

MODIFIED BITUMINOUS MEMBRANE ROOFING – TORCH APPLICATION

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

- A.** This portion of the specification sets forth the general requirements and describes materials and workmanship for installing the torch applied modified bituminous membrane roof system over prepared substrate.
- B.** Roofing contractor shall furnish and install all materials described herein unless specifically noted otherwise.
- C.** This section is for work on all roofs where indicated on the drawings.

1.2 SUMMARY

- A.** Torch Applied SBS modified bituminous membrane roofing over prepared substrate.
 - 1. Nail Type II base sheet to Lightweight Concrete.
 - 2. Install (1) ply of HPR Torch Base Sheet
 - 3. Install (1) ply of Stress Ply IV Torch Cap Sheet
 - 4. Install flood coat of Black Knight Cold Process Adhesive and gravel
 - 5. Install two (2) ply modified asphalt membrane flashing system using Torch Applied methods consisting of the base and cap sheets specified above

1.3 RELATED SECTIONS

- A.** Section 02 41 00 “Demolition”
- B.** Section 07 60 00 “Flashing and Sheet Metal”
- C.** Section 02 82 13.21 “Asbestos Roofing Abatement”
- D.** Section 04 05 31 “Masonry Tuck Pointing”

1.4 REFERENCES

- A.** American Society of Civil Engineers (ASCE):
 - 1.** ASCE 7-02, Minimum Design Loads for Buildings and Other Structures.
- B.** American Society for Testing and Materials (ASTM):

1. ASTM D41 Standard Specification for Asphalt Primer Used in Roofing, Dampproofing and Waterproofing.
 2. ASTM D312 Standard Specification for Asphalt Used in Roofing.
 3. ASTM D451 Standard Test Method for Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products.
 4. ASTM D1079 Standard Terminology Relating to Roofing, Waterproofing and Bituminous Materials.
 5. ASTM D1227 Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.
 6. ASTM D1863 Standard Specification for Mineral Aggregate Used as a Protective Coating for Roofing.
 7. ASTM D2178 Standard Specification for Asphalt Glass Felt Used as a Protective Coating for Roofing.
 8. ASTM D4586 Standard Specification for Asphalt Roof Cement.
 9. ASTM D2824 Standard Specification for Aluminum-Pigmented Asphalt Roof Coating.
 10. ASTM D4601 Standard Specification for Asphalt Coated Glass Fiber Base Sheet Used in Roofing.
 11. ASTM D5147 Standard Test Method for Sampling and Testing Modified Bituminous Sheet Materials.
 12. ASTM D6162 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.
 13. ASTM D6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
 14. ASTM E108 Standard Test Methods for Fire Test of Roof Coverings.
- C. Factory Mutual Research (FM):
1. Roof Assembly Classifications.
- D. National Roofing Contractors Association (NRCA):
1. Roofing and Waterproofing Manual.

- E.** Underwriters Laboratories, Inc. (UL):
 - 1.** Fire Hazard Classifications.
- F.** Warnock Hersey (WH):
 - 1.** Fire Hazard Classifications.
- G.** American National Standards Institute and Single Ply Roofing Institute (ANSI/SPRI)
 - 1.** ANSI/SPRI ES-1 Testing and Certification Listing of Shop Fabricated Edge Metal

1.5 DISCLOSURE OF MATERIALS AND SUBSTITUTIONS

- A.** The materials outlined herein are the type of materials that should be used in this project. When a particular make or trade name is specified, it shall be indicative of the minimum standard required.
- B.** If an alternative material is bid, the material must be equal to or exceed the specifications, and submitted to the Owner (10) days prior to bid opening for approval and include the following:
 - 1.** Written application with explanation of why the material should be considered.
 - 2.** Material product data sheets.
 - 3.** A certificate from an accredited testing laboratory comparing the physical and performance attributes of the proposed material with those materials denoted as pre-approved systems of the characteristics noted in the material specifications section, included but not limited to the following:
 - a.** Modified roofing membrane(s) and flashings substantiating Flexibility, Tensile Strength and Tear Strength. Test results must be dated, notarized and be on testing laboratory stationary. Testing for SBS membrane must follow standard ASTM D 5147 test methods. Testing shall be performed at 77 degrees Fahrenheit. Tests at 0 degrees Fahrenheit shall not be considered.
 - 4.** A list of at least (5) jobs where the proposed alternate material was used under similar conditions. These jobs shall be located within fifty (50) miles of the St. Alban's Veterans Administration Hospital. Each job must be at least five (5) years old, and each must be available for inspection by the Owner.
 - 5.** The manufacturer must have a current ratio of 6:1 (current assets to current liabilities) and demonstrate such with an audited financial statement supported by an affidavit from a third party.

