation at minimum 50 degrees F for minimum 7 days.

1.7 COORDINATION

A. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Cement: ASTM C150, Type V –Sulfate Resistant Portland cement unless otherwise specified on contract drawings.
B. Coarse Aggregates: Provide coarse aggregate consisting of crushed stone meeting requirements of ASTM C33 for normal weight concrete.
   1. Grade coarse aggregate according to size No. 57 in table 2 of ASTM C33
   2. The limits for deleterious substances and physical property requirements given in Table 3 of ASTM C33 without exception.
C. Fine Aggregates: Provide fine aggregate of normal sharp sand meeting requirements of ASTM C33 for normal weight concrete.
D. Water: Use clean water in mixing concrete which does not contain deleterious amounts of acids, alkalies or organic materials.

2.2 ADMIXTURES

A. Furnish materials according to Clark County of Nevada Department of Public Works standards.
B. Air Entrainment admixture conforming to ASTM C260.
C. Water-reducing admixture conforming to ASTM C494 Type A
D. Water reducing and retarders conforming to ASTM C494 Type D

2.3 ACCESSORIES

A. Bonding Agent as specified on contract drawings.
B. Non-Shrink Grout conforming to ASTM C1107; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2400 psi in 48 hours and 7000 psi in 28 days.
C. Concrete Reinforcing Fibers conforming to ASTM C1116, high strength industrial-grade fibers specifically engineered for secondary reinforcement of concrete. Tensile strength of 130 ksi; toughness of 15 ksi; ¾ inchlong fibers, weight 6 to 8 Denier per filament.

2.4 JOINT DEVICES AND FILLER MATERIALS

A. Joint Filler as specified on contract drawings**.**
B. Expansion and Contraction Joint Devices: as specified on contract drawings.
C. Sealant: ASTM D6690, Type I

2.5 CONCRETE MIX

A. Provide concrete to the 28 days compressive strength specified on contract drawings.
B. Ready Mixed Concrete: Mix and deliver concrete in accordance with ASTM C94.
C. Site Mixed Concrete: Mix concrete in accordance with ACI 318.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 013113 - Administrative Requirements: Coordination and project conditions.
B. Verify requirements for concrete cover over reinforcement.
C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 PREPARATION

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.
B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
C. Remove debris and ice from formwork, reinforcement, and concrete substrates.
D. Remove water from areas receiving concrete before concrete is placed.

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 301 or ACI 318.
B. Notify testing laboratory and Architect/Engineer minimum 24 hours prior to commencement of operations.
C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, and embedded conduits are not disturbed during concrete placement.
D. Deposit concrete at final position. Prevent segregation of mix.
E. Place concrete in continuous operation for each panel or section determined by predetermined joints.
F. Consolidate concrete.
G. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
H. Place concrete continuously between predetermined expansion, control, and construction joints.
I. Do not interrupt successive placement; do not permit cold joints to occur.

3.4 CONCRETE FINISHING

A. Finish concrete floor surfaces in accordance with ACI 301 or ACI 318.

3.5 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
    1. Protect concrete footings from freezing for minimum 5 days.
B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
C. Cure floor surfaces in accordance with ACI 301 or ACI 318.

3.6 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed by Owner's testing laboratory in accordance with IBC 2012.
B. Provide free access to Work and cooperate with appointed firm.
C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.
D. Concrete Inspections:
    1. As specified on contract drawings.
E. Strength Test Samples:
    1. Sampling Procedures: ASTM C172.
    2. Sample as required by IBC 2012
F. Field Testing:
    1. Slump Test Method: ASTM C14.
    2. Air Content Test Method: ASTM C173.
    3. Temperature Test Method: ASTM C1064.
    4. Measure slump and temperature for each compressive strength concrete sample.
    5. Measure air content in air entrained concrete for each compressive strength concrete sample.
G. Cylinder Compressive Strength Testing:
    1. Test Method: ASTM C39.
    2. Test Acceptance: In accordance with IBC 2012.
H. Core Compressive Strength Testing:
    1. Sampling and Testing Procedures: ASTM C42.
    2. Test Acceptance: In accordance with [IBC 2012.
    3. Drill three cores for each failed strength test from concrete represented by failed strength test.
I. Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.

3.7 PATCHING

A. Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.
B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect/Engineer upon discovery.
C. Patch imperfections as directed by Architect/Engineer.

3.8 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
B. Repair or replacement of defective concrete will be determined by Architect/Engineer.
C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

END OF SECTION

SECTION 07542
ADHERED
PVC THERMOPLASTIC MEMBRANE ROOFING

PART 1 - GENERAL CONDITIONS

1.01 DESCRIPTION

A. Scope

Remove only the existing single ply membrane, including all membrane flashings, leaving the existing rigid isocyanurate insulation in place. Install new tapered rigid insulation at the base of the perimeter parapet walls and at the perimeter elevation transition (approximately 4' in from the parapet walls). Repair and prepare to receive new layer of ½" Dens Deck Prime installed directly over the existing insulation and the added tapered isocyanurate rigid insulation with low rise polyurethane foam adhesive

1. Provide and install the necessary tapered rigid isocyanurate insulation at the perimeter elevation transition in order to create a uniform slope between the two existing elevations. Stagger all joints and fully adhered with approved low rise polyurethane foam adhesive per approved PVC manufacturer's installation and detail requirements and the following specification and conforming to FM 1-75 attachment requirements.

2. Provide and install new layer of ½" Dens Deck Prime over the existing rigid insulation and the newly installed rigid tapered insulation. Stagger all joints and fully adhere new ½" Dens Deck Prime with approved low rise polyurethane foam adhesive per the approved PVC membrane manufacturer's installation and detail requirements and the following specifications and conforming to FM 1-75 wind uplift requirements

PART 2 - Provide and install a new adhered 72 mil Single Ply Thermoplastic (PVC) Roofing Membrane along with flashings and other components to comprise a roofing system per the following specifications. Membrane color to be Energy Smart White.

