



# BASALT REGIONAL LIBRARY ROOFING REPLACEMENT PROJECT MANUAL

14 Midland Avenue  
Basalt, Colorado 81621



September 22, 2023  
***Project Record***  
WJE No. 2022.7310.0

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**END OF SECTION**

**SECTION 00 70 00**  
**CONTRACTOR WARRANTIES**

**PART 1 GENERAL**

- A. Furnish Owner with written warranty for period of two (2) years from date of Notice of Final Completion that all work is in accord with the Contract Documents and without defects in labor or materials. If repairs or changes are required in connection with the warranted Work within the warranty period, the Contractor shall, promptly upon receipt of notice from the Owner and without expense to the Owner, comply with the following:
  - 1. Place in satisfactory condition in every particular, all of such warranted Work and correct all defects therein.
  - 2. Make good all damage to the building or site, which is the result of the condition needing said repairs and changes.
  - 3. Make good any Work disturbed or new work created in fulfilling any such warranty.
- B. If repairs are required in connection with warranted Work within warranty period and notice thereof is given within such period, the warranty shall continue as to Work requiring repair until the repairs required are completed, and the termination of the warranty period shall not apply thereto.
- C. Corrections of defects, imperfections, and faults shall not relieve the Contractor from his responsibility for additional corrective work during the remaining time period of the warranty.
- D. No provision in the Contract Documents nor any special or general warranty shall be held to limit, as to time or scope of liability, the Contractor's liability for defects, or the liability of his sureties, to less than the legal limit of liability under laws having jurisdiction.
- E. The Contractor will not be held responsible for defects due to misuse, negligence, willful damage, improper maintenance, or accident caused by others.
- F. The delivery of any warranties shall not relieve the Contractor from any obligation assumed under any other provision of the Contract Documents.
- G. The obligations of the Contractor under this Section shall survive termination of the Contract.

**END OF SECTION**

**SECTION 01 11 00****SUMMARY OF WORK****PART 1 GENERAL****1.1 WORK COVERED BY CONTRACT DOCUMENTS**

- A. The intent of this Section is to generally summarize the nature and extent of work to be performed without in any way limiting the specific requirements of the Contract Documents. The Contractor shall provide all labor, material, supplies, equipment, services, facilities, and appurtenances which are indicated or reasonably implied by the Drawings, or as specified, or that are required for the work described in the Contract Documents.
- B. This contract provides for the following roofing system replacement:
- C. Demolition:**
1. **At Roof Areas A, B, and C:** Temporarily remove photovoltaic panels and associated electrical system and store all materials in a controlled environment for reinstallation.
  2. **At Roof Areas A through F:** Remove and legally dispose of off-site (discard) the existing TPO roofing membrane and cover board. Salvage all existing polyiso insulation.
    - a. Remove and discard existing sheet metal parapet copings, counter flashings, sheet metal scuppers, conductor heads, ladders and downspouts in all areas.
  3. **At Roof Area G:** No demolition, except temporary removal of flashings that will intersect with adjacent roof replacement.
  4. Temporarily move all gas piping and electrical conduit for access to existing roof, as needed.
- D. New Construction:**
1. If areas of wet/damaged insulation are found, contractor to replace areas of wet/damaged polyiso insulation, thickness to match the existing and slope to match in-kind.
  2. Contract to have HVAC sub-contractor to lift and reset mechanical units for the installation of the new TPO roofing system. Roofing contractor shall coordinate work with Owner so facilities remain operational.
  3. **At Roof Area A through F:** Furnish and install a new adhered 80-mil TPO roofing system at the specified roof area, consisting of:

- a. Remaining polyisocyanurate insulation mechanically fastened through all layers of insulation down to roof deck, one layer of 1/2 inch thick gypsum cover board adhered in low-rise foam adhesive, and one layer of adhered 80-mil TPO (color – white).
4. **Add Alternate at Roof A and B:** At the steep-sloped section of A and B, install a new double locked standing seam coated metal roof system that is similar to existing Roof Area G. New standing seam roof will include high temperature underlayment, eave and rake flashing, and transition to TPO roof system. Existing PV system will be secured to stand seams utilizing PV clamps.
5. TPO membrane shall come with the manufacturer’s protective film (Carlisle Apeel or similar) and 6-inch cover tape to achieve 100% coverage of the TPO surface and to guard the surface of the TPO from scuffs and dirt throughout the duration of the work. Protective film shall be removed at the completion of the work.
6. Furnish and install new tapered insulation crickets to direct water towards scuppers. Install insulation crickets at all roof curbs wider than 24 inches (upslope side of curb) and at other locations as necessary to create positive drainage.
7. Install sheet metal copings, flashings, counterflashings, ladders, etc.
8. Install photovoltaic system.
9. Install new heat tape at locations identified on Drawings.
10. TPO Manufacturer’s Warranty:
  - a. Manufacturer’s no dollar limit (NDL) warranty: 20 years from the date of substantial completion (re: specifications). Manufacturer’s warranty shall include a wind speed rider of 80 mph.
11. Contractor’s Warranty: 2 years from the date of substantial completion for both roofing systems (re: specifications).
12. Mockup: At locations designated by WJE and as indicated on the drawings, the contractor shall perform mock-ups to demonstrate aesthetic affects and quality of materials and execution. Leave portions of work unfinished for observation by WJE. Contractor shall provide WJE 48-hour notice prior to execution of mock-up.
  - a. If WJE determines mock-up does not comply with requirements, modify mock-up or construct new mock-up until mock-up is approved. Do not proceed with work until mock-up is approved.
  - b. Approved mock-up will be acceptance of standard for remainder of work.

