

**SECTION 07 55 56
FLUID APPLIED PROST MEMB ROOF W PAVERS**

SECTION 07 55 56

1.01 FLUID-APPLIED PROTECTED MEMBRANE ROOFING WITH CONCRETE PAVERS (CANOPY)

PART 1 - GENERAL

2.01 1.01 GENERAL REQUIREMENTS

- A. The Contractor is referred to the Instructions to Bidders and General Conditions, NYCHA Contracts; the Special Notice to Contractors; the Form of Proposal; the Form of Bid Bond; Division 01 - General Requirements of the Contract Specifications; the Contract Drawings and all Amendments and Addenda thereto; all of which govern the Work of this Section.
- B. The Contractor is also directed to Division 01 and other Divisions of this specification. They include a description of additional work for removal and replacement of roofing with all related work described herein under Division 07.
- C. Prior to submission of bid, visit the work site to verify the existing conditions, dimensions and quantities as set forth in the Contract Documents.
- D. The roofing replacement requires a highly reflective & emissive, fully reinforced, cold fluid-applied, 2 component PMMA, liquid resin roofing and waterproofing membrane and flashing system, and all other ancillary waterproofing work including but not limited to installation of insulation, cover boards, pavers, sealants and metal work as specified to provide A MINIMUM COMPLETE MANUFACTURER'S NO DOLLAR LIMIT 30 YEAR FULL SYSTEM GUARANTEE ON INSTALLATION AND MATERIALS. As such the contractor must be certified as an installer by roofing manufacturer providing the guarantee. Further the certified installer must pre-register the 30-year guarantee with manufacturer and submit a copy of that pre-registration at the pre-start meeting and prior to beginning work. The actual guarantee must be provided to the Authority PRIOR to the close out of the Job.
- E. As part of the turnover of warranty, the Contractor is to install "Roof Warranty
- F. Holder" sign on the interior side of every bulkhead door. See sign sample at the end of this section specifications. If no bulkhead door to place sign contact NYCHA PM for alternate location.
- G. The work to be performed under this specification shall include but is not limited to the following: Attend necessary job meetings and furnish competent and full-time supervision, experienced roof mechanics, all materials, tools, and equipment necessary to complete, in an acceptable manner, the roof installation in accordance with this specification. Comply with the latest written application instructions of the manufacturer of the primary roofing products. In addition, application practice shall comply with requirements and recommendations contained in the latest edition of the Handbook of Accepted Roofing Knowledge (HARK) as published by the National Roofing Contractors Association.
- H. Local Regulations: Conform to regulations of public agencies, including any specific requirements of the city and/or state of jurisdiction.
- I. Manufacturer Requirements: The primary roofing materials manufacturer shall provide direct trained Field Technical Representative to attend necessary job meetings, perform periodic inspections, and conduct a final inspection upon successful completion of the project.
- J. Roofing Conference: To finalize the scope of work for each roof, a roofing conference must be held prior to beginning any work, between the NYCHA, Development Supervisor, and NYCHA's Representative, the certified roofing installer, contractor, The NYCHA field representative the Field Technical Representative of roofing manufacturer providing the 30 Year NDL Guarantee. At that conference the type of replacement roofing system will be confirmed, and the roofing manufacturer's representative will perform the required inspection for registering the 30-year NDL Guarantee.

- K. Installation of all roofing materials and systems must conform to minimum FM-I-90 wind uplift or any more stringent specific height and location uplift requirements. Fascia, sumps coping, and gravel stops must conform and be tested to meet ANSI/SPRI ES-1 wind resistance for 110 mph. See Section 07 71 00 Roof Specialties.
- L. Phasing and Coordination
1. Phasing/Coordinating Work at Building
 - a. Temporary Roofing Protection: The contractor must provide temporary roofing protection from water infiltration of the exposed roof and brick.
 - 1) This includes temporary protection immediately after asbestos abatement of waterproofing and flashing at roofs and walls. All abatement of roofing materials involves complete removal of roofing down to the concrete plank structural roof slab. Temporary roofing protection includes:
 - (a) Temporary torch down / vapor barrier to be manufacturer's approved modified cap sheet for use as water stopping on existing slab and up onto existing roofing.
 - (b) Installer of Torch Down Roofing: Must be a certified installer trained in and adhering to all FDNY and New York City Codes and Industry Standards Regulation and Requirements for utilizing gas/torch equipment and installing torch down roofing.
 - b. General roofing removal and replacement shall only commence once:
 - c. Asbestos abatement has been completed.
 - 1) Brickwork staged from the roof and railing replacement with new railing has been completed.
 - d. Criteria which allow the Contractor to remove roofing assembly over an entire roof leaving to existing sound waterproof vapor barrier as temporary waterproofing membrane.
 - 1) The ambient temperatures must remain above 45 degrees for the entire period a roofing system will be replaced.
 - 2) If inspection of the existing vapor barrier by the NYCHA representative finds the existing vapor barrier sound, dry and waterproof the contractor may still under direction of the field representative patch any areas of the existing vapor barrier to assure that the roof is watertight.
 - 3) Then the contractor may be allowed to do a complete removal of all roofing down to the existing waterproof vapor barrier which will act as temporary waterproofing.
 - 4) Subsequently, as per this specification, the Contractor must remove only that portion of the existing vapor barrier and provide the new roofing assembly/ system, as can be completed in a workday. This includes scarify patching and priming the slab after that portion of the existing vapor barrier has been removed and providing the new roofing system (water stopping, insulation, cover board, roofing membrane and flashing, fascia and cap flashing).
 - 5) If any of these criteria and or conditions can't be met, then the contractor may only remove as much roofing as can be replaced within one day (which includes removing existing vapor barrier).
 - 6) Existing vapor barrier as temporary waterproofing will be removed and replaced with new vapor barrier prior to installation of new roofing assembly.
 - e. Coordinating 2 Piece Cap Flashing Heights: At all roofs and where shown on drawings new stainless steel through wall cap flashing at bulkheads and building walls, and regleted cap flashing are being provided under masonry work. Coordinate to ensure that the cap flashings are installed at adequate height above the finished roofing.
 - f. No asbestos-containing materials shall be permitted on site or for any use, as either a temporary or permanent part of construction.

1.02 SCOPE OF WORK

- A. Work shall include, but is not limited to, the following:
- B. Sloped Insulation Drawing. Though the liquid applied reinforced roofing system specified is a waterproofing system with paver and can tolerate standing water, NYCHA the owner requires at minimum a hybrid taper and where possible a positive sloped system which will move water towards drains. Therefore, the Contractor must survey the roofs and provide positive sloped insulation drawings. The Schematic Sloped Insulation Plans (in the bid set drawings) are only conceptual but can assist in making Bids as well as serve as a background for final sloped insulation drawings.
1. Provide Survey: The accepted Contractor shall have Licensed surveyor perform a survey of roof existing elevations/slopes, windowsill heights, cap flashing/weep holes, heights of curbs, fire escape platform, all penetrations and railing above the roof slab.
 2. Provide sloped insulation shop drawing: The Contractor shall then send that Survey on a scaled roof plan to a taper insulation Designer and coordinate with them to obtain a detailed insulation layout drawing which directs water towards drains and does not overwhelm door saddles, cap flashing/weep holes and leaves minimum contract required 48" between the top of the proposed finished roofing and the top of the perimeter fence or parapet.
 3. Provide a 1/8" positive sloped insulation plus drainage enhancers /sumps/ crickets/ kickers to effectively channel water through the roof drain. The Contractor shall then incorporate the final sloped insulation drawing into a Shop Drawing for submission and approval by NYCHA.
 - a. NOTE:
 - b. NYS Energy Code and HUD CF24R value requirements for roofing insulation: NYS/NYC ECC and HUD require a minimum weighted average R-value of 35 for roofing insulation assemblies (insulation and cover board) above the roof deck.
 - c. The Manufacturer's Insulation Layout Design is integral to a 30year NDL guaranteed roofing system. Deviations from their layout may void the guarantee and as such must not be done without be signed pre-approval by the Roofing Manufacturer and the Authority. Layout design must indicate minimum thicknesses, taper layout, drainage enhancers, and sumps.
 - d. GENERAL CONTRACTOR's COORDINATION OF CAP FLASHING UNDER MASONRY RESTORATION (Division 04, Section 04 20 00): Since installation the new through wall and regulated cap flashing are being performed under masonry restoration the General Contractor must coordinate the installation height of the 2 pieces with the final finished height of the roofing installation.
 - 1) Preparation of existing roof deck and all flashing substrates.
 - 2) SBS-modified bitumen base ply heat-welded (torch).
 - 3) Liquid-applied, reinforced membrane cap sheet.
 - 4) Liquid-applied, reinforced flashings.
 - 5) Drainage mat installed over waterproofing membrane.
 - 6) Extruded polystyrene (XPS) rigid insulation.
 - 7) Filter fabric installed over insulation layer.
 - 8) Paver and installation.
 - 9) All related materials and labor required to complete specified roofing necessary to receive specified manufacturer's warranty.
 - 10) Canopy roof does not require R-33 (ci) value for roofing insulation.
- C. Roof Drains, Leaders and Traps
1. Prior to commencement of work, NYCHA's Representative, the Contractor, Development Superintendent and Contract Inspector shall conduct a joint survey to determine which (if any) of the roof drains and leaders are blocked. The contractor shall be responsible for performing this test. Contractor shall provide all tools, equipment, and manpower required to evaluate every roof drain or leader.

2. Attach to the minutes of the pre-construction meeting, three copies of a form listing the condition of each drain line and signed by the Development Superintendent and Contractor.
 3. The Development Superintendent is responsible for unclogging blocked drains and leaders in a timely manner to allow the beginning of roofing work.
 4. No roofing work shall commence until the Contractor and Development Superintendent certify in writing to NYCHA that all roof drain and leaders are in working order and free of blockages. Any subsequent blockages encountered shall be the responsibility of the Contractor and will be treated as a punch list item.
 5. Clean debris and all foreign matter from the drain bodies.
 6. Provide new Vandal Resistant stainless steel perforated gravel guard.
 7. Provide temporary wood protection plugs in roof drains during work. Remove them at the end of each workday and once work is completed.
 8. Provide replacement/retrofit roof drain (all hardware to be Vandal resistant). See Section 22 14 23 Storm Drainage Specialties.
- D. Description of Work
1. Consists of removal of the existing roofing system down to the concrete structural slab at Apartment Building entrance roof. Repairing/replacing and mechanically preparing slab for new roof system installation, providing a fully reinforced, cold fluid applied, insulated roof system assembly with pavers and performing related work.
 2. After abatement and partial removal of allowable amounts of existing roofing down to the concrete structural plank roof slab:
 - a. Scarify the slab.
 - b. Patch structural roof slab with quick curing patch.
 - c. Prime with asphalt primer.
 - d. Torch down temporary roofing / vapor barrier.
 - e. Temporary flash around all penetrations.
 3. Provide Torch down SBS-modified bitumen Base sheet adhered to roof slab / vapor Barrier, and up onto vertical walls.
 4. Provide tapered / sloped / or hybrid roof insulation.
 5. Provide cement roofing cover board installed/adhered in compatible roof insulation adhesive.
 6. Provide SBS top cap sheet adhered to primed cement board to provide a uniform substrate and cover all joints in cement board.
 7. Provide pavers.
- E. Cold Fluid Applied, Reinforced, Liquid Applied Roofing
1. Primer:
 - a. Apply appropriate proprietary fast-curing primer on all substrates as required or recommended by the cold liquid-applied Membrane Manufacturer.
 - b. For substrates requiring metal primer, apply single component fast-curing primer as recommended by the Membrane Manufacturer.
 - c. For substrates requiring standard primer, apply two component fast-curing PMMA primer as recommended by the Membrane Manufacturer.
 2. Reinforcement:
 - a. Needle punched polyester fleece reinforcement with a minimum weight of 110 grams per square meter.
 3. Membrane Resin:
 - a. Two (2) component Polymethyl Methacrylate (PMMA), solvent free, Low VOC, odor free for use in field and flashings.
- F. Roofing metal edge systems: Facias, sumps, and cap flashing metal
- a. systems shall be stainless steel and each location's specific profile shall be tested and certified for ANSI/SPRI ES-1 wind resistance for 110 mph.
 - b. See Section 07 71 00 Roof Specialties.

