

ROOF RECOVERY SPECIFICATION

Transwestern - 180 Mount Airy Road, Basking Ridge, NJ

PART 1 GENERAL

1.1 SUMMARY

A. Scope of Work:

1. Work specified herein shall be provided only to the extent and as applicable to the work included in this specification.

B. Section Includes:

1. Roofing Membrane Recovery/Retrofit.
2. TPO & PVC Membrane Roofing System.
3. Waterproofing Membrane.
4. Flashing Membrane.
5. Roof Insulation.
 - a. Polyisocyanurate insulation. (Replacement of Damaged Insulation)
 - b. High Density Wood Fiber Board
 - c. Perlite Separator Board

1.2 REFERENCES

A. American Society for Testing and Materials:

1. ASTM C 208 - Cellulosic Fiber Insulating Board.
2. ASTM C 1289 - Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
3. ASTM C 1303 - Standard Test Method For Estimating The Long-Term Change In The Thermal Resistance Of Unfaced Rigid Closed-Cell Plastic Foams By Slicing And Scaling Under Controlled Laboratory Conditions
4. ASTM D 4434 - Polyvinyl Chloride Sheet Roofing.

B. Factory Mutual Research Corporation (FM):

1. FM Approval Guide, Chapter 18 - Building Materials.
2. FM Loss Prevention Data Sheet 1-28 - Insulated Steel Deck.
3. FM Loss Prevention Data Sheet 1-29 - Mechanically Attached Single-Ply Membrane Roof Coverings.
4. FM Standard 4470 - Class I Roof Covers.

C. Underwriters Laboratories, Inc. (UL):

1. UL - Roofing Materials and Systems Directory.
2. UL 790 - Standard Tests for Fire Resistance of Roof Covering Materials.
3. UL 1256 - Standard Fire Test of Roof Deck Construction.

1.3 SYSTEM DESCRIPTION

- A. Single Ply Membrane Roofing System: Single ply 60 mil reinforced membrane mechanically fastened membrane roofing system consisting of the following as applicable. Provide the following Membrane Roofing System.
 - 1. Single Ply TPO (thermoplastic polyolefin) Membrane Roofing.
 - 2. Single Ply PVC (polyvinyl chloride) Membrane Roofing.

- B. Acceptable Manufacturers:
 - 1. GAF
 - 2. Johns Manville
 - 3. Carlisle-Syntec

- C. Insulation of the following type:
 - 1. ½ inch High Density Wood Fiber Board (over existing membrane after gravel removal).
 - 2. Polyisocyanurate insulation on metal deck (replacement of damaged Insulation).

- D. Flashing and Waterproofing Membranes: 60 mil-reinforced TPO membrane, fully adhered, as defined herein and indicated on the drawings.

1.4 SUBMITTALS

- A. Submittals after Award of Contract: After award of project, submit the following submittals to Transwestern Construction Representative. Submittals shall be available at all times to the Transwestern Representative.
 - 1. MSDS sheets for products to be used on site.
 - 2. Product Data sheets for accepted system showing compliance with the specified physical properties.
 - 3. Shop Drawing showing:
 - a. Fastener patterns to meet uplift requirements.
 - b. Details required for completion but not shown on attached drawings.
 - c. Techniques for end of workday tie offs.
 - 4. Copy of Certified Applicator Statement from system manufacturer (If Requested).
 - a. Job names, size, scope, letters from owner contact, present owner contact name and phone number to verify logistical and system experience (If Requested).

1.5 QUALITY ASSURANCE

- A. Qualifications of Applicator:
 - 1. System Experience:
 - a. Contractor shall have been trained by and shall be an authorized installer or licensed contractor for the roofing system manufacturer, as defined by the roof system manufacturer, for one year prior to the bid date.
 - b. Contractor shall have installed a minimum of three projects using the specified roofing system.

B. Regulatory Requirements for Roof Assembly: Comply with Factory Mutual System Approval Guide or Underwriters Laboratories, Inc. Roofing Materials and Systems Directory as specified:

1. Factory Mutual: Provide roofing assembly meeting Class IA-90 (FM Standard 4470) requirements for fire resistance and wind uplift in accordance with FM Loss Prevention Data Sheet 1-28 and FM Loss Prevention Data Sheet 1-29
2. Underwriters Laboratory: Provide roof assembly meeting Fire Classification 1256 for Flame Spread developed from underside of deck.