6. The materials installed for the waterproofing membrane must be physically manufactured and guaranteed by the materials supplier.
7. A sample warranty by the manufacturer of the modified bitumen membrane roofing system. The manufacturer must be the organization that physically manufactures the modified roofing membrane.
8. All products must be in accordance with the Health, Safety and Environmental Control (H, S & E) Regulations, e.g., No asbestos materials, no harmful solvent release materials, etc.
9. In making a request for submission, Bidder/Contractor represents:
 - a. He/she has personally investigated the proposed product or method, and determined that it is equal or superior in all respects to that specified.
 - b. He/she will provide the same guarantee for substitution as for the product and method specified.
 - c. He/she will coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.
 - d. He/she waives all claims for additional cost related to substitution which consequently become apparent.
 - e. Cost data is complete and includes all related cost under his/her contract or other contracts which may be affected by the substitution.
 - f. He will reimburse the Owner for all redesign cost by the Architect for accommodation of the substitute.
10. The Owner reserves the right to be the final authority on the acceptance or rejection of any or all bids, proposed alternate roofing systems or materials that has met ALL specified requirement criteria.
11. Alternate material submissions shall be sent to the Owner. Only substitutes approved in writing by the Owner will be considered.
12. Notification by addendum of approvals will be mailed at least seven (7) days before bid opening.

NOTE: Failure to submit substitution package, or any portion thereof requested, as per the minimum day allowance described above, will result in immediate disqualification and consideration for that particular contractors request for manufacturer

1.6 SUBMITTALS

- A. Submit under provisions of Section 1 and this section.
- B. Product Data: Provide manufacturer's technical product data for each type of roofing product specified. Include data substantiating that materials comply with specified requirements.

- C. Samples: Submit two (2) samples of each product specified.
- D. Manufacturer's Installation Instructions: Submit installation instructions and recommendations indicating special precautions required for installing the roof system.
- E. Manufacturer's Certificate: Certify that roof system furnished is approved by Factory Mutual, Underwriters Laboratories, Warnock Hersey or approved third party testing facility in accordance with ASTM E108, Class A for external fire and meets local or nationally recognized building codes.
- F. Manufacturer's Certificate: Certify that the modified membrane materials specified and to be used on this project are physically manufactured, supplied and warranted by one manufacturer in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.
- G. Manufacturer's Certificate: Submit a certified copy of the roofing manufacturer's ISO 9001 compliance certificate.
- H. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147.
- I. Submit a copy of an unexecuted manufacturer's warranty for review.
- J. Submit a sample of roofing aggregate for review.
- K. Written certification from the roofing system manufacturer certifying the applicator is currently authorized for the installation of the specified roof system.

1.7 CONTRACT CLOSEOUT SUBMITTALS

- A.** General: Comply with Requirements of Division 01 Section - Closeout Submittals.
- B.** Special Project Warranty: Provide specified warranty for the Project, executed by the authorized agent of the Manufacturer.
- C.** Roofing Maintenance Instructions. Provide a manual of manufacturer's recommendations for maintenance of installed roofing systems.
- D.** Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.
- E.** Demonstration and Training Schedule: Provide a schedule of proposed dates and times for instruction of Owner's personnel in the maintenance requirements for completed roofing work. Refer to Part 3 for additional requirements.

1.8 QUALITY ASSURANCE

- A.** Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with not less than 12 years documented experience and have ISO 9001 certification.

- B.** Installer Qualifications: Company specializing in modified bituminous roofing installation with not less than 5 years experience and authorized by roofing system manufacturer as qualified to install manufacturer's roofing materials.
- C.** Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress. Maintain proper supervision of workmen.
- D.** Maintain a copy of the Contract Documents in the possession of the Supervisor/Foreman and on the roof at all times.
- E.** Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer.
 - 1.** Upon request of the Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.
- F.** Source Quality Control: Manufacturer shall have in place a documented, standardized quality control program such as ISO-9001.

1.9 PRE-INSTALLATION CONFERENCE

- A.** Pre-Installation Roofing Conference: Convene a pre-roofing conference approximately two (2) weeks before scheduled commencement of modified bituminous roofing system installation and associated work.
- B.** Require attendance of installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in and around roofing which must precede or follow roofing work (including mechanical work if any), Architect, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, testing agencies and governing authorities. Objectives of conference include:
 - 1.** Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
 - 2.** Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work performed by others.
 - 3.** Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
 - 4.** Review roofing system requirements (drawings, specifications and other contract documents).

5. Review required submittals both completed and yet to be completed.
 6. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 7. Review required inspection, testing, certifying and material usage accounting procedures.
 8. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not mandatory requirement).
 9. Record discussion of conference including decisions and agreements (or disagreements) reached and furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.
 10. Review notification procedures for weather or non-working days.
- C. The Owner's Representative will designate one of the conference participants to record the proceedings and promptly distribute them to the participants for record.
 - D. The intent of the conference is to resolve issues affecting the installation and performance of roofing work. Do not proceed with roofing work until such issues are resolved to the satisfaction of the Owner. This shall not be construed as interference with the progress of Work on the part of the Owner.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.
- B. Store and handle roofing sheets in a dry, well-ventilated, weather-tight place to prevent moisture exposure. Store rolls of felt and other sheet materials on pallets or other raised surface. Stand all roll materials on end. Cover roll goods with a canvas tarpaulin or other breathable material (not polyethylene).
- C. Do not leave unused materials on the roof overnight or when roofing work is not in progress unless protected from weather and other moisture sources.
- D. Secure all material and equipment on the job site. If any material or equipment is stored on the roof, the assure that the integrity of the deck is not compromised at any time. Damage to the deck caused by the Contractor's actions will be the sole responsibility of the Contractor and will be repaired or replaced at his expense.

1.11 MANDATORY MANUFACTURER'S INSPECTIONS

- A.** When the project is in progress, the roofing system manufacturer will provide the following:
 - 1.** Report progress and quality of the work as observed.
 - 2.** **Provide daily job site inspections with daily On-Line reports including photographs, to the Owner.**
 - 3.** Report to the Owner in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
 - 4.** Confirm after completion that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.