1. Install a new clad metal detail at perimeter edge where required per the following specification and detail requirements. Install per PVC manufacturer's detail and installation requirements.

   Install new surface mounted counter flashing where required. Install per PVC manufacturer's detail and installation requirements.

2. At all A/C or Mechanical unit access areas, install new PVC Crossgrip walkway. Install per PVC manufacturer's recommended detail and installation requirements.

3. Flash each penetration with a cone flashing membrane per PVC manufacture's standard written and detail requirements. Any and all pitch pans are to be removed and each penetration flashed individually.

4. Flash new scuppers with new PVC clad metal per PVC manufacturer's standard written instructions and detail requirements.

B. Related Work

The work includes but is not necessarily limited to the installation of:

1. Roofing and Insulation Installation
2. Substrate Preparation
3. Roof Drains
4. Wood Blocking
5. Insulation
6. Separation Layers
7. Roof Membrane
8. Fasteners
9. Adhesive for Flashings
10. Roof Membrane Flashings
11. Walkways
12. Metal Flashings
13. Sealants

C. Upon successful completion of work the following warranties may be obtained:

1. Manufacturer Warranty – 20 Year Systems Warranty “No Dollar Limit”
2. Roofing Contractor Warranty – 5 Year

1.02 QUALITY ASSURANCE

A. This roofing system shall be applied only by a Roofing Contractor authorized by the Manufacturer prior to bid ("Applicator"). The Roofing Contractor shall have at least five (5) years of experience as an applicator with the submitted manufacturer as certified by the manufacturer.

B. Upon completion of the installation and the delivery to the Manufacturer by the Applicator of a certification that all work has been done in strict accordance with the contract specifications and the Manufacturer’s requirements, an inspection shall be made by a Technical Representative of the Manufacturer to review the installed roof system.

C. There shall be no deviation made from the Project Specification or the approved shop drawings without prior written approval by the Architect, the Owner, the Owner’s Representative and the approved PVC Membrane Manufacturer.

D. All work pertaining to the installation of the membrane and flashings shall only be completed by Applicator personnel trained and authorized by the Manufacturer in those procedures.

E. Membrane to have no formulation changes in the last fifteen (15) years as certified by the manufacturer. **No private labeled membrane products will be accepted or reviewed.**

F. Unreinforced or polyester reinforced membrane base flashings are prohibited.

G. PVC Membrane Manufacturer’s warranty shall have “No Dollar Limit” for the replacement of defective materials and/or labor and shall not contain any exclusion for ponding water.

H. PVC Membrane Manufacturer shall submit third party test data documenting the proposed equal has a membrane “polymer thickness” with two (2) mils of the specified mil thickness, ASTM (+/-) mil tolerances are not excepted.

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

J. PVC Membrane Manufacturer to confirm in writing that they directly manufacture the roofing membrane (private labeled membranes are no acceptable)

1.03 SUBMITTALS

All submittals which do not conform to the following requirements will be rejected.

A. SUBMITTALS WITH BID

1. A list of each primary component to be used in the roof system and the Manufacturer's current literature for each component.

2. Sample copy of Contractor's warranty.

3. Letter from Roofing Manufacturer confirming that the Contractor is an authorized applicator of the specified roof system.

B. SUBMITTALS OF EQUALS

Submit proposed equals to be considered for use on this project no less than ten (10) days prior to bid date. Proposed roof systems which have been reviewed and accepted will be listed in an addendum prior to bid date; only then will roof systems be accepted at bidding.

Submittals shall include the following:

A. Copies of Specification including physical properties.

B. Samples of each primary component to be used in the roof system and the manufacturer's current literature for each component.

C. Written approval by the insulation manufacturer (as applicable) for use and performance of the product in the proposed system.

D. Sample copy of Manufacturer's warranty including **no exclusion for ponding water** and no time limit shall be assigned to any such ponding water.

E. Sample copy of Applicator's warranty.

F. Certifications by manufacturers of roofing and insulating materials that all materials supplied comply with all requirements of the identified ASTM and industry standards or practices and requirements of this specification as stated in Section 2.01, C & D and Quality Assurance. **Copy of the ASTM Certification for the named product showing the Type II Class I fiberglass reinforced roofing membrane.**

G. Certification from the Applicator that the system specified meets all identified code and insurance requirements as required by the Specification.

H. Letter from the proposed manufacturer confirming the number of years it has DIRECTLY manufactured the proposed roof system under the trade names and/or trademarks as proposed. **No private labeled products/membranes will be accepted or reviewed.**

I. Material Safety Data Sheets (MSDS)

J. Written Confirmation from a corporate officer of the roofing system manufacturer that the membrane manufacturer has initiated a post consumer recycle program.

1.04 CODE REQUIREMENTS

The applicator shall submit evidence that the proposed roof system meets the requirements of the local building code and has been tested and approved or listed by the following test organizations. These requirements are minimum standards and no roofing work shall commence without written documentation of the system's compliance, as required in the "Submittals" section of this specification.

A. Factory Mutual Research Corporation (FM) - Norwood, MA

1. Class 1-75 (attachment requirements only)

B. Underwriters Laboratories, Inc. - Northbrook, IL

1. Class A assembly

C. California Title 24 Part 6: Roof Membrane (not post installation applied finish) must comply with current minimum 3 year aged solar reflectance of 0.55 and a minimum thermal emittance of .75.

D. Field and Flashing membrane shall conform to ASTM D4434 (latest version), Standard for Polyvinyl Chloride Sheet Roofing". Classification: Type II Grade I.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

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

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

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

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

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

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

1.06 JOB CONDITIONS

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

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

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

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

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

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

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

H. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the Applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over Felt or plywood over insulation board shall be provided for all new and existing roof areas that receive rooftop traffic during construction.

I. Prior to and during application, all dirt, debris and dust shall be removed from surfaces either by vacuuming, sweeping, blowing with compressed air and/or similar methods.