- c. Approved mock-up may become part of completed work if undisturbed at time of substantial completion.

**END OF SECTION**



**SECTION 01 21 00**  
**ALTERNATES AND ALLOWANCES**

**PART 1 GENERAL**

**1.1 REFERENCES**

- A. FM Global Class I

**1.2 ALTERNATES**

- A. Alternate Bid prices for items listed below include all work indicated in the Drawings and Specifications for the scope of work indicated.
- B. Alternate No. 1**
1. Replacing skylight flat acrylic glazing with new domed acrylic glazing.
  2. Added price for 80-mil TPO in-lieu of 60-mil TPO at all roof areas.
  3. Replacing all metal flashing and counterflashing that interfaces with TPO replacement.

**1.3 UNIT PRICES**

- A. Unit prices for items listed under allowances shall be additive and deductive, and applied first against the allowances where such items are applicable. Where such allowances are not used up, the Owner will be credited for the unused portion of the allowances at the unit prices listed on the Contractor's Proposal Form. The Contractor will receive no compensation for unit priced items until the allowances have first been used up.
- B. WOOD NAILERS**
1. Unit prices for treated kiln dried (KD) wood nailers shall assume the cost of replacing wood nailers with new nailer if deterioration is uncovered. Per linear foot.
- C. POLYISO INSULATION**
1. The unit price for 4 x 8 piece of polyiso insulation and like type thickness replacement. Per square foot.
- D. COPPER METAL FLASHING**
1. Unit price for replacing copper metal flashing and counterflashing. Per linear foot.

**1.4 TABLE OF ALLOWANCES**

- A. Use the Table of Allowances for this project and include the cost of such in the Base Proposal and each Alternate.

**PART 2 PRODUCTS**

**2.1 NOT USED.**

**PART 3 EXECUTION**

**3.1 NOT USED.**

## TABLE OF ALLOWANCES AND WORKSHEET - SECTION 01 21 00

Contractor shall use this Table of Allowances to calculate the Unit Priced Allowance included in their proposal and later to calculate the cost adjustments for actual quantities used versus the quantities identified in the Construction Documents.

Description	Polyiso Insulation  Square Foot	2X Wood Nailer/Blocking  Linear Foot	Copper Metal Flashing  Linear Foot
<b>(1) Total Allowances</b>			
<b>(2) Times (x) Unit Price on Proposal Form</b>			
<b>(3) Total Allowance Cost</b>			
<b>(4) Actual Quantities Used</b>			
<b>(5) Times (x) Unit Price on Proposal Form</b>			
<b>(6) Total Actual Cost</b>			
<b>(7) Balance or Credit to Owner, Line (3) – Line (6)</b>			

**END OF SECTION**

## **SECTION 01 43 00**

### **MOCKUPS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. The first type of each unique installation will be considered a mockup. Location of mockups shall be coordinated between Contractor and Architect/Engineer. The purpose of these individual mockups is to provide the Contractor, Owner's Representative and Architect/Engineer with a unified understanding of the type, quality, and finished appearance of Work that will satisfy the requirements of the Project.
- B. All Work must be performed with tools similar to those that will be used on the remainder of the Project.
- C. If in the course of erecting and reviewing the mock-up, changes are required to satisfy the Project requirements or existing conditions, such changes shall be observed and documented by Architect/Engineer. Such documented changes will be additional technical requirements of the Project.
- D. When completed and approved by the Architect/Engineer and Owner's Representative, the mock-ups shall become the standard of quality for the remainder of the Project. All concealed portions of the mock-ups may be inspected by the Architect/Engineer and, if approved, photographed for future reference. The completed mockup areas may become part of the finished repair of the building.

##### **1.2 QUALITY ASSURANCE**

- A. All portions of each section of the specifications are to be followed for each item or procedure utilized in the construction of the mockups.

**END OF SECTION**

## **SECTION 01 50 00**

### **TEMPORARY FACILITIES AND CONTROLS**

#### **1.1 TEMPORARY CONSTRUCTION UTILITIES**

- A. The Owner will provide and pay for necessary electrical power and water used on site during the course of construction. The Contractor shall be responsible for providing temporary facilities required to deliver such utility services from their existing location on the site to point of intended use. Contractor shall verify characteristics of power available. Where power is not currently available or where power of different voltage, phase or current is required, Contractor shall be fully responsible for providing such service and shall pay all costs required therefore.

#### **1.2 TEMPORARY FIRE PROTECTION**

- A. Portable equipment, extinguishers and general fire protection required by the Contractor shall be furnished by the Contractor. Contractor shall comply with the job-site fire regulations that are issued by the fire protection agency having jurisdiction. Contractor may be subject to periodic fire protection inspections and any deficiency or unsafe condition shall be corrected by the Contractor to the satisfaction of the Owner.

#### **1.3 SANITARY FACILITIES**

- A. The Contractor shall provide, pay for, install and maintain for the duration of the work, necessary toilet and sanitary facilities for workmen. Such facilities shall be kept in a clean and sanitary condition and shall conform to applicable codes and regulations governing such facilities. Sanitary facilities in the buildings shall not be used by the Contractor.

#### **1.4 REMOVAL OF EXISTING MATERIALS**

- A. In the removal of roofing, membrane materials, flashings and related roofing materials, no area of removal shall be greater than the area which can have a watertight surface installed during the same working day. The Contractor shall furnish all closures, tents and other means necessary to protect the building from damage from inclement weather.

