

SECTION 07511 – BUILT-UP ASPHALT ROOFING OVER INSULATION**PART 1 - GENERAL****1.01 RELATED DOCUMENTS**

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

1.02 SCOPE OF WORK

- A. Provide a complete roof system of insulation; hot mopped felts, cap sheet, flashings, sealants and accessories.

1.03 BIDDER'S REPRESENTATION

- A. A large part of the value of this work is contained in the bidder's and the bidder's proposed manufacturer's capacity to provide long-term responsibility for the satisfactory performance of the roof. A 20-year, no dollar limit warranty is required. To that end, the following requirements are essential provisions of this specification:
1. By offering a bid for this work, the bidder certifies that he has visited the site and determined that all the conditions of the surrounding and underlying work are consistent with his proposed manufacturer's requirements for the specified warranty. In the event that the bidder discovers any condition of the surrounding and underlying work that would prevent him or his manufacturer from providing the specified warranty, he shall report it to the design professional not less than ten days before the bid opening.
 2. By offering a bid for this work, the bidder certifies that he has examined the Contract Documents and has found all the details and requirements of the scope of work are complete and consistent with his proposed manufacturer's requirements for the specified warranty. In the event that the bidder discovers any detail or requirement in the Contract Documents that would prevent him or his manufacturer from providing the specified warranty, he shall report it to the design professional not less than ten days before the bid opening.
 3. By offering a bid for this work, the bidder certifies that he can, within ten calendar days of a notice of award from the Owner, provide a surety bond for the performance of the work, a surety bond for payment of labor and materials, and a specimen warranty certificate from the manufacturer whose system he proposes to use on the project.

1.04 QUALIFICATIONS

- A. **Manufacturer Qualifications**
1. The manufacturer of the roofing system shall be the actual manufacturer of the roofing and insulation component materials, and shall have not less than fifteen (15) years experience in the production of the specified system.

2. The contractor shall include a certification from the manufacturer, on the manufacturer's letterhead, that the proposed membrane and insulation materials will be produced by the manufacturer of record.

B. Installer Qualifications

1. The installer of the built-up roofing shall have been engaged in the business of installing built-up roofing for not less than five (5) years and shall be experienced in the layout and application of this material. The crew shall be composed of experienced and skilled workers in this work.

1.05 SUBMITTALS

- A. **Shop Drawings:** Submit in accordance with Conditions of Contract and Division 1 Specification Sections, indicating roof size, membrane attachment layout, location, and type of penetrations, perimeter and penetration details, roof insulation make-up and layout.
- B. **Product Data Submittals:** Include manufacturer's technical product data, including UL product listing for each type of insulation, deck, fasteners and roofing product required.
- C. **Fire Resistance:** Provide roofing system, insulation, and component materials that have been tested for application and slopes indicated and are listed by Underwriters Laboratories, Inc. (UL) for Class A external fire exposure over decks specified herein.
- D. **Wind Uplift:** Provide rigid insulation, mechanically fastened roofing system, and component materials suitable for the structural deck and that have been tested as a complete system for application and slopes indicated. Provide a complete outfit of submittals ready for review. Allow sufficient time for review of the submittal. Provide fastening for uplift resistance to meet the applicable Building Code but in no case less than 90 psf.

1.06 INSPECTIONS

- A. During the roofing system installation, 5 digital photos shall be taken daily of the work in progress. The photos shall be forwarded to the Design Professional and the Owner daily with a brief caption of the roofing area being installed and the products being used.
- B. After the roof installation is complete, the manufacturer shall inspect the work and inform (by written report) the design professional, contractor, and the installer of defective/incomplete work to be remodeled. Those areas indicated shall be corrected to the full satisfaction of the design professional, Owner, and manufacturer. The manufacturer shall submit written acceptance of the project to the design professional to issuance of the weather-tightness warranty.
- C. Inspections shall be performed at each transition of roof detail encountered for each phase of roofing for the duration of the project. An experienced, full-time employee of the manufacturer, with experience in similar inspections over the past two years, must conduct each inspection.