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

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

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

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

N. Installation of the membrane over coal tar pitch or a resaturated roof requires special consideration to protect the membrane from volatile fumes and materials. Consult the manufacturer for precautions prior to bid.

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

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

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

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

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

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

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

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

1. The roof assembly permits interior air to pressurize the membrane underside.
2. Any exterior wall has 10% or more of the surface area comprised of opening doors or windows.
3. The wall/deck intersection permits air entry into the wall flashing area.

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

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

1.07 BIDDING REQUIREMENTS

A. Pre-Bid Meeting:

A pre-bid meeting shall be held with the Owner's Representative and involved trades to discuss all aspects of the project. The Applicator's field representative or roofing foreman for the work shall be in attendance. Procedures to avoid rooftop damage by other trades shall be determined.

B. Site Visit:

Bidders shall visit the site and carefully examine the areas in question as to conditions that may affect proper execution of the work. All dimensions and quantities shall be determined or verified by the contractor. No claims for extra costs will be allowed because of lack of full knowledge of the existing conditions unless agreed to in advance with the Owner or Owner's Representative.

1.08 WARRANTIES

A. 20 Year Systems Warranty (only products purchased from the membrane manufacturer are covered under System Warranty)

Upon successful completion of the work to the Roofing Manufacturer's and Owner's (UNLV) satisfaction, and receipt of final payment, the twenty (20) Year Systems Warranty shall be issued. The System Warranty shall provide for the roof membrane, all accessories that comprise a roof system, and contractor labor. The Warranty shall be **Non-Prorated** provide for No Dollar Limit (NDL), and **shall not exclude ponding water and no time limited shall be assigned for any such ponding water during the warranty period**.

B. Applicator/Roofing Contractor Warranty

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

C. Owner Responsibility

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

PART 3 - PRODUCTS

2.01 GENERAL

A. The components of the Adhered roof system are to be products of the membrane manufacturer as indicated on the Detail Drawings and specified in the Contract Documents.

B. Components to be used that are other than those supplied or manufactured by the membrane manufacturer may be submitted for review and acceptance by the manufacturer. The manufacturer's acceptance of any other product is only for a determination of compatibility with membrane products and not for inclusion in the manufacturer's warranty. The specifications, installation instructions, limitations, and/or restrictions of the respective manufacturers must be reviewed by the Owner's Representative for acceptability for the intended use with the manufacturer's products.

C. Membrane shall be certified by the manufacturer to be within two (2) mils of the specified membrane thickness as stated in this section. ASTM minimum standards of +/- 10% will not be accepted.

2.02 MEMBRANE

A. Basis of Design - Sika Sarnafil® G410 fiberglass reinforced membrane with a factory-applied integral lacquer coating to repel dirt and sustain reflectivity.

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

1. Sika Sarnafil G410, 72 mil , thermoplastic membrane with fiberglass reinforcement.
2. Or Pre-Approved Equal.

C. Color of Membrane

1. EnergySmart (white), initial reflectivity of 0.83, initial emissivity 0.90, solar reflective index (SRI) of >104.
2. Other standard colors as selected by architect.

D. Typical Physical Properties

Parameters	ASTM Test Method	Minimum ASTM Requirement	Sarnafil Typical Physical Properties
Reinforcing Material	-		Fiberglass
Overall Thickness, min., inches (mm)	D638	0.045	[0.048 inches)]
Tensile Strength, min., psi (MPa)	D638	1500 (10.4)	1600 (11.1)
Elongation at Break, min. (machine x tranverse)	D638	250% / 230%	270% / 250%
Seam strength*, min. (% of tensile strength)	D638	75	80
Retention of Properties After Heat Aging	D3045	-	-
Tensile Strength, min., (% of original)	D638	90	95
Elongation, min., (% of original)	D638	90	90
Tearing Resistance, min., lbf (N)	D1004	10 (45.0)	14 (63.0)
Low Temperature Bend, -40º F (-40º C)	D2136	Pass	Pass
Accelerated Weathering Test (Xenon Arc)	D2565	5,000 Hours	10,000 Hours
Cracking (7x magnification)	-	None	None
Discoloration (by observation)	-	Negligible	Negligible
Crazing (7 x magnification)	-	None	None
Linear Dimensional Change	D1204	0.10 %	0.02%
Weight Change After Immersion in Water	D570	± 3.0%	2.5%
Static Puncture Resistance, 33 lbf (15 kg)	D5602	Pass	Pass
Dynamic Puncture Resistance, 7.3 ft-lbf (10 J)	D5635	Pass	Pass

*Failure occurs through membrane rupture not seam failure.

2.03 FLASHING MATERIALS

A. Wall/Curb Flashing

1. Flashing Membrane

   A fiberglass reinforced membrane adhered to approved substrate using adhesive.

2. Clad

   A PVC-coated, heat-weldable sheet metal capable of being formed into a variety of shapes and profiles. Clad is a 25 gauge, G90 galvanized metal sheet with a 20 mil (1 mm) unsupported membrane laminated on one side.

B. Miscellaneous Flashing

1. Stack – Membrane Prefabricated Pipe Flashing
   A prefabricated vent pipe flashing made from 0.048 inch (48 mil/1.2 mm) thick G410 membrane.

2. Circle-"G"
   Circular 0.048 inch (48 mil/1.2 mm) thick G410 membrane patch welded over T-joints formed by overlapping thick membranes.

3. Corner
   Prefabricated outside and inside flashing corners made of 0.060 inch (60 mil/1.5 mm) thick membrane that are heat-welded to membrane or Clad base flashings. Corner is available in 2 outside sizes (5 inch and 8½ inch diameter/127 mm and 215 mm) and 1 inside size.

4. Multi-Purpose Sealant
   A sealant used at flashing terminations.

5. Flashing Adhesive
A solvent-based reactivating-type adhesive used to attach membrane to flashing substrate.

6. Self Adhered Vapor Barrier
A 32 mil self adhesive vapor barrier that can also serve as temporary roof protection. Self Adhered Vapor Barrier is available in rolls 44.9 inches x 133.8 feet.

