SECTION 07 01 51 – ROOF REHABILITATION

PART 1 GENERAL

1. SUMMARY

a. This Section includes the following:

   1) Application of reinforced fluid-applied roof membrane and flashings over existing and repaired fully adhered EPDM membrane roof.

   2) Manufacturer's or Independent Roofing Inspection of roofing rehabilitation.

b. Related Information:

   1) All Documents listed in Table of Contents “TOC”.

   2) Division 07 Section "Roof Preparation and Repair" for existing surface preparation, roofing tear-off where noted, patching, and substrate preparation for rehabilitation of roofing membrane.

c. Allowances: Refer to Division 01 Section "Allowances" for description of Work in this Section affected by allowances.

d. Unit Prices: Refer to Division 01 Section "Unit Prices" for description of Work in this Section affected by unit prices.

2. ROOFING CONFERENCES

a. Roofing Rehabilitation Preinstallation Conference: Conduct conference at Project site to review methods and procedures related to roofing system.

   1) Meet with Owner; Architect; roofing coating materials manufacturer’s representative; roofing rehabilitation Installer including project manager and foreman; and installers whose work interfaces with or affects rehabilitation including installers of roof accessories and roof-mounted equipment requiring removal and replacement as part of the Work.

   2) Review temporary protection requirements for existing roofing system that is to remain uncoated, during and after installation.

   3) Review methods and procedures related to re-coating preparation. (Refer to Section 07 01 50) , including coating manufacturer's written instructions.
4) Review roof drainage during each stage of coating and review roof drain plugging and plug removal procedures.

5) Review and finalize construction schedule, and verify availability of materials, Installer’s personnel, equipment, and facilities needed to make progress and avoid delays.

6) Review base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that will affect coating.

7) Review HVAC shutdown and sealing of air intakes.

8) Review shutdown of fire-suppression, -protection, and -alarm and -detection systems.

9) Review procedures for asbestos removal or unexpected discovery of asbestos-containing materials.

10) Review governing regulations and requirements for insurance and certificates if applicable.

11) Review existing conditions that may require notification of Owner before proceeding.

3. MATERIALS OWNERSHIP

a. Demolished materials shall become Contractor’s property and shall be removed from Project site.

4. DEFINITIONS


b. Roofing Coating Preparation: Existing roofing that is to remain and be prepared to accept restorative coating application.

c. Patching: Removal of a portion of existing membrane roofing system from deck or removal of selected components and accessories from existing membrane roofing system and replacement with similar materials.

d. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and reinstalled.

e. Existing to Remain: Existing items of construction that are not indicated to be removed.
5. ACTION SUBMITTALS

   a. Product Data: For each type of product specified.

6. INFORMATIONAL SUBMITTALS

   a. Contractor's Product Certificate: Submit notarized certificate, indicating products intended for Work of this Section, including product names and numbers and manufacturers' names, with statement indicating that products to be provided meet the requirements of the Contract Documents.

      1) Provide manufacturer's UL listing certificate for roofing system.

   b. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing rehabilitation system.

   c. Qualification Data: For Installer, and Manufacturer.

      1) Letter written for this Project indicating manufacturer certification that the installer has installed and successfully completed no less than three (3) independent projects with identical reinforced coating application of over 10,000 SF within the previous five years in the Commonwealth of Pennsylvania (Refer also to bid form.)

      2) Letter written for this Project indicating manufacturer approval of Installer to apply specified products and provide specified warranty.

   d. Warranties: Unexecuted sample copies of specified warranties.

   e. Photographs: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, which might be misconstrued as having been damaged by rehabilitation operations. Submit before Work begins.

   f. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, and for dust control. Indicate proposed locations and construction of barriers.

7. CLOSEOUT SUBMITTALS

   a. Maintenance Data: To include in maintenance manuals.

   b. Warranties: Executed copies of approved warranty forms.
8. QUALITY ASSURANCE

a. Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of three years’ experience installing products similar to those specified, able to communicate verbally with Contractor, Architect, and employees, and the following:

1) Qualified by the manufacturer to install manufacturer’s product and furnish warranty of type specified.

b. Manufacturer Qualifications: Primary product manufacturer that is UL listed for roofing system identical to that specified for this Project with minimum five years’ experience in manufacture of comparable products in successful use in similar applications, and able to furnish warranty with provisions matching specified requirements.