1.12 PROJECT CONDITIONS

- A.** Proceed with roofing work only when existing and forecasted weather conditions will permit unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements.
- B.** Do not apply roofing insulation or membrane to damp deck surface.
- C.** Do not expose materials subject to water or solar damage in quantities greater than can be weatherproofed during same day.

1.13 SEQUENCING AND SCHEDULING

- A.** Sequence installation of roofing with related units of work specified in other sections to ensure that roof assemblies including roof accessories, flashing, trim and joint sealers are protected against damage from effects of weather, corrosion and adjacent construction activity.
- B.** Complete all roofing field assembly work each day. Phased construction will not be accepted.

1.14 WARRANTY

- A.** Owner shall receive ONE (1) WARRANTY from the manufacturer of the modified bitumen roof system covering ALL the following criteria.
- B.** Upon completion of installation, and acceptance by the Owner and Architect, the manufacturer will supply to the Owner a thirty (30) year NDL (No Dollar Limited) Warranty (25+5) covering the modified bitumen roof system.
- C.** Installer will submit a minimum of a three (3) year warranty to the manufacturer with a copy directly to Owner.

D. At the request of the Owner, the manufacturer will provide an annual inspection of the roof. This period shall extend for the life of the warranty.

1.15 SITE CONDITIONS

- A. Field measurements and material quantities:
 - 1. Contractor shall have SOLE responsibility for accuracy of all measurements, estimates of material quantities and sizes, and site conditions that will affect work.
- B. Existing Conditions:
 - 1. Building space directly under roof area covered by this specification will be utilized by on-going operations. Do not interrupt Owner operations unless prior written approval is received from Owner.
- C. Waste Disposal:
 - 1. Do not re-use, re-cycle or dispose of materials except in accordance with all applicable regulations. The use of products is responsible for proper use and disposal of product containers.
- D. Safety Requirements:
 - 1. All application, material handling, and associated equipment shall conform to and be operated in conformance with OSHA safety requirements.
 - 2. Comply with federal, state, local and Owner fire and safety requirements.
 - 3. Advise Owner whenever work is expected to be hazardous to Owner, employees, and/or operators.
 - 4. Maintain a crewman as a floor area guard whenever roof decking is being repaired or replaced.
 - 5. Maintain fire extinguisher within easy access whenever power tools, roofing kettles, fuels, solvents, torches and open flames are being used.

PART 2 — PRODUCTS

2.1 PRODUCTS, GENERAL

- A. When a particular trade name or performance standard is specified it shall be indicative of the minimum standard required. Product names for the materials used in this section shall be based on performance characteristics of the modified bitumen roof system supplied by the Garland Company, Cleveland, OH, (1-516-717-5051) and **shall form the Basis of Design for the contract documents.**
- B. This specification is based on the performance characteristics of the system identified herein. Any proposed alternate systems or manufacturers, specified or not, must meet or exceed the following listed characteristics and must have all items specified herein submitted prior to the bid due date and gain approval prior to bidding. These include, but not limited to, all Warranty Criteria (Section 1.15) as well as all items listed in the Disclosure of Materials and Substitutions (Section 1.6). Failure of a system to meet all requirements of this specification will result in forfeiture of the bid award.
- C. Any item or materials submitted, as a substitution to the manufacturer specified must comply in all respects as to the quality and performance of the brand name specified. The Owner shall be the sole judge as to whether

or not an item submitted as a substitute is truly equal. Should the Contractor choose to submit a substitute product, he shall assume all monetary or other risk involved, should the Owner find the substitution unacceptable.

- D. Provide primary products, including each type of roofing membrane, felt plies, flood coat, base flashings, flashing membrane ply and miscellaneous flashing materials from a single source roof manufacturer. Provide secondary products only as recommended by the roof manufacturer of primary products for use with the roof system specified.
- E. The following manufacturers are acceptable, providing they meet these specifications and the minimum standards stated.
 - a. The Garland Company, Inc. **(Basis of Design)**
 - b. Approved Equal

2.3 DESCRIPTION

A. Modified bituminous roofing work including but not limited to:

- 1. One ply of ULTRA-SHEILD SBS Type II Base nailed to the lightweight concrete roof using FM Approved fasteners which have been tested on site, and recommended by the fastener manufacturer
- 2. Base Flashing Ply: One (1) ply of SBS Torch Grade Base sheet covered by an additional layer of SBS Torch Modified Membrane
- 3. Modified Membrane Flashing Ply: STRESSPLY IV; 180 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing membrane reinforced with a dual fiberglass scrim. This membrane is designed for torch applications and has a burn-off backer that indicates when the material is hot enough to be installed.
- 4. Base Ply: One (1) ply of SBS Torch Grade Base sheet covered by an additional layer of SBS Torch Modified Membrane
- 5. Modified Membrane: STRESSPLY IV; 180 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing membrane reinforced with a dual fiberglass scrim. This membrane is designed for torch applications and has a burn-off backer that indicates when the material is hot enough to be installed.
- 6. Surfacing: Flood coat of BLACK KNIGHT CTP: ASTM D-450 TYPE I cold tar pitch based cold applied adhesive with the following characteristics:
 - a. Softening Point 126°F-140° F (52°C-60°C)
 - b. Flash Point 374° F (190°C)
 - c. Penetration@ 77F 5dmm
 - d. Low Temp Flex Pass 65°F-70°F (18°C-21°C)
 - e. Slope Restriction ¼:12

7. The surfacing will be ASTM D-1863 roofing aggregate consisting of white Spar, Birdsboro White or approved equal. The aggregate will be set into hot applied coal tar pitch flood coat.