2.04 INSULATION & SEPARATION BOARD

A. Dens-Deck Prime – 1/2" thickness
A siliconized gypsum, fire-tested hardboard with glass-mat facers. Dens-Deck is provided in a 4 ft x 8 ft (1.2 m x 2.4 m) board size and in thicknesses of ½ inch.

B. Rigid Insulation – R-30 – 2 layers of 2.6" (if required)
Rigid polyisocyanurate foam insulation with black mat facers, 20 psi. Consult product data sheet for additional information.

2.05 ATTACHMENT COMPONENTS

A. Membrane adhesive
1. Water Based Adhesive: Field Membrane

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

APPLICATION RATES FOR FELTBACK MEMBRANE						
	Adhesive Rates - Gallons/100 Ft² *(Liters/Meter²)*					**Approximate Sq. Ft./Pail** *(meter²)*
	Substrate		**Membrane**		**Total**	
Isocyanurate facer	1.75 *(0.71)*	+	0	=	1.75 *(0.71)*	285 *(26.48)*
Smooth plywood	1.75 *(0.71)*	+	0	=	1.75 *(0.71)*	285 *(26.48)*
Concrete deck	2.00 *(0.81)*	+	0	=	2.00 *(0.81)*	250 *(23.23)*
Cellular concrete	2.00 *(0.81)*	+	0	=	2.00 *(0.81)*	250 *(23.23)*
GP Dens-Deck®	1.75 *(0.71)*	+	0	=	1.75 *(0.71)*	285 *(26.48)*
GP Dens-Deck Prime®	1.50 *(0.61)*	+	0	=	1.50 *(0.61)*	333 *(30.94)*

Notes:

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

B.

Notes:

a) Adhesive must be applied as a continuous layer.
b) Use a water-filled, foam-covered lawn roller to consistently and evenly press insulation into adhesive layer.
c) Storage temperatures in excess of 90° F (32° C) may affect shelf life.
d) If exposed to temperatures below 40° F (5° C), restored to a minimum temperature of 60°F (15° C) before use.
e) Job site conditions may affect performance. Adhesive shall not be used if surface and/or ambient temperatures below 40° F (5° C) are expected during application or subsequent curing time.
f) Adhesive shall not be applied to wet or damp surfaces.

C. Fastener XP

A #15, heavy duty, corrosion resistant fastener used with peel-stop and bar to attach PVC membrane to steel or wood decks. Fastener XP has a shank diameter of approximately .21 inch (5.3 mm) and the thread diameter is approximately .26 inch (6.6 mm). The driving head has a diameter of approximately .435 inch (11 mm) with #3 Phillips recess to for positive engagement.

D. Peel Stop

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

E. Insulation Board Adhesive

1. Olybond 500 Adhesive

A two component (part A and B) low rise polyurethane foam used to attach insulation to approved compatible substrates. Adhesive is applied with a pace cart in bands 12 inches on center. Application rates are typically one gallon per square. Additional adhesive may be required for rougher surfaces.

2. Millenium Adhesive:

A one step low rise polyurethane foam used to attach insulation to approved compatible substrates. Adhesive is applied with a gravity fed applicator or by hand with a dual component caulk gun in bands 12 inches on center. Additional adhesive may be required for rougher surfaces.

2.06 WALKWAY PROTECTION

A. Crossgrip Walkway

A rolled out reinforced protection mat used to protect PVC roofing membrane from mechanical abuse. Crossgrip Walkway is 9/16 inch thick flexible pvc with a heavily textured surface. The walk way is to be secured with loops of PVC membrane welded to the field sheet.

2.07 MISCELLANEOUS FASTENERS AND ANCHORS

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

PART 4 - EXECUTION

3.01 PRE-CONSTRUCTION CONFERENCE

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

B. The meeting shall discuss all aspects of the project including but not limited to:

1. Safety
2. Set up
3. Construction schedule
4. Contract conditions
5. Coordination of the work

3.02 SUBSTRATE CONDITION

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

B. Applicator shall verify that the work done under related sections meets the following conditions:

1. Roof drains and/or scuppers have been reconditioned and/or replaced and installed properly.
2. Roof curbs, nailers, equipment supports, vents and other roof penetrations are properly secured and prepared to receive new roofing materials.
3. All surfaces are smooth and free of dirt, debris and incompatible materials.
4. All roof surfaces shall be free of water, ice and snow.

3.03 SUBSTRATE PREPARATION

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

A. Re-roof

General Criteria

Only that amount of roofing and flashing which can be made weathertight with new materials during a one-day period or before the onset of inclement weather.

1. Poured Concrete Substrate:

   The roof deck shall be installed and cured in accordance with industry standards. The surface shall have a smooth and level finish and shall be free of dust, excess moisture, oil-based curing agents and loose debris. Sharp ridges and other projections above the surface shall be removed before roofing.

2. Repair of the existing damaged concrete substrate, all damaged concrete to be removed per industry standards.
   a. The existing reinforcement steel will be cleaned to industry standards with a heavy wire cup brush until all corrosion has been removed and the rebar is rust free. The prepared area shall be protected from any moisture intrusion prior to the placement of modified concrete.
   b. Modified/plasticized concrete shall be used to repair the existing prepared concrete to a smooth finish that will match the adjacent elevations around the prepared area.

3. Stucco repair and replacement
   a. All damage stucco shall be removed and replaced in order to provide a uniform finish to all adjacent stucco surfaces and provide a watertight building envelope.

3.04 SUBSTRATE INSPECTION – INSULATION BOARD INSTALLATION

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

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

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

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

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

F. INSULATION BOARD INSTALLATION:

Olybond 500 Adhesive

1. Apply using a pace cart equipment over properly installed and prepared substrate in bands 12 inches on center. Allow to rise approximately ½-3/4” inch. Lay separation boards in adhesive and walk into place to ensure full embedment. On roof slopes greater that ½ inch in 12 inches, begin adhering separation boards at low point and work upward to avoid slippage. One person should be designated to walk in, trim/slit and apply weight to all insulation boards to ensure adequate securement. Only areas that can be made completely water tight in the same day’s operation shall be coated.

