PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section includes the following:
   1. Removal of existing roofing membrane. Existing bur roof has one overlay and penetration mastic is asbestos containing. See included test report.
   2. Mechanical attached single ply roofing membrane system, including roof insulation board, base flashing, pre-coated metal flashings.
   3. Fully adhered single ply roofing membrane at steep sloped surfaces, cants, flanges, and accessories.
   4. Minor repair to adjacent clay tile roofing and flashings.

B. Related Sections:
   1. Asbestos materials abatement.

1.02 SUBMITTALS

A. Product Data: Copies of manufacturer's printed product data and specifications.
B. Certificates of Compliance: From insulation and roofing component manufactures that materials to be supplied comply with the industry standards and are compatible with one another.
C. Samples: Submit finish samples of roofing membrane.
D. Shop Drawings: Show special joint treatment or termination conditions and conditions of interface with other materials.

1.03 QUALITY ASSURANCE

A. Installer: Authorized by the roofing system manufacturer to install the specified roofing system, with a minimum of 5-years experience.
C. Sheet metal work shall conform to S.M.A.C.N.A (Sheet Metal and Air Conditioning Contractors' National Association) requirements.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the jobsite in their original, tightly-sealed containers or unopened packages.
B. Materials shall be clearly labeled with the manufacturer's name and product identification.
C. Protect materials from damage during transit, handling, storage, and installation. Place materials on pallets and protect from moisture.
D. Store materials in a dry area, protected from the elements. Store membrane rolls flat on pallets.
E. Store adhesive shall be stored at temperatures above 40-deg. F.
F. Store flammable materials in a cool, dry area away from sparks and open flames. Follow precautions outlined by material manufacturer/supplier.
1.05 JOB CONDITIONS

A. Only as much new roofing as can be made weather tight each day shall be installed each day. This includes all flashing work.

B. Substrates to receive new insulation, membrane or flashing shall be thoroughly dry. Should surface moisture occur, provide adequate equipment to dry the substrate.

C. Prior to and during application, remove dirt, debris and dust from surfaces to be roofed.

D. Take precautions to prevent wind blow-off or wind damage during the course of the roofing application.

E. Verify and ensure that roof drain lines are unblocked before starting work.

F. Install temporary waterstops at the end of each day's work or if inclement weather conditions dictate. Remove temporary waterstops at the start of the next day's work and properly dispose of.

G. Do not install the roofing membrane in direct contact with any product containing asphalt, coal tar pitch, creosote or penta-based materials.

H. Do not allow waste products containing petroleum, grease, acid, solvents, vegetable or mineral oil, animal oil, animal fat, etc. or direct steam venting to come into direct contact with the roofing membrane.

I. Follow safety regulations as recommended by OSHA.

J. Schedule and execute work without exposing interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against risks. Arrange work sequences to avoid use of newly constructed roofing for storage, walking surfaces and equipment movement. Provide necessary protection and barriers to segregate the work areas and prevent damage to adjacent areas. If excessive foot traffic over newly installed membrane is necessary, provide plywood or polyester felt protection to prevent damage.

K. Report unusual or concealed conditions discovered during the course of the work to the Owner’s representative in writing. Stop work until the Owner’s representative has responded with a solution to the problems.

L. When a system is specified to meet an Underwriter's Laboratories, Inc. rating, materials used in the system must be UL labeled and approved for that particular system.

M. Comply with the requirements of local building codes and requirements.

N. Do not use products near fire or flame.

O. Avoid breathing vapors of solvent, sealant and adhesives. Use with adequate ventilation. Avoid prolonged contact of solvents, sealants and adhesives with skin.

P. Do not use open flames to expedite drying of surfaces, sealants, or adhesives.

Q. Consult Material Safety Data Sheets and container labels for specific safety instructions.

1.06 WARRANTY

A. Furnish written warranties from the roofing system manufacturer covering labor and materials for 15-years from date of Substantial Completion. The warranties shall include no disclaimer for failure or leakage caused by structural movement within the existing roof deck.

B. The terms of the warranty shall provide for the removal, replacement, repair, and making good, without cost to the Owner, of defects due to imperfect materials and workmanship.

C. All repairs required under the warranty shall be made within 3-days after receiving notice of the need for repairs from the Owner, weather permitting.

PART 2 - PRODUCTS
2.01 APPROVED MANUFACTURER

2.02 APPLICABLE STANDARDS
A. UL approved for use with construction of class A, B, or C roofs, FM Approved ASTM D6878.
B. Provide separation sheets as approved for installation on existing plywood deck (Nominal ½”).
C. UL Rating: Class A.
D. Comply with 2010 California Building Code.