3.02 OTHER RELATED WORK IN SEPARATE SECTIONS OF THIS SPECIFICATION

- A. Division 01 00 00 – General Requirements
- B. Division 01 10 00 – Summary of Work
- C. Division 02 82 13 – Asbestos Abatement of Roofing Materials
- D. Division 03 01 00 – Concrete Restoration
- E. Division 04 20 00 – Masonry Restoration
- F. Division 07 71 00 – Roofing Specialties
- G. Division 22 14 23 – Storm Drainage Piping Specialties.

3.03 DEFINITIONS

- A. ASTM D1079-Definitions of Term Relating to Roofing and Waterproofing.
- B. The National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual, Fifth Edition Glossary.

3.04 REFERENCE

- A. AMERICAN SOCIETY OF CIVIL ENGINEERS - Reference Document ASCE 7, Minimum Design Loads for Buildings and Other Structures.
- B. AMERICAN STANDARD OF TESTING METHODS (ASTM):
 - 1. ASTM C 836 - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
 - 2. Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
 - 3. ASTM C920 - Standard Specification for Elastomeric Joint Sealants
 - 4. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Damp proofing, and Waterproofing.
 - 5. ASTM D 312- Standard Specification for Asphalt Used in Roofing.
 - 6. ASTM D 1863 – Standard Specification for Mineral Aggregate Used on Built-Up Roofs.
 - 7. ASTM D 1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 - 8. ASTM D 2178 - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
 - 9. ASTM D 3019 - Standard Specification for Lap Cement Used with Asphalt Roll Roofing, Non-Fibered, Asbestos-Fibered, and Non- Asbestos-Fibered.
 - 10. ASTM D 3746 - Standard Test Method for Impact Resistance of Bituminous Roofing System.
 - 11. ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
 - 12. ASTM D 4601 - Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.
 - 13. ASTM D 5147 - Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material.
 - 14. ASTM D 5849 - Standard Test Method for Evaluating Resistance of Modified Bituminous Roofing Membrane to Cyclic Fatigue (Joint Displacement)
 - 15. ASTM D 6162 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.
 - 16. ASTM D 6163 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
 - 17. ASTM D 6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
 - 18. ASTM D 6298 - Standard Specification for Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Bituminous Sheets with a Factory Applied Metal Surface.
 - 19. ASTM D 7379 - Standard Test Methods for Strength of Modified Bitumen Sheet Material Laps Using Cold Process Adhesive.
 - 20. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings.

21. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
- C. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI):
 1. ANSI/SPRI/FM 4435/ES-1 Wind Design Standard for Edge System Used with Low Slope Roofing System.
 2. ANSI/SPRI FX-1, Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
 3. ANSI/SPRI IA-1, Standard Field Test Procedure for Determining the Mechanical Uplift Resistance of Insulation Adhesives over Various Substrates.
 4. ANSI/FM 4474- American National Standard for Evaluating the Simulated Wind Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures.
- D. COOL ROOF RATING COUNCIL (CRRC)
- E. EPA ENERGY STAR
- F. FACTORY MUTUAL (FM):
 1. FM 4450 - Approval Standard - Class I Insulated Steel Roof Decks.
 2. FM 4470 - Approval Standard - Class I Roof Covers.
- G. New York City Department of Buildings
 1. 2014 Building Code
 2. 2020 Energy Conservation Code
- H. NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA).
 1. UL 790 Standard Test Methods for Fire Tests of Roof Coverings.
 2. UL 1256 – Fire Test of Roof Deck Constructions.

3.05 SUBMISSIONS

- A. SEE GENERAL REQUIREMENTS: SECTION 01 33 00 – Submittal Procedures, for other specific requirements.
- B. Also SEE: SECTION 07 14 00 – Roofing Replacement, Cold Fluid Applied Reinforced Roofing - PMMA Roofing System.

3.06 QUALITY ASSURANCE

- A. MANUFACTURER QUALIFICATIONS:
 1. Manufacturer shall have 20 years of manufacturing experience.
 2. Manufacturer shall have trained technical service representatives employed by the manufacturer, independent of sales.
 3. Manufacturer shall provide site visit reports in a timely manner.
- B. CONTRACTOR QUALIFICATIONS:
 1. Contractor shall be authorized by the manufacturer to install specified materials prior to the bidding period through satisfactory project completion.
 2. Applicators shall have completed projects of similar scope using same or similar materials specified.
 3. Contractor shall provide full time, on-site superintendent or foreperson experienced with the specified roofing from beginning through satisfactory project completion.
 4. Applicators shall be skilled in the application methods for all materials.
 5. Contractor shall maintain a daily record, on-site, documenting material installation and related project conditions.
 6. Contractor shall maintain a copy of all submittal documents, on- site, available at all times for reference.
- C. MATERIALS AND INSTALLATION:
 1. Materials supplied shall meet the specified requirements.
 2. Evaluate moisture content of cementitious substrate materials. Contractor shall determine substrate moisture content throughout the work and record with Daily Inspection Reports

or other form of reporting acceptable to the Owner or designated Representative, and Membrane Manufacturer.

3. Evaluate surface moisture content by means of a Tramex Concrete Moisture Encounter Meter. A surface moisture content of ??? 6% is required to allow for proper primer penetration into the substrate.
 4. Bubbling, or pinholes within the primer indicates excessive moisture content within the substrate. Blistering of membrane may result from excessive substrate moisture. Primer application during late afternoon/early evening will reduce vapor pressure within the substrate and may alleviate these conditions.
 5. Continued bubbling, or pinholes indicates excessive moisture content that requires more substantial measures. Evaluate substrate moisture content by means of relative humidity (RH) probes in accordance with ASTM F2170. Relative moisture content of 75% or greater indicates the need for more extensive substrate priming and sealing. Contact Membrane Manufacturer for recommendations.
 6. Random tests to determine tensile bond strength of membrane to substrate shall be conducted by the Contractor at the job site using an Elcometer Adhesion Tester Model 106 or similar device, or by the performance of a manual pull test. Contractor shall perform tests at the beginning of the Work, and at intervals as required to assure specified adhesion with a minimum of three (3) tests per 5000 sq feet. Smaller areas shall receive a minimum of three (3) tests. Test results shall be submitted to the Owner or his designated Representative and the Membrane Manufacturer. Contractor shall immediately notify the Owner or his designated Representative and Membrane Manufacturer in the event bond test results are below specified values.
 - a. Adequate surface preparation will be indicated by tensile bond strength of membrane to substrate greater than or equal to 116 psi, as determined by use of an adhesion tester.
 - b. In the event the bond strengths are less than the minimum specified, additional substrate preparation is required. Repeat testing to verify suitability of substrate preparation.
 - c. Monitor quantities of installed materials. Monitor application of resin mixture, reinforcing fleece and flashing. Perform Work in accordance with manufacturer's instructions.
 - d. Mock-up areas shall be used to determine required methods and tools to obtain degree of substrate preparation required by the membrane manufacturer. Conduct tests as required to verify that substrate preparation meets specified requirements. Tests shall include, but are not limited to, tensile bond strength and moisture content of substrate.
 - 1) Prepare and clean a three (3) foot by three (3) foot area of each substrate material type. Submit findings in writing to Owner or his designated Representative and Membrane Manufacturer.
 - 2) Mock-up areas shall be maintained for quality control for the entire project.
 - e. Substrates and conditions are acceptable for purpose of providing specified warranty.
- D. Perform thermal imaging with use of infrared camera after each roofing installation completion and after rainy day.

3.07 DELIVERY, STORAGE AND HANDLING

- A. The Contractor together with the Owner or his designated Representative shall define a storage area for all components. The area shall be cool, dry, out of direct sunlight, and in accordance with manufacturer's recommendations and relevant regulatory agencies. Materials shall not be stored in quantities that will exceed design loads, damage substrate materials, hinder installation or drainage.
- B. Store solvent-bearing solutions, resins, additives, inhibitors or adhesives in accordance with the MSDS and/or local fire authority. After partial use of materials replace lids promptly and tightly to prevent contamination.

- C. Roll goods shall be stored horizontally on platforms sufficiently elevated to prevent contact with water and other contaminants. DO NOT use rolls that are wet, dirty or have damaged ends.
- D. Roofing/waterproofing materials must be kept dry at all times. If stored outside, raise materials above ground or roof level on pallets and cover with a tarpaulin or other waterproof material. Plastic wrapping installed at the factory should not be used as outside storage covers.
- E. Follow manufacturer's directions for protection of materials prior to and during installation. Do not use materials that have been damaged to the point that they will not perform as specified. Fleece reinforcing materials must be clean, dry and free of all contaminants.
- F. Copies of all current MSDS for all components shall be kept on site. Provide any and all crew members with appropriate safety data information and training as it relates to the specific chemical compound he or she may be expected to deal with. Each crew member shall be fully aware of first-aid measures to be undertaken in case of incidents. Comply with requirements of OSHA, NIOSH or local governing authority for work place safety.
- G. Refer to each product data sheet or other published literature for specific requirements.
- H. Deliver materials and store them in their unopened, original packaging, bearing the manufacturer's name, related standards, and any other specification or reference accepted as standard.
- I. Protect and store materials in a dry, well-vented, and weatherproof location. Only materials to be used the same day shall be removed from this location. During cold weather, store materials in a heated location, removed only as needed for immediate use.
- J. When materials are to be stored outdoors, store away from standing water, stacked on raised pallets or dunnage, at least 4 inch or more above ground level. Carefully cover storage with "breathable" tarpaulins to protect materials from precipitation and to prevent exposure to condensation.
- K. Carefully store roof membrane materials delivered in rolls on-end with selvage edges up. Store and protect roll storage to prevent damage.
- L. Properly dispose of all product wrappers, pallets, cardboard tubes, scrap, waste, and debris. All damaged materials shall be removed from job site and replaced with new, suitable materials.

3.08 SAFETY, HEAT WELDING & SITE CONDITIONS

- A. SAFETY:
 - 1. Contractor and contractor's crew members shall observe and enforce all appropriate safety and fire department regulations during installation and handling of roofing materials and asphalts.
 - 2. A fully operational fire extinguisher shall be maintained within reasonable access to each applicator, at propane tanks, and other area, and/or as required by local fire department regulations.
 - 3. Protect all partially and fully completed roofing work from other trades until completion. Whenever possible, stage materials in such a manner that foot traffic is minimized over completed roof areas. When it is not possible to stage materials away from locations where partial or complete installation has taken place, temporary walkways and platforms shall be installed in order to protect all completed roof areas from traffic and point loading during the application process.
 - 4. Temporary tie-ins shall be installed at the end of each workday and removed prior to commencement of work the following day.
 - a. Additional Criteria:
 - 1) Provide protection against staining and mechanical damage for newly applied roofing and adjacent surfaces throughout this project.
 - 2) Limited Access: Prevent access by the public to materials, tools and equipment during the project.
 - 3) Debris Removal: Remove all debris daily from the project site and take to a legal dumping area authorized to receive such materials.