Millennium Adhesive:

1. With a utility knife, cut away the plastic plugs from the adhesive mixing head. Attach a mixing tip to the threaded mixing head. Place the cartridge in the applicator. At the beginning of the tube, some the material should be pumped out initially to make sure of a proper mix. Apply using gravity fed applicator or by hand with a dual component caulk gun over properly installed and prepared substrates in bands of 12 inches on center. Walk insulation boards into wet adhesive to ensure full embedment.

3.05 INSTALLATION OF ROOF MEMBRANE

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

A. Water Based Adhesive:

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

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

3. Weld PVC coverstrips at all PVC membrane seams that do not have a factory selvage edge.

   Notes:

   a) Water based adhesive shall not be used if temperatures below 40º F (5º C) are expected during application or subsequent drying time.
   b) No adhesive shall be applied in seam areas. All membrane shall be applied in the same manner.

3.06 HOT-AIR WELDING OF SEAM OVERLAPS

A. General

1. All seams shall be hot-air welded. Seam overlaps should be 3 inches (75 mm) wide when automatic machine-welding and 4 inches (100 mm) wide when hand-welding, except for certain details.

2. Welding equipment shall be provided by or approved by the manufacturer. All mechanics intending to use the equipment shall have successfully completed a training course provided by a Technical Representative prior to welding.

3. All membrane to be welded shall be clean and dry.

B. Hand-Welding

Hand-welded seams shall be completed in two stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding.

1. The back edge of the seam shall be welded with a narrow but continuous weld to prevent loss of hot air during the final welding.

2. The nozzle shall be inserted into the seam at a 45 degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow," the hand roller is positioned perpendicular to the nozzle and pressed lightly. For straight seams, the 1½ inch (40 mm) wide nozzle is recommended for use. For corners and compound connections, the ¾ inch (20 mm) wide nozzle shall be used.

C. Machine Welding

1. Machine welded seams are achieved by the use of automatic welding equipment. When using this equipment, the manufacturer's instructions shall be followed and local codes for electric supply, grounding and over current protection observed. Dedicated circuit house power or a dedicated portable generator is recommended. No other equipment shall be operated off the generator.

2. Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.

D. Quality Control of Welded Seams

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

3.07 MEMBRANE FLASHINGS

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

A. Adhesive for Membrane Flashings

1. Over the properly installed and prepared flashing substrate, adhesive shall be applied according to instructions found on the Product Data Sheet. The adhesive shall be applied in smooth, even coats with no gaps, globs or similar inconsistencies. Only an area which can be completely covered in the same day's operations shall be flashed. The bonded sheet shall be pressed firmly in place with a hand roller.

2. No adhesive shall be applied in seam areas that are to be welded. All panels of membrane shall be applied in the same manner, overlapping the edges of the panels as required by welding techniques.

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

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

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

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

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

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

H. All flashings that exceed 30 inches (0.75 m) in height shall receive additional securement. The awarded contractor shall Consult Technical Department for securement methods.

3.08 CLAD METAL BASE FLASHINGS/EDGE METAL

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

A. Clad metal flashings shall be formed and installed per the Detail Drawings.

1. All metal flashings shall be fastened into solid wood nailers with two rows of post galvanized flat head annular ring nails, 4 inches (100 mm) on center staggered. Fasteners shall penetrate the nailer a minimum of 1 inch (25 mm).

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

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

3.09 WALKWAY INSTALLATION

A. Cross Grip Walkway

Roofing membrane to receive the Cross Grip Walkway shall be clean and dry. Crossgrip Walkway is installed loose laid on top of completed PVC roof assemblies. Where design wind speeds exceed 94 mph. the walkway must be secured/welded with PVC membrane loops to newly installed PVC membrane. Unroll and position Crossgrip Walkway within specified areas and cut to desired length. Do not install Crossgrip Walkway directly over securement bars. Securement clips are available for butting tow ends together.

3.10 TEMPORARY CUT-OFF

All flashings shall be installed concurrently with the roof membrane in order to maintain a watertight condition as the work progresses. All temporary waterstops shall be constructed to provide a 100% watertight seal. The stagger of the insulation joints shall be made even by installing partial panels of insulation. The new membrane shall be carried into the waterstop. The waterstop shall be sealed to the deck and/or substrate so that water will not be allowed to travel under the new or existing roofing. The edge of the membrane shall be sealed in a continuous heavy application of sealant as described in Section 1.06. When work resumes, the contaminated membrane shall be cut out. All sealant, contaminated membrane, insulation fillers, etc. shall be removed from the work area and properly disposed of off site. None of these materials shall be used in the new work.

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

If any water is allowed to enter under the newly-completed roofing, the affected area shall be removed and replaced at the Applicator's expense.

3.11 COMPLETION

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

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

END OF SECTION

SECTION 076000

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements of other sections shall apply to this section.

1.2 SUMMARY/WORK INCULDED

A. This Section includes, but is not limited to, the purchase and installation of the following sheet metal flashing and trim to provide a permanently watertight condition:
   1. Receivers, counterflashing and counterflashing extensions.
   2. Sheet metal parapet coping cap.
   3. Equipment curb, pipe and penetration covers / caps.
   4. Drip edge flashings.
   5. Metal flashings and counter flashings required in coordination with roofing systems.
   6. Polymer clad metal flashings.
   7. Scuppers, collector heads, downspouts and accessories.

1.3 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

C. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

D. As applicable, meet ANSI/SPRI ES-1 and FM 1-49 compliance.

E. National Roofing Contractors Association Roofing Manual(s).

F. Architectural Sheet Metal Manual, Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

G. Annual Book of ASTM Standards, ASTM International

H. Manufacturer’s published specifications, product data sheets, application instructions and technical bulletins.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, attachment /fastening rates, dimensions of individual components and profiles, and finishes.