2.4 BITUMINOUS MATERIALS

- A. Asphalt Primer: V.O.C. compliant, ASTM D41.
- B. Asphalt Roofing Mastic: V.O.C. compliant, ASTM D4586, Type II.
- C. Flood Coat Adhesive: BLACK KNIGHT CTP; ASTM D-450 Type I

2.5 SHEET MATERIALS

- A. Base Sheet: ULTRA-SHIELD TYPE II BASE SHEET
 1. ULTRA-SHIELD TYPE II BASE SHEET: 110 mil SBS Type II Grade Base Sheet with woven fiberglass scrim reinforcement with the following minimum performance requirements according to ASTM D5147.

Properties: (Finished Membrane):

Tensile Strength (ASTM D-5147)

2 in/min. @ 73.4 ± 3.6°F MD 210 lbf/in CMD 210 lbf/in

Tear Strength (ASTM D-5147)

2 in/min. @ 73.4 ± 3.6°F MD 250 lbf CMD 250 lbf

Elongation at Maximum Tensile (ASTM D-5147)

2 in/min. @ 73.4 ± 3.6°F MD 4.0% CMD 4.0%

- B. Base Flashing Ply: SBS Torch Grade Base Sheet with woven fiberglass scrim reinforcement with the following minimum performance requirements according to ASTM D5147. Properties: (Finished Membrane):

1. Tensile Strength (ASTM D-5147)

a. 2 in/min. @ 73.4 ± 3.6°F MD 210 lbf/in CMD 210 lbf/in

b. 50 mm/min. @ 23 ± 3°C MD 36.7 kN/m CMD 36.7 kN/m

2. Tear Strength (ASTM D5147)

a. 2 in/min. @ 73.4 ± 3.6°F MD 250 lbf CMD 250 lbf

b. 50 mm/min. @ 23 ± 3°C MD 1112N CMD 1112N

3. Elongation at Maximum Tensile (ASTM D5147)
 - a. 2 in/min. @ $73.4 \pm 3.6^{\circ}\text{F}$ MD 4.0% CMD 4.0%
 - b. 50 mm/min. @ $23 \pm 3^{\circ}\text{C}$ MD 4.0% CMD 4.0%
- c. Modified Membrane Flashing Ply
 1. STRESSPLY IV
- d. Modified Membrane Properties (Finished Membranes): STRESSPLY IV; ASTM D6163, Type III Grade S
 1. Tensile Strength (ASTM D5147)
 - a. 2 in/min. @ $73.4 \pm 3.6^{\circ}\text{F}$ MD 210 lbf/in CMD 210 lbf/in
 - b. 50 mm/min. @ $23 \pm 3^{\circ}\text{C}$ MD 36.7 kN/m CMD 36.7 kN/m
 2. Tear Strength (ASTM D5147)
 - a. 2 in/min. @ $73.4 \pm 3.6^{\circ}\text{F}$ MD 250 lbf CMD 250 lbf
 - b. 50 mm/min. @ $23 \pm 3^{\circ}\text{C}$ MD 1112 N CMD 1112 N
 3. Elongation at Maximum Tensile (ASTM D5147)
 - a. 2 in/min. @ $73.4 \pm 3.6^{\circ}\text{F}$ MD 6.0% CMD 6.0%
 - b. 50 mm/min. @ $23 \pm 3^{\circ}\text{C}$ MD 6.0% CMD 6.0%
 4. Low Temperature Flexibility (ASTM D5147): Passes -30°F (-34°C)

2.6 SURFACING MATERIALS

- a. Coal Tar Protective Roof Coating: Black-Knight Cold; heavy-bodied, fiber reinforced, cold process polymer modified, coal tar roof coating having the following characteristics:
 1. Weight/Gallon 9.0 lbs./gal. (1.07 g/cm³)
 2. Solids by weight 87%
 3. Viscosity; Brookfield Heliopath, 2.5 rpm 120,000 cPs

4 . Roofing Aggregate: To conform to ASTM D1863

a . Slag, Pea Gravel, or White Spar

2.7 RELATED MATERIALS

A . Nails and Fasteners: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel. Fasteners shall be self-clinching type of penetrating type as recommended by the manufacturer of the deck material. Nails and fasteners shall be flush-driven through flat metal discs of not less than one (1) inch diameter. Omit metal discs when one-piece composite nails or fasteners with heads not less than one (1) inch diameter are used.

B . Metal Discs: Flat discs or caps of zinc-coated sheet metal not lighter than twenty eight (28) gauge and not less than one (1) inch in diameter. Form discs to prevent dishing. Bell or cup shaped caps are not acceptable.

C . Metal Flashing Sheet: Metal flashing sheet is specified in Section 07600 - Sheet Metal Flashing and Trim.

D . Lead Flashing Sheet: Meets Federal Specification QQ-L-201, Grade B, four pounds per square foot.

E . Urethane Sealant: One part, non-sag sealant as recommended and furnished by the membrane manufacturer for moving joints.