#### **1.5 PROJECT SIGNS**

- A. Project and Contractor signs are not permitted unless approved by Owner.

### **PART 2**

#### **2.1 SAFETY AND SECURITY**

- A. Precaution shall be exercised at all times for the protection of persons (including employees) and property. The safety provisions of applicable laws, building and construction codes shall be observed. Machinery, equipment, and all hazards shall be guarded or eliminated in accord with recommended safety provisions established by the Associated General Contractors of America, to the extent that such provisions are not in contravention of applicable law. The Contractor shall protect hazards with adequately constructed guard rails and/or barricades and shall provide lanterns, warning lights, and the like, as necessary. The Contractor shall eliminate attractive nuisances from the work and from the site. To this end, he shall so dispose, store, guard, and

protect the premises and all work, materials, equipment and both permanent and temporary construction as to preclude the unauthorized use thereof by children or others and, particularly, to eliminate possible consequent injury to unauthorized persons.

- B. The Owner or Consultant will not be responsible, under any circumstances, for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the work, nor shall the Owner or Consultant be responsible for Contractor's failure to employ proper safety procedures.

## **2.2 SCAFFOLDING AND HOISTS**

- A. Contractor shall furnish, maintain, and be responsible for hoists, staging, rigging, scaffolding, and runways required in the prosecution of the Work under this Contract. Such temporary work shall be erected, equipped and maintained in accord with statutes, laws, ordinances, rules or regulations of the State or other authorities and insurance companies having jurisdiction.

## **2.3 ACCESS AND CONTRACTOR USE OF PREMISES**

- A. Contractor shall have access to the site at staging areas selected and approved by the Owner.
- B. Access to the interior of the building by the Contractor, including material suppliers and employees, is expressly prohibited, except as specifically authorized, scheduled and supervised by the Owner on a daily basis.
- C. Work hours are limited to those stipulated by the local jurisdiction. Generally, 8:00 A.M. to 5:00 P.M. Monday through Friday, excluding legal holidays. Additional work hours or time may be arranged if approved by the Owner.
- D. Control work activities and sequences to accommodate Owner use of property.
- E. Contractor shall purchase parking permits from parking and transportation services (970-491-7041, 1508 Center Avenue in Fort Collins, Colorado) for all vehicles during construction. Provide adequate signage that reads "Construction Parking" at all parking spaces rented during construction.

## **2.4 MAINTENANCE OF EXITWAYS**

- A. Contractor shall provide safe access to building at all times. Maintain all exitways clear and free of debris or obstructions at all times.

## **2.5 CONSTRUCTION DUST AND NOISE**

- A. Contractor shall note that the building will remain in continuous operation and use during the entire construction period. He shall take all reasonable precautions to eliminate dust and unsightly conditions, to minimize noise related to construction operations, and to minimize disruption and inconvenience to users of the building.

## **2.6 PROTECTION OF BUILDING AND GROUNDS**

- A. All building surfaces interior and exterior, walkways, curbs and paving, landscaping, trees, shrubs and other plantings within project area and adjacent thereto shall be protected from damage due to construction operations. Damaged items shall be restored or replaced to Owner's satisfaction.

## **2.7 MATERIAL STORAGE**

- A. Contractor shall store materials in a defined, secured area on site. Storage area shall be coordinated with the owner.

## **2.8 EXISTING DRAINAGE AND UTILITY LINES**

- A. The Contractor shall maintain in operation, at his expense, for the duration of Contract, all drainage and utility lines within working areas.
- B. Contractor shall notify City's project manager of all plans to move, or disrupt service of utilities or equipment.
- C. All connections to or modifications of utility lines and cameras shall be made and maintained in such manner as to not interfere with the continuing use of same by the Owner or others during the entire progress of the Work.
- D. Contractor shall verify that all drains in or adjacent to work areas are open and flowing freely prior to the start of the work (including stocking the job). Any plugged drains and damage caused by them will be the sole responsibility of the Contractor.
- E. Contractor shall verify that all utility lines, cameras, and equipment are functional and acceptable to the City at the completion of the project. All cost for this work is the Contractor's responsibility.

## **2.9 ROOFING CONSTRUCTION CONTROLS**

- A. All staging and setup areas shall be enclosed with 6 foot high chain link fencing and weighted with sandbags. Chain link fencing shall be locked when the Contractor is not on-site.
- B. Smoking, tobacco use of any kind, and illegal drug use, are prohibited on the premises.
- C. Workmen shall wear a shirt at all times.
- D. Workmen shall refrain from using rude comments or whistles at passersby.
- E. Building permit shall be posted.
- F. There shall be a full height tarp on building at all staging areas.
- G. All debris shall be removed via crane or full height tear-off chute (no debris shall be thrown over side of building).
- H. A spotter shall be used whenever a vehicle is moved on the property.

**END OF SECTION**

## **SECTION 01 74 00**

### **CLEANING UP**

#### **1.1 GENERAL**

- A. The Contractor shall, at all times during the course of this Contract, keep the building, the Owner's premises, and the adjoining premises, including streets and other areas assigned to, or used by, the Contractor, free from accumulations of waste materials and rubbish caused by his employees or Work, or by the employees or Work of his Subcontractors. All waste materials and debris shall be legally and safely disposed of off the Owner's property.

#### **1.2 CLEANING MATERIALS**

- A. The Contractor shall be fully responsible for any damage to any surface or substrate caused by the improper use of cleaning techniques or materials.