1.07 WARRANTY

- A. **Manufacturer's Warranty:** Provide roofing manufacturer's total system leak-tight 20-year "No Dollar Limit Warranty," including insulation. Provide all details necessary to qualify for manufacturer's 20-year "No Dollar Limit Warranty".
- B. **Roofer's Guarantee:** Provide written guarantee from the Contractor stating that the Contractor will respond within 24 hours and repair within 5 business days, any leaks or defects in the roofing assembly for 2 years at no cost to the Owner.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Install roofing materials only when surfaces are clean, dry, smooth and free of snow or ice.
- B. Do not apply roofing membrane during inclement weather or when ambient conditions will not allow proper application. Consult manufacturer's technical specifications on cold weather application.
- C. If during the course of this project, the rooftop mechanical equipment (heating and/or cooling) must be taken out of service to accomplish the work, the General Contractor shall provide temporary portable heating and/or cooling systems to maintain the building's interior environment equal to the building's own heating and/or cooling system.

PART 2 – PRODUCTS**2.01 MANUFACTURER**

- A. Provide a four ply felt with a one-ply mineral surfaced fiberglass cap sheet built-up roofing system. This is a minimum performance specification. Other manufacturer's systems may qualify, as determined by the design professional.

2.02 ROOF INSULATION PRODUCTS

- A. **Perlite Board Roof Insulation:** Rigid, noncombustible, perlite/fiber boards of thicknesses indicated and complying with ASTM C 728; manufacturer's standard sizes.
- B. **Wood Fiber Roof Insulation:** High density wood fiber board tested in accordance with ASTM C-208 where permitted by code and system requirements.
- C. **Polyisocyanurate Foam Roof Insulation:** Insulation shall be a close cell, polyisocyanurate foam core with factory-laminated facers conforming to ASTM specification C 1289-01, Type II, Class 1. Foam core shall have a rated flame spread of 25 or less according to ASTM E 84. Insulation shall have minimum compressive strength of 20 psi (Grade 2) according to ASTM C 1289-01. Insulation shall be supplied in 4'x4' boards for adhered applications and 4' x 8' boards for mechanically attached applications.
- D. **Perlite cant strip** complying with ASTM C-728.
- E. **Tapered edge strips,** non-flammable perlite taper strips complying with ASTM C 209.
- F. **Mechanical Fasteners:** Provide fasteners and plates listed in the approved report as part of the total assembly proposed. Fasteners shall be installed in

patterns as required for the specified rigid insulation by the manufacturer to produce the required wind uplift resistance.

2.03 ROOF SYSTEM

A. Approved Manufacturer

1. John Manville Roofing Systems Group, Specification 5G1C
2. GAF Material Corporation, Specification I-O-5-M-/P6

B. Roofing Felts

1. Ply Sheets: Four plies of asphalt-impregnated glass fiber mat complying with ASTM D 2178, Type VI.
2. Felt Envelopes: Non-perforated, asphalt-saturated organic roof felt complying with ASTM D 226, Type I.
3. Mineral surfaced fiberglass cap sheet complying with ASTM D 3909.
 - a. GlasKap by Johns Manville (GlasKap CR for LEED projects)
 - b. GAF Glas Mineral Cap Sheet by GAF (EnergyCap for LEED projects)

C. Roofing Bitumens

1. Low fuming/low odor asphalt bitumen complying with ASTM D 312. Asphalt shall be domestically manufactured in the United States and as approved by the roofing system manufacturer.
 - a. Approved Products
 - i. Trulo Max by Owens Corning Trumbull
 - ii. No Smell Asphalt by Continental Materials
 - iii. No Smell Asphalt by United Asphalt
 - iv. Hot Stuff Asphalt's "Lite Packs"
 - b. Interply moppings – Type III, IV
 - c. Glaze coat – Type III
 - d. Flashings – Type III or IV, as recommended by manufacturer

2. Contractor shall provide and maintain a fume recovery system acceptable to the Owner for the duration of the project to control fumes/odors associated with bitumen kettles.

D. Flashings

1. Base Flashing Materials: Two plies of material base ply shall be an SBS polymer modified bitumen reinforced with a polyester and/or glass fiber mat. (Top ply shall be the highly reflective fiberglass reinforced mineral cap sheet if LEED project).
 - a. Dynalastic 180S and Glaskap by Johns Manville Roofing Systems Group