1 . Tensile Strength (ASTM D412) 250 psi

2 . Elongation (ASTM D412) 950%

3 . Hardness, Shore A (ASTM C920) 35

4 . Adhesion-in-Peel (ASTM C920) 30 pli

F . Non-Shrink Grout: Use an all weather fast setting chemical action concrete material to fill pitch pans.

1 . Flexural Strength (ASTM C78 (modified)) 7 days 1100psi

2 . High Strength (ASTM C109 (modified)) 24 days 8400lbs (3810kg)

- G.** Pitch Pocket Sealer: Two part, 100% solids, self leveling, polyurethane sealant for filling pitch pans as recommended and furnished by the membrane manufacturer.
 - 1.** Durometer (ASTM D2240) 40-50 Shore
 - 2.** Elongation (ASTM D412) 250%
 - 3.** Tensile Strength (ASTM D412) 200 @ 100 mil
- H.** Glass Fiber Cant: Continuous triangular cross Section made of inorganic fibrous glass used as a cant strip as recommended and furnished by the membrane manufacturer.
- I.** Roof Drains: Drain system as recommended and furnished by the membrane manufacturer.
- J.** Pitch pans, Rain Collar 24 gauge stainless or 20oz (567gram) copper. All joints should be welded/soldered watertight. See details for design.
- K.** Drain Flashings should be 4lb (1.8kg) sheet lead formed and rolled
- L.** Plumbing stacks should be 4lb (1.8kg) sheet lead formed and rolled.
- M.** Liquid Flashing: An asphaltic-polyurethane, low odor, liquid flashing material designed to seal tough roofing details that a modified membrane would have a difficult making watertight.
 - 1.** Tensile Strength (ASTM D412) 400 psi
 - 2.** Elongation (ASTM D412) 300%
 - 3.** Density @77°F 8.5 lb/gal typical

PART 3 — EXECUTION

3.1 EXECUTION, GENERAL

- A.** Comply with requirements of Division 01 Section "Common Execution Requirements."

3.2 EXAMINATION

- A.** Verify that deck surfaces and project conditions are ready to receive work of this section.
- B.** Verify that deck is supported and secured to structural members.
- C.** Verify that deck is clean and smooth, free of depressions, projections or ripples, and is properly sloped to drains.
- D.** Verify that adjacent roof substrate components do not vary more than 1/4 inch in height.

- E.** Verify that deck surfaces are dry.
- F.** Confirm that moisture content does not exceed twelve (12) percent by moisture meter tests.
- G.** Verify that openings, curbs, pipes, conduit, sleeves, ducts, and other items which penetrate the roof are set solidly, and that wood cant strips are set in place.

3.3 DECK PREPARATION

A. Lightweight Concrete Deck

- 1.** Fill honeycombing and imperfections in deck surface with latex filler.

3.4 DRAIN INSTALLATION

- A.** All existing drains will be replaced, unless noted otherwise. New insert drains shall be J.R. Smith Series, or approved equal, of sizes and configuration to match existing or as specified on project documents. Type shall be as required to accommodate building structure configuration. Drains will have deck clamps, threaded receivers metal strainers. Drains shall be installed prior to or during the roof installation.
- B.** All drains will be snaked from the surface of the roof extending into the basement of the structure to ensure the piping is properly functioning, and all piping is clear of residual debris. Drains shall be snaked prior to the installation of the new roof.

3.5 WOOD NAILERS/BLOCKING

- A.** Provide new wood blocking for any and all new nailers. Remove and replace all deteriorated, unsound and rotten wood blocking/nailers.
- B.** All wood shall be free of any warping or splits.
- C.** Mechanically fasten the wood nailers as per the current FM 1-90 requirements or the project specifications, using whatever is the more stringent requirements. Use only specified fasteners. Multiple layered wood nailers shall be staggered from the underlying courses. Fasteners shall run in a staggered fashion with a minimum of two (2) fasteners at every board end.
- D.** Where required, install wood blocking along the perimeter of the various roof sections requiring a coping cap, gravel stop and/or metal edge system.
- E.** As shown on the project documents, install new wood blocking along the perimeter of all roof sections parapet wall detail and the lower roof raised area gravel stop/metal edge detail.

3.6 GENERAL INSTALLATION REQUIREMENTS

- A.** Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing the roof system.

- B.** Insurance/Code Compliance: Where required by code, install and test the roofing system to comply with governing regulation and specified insurance requirements.
- C.** Protect other work from spillage of roofing materials and prevent materials from entering or clogging drains and conductors. Replace or restore other work damaged by installation of the coal tar modified bituminous roofing system.
- D.** Coordinate installation of roofing system components so that insulation and roofing plies are not exposed to precipitation or left exposed overnight. Provide cut-offs at end of each day's work to cover exposed ply sheets and insulation with two (2) plies of an SBS modified torch base sheets and with joints and edges sealed with roofing cement. Remove cut-offs immediately before resuming work.
- E.** Substrate Joint Penetrations: Prevent bitumen from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.
- F.** Apply roofing materials as specified by manufacturer's instructions.
 - 1.** Keep roofing materials dry before and during application.
 - 2.** Do not permit phased construction.
 - 3.** Complete application of roofing plies, modified sheet and flashing in a continuous operation.
 - 4.** Begin and apply only as much roofing in one day as can be completed that same day.
 - 5.** Cut-Offs (Waterstops): At end of each day's roofing installation, protect exposed edge of incomplete work, including ply sheets and insulation. Provide temporary covering of two (2) plies of #15 organic roofing felt set in roofing cement with joints and edges sealed.