#### **1.3 EXECUTION**

- A. Final Cleaning: At completion of the Work, and prior thereto if so required by job-site conditions, remove from the premises, tools, appliances, surplus materials, debris, and temporary construction. Remove marks, stains and soil from building surfaces when such have resulted from work under this Contract.
- B. If the Contractor, upon request by the Owner, does not attend to cleaning with reasonable promptness, the Owner may cause such cleaning to be done by others and charge the cost of same to the Contractor or deduct the said cost from payments still due the Contractor under the Contract.

**END OF SECTION**



## **SECTION 02 41 20**

### **ROOF TEAR-OFF AND DECK PREPARATION**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Applicable Deck and Substrate Type - The Work covered under this Specification Section applies to all roof decks encountered within the scope of work of this project.
  - 1. Protection of work to remain
  - 2. Removal of certain building components
  - 3. Preparation of substrate for roof application

##### **1.2 REFERENCES**

- A. Perform all Work in accordance with the building code of the governing body having jurisdiction, the governing State Industrial Safety Orders, and the requirements of the Occupational Safety and Health Administration.
- B. U.S. Product Standard
  - 1. USPS - PS 1
- C. American Plywood Association (APA)
  - 1. APA PRP-108 Performance Standards

##### **1.3 PROJECT/SITE CONDITIONS**

- A. Be responsible for stability and safety of all existing structures on the site or on adjoining properties. Promptly repair or replace existing property damaged during this Work to the original state at no extra cost to the Owner.

##### **1.4 SCHEDULING**

- A. Provide a construction progress schedule to the Architect/Engineer in advance of starting construction work. Verify that occupants of building are notified at least twenty-four (24) hours prior to commencing work on the building.
- B. Confer with the Owner through Architect/Engineer regarding the sequencing and phasing of the performance of various parts of the Work. Cooperate fully and if necessary, so that certain facilities and services will be maintained in operation until immediately before their removal is required to permit installation of new work.
- C. Submit proposed methods and operations of partial roof demolition to Architect/Engineer for review prior to start of Work.
- D. Ensure through protection and good rooftop management practices that traffic and loads imposed on the roof are such that the deck will not be crushed, broken, pulverized, or otherwise damaged in such a manner as to render it unsuitable to receive the roofing system. Any such damage performed by the Contractor, his employees, or subcontractors, shall be repaired in a manner acceptable to the Architect/Engineer.

## **1.5 SUBMITTALS**

- A. Shop Drawings - Provide project-specific shop drawings of all project materials. Submittals shall be submitted as one package on the approved submittal forms found in these project documents. Submittals will not be reviewed if the submittal package is not complete.

## **PART 2 PRODUCTS**

### **2.1 COVER BOARD REPAIR MATERIALS**

- A. Gypsum Cover Board – Refer to 07 54 23 Single-Ply Membrane Roofing.

## **PART 3 EXECUTION**

### **3.1 FIELD CONDITIONS**

- A. Verify drawing dimensions with actual field conditions. Inspect related work and adjacent surfaces. Report to the Architect/Engineer all conditions that prevent proper execution of this Work.
- B. Prior to performing Work, inspect all objects designated for removal and protect the limits of demolition. Verify with the Architect/Engineer.
- C. Locate all active utility lines and provide for their protection. Leave them in operating condition.

### **3.2 PROTECTION**

- A. Lowering material - Provide hoists and enclosed chutes as required to lower removed material. Throwing, dropping, or permitting the free fall of material and debris from heights that would cause damage to Work, or to plantings, or cause undue noise or nuisance, or excessive dust, is expressly prohibited.
- B. Work to remain - Provide protection as may be necessary to prevent damage to existing equipment.
- C. Existing roofing - Protect the existing roof whether scheduled for removal and replacement or not with plywood runways over all equipment or foot traffic areas.
- D. Existing decking - During the tear-off and demolition operation, the existing deck is to be protected from storage, abuse, impact, or excessive traffic which might tend to damage the decking. Any decking damaged in any of the foregoing ways shall be replaced with matching decking in accordance with the manufacturer's original installation specifications.

### **3.3 TEAR-OFF AND DEMOLITION WORK**

- A. Workmanship - Have indicated items removed by skilled and properly equipped workers. Have materials and equipment to be salvaged removed under the direction of or by the crafts persons who would normally install these items.
- B. Limited Daily Tear off - The Contractor shall tear off only as much roofing daily as can be replaced securely and completed the same day, or before the onset of inclement weather. All work

shall be fully completed daily except for flashing and trim work. However, all work shall be completely weather tight to be free from leaks or water infiltration at the end of each workday.

- C. Cut Roof into Sections - Using a power roof cutter, cut the roof and insulation into squares no larger than 36 inches by 36 inches for ease of handling. Set the roof cutter blade so that it will cut through the roof and well into the insulation, but not so deep as to touch the deck itself. No chopping or hammering with an ax or other impact tools or devices is permitted.
- D. Operation - Upon tearing roof off, remove all tear-off debris from the roof into containers and dumpsters immediately. Do not store on the roof. Do not concentrate tear-off debris in any area that may overload the structure. Use no equipment or machinery that imposes excessive loads, deflections on the deck, or damages to the surface of the deck. Dispose of all debris in a legally licensed landfill.
- E. Wet and/or Rotted Decks - Notify Architect/Engineer if deck is found to be wet and/or rotted.