1) Approval of Other Manufacturers and Comparable Fully-Reinforced Products: Shall submit the following in accordance with project substitution requirements, a minimum of seven (7) working days prior to the due date of the bid as specified in the Instructions to bidders:

   a) Product data, including certified independent test data indicating compliance with requirements.

   b) Samples of each component.

   c) Sample submittal from similar project.

   d) Project references: Minimum of three installations of specified products installed by the warded roofing contractor not less than five years old, with Owner and Architect/Owner's Consultant contact information.

   e) Sample warranty.

c. Roofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer’s compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:

1) An authorized full-time technical employee of the manufacturer.

2) An independent party certified as a Registered Roof Observer by the International Institute of Building Enclosure Consultants (formerly the Roof Consultants Institute) retained by the Contractor or the Manufacturer and approved by the Manufacturer.
9. FIELD CONDITIONS

a. **Weather Condition Limitations:** Do not apply roofing system during inclement weather or when wet weather is forecast. Wet weather shall include and not be limited to Rain, Mist, Fog, Dew, Morning Condensation or any other conditions where substrate surface is wet and/or damp.

b. Proceed with rehabilitation work only when existing and forecasted weather conditions permit Work to proceed without water entering into existing roofing system or building.
   1) Store all materials prior to application at temperatures recommended by manufacturer.
   2) Apply coatings within range of ambient and substrate temperatures recommended by manufacturer.
   3) Do not apply roofing in snow, rain, fog, or mist.

c. Protect building to be rehabilitated, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from rehabilitation operations.
   1) **SPRAY APPLICATION OF ROOF COATINGS IS PROHIBITED.**

 d. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.

e. Daily Protection: Coordinate installation of roofing so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

f. Owner will occupy portions of building immediately below re-coating area. Conduct re-coating so Owner’s operations will not be disrupted. Provide Owner with not less than 72 hours’ notice of activities that may affect Owner’s operations.

10. WARRANTY

a. Manufacturer’s Warranty: In which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within warranty period, as follows.

   1) Form of Warranty: Tremco "Plain and Simple" warranty form.

   2) Scope of Warranty: Work of this Section.

   3) Warranty Period: 20 years from date of completion.

   4) Inspections by Manufacturer: To occur every five years following completion.
PART 2 PRODUCTS

1. MANUFACTURERS
   a. Basis of Design: The roof system specified in this Section is based upon products of Tremco, Inc., Beachwood, OH, (800) 562-2728, www.tremcoroofing.com that are named in other Part 2 articles. Provide specified products or comparable products of one of the following.
      1) Manufacturers of comparable products: Approved by Architect prior to bid.
   b. Source Limitations: Obtain components for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2. PERFORMANCE REQUIREMENTS
   a. General Performance: Rehabilitated roofing shall withstand exposure to weather without failure or leaks due to defective manufacture or installation.
      1) Accelerated Weathering: Roofing system shall withstand 5000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
   b. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
   c. Exterior Fire-Test Exposure: Roofing system exterior fire-test exposure performance following application of rehabilitation coating shall be not be less than that of the rehabilitated roof performance when tested in accordance with ASTM E108, based upon manufacturer’s tests of identical applications.

3. MATERIALS, GENERAL
   a. General: Rehabilitation materials recommended by roofing system manufacturer for intended use and compatible with components of existing membrane roofing system.
   b. Infill Materials: Where required to replace test cores and to patch existing roofing, use infill materials matching existing membrane roofing system materials, unless otherwise indicated.
   c. Temporary Roof Drainage: Design and selection of materials for temporary roof drainage are responsibilities of the Contractor.
4. FLUID-APPLIED ROOFING MEMBRANE COATING
      1) Polyurethane Roof Coating System Base Coat: Single-part moisture-curing, for use with a compatible top coat.
         a) Basis of design product: Tremco, AlphaGuard MTS Base Coat.
         b) Combustion Characteristics, UL790: Maintains combustion characteristics of existing roof system.
         c) Volatile Organic Compounds (VOC), maximum, ASTM D3960: 42 g/L.
         d) Accelerated Weathering, 5000 hours, ASTM G154: Pass.
         f) Solids, by volume, ASTM D2697, minimum: 87 percent.
         g) Minimum Thickness, Base Coat on Smooth Surface: 48 mils (1.22 mm) wet.
      2) Polyurethane roof coating system top coat, low odor low VOC single-part, for application over compatible base coat.
         a) Basis of design product: Tremco, AlphaGuard MTS Top Coat.
         b) Combustion Characteristics, UL790: Maintains combustion characteristics of existing roof system.
         c) Volatile Organic Compounds (VOC), maximum, ASTM D3960: 44 g/L.
         d) Solar Reflectance Index (SRI), ASTM E1980: For white, not less than 108.
         g) Solids, by volume, ASTM D2697: 87.
         h) Minimum Thickness: 32 mils (0.81 mm) wet over cured base coat.
         i) Minimum Thickness, Slip-Resistant Coat: 20 mils (0.50 mm) wet.
         j) Color:
1) Roof and flashings: White.
2) Slip-resistant walkways: Safety yellow.