B. Provide custom shop drawings for each product including layout, profile, joinery, attachment, etc.

C. Provide ANSI/SPRI ES-1 Certification for all perimeter edge metal.

D. Coordinate and provide nailer attachment schedule in accordance with FM 1-49.

E. Provide sample metal warranty from primary manufacturer, to include provisions regarding, finish, weather tightness, and wind speed.

F. Samples for Initial Selection: For each type of sheet metal flashing and trim indicated with factory-applied color finishes.
   1. Include similar Samples of trim and accessories involving color selection.

G. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
   1. Sheet Metal Flashing: 12 inches long. Include specified joints, fasteners, cleats, clips, closures, and other attachments.
   2. Trim: 12 inches long. Include fasteners and other exposed accessories.
   3. Accessories: Full-size Sample.

1.5 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" and the NRCA's Roofing and Waterproofing Manual in coordination with requirements of roofing and waterproofing systems (the more stringent shall apply). Conform to dimensions and profiles shown unless more stringent requirements are indicated.

B. Qualification of Installers: Use skilled workers who are trained and experienced in the crafts and who are completely familiar with the specified requirements.

C. In acceptance or rejection of the work of this section, the owner will make no allowances for lack of skill on the part of the workers.

D. Warranties:
   1. Sheet metal flashings and associated components shall be included as part of the primary roofing manufacturer's warranty.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section.
   1. Meet with Owner, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials and roof-mounted equipment.
   2. Review methods and procedures related to sheet metal flashing and trim.
   3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
   4. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling. Handle material in such a manner as to prevent damage and contamination with moisture or foreign matter. Deliver materials in the manufacturer's original sealed and labeled containers and in quantities required to allow continuity of application.

B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage. Store materials within areas

designated or approved by owner. Ensure materials remain dry, covered and not in direct contact with the ground.

C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

D. Roof surfaces shall be protected from damage at all times. When storing materials on roof, do not overstress the deck.

E. In the event of damage, immediately make all repairs and replacements to the satisfaction of the owner at no additional cost.

F. Follow the manufacturers published recommendations for storing of temperature sensitive materials.

1.7 COORDINATION

A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation. Fabricate flashings from materials noted below as most appropriate in regards to the system that the flashing is being integrated with and / or adjacent to and in coordination with the drawings and finish schedules. Concealed flashings may be mill finish.

B. Coordinate all phases of work to allow continuity of work without delays.

C. Protect building and its components from the elements at all times during the project.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. Stainless-Steel Sheet: Minimum 24 ga., AISI Type 302 / 304 alloy, 2B finish.

B. Aluminum: 3003-H14 alloy, meeting ASTM B209-02a. Minimum 0.040” thickness.

C. Galvanized: G-90, Minimum 22 gauge. ASTM A653 / A653M., mill finish
1) Cleat(s)

D. Sheet lead: Minimum 4.0 lbs. / sq. ft.

E. Polymer Clad Metal: Heat-weldable, 25 ga., G-90 galvanized steel sheet with a 20-mil unsupported PVC membrane coating laminated on one side. Polymer clad metal shall be manufactured by and included in the warranty of the primary roofing system manufacturer.
a) Manufacturers Standard Color as selected by Owner. Paint polymer clad metal flashings color selected by Owner.

1) Metal Drip Edge – Color to match adjacent membrane.
2) Flanges – Color to match adjacent membrane
3) Sleeves – Color to match adjacent membrane

F. Pre-finished steel: 22-24 ga. G-90 galvanized, commercial steel, extra smooth, primed and finished on one side with Kynar/Hylar based fluoropolymer coating of 1.0 mil total dry filn thickness, and on the reverse side, with a wash coat of .03 to .4 mil dry film thickness. A strippable plastic film should protect the finish during fabrication and installation.
a) Color to be selected by owner from standard color chart.
2) Slip flashing, 24 ga min.
3) Collector Head, 22ga min.
4) Counter flashing, 24 ga min.
5) Receiver Flashing, 22 ga min.
6) Sheet Metal Coping, 24 ga min.
7) Downspouts, 22 ga min.

2.2 UNDERLAYMENT MATERIALS

A. Polyethylene Sheet: 6-mil-thick polyethylene sheet complying with ASTM D 4397.

B. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

C. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft..

D. Self-Adhered Underlayments: ASTM D 1970 and HT (High Temperature) Grade.

E. Roofing Membrane: Same mil and thickness as field sheet.

F. Use only compatible materials in contact with roofing membrane.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Fasteners: Provide stainless (where applicable) steel wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads. Coordinate fastener type and material with metal flashing material.

1. Exposed Fasteners: Self-drilling screws (sheet metal to sheet metal) or wood screws (sheet metal to wood) with hex heads and neoprene washers.
2. Blind Fasteners: Stainless-steel rivets.
3. Roofing nails: 11 or 12 ga. Stainless ring shank or annular threaded roofing nails with diamond point, 3/8" minimum diameter head and minimum 1 ¼" length.
4. Screws: #12 stainless steel hex or pan head screws with lengths as required to penetrate substrate a minimum of 1 ½""
5. Washers: Stainless steel with neoprene gasket backing. Shall be 9/16" diameter for use with #12 screws and 5/8" diameter for use with ¼" diameter concrete masonry anchors.
6. Concrete and Masonry Anchors: ¼" diameter metal based expansion anchor with stainless steel pin length as required to penetrate substrate a minimum of 1 ½".
7. Rivets: #44 stainless steel rivets with stainless steel mandrel. Length as required to properly fasten sheet metal components. Rivets shall be factory painted to match adjacent sheet metal.

C. Solder for Zinc-Tin Alloy-Coated Stainless Steel: ASTM B 32, 100 percent tin.

D. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

E. Silicone Sealant: Type S, Grade NS, Class 25. SIKASIL, DOW 795 or equal. Color to match adjacent materials.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.