- b. Ruberoid Mop Smooth and GAF Glas Mineral Cap by GAF Material Corp.
 - 2. Strip Flashing Materials: One ply of granule-surfaced SBS polymer modified bitumen sheet reinforced with a polyester and/or glass fiber mat:
 - a. Dynalastic 180S by Johns Manville Roofing Systems Group
 - b. Ruberoid Mop Smooth by GAF Material Corporation
- E. Walkways
 - 1. Granule-surfaced modified asphalt boards:
 - a. Dyna Tred by Johns Manville Roofing Systems Group
- F. Asphalt Roof Cement
 - 1. To comply with ASTM D 4586, asphalt roof cement (asbestos free) or roofing membrane manufacturer supplied SBS modified asphalt roof cement (asbestos free), as required.
- G. Related Materials
 - 1. Lead Flashing for roof drains shall be 27" x 27" and be minimum 4 pound lead.
 - 2. Pipe or vent jackets shall be minimum 3 pound lead with cap designed for use on flat roof construction.
 - 3. Perma-Flash is an acceptable alternative to lead pipe jackets. Perma-Flash system requires 1 coat of TopGuard Base Coat and 2 coats of TopGuard 4000 to final product.
 - 4. Wood Nailers: Shall be FTRW only on any roofing surfaces.
 - 5. Flashing securement devices shall be of adequate design to achieve substantial and positive anchorage.
 - a. Anchor bars for flashing securement to concrete or masonry substrates shall be 1/8" x 1" flat aluminum bar with 8" hole spacing by OMG, or approved equal.

PART 3 - EXECUTION

3.01 INSPECTION

- A. The contractor shall be responsible for suitable substrate to accept the roofing system.
- B. Installer of roofing system shall examine substrate and conditions under which roofing work is to be performed and shall notify the Architect and Owner representative immediately of unsatisfactory conditions. Do not proceed with roofing work until unsatisfactory conditions have been corrected in manner acceptable to installer and manufacturer.

- C. Before roofing work may begin, the design professional shall conduct a pre-roofing coordination meeting. It shall be attended by the Owner's representative, PSFA representative, as necessary, the general contractor, the roofing contractor, the roofing manufacture's rep, (local sales rep is acceptable) and all other subcontractors who have any components of their work on or penetrating the roof. The participants shall:
1. As much as is possible by visual inspection and by the cutting of core samples, verify that surfaces and site conditions are ready to receive work.
 2. Examine roof deck to determine that it is sufficiently rigid to support roofers and their mechanical equipment and that deflection will not strain or rupture roof components or deform deck.
 3. Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to insure drainage. Examine substrate to determine that surface is in a suitable condition for roofing work.
 4. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, and cant strips, wood nailing strips and reglets are in place. Verify that all curbs and penetrations have been laid out and installed with adequate vertical and horizontal clearance as required by the manufacturer to provide the specified warranty.
 5. The condition of surface to receive roof insulation shall be firm, clean, smooth, and dry. Do not start roof application until defects have been corrected.

3.02 INSTALLATION

- A. General: Comply with manufacturer's written instruction for installation of the roof system.
- B. All flashings shall be installed concurrently with the roofing membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative. If any water is allowed to enter under the newly completed roofing due to incomplete flashings, seams and or night seals, the affected area shall be removed and replaced at the Applicator's expense.
- C. Phased Construction & Completion Requirements
1. Phased construction will not be permitted on this project.
 2. Once roofing is started the roofing application must be finalized and all punch lists completed in _____ **calendar days**.

3.03 WOOD NAILER LOCATION AND INSTALLATION

- A. Nailers are to be installed as per detail drawings.
- B. Discard units of material with defects that might impair quality of work and units that are too small to use in fabricating work with minimum joints or optimum joint arrangement.
- C. Set nailers to required levels and lines with members plumb and true.
- D. All perimeter nailers shall be of uniform height within a given roof section.

- E. Nailers shall be installed with ¼” gap between ends of adjoining pieces.
- F. Nailers shall be fastened in accordance with the following schedule:
 1. Fasteners in 6” or wider (nominal) lumber shall be installed in two (2) rows, staggered one-third of nailer width. Listed spacings indicate distance between fasteners in adjacent rows.
 2. Two (2) fastener spacing shall extend 8’ from all outside building corners.
 3. Corner fastener spacing shall extend 8’ from all outside building corners.
 4. Where two or more nailers are installed, each nailer shall be fastened independently.
 5. Over all deck types, the bottom nailer shall be fastened using the specified fasteners and 5/8” diameter washers. Countersink washers and fasteners level with top of wood using spade bit or similar method. Fasten subsequent nailers, where specified, using the specified screws without washers.
 6. When nailers are stacked, stagger the layer ends to less than 24”.
 7. Nailer Attachment Schedule (unless noted otherwise on the drawings)