- 4) Site Condition: Complete, to the NYCHA Field Inspector's satisfaction, all job sites clean-up including building interior where applicable, exterior and landscaping where affected by the construction.
 5. Torch Safety (If torch down application is used for vapor barrier and base sheet over Dense Deck): Crew members handling torches shall be trained by an Authorized Certified Roofing Torch Applicator (CERTA) Trainer, be certified according to CERTA torch safety guidelines as published by the National Roofing Contractors Association (NRCA) and follow torch safety practices as required by the contractor's insurance carrier.
 - a. Designate one person on each crew to perform a daily fire watch. The designated crew member shall watch for fires or smoldering materials on all areas during roof construction activity, and for the minimum period required by CERTA guidelines after roofing material application has been suspended for the day.
 - b. NOTE: The use of Torch down application may require a variance from the NYC Fire Department.
 6. The contractor shall be responsible for complying with all project-related safety and environmental requirements.
 7. Heat-welding shall include heating the specified membrane ply using propane roof torches or electric hot-air welding equipment. The contractor shall determine when and where conditions are appropriate to utilize heat-welding equipment. When conditions are determined by the contractor to be unsafe to proceed, equivalent SBS-modified bitumen materials and methods shall be utilized to accommodate requirements and conditions.
 8. Refer to NRCA CERTA recommendations, local codes and building owner's requirements for hot work operations.
 9. The contractor shall review project conditions and determine when and where conditions are appropriate to utilize the specified liquid-applied, or semi-solid roofing materials. When conditions are determined by the contractor to be unsafe or undesirable to proceed, measures shall be taken to prevent or eliminate the unsafe or undesirable exposures and conditions, or equivalent approved materials and methods shall be utilized to accommodate requirements and conditions.
 10. The contractor shall review project conditions and determine when and where conditions are appropriate to utilize the specified hot asphalt- applied materials. When conditions are determined by the contractor to be unsafe or undesirable to proceed, measures shall be taken to prevent or eliminate the unsafe or undesirable exposures and conditions, or equivalent approved materials and methods shall be utilized to accommodate requirements and conditions.
 11. The contractor shall refer to product Safety Data Sheets (SDS) for health, safety, and environment related hazards, and take all necessary measures and precautions to comply with exposure requirements.
- B. HEAT WELDING:
1. The Contractor is responsible for project safety. Where conditions are deemed unsafe to use open flames, manufacturer's alternate membrane application methods shall be used to install SBS modified bitumen membrane and flashings. Acceptable alternate installation methods include hot asphalt, cold adhesive-applied, self-adhered membranes and mechanically fastened plies. Hot-air welding equipment may be used in lieu of roof torches to seal membrane side and end laps where heat welding the laps is necessary. Refer to NRCA CERTA, local codes and building owner's requirements for hot work operations.
 2. Single or multi-nozzle, hand-held propane roof torches shall be used to install heat-welded membrane and flashing plies. Multi-nozzle carts (dragon wagons) may also be utilized to install membrane plies.
 - a. (7) nozzle carts are recommended for more uniform heat application in lieu of five (5) nozzle carts.
 3. Heat-Welding Application: Take all necessary precautions and measures to monitor conditions to ensure all environmental conditions are safe to use roof torches and hot-air welding equipment. Combustibles, flammable liquids and solvent vapors that represent a hazard shall be eliminated. Flammable primers and cleaners shall be fully dry before

proceeding with heat-welding operations. Prevent or protect wood, paper, plastics and other such combustible materials from direct exposure to open flames from roof torches. Refer to NRCA CERTA recommendations.

C. ENVIRONMENTAL CONDITIONS:

1. Monitor substrate temperature and material temperature, as well as all environmental conditions such as ambient temperature, moisture, sun, cloud cover, wind, humidity, and shade. Ensure conditions are satisfactory to begin work and ensure conditions remain satisfactory during the installation of specified materials. Materials and methods shall be adjusted as necessary to accommodate varying project conditions. Materials shall not be installed when conditions are unacceptable to achieve the specified results.
2. Precipitation and dew point: Monitor weather to ensure the project environment is dry before, and will remain dry, during the application of roofing materials. Ensure all roofing materials and substrates remain above.
 - a. the dew point temperature as required to prevent condensation and maintain dry conditions.

3.09 PERFORMANCE REQUIREMENTS

A. AIR PERMEANCE:

1. Vapor Retarder/Air Barrier meets or exceeds ASTM D2178 "Standard Test Method for Air Permeance of Building Materials."

B. WATER VAPOR TRANSMISSION:

1. Vapor Retarder/Air Barrier meets or exceeds ASTM E96 (Procedure B) "Standard Test method for Water Vapor Transmission of Materials."
 - a. WIND UPLIFT RESISTANCE:
2. Performance testing shall be in accordance with ANSI/FM 4474, FM 4450, FM 4470, UL 580 or UL 1897.
 - a. Roof System Design Pressures: Calculated in accordance with ASCE 7, or applicable standard, for the specified roof system attachment requirements.
 - b. Design Pressures:
 - 1) Field of Roof (Zone 1):- 0 psf.
 - 2) Perimeter of Roof (Zone 2):- 0 psf.
 - 3) Corners of Roof (Zone 3):- 0 psf.
 - c. Approval Rating:
 - 1) FM 1-00
 - d. ANSI/FM 4474 Maximum Design Pressure -000.00

C. FIRE CLASSIFICATION:

1. Performance testing shall be in accordance with UL 790, ASTM E108, FM 4450 or FM 4470 to meet the flat roof requirement.
 - a. Meets requirements of UL Class A or FM Class A.
2. Performance testing shall be in accordance with UL 1256, FM 4450 or FM 4470 to meet the specified requirements for interior flame spread and fuel contribution.
 - a. Meets requirements of UL 1256, or FM Class 1.

D. ROOF SLOPE:

1. Finished roof slope shall be 1/8 inch per foot (1 percent) minimum for roof drainage.

E. IMPACT RESISTANCE:

1. Performance testing for impact resistance shall be in accordance with FM 4450, FM 4470, ASTM D3746 or CGSB 37-GP 56M to meet the specified impact resistance requirements.
 - a. Meets requirements for FM-SH (Severe Hail), ASTM D3746, or CGSB 37-GP 56M.

F. CYCLIC FATIGUE:

1. The waterproofing membrane shall pass ASTM D5849 Standard Test Method for Evaluating Resistance of Modified Bituminous Roofing Membrane to Cyclic Fatigue (Joint Displacement). Passing results shall show no signs of cracking, splitting or tearing over

the joint. Waterproofing membrane shall pass Test Condition 4, tested at 14°F (-10°C) in accordance with ASTM D5849.

2. Waterproofing membrane shall pass Test Condition 5, tested at -4°F (-20°C) in accordance with ASTM D5849.

G. ENERGY CONSERVATION REQUIREMENTS:

1. Extruded Polystyrene Insulation "R" Value: Long-term thermal resistance (LTTR) values of the specified foam insulation shall be determined in accordance with CAN-ULC-S770.
2. Thermal Resistance 'R' for the specified roof insulation system shall include the continuous insulation (ci) above the roof deck.
 - a. Total Thermal Resistance R Value, continuous insulation (ci) above-deck: R-33.

3.10 WARRANTY

- A. Manufacturer's No Dollar Limit (NDL) Warranty. The manufacturer shall provide the owner with the manufacturer's warranty providing labor and materials for 20 years from the date the warranty is issued.
 1. Single source warranty covering all components of the waterproofing installation, and including the sheet metal fabrications, insulation, drainage mat, filter fabric, pedestals and pavers when supplied by the manufacturer and installed in accordance with the manufacturer's general requirements.
 2. Provide manufacturers overburden warranty rider for removal and replacement of the overburden and paver components if roof leaks occur and repairs are needed.
- B. Extruded Polystyrene Insulation: The insulation to retain 80% of its original thermal value for the period of 10 years and to be included with waterproofing warranty.
- C. Pavers: The pavers shall not crack, split, spall, or disintegrate as a result of freeze-thaw cycling for a period of 10 years and to be included with waterproofing warranty.
- D. The contractor shall guarantee the workmanship and shall provide the owner with the contractor's warranty covering workmanship for a period of 25 years from completion date.

3.11 ENVIRONMENTAL REQUIREMENTS

- A. Protection of adjacent areas from system-related contamination shall be the responsibility of the installer.
- B. Do not apply roofing / waterproofing membrane during or with the threat of inclement weather.
- C. Application of cold fluid-applied reinforced PMMA roofing / waterproofing membrane may proceed while air temperature is between 23°F (-5°C) and 95°F (35°C) providing the substrate is a minimum of 5°F above the dew point.
- D. When ambient temperatures are at or expected to fall below 23°F (-5°C) or reach 95°F (35°C) or higher, follow Membrane System Manufacturer's recommendations for weather related application procedures.
- E. Ensure that substrate materials are dry and free of contaminants. DO NOT commence with the application unless substrate conditions are suitable. Contractor shall demonstrate that substrate conditions are suitable for the application of the materials.
- F. Modified bitumen membrane should not be installed in extremely cold temperatures unless precautions have been taken to protect the rolls from freezing.
- G. Correct solvent, heat welding, adhesive, and/or bitumen application temperatures must be maintained.
- H. Verify adhesion regularly during application. Hot-applied bituminous roofing materials must be applied promptly.
- I. In cold weather conditions, store rolls in a heated location until needed on the roof.
- J. Asphalt mopping is not recommended at consistent temperatures below 40°F. Recommended EVT must be maintained.
- K. All materials to be installed must be kept dry.

1. REQUIREMENTS PRIOR TO START OF JOB

- L. NOTIFICATION: Give a minimum of five (5) days' notice to the owner and manufacturer prior to commencing any work and notify both parties on a daily basis of any change in work schedule.
- M. PERMITS: Obtain all permits required by local agencies and pay all fees, which may be required for the performance of the work.
- N. SAFETY: Familiarize every member of the application crew with all fire and safety regulations recommended by OSHA, NRCA and other industry or local governmental groups. See also Section 3.12.

1. DECK REQUIREMENTS

- O. Weight limits on Roof Slab. Do not overload any portion of the building either by use of or placement of equipment, storage of debris or storage of materials. The total live and dead load is not to exceed 160 lbs./sq. Ft.
- P. The roof deck must be sound, smooth, dry, and free from deformation. Provide patching to level areas prior to start of reroofing.
- Q. The roof deck must be suitable for the type of roofing system selected and must meet all the deck requirements.

1. PRE-INSTALLATION CONFERENCE

- R. Prior to scheduled commencement of the roofing installation and associated work, conduct a meeting at the project site with the installer, NYCHA construction Inspector, the roofing Manufacturer's technical representative and any other persons directly involved with the performance of the work. The installer shall record conference discussions to include decisions and agreements reached (or disagreements) and furnish copies of recorded discussions to each attending party. The main purpose of this meeting is to review foreseeable methods and procedures related to roofing work.

1. REGULATORY REQUIREMENTS

- S. All work shall be performed in a safe, professional manner, conforming to all federal, state and local codes.
- T. Exterior Fire Test Exposure: Provide a roofing system that will achieve a rating for roof slopes indicated.
- U. FM / UL Class A.
- V. Windstorm Classification: Provide a roofing system, which will achieve a wind uplift rating, as listed in the current FM Approval Guide of FM-I-90.
- W. Roof Perimeter Metal Edge Wind Design: Provide a roofing system in compliance with ANSI/SPRI ES-1 "Wind Design Standard for Edge Systems Used with Low Slope Roof Systems" for the performance for Maximum Wind Speed and the Building Height required for the project. Provide a ANSI/SPRI ES-1 Certificate of Compliance.
- X. Conform to applicable New York Building code for roof assembly fire hazard.
- Y. Conform to applicable New York Building code for cool/reflective roofing based on product listings available thru CRRC (Cool Roof Rating Council) coolroofs.org.

PART 2 PRODUCTS

4.01 MANUFACTURER

- A. The products herein specified are totally pre-engineered products of the listed manufacturers and establish criteria for the approval of substitutions. Products must be part of a pre-engineered, low VOC fully reinforced cold liquid applied 2 component PMMA resin waterproofing membrane system, equivalent in function, quality, composition and method of application to be considered for approval as an "Approved Substitute". Substitute materials must meet or exceed all physical performance characteristics of the specified materials. PUMA, or single component primers or resin systems will not be accepted. A minimum 110 g/m2 fleece reinforcement is required.

- B. SINGLE SOURCE MANUFACTURER: All SBS modified bitumen membrane, liquid applied membrane and accessory components shall be manufactured by a single supplier with 20 years or more manufacturing history in the US.
 - 1. Comply with the Manufacturer's requirements as necessary to provide the specified warranty.
- C. PRODUCT QUALITY ASSURANCE PROGRAM: Manufacturer shall be an ISO 9001 registered company. A 'Quality Compliance Certificate (QCC) for reporting/confirming the tested values of the SBS-Modified Bitumen Membrane Materials will be supplied upon request.
- D. ACCEPTABLE MANUFACTURER:
 - 1. SOPREMA, located at: 310 Quadral Dr.; Wadsworth, OH 44281; Tel: 800-356-3521; Tel: 330-334-0066; Website: www.soprema.us, Contact: Maciej Tobolewski (908) 400-1369 or mtobolewski@soprema.us.
 - 2. Kemper
 - 3. Siplast
 - 4. or equal.
 - 1) Membrane: Two-component, cold fluid-applied reinforced PMMA waterproofing membrane with a 360-degree needle punched non-woven 110 g/m² polyester reinforcing fleece, for a finished dry film membrane thickness of .080-inch nominal per ply. Provide products manufactured and supplied by above acceptable manufacturer or equal.

