SECTION 075900

BUILT-UP ROOFING SYSTEM REPAIR

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: Built-up roofing system repair.

1.2 DESCRIPTION OF WORK

A. Definition: Built-up roofing (BUR) system is defined to include roofing membrane, insulation immediately under roofing, fiber cants, composition flashing and stripping, and roofing accessories integrally related to roof installation.

B. Repair work consists of removal of existing roofing system at locations where new openings are made through existing roof, and restoration of roofing system. Existing roofing to be repaired is asphalt type.

C. Related Work Specified Elsewhere:

1. Various sections - Making and reinforcing openings in roof deck.

2. Flashing: Section 07 60 00, FLASHING AND SHEET METAL.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide primary products, including each type of roofing sheet (felt), bitumen, and composition flashings, produced by a single manufacturer, which has produced that type product successfully for not less than 3 years. Provide secondary products only as recommended by manufacturer of primary products for use with roofing system specified.

B. Installer Qualifications: A single Installer (Roofer) shall perform the work of this Section; and shall be a firm with not less than 5 years of successful experience in installation of built-up roofing systems similar to those required for this project and which is acceptable to or licensed by manufacturer of primary roofing materials.

C. Pre-Roofing Conference: Before beginning installation of roofing system repair, a conference shall be held at project site attended by the Roofer, General Contractor, Mechanical Contractor, representative of roofing material manufacturer, Owner, Architect, and, when required, representatives of other parties concerned with performance of the work.

D. Insurance and Code Requirements: Provide materials and installation methods complying with governing regulations and the following:

1. Factory Mutual (FM) requirements for Class insulated steel deck construction (FM Bulletin 128), and listed in FM Approval Guide.

2. Underwriters Laboratories (UL) Class A external fire exposure

and UL Design No. indicated on drawings, if any.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical data, installation instructions and recommendations for each type of product required, substantiating that materials comply with requirements. Supplement with statement indicating proposed repair methods. For asphalt bitumen, provide label on each container or certification with each load of bulk bitumen, indicating flash point (FP), finished blowing temperature (FBT), softening point (SP) and equiviscous temperature (EVT).

B. Shop Drawings: Submit shop drawings showing details of special roofing or flashing conditions, and layout of roof crickets formed by tapered insulation units.

C. Field Test Reports: Submit daily softening point test reports on samples of asphalt used on project, taken at beginning of each day's work and at 2-hour intervals during course of the work thereafter. Perform tests in field by Ring and Ball Test, ASTM D 2398, or similar recognized test method.

1.5 JOB CONDITIONS

A. Weather Conditions Limitations: Proceed with roofing work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturers' recommendations and warranty requirements.

B. Coordination: Perform removals and repairs in close coordination with installers of work requiring openings. Repair opened areas as quickly as possible. Provide protection to prevent leakage of water or spillage of repair or debris into building.

1.6 PRODUCT HANDLING

A. Store and handle roofing felts in a manner which will ensure that there is no possibility of significant moisture pick-up. Store in a dry, well ventilated, weathertight place. Unless protected from weather or other moisture sources, do not leave unused felts on the roof overnight or when roofing is not in progress. Store rolls of felt on end on pallets or other raised surface. Handle and store materials or equipment in a manner to avoid significant or permanent deflection of deck.

1.7 GUARANTEE

A. Submit 2 executed copies of local roofing contractors association's standard 2-year Roofing Guarantee, covering work of this Section including roofing membrane, composition flashing, roof insulation, and roofing accessories, signed and countersigned by Roofing Installer and Contractor.

PART 2 - PRODUCTS

2.1 ROOF INSULATION

A. Replacement insulation shall be of same overall thickness as

existing, so that top surfaces of both are flush. Provide new insulation which has same or better thermal value as existing.

B. Where required for positive slope to roof drains, provide tapered insulation units of material which is compatible with flat units. Furnish in manufacturer's standard sizes or factory cut and marked per approved layout. Units shall provide roof slope to drains of not less than 1/4"/ft.

C. Preformed Cants: Rigid insulation units matching roof insulation, or asphalt-impregnated organic fiber insulation units, molded to form 3-1/2" x 3-1/2" cant strips.