C. Pre-installation Conference:

1. Contractor shall convene a pre-installation conference at the site, one week prior to commencing work of this Section. Require attendance of parties directly affecting work of this Section, including, but not limited to, the Owner's representative, Roofing Applicator and job foreman, and Roofing Manufacturer's Representative.
2. Contractor shall record discussions of conference and decisions and agreements (or disagreements) reached, and furnish copy of record to each party attending. Review foreseeable methods and procedures related to roofing work, including the following:
 - a. Tour, inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work.
 - b. Review required submittals.
 - c. 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.
 - d. Review required inspections, testing, certifying, and material usage accounting procedures.
 - e. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not a mandatory requirement).

D. Manufacturer's Site Inspections:

1. Provide site inspection and reports by the manufacturer's representative at the following periods:
 - a. Prior to 50% of roof installation.
 - b. Final Inspection: Two weeks prior to Final Payment.
2. Prepare certificate of acceptance of completed roof installation by the Manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Contractor shall make arrangements for delivery of materials in manufacturer's original unopened containers, dry, undamaged, seals and labels intact.
- B. Contractor shall store materials in weather-protected environment, clear of ground and moisture. Storage requirements for insulation are as follows:
 1. Cut or remove plastic shipping wrap from insulation.
 2. Cover with tarpaulin, shield from moistures and ultraviolet rays.
 3. Elevate minimum of 4 inches above substrate.
 4. Secure to resist high winds.
 5. Distribute insulation stored on roof deck to prevent concentrated loads.

6. Do not install wet insulation. Insulation shall be thoroughly dry prior to installation.
- C. Store cements, primers, and caulks in heated area above 40 degrees F during cold weather and in area below 80 degrees F in warm weather.
- D. Protect adjacent materials and surfaces against damage from roofing work. Do not store materials on completed roofing.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Follow industry standards for environment requirements including, but not limited to, the following:
 1. Do not apply roofing membrane during inclement weather. When air temperature is expected to fall below 40 degrees F, follow specified Cold Weather Application Procedures as specified herein.
 2. Do not apply finished roofing system to wet, damp or frozen surfaces or when precipitation is occurring.
 3. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.8 SEQUENCING AND SCHEDULING

- A. Contractor shall coordinate the Work with installation of associated metal counterflashings specified under other sections as the Work of this Section proceeds.

1.9 WARRANTY

- A. Provide a warranty commencing at date of roof final acceptance by Transwestern and Material Manufacturer, that includes the cost of labor and materials for loss of weather tightness without financial limit for a period of 10 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with specification requirements herein, manufacturers are considered acceptable to Transwestern that are listed below and provide the 10 year warranty (as specified in Section 1.9 Warranty) and roofing systems or products that meet the performance criteria listed in Section 2.2 MEMBRANE PERFORMANCE CRITERIA.

Acceptable Manufacturers:

1. GAF
2. Johns Manville
3. Carlisle-Syntec
4. Sarnifil

2.2 MEMBRANE PERFORMANCE CRITERIA – TPO & PVC

- A. TPO: Membranes composed of a top and bottom film formulated with an ultra-violet

resistant thermoplastic polyolefin with a polyester reinforcement, 60 mil thickness, white, 7 ft. maximum sheet width.

- B. PVC: Thermoplastic single ply membrane composed of polyvinyl chloride (PVC) sheet and reinforced with polyester scrim conforming to ASTM D 4434, Type III, 60 mil thickness, white, 7 ft. maximum sheet width.

2.3 FLASHING MEMBRANE

- A. Flashing Membrane: Reinforced and non-reinforced membrane and pressure-sensitive or heat welded flashings by Roofing System manufacturer, minimum 60 mils, specifically designed for use in flashing at perimeters and wall, and around projections through roofing system.

2.4 WATERPROOFING MEMBRANE

- A. Waterproofing Membrane: Membrane waterproofing formed into uniform, flexible sheets by Roofing System manufacturer. Reinforced, 60 mils nominal thickness.
- B. Waterproofing Flashing: Reinforced and non-reinforced membrane and pressure-sensitive or heat welded flashings by Roofing System manufacturer, minimum 60 mils, specifically designed for use in flashing at perimeters and wall, and around projections through roofing system.

2.5 ROOF INSULATION

- 1. Isocyanurate Foam: Polyisocyanurate board insulation, ASTM C 1289, Type II, felt or glass-fiber mat facer on both major surfaces with an LTTR (Long Term Thermal Resistance) value of 22 based on ASTM C1303 and CAN/ULC S770.
- 2. High Density Wood Fiber Board: Cellulose wood fiber recovery board conforming to ASTM C 208.
- 3. Perlite Separator/Insulation Board.
- B. Tapered Insulation: Provide crickets, saddles, and tapered insulation of polyisocyanurate. Taper to the following slopes:
 - 1. Crickets and Saddles: 1/4 inch per foot.
 - 2. Insulation Installed to Counter slope the Roof Structure: 1/2 inch per foot.
 - 3. Edge Taper Insulation: Adjacent to gutter assembly, slope at minimum rate of 1/2 inch per foot. Provide insulation tapering up to match nominal roof insulation thickness.