Attachment Substrate	Perimeter Fastener Spacing (maximum)	Corner Fastener Spacing (maximum)
Structural Concrete	12” o.c	6” o.c
CMU (fastener into solid material)	12” o.c	6” o.c
Steel Deck	12” o.c	6” o.c
Wood	12” o.c	6” o.c

3.04 INSULATION INSTALLATION

- A. Install Insulation: Install only as much insulation as can be covered with the roofing membrane and completed before the end of the day's work or before the onset of inclement weather.
- B. Fit Insulation: Neatly fit insulation to all penetrations, projections, and nailers. Insulation should be loosely fitted, with gaps greater than 1/4" being filled with acceptable insulation. Under no circumstances should the membrane be left unsupported over a space greater than 1/4". Tapered or feathered insulation should be installed around roof drains so as to provide proper slope for drainage.
- C. Two-Layer Installation: Where overall insulation thickness is 2 inches or greater, install required thickness in two layers with joints of second layer staggered from joints of the first layer a minimum of 12 inches each direction.
- D. Attach Insulation: Insulation must be attached using Fasteners and Insulation Plates. Refer to the Technical Information for attachment patterns and rates for specific insulation types and thickness. In a multi-layer insulation assembly, the type and thickness of the top layer of insulation determine fastening pattern. Insulation fasteners shall penetrate the top of the flutes and shall not extend into the building interior. Roofing contractor is liable for replacing fasteners that extend beyond the bottom of the flutes.

- E. Stagger Insulation Joints: When installing multiple layers of insulation, all joints between layers should be staggered.

3.05 MEMBRANE FLASHING INSTALLATION

- A. Asphalt Bitumen Heating: Heat and apply bitumen in accordance with equiviscous temperature method ("EVT Method") as recommended by NRCA. Do not raise temperature above minimum normal fluid-holding temperature necessary to attain EVT (plus 25°F at point of application) more than one hour prior to time of application. Discard bitumen that has been held at temperature, exceeding finished blowing temperature (FBT) for a period exceeding 3 hours.
- B. Contractor shall provide and maintain a fume recovery system acceptable to the Owner for the duration of the project to control fumes/odors associated with bitumen kettles.
- C. Quality Control: Contractor's asphalt kettle shall be equipped with an accurate built-in thermometer. Contractor shall also have available at the site and additional portable thermometer for checking temperature of asphalt at the point of application and for use as a check on the kettle thermometer.
- D. Bitumen Mopping Weights: For interplay mopping, and for other moppings except as otherwise indicated, apply bitumen at the rate of 25 pounds of asphalt (plus or minus 25 percent on a total-job average basis) per roof square (100 sq. ft.) between plies.
- E. Substrate Joint Penetrations: Do not allow bitumen to penetrate substrate joints and enter building or damage insulation, vapor retarders, or other construction. Where mopping is applied directly to a substrate, tape joints or, in the case of steep asphalt, hold mopping back 2 inches from both sides of each joint.
- F. Cutoffs: At end of each day's roofing installation, protect exposed edge of incomplete work, including ply sheets and insulation. Provide temporary covering of 2 plies of No. 15 roofing felt set in full moppings of hot bitumen; remove at beginning of next day's work. Glaze-coat areas of completed organic ply sheets before end of each day's work.
- G. Roofing Membrane Installation: Apply a piece 9" wide, then over that, one 18" wide, then over that, one 27" wide. Over these 3 partial sheets install a full width 36" piece. The following felts are to be applied full width, overlapping the preceding felts by 27-1/2" so that at least 4 plies of felt cover the substrate at all locations. Install each felt so that it is firmly and uniformly set, without voids, into the hot bitumen (within $\pm 25^\circ\text{F}$ of the EVT) applied just before the felt at a nominal rate of 23 lbs. per square, over the entire surface. Installation over porous substrates such as roof insulation may require up to 33 lbs. of hot bitumen per square.
- H. Surfacing: Prior to application of the fiberglass reinforced mineral surfaced cap sheet, cut the cap sheet into handleable lengths (12' – 18'). Lay the material out on the roof and allow it to relax and flatten. To accommodate a full width sheet, apply a mopping of hot asphalt, approximately 20°F above the EVT, at a nominal rate of 25 lbs. per square. (The higher temperature of asphalt maximizes the bonding of the cap sheet to the ply felts.) Then flop the cap sheet into the hot asphalt. On subsequent courses, the cap sheet is positioned upside down,

directly over the sheet in the preceding course such that the side lap area of the preceding sheet is exposed. Care should be taken to maintain 2" side laps and 6" end laps. Asphalt is applied in the same manner as before, making sure to also cover the 2" exposed side lap. Asphalt may also be applied to the exposed "upside down" cap sheet, prior to "flopping" it into the hot asphalt. The cap sheet must be firmly and uniformly set, without voids, into the hot asphalt with all edges and laps well sealed.