2.2 ROOF MEMBRANE AND FLASHING MATERIALS

A. General: Use materials of same type and quality as existing insofar as possible, and same construction (number of plies, surfacing, etc). Assure that new materials are completely compatible with existing. If existing materials cannot be matched due to unavailability, or cannot be identified, provide materials specified below.

B. Base Sheet: Asphalt-impregnated heavy weight glass fiber mat, ASTM D2178, Type III or IV.

C. Ply Felts: Asphalt-impregnated glass fiber mats, ASTM D 2178, Type III or IV.

D. Bitumen: Roofing asphalt, ASTM D 312, Type II.

E. Roofing Cement: Asphaltic cement, ASTM D 2822.

F. Glass Fiber Fabric: 1.5 lb sheet of woven glass fiber, impregnated with asphalt ASTM D 1668.

G. Surfacing Aggregate: Clean, water-worn opaque gravel, crushed slag, or crushed stone free of sharp edges, complying with ASTM D 1863.

1. Where ASTM D 1863 aggregate is not available, provide aggregate complying with gradation sizes 6, 7, and 67 of ASTM D 448, provided that moisture content by weight is 3" or less and aggregate meets other requirements of ASTM D 1863. Color of aggregate shall match existing as closely as possible.

H. Walkway Protection Boards: Mineral surfaced bituminous composition boards, approximately 1/2" thick, manufactured specifically for hot bituminous application on BUR as a protection course for foot traffic.

2.3 SHEET METAL ACCESSORIES MATERIALS

A. General: Refer to Section 076000 - FLASHING AND SHEET METAL

B. Zinc-Coated Steel: ASTM A 526, with 0.20% copper, G90 hot-dip galvanized, mill phosphatized, 20 gage.

C. Aluminum: ASTM B 209, alloy 3003, temper H 14 unless harder temper required for forming and performance, AA-C22A41 clear anodized finish; 0.032" thick.

D. Solder for Sheet Metal: Except as otherwise recommended by metal manufacturer, provide 50/50 tin/lead type ASTM B 32 for tinning and soldering joints; use rosin flux.

2.4 MISCELLANEOUS MATERIALS

A. Mastic Sealant: Polyisobutylene (plain or bituminous modified), nonhardening, nonmigrating, nonskinning and nondrying.

B. Fasteners: Standard types of mechanical fasteners for BUR system work, tested by manufacturer for required pull-out strength where applicable, compatible with deck type and roofing products used, and corrosion protected to meet FM 4470 test procedure. Provide either 1" diameter nail heads or 1-3/8" diameter x 30 gage sheet metal caps for nails used to secure base sheets, felts, or insulation boards.

2.5 FABRICATING SHEET METAL ACCESSORIES

A. Work shall conform to details shown, to applicable fabrication requirements of SMACNA Architectural Sheet Metal Manual, and to installation details of NRCA Roofing and Waterproofing Manual.

B. Prefabricate units as indicated, or provide standard manufactured units complying with requirements and fabricated from sheet metal, galvanized steel where concealed, aluminum where exposed, unless indicated otherwise.

C. Provide 4" wide flanges for setting on BUR membrane with concealment by composition stripping.

D. Fabricate work with flat-lock soldered joints and seams; except where joint movement is necessary provide 1" deep interlocking hooked flanges, filled with mastic sealant.

PART 3 - EXECUTION

3.1 REMOVAL

A. Cut existing roofing and insulation neatly at required locations. Remove back far enough to permit subsequent roof deck opening and new construction work to be performed. Where necessary, scrape deck to remove adhered insulation, adhesive, bitumen, and foreign matter.

B. Stop insulation removal at edges of existing units. Do not allow small pieces of insulation to remain. Cut roofing membrane at not less than 6" back from edge of remaining roof insulation.

C. Remove aggregate (where applicable) carefully from membrane surface far enough back to permit required lapping of felts.

3.2 EXAMINATION OF SUBSTRATE

A. Examine substrate surfaces to receive built-up roofing system and associated work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

B. Verify that conditions, flatness and fastening of metal roof decks are suitable for making roofing system repairs. Report any deck corrosion, concavity or convexity, looseness of deck units or other improper conditions, so that corrective action may be determined.