4.02 ROOFING SYSTEM

- A. SBS-MODIFIED BITUMEN / PMMA HYBRID MEMBRANE SYSTEM BASIS OF DESIGN: SOPREMA
 - 1. SBS-MODIFIED BITUMEN VAPOR BARRIER & TEMPORARY WATERPROOFING, HEAT WELDED:
 - a. SOPREMA COLPHENE 180 SP or equal: SBS-modified bitumen membrane with a plastic burn-off film on the bottom surface and a sanded top surface. Non-woven polyester reinforcement. Meets or exceeds ASTM D6164, Type I, Grade S per ASTM D5147 test methods.
 - 1) Thickness: 87 mils 0.09 inch
 - 2) Width: 39.4 inch
 - 3) Length: 49.2 feet
 - 4) Roll weight: 86 lb (39 kg)
 - 5) Net mass per unit area, lb/100 sq ft (g/sq m):
 - (a) 54 lb (2625 g)
 - 6) Peak load @ 0°F (-18°C), lbf/in (kN/m).
 - (a) MD 110 lbf/in (19.3 kN/m), XMD 85 lbf/in (14.9 kN/m)
 - 7) Elongation at peak load @ 0°F (-18°C), lbf/in (kN/m):
 - (a) MD 35%, XMD 40%
 - 8) Peak load @ 73.4°F (23°C), lbf/in (kN/m):
 - (a) MD 85 lbf/in (14.9 kN/m), XMD 65 lbf/in (11.4 kN/m)
 - 9) Elongation at peak load @ 73.4°F (23°C), lbf/in (kN/m):
 - (a) MD 55%, XMD 60%
 - 10) Ultimate Elongation @ 73.4°F (23°C), lbf/in (kN/m):
 - (a) MD 60%, XMD 65%
 - 11) Tear Strength @ 73.4°F (23°C), lbf (N):
 - (a) a) MD 125 lbf (556 N), XMD 85 lbf (378 N)
 - 12) Low temperature flexibility, °F (°C):
 - (a) a) MD/XMD: -15°F (-26°C)
 - 13) Dimensional stability, %:
 - (a) MD/XMD: Less than 0.5%
 - 14) Compound stability, °F (°C):

- (a) a) MD/XMD: 240°F (116°C)
 - 15) ASTM D 5385:
 - (a) Pass
- 2. (ALTERNATE) SBS-MODIFIED BITUMEN VAPOR BARRIER & TEMPORARY WATERPROOFING, COLD ADHESIVE APPLIED:
 - a. SOPREMA COLPHENE 180 SANDED or equal: SBS- modified bitumen membrane sanded on both top and bottom surfaces. Non-woven polyester reinforcement. Meets or exceeds ASTM D6164, Type I, Grade S per ASTM D5147 test methods.
 - 1) Thickness: 87 mils 0.09 inch
 - 2) Width: 39.4 inch
 - 3) Length: 49.2 feet
 - 4) Roll weight: 83 lb (37.7 kg)
 - 5) Net mass per unit area, lb/100 sq ft (g/sq m):
 - (a) a) 52.3 lb (2552 g)
 - 6) Peak load @ 0°F (-18°C), lbf/in (kN/m).
 - (a) MD 110 lbf/in (19.3 kN/m), XMD 85 lbf/in (14.9 kN/m)
 - 7) Elongation at peak load @ 0°F (-18°C), lbf/in (kN/m):
 - (a) MD 35%, XMD 40%
 - 8) Peak load @ 73.4°F (23°C), lbf/in (kN/m):
 - (a) MD 85 lbf/in (14.9 kN/m), XMD 65 lbf/in (11.4 kN/m)
 - 9) Elongation at peak load @ 73.4°F (23°C), lbf/in (kN/m):
 - (a) MD 55%, XMD 60%
 - 10) Ultimate Elongation @ 73.4°F (23°C), lbf/in (kN/m):
 - (a) MD 60%, XMD 65%
 - 11) Tear Strength @ 73.4°F (23°C), lbf (N):
 - (a) a) MD 125 lbf (556 N), XMD 85 lbf (378 N)
 - 12) Low temperature flexibility, °F (°C):
 - (a) a) MD/XMD: -15°F (-26°C)
 - 13) Dimensional stability, %:
 - (a) MD/XMD: Less than 0.5%
 - 14) Compound stability, °F (°C):
 - (a) a) MD/XMD: 240°F (116°C)
 - 15) ASTM D 5385:
 - (a) Pass
- 3. SBS MODIFIED BITUMEN BASE SHEET / UNDERLAYMENT PLY SHEET, HEAT-WELDED:
 - a. SOPREMA ELASTOPHENE SP 2.2 or equal: SBS-modified bitumen membrane with plastic burn-off film on the bottom surface and a sanded top surface. Glass fiber reinforcement. Meets or exceeds ASTM D6163, Type I, Grade S, per ASTM D5147 test methods:
 - 1) Thickness: 87 mils 0.09 inch
 - 2) Width: 39.4 inch
 - 3) Length: 49.2 feet
 - 4) Roll weight: 101 lb (45.8 kg)
 - 5) Net mass per unit area, lb/100 sq ft (g/sq m):
 - (a) a) 62.6 lb (3054g)
 - 6) Peak load @ 0°F (-18°C), lbf/in (kN/m).
 - (a) MD 100 lbf/in (17.5 kN/m), XMD 90 lbf/in (15.7 kN/m)
 - 7) Elongation at peak load @ 0°F (-18°C), lbf/in (kN/m):
 - (a) MD 4%, XMD 4%
 - 8) Peak load @ 73.4°F (23°C), lbf/in (kN/m):
 - (a) MD 50 lbf/in (8.8 kN/m), XMD 40 lbf/in (7.0 kN/m)
 - 9) Elongation at peak load @ 73.4°F (23°C), lbf/in (kN/m):

- (a) MD 5%, XMD 4%
- 10) Ultimate Elongation @ 73.4°F (23°C), lbf/in (kN/m):
 - (a) MD 45%, XMD 45%
- 11) Tear Strength @ 73.4°F (23°C), lbf (N):
 - (a) MD 60 lbf (267 N), XMD 60 lbf (267 N)
- 12) Low temperature flexibility, °F (°C):
 - (a) a) MD/XMD: -15°F (-26°C)
- 13) Dimensional stability, %:
 - (a) MD/XMD: Less than 0.1%
- 14) Compound stability, °F (°C):
 - (a) a) MD/XMD: 250°F (121°C)
- 4. POLYMETHYL METHACRYLATE (PMMA) MEMBRANE CAP SHEET, LIQUID-APPLIED:
 - a. SOPREMA ALSAN RS 230 FIELD or equal: Rapid curing, polymethyl methacrylate (PMMA) liquid resin with an embedded polyester reinforcement fabric used for monolithic waterproofing field membranes.
 - 1) VOC content: 2.3 g/L (summer), 2.4 g/L (winter).
 - 2) Color: White, Grey
 - 3) Elongation at peak load, avg. (((ASTM D412))): 55%.
 - 4) Peak load at 73°F, avg. (((ASTM D412))): 809 lbf/in².
 - 5) Tear strength (ASTM D 5147): 107 lbf.
 - 6) Shore A hardness, avg. (((ASTM D2240))): 81
 - 7) Water absorption (Method I, 24h@73°F)((ASTM D570)): 0.41%.
 - 8) Water absorption (Method I, 48h@122°F)((ASTM D570)): 1.57%.
 - 9) Low temperature flexibility (ASTM D5147): -13°F.
 - 10) Dimensional stability (ASTM D5147): -0.063%.
- 5. POLYMETHYL METHACRYLATE (PMMA) MEMBRANE FLASHING, LIQUID-APPLIED:
 - a. SOPREMA ALSAN RS 230 FLASH or equal: Catalyzed polymethyl methacrylate (PMMA) liquid resin with polyester reinforcing fleece fabric fully embedded into the resin to form fully reinforced waterproofing membrane flashings. All LIQUID-APPLIED flashing shall be manufactured by the single-sourced membrane supplier.
 - 1) VOC Content: No VOC Content.
 - 2) SOPREMA ALSAN RS 230 FLASH Polymethyl methacrylate (PMMA) Polymethacrylate liquid resin.
 - 3) SOPREMA ALSAN RS CATALYST POWDER: Reactive agent added to the liquid resin to induce polymerization.
 - 4) SOPREMA ALSAN RS FLEECE: Polyester reinforcement fabric.
 - 5) Color: Flash color and finish to match Field.
- 6. WATER-STOPPING
 - a. Water-stopping (every 400 sq. ft.) shall consist of 2 plies of roof felt extending 10" under and 6" over the top of the insulation. These water stops felt shall using cold applied flashing cement be first set in and adhered to the roof slab, saturated turned up on the vertical edges of the insulation and then turned over fixed to the top of the insulation. ASTM D2178, Type IV Felts.

4.03 THERMAL INSULATION SYSTEM

A. BELOW WATERPROOFING RIGID INSULATION

1. POLYSTYRENE INSULATION:

- a. SOPREMA SOPRA-XPS (or as approved equal by membrane manufacturer), tapered extruded polystyrene insulation board for waterproofing assemblies meeting ASTM C578 Type VII criteria.
 - 1) Taper: Provide tapered insulation to create positive slope below waterproofing membrane as specified or required.

- 2) Thickness: Total thickness to meet specified insulation system total thermal resistance 'R' value of R-35.
- 3) Aged Thermal Resistance (((ASTM C518))); R-5 per inch (RSI 0.87 per 0.98 inch).
- 4) Board Size: 24 inch wide, 96 inch long, 1.5" (1.5 inch) thick.
- 5) Compressive Strength: Minimum 60 psi.
- 6) Water Absorption (ASTM C272): 0.3% by volume maximum.
- 7) Edges: Square.
- 8) Water Vapor Permeance (ASTM E96): less than 0.8 perm max.
- 9) Flame Spread/Smoke Developed Values (((ASTM E84))); 15/165.
- 10) Certified by foam manufacturer to be CFC free.

B. COVER-BOARD

1. CEMENT ROOF BOARD

- a. Cement Roof Board: High compressive strength, non-combustible, roof underlayment board consisting of aggregated Portland cement slurry with polymer-coated glass-fiber mesh, with the following characteristics:

1.	Board Weight	2.4 lbs/sq.ft.
2.	Board Size	48 x 96 inches
3.	Board Thickness	1/2 inch
4.	Flexural Strength	> 750 psi ASTM C-947
5.	Compressive Strength	> 1000 psi nominal

- 1) Flute Spinnability 12 inch. ASTM E661
- 2) Permeance 5.84 perms ASTM E-96
- 3) Thermal Conductivity R-value of 0.39 ASTM C518
- 4) Coefficient of thermal expansion 4.5×10^6 ASTM E-831
 - (a) Linear variation w change in moisture <0.07% max ASTM D1037
- 5) Water absorption <15 % max ASTM C473
- 6) Mold resistance 10 ASTM D3273
- 7) Board Edges Square

C. BELOW WATERPROOFING INSULATION & COVERBOARD ADHESIVE

1. POLYURETHANE FOAM INSULATION ADHESIVE

- a. SOPREMA DUOTACK 365 or equal: Two-component, polyurethane foam insulation adhesive, applied in ribbons from cartridges or two-component bulk packaging with pump-driven delivery system.
 - 1) Ribbon size: 1/2 inch to 3/4 inch wide.
 - 2) Ribbon spacing: As required to meet specified wind uplift resistance performance.
 - (a) Field of Roof (Zone 1): 12 inch on-centers
 - (b) Perimeter of Roof (Zone 2): 6 inch on-centers
 - (c) Corners of Roof (Zone 3): 4 inch on-centers

4.04 ACCESSORIES

A. PRIMERS:

- B. NOTE: SOPREMA ELASTOCOL 350/500 Primer or equal is not required for SOPREMA COLPLY EF ADHESIVE and SOPREMA COLPLY EF FLASHING