3.7 VAPOR BARRIER INSTALLATION

- A.** Fiberglass Plies: Install one (1) fiberglass ply sheet using approved fasteners to the entire surface. Shingle in direction of slope of roof to shed water on each roof area.
- B.** Lap ply sheet ends eight (8) inches (203mm). Stagger end laps twelve (12) inches (304mm) minimum.
- C.** Extend plies two (2) inches (50mm) beyond top edges of cants at wall and roof projections and equipment bases.
- D.** Install base flashing ply to all perimeter and projection details. Properly seal all curbs penetrations and perimeter, prior to application of remaining roof.

3.6 UNDERLAYMENT INSTALLATION

- A.** Install one layer of SBS Torch Base Sheet to a properly prepared substrate. Shingle in proper direction to shed water on each area of roofing.
- B.** To a suitable substrate, lay out the roll in the course to be followed and unroll six (6) feet (1.8m).
- C.** Using a roofing torch, heat the surface of the coiled portion until the burn-off backer melts away. At this point, the material is hot enough to lay into the substrate. Progressively unroll the sheet while heating and press down with your foot to insure a proper bond.
- D.** After the major portion of the roll is bonded, re-roll the first six (6) feet (1.8m) and bond it in a similar fashion.
- E.** Repeat this operation with subsequent rolls with side laps of four (4) inches (101mm) and end laps of eight inches.
- F.** Give each lap a finishing touch by passing the torch along the joint and spreading the melted bitumen evenly with a rounded trowel to insure a smooth, tight seal.
- G.** Extend underlayment two (2) inches (50mm) beyond top edges of cants at wall and projection bases.
- H.** Install base flashing ply to all perimeter and projections details.

3.7 HPR MODIFIED MEMBRANE APPLICATION

- A.** Install StressPly IV as described below.
- B.** Over the SBS Torch Base Sheet underlayment(s), lay out the roll in the course to be followed and unroll six (6) feet. Seams for the top layer of modified membrane will be staggered over the SBS Torch Base Sheet seams.
- C.** Using a roofing torch, heat the surface of the coiled portion until the burn-off backer melts away. At this point, the material is hot enough to lay into the substrate. Progressively unroll the sheet while heating and press down with your foot to insure a proper bond.
- D.** After the major portion of the roll is bonded, re-roll the first six (6) feet (1.8m) and bond it in a similar fashion.
- E.** Repeat this operation with subsequent rolls with side laps of four (4) inches (101mm) and end laps of eight (8) inches (203mm).
- F.** Give each lap a finishing touch by passing the torch along the joint and spreading the melted bitumen evenly with a rounded trowel to insure a smooth, tight seal.

3.8 FLASHING MEMBRANE INSTALLATION

- A.** Seal all curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
- B.** Prepare all walls, penetrations, expansion joints, and where shown on the drawings] to be flashed with asphalt primer at the rate of one hundred (100) square feet per gallon. Allow primer to dry tack free.
- C.** Use the modified membrane as the flashing membrane. Adhere to the underlying base flashing ply with specified asphalt unless otherwise noted in these specifications. Nail off at a minimum of eight (8) inches (203mm) o.c. from the finished roof at all vertical surfaces.
- D.** Solidly adhere the entire sheet of flashing membrane to the substrate. Tops of all flashings that are not run up and over curb shall be secured through termination bar 6 inches (152mm) and sealed at top
- E.** Seal all vertical laps of flashing membrane with a three-course application of trowel-grade mastic and fiberglass mesh.
- F.** Coordinate counter flashing, cap flashings, expansion joints, and similar work with modified bitumen roofing work [as specified in other sections].
- G.** Coordinate roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices with the roofing system work [as specified in other sections]. When using mineralized cap sheet all stripping plies type IV felt / Versiply 40 shall be installed prior to cap sheet installation.
- H.** Raised Metal Edge [Detail No. MBT-11]:
 - 1.** Inspect the nailer to assure proper attachment and configuration.
 - 2.** Run underlayment over the edge. Ensure coverage of all wood nailers. Fasten underlayment with ring shank nails at eight (8) inches (203mm) o.c.
 - 3.** Install continuous cleat and fasten at six (6) inches (152mm) o.c.
 - 4.** Install new metal edge hooked to continuous cleat and set in bed of roof cement. Fasten flange to wood nailer every three (3) inches (76mm) o.c. staggered.
 - 5.** Prime metal edge at a rate of one hundred (100) square feet per gallon and allow to dry.

6. Strip in flange with base flashing ply covering entire flange in bitumen with six (6) inches (152mm) on to the field of roof. Assure ply laps do not coincide with metal laps.
7. Install a second ply of modified flashing ply over the base flashing ply, nine (9) inches (229mm) on to the field of the roof.