C. Make sure that required wood blocking and nailers are in place. Coordinate this work with their installation.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Workmanship: Materials shall be securely installed in a watertight, neat and workmanlike manner. Workers shall be thoroughly experienced in the particular class of work upon which employed. Work shall conform to manufacturer's specifications and to requirements specified herein. Each substrate surface shall be clean and dry before subsequent work is started.

B. Equipment: Locate heating kettles and pumping equipment on the ground at a safe distance from buildings. Kettles will not be permitted on the roof. Guard against fires and provide suitable fire extinguisher conveniently located at the site. Competent operators of kettles and pumping equipment shall be in attendance at all times such equipment is in use. Materials shall be so located and dispersed as to prevent fire hazard. Equip kettles with thermometers to provide a continuous check on temperature of materials.

C. Protection: Use tarpaulins or other approved means to protect adjacent work from spillage or dropping of roofing materials. Take care to prevent bitumen from running into and clogging drains and conductors. Provide and maintain temporary wood runways, where required to protect roofing from damage due to concentrated loads or traffic during construction.

D. Phased application is strictly prohibited. Coordinate the installation of insulation and felts so that no areas are exposed to precipitation nor exposed overnight. Glaze coat installed ply-sheet courses at end of each day's work where final surfacing has not been installed.

E. Heating Asphalt:

1. Heat and apply asphalt in accordance with equiviscous temperature (EVT) method as recommended by NRCA. Do not raise temperature above minimum normal fluid-holding temperature necessary to attain EVT (+25ºF at point of application) more than one hour before time of application. Discard bitumen which has been held at temperature exceeding finished blowing temperature (FBT) for a period exceeding 3 hours.

2. Determine FP, FBT, and EVT of bitumen, either by information from bitumen producer or by suitable tests. Determine maximum fire-safe handling temperature and do not exceed that temperature in heating asphalt. In any case, do not heat asphalt to a temperature more than 25ºF below FP.

3. For aggregate-surfaced pour coats of bitumen, limit application temperature to minimum required for proper embedment of aggregate and maximum which will permit retention of required coating weight.

4. Keep kettle lid closed except when adding asphalt.

F. Bitumen Mopping Weights: For interply mopping and for other moppings, apply asphalt at rate of 25 lb (+/-25% on a total-job average basis) per roof square (100 sq. ft.) between plies.

G. Substrate Joint Penetrations: Do not allow asphalt to penetrate substrate joints and enter building or damage insulation or other construction. Where mopping is applied directly to a substrate, tape joint or, in the case of steep asphalt, hold mopping back 2" from both sides of each joint.

H. Cutoffs: At end of each day's work, 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 asphalt; remove at beginning of next day's work.

3.4 INSTALLING INSULATION

A. General:

1. Comply with insulation manufacturer's instructions and recommendations for the handling, installation and bonding or anchorage of insulation to substrate, and with requirements specified herein.

2. Apply insulation units uniformly with all joints tightly butted. Cut insulation to fit neatly at openings and at terminations. Make sure all spaces are filled and no voids remain. Trim or discard any units with broken corners or similar defects.

3. Where practicable run long joints of insulation in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows.

B. Fastening insulation:

1. Wherever possible secure insulation to deck using mechanical fasteners sized for attaching specific insulation to top surface of deck. Locate each fastener so it penetrates top surface of deck. Fasten insulation over entire area of roofing at spacing as required by FM for Windstorm Resistance Classification I-90.

2. For small areas or inaccessible locations, insulation may be secured to deck with hot asphalt applied in ribbons on top surface of deck at rate recommended by insulation manufacturer.

3. Where overall insulation thickness is 2" or greater, install required thickness in two layers with joints of second layer staggered from joints of first layer a minimum of 12" each direction. Install second layer in full mopping of hot Type III asphalt, applied within temperature range of EVT +/-25ºF and at rate of 25-lb./100 sq. ft. (+/-25% on total-job basis).

C. Protecting plastic foam insulation: Above plastic foam insulation, provide permeable medium which will dissipate any moisture buildup and avoid blistering, per NRCA recommendations.

D. Tapered units: Construct sloped areas using multiple layers of tapered insulation units in accordance with approved shop drawings. Completed surface shall meet plane of main insulation in single line at each juncture.