### **3.4 DECK PREPARATION FOR ROOFING**

- A. Clean Deck - Clean the deck thoroughly and remove any nails or fasteners which protrude. Do not bend over or hammer down protruding screws or fasteners. Chip off rough spots that may impede adhesion of the roof insulation, or wood nailer installation.
- B. Dead or Unused Penetrations - Close all equipment or pipe penetration holes as shown in the Drawings or as otherwise directed by the Architect/Engineer. Ensure that the holes are closed in such a manner as to preclude leakage of primer or hot bitumen through the hole.
- C. Wood Decks – Repair holes larger than 12 inches in diameter in the existing wood deck using deck materials to match the existing unless other wise noted herein.
  - 1. New deck repair material must span three joists. Holes small than 12-inches are to be repaired with 20-gauge galvanized iron flat sheet, securely fastened to the wood deck 4-inches on-center, minimum 2 fasteners per side.
  - 2. Installation – Install with the long dimension or strength axis of the panel across supports, except where noted, and with panel continuous over two or more spans. Suitable edge support shall be provided where indicated on the Drawings or in recommendations of the American Plywood Association by use of panel clips, tongue-and-groove edges, or lumber blocking between joists. Panel end joints shall occur over framing. Allow 1/8-inch-spacing at panel ends and edges, unless otherwise recommended by the panel manufacturer. Nail 6-inches on-center along supported panel edges and 12 inches on-center at intermediate supports, except that when supports are spaced 48 inches on-center or more, space nails at 6 inches on-center at all supports. Use 6d common nails for panels ½-inch and less and 8d nails for greater thickness, except that when panels are 1-1/8 inches, use 8d ring shank or 10d common nails.

**END OF SECTION**

**SECTION 06 10 00**  
**ROUGH CARPENTRY**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. This Section covers all wood blocking, curbs, nailers, and edges carpentry work as may be required for roofing work to comply with the Drawings and industry standards.
- B. Section Includes:
  - 1. Replacement of damaged or rotten wood nailers, blocking, or equipment curbs.
  - 2. Nailers, blocking, and equipment curbs to raise flashing heights to industry standards, or to meet FM Global requirements for compliance with FM Global Bulletin 1-49, ANSI/SPRI ES-1, and the Drawings. Fastening requirements shall comply with the most stringent standard applicable to the geographical area.
  - 3. Addition of new nailers, blocking, or equipment curbs to accommodate increased heights corresponding with added roof insulation thickness above that existing prior to work under these documents.
  - 4. Lumber and plywood shall not be treated and shall be kiln dried. Lumber and plywood may be fire-treated, if required by local building codes.
- C. Related Sections
  - 1. 07 20 00 Roof Insulation
  - 2. 07 54 23 Thermoplastic-Polyolefin (TPO) Roofing
  - 3. 07 62 00 Sheet Metal Flashing and Trim

**1.2 REFERENCES**

- A. General
  - 1. All standards current edition as of the date of this Specification.
- B. American Plywood Association (APA)
  - 1. APA PRP-108 Performance Standards
- C. American Society of Testing Materials (ASTM)
- D. American Soft Wood and Lumber
  - 1. Standard PS 20
- E. FM Global
  - 1. FM Global Bulletin 1-49
- F. National Roofing Contractors Association (NRCA)
  - 1. NRCA Roofing and Waterproofing Manual, 5th Edition, published in 2001
- G. U.S. Products
  - 1. U.S. Products Standards PS 1

### 1.3 QUALITY ASSURANCE

- A. For each use, comply with the American Soft Wood and Lumber Standard PS 20 by the United States Department of Commerce. Nominal sizes are shown or specified; provide actual sizes complying with the minimum size requirements of PS 20 for the moisture content specified for each use.
- B. Grading rules and trademarks
  - 1. Southern Pine Inspection Bureau - SPIB
  - 2. Western Wood Products Association - WWPA
  - 3. American Plywood Association - APA
  - 4. American Wood Preservers Institute - AWPI
  - 5. American Lumber Standards Committee
  - 6. United States Products Standards (PS 1)
  - 7. National Forest Products Association (NFPA) – National Design Specification for Wood Construction
- C. Local Building Codes - All applicable provisions. This includes, but is not limited to, compliance the International Building Code, the applicable Codes for the municipal jurisdiction, Underwriters Laboratory U.L.-90 and ANSI/SPRI ES-1 - whichever is more stringent. Whenever a particular attachment methodology is to be employed for fastening wood blocking or nailers to structural elements of the building, the standards, methodology, gauges, thickness, and frequency of attachment shall be as specified in FM Global Bulletin 1-49, or its successor document.

### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated, include material descriptions, and dimensions of individual components and profiles.
- B. Photograph plywood grade stamp (or allow A/E to observe on site).

### 1.5 MARKINGS AND LABELS

- A. All wood products shall be clean and free of all surface deposits.
- B. Each piece shall be indelibly ink stamped with the Quality Mark of an approved independent third party inspection agency having a follow-up testing and inspection service at the plant over the quality of the product, and whose service is certified by an approved overview agency such as SPIB or TPI.
- C. Quality Mark Stamp shall include the following in a legible format:
  - 1. Logo of the overview agency
  - 2. Logo of the inspection agency, the quality standard
  - 3. The initials KD (Kiln Dried)
- D. All lumber products specified for structural uses shall bear an indelible ink stamp, signifying that the lumber has been marked by, or under the supervision of, an inspection agency certified by the ALSC and conforms to the requirements of the applicable grading rules.
- E. All plywood products specified shall bear an indelible ink stamp indicating conformance to a plywood grade description contained in the current issue of U.S. Products Standards PS 1.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Wood products that are to be painted or required to be kiln dried shall be stored off the ground and under cover at the job site and protected from the weather until used.
  - 1. Keep lumber and plywood dry.