2.6 ROOF PENETRATION FLASHING AND SEALS

- A. Molded Pipe Flashing: Pre-molded flexible pipe flashing as recommended and supplied by the roofing manufacturer.
- B. Pitch Box/Pocket Sealer: Manufacturer's two-part pourable urethane sealer.

2.7 ACCESSORIES

- A. Provide new manufacturer's system accessories as required for a complete and warranted Roofing System. Use of each accessory item indicates its acceptance by the material manufacture providing the long-term warranty. Roofing contractor is responsible for using accessory

items that are acceptable by the manufacturer of the primary roofing material.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Due to multiple roof system options the installation guidelines listed may include more than one alternative. Finished installation must be acceptable to the Material Manufacturer of the proposed primary roof membrane material for issuance of the specified long-term warranty.

3.2 EXAMINATION

- A. Verify substrate surfaces are dry and free of water, snow, and ice.
- B. Beginning installation means acceptance of substrate and pre-installation conference has been held with agreements reached.

3.3 PREPARATION

- A. Provide covers and other means of protection as necessary to protect building surfaces against damage during roofing work.
- B. Where Work shall continue over newly finished roof membrane, protect surfaces from damage.

3.4 RECOVER OF EXISTING ROOF

- A. Remove all existing gravel from roof and sweep surface membrane clean of all loose dirt and debris.
- B. Existing roof system to remain. Overlay existing roof system with high-density wood fiber-board or perlite board directly over existing system and installation of new 60 mil membrane roofing system.
- C. Existing Membrane Preparation: Cut and remove any large blisters or anomalies that might inhibit the uniform positioning of the separator board and new membrane system.
- D. Damaged insulation identified by prior performed infrared scan shall be removed and replaced with specified polyisocyanurate insulation. Thickness: To match the height of the surrounding roof system. Per square foot price for the removal and fill in of damaged insulation that exceeds the square footage identified on the roof is provided on the bid form.

3.5 REMOVAL OF DAMAGED INSULATION AND FLASHING MAMBRANES

- A. Existing damaged insulation shall be removed to decking material. Contractor shall inspect the deck to identify any unsuitable conditions. Unsuitable conditions shall be reported to the Transwestern prior to subsequent work thereon.
- B. Flashing membrane removal shall only occur if required by the material manufacturer.

Due to the existing building construction and the gap that exists between the parapet wall and the roof deck - the preferred approach will be to encapsulate the existing wall flashing

assembly by installing the new membrane over the existing membrane flashings. Surfaces shall be cleaned and prepared for application of new materials as satisfactory with the manufacturer.

- C. Specific replacement of significant flashing metal, nailers, drain bowls/strainers, etc and the need to increase curb height will be outlined in the Estimator Assistant segment of the web site presentation of the roof Project Package. In many cases unit prices will be requested for these items on the bid form provided.

3.6 ROOF INSULATION INSTALLATION

- A. Lay insulation units with long edge joints continuous and end joints staggered. Mechanically fasten insulation through the existing roof into the deck with FM approved fasteners and plates in accordance with requirements of FM.
 - 1. Install fasteners using drill with torque clutch. Other types of drills will not be permitted.
 - 2. Install fasteners in the pattern and spacing as recommended by the manufacturer for the application but not closer than 6" from either edge of the insulation board.
- B. Lay insulation boards to moderate contact without forcing joints. Cut insulation to fit neatly around protrusions through roof. At parapet walls, cope insulation around protrusions and embed plates. Butt insulation tight against wall to provide sealing. Fill gaps over 1/4 inch wide with filler as recommended by the manufacturer.
- C. Place roof crickets and tapered insulation to required slope pattern or as required to prevent ponding when required for complete roof removal and replacement.
- D. Apply no more insulation than can be sealed with membrane in same day.

3.7 ROOFING MEMBRANE APPLICATION

- A. Membrane Placement:
 - 1. Starting at high point of roof surface, run membrane perpendicular to roof slope. Unroll membrane over prepared substrate, lapping adjoining sheets as recommended by manufacturer.
 - 2. Mechanically fasten membrane using manufacturer's fastening system. Install fasteners in accordance with submitted engineered layout pattern to resist specified wind uplift.
 - 3. Install fasteners using drill depth sensing or torque limiting screw guns to limit under/over drive of fasteners.
 - a. Drill motors and other non-limiting drivers shall not be used.
 - 4. Install termination bar at base of perimeter walls. Mechanically attach to wall with approved anchors.
- B. Cold Weather Application Procedures: When air temperature is expected to fall below 40 degrees F, follow Cold Weather Application Procedures as follows:
 - 1. Store materials in heated storage units prior to installation. Rotate adhesive, cement, and sealant containers to maintain their temperature above 40 degrees F.
 - 2. Allow membrane to relax until no wrinkles are visible and restrict work to sunny days.
 - 3. Allow adequate time for solvents in cements to flash off. Check dryness of applied cements before sealing joints.
 - 4. Verify that frost, dew, and other forms of moisture have evaporated prior to covering insulation with membrane to prevent entrapment of moisture within finished roof

system.