I. Coping Cap [Detail No. MBT-20]:

1. Minimum flashing height is eight (8) inches (203mm) above finished roof height. Maximum flashing height is twenty four (24) inches (609mm). Prime vertical wall at a rate of one hundred (100) square feet per gallon and allow to dry.
2. Set cant in Flashing Bond Mastic. Run all field plies over cant a minimum of two (2) inches (50mm).
3. Attach tapered board to top of wall.
4. Install base flashing ply covering entire wall and wrapped over top of wall and down face with six (6) inches (152mm) on to field of roof. Nail membrane at eight (8) inches (203mm) o.c.
5. Install a second ply of torchable modified flashing ply over the base flashing ply, nine (9) inches (228mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all seams and allow to cure and aluminize.
6. Install continuous cleat and fasten at six (6) inches (152mm) o.c. to outside wall.
7. Install new metal coping cap hooked to continuous cleat.
8. Fasten inside cap twenty four (24) inches (609mm) o.c. with approved fasteners and neoprene washers through slotted holes which allow for expansion and contraction.

J. Surface Mounted Counterflashing/Coping Cap [Detail No. MBT-21]:

1. Minimum flashing height is eight (8) inches (203mm) above finished roof height. Prime vertical wall at a rate of one hundred (100) square feet per gallon and allow to dry.
2. Set cant in Flashing Bond Mastic. Run all field plies over cant a minimum of two (2) inches (50mm).

3. Install base flashing ply covering wall with six (6) inches (152mm) on to field of roof.
4. Install a second ply of modified flashing ply over the base flashing ply, nine (9) inches (228mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all seams and allow to cure and aluminize.
5. Apply butyl tape to wall behind flashing. Secure termination bar through flashing, butyl tape and into wall. Alternatively use caulk to replace the butyl tape.
6. Secure counterflashing set on butyl tape above flashing. Fasten eight (8) inches (203mm) o.c. and caulk top of counterflashing.
7. Attach tapered board to top of wall (minimum slope $\frac{1}{4}$ " in 12")(Do not use organic fiberboard or perlite).
8. Cover tapered board and all exposed wood with base flashing ply. Fasten inside and out at eight (8) inches (203mm) o.c.
9. Install continuous cleat and fasten at six (6) inches (152mm) o.c. to outside wall.
10. Install new metal coping cap hooked to continuous cleat.
11. Fasten inside of cap twenty four (24) inches (609mm) o.c. with approved fasteners and neoprene washers.

K. Surface Mounted Counterflashing [Detail No. MBT-22]:

1. Minimum flashing height is eight (8) inches (203mm) above finished roof height. Maximum flashing height is twenty four (24) inches (609mm). Prime vertical wall at a rate of one hundred (100) square feet per gallon and allow to dry.
2. Set cant in Flashing Bond Mastic. Run all field plies over cant a minimum of two (2) inches (50mm).
3. Install base flashing ply covering wall with six (6) inches (152mm) on to field of the roof
4. Install a second ply of modified flashing ply over the base flashing ply, nine (9) inches (228mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.
5. Apply butyl tape to wall behind flashing. Secure termination bar through flashing, butyl tape and into wall. Alternatively use caulk to replace the butyl tape.
6. Secure counterflashing set on butyl tape above flashing at eight (8) inches (203mm) o.c. and caulk top of counterflashing.

L. Equipment Support [Detail No. MBT-32]:

1. Minimum curb height is eight (8) inches (203mm) above finished roof height. Prime vertical at a rate of one hundred (100) square feet per gallon and allow to dry.
2. Set cant in Flashing Bond Mastic. Run all field plies over cant a minimum of two (2) inches (50mm).
3. Install base flashing ply covering curb with six (6) inches (152mm) on to field of the roof.
4. Install a second ply of modified flashing ply over the base flashing ply, nine (9) inches (228mm) on to the field of the roof. Attach top of membrane to top of curb and nail at eight (8) inches (203mm) o.c. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.
5. Install pre-manufactured cover. Fasten sides at twenty four (24) inches (609mm) o.c. with fasteners and neoprene washers. Furnish all joint cover laps with butyl tape between metal covers.
6. Set equipment on neoprene pad and fasten as required by equipment manufacturer.

M. Curb Detail/Air Handling Station [Detail No. MBT-33]:

1. Minimum curb height is eight (8) inches (203mm) above finished roof height. Prime vertical at a rate of one hundred (100) square feet per gallon and allow to dry.
2. Set cant in Flashing Bond Mastic. Run all field plies over cant a minimum of two (2) inches (50mm).
3. Install base flashing ply covering curb with six (6) inches (152mm) on to field of the roof.
4. Install a second ply of modified flashing ply over the base flashing ply, nine (9) inches (228mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.
5. Install pre-manufactured counterflashing with fasteners and neoprene washers or per manufacturer's recommendations.
6. Set equipment on neoprene pad and fasten as required by equipment manufacturer.

N. Exhaust Fan [Detail No. MBT-36]:

1. Minimum curb height is eight (8) inches (203mm) above finished roof height. Prime vertical at a rate of one hundred (100) square feet per gallon and allow to dry.
2. Set cant in Flashing Bond Mastic. Run all plies over cant a minimum of two (2) inches (50mm).
3. Install base flashing ply covering curb with six (6) inches (152mm) on to field of the roof.
4. Install a second ply of modified flashing ply installed over the base flashing ply, nine (9) inches (228mm) on to field of the roof. Attach top of membrane to top of wood curb and nail at eight (8) inches (203mm) o.c. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.
5. Install metal exhaust fan over the wood nailers and flashing to act as counterflashing. Fasten per manufacturer's recommendation.