## 1.7 COORDINATION

- A. All wood products shall be kiln dried (KD) to a maximum moisture content of 19 percent for lumber and 18 percent for plywood.
- B. The Engineer has designated all structural uses for treated wood products based on the applicable species and grade in accordance with the National Design Specification for Wood Construction of NFPA, and the Plywood Design specification of APA. Use only the species and grade specified for each use application.

## PART 2 PRODUCTS

### 2.1 DIMENSIONAL LUMBER

- A. New framing/blocking shall be 2x framing lumber, air or kiln dried (KD15 or MC15), S4S, well seasoned "No. 1 Grade", Hem-Fir with a minimum FB (Bending Fiber Stress) of 975 psi, and "E" (Modulus of Elasticity) of 1,500,000 psi, sizes as shown in the drawings, or as required for construction and in compliance w/ FM Global where required.

### 2.2 PLYWOOD - ALL PLYWOOD SHALL MEET THE FOLLOWING REQUIREMENTS:

- A. Each construction and industrial panel shall be identified with the appropriate trademark of the APA, and shall meet the requirements of the latest edition of U.S. Product Standard PS 1 or APA PRP-108 Performance Standards.
- B. All panels which have any edge or surface permanently exposed to the weather shall be classed "Exterior."
- C. Panel thickness, grade, and Group Number of Span Rating shall be at least equal to that shown on the Drawings. Application shall be in accordance with the recommendations of the APA.
- D. Plywood used on the roof shall bear the following designation "APA C-C PLUGGED, EXPOSURE DURABILITY CLASSIFICATION: Exterior." Note that this is not "Exposure 1" or "CDX." Do not use preservative treated plywood.
- E. Plywood permanently exposed to weather shall be classed "Exterior." Install with the long dimension or strength axis of the panel across supports, except where noted, and with panel continuous over two or more spans. Suitable edge support shall be provided where indicated on the Drawings or in recommendations of the APA by use of panel clips, tongue-and-groove edges, or lumber blocking between joists. Panel end joints shall occur over framing. Allow 1/8-inch spacing at panel ends and edges, unless otherwise recommended by the panel manufacturer. Nail 6 inches on-center along supported panel edges and 12 inches on-center at intermediate supports, except that when supports are spaced 48 inches on-center or more, space nails at 6 inches on-center at all supports. Use 6d common nails for panels 1/2 inch and less and

8d nails for greater thickness, except that when panels are 1-1/8 inches, use 8d ringshank or 10d common nails.

## 2.3 FASTENERS

- A. For Attachment of Lumber, or Plywood to Wood Members - Use Type 316 stainless steel, flat head, torx drive, Deck-Drive DWP Wood SS Screws, with countersinking nibs, available from Simpson Strong-Tie. Length shall be 10 x 2", minimum, or as required to penetrate into blocking member at least 1-1/2 inches.
- B. For Attachment of Lumber or Plywood to Concrete and Masonry - Use flat-head, hot-dipped galvanized or polymer acrylic coated double threaded masonry screws as manufactured by Buildex, OMG, or equal. Holes are to be pre-drilled in masonry to a depth 1/2 inch deeper than the fastener is to penetrate.
- C. For Attachment of Unsupported Plywood Edges - Use H-clips at 16 inches on center at plywood edges unsupported by solid wood blocking.
- D. Refer to the Drawings and Section 07 62 00 for fasteners and requirement for roof edge securement. In the case of conflict, the fastening requirements shown in the Drawings will govern.

## PART 3 EXECUTION

### 3.1 FABRICATION AND INSTALLATION

- A. All wood members are to be fastened using screws as specified or as indicated in details.
- B. Where necessary, pre-drill holes to ensure no splitting of wooden members occurs. The use of self-drilling brass double concentric thread screws is permitted in lieu of pre-drilling.
- C. Screw guns and drills shall be calibrated and adjusted in such a way as to prevent over-drilling or stripping of holes or threads. Insert fasteners flush with surface or slightly recessed (not to exceed 1/8 inch). Do not over tighten metal-to-metal components such that fasteners strip, or on metal-to-wood such that the visible metal 'puckers' more than 1/64 inch.
- D. All wood nailers and fastener requirements including size, frequency, pattern, and gauge shall be installed in accordance with the details shown in the Factory Manual Loss Control Bulletin 1-49, ANSI/SPRI ES-1, or the National Roofing Contractors Association Roofing and Waterproofing Manual, whichever is most stringent.
- E. All nailers are to be installed straight and shimmed when necessary to ensure tight fit and finish. Contractor may reuse existing wood nailers where such nailers are not rotten or deteriorated and are in good repair. In such cases, however, nailers must be supplemented with additional blocking to raise nailing height to 1/4 inch below top of new insulation. Contractor shall rip lumber or otherwise add blocking so that blocking is 1/4 inch below height of insulation. "Step-ups" from insulation to nailers are not acceptable.
- F. When installing pieces in multiple components, end joints shall be staggered a minimum of 24 inches. All joints are to be staggered in such a way that a joint does not ever fall over a joint.