b. Primers:

1) Primer for Asphaltic and Single-Ply Membranes: Water-based, polymer-modified quick-dry low odor primer.
   a) Basis of design product: Tremco, AlphaGuard WB Primer.
   b) Volatile Organic Compounds (VOC), maximum, ASTM D3960: 1 g/L.
   c) Solids, by weight: 70 percent.

2) Primer for Masonry Surfaces: Two-part high-solids epoxy-penetrating low-odor primer for masonry and concrete surfaces.
   a) Basis of design product: Tremco, AlphaGuard C-Prime.
   b) Volatile Organic Compounds (VOC), maximum, ASTM D3960: 0 g/L.
   c) Solids, by weight: 100 percent.

3) Primer for Non-Porous Surfaces: Single-part, water-based primer to promote adhesion of urethanes to metals, PVC and other non-porous surfaces.
   a) Basis of design product: Tremco, AlphaGuard M-Prime.
   b) Volatile Organic Compounds (VOC), maximum, ASTM D3960: 22 g/L.
   c) Nonvolatile Content, minimum, ASTM D2369: 5 percent.
   d) Density at 77 deg F (25 deg C): 8.3 lb/gal (1kg/L).

4) Primer for Intercoat and Substrate Adhesion: Single-part, quick-drying primer to promote adhesion of urethane products to previous urethane coats and to other approved surfaces.
   a) Basis of design product: Tremco, Geogard Primer.
   b) Volatile Organic Compounds (VOC), maximum, ASTM D3960: 100 g/L.
   c) Coverage Rate, 400 sq. ft/ gal. (10 m2/ L): 4 mils (0.10 mm) wet.

c. Fluid-Applied Roofing Reinforcing Fabric:
1) Polyester Reinforcing and Protection Fabric: 100 percent stitch-bonded mildew-resistant polyester fabric intended for reinforcement of compatible fluid-applied membranes and flashings and as a protection layer under pavers or stone aggregates.
   a) Basis of design product: Tremco, Permafab.
   b) Tensile Strength, Minimum, ASTM D1682: 50 lbf (23 kg) avg..
   c) Elongation, Minimum, ASTM D1682: 60 percent.
   d) Tear Strength, Minimum, ASTM D1117: 16 lbf (7.3 kg) avg..
   e) Weight: 3 oz./sq. yd (102 g/sq. m).

5. AUXILIARY ROOFING REHABILITATION MATERIALS

a. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with existing roofing system and roofing coating system.

b. Seam Sealer: Waterproof seam and patching material compatible with applied coating.
   1) Seam Sealer: Aliphatic polyurethane sealer, single-component, moisture curing, high solids, low-VOC, formulated for compatibility and use with specified roofing substrates.
      a) Basis of design product: Tremco, SOLARGARD Seam Sealer.
      b) Volatile Organic Compounds (VOC), maximum, ASTM D3960: 75 g/L.
      c) Tensile Strength, ASTM D412: 270 psi (1860 kPa).
      d) Tear Strength, ASTM D412: 35 pli (6 kN/m).
      e) Elongation, ASTM D412: 700 percent.
      f) Color: White.

c. Seam and Detail Reinforcing Fabric:
   1) Polyester Reinforcing and Protection Fabric: 100 percent stitch-bonded mildew-resistant polyester fabric intended for reinforcement of compatible fluid-applied membranes and flashings and as a protection layer under pavers or stone aggregates.
      a) Basis of design product: Tremco, Permafab.
b) Tensile Strength, Minimum, ASTM D1682: 50 lbf (23 kg) avg..

c) Elongation, Minimum, ASTM D1682: 60 percent.

d) Tear Strength, Minimum, ASTM D1117: 16 lbf (7.3 kg) avg..

e) Weight: 3 oz./sq. yd (102 g/sq. m).

d. Joint Sealant: Elastomeric joint sealant compatible with applied coating, with movement capability appropriate for application.