E. Cants: Install cant strips at junctures of BUR membrane with vertical surfaces by embedding in hot asphalt.

3.5 INSTALLING FOR MEMBRANE

A. Inter-ply sheets:

1. For each repair area, provide the number and type of ply sheet (felts) to match existing membrane, lapped (shingled) as required to form a continuous, uniform membrane with bitumen mopping between sheets so that ply sheet does not touch ply sheet. At juncture with existing membrane, lap each successive felt over the juncture by the amount recommended by manufacturer.

2. Mop base of membrane directly to insulation. Broom or press each sheet into hot bitumen. Lay felts without wrinkles, buckles or kinks.

3. Finish roofing system shall be free form blisters or pockets which restrict water flow. Glaze-coat top of ply-sheet membrane with 10 lb. mopping of same bitumen, integrally with operation of laying up membrane.

B. Edges and penetrations:

1. Extend BUR membrane to 2" (nominal) above top edge of cant strip and terminate.

2. Provide a folded-back envelope at penetrations of BUR membrane where it is not turned up on a tapered strip, so as to provide positive protection against flow of bitumen into building. Extend base sheet to form envelope or, where no base sheet is provided, install one ply of coated felt set in steep asphalt with joints sealed. Seal corners and other interruptions of envelope with large beads of roofing cement to provide positive protection against flow of bitumen.

3. Nail edges of roofing membrane to wood blocking at openings and perimeter edges of roof. Space nails at maximum 8" o.c.

C. Nailing: Comply with governing regulations, insurance requirements, roofing manufacturer's recommendations, and recognized industry standards. On non-nailable substrates, nail membrane to each nailer in substrate. Conceal nailing within ply-sheet makeup of roofing membrane, with no exposed nails before roof coatings or aggregate surfacing are applied.

D. Set-on Accessories: Where small roof accessories are set in BUR 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.

E. Composition flashing and stripping:

1. Provide composition flashing at cant strips and other sloping and vertical surfaces, and at penetrations through roof. Provide one ply of No. 15 asphalt-impregnated glass fabric and one ply of glass fiber reinforced flashing, each set in a continuous coating of roofing cement and extended onto deck 6" and 4", respectively. Nail or provide other forms of mechanical anchorage of composition flashing to vertical surfaces, as recommended by manufacturer of primary roofing materials. Except where concealed by elastic flashing, apply a heavy coating of roofing cement over composition flashing.

2. Provide composition stripping where metal flanges are set on roofing. Provide not less than one ply of glass-fiber fabric and coating of roofing cement and extended onto the deck 6" and 4", respectively. Except where concealed by aggregate surfacing or elastic flashing, apply a heavy coating of roofing cement over composition stripping.

F. Counter flashings and accessories: Counter flashings, cap flashings, and miscellaneous sheet metal accessories to be coordinated with BUR work, are specified in other Sections of these specifications. Allow for expansion of running metal flashing and edge trim which adjoins roofing. Do not seal or bond BUR membrane or composition flashing and stripping to metal flanges over 3'-0" in length.

G. Aggregate surfacing: Promptly after completion of BUR membrane, edge treatment and set-on accessories in each substantial area of roofing, flood-coat surface with 60 lb per square of Type I or Type II asphalt. While each small area is hot and fluid, embed 300 lb of slag or 400 lb of gravel or crushed stone, per square, spread uniformly.

H. Roof walkways: Provide walkway protection boards at locations shown or required, using units of manufacturer's standard size, 1/2" thick. Set units in additional pour coat of hot bitumen after aggregate surfacing of BUR membrane. Allow space between units to assure that drainage is not impeded.

3.6 PROTECTION OF ROOFING

A. Upon completion of new areas of roofing, Installer shall advise Contractor of recommended procedures for surveillance and protection of roofing during remainder of construction period. At end of construction period, or at a time when remaining construction work will affect or endanger roofing (at Contractor's option), Installer shall make a final inspection of new roofing areas and prepare as written report describing nature and extent of deterioration or damage found in the work.

B. Installer shall restore new areas which are found to be deteriorated or defective at time of final inspection. Repair or replace the roofing and associated work to a condition free of damage and deterioration at time of substantial completion.

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