G. Bituminous Coating: For separation of dissimilar materials. Cold-applied asphalt mastic, SSPC-Paint 12, compounded for minimum 30-mil dry film thickness. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

H. Aluminum Tape: Pressure sensitive, 2" wide aluminum tape used as a separation layer between small areas of asphalt contamination and the membrane and as a bond breaker at the PVC clad metal edge joints.

I. Compressible insulation: Un-faced friction-fit fiberglass building insulation, cut to fit from batts.

J. Backer Rod: Non-absorbent, non-staining and non-gasing. Must be 1.5 times the width of the joint.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" and the NRCA's Roofing and Waterproofing Manual that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.

B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
1. Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

D. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

G. Dissimilar materials: Dissimilar materials or metals in contact that are subject to electrolysis shall be protected against such prior to installation. Protective materials shall not be visible after installation. Protect metals using coatings or separators as recommended by manufacturer.

H. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" and NRCA's Roofing and Waterproofing Manual for application but not less than thickness of metal being secured.

2.5 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Counterflashing and Counterflashing Extensions: Fabricate with length sufficient to lap base flashing fasteners 2 inches minimum. Fry Reglet, Co, SM and ST Type as applicable, or equal.

B. Flashing Receivers: Fabricate in minimum 96-inch-long, but not exceeding 10-foot-long, sections. Lap, rivet and solder joints. Turn up back edge of reglet-mounter receivers 1/2 inch. Turn up end dams 4 inches. Form receiver for counterflashing along front edge.

C. Curb Covers/ Cap Flashings: Fabricate with length sufficient to lap base flashing fasteners 2 inches minimum. Solder all joints.

D. All other copings, metal edges, scuppers, collector heads, counter-flashings, downspouts, etc. as specified and detailed.

2.6 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Fluoropolymer Coating Finish: Two coat, shop-applied, baked-on fluorpolymer coating system based on minimum 70% resin, formulated by a licensed manufacturer and applied by manufacturer's approved applicator to meet AAMA 2605-98. Color (from manufacturer's standard color selection) as selected by Owner and / or noted on finish schedule.

C. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

D. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.

1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

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

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
1. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
1. Coat side of stainless-steel and lead sheet metal flashing and trim with compatible coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of approved underlayment and cover with a slip sheet or install a course of polyethylene underlayment.

C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and butyl sealant.

E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Field verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches

of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for screws.
   1. Stainless Steel: Use stainless-steel fasteners.

H. Seal non-soldered joints with compatible sealant as required for watertight construction.
   1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
   2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches except where pretinned surface would show in finished Work.
   1. Do not solder prepainted, metallic-coated steel sheet.
   2. Pretinning is not required for zinc-tin alloy-coated stainless steel and lead.
   3. Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.

3.3 ROOFING FLASHING INSTALLATION

A. General: Install sheet metal roof flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual" and the NRCA's Roofing and Waterproofing Manual. Provide concealed fasteners unless otherwise indicated, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

B. Curb Flashing:
   1) Extend height of curb as shown in detail drawing.
   2) Terminate flashing membrane a minimum of 8" above the finished roof surface and apply sealant at the top of the flashing membrane.
   3) Fabricate metal flashing at curbs as shown in detail drawings in 10' lengths.
   4) Notch and lap ends of adjoining sections not less than 4"; apply sealant between sections.
   5) Secure flashing 12" on center and a minimum of two fasteners per side of the curb.
   6) Lap miters at corners a minimum of 1" and apply sealant.

C. Two-Piece Receiver and Counter flashing:
   1) Fabricate receiver and counter flashing as depicted in drawings in 10' lengths.
   2) Terminate flashing membrane a minimum of 8" above the finished roof surface and apply sealant at the top of the membrane flashing.
   3) Counter flashing shall extend a minimum of 2" below the base flashing termination.
   4) Notch and lap ends of adjoining sections not less than 4"; apply sealant between sections.
   5) Apply sealant tape between receiver flashing and wall substrate and surface mount receiver flashing 12 inches on center.
   6) Install properly tooled sealant to ensure adhesion and slope to shed water.

7) Install counter flashing as indicated in drawings and secure receiver flashing 12 inches on center. Stagger receiver anchors with counter flashing anchors.
8) Lap miters at corners a minimum of 1" and apply sealant.

D. Counterflashing Extensions: Fasten counterflashing extensions to through-wall flashing, receivers and integral equipment caps/ counter flashings with stainless steel screws with neoprene washers, minimum 24 inches on center, and minimum 3 per side of curbs. Lap joints a minimum of 4 inchesand bed with two rows of sealant.
1. Secure in a waterproof manner by means of stainless steel screws with neoprene washers a minimum of 12-incheson center.

E. Pipe / Conduit Enclosures: Where mechanical, electrical or other grouped piping/ conduits penetrate the roofing system, install wood curbs constructed to provide 10 inches of vertical clearance above the roof insulation surface. Reroute existing or install new pipes/ conduits to configuration shown on the Drawing so pipes/ conduits slope away from curb. Field verify dimensions and fabricate enclosure as shown on Drawing. Solder all joints, except as noted. Reconnect mechanical equipment, and verify units function properly. Fill enclosure with insulation.

F. Sheet Metal Parapet Cap
a. Install new nailers at top of parapet wall sloping to interior side.
b. Extend roofing membrane up and over the parapet wall down the outside face approximately 1.5 inches below the nailer.
c. Embed the edge of the membrane in two-sided multipurpose tape and fasten.
d. Install continuous cleat and fasten.
e. Install sheet metal parapet cap flashing in accordance with plans, specifications, industry standards and manufacturers requirements.
f. Install nailer in accordance with FM 1-49.
g. Install coping in accordance with ANSI/SPRI ES-1.

G. Collector Head
a. Fabricate and install collector heads in accordance with specifications and details. Install in accordance with specified industry standards.

H. Down Spouts
a. Fabricate and install downspouts in accordance with specification and details. Install in accordance with specified industry standards.