O. Passive Vent/Air Intake [Detail No. MBT-37]:

1. Minimum curb height is eight (8) inches (203mm) above finished roof height. Prime vertical at a rate of one hundred (100) square feet per gallon and allow to dry.
2. Set cant in Flashing Bond Mastic. Run all plies over cant a minimum of two (2) inches (50mm).
3. Install base flashing ply covering curb with six (6) inches (152mm) on to the field of the roof.
4. Install a second ply of modified flashing ply installed over the base flashing ply, nine (9) inches (228mm) on to field of the roof. Attach top of membrane to top of wood curb and nail at eight (8) inches (203mm) o.c. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.
5. Install passive vent/air intake over the wood nailers and flashing to act as counterflashing. Fasten per manufacturer's recommendations.

P. Roof Drain [Detail No. MBT-40]:

1. Plug drain to prevent debris from entering plumbing.
2. Taper insulation to drain minimum of twenty four (24) inches (609mm) from center of drain.

3. Run roof system plies over drain. Cut out plies inside drain bowl.
4. Set lead/copper flashing (thirty (30) inch square minimum) in ¼ inch bed of mastic. Run lead/copper into drain a minimum of two (2) inches (50mm). Prime lead/copper at a rate of one hundred (100) square feet per gallon and allow to dry.
5. Install base flashing ply (forty (40) inches square minimum).
6. Install modified membrane (forty eight (48) inches square minimum).
7. Install clamping ring and assure that all plies are under the clamping ring.
8. Remove drain plug and install strainer.

Q. Plumbing Stack [Detail No. MBT-50]:

1. Minimum stack height is twelve (12) inches (609mm).
2. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.
3. Prime flange of new sleeve. Install properly sized sleeves set in ¼ inch (6mm) bed of roof cement.
4. Install base flashing ply by torch.
5. Install modified membrane by torch.
6. Caulk the intersection of the membrane with elastomeric sealant.

7. Turn sleeve a minimum of one (1) inch (25mm) down inside of stack.

R. Heat Stack [Detail No. MBT-51]:

1. Minimum stack height is twelve (12) inches (609mm).
2. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.
3. Prime flange of new sleeve. Install properly sized sleeves set in ¼ inch (6mm) bed of roof cement.
4. Install base flashing ply by torch.
5. Install membrane by torch.

6. Caulk the intersection of the membrane with elastomeric sealant.
 7. Install new collar over cap. Weld collar or install stainless steel draw brand.
- S.** Pitch Pocket [Detail No. MBT-52]:
1. Run all plies up to the penetration.
 2. Place the pitch pocket over the penetration and prime all flanges.
 3. Strip in flange of pitch pocket with one (1) ply of base flashing ply. Extend six (6) inches (152mm) onto field of roof.
 4. Install second layer of membrane extending nine (9) inches (228mm) onto field of the roof.
 5. Fill pitch pocket half full with non-shrink grout. Let this cure and top off with pourable sealant.
 6. Caulk joint between roof system and pitch pocket with roof cement.

3.9 APPLICATION OF SURFACING

- A.** Aggregate Surfacing:
1. Apply surfacing materials in the quantities specified (five hundred (500) lbs. (226kg) per square for aggregate, four hundred (400) lbs. (181kg) per square for slag). Uniformly embed aggregate in a flood coat of cold applied coal tar pitch adhesive at a rate of sixty (60) to seventy (70) lbs. (27-32kg) per square coverage after felt flashings, tests, repairs, and corrective actions have been completed and approved.

3.10 FIELD QUALITY CONTROL

- A.** Perform field inspection and testing as required under provisions of Division 01 Section Quality Requirements.
- B.** Correct defects or irregularities discovered during field inspection.
- C.** Require attendance of roofing materials manufacturers' representatives at site during installation of the roofing system. A copy of the specification should also be on site at all times.

3.11 CLEANING

- A.** Remove bitumen adhesive drippings from all walls, windows, floors, ladders and finished surfaces.
- B.** In areas where finished surfaces are soiled by asphalt or any other sources of soiling caused by work of this section, consult manufacturer of surfaces for cleaning instructions and conform to their instructions.
- C.** Repair or replace defaced or disfigured finishes caused by work of this section.

3.12 CONSTRUCTION WASTE MANAGEMENT

- A.** Remove and properly dispose of waste products generated during roofing procedures. Comply with requirements of authorities having jurisdiction

3.13 FINAL INSPECTION

- A.** At completion of roofing installation and associated work, meet with Contractor, Architect, installer, installer of associated work, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.
- B.** Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.
- C.** The roofing system manufacturer reserves the right to request a thermographic scan of the roof during final inspection to determine if any damp or wet materials have been installed. The thermographic scan shall be provided by the [Roofing] Contractor.
- D.** If core cuts verify the presence of damp or wet materials, the Contractor shall be required to replace the damaged areas at his own expense.
- E.** Repair or replace deteriorated or defective work found at time above inspection as required to produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- F.** Notify the Owner upon completion of corrections.
- G.** Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.
- H.** Immediately correct roof leakage during construction. If the Contractor does not respond within twenty four (24) hours, the Owner will exercise rights to correct the Work under the terms of the Conditions of the Contract.

END OF SECTION 075200 - MODIFIED BITUMINOUS MEMBRANE
ROOFING - TORCH-APPLICATION