- C. CEMENT applications.
1. SOPREMA ELASTOCOL 500 Primer or equal: Asphalt cut-back primer. Primer for the preparation of membrane substrates for asphalt, heat-welded, hot asphalt and COLPLY ADHESIVE, solvent-based, cold adhesive-applied and cement applications.
 - a. Meets or exceeds ASTM D41
 - b. VOC content: 350 g/L or less.
 - c. SOPREMA ELASTOCOL 350 Primer or equal: Polymer emulsion primer, meeting low VOC requirements for the preparation of membrane substrates for
 - (a) hot asphalt, torch and SOPREMA COLPLY adhesive and flashing cement applications.
 - d. SOPREMA ALSAN RS 222 PRIMER or equal: Rapid curing, polymethyl methacrylate (PMMA) liquid resin used to promote adhesion of PMMA/PMA membranes over asphaltic substrates, wood, concrete and approved waterproofing board substrates.
 - 1) VOC content: 2.5 g/L
 - 2) Color: Clear
 - e. SOPREMA ALSAN RS METAL PRIMER or equal: Solvent-based primer used to improve the adhesion of PMMA/PMA membranes to metal substrates.
 - 1) VOC content: 50 g/L
 - 2) Color: Off White
- D. MEMBRANE ADHESIVE:
1. NOTE: MEMBRANE ADHESIVE/SOPREMA COLPLY EF ADHESIVE or equal should be deleted if not required or used for base ply attachment.
 2. SOPREMA COLPLY EF ADHESIVE or equal: Premium, non-toxic, low odor, solvent-free, polymeric membrane adhesive for use with all SBS-modified bitumen sanded base ply and all Cap Sheet membrane applications.
 - a. VOC Content: 32 g/L or less VOC Content.
 - b. Meets or exceeds ASTM D7379
- E. CATALYST:
1. SOPREMA ALSAN RS CATALYST POWDER or equal: Reactive agent used to cure PMMA/PMA liquid resins.
- F. REINFORCING FABRIC:
1. SOPREMA ALSAN RS FLEECE or equal: Woven polyester reinforcement used in PMMA/PMA liquid applied membrane and flashing applications.
 - a. Thickness: 30-40 mils (0.8- 0.04 inch)
 - b. Weights: 110 g/m²
 - c. Width(s): 10.3 inch, 13.8 inch, 20.7 inch, 41.3 inch. Size as required.
 - d. Length: 164 feet
 - 1) SOPREMA ALSAN RS PRE-CUT FLEECE or equal: Factory pre-cut woven polyester reinforcement used for a variety of penetration flashings in PMMA/PMA liquid applied membrane and flashing applications.
 - e. Thickness: 30-40 mils (0.8- 0.04 inch)
 - f. Weights: 110 g/m²
 - g. Component/Size(s): Small Pipe Flashing ½ - 3 inch, Large Pipe Flashing 4 - 8 inch, Universal Corner sizes as required.
- G. PASTE AND MORTAR:
- (a) SOPREMA ALSAN RS PASTE or equal: Rapid curing, polymethyl methacrylate (PMMA) paste resin used to fill small cracks and voids on non- traffic bearing substrates prior to the application of PMMA/PMA membranes.
 - b. VOC content: 4.4 g/L
 - c. Color: Grey
 2. SOPREMA ALSAN RS MORTAR or equal: Rapid curing, polymethyl methacrylate (PMMA) paste resin used as a lean mortar or a gradient leveling mortar.

a. CLEANER:

- b. VOC content: 4.5 g/L
- c. Color: Grey
- d. SOPREMA ALSAN RS CLEANER or equal: Clear, blended solvent used to clean and prepare plastic and metal surfaces or used to clean existing ALSAN RS surfaces prior to the application of PMMA/PMA liquid applied membrane and flashings.
 - 1) VOC content: <5 g/L
 - 2) Color: Clear

H. FLASHING CEMENT

- 1. SOPREMA COLPLY EF FLASHING CEMENT or equal: Premium, non-toxic, low-odor, solvent-free, polymeric membrane flashing cement for use with sanded base ply and all sanded Cap Sheet flashing applications.
 - a. VOC Content: 32 g/L or less VOC Content.

I. GENERAL PURPOSE SEALANT

- 1. SOPREMA SOPRAMASTIC SP1 or equal: General purpose, paintable, gun- grade, elastomeric, polyether moisture curing sealant for sealing SBS membrane terminations, Kynar 500 PVDF, horizontal and vertical construction joints.
 - a. VOC Content: 20 g/L or less.
 - b. Meets or exceeds ASTM C920, Type S, Grade NS, Class 50.
 - c. Standard color, custom color.

4.05 ABOVE WATERPROOFING ROOF INSULATION COMPONENTS

A. RIGID INSULATION

- 1. EXTRUDED POLYSTYRENE INSULATION (XPS):
 - a. SOPREMA SOPRA-XPS (or as approved equal), tapered extruded polystyrene insulation board for waterproofing assemblies meeting ASTM C578 Type VII criteria.
 - 1) Taper: Reverse taper required to create level slope above waterproofing membrane assembly.
 - 2) Thickness: Total thickness to meet specified insulation system total thermal resistance 'R' value of R-33.
 - 3) Aged Thermal Resistance (((ASTM C518))): R-5 per inch (RSI (a) 0.87 per 0.98 inch.
 - 4) Board Size: 24 inch wide, 96 inch long, 1.5" (1.5 inch) thick.
 - 5) Compressive Strength: Minimum 60 psi.
 - 6) Water Absorption (ASTM C272): 0.3% by volume maximum.
 - 7) Edges: Square.
 - 8) Water Vapor Permeance (ASTM E96): less than 0.8 perm max.
 - 9) Flame Spread/Smoke Developed Values (((ASTM E84))): 15/165.
 - 10) Certified by foam manufacturer to be CFC free.

4.06 ROOF DRAINAGE COMPONENTS

A. PREFABRICATED DRAINAGE MAT

- 1. SOPREMA SOPRADRAIN ECO-Vent: Composite drainage board or equal consisting of a post-industrial recycled polypropylene core of fused, entangled filaments covered with a geocomposite filter fabric on its upper surface to allow water to pass into the drainage core while restricting the movement of soil particles and suitable for use in select vertical and horizontal applications and shall be manufactured by the membrane supplier:
 - a. Thickness: 0.40 inch
 - b. Dimensions: 48 inch. x 100 feet
 - c. Flow rate: 135 gal/min/sf
 - d. Puncture strength: 310 lbs
 - e. Trapezoid tear strength: 50 lbs

B. FILTER FABRIC

1. SOPREMA SOPRANATURE FILTER FABRIC or equal: Non-recycled polypropylene, staple fiber, needle-punched nonwoven geotextile designed to separate the growth medium and/or pavers from drainage system.
 - a. Length: 360 feet
 - b. Width: 6.25 feet
 - c. Flow rate: 140 gpm/sf
 - d. Tensile strength: 100 lbs
 - e. Elongation: 80%

4.07 PAVER OVERBURDEN COMPONENTS

A. ARCHITECTURAL PAVERS

1. Approved HANOVER, WAUSAU TILE, WESTILE, SUNNY BROOK PRESSED CONCRETE or as approved equal architectural precast concrete pavers with beveled edges and integral pedestal:
 - a. Nominal size: 24 inch. x 24 in. x 2 1/4 inch thick
 - b. Compressive strength: 8,500 psi per ASTM C-140; 1750 pounds minimum center load required.
 - c. Flexural strength: 1100 psi per ASTM C-293
 - d. Water absorption: ≤ 5% per ASTM C-140
 - e. Freeze-thaw: no breakage and not more than 1% loss in dry weight after 50 cycles in accordance with ASTM C-67
 - f. Fixed height pedestals supplied thru membrane manufacturer.
 - g. Color and finish: Contact manufacturer, Finish must be slip- resistant.

4.08 MISCELLANEOUS ACCESSORIES

- 1) SHEET METAL FLASHING
- b. Contractor shall furnish all sheet metal flashings, counter flashings, roof edge system, and all other related sheet metal flashings and associated fasteners necessary to flash and counter flash the specified waterproofing system.
 - (a) Sheet metal flashing materials and fasteners shall be compatible with adjacent materials, to accommodate all project related exposures.
 - (b) Pre-Finished (Mill Finished) Sheet Metal Flashing Material: Aluminum, Stainless Steel, Copper.
 - (c) Roof Edge System: Tested per ANSI/SPRI ES-1 to meet or exceed design pressures at roof edge.

PART 3 EXECUTION

5.01 EXAMINATION

- A. Examination includes visual observations, qualitative analysis, and quantitative testing measures as necessary to ensure conditions remain satisfactory throughout the project.
- B. The contractor shall examine all roofing substrates including, but not limited to: insulation materials, roof decks, walls, curbs, rooftop equipment, fixtures, conduit, roof fan, equipment enclosure fence and wood blocking.
- C. The applicator shall not begin installation until conditions have been properly examined and determined to be clean, dry and, otherwise satisfactory to receive specified roofing materials.
- D. During the application of specified materials, the applicator shall continue to examine all project conditions to ensure conditions remain satisfactory to complete the specified roofing system.

5.02 INSPECTION

- A. NYCHA's field inspector, Installer shall inspect and approve the prepared substrate prior to application of the sealer/primer coat.
- B. Random tests for adequate tensile strength of the substrate shall be conducted (using an Elcometer Adhesion Tester) on the substrate by the installer (for an agreed fee), at a minimum frequency of one per 5000 sf. For roofs 15,000 sq. ft. and smaller, a minimum of three tests

shall be conducted and the results recorded. C. The minimum tensile bond strength of the concrete shall be 116 psi.

5.03 PREPARATION

A. GENERAL

5.04 REFERENCE STANDARDS

- A. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems; 2022.
- B. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- C. ASTM C473 - Standard Test Methods for Physical Testing of Gypsum Panel Products; 2024.
- D. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- E. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.
- F. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- G. ASTM D1037 - Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials; 2012 (Reapproved 2020).
- H. ASTM D1079 - Standard Terminology Relating to Roofing and Waterproofing; 2024.
- I. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.
- J. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers; 2022.
- K. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2020a.
- L. ASTM E661 - Standard Test Method for Performance of Wood and Wood-Based Floor and Roof Sheathing Under Concentrated Static and Impact Loads; 2022.
- M. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011 (Reapproved 2019).
- N. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.
- O. CAN-ULC-S770 - Standard Test Method for Determination of Long-Term Thermal Resistance of Closed-Cell Thermal Insulating Foams; 2020 Reaffirmed.
- P. FM 4470 - Examination Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction; 2022.
- Q. FM 4474 - American National Standard for Evaluating the Simulated Wind Uplift Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures; 2020.
- R. ISO 9001 - Quality Management Systems — Requirements; 2015, with Amendment (2024).
- S. PS 1 - Structural Plywood; 2023.
- T. SPRI IA-1 - Standard Field Test Procedure for Verifying the Suitability of Roof Substrates and Adhesives; 2021.
- U. SSPC-SP 3 - Power Tool Cleaning; 2024.
- V. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including All Revisions.
- W. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings; Current Edition, Including All Revisions.
- X. UL 1897 - Uplift Tests for Roof-Covering Systems; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1. Before commencing work each day, the contractor shall prepare all roofing substrates to ensure conditions are satisfactory to proceed with the installation of specified roofing materials. Preparation of substrates includes, but is not limited to, substrate repairs, securement of substrates, eliminating all incompatible materials, and cleaning.
2. Where conditions are found to be unsatisfactory, work shall not begin until conditions are made satisfactory to begin work. Commencing of work shall indicate contractor's acceptance of conditions.
3. On reroofing applications, the existing roof membrane and flashings shall be completely removed to the deck. Prepare deck and flashings substrates as required for application of new waterproofing system.
4. SBS MEMBRANE PRIMER APPLICATION
 - a. NOTE: SOPREMA ELASTOCOL 350/500 Primer or equal is not required for SOPREMA COLPLY EF ADHESIVE and SOPREMA COLPLY EF FLASHING CEMENT
 - 1) applications or equal. If SOPREMA COLPLY EF or equal is used this section should be deleted.
- Y. Examine all substrates, and conduct adhesion peel tests as necessary, to ensure satisfactory adhesion is achieved.
- Z. Apply the appropriate specified primer to dry, compatible substrates as required to enhance adhesion of new specified roofing materials.
- AA. Apply primer using brush, roller, or sprayer at the rate published on the product data sheet. Lightly prime for uniform coverage, do not apply heavy or thick coats of primer.
- BB. Asphalt Primer: Apply SOPREMA ELASTOCOL 350/500 primer or equal to dry compatible masonry, metal, wood and other required substrates before applying asphalt and heat-welded membrane plies. Primer is optional for solvent based solvent based SBS adhesives and cements. Refer to product data sheets.
- CC. Project conditions vary throughout the day. Monitor changing conditions, monitor the drying time of primers, and monitor the adhesion of the membrane plies. Adjust primer and membrane application methods as necessary to achieve the desired results.
 1. HEAT-WELDED, FULLY ADHERED SBS VAPOR BARRIER APPLICATION NOTE: If SOPREMA COLPLY EF or equal is used this section should be deleted.
- DD. Follow material product data sheets and published general requirements for installation instructions.
- EE. Ensure environmental conditions are safe and satisfactory, and will remain safe and satisfactory, during the application of the heat-welded membrane and flashings.
- FF. Ensure all primers are fully dry before beginning heat-welding operations.
- GG. Unroll membrane onto the roof surface and allow time to relax prior to heat welding.
- HH. Starting at the low point of the roof, lay out the membrane to ensure the plies are installed perpendicular to the roof slope, shingled to prevent back-water laps.
- II. Ensure all roofing and flashing substrates are prepared and acceptable to receive the heat-welded membrane.
- JJ. Cut membrane to working lengths and widths to conform to rooftop conditions and lay out to always work to a selvage edge.
- KK. Ensure specified side-laps and end-laps are maintained. End-laps should be staggered 3 ft apart.
- LL. Direct roof torch on the roll as necessary to prevent overheating and damaging the membrane and substrates.
- MM. As the membrane is unrolled, apply heat to the underside of the membrane until the plastic burn-off film melts away. Continuously move the torch side-to-side across the underside of the roll to melt the bitumen on the underside of the sheet, while continuously unrolling membrane.