2.03 ROOF INSULATION
A. Roof Insulation: Type recommended by roof system manufacturer, based on extruded polystyrene or isocyanurate board. Closed cell, rigid boards conforming to ASTM C578 and FS HH-I-524C. Provide flat and tapered boards as required to achieve minimum thickness of 1.7-inches and aged thermal resistance of R-10 minimum or as required to meet 2010 California Energy Code.
   2. Flame Spread, ASTM E84: 5.
   3. Smoke Developed, ASTM E84: 45-175 depending on thickness.
   4. UL Rating: Class A.
C. Insulation Fasteners:
   1. Mechanical Fasteners: As recommended by roof insulation manufacturer for securing roof insulation to metal decking.

2.04 ROOF MEMBRANE
A. Roofing Membrane: 60-mil thick TPO. Color to be white from manufacturer’s standards.
B. Solvent: Solvent welding solution as recommended by roofing membrane manufacturer.
C. Seam or Lap Sealant: Liquid PVC sealing compound, with a consistency equal to that of “honey” at room temperature.
D. Caulk: Single component, non-sag elastomeric polyurethane sealant.
E. Aluminum Foil Tape: 3-mil thick aluminum foil tape with acrylic adhesive, for use over metal joints prior to strips being welded over the joints.
F. Flashing Metal: 24-gauge galvanized steel laminated to 40-mils of roofing membrane in white, grey and black colors used for flashing and edge metal detailing.
H. Membrane Fasteners and Discs: As recommended by roofing membrane manufacturer for securing membrane to insulation surface.
I. Adhesive: As recommended by roofing membrane manufacturer for securing membrane to required substrates.

J. Walkway: TPO membrane .100-inch thick for traffic areas.

K. Prefabricated Details: Provide inside/outside corners, vent pipe boots in sizes to fit pipes from 3/4- to 11-inches, and pitch-pocket.


M. Joint Cover Strips: For use in waterproofing joints of metal.

N. Disc Caps: Prefabricated 7-inch round pieces of membrane for use in the disc-cap method of installation to cover the steel discs and fasteners used to secure the membrane to the roof through the top of the sheet.

O. Prefabricated expansion joint covers:
   1. Low profile (Flat Type) prefabricated .045 thick.
   2. 50 foot continued rolls for 2" expansion joints.
   3. Provide 3 ½" wide, pressure treated nailers flush with insulation.

P. Other Accessories: As recommended by roofing system manufacturer and as required for complete, fire-rated, weather tight installation.

PART 3 - EXECUTION

3.01 GENERAL

A. When installing roofing in cooler weather, liquids such as solvents, sealants, etc. shall be stored at minimum 40-deg. F. until just prior to use in order to facilitate the installation.

3.02 SUBSTRATE CONDITIONS

A. The roof deck shall be structurally sound to provide proper securement for mechanical fasteners. Areas showing a loss of integrity due to corrosion, rotting, warping, concrete spalling, etc., shall be repaired or replaced prior to installing the roofing system.

B. Contact the material manufacturer when the substrate is exposed to excessively high humidity and/or a corrosive environment. Special fasteners or details may be required.

3.03 ROOF INSULATION

A. General: Install roof insulation in conformance with the manufacturer's printed instructions. Do not apply more insulation in one day than can be covered with roof membrane.

B. Mechanical Fasteners: Secure rigid insulation boards using fasteners designed and sized for attaching roof insulation to plywood deck.

C. Cant Strips and Tapered Edge Pieces: Install over roof boards in hot mopping of steep asphalt or with adhesive.

D. Trim surface of insulation where necessary at roof drains so completed surface is flush with ring of drain.

E. Nailers: Install wood nailers around the perimeter of and openings in the roof deck. Nailers shall be the same thickness as roof insulation.

3.05 MEMBRANE INSTALLATION

A. General: Unroll sheet roofing and position without stretching the membrane. Allow the membrane to relax at least 15-minutes when the temperature is above 60-degrees F., or 30-minutes when the temperature is below 60-degrees F., prior to installation. Inspect for damage. Remove sections of membrane that are creased or damaged. Lap sheets as recommended by manufacturer depending on fastening method to be used.

B. Mechanically-Attached Roof Membrane:
1. **In-Lap Fastening:**

   a. **Perimeter:** When installing roofing, install minimum two 1/2 sheets parallel with the perimeter and fastened with fastening system at the predetermined spacing in the lap area in a line centered approximately 1-1/2-inches from the edge of the sheet leaving 1/2-inch of membrane outside the disc. Weld lap area to metal base flashing continuously a minimum of 2-inches weld width.

   b. **Field Areas:**

   1) Membrane shall run perpendicular to the direction of roof slope.