1) Joint Sealant, Polyurethane: ASTM C920, Type S, Grade NS, Class 50 single-component moisture curing-sealant, formulated for compatibility and use in dynamic and static joints; paintable.

a) Basis of design product: Tremco, TremSEAL Pro.

b) Volatile Organic Compounds (VOC), maximum, ASTM D3960: 40 g/L.

c) Hardness, Shore A, ASTM C661: 40.

d) Adhesion to Concrete, ASTM C794: 35 pli.

e) Tensile Strength, ASTM D412: 350 psi (2410 kPa).

f) Color: Closest match to substrate.

e. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

6. WALKWAYS

a. Slip Resistant Product for Fluid-Applied Walkways:

1) Aggregate, Slip Resistant Silica Sand: Silica sand, broadcast into fluid-applied roof coating products for use as aggregate fill for slip-resistant, abrasion-resistant coating applications.

a) Size: 20 - 40 mesh.

b) Application Rate: Minimum 20 lb/100 sq ft (1 k/m2).
PART 3  EXECUTION

1.  EXAMINATION
   a. Examine existing roofing substrates, with Installer present, for compliance with requirements and for other conditions affecting application and performance of roof coatings
      1) For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
      2) Verify compatibility with and suitability of substrates.
      3) Verify that substrates are visibly dry and free of moisture.
      4) Verify that roofing membrane surfaces have adequately aged to enable proper bond with base coat.
      5) Verify that roofing membrane is free of blisters, splits, open laps, indications of shrinkage, and puncture damage or other indications of impending roof system failure.
      6) Commencing application of coatings indicates acceptance of surfaces and conditions.

2.  PREPARATION
   a. Protect existing roofing system that is indicated not to be rehabilitated, and adjacent portions of building and building equipment.
      1) Mask surfaces to be protected. Seal joints subject to infiltration by coating materials.
      2) Limit traffic and material storage to areas of existing roofing membrane that have been protected.
      3) Maintain temporary protection and leave in place until replacement roofing has been completed.
   b. Shut down air intake equipment in the vicinity of the Work in coordination with the Owner. Cover air intake louvers before proceeding with coating work that could affect indoor air quality or activate smoke detectors in the ductwork.
      1) Verify that rooftop utilities and service piping affected by the Work have been shut off before commencing Work.
c. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.

1) Do not permit water to enter into or under existing membrane roofing system components that are to remain.

3. ROOFING COATING PREPARATION

a. Roofing Partial Tear-off and Patching: Refer to requirements of Division 07 Section "Preparation for Re-roofing."

b. Membrane Surface Preparation:

1) Verify that existing substrate is dry before proceeding with application of coating. Spot check substrates with an electrical capacitance moisture-detection meter.

2) Verify adhesion of new products.

c. Existing Flashing and Detail Preparation: Repair flashings, gravel stops, copings, and other roof-related sheet metal and trim elements. Reseal joints, replace loose or missing fasteners, and replace components where required to leave in a watertight condition.

1) Do not damage metal counterflashings that are to remain. Replace metal counterflashings damaged during removal with counterflashings of same metal, weight or thickness, and finish.

2) Roof Drains: Remove drain strainer and clamping ring. Grind metal surfaces down to clean, bare, metal.

d. Surface Priming: Prime surfaces to receive fluid-applied coating using coating manufacturer’s recommended product for surface material. Apply at application rate recommended by manufacturer.

1) Ensure primer does not puddle and substrate has complete coverage.

2) Allow to cure completely prior to application of coating.

4. FLUID-APPLIED FLASHING APPLICATION

a. Fluid-Applied Flashing and Detail Base Coat Application: Complete base coat and fabric reinforcement at parapets, curbs, penetrations, and drains prior to application of field of fluid-applied membrane. Apply base coat in accordance with manufacturer's written instructions.
1) Apply base coat on prepared and primed surfaces and spread coating evenly. Extend coating minimum of 8 inches (200 mm) up vertical surfaces and 4 inches (100 mm) onto horizontal surfaces.

2) Back roll to achieve minimum coating thickness indicated on Part 2 product listing, unless greater thickness is recommended by manufacturer; verify thickness of base coat as work progresses.