- NN. While unrolling and heating the sheet, ensure approximately ¼ to 1/2 inch of hot bitumen flows ahead of the roll as it is unrolled, and there is 1/8 to 1/4 inch bleed out at all laps.
- OO. Adjust the application of heat to the underside of the membrane and to substrate as required for varying substrates and environmental conditions.
- PP. At the 6 inch end-laps, melt the plastic burn-off film from the top surface or embed granules and remove surfacing, where present, using a torch or hot-air welder.
- QQ. At end-laps where T-Joints exist, cut a 45-degree dog-ear away from the selvage edge, or otherwise ensure the membrane is fully heat-welded watertight at all T-joints.
- RR. Each day physically inspect all side and end-laps, and ensure the membrane is sealed watertight. Where necessary, use a torch or hot-air welder and a clean trowel to ensure all laps are fully sealed.
- SS. Inspect the installation each day to ensure the plies are fully adhered. Repair all voids, wrinkles, open laps and all other deficiencies.
- TT. Offset cap sheet side and end-laps away from the base ply laps so that cap sheet laps are not located within 18 inch of base ply laps.

5.05 COLD APPLIED, FULLY ADHERED SBS VAPOR BARRIER APPLICATION NOTE: IF SOPREMA COLPLY EF OR EQUAL IS NOT USED THIS SECTION SHOULD BE DELETED.

- A. The ambient temperature shall be above 50°F (10°C), and the adhesive temperature shall be a minimum of 70°F (21°C) at the point of membrane application.
- B. To ensure the adhesive is applied at 70°F (21°C), during cold weather, drums and 5-gallon pails shall be stored in heated areas. Drums and 5-gallon pails exposed to cold temperature on the roof shall be provided with heaters when necessary to ensure the minimum application temperature is maintained.
- C. SOPREMA COLPLY EF ADHESIVE may be applied using a 3/16 – 3/8-inch notched squeegee or brush. SOPREMA COLPLY EF ADHESIVE is not spray-applied.
- D. Apply adhesive to clean, dry and prepared compatible substrates as required to ensure full adhesion.
- E. Follow the adhesive product data sheet requirements for application rates.
- F. Apply a uniform application of membrane adhesive at the application rate published on the product data sheet.
- G. Apply 1-1/2 to 2 gallons per square between membrane plies. The application rate is 2 to 3 gallons per square or more over absorptive substrates and over granule surfaces. Refer to manufacturer's product data sheet and adjust application rate based upon surface conditions.
- H. Install the SBS membrane ply before the adhesive begins to skin over. Once adhesive skins over, the membrane ply will not adhere.

5.06 BELOW WATERPROOFING INSULATION & COVERBOARD ADHESIVE APPLICATION

- A. Apply the specified two-component insulation adhesive to adhere Insulation Base Layer to subsequent insulation Layers and to Cover-board, and to the deck and insulation substrate(s).
- B. Follow insulation adhesive product data sheets and published general requirements for installation requirements.
- C. Apply insulation adhesive in uniform ribbons, 1/2 inch to 3/4 inch wide.
- D. Immediately install insulation components into insulation adhesive and apply weight to ensure the materials maintain full contact with all ribbons for complete adhesion. Do not allow insulation adhesive to skin-over before placing the insulation materials into the adhesive.
- E. Adhere the insulation system to meet the specified wind uplift resistance performance and specified warranty requirements.
- F. Minimum insulation adhesive ribbon spacing:
 1. Field of Roof (Zone 1): 12 inch on-centers.

2. Perimeter of Roof (Zone 2): 6 inch on-centers.
3. Corners of Roof (Zone 3): 4 inch on-centers.

5.07 BELOW WATERPROOFING INSULATION & COVERBOARD SYSTEM APPLICATION

- A. Follow insulation system component product data sheets, published general requirements and approvals.
- B. Install all insulation system components on clean, dry, uniform and, properly prepared substrates.
- C. All insulation system boards shall be carefully installed and fitted against adjoining sheets to form tight joints.
- D. Insulation system boards that must be cut to fit shall be saw-cut or knife-cut in a straight line, not broken. Chalk lines shall be used to cut insulation components. Uneven or broken edges shall not be accepted. Remove dust and debris that develops during cutting operations.
- E. Stagger successive layers of insulation 12 inch vertically and laterally to ensure board joints do not coincide with joints from the layers above and below.
- F. Crickets, saddles, and tapered edge strips shall be installed before installing Cover- boards.
- G. Install tapered insulation, saddles and crickets as required to ensure positive slope for complete roof drainage.
- H. Cover-boards shall be installed to fit tight against adjacent boards. When required by the Cover-board manufacturer, a uniform gap shall be provided between Cover-boards using a uniform guide placed between board joints to form a gap between all boards during installation.
- I. The finished insulation system surface shall be tight to, and flush with, adjacent substrates to form a satisfactory substrate to install specified roof membrane and flashings.
- J. Install specified cants where required for membrane flashing transitions.

5.08 HEAT-WELDED, FULLY ADHERED SBS BASE PLY APPLICATION

- A. Follow material product data sheets and published general requirements for installation instructions.
- B. Ensure environmental conditions are safe and satisfactory, and will remain safe and satisfactory, during the application of the heat-welded membrane and flashings.
- C. Ensure all primers are fully dry before beginning heat-welding operations.
- D. Unroll membrane onto the roof surface and allow time to relax prior to heat welding.
- E. Starting at the low point of the roof, lay out the membrane to ensure the plies are installed perpendicular to the roof slope, shingled to prevent back-water laps.
- F. Ensure all roofing and flashing substrates are prepared and acceptable to receive the heat-welded membrane.
- G. Cut membrane to working lengths and widths to conform to rooftop conditions and lay out to always work to a selvage edge.
- H. Ensure specified side-laps and end-laps are maintained. End-laps should be staggered 3 ft apart.
- I. Direct roof torch on the roll as necessary to prevent overheating and damaging the membrane and substrates.
 - 1) AA.As the membrane is unrolled, apply heat to the underside of the membrane until the plastic burn-off film melts away. Continuously move the torch side-to-side across the underside of the roll to melt the bitumen on the underside of the sheet, while continuously unrolling membrane.
 - 2) BB.While unrolling and heating the sheet, ensure approximately ¼ to 1/2 inch of hot bitumen flows ahead of the roll as it is unrolled, and there is 1/8 to 1/4 inch bleed out at all laps.

- 3) CC. Adjust the application of heat to the underside of the membrane and to substrate as required for varying substrates and environmental conditions.
 - 4) DD. At the 6 inch end-laps, melt the plastic burn-off film from the top surface or embed granules and remove surfacing, where present, using a torch or hot-air welder.
 - 5) EE. At end-laps where T-Joints exist, cut a 45-degree dog-ear away from the selvage edge, or otherwise ensure the membrane is fully heat-welded watertight at all T-joints.
 - 6) FF. Each day physically inspect all side and end-laps, and ensure the membrane is sealed watertight. Where necessary, use a torch or hot-air welder and a clean trowel to ensure all laps are fully sealed.
- b. Inspect the installation each day to ensure the plies are fully adhered.
- (a) Repair all voids, wrinkles, open laps and all other deficiencies.
 - 2) HH. Offset cap sheet side and end-laps away from the base ply laps so that cap sheet laps are not located within 18 inch of base ply laps.

5.09 LIQUID-APPLIED PMMA CAP PLY AND FLASHING SYSTEM SUBSTRATE PREPARATION (SOPREMA ALSAN RS OR EQUAL)

- A. Before commencing work each day the contractor shall prepare all substrates to ensure conditions are satisfactory to proceed with the installation of specified materials.
- B. Preparation of substrates includes, but is not limited to, the following:
- C. General:
 1. All substrates must be clean, dry and free from gross irregularities, loose, unsound or foreign material such as dirt, ice, snow, water, grease, oil, release agents, lacquers, or any other condition that would be detrimental to adhesion of primer and/or resin materials to the substrate. Most surfaces will require mechanical abrasion in the form of scarifying, shot blasting or grinding to achieve a suitable substrate.
 2. Inspect all substrates and correct defects before application of waterproofing materials. Fill all surface voids 1/16 inch or greater wide and/or deep with appropriate fill material.
- D. Concrete Substrates:
 1. Concrete shall comply with requirements of ACI 301 and ACI 308.
 2. Concrete compressive strength: 3,500 psi for all primers or 2,500 psi minimum when use of a moisture mitigation primer is required.
 3. Relative humidity: Maximum 75 percent per ASTM F2170 unless otherwise approved.
 4. Surface: Scarify, shot blast or grind to ICRI Concrete Surface Profile CSP 3 to CSP 5; CSP 3 being the preferred profile.
 5. Adhesion: Adhesion of specified primer and liquid applied membrane shall be minimum 220 psi for traffic bearing waterproofing applications or 116 psi for roofing or non-traffic bearing waterproofing applications per ASTM D4541.
 6. Areas of spalls, voids, bug holes and other deterioration on vertical or horizontal surfaces shall be repaired as required or recommended.
- E. Masonry Substrates:
 1. Walls shall be structurally sound built of hard kiln dried brick, reinforced concrete block, or waterproof concrete block construction.
 2. Liquid applied membrane must not be applied over soft or scaling brick or block, faulty mortar joints, or walls with broken, damaged, or leaking coping. Areas of spalls, voids, bug holes and other deterioration on vertical surfaces shall be repaired as required or recommended.
 3. Walls of ordinary hollow tile, or other materials which in themselves are not waterproofed, should not be accepted as suitable to receive liquid applied membrane unless properly waterproofed to prevent moisture infiltration from above or behind the new liquid applied membrane.
 4. Relative humidity: Maximum 75 percent per ASTM F2170 unless otherwise approved.