- I. Care shall be taken not to track bitumen onto the finished exposed membrane. Full adhesion shall be achieved and all edges shall be well sealed. Leading and trailing edges of T-laps in both plies shall be hand rolled to prevent formation of voids. Asphalt shall bleed out ¼" to ½" at laps. #11 color match granules shall be broadcast into asphalt bleed out while hot so that the finished appearance is uniform and neat.
- J. **Set-On Accessories:** Where small roof accessories are set on built-up roofing membrane, set metal flanges in a bed of roofing cement and seal penetration of membrane with bead of roofing cement to prevent flow of bitumen from membrane.
- K. **Composition Flashing and Stripping:** Install composition flashing at cant strips and other sloping and vertical surfaces, at roof edges and at penetrations through roof.
- L. **Application of Base Flashing:** The roofing membrane must extend to the top of the cant. The completed base flashing shall extend not less than 8" nor more than 24" above the level of the roof, and shall extend onto the roof membrane a minimum of 4".
 1. Starting just below the point on the parapet where the base flashing will terminate, mop the parapet and the surface on the roofing felts on the cant with hot Type III or Type IV asphalt. Immediately place the backer felt into the hot bitumen, smoothing the felt to set it firmly into the bitumen. The bottom edge of the backer felt should terminate at the bottom edge (base) of the cant. Do not extend the backer felt onto the horizontal membrane surface. Laps in the backer felt should be a minimum of 2".
 2. All flashings shall be installed in 39" long pieces, cut from the end of the roll. Starting just above the top edge of the backer felt, mop the wall, the surface of the backer felt and out onto the roof membrane with hot Type III or IV asphalt. Holding the upper corners of the flashing, position its lower horizontal edge on the roof membrane (minimum 4" from base of the cant) and lay it into place over the cant strip and up the wall. The sheet should be "worked-in" to ensure that it is firmly and uniformly bonded. In cool or cold weather, the back of the flashing sheet should also be mopped with the hot bitumen, and shorter lengths of flashing should be used. Laps in the flashing should be minimum of 3" and be well sealed.
 3. Mechanically fasten the base flashing on 6" centers along its top edge. Fasteners must have a 1" minimum diameter integral cap, or be driven through 1" minimum diameter rigid metal discs.

4. All inside and outside corners and vertical laps shall be three-coursed with asphalt roof cement and reinforcing fabric, with #11 color matched granules broadcast and pressed into the cement while wet.
- L. Roof Drains: Fill clamping ring base with a heavy coating of roofing cement. Extend built-up roofing membrane into clamping ring or, where not feasible, provide two-ply of glass-fiber-reinforced flashing mopped with Type III asphalt and extended into clamping ring. Extend flashings onto built-up asphalt roofing system 6 inches and 10 inches, respectively. Before placing clamping ring, set 2 plies of glass-fiber fabric in roofing cement and coat with roofing cement. Extend each fabric into clamping ring and for distances of 14 inches and 16 inches, respectively, onto built-up roofing.
- M. Installation of Roof Accessories: Miscellaneous sheet metal accessory items, including insulation vents and other devices, and major items of roof accessories (if any) to be coordinated with built-up roofing system work, are specified in other sections of these specifications.

3.06 PROTECTION

- A. Protect building surfaces against damage from roofing work. Where traffic must continue over finished roof membrane, protect surfaces.

3.07 TEMPORARY CLOSURE

- A. Temporary closures to ensure that moisture does not damage any completed section the new roofing system are the responsibility of the roofing contractor. Completion of flashing, terminations, and temporary closures should be complete as required to provide a watertight condition. Any material contaminated by a temporary closure must be cut out and discarded prior to resumption of installation.

3.08 CLEANUP

- A. Remove bituminous markings from finished surfaces.
- B. In areas where finished surfaces are soiled by work of this Section, consult manufacturer of surfaces for cleaning advice and conform to their instructions.
- C. Remove excess materials, trash, debris, equipment, and parts from the Work.
- D. Repair or replace defaced or disfigured finishes caused by work of this Section.

- End of Section-