3) Reinforcing Fabric: Embed fabric reinforcement into wet base coat. Lap adjacent flashing pieces of fabric minimum 3 inches (75 mm) along edges and 6 inches (150 mm) at end laps.
   a) Roll surface of fabric reinforcing to completely embed and saturate fabric. Leave finished base coat with fabric free of pin holes, voids, or openings.

4) Roof Drains: Install base coat onto surrounding membrane surface and metal drain bowl flange. Install target piece of fabric reinforcement immediately into wet base coat and roll to fully embed and saturate fabric. Reinstall clamping ring and strainer following application of top coat. Replace broken drain ring clamping bolts.

5. FLUID-APPLIED MEMBRANE APPLICATION
   a. Fluid-Applied Membrane Base Coat: Apply base coat to field of membrane in accordance with manufacturer’s written instructions.
      1) Apply base coat on prepared and primed surfaces and spread coating evenly.
      2) Back roll to achieve minimum coating thickness indicated on Part 2 product listing, unless greater thickness is recommended by manufacturer; verify thickness of base coat as work progresses.
      3) Fabric Reinforcement: Embed fabric reinforcement into wet base coat. Lap adjacent pieces of fabric minimum 3 inches (75 mm) along edges and 6 inches (150 mm) at end laps.
         a) Roll surface of fabric reinforcing to completely embed and saturate fabric. Leave finished base coat with fabric free of pin holes, voids, or openings.
   b. Fluid-Applied Membrane Top Coat: Apply top coat to field of membrane and flashings uniformly in a complete, continuous installation.
      1) Allow base coat to cure prior to application of top coat.
      2) Following curing of base coat and prior to application of top coat, sand raised or exposed edges of fabric reinforcement.
3) Prime base coat prior to application of top coat if top coat is not applied within 72 hours of the base coat application, using manufacturer’s recommended primer.

4) Apply top coat extending coating up vertical surfaces and out onto horizontal surfaces. Install top coat over field base coat and spread coating evenly.

5) Back roll to achieve minimum coating thickness indicated on Part 2 product listing, unless greater thickness is recommended by manufacturer; verify thickness of base coat as work progresses.

6) Avoid foot traffic on new fluid-applied membrane for a minimum of 24 hours.

6. WALKWAY INSTALLATION

a. Install walkways following application of coating. Locate as indicated on drawings, or as directed by Owner.

1) Width of walkways: 36 inches.

b. Slip-Resistant Walkway Topcoat: Apply walkway second, compatible, topcoat following application and curing of top coat. Locate as indicated on Drawings.

1) Mask walkway location with tape.

2) Prime first top coat prior to application of walkway top coat if walkway top coat is not applied within 72 hours of the first top coat application, using manufacturer’s recommended primer.

3) Apply walkway topcoat and back roll to achieve minimum coating thickness indicated on Part 2 product listing, unless greater thickness is recommended by manufacturer; verify thickness of base coat as work progresses.

4) Broadcast Slip-Resistant Top Coat Aggregate in wet top coat at rate indicated in Part 2 product listing or as otherwise recommended by coating manufacturer.

   a) Back roll aggregate and top coat creating even dispersal of aggregate. Remove masking immediately.

7. FIELD QUALITY CONTROL

a. Roofing Inspector: Contractor shall engage a qualified roofing inspector for a minimum of 2 full-time days on site, per 40-hour crew week, to perform roof tests and inspections and to prepare start up, interim, and final reports. Roofing Inspector’s quality assurance inspections shall comply with criteria established in Quality Control and Quality-assurance Guidelines for the Application of Membrane Roof Systems."
b. **Roof Inspection:** Contractor shall engage roofing system manufacturer’s technical personnel to inspect roofing installation a minimum of 8 hours per week and no less than 2 visits per week, and submit report. Notify Architect in advance of dates and times of inspections. Inspect work as follows:

1) **Upon completion of preparation of first component of work, prior to application of re-coating materials.**

2) **Following application of re-coating to flashings and application of base coat to field of roof.**

3) **Upon completion of re-coating but prior to re-installation of other roofing components.**

c. Repair fluid-applied membrane where test inspections indicate that they do not comply with specified requirements.

d. Arrange for additional inspections, at Contractor’s expense, to verify compliance of replaced or additional work with specified requirements.

8. **PROTECTING AND CLEANING**

a. Protect roofing system from damage and wear during remainder of construction period.

b. Correct deficiencies in or remove coating that does not comply with requirements, repair substrates, and reapply coating.

c. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 01 51