5. Surface: Scarify, shot blast or grind to ICRI Concrete Surface Profile CSP 2 to CSP 4.
 6. Adhesion: Adhesion of specified primer and liquid applied membrane shall be minimum 220 psi for traffic bearing waterproofing applications or 116 psi for roofing or non-traffic bearing waterproofing applications per ASTM D4541.
- F. Metal Substrates:
1. Clean and prepare metal to near-white metal in accordance with SSPC-SP 3 (power tool clean) to a point maximum 1/8 inch beyond the termination of liquid applied membrane materials and wipe with solvent cleaner to remove oils, debris or contaminants.
 2. Stainless Steel Series 300 and 400: Abrade to provide rough, open surface and wipe with solvent cleaner to remove oils, debris or contaminants.
 3. Galvanized & Zinc-Rich Metals: Galvanized and/or zinc rich metals are coated with either a layer of oil to prevent white rust or is passivated which must be completely removed prior to applying primer or liquid applied waterproofing. This can be confirmed by applying a coat of copper sulfate solution to the prepared and cleaned galvanized/zinc metal. A properly prepared surface will turn black indicating the passivator has been removed. If the surface does not turn black, additional abrasive cleaning will be required.
 4. Adhesion: Examine metal substrates by conducting adhesion testing. Prime with specified metal primer where required to achieve adequate adhesion.
- G. Rigid Plastics (PVC & ABS):
1. Rigid plastics should be lightly abraded and wiped with solvent cleaner. Extend preparation maximum 1/8 inch beyond the specified termination of the liquid applied membrane flashing materials.
- H. Wood Substrates:
1. Provide sanded $\frac{3}{4}$ in 0.75 inch minimum thickness APA A-C, Group 1, Exterior or Exposure 1, 48 inch x 96 inch tongue & groove sheathing panels. Install all panels with "A" side up, edges supported by blocking or structural framing, fastened using only non-corrosive screw fasteners with heads installed flush with sheathing applied at 6 inch minimum o.c. along panel edges and 12 inch o.c. over intermediate supports and/or additional fastening as required by jurisdictional codes. All new plywood substrates shall be structural panels performance-rated pursuant to National Institute of Standards and Technology (NIST) voluntary product standard PS 1-95; identified with American Plywood Association (APA) grade designations.
 2. Hygroscopic building materials such as wood plank, timber or plywood will normally have higher moisture content (in the range of 8% to 12%) as they adsorb or desorb moisture to reach equilibrium moisture content with the surrounding air. Cold liquid applied primer and reinforced membrane should not be applied to damp or wet sheathing materials but may be applied to materials with higher moisture contents as indicated above, provided the exposed surface is clean and dry. Ultimately, determinations of moisture content and the resulting bond strength should be performed periodically to determine acceptability. If poor adhesion or blistering occurs, substrate will require additional drying time before proceeding.
 3. After priming plywood panels, fill joint gaps, holes and cracks with proprietary PMMA paste or PMMA mortar. All joints must be covered with minimum 1 inch wide bond breaker tape followed with minimum 6 inch wide strips of cold liquid applied reinforced waterproofing membrane centered over joint.
 - a. Cover knot holes or cracks with strips of cold liquid applied reinforced waterproofing membrane.
- I. Acceptable Roof Cover Boards:
1. After panels, fill joint gaps, holes, and cracks with proprietary PMMA paste or PMMA mortar. All joints must be covered with minimum 6 inch wide strips of cold liquid applied reinforced waterproofing membrane centered over joint.
- J. Membrane Flashing – General:

1. Membrane flashings shall be fabricated with primer appropriate for the substrate surface, resin of the same base chemical type as the field membrane, and fleece of the same weight as the field membrane unless specified otherwise.
 2. Primer, resin, and fleece mixing, and application methods as specified for field membranes are also suitable for membrane flashing. Fleece shall overlap 2" 0.16 feet minimum for all side joints and 4-inch 0.33 feet overlaps at butt laps, tie-ins and horizontally at all substrates. Fleece shall be cut neatly to fit all flashing conditions without a buildup of multiple fleece layers. Work wet membrane with a brush or roller to eliminate blisters, openings, or lifting at corners, junctions, and transitions.
- K. Pipes, Conduits, and Unusual Shaped Penetrations:
1. Pipes conduits and other items to be flashed must be separated with 1-inch 0.08 feet minimum clearance or as recommended by Membrane Manufacturer to adequate waterproof each individual penetration.
 2. All penetrations must be flashed individually. Two or more items ganged together in a flashing will NOT be permitted.
 3. Flash penetrations using cold fluid-applied reinforced membrane or Membrane Manufacturers proprietary flashing matrix as recommended. Flashing shall consist of a reinforced deck skirt/target flashing and reinforced vertical wrap.
- L. Roof Drains and Scuppers:
1. Flash roof drains using cold fluid-applied membrane. Flashing shall consist of target flashing extending minimum 12-inches 0.98 feet horizontally onto the substrate and extend down into the prepared drain bowl a minimum of 3-inches 0.25 feet.
 2. At no time should the cold fluid-applied membrane be installed to restrict or reduce the drain inlet in size.
 3. For new roof drains, Contractor shall include cost of all plumbing work, piping and connection to existing storm sewer system. Acceptable drain and scupper materials are cast iron, cast aluminum, stainless steel and copper.
 4. Connect new drains and scuppers to existing storm sewer system.
 5. Alternatively, replace all broken or damaged parts of existing drains and scuppers.
 6. Flashing material shall extend four (4) inches minimum onto drain or scupper flange and into drain/scupper body.
 7. Install clamping ring if provided as part of the drain or scupper design. Install a strainer basket to prevent debris from clogging the drainage line.
- M. Hot Pipes:
1. Protect cold fluid-applied membrane components from direct contact with steam or heat sources when the in-service temperature exceeds 150 degrees Fahrenheit. In all such cases flash to an intermediate "cool" sleeve.
 2. Fabricate "cool" sleeve in the form of a metal cone using galvanized metal in accordance with membrane manufacturer details.
 3. Flash sleeve using cold fluid-applied reinforced membrane or Membrane Manufacturers proprietary flashing matrix as recommended. Flashing shall consist of a reinforced deck skirt/target flashing and reinforced vertical wrap.
- N. Flexible Penetrations
1. Provide a weather-tight gooseneck set in Membrane Manufacturers acrylic resin paste and secured to the deck.
 2. Flash gooseneck penetrations using cold fluid-applied reinforced membrane or Membrane Manufacturers proprietary flashing matrix as recommended. Flashing shall consist of a reinforced deck skirt/target flashing and reinforced vertical wrap.
- O. Walls, Curbs and Bases:
1. Flash all walls, curbs and base flashings using cold fluid-applied reinforced membrane. Wherever possible extend flashing up and over tops of walls, curbs and bases so the membrane terminates on the opposite vertical face of the building element.

2. Wall, curb and base flashings shall be installed to solid substrate surfaces only. Adhering to gypsum-based panels, cementitious stucco, synthetic stucco, wood or metal siding, and other similar materials is not acceptable.
 3. All pins, dowels and other fixation elements shall be flashed separately with a vertical flashing component prior to installing the exposed flashing layer.
- P. Expansion Joints:
1. Flash all expansion joints with two layers of cold fluid-applied reinforced membrane. The bottom ply shall be installed using 1-ply of Membrane Manufacturers fabric reinforced membrane followed by 1ply of Membrane Manufacturers MMA flashing matrix applied over an expansion tube and bond breaker tape.
- Q. Drip Edges and Gravel Stops:
1. Metal drip edges and gravel stops shall be installed to solid substrate surfaces or wood nailers only. Securement to gypsum-based panels, cementitious stucco, synthetic stucco, wood or metal siding or coping, and other similar materials is not acceptable.
 2. Flash all drip edges and gravel stops by extending the field membrane all the way to the edge of the exposed face prior to installing the metal edging. Strip in the metal flange with a separate 8-inch-wide strip of membrane adhered to both the securement flange and to the field membrane.
 3. For conditions where water infiltration behind the exposed drip edge or gravel stop face is possible, install a separate membrane layer positioned behind the face area and extending a minimum of four (4) inches past the securement flange onto the field substrate prior to installing the drip edge or gravel stop.
- R. Electrical Conduit, Gas Lines and Lightning Protection:
1. Supports for electrical conduit and gas lines greater than one (1) inch in diameter require the use of a separate engineered support system.
 2. Supports for electrical conduit and gas lines one (1) inch or less in diameter, and bases for lightning protection rods and cable, can be adhered directly to the membrane surface with a single-component, high quality polyurethane sealant.
- S. Disposal of Resin:
1. Cured resin may be disposed of in standard landfills. This is accomplished by thoroughly mixing all components.
 2. Uncured resin is considered a hazardous material and must be handled as such, in accordance with local, state and federal regulation. Do not throw uncured resin away.
 3. c. Where conditions are found to be unsatisfactory, work shall not begin until conditions are adjusted appropriately. Commencing of work shall indicate contractor's acceptance of conditions.

5.10 PMMA MEMBRANE & FLASHING PRIMER APPLICATION (GENERAL)

- A. Refer to manufacturer's detail drawings, product data sheets and published general requirements for application rates and specific installation instructions.
- B. Examine all substrates and conduct adhesion peel tests as necessary to ensure satisfactory adhesion is achieved.
 1. PMMA PRIMER APPLICATION (SOPREMA ALSAN RS 222 or equal)
- C. Mix primer resin and catalyst approximately 2 minutes using a clean spiral agitator on slow speed or stir stick until evenly mixed. Do not aerate. Mix only the amount of primer that can be used within the application time.
- D. Apply the appropriate specified primer to dry, compatible substrates as required to enhance adhesion of new specified waterproofing materials.
- E. Apply primer using brush or roller at the rate published on the product data sheet. Do not allow primer to pond or collect in low areas.
- F. Project conditions vary throughout the day. Monitor changing conditions, and the curing time of primers.

- G. Allow primer to fully cure before membrane application.
 - 1. METAL PRIMER APPLICATION (SOPREMA ALSAN RS METAL PRIMER or equal)
- H. Mix primer resin approximately 2 minutes using a clean spiral agitator on slow speed or stir stick until evenly mixed. Do not aerate. Mix only the amount of primer that can be used within the application time.
- I. Apply the appropriate specified primer to dry, compatible substrates as required to enhance adhesion of new specified waterproofing materials.
- J. Apply primer using brush or roller at the rate published on the product data sheet. Do not allow primer to pond or collect in low areas.
- K. Project conditions vary throughout the day. Monitor changing conditions, and the curing time of primers.
- L. Allow primer to fully cure before membrane application.
 - 1. SUBSTRATE PATCHING, LEVELING & REPAIR (SOPREMA ALSAN RS PASTE OR ALSAN RS 233/RS 263 MORTAR or equal)
- M. GENERAL:
 - 1. After priming and before commencing with application of liquid applied waterproofing, the contractor shall patch, level or repair all substrates as required to eliminate bug holes, voids, cavities, low spots, repair cracks or any other condition that may be detrimental to proper application of the liquid applied waterproofing.
- N. PATCHING, LEVELING & REPAIRS:
 - 1. Contractor shall use proprietary paste or resin-mortar for all patching, leveling or repairs wherever possible. Refer to manufacturer's detail drawings, product data sheets and published general requirements for application rates and specific installation instructions.
 - 2. Traffic bearing substrates: Use only resin-mortar for all substrate leveling, patching and repairs.
 - 3. Non-traffic bearing horizontal or vertical substrates: Use paste or resin-mortar for all substrate leveling, patching and repairs.
 - 4. Application:
 - a. Install paste or resin-mortar over a fully cured primer.
 - b. The substrate shall be dry and free of any dust or loose particles.
 - c. Mix paste resin and/or resin-mortar using a slow speed agitator prior to pouring into a larger container.
 - d. When required, combine the paste or resin-mortar with #1 (0.7 – 1.2mm) kiln-dried quartz aggregate as recommended for deep voids or large areas.
 - e. Mix paste and/or resin-mortar and catalyst approximately 2 minutes using a clean spiral agitator on slow speed or stir stick until evenly mixed. Do not aerate. Mix only the amount of product that can be used within the application time.
 - f. Apply the catalyzed paste and/or resin-mortar onto the substrate using a smoothing trowel, working the material into the surface for complete coverage and full adhesion.
 - g. Paste and/or resin-mortar should be placed in lifts no greater than the maximum thicknesses recommended.
 - h. If additional lifts will be required, broadcast top surface of the placed paste or resin-mortar with clean dry #1 (0.7 - 0.05 inch kiln-dried quartz aggregate at approximately 25% coverage while the paste and/or resin-mortar is wet. Place next lift once the paste and/or resin-mortar has cured.
- O. NON-MOVING (STATIC) CRACKS – 0.04 inch or less:
 - 1. Determine that crack is non-moving. Remove any existing filler and clean out crack by brushing and oil-free compressed air. Fill crack with resin mortar or paste as required.
- P. MOVING (DYNAMIC) CRACKS – 0.04 inch or less:
 - 1. Determine that crack is moving. Remove any existing filler and clean out crack by brushing and oil-free compressed air. Fill crack with resin-mortar or paste as required.

After the resin-mortar or paste has cured, apply minimum 4 inch wide strip of reinforced cold liquid applied membrane centered over crack.

- Q. MOVING (DYNAMIC) CRACKS – 0.12 inch or less:
1. Determine that crack is moving. Remove any existing filler and clean out crack by brushing and oil-free compressed air. Fill crack with resin-mortar or paste as required. After the resin-mortar or paste has cured, apply bond breaker tape 5 times in width greater than the maximum anticipated expansion. Then cover with a strip of reinforced cold liquid applied membrane centered over crack sized to provided 2 inch minimum cover beyond all side of the bond breaker tape but no less than 6 inch minimum width.
- R. MOVING (DYNAMIC) CRACKS – Greater than 0.12 inch:
1. Moving cracks greater than 0.12 inch must be treated as an expansion joint.