- G. Where necessary, pre-drill holes to ensure no splitting of members occurs. The use of self-drilling brass double concentric thread screws is permitted in lieu of pre-drilling.
- H. Fiber cants may be used at walls except where wood blocking is needed to support scuppers, vertical wood nailers, curbs, or other mechanical or equipment supports.
- I. All scupper openings shall be framed with a minimum 2 by 6 at the base, or otherwise framed in such a manner that the flange of the scupper rests on wood, not roof insulation. The wood blocking and wood cant shall extend for a distance of 12 inches on either side of the scupper outside opening.
- J. Unless otherwise noted on the Drawings, anchor wood blocking and nailers to structure at:
  - 1. 4 feet on center with ½-inch anchor bolts at CMU and concrete walls, except two feet on center for 8'-0" from outside building corners (or the dimension of the corner wind zone, whichever is greater).
  - 2. 4 feet on center with ½-inch through-bolts or ½-inch welded, threaded studs at steel angles or channels, except two feet on center for 8'-0" from outside building corners (or dimension of the corner wind zone, whichever is greater).
  - 3. 2 feet on center, staggered, with #10 screws to metal roof deck. Provide a 5/8-inch galvanized steel washer under screw heads where wood blocking is parallel to deck flutes.
- K. Level and Continuous Nailers – The Contractor is cautioned to ensure that during the installation of all wood blocking and continuously level and smooth elevation is provided to ensure a simplicity of installation.

**END OF SECTION**



**SECTION 07 20 00****ROOF INSULATION****PART 1 GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1-Specification sections, apply to work of this section.

**1.2 DESCRIPTION**

- A. Work Included: Work consists of furnishing all labor, materials and equipment necessary to effectively install the roof insulation as shown on the drawings, including, but not necessarily limited to, the following:
1. Self-adhered underlayment.
  2. Polyisocyanurate board type roof insulation.
  3. Preformed Polyisocyanurate tapered insulation crickets, saddles, and kick-backs.
  4. Impact resistant cover board.
  5. Wood blocking and plywood sheathing.
  6. Fasteners and contingent materials.
- B. Related Work Specified Elsewhere
1. Roof Tear-Off and Deck Preparation 02 41 20
  2. Sheet Metal Flashing and Trim: Section 07 62 00.
  3. Thermoplastic Polyolefin (TPO): Section 07 54 23.
  4. Roof Accessories: Section 07 72 00.
  5. Joint Sealants: 07 92 00.

**1.3 SYSTEM DESCRIPTION**

- A. Roof Area A-1:
1. Two layers of 2.6-inch thick polyisocyanurate insulation (5.2-inch in total), and ½-inch thick high-density (HD) polyisocyanurate cover board. The insulation system shall be in

compliance with the criteria of UL “Class A” and FM 1-90 (minimum), manufacturer’s requirements for attachment, and compatible with the TPO membrane system for guarantee by the manufacturer.

B. Roof Area A-2:

1. Self-adhered underlayment, two layers of 2.6-inch thick polyisocyanurate insulation (5.2-inch in total), and ½-inch thick high-density (HD) polyisocyanurate cover board. The insulation system shall be in compliance with the criteria of UL “Class A” and FM 1-90 (minimum), manufacturer’s requirements for attachment, and compatible with the TPO membrane system for guarantee by the manufacturer.

#### 1.4 QUALITY CONTROL

- A. Requirements of Regulatory Agencies: The Work under this section shall be subject to all applicable provisions of the state and local building and safety codes.
- B. Reference Standards: Except as modified by the Drawings and Specifications, the following documents, or applicable portions thereof, govern the work.
  1. National Roofing Contractors Association (NRCA) "Roofing and Waterproofing Manual - Fifth Edition."
  2. American National Standards Institute (ANSI)/Single Ply Roofing Industry (SPRI):
    - a. ANSI/SPRI FX-1: Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
  3. American Society of Civil Engineers (ASCE)/Structural Engineering Institute (SEI):
    - a. ASCE/SEI 7: Minimum Design Loads for Buildings and Other Structures.
  4. National Roofing Contractors Association (NRCA) "Roofing and Waterproofing Manual - Fifth Edition."
  5. NRCA “2019 Membrane Roof Systems.”
  6. Factory Mutual (FM) Global Standards
    - a. FM Global Property Loss Prevention Data Sheet 1-28 Wind Design.
    - b. FM Global Property Loss Prevention Data Sheet 1-34 Hail Damage.
    - c. FM Global Property Loss Prevention Data Sheet 1-49 Perimeter Flashing.
    - d. FM Global Roof Nav ([www.roofnav.com](http://www.roofnav.com)) Roof Assemblies.

C. Qualifications

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Roofing Replacement

1. Prior to the Notice of Award, the Contractor shall submit evidence that his existing company has five (5) years continuous successful experience in applying specific material(s) and is currently an approved applicator for the specific material manufacturer(s).
  2. Reference Section 07 54 23 for additional requirements.
- D. UL Listed Products - Provide insulation materials for roofing work which have been tested and listed by UL, and bear UL label on each package, or are shipped to the project with a UL certification of compliance.
- E. Fire and Insurance Ratings: Comply with ratings as required by governing authorities and codes, and comply with the following:
1. Underwriters Laboratories (UL) "Class A."
  2. Factory Mutual (FM) 1-90 minimum rating.
- F. Additional Performance Standards: All roofing system components shall be manufactured, labeled, or specifically approved in writing by the membrane manufacturer issuing the roofing system warranty. In such cases where conflicting requirements exist between FM Global, Underwriters Lab, the project design pressures listed on the Drawings (ASCE 7-16), and the manufacturer's requirements, the most stringent requirements shall govern.

## 1.5 SUBMITTALS

- A. Provide submittals in advance of the Pre-Roofing Conference. Any materials ordered prior to receiving written approval of submittals shall be at the Contractor's risk.
- B. Product Data
1. Product Data: Submit Product Data sheets, Manufacturer's literature, Material Safety Data Sheets and application instructions for all items proposed to be furnished and installed under this Section including manufacturer's specifications, recommended installation procedures, and data demonstrating compliance with the specified requirements.
  2. Provide manufacturer's recommended fastening patterns for field, perimeter, and corner conditions, certified for the appropriate substrate to meet the FM Global wind uplift requirements.
  3. Provide manufacturer's fastener pull-test report to show compliance with manufacturer and wind uplift requirements.
  4. Where UL or FM requirements are specified, provide documentation that shows that the roofing system to be installed is UL-Classified or FM-approved, as applicable; include data itemizing the components of the classified or approved system.