   2) Install membrane overlaps to facilitate the flow of water.

   3) Overlap membrane sheets a minimum of 5-inches to provide space for fastener and disc placement and for a continuous 2-inch width weld.

2. **Fully-Adhered Roof Membrane:**

   1. Install membrane by unrolling over prepared substrate, lapping adjoining sheets as recommended.

   2. Apply adhesive to roof deck and roll sheet membrane into place when adhesive has properly cured.

D. **Verify welded seams for continuity and integrity using a rounded screwdriver or other suitable blunt object.** Seam checks shall be made daily. Take sample of seams 2-inches wide and 12-inches long three times a day from completed seams; at least one to be from the first seam made of the day. Each test cut shall be patched at no extra charge to the Owner. Test cuts shall be used to determine adequate seam strength.

### 3.06 WELDING OF LAP AREAS

A. **General:** Roofing membrane shall be hot air welded only. Surfaces to be welded shall be clean and dry.

B. **Hot Air Welding:**

   1. Follow hot air welding machine manufacturer's instructions for use.

   2. Hand-held welding machines are also available to weld membrane. After the preheated nozzle tip is applied in the overlap area and the material starts to flow, immediately follow with a hand roller to press the heated membrane surfaces together with slow, even movements. Keep the roller within 1-inch of the nozzle tip. Angle the hot air tool so that the flowing air faces the roller. Adjust the temperature of the hot air tool so that a minimum of smoke is developed and material from the bottom of the sheet begins to soften and flow from the seam. Seam strength may be tested when cool. For best results, test seams 8-hours after hot air welding.

C. **Quality Control of Seams:**

   1. After seaming, check seams for integrity with a probe. Repair openings or "fishmouths" with a hand-held hot air tool fitted with a narrow nozzle tip and with a roller.

   2. Each day several sections of welded seams shall be pulled apart to test the quality of the welds. Should the welds be deficient, a more thorough examination of the work performed shall be carried out and necessary repairs made.

   3. Use seam sealant to seal the membrane edges where reinforcing fabric is cut and exposed.

### 3.07 FLASHING INSTALLATION

A. **Metal Flashing:**

   1. Install metal flashing in accordance with manufacturer's instructions and recommendations.

   2. Complete metal work concurrently with roofing and flashings so that a watertight condition exists daily.

   3. Provide metal transitions required at peaks, valleys and slope intersections where the net change in slope exceeds 1-1/2-inch in 12-inches.
4. Install metal to provide adequate resistance to bending and to allow for normal thermal expansion and contraction.

5. Metal joints shall be watertight and staggered over nailer joints to prevent joints in nailers and joints in metal from lining up.

6. Extend base flashings a minimum of 6-inches up vertical surfaces.

7. Metal flashings and terminations shall be securely fastened in the plane of the roof deck with fasteners recommended by the roofing system manufacturer.

8. Fasteners and roofing nails used to secure flashings to wood nailers shall be stainless steel, galvanized metal or other corrosion resistant material, with a head diameter of not less than 3/8-inch, and with fastener penetration into the wood nailer of at least 3/4-inch.

9. Fabricate metal with hemmed edges to prevent sharp metal edges from cutting the membrane, except when in conjunction with wood nailers.

10. Membranes flashings are not acceptable for use on this Project unless the use of sheet metal is not feasible.

3.08 WALKWAY INSTALLATION

A. Install walkway material over clean, dry surfaces.

B. Layout areas where walkway material is to be installed with most of the material being oriented so that it is placed between field seams in maximum lengths of 30-feet with each adjacent and abutting section gapped a minimum of 6-inches.

C. Solvent weld or heat weld the perimeter of the properly positioned walkway material. Check seams for voids or inconsistencies which might prevent watertightness.

D. Apply seam sealant at welded edges.

3.09 WATERSTOPS

A. Install temporary cutoffs around incomplete edges of roofing assembly at the end of each day's work and when work must be postponed due to inclement weather. Straighten the insulation line using pieces of insulation loosely laid, and seal the sheet membrane to the deck or existing membrane. Use a heavy application of roof cement or hot asphalt at least 6-inches in width overlayed with an embedded reinforcement. Remove the temporary seals completely when work resumes, cutting out the contaminated membrane. Remove sealant, contaminated membrane, insulation fillers, etc. from the work area and properly dispose off-site.

END OF SECTION