5.11 PMMA MEMBRANE INSTALLATION & STAGING

- A. In a normal cold liquid applied membrane application the substrate is prepared and primed, flashings are installed, followed by the application of the waterproofing membrane and finish. When applying broadcast aggregate that will be top coated with PMMA finish, the aggregate should not be left subject to the elements, and therefore must be top coated with finish the same day of application whenever possible.
- B. If work is interrupted for more than 12 hours use manufacturer's proprietary cleaner to clean applied primer, resin mortar, flashing membrane or field membrane transition areas. Cleaner should be allowed a minimum of 20 minutes evaporation time after application and covered within 60 minutes of application or as recommended by the manufacturer.

5.12 LIQUID APPLIED PMMA FLASHING MEMBRANE APPLICATION (SOPREMA ALSAN RS 230 FLASH OR EQUAL)

- A. General:
- B. Refer to manufacturer's detail drawings, product data sheets and published general requirements for application rates and specific installation instructions.
- C. Provide a minimum vertical height of 8 inch for all flashing terminations wherever possible. Flashing height shall be at least as high as the potential water level that could be reached as a result of a deluging rain and/or poor slope.
- D. Do not flash over existing through-wall flashings, weep holes and overflow scuppers.
- E. All flashing shall be terminated as required by the manufacturer. Cap flashings or counter flashings may be constructed of metal, stone, tile or other materials properly installed in accordance with industry-accepted practice.
- F. Install all flashing membranes before installing field membranes.
- G. The primed substrate shall be dry and free of any dust, loose particles, or contaminants.
- H. Precut reinforcing fleece to conform to terminations, transitions and penetrations being flashed. Ensure a minimum 2 inch overlap of fleece at side laps and extend flashing 4 inch minimum horizontally onto deck unless otherwise specified. Ensure the completed liquid applied flashing membrane is fully reinforced.
- I. Wherever possible factory pre-cut fleece pipe penetration and universal corners shall be used.
- J. Mix waterproofing resin and catalyst approximately 2 minutes using a clean spiral agitator on slow speed or stir stick until evenly mixed. Do not aerate. Mix only the amount of waterproofing resin that can be used within the application time.
- K. Apply the base coat of catalyzed waterproofing resin onto the substrate using a brush or roller, working the material into the surface for complete coverage and full adhesion.
- L. Immediately apply the reinforcing fleece into the wet base coat of resin making sure the smooth side is up. Using a brush or roller, work the reinforcing fabric into the wet resin while applying the second coat of catalyzed waterproofing resin to completely encapsulate the fleece. Avoid any folds and wrinkles.

- M. At membrane tie-ins, clean cured membrane with specified cleaner before application of adjacent membrane.
- N. Penetrations
- O. Pipes, Conduits, Posts, Supports and Unusual Shaped Penetrations:
 1. Pipes, conduits, and other items to be flashed must be separated with $\frac{1}{2}$ in 0.51 inch minimum clearance or as recommended by manufacturer to adequate waterproof each individual penetration.
 2. All penetrations must be flashed individually. Two or more items ganged together in a flashing will NOT be permitted.
 3. Flash penetrations using cold liquid applied reinforced membrane or proprietary fibrated flashing resin as recommended. Flashing shall be applied using factory pre-cut fleece wherever possible consisting of a reinforced deck skirt/target flashing applied over a reinforced vertical wrap finger flashing.
- P. Drains:
 1. Flash drains using cold liquid applied membrane. Flashing shall consist of a membrane target extending minimum 12 inch horizontally onto the substrate applied over a finger flashing extended into the prepared drain bowl a minimum of 3 inch.
 2. At no time should the cold liquid applied membrane be installed to restrict or reduce the drain inlet in size.
 3. For new drains, contractor shall include cost of all plumbing work, piping and connection to existing storm sewer system.
- Q. Hot Pipes:
 1. Protect cold liquid applied membrane components from direct contact with steam or heat sources when the in-service temperature exceeds 150°F (65.5°C). In all such cases flash to an intermediate "cool" sleeve.
 2. Fabricate "cool" sleeve in the form of a metal cone using non-ferrous metal in accordance with manufacturer details.
 3. Flash sleeve using cold liquid applied reinforced membrane similar to a standard pipe flashing. Flashing shall consist of a reinforced target applied over a reinforced vertical wrap finger flashing.
- R. Flexible Penetrations:
 1. Provide a weather-tight gooseneck set in manufacturers resin paste and secured to the deck.
 2. Flash gooseneck penetrations using cold liquid applied reinforced membrane as recommended. Flashing shall consist of a reinforced target and reinforced vertical wrap finger flashing.
- S. Walls, Curbs and Bases:
 1. Flash all walls, curbs and bases using cold liquid applied reinforced membrane. Wherever possible extend flashing up and over tops of walls, curbs and bases so the membrane terminates on the opposite face of the vertical element.
- T. Expansion Joints:
 1. Flash all expansion joints with minimum two layers of manufacturer's cold liquid applied reinforced membrane applied over an expansion joint compressible filler, expansion tube, backer rod and/or bond breaker tape as recommended by manufacturer.
- U. Non-standard Flashing Details:
 1. When required, consult manufacturer for recommendations on flashing non- standard conditions, penetrations, or protrusions.

5.13 LIQUID APPLIED PMMA FIELD MEMBRANE CAP PLY APPLICATION (SOPREMA ALSAN RS 230 OR EQUAL)

- A. Refer to manufacturer's detail drawings, product data sheets and published general requirements for application rates and specific installation instructions.

- B. Install all flashing membranes before installing field membranes.
- C. The primed substrate shall be dry and free of any dust, loose particles or contaminants.
- D. Precut reinforcing fleece to conform to terminations, transitions and penetrations being flashed. Ensure a minimum 2 inch overlap of fleece at side and 4 inch at end-laps. Ensure the completed liquid applied membrane is fully reinforced.
- E. Mix waterproofing resin and catalyst approximately 2 minutes using a clean spiral agitator on slow speed or stir stick until evenly mixed. Do not aerate. Mix only the amount of product that can be used within the application time.
- F. Apply the base coat of catalyzed waterproofing resin onto the substrate using a brush or roller, working the material into the surface for complete coverage and full adhesion.
- G. Immediately apply the reinforcing fleece into the wet base coat of waterproofing resin making sure the smooth side is up. Using a brush or roller, work the reinforcing fabric into the wet resin while applying the second coat of catalyzed waterproofing resin to completely encapsulate the fleece. Avoid any folds and wrinkles.
- H. At membrane tie-ins, clean cured membrane with specified cleaner before application of adjacent membrane.

5.14 SHEET METAL FLASHING INSTALLATION

- A. Refer to sheet metal flashing detail drawings and follow product data sheets and published general requirements for installation instructions.
- B. Follow the most recent edition of the SMACNA Architectural Sheet Metal Manual for fabrication and installation requirements.
 - 1. WATERPROOFING MEMBRANE CONTINUITY TESTING
- C. Thermal Imaging:
 - D. Thermal imaging with the use of infrared camera (by FLIR E95 or approved equal) should be performed on each roof after completion of all punch list items.
 - E. Thermal imaging should be performed after rainy day. Roof surface has to be completely dry to avoid false reading. Imaging work should be scheduled in advance in writing with Owner's representative and Architect.
 - F. Independent testing company to perform thermal imaging, should be retained by the Contractor and approved by the Owner's representative.
 - G. Contractor to forward report of the thermal imaging within 3 business days after completion of imaging.
- H. Roof Ponding
 - I. The contractor shall ensure that the executed roofing system shall have no ponding water on the roof 48 hours after rain during weather conducive to drying. If after 48 hours the ponding still exists, the ponding area must be corrected as per the Manufacturer's Recommendations to avoid affecting the Roofing system.
 - J. Ponding shall be checked after 48 hours as recommended by NCRA and industry standards.
 - K. Individual ponding areas should have a maximum width of 2 feet and maximum length of 4 feet to a maximum total area of 8 sq feet per "pond".
 - L. The total ponding locations added together in any Roof should not exceed 1% of the total roof area.
 - M. Ponding locations cannot be concentrated in any area such that it prevents safe access to areas of the roof.
 - N. Maximum depth of water in any area should not exceed ½".
 - O. No ponding in front of bulkhead doors, stairs to utility rooms, roof fans or elevator rooms is permitted.

- P. Any ponding that exceeds any of the above thresholds must be addressed and repaired as per Manufacturer's Recommendations.
 - 1. WATERPROOFING MEMBRANE PROTECTION (General)
- Q. A. Protect waterproofing membrane to avoid damage by other trades and during placement of overburden. Place protection layer immediately upon curing of waterproofing membrane. Drainage composite or protection boards may be installed the same day the membrane is applied or immediately after flood testing when required.
- R. Horizontal applications: Use a drainage composite, or 1/8" to 1/4" (3.2 to 0.25 inch asphaltic hardboard. When reinforced concrete slabs are placed over the membrane, use drainage composite or 1/4" (6.4 mm) hardboard. Where required, adhered protection board to waterproofing membrane using Membrane Manufacturers proprietary acrylic resin paste or approved adhesive.
- S. Vertical applications: Use drainage composite, 1 inch expanded polystyrene or extruded polystyrene that has a minimum compressive strength of 10 lb/in² (69 kN/m²). If extruded polystyrene protection board is used, backfill should not contain sharp rock or aggregate over 2 inch in diameter. Adhere drainage composite or polystyrene protection board to waterproofing membrane as required using Membrane Manufacturers proprietary acrylic resin paste or an approved adhesive.

5.15 PAVER OVERBURDEN INSTALLATION

- A. DRAINAGE MAT:
 - B. Install course of drainage mat over horizontal surfaces. Allow to lay flat and overlap min. three (3) inch all side laps or as required by membrane's manufacturer.
 - C. Cut and fit drainage mat per manufacturer's specifications to fit the perimeter and penetrations.
 - D. Bond all overlap edges to adjacent drainage mat course with an acceptable adhesive if required to ensure geotextile integrity.
- E. EXTRUDED POLYSTYRENE (XPS) INSULATION BOARD INSTALLATION
 - F. Loose lay extruded polystyrene insulation boards in a staggered manner. Butt all boards tightly leaving a maximum acceptable opening between panels of three- eights (3/8) inch. Install insulation within the required distances of all projection,
 - 1. penetrations, etc. In multi-layer applications the bottom layer must be the thickest layer and have a minimum thickness of 2" 2 inch.
- G. FILTER FABRIC INSTALLATION
 - H. Install filter fabric course over all extruded insulation panels. Allow to lay flat.
 - I. Cut and fit filter fabric per manufacturer's specifications to fit the perimeter and penetrations.
 - J. Bond all overlap edges to adjacent filter fabric course to ensure geotextile integrity.
- K. PAVERS PLACEMENT
 - L. Install subsequent overburden materials as soon as possible.
 - M. Install finish pavers (slip resistant), on leveling shims as required, in accordance with Manufacturer's recommendations and architectural layout.

5.16 CLEAN-UP AND PROTECTION

- A. Clean-up and properly dispose of waste and debris resulting from these operations each day as required to prevent damages and disruptions to operations.
- B. Upon completion of new work (including all associated work), institute appropriate procedures for surveillance and protection of finished work during remainder of construction period. Protect all areas where waterproofing membrane has been installed.
- C. Upon completion of waterproofing and flashings (including all associated work), institute appropriate procedures for surveillance and protection of roofing during remainder of construction period. Protect all areas where membrane has been installed.

5.17 CLOSEOUT

- A. Correction of Work:
- B. Work that does not conform to specified requirements including tolerances, slopes, and finishes shall be corrected and/or replaced. Any deficiencies of membrane application, termination and/or protection as noted during the Membrane Manufacturer's inspections shall be corrected and/or replaced at Contractor's expense.
 - a. Clean-Up:
- C. Site clean-up, including both interior and exterior building areas that have been affected by construction, shall be restored to preconstruction condition.
- D. Issuance of the Warrantee: Complete all post installation procedures in accordance with the manufacturer's guidelines for warranty issuance of the specified warrantee.

END OF SECTION 07 55 56