3.8 WATER CUTOFFS AND WEATHER PROTECTION

- A. Install water cut-offs at end of day's operation to seal insulation and edge of roof membrane from moisture entry. If inclement weather appears imminent during roofing application, cease operations and protect deck, insulation, flashings, penetrations, and membrane from moisture infiltration with water cutoffs. Insulation and roofing materials not so protected prior to inclement weather will be considered damaged and will be cause for rejection.
- B. Remove water cut-offs and other temporary weather protections prior to continuing roofing work. Remove materials that have been subject to moisture damage and return deck to a clean, dry condition before proceeding with roofing operations. Remove damaged materials from job site.
- C. The water cut-offs and weather protection shall not be considered a part of the final roof system specified.

3.9 MEMBRANE FLASHING AND ACCESSORIES

- A. Apply flexible flashings to seal membrane to vertical elements using manufacturer's standard peel and stick or heat welded flashings.
 - 1. Reinforced Flashing Membrane: Where conditions permit, flash penetrations and walls with reinforced flashing membrane.
 - 2. Uncured Flashing: Limit use of uncured flashing to overlay vertical seams as required at angle changes, to flash inside and outside corners, scuppers, and other penetrations or unusually shaped walls as approved by the manufacturer.
- B. Roof Penetrations:
 - 1. Molded Pipe Flashing: Install where configuration of penetration will permit.
 - a. Install per manufacturers application instructions.
- C. Seal flashings and flanges of items penetrating membrane.
- D. Fasten termination bars at 12 inches on center or less to maintain constant compression.
- E. Gas Pipe Supports and Isolation Pads: Inspect wood block pipe supports and replace as required and as shown on the drawings. Install new isolation pads at each pipe support.
- F. Walkway Pads: Layout pattern shall provide membrane protection at roof access, around each rooftop units and at jib crane. Adhere pads to roofing membrane to prevent displacement in maximum anticipated design wind velocity.

3.10 WATERPROOFING MEMBRANE

- A. Waterproofing Membrane: Install waterproofing membrane to be fully adhered to parapet using bonding adhesive as recommended by membrane manufacturer. Run membrane waterproofing up parapet and terminate under coping stone with surface mounted counterflashing. Caulk off the top.
- B. Waterproofing Flashing: Apply waterproofing membrane flashings to seal membrane to vertical elements using manufacturer's standard sealing procedure.

1. Reinforced Waterproofing Flashing: Where conditions permit, flash walls with reinforced waterproofing flashing or as required by the manufacturer.
2. Uncured Flashing: Limit use of uncured flashing to overlay vertical seams as required at angle changes, to flash inside and outside corners, scuppers, and other penetrations or unusually shaped walls where use of reinforced waterproofing flashing is not practical or as required by the manufacturer.

3.11 FLASHING DETAILS

A. GENERAL

1. Flashing Details by Number as shown in the Detail Drawing Link and metal types and gauge are identified in the Estimator Assistant Link.

B. REFERENCES

1. American Society for Testing and Materials (ASTM):
 - a. ASTM A 653 - Specification for Steel sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.
 - b. ASTM A 792 – Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
 - c. ASTM B 749 –Lead and Lead Alloy Strip, Sheet, and Plate Products
 - d. ASTM D 523 - Standard Test Method for Specular Gloss
2. National Roofing Contractors Association (NRCA):
 - a. NRCA - Low Slope Roofing Manual.
3. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
 - a. SMACNA - Architectural Sheet Metal Manual, Fifth Edition, 1993.

3.12 RESTORATION AND CLEANING

- A. Prior to demobilization from the site, the work shall be reviewed by the Owner's Representative and the Applicator. All defects noted and non-compliances with the Specifications or the recommendations of The Proposed Manufacturer shall be itemized in a punch list. These items must be corrected immediately by the Applicator to the satisfaction of the Owner's Representative and The Proposed Manufacturer prior to demobilization.
- B. Assure surfaces of new work is clean and free of excess construction material and debris.

3.13 PROJECT CLOSE OUT

- A. All Warranties referenced in this Specification shall be submitted to Transwestern and be accepted before final payment is made.

END OF SPECIFICATION