I. Polymer Clad Metal Edge:
1) Extend roofing membrane over eave edge and terminate as detailed.
2) Fabricate metal edge as shown in detail in 10' lengths. Meet ANSI/SPRI ES-1. Install continuous cleat as indicated on drawings and fasten to substrate in accordance with ANSI/SPRI ES-1, with a minimum 6" on center. Locate fasteners no greater than 2" from the bottom hem.
3) Lock polymer clad drip edge onto continuous cleat and fasten in accordance with ANSI/SPRI ES-1, with a minimum attachment rate of 4" on center through the metal flange, not within ½" from the inside edge and ¾" from the outside edge.
4) Strip flange of metal edge with hot-air welded stripping membrane. Stripping membrane shall be 4" greater than the flange width and shall fit closely to the lip of the metal edge.
5) Metal Edge Joints:
a) Leave ¼" opening between metal edge sections. Install two fasteners in the end of the flange, and one in the end of the vertical face of each metal edge section.
b) Center aluminum tape over entire joint opening(flange and face).
c) Hot air weld 4" wide strip of stripping membrane over the entire joint.
d) Strip in flange of metal edge as described.
e) Follow manufacturer's instructions.

3.4 MISCELLANEOUS FLASHING INSTALLATION

A. Install all other sheet metal flashings in accordance with specified industry standards and manufacturers recommendations.

B. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment.

3.5 CLEANING AND PROTECTION

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

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 079200

JOINT SEALANTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and color Samples.

B. Environmental Limitations: Do not proceed with installation of joint sealants when ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS

A. Low-Emitting Materials: Sealants shall comply with.

B. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under service and application conditions.

C. Sealant for Use in Building Expansion Joints;

1. Single-component, neutral-curing silicone sealant, ASTM C 920, Type S; Grade NS; Class 50; for Use NT.

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

1) Dow Corning Corporation.

2) GE Construction Sealants; Momentive Performance Materials Inc.

3) Sika Corporation; Joint Sealants.

b.

2.2 MISCELLANEOUS MATERIALS

A. Provide sealant backings of materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

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

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

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with ASTM C 1193.

B. Install sealant backings to support sealants during application and to produce cross-sectional shapes and depths of installed sealants that allow optimum sealant movement capability.

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

D. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal perimeters, control joints, openings, and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions. Comply with ASTM C 919.

END OF SECTION

SECTION 099113

EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:
   1. Product Data:[Include printout of MPI's "MPI Approved Products List" with product highlighted.]
   2. Samples.

B. Extra Materials: Deliver to Owner [**1 gal.**] of each color and type of finish-coat paint used on Project, in containers, properly labeled and sealed.

PART 2 - PRODUCTS

2.1 PAINT

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Benjamin Moore & Co.
   2. Dunn-Edwards Corporation.
   3. Frazee Paint; Comex Group.
   4. Kwal Paint.

B. MPI Standards: Provide materials that comply with MPI standards indicated and listed in its "MPI Approved Products List."
   1. Block Filler, Latex: MPI #4.
   2. Primer, Alkali Resistant, Water Based: MPI #3.
   3. Primer, Bonding, Water Based: MPI #17.
   4. Primer, Bonding, Solvent Based: MPI #69.
   5. Primer, Alkyd, Anticorrosive: MPI #79.
   6. Primer, Galvanized, Water Based: MPI #134.
   7. Primer, Quick Dry, for Aluminum: MPI #95.
   8. Primer, Latex: MPI #6.
   9. Primer, Alkyd: MPI #5.
   10. Latex, Exterior Flat (Gloss Level 1): MPI #10.
   11. Latex, Exterior Low Sheen (Gloss Level 3-4): MPI #15.
   12. Latex, Exterior Semigloss (Gloss Level 5): MPI #11.
   13. Latex, Exterior, Gloss (Gloss Level 6): MPI #119.
   14. Light Industrial Coating, Exterior, Water Based (Gloss Level 3): MPI #161.
   15. Light Industrial Coating, Exterior, Water Based, Semigloss (Gloss Level 5): MPI #163.
   16. Light Industrial Coating, Exterior, Water Based, Gloss (Gloss Level 6): MPI #164.
   17. Alkyd, Exterior Flat (Gloss Level 1): MPI #8.
   18. Alkyd, Exterior, Semigloss (Gloss Level 5): MPI #94.
   19. Alkyd, Exterior Gloss (Gloss Level 6): MPI #9.
   20. Alkyd, Quick Dry, Semigloss (Gloss Level 5): MPI #81.
   21. Alkyd, Quick Dry, Gloss (Gloss Level 7): MPI #96.

C. Material Compatibility: Provide materials that are compatible with one another and with substrates.
   1. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

D. Colors: Match Existing.

PART 3 - EXECUTION

3.1 PREPARATION

A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove hardware, lighting fixtures, and similar items that are not to be painted. Mask items that cannot be removed. Reinstall items in each area after painting is complete.

C. Clean and prepare surfaces in an area before beginning painting in that area. Schedule painting so cleaning operations will not damage newly painted surfaces.

3.2 APPLICATION

A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Paint exposed surfaces[**, new and existing,**] unless otherwise indicated.
   1. Do not paint prefinished items, items with an integral finish, operating parts, and labels unless otherwise indicated.

C. Apply paints according to manufacturer's written instructions.
   1. Use brushes only where the use of other applicators is not practical.

D. 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.
   1. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

3.3 EXTERIOR PAINT APPLICATION SCHEDULE

A. Concrete, Surfaces:
   1. [**Low-Sheen**] Latex: [**Two coats**]: MPI EXT 3.1A.

B. Steel:
   1. [**Semigloss**], Alkyd Quick-Dry: [**One coat**] over alkyd anticorrosive primer: MPI EXT 5.1A.

C. Galvanized Metal:
   1. [**Low-Sheen**] Latex: [**Two coats**] over waterborne galvanized-metal primer: MPI EXT 5.3H.

END OF SECTION