## a. Factory Mutual Global Standards:

- 1) Roof Areas A-1 – A-2 shall utilize the roofing assembly and meet specified wind uplift classification (including system manufacturer's specified board insulation, cover board, and accessories) required in *FM Global RoofNav Assembly No:*

- a) *Carlisle 353875-0-0*

- b) *Firestone*

- c) *Johns Manville*

## C. Shop Drawings

1. Detailed shop drawings, including plan views and sections, of the new tapered cricket insulation system. Tapered insulation layouts shall be prepared in advance and submitted as a part of the submittal package.

## D. Required After Completion of Work

1. Contractor's warranty per Section 00 70 00.
2. Manufacturer's NDL warranty.

**1.6 PRODUCT DELIVERY AND STORAGE**

- A. Delivery of Materials: Deliver material to jobsite in sealed, undamaged containers. Identify each container with material name, date of manufacturer, and lot number.
- B. Keep all materials dry while they are transported, stored and installed. Reject any new materials which exhibit evidence of moisture during application, or have been exposed to moisture.
- C. All materials shall be stored in enclosed trailers on the ground, except a one-day supply of materials which may be stored on the roof on raised platforms with weather protective coverings. The manufacturer's standard packaging and covering is not considered adequate weather protection. Tarpaulins are required for protection of all roof materials. MATERIAL STORAGE PROCEDURES WILL BE CONSTANTLY MONITORED AND STRICTLY ENFORCED.
- D. Materials stored on roofs shall be limited to the safe loading of installed materials, decking and structural framing.

**1.7 JOB CONDITIONS**

- A. All dimensions and existing details shall be field-verified by contractor prior to bidding and acquisition or installation of materials. Contractor shall notify the engineer of any existing

condition found to be different than that indicated in the contract documents. Engineer shall review the situation and inform contractor of necessary changes, if any.

- B. Install materials in strict accordance with all safety and weather conditions required by manufacturer, product literature, Material Safety Data Sheets, or of local, state, and federal rules and regulations.

## **1.8 PROTECTION**

- A. Temporary tie-offs and water cut-offs shall be provided by the Roofing Contractor at the end of each day, and where and when a danger exists that water caused by precipitation may get under the new roofing membrane. Temporary tie-offs and water cut-offs shall extend beyond new insulation and membrane and be adhered to the existing roof system. All temporary tie-offs and water cut-offs shall be removed prior to proceeding with the work by uncovering the edge of the insulation and removing all temporary materials.
- B. When installing temporary tie-offs or water cut-offs, do not cut any staggered insulation pieces that are already installed. Rather, straighten the staggered insulation with unattached pieces of insulation. Remove all temporary insulation pieces prior to proceeding with the work.

## **1.9 WARRANTIES**

- A. Warranty (by contractor to the Owner). Applies to all reroofed areas (refer to Section 00 70 00).
- B. Manufacturer's 20-year "No Dollar Limit" Roof System Guarantee (by Materials Manufacturer to the Owner). Applies to all reroofed areas.
  - 1. Wind speed warranty shall be 80 miles per hour.
  - 2. Contractor must contact membrane manufacturer prior to bidding to confirm that all proposed system components are acceptable.
  - 3. Paid for by contractor.

## **1.10 CHANGES IN THE WORK**

- A. During reroofing work, the contractor may encounter existing conditions which are not now known or are at variance with the Drawings or Specifications (discovery). Such conditions may interfere with reroofing work and may consist of damage or deterioration to the deck or surrounding materials or components which could jeopardize the integrity of the new roof. The contractor shall notify the Engineer of all discoveries he/she believes may interfere with proper execution of the work or jeopardize the integrity of the new roof prior to proceeding with work related to such discoveries.
- B. In the event of discrepancies within the Drawings, within the Specifications, or between the Drawings and Specification, the more stringent of the two items shown or described shall be

considered to be shown or specified at all locations where the discrepancies occur. The Engineer shall be notified of such discrepancies.

- C. When a substitute or alternate is requested by the Contractor, and such substitute or alternate is accepted by the Engineer, the Contractor shall bear all additional costs which may arise directly or indirectly from the use of the substitute or alternate.

## **PART 2 PRODUCTS**

### **2.1 INSULATION BOARD**

- A. Polyisocyanurate Insulation Board - Rigid, closed-cell, polyisocyanurate insulation board having an "LTTR" R-value equal to 5.6 per inch thickness excluding the facer sheet. The factory-applied facer sheet shall be fully adhered to both sides of the insulation board and shall be low-rise foam adhesive compatible. The following additional criteria shall apply:
1. Board density shall be 2.0 pounds per cubic foot when measured in accordance with ASTM D1622.
  2. Compressive strength shall be 20 pounds per square inch minimum when measured in accordance with ASTM C209 or ASTM D1621.
  3. Board insulation shall comply with water absorption requirements when measured in accordance with ASTM C209.
  4. Acceptable manufacturers shall be the following:
    - a. Carlisle, Carlisle, PA
      - 1) HP-H Polyiso Board
    - b. Firestone, Carmel, IN
      - 1) ISO 95+
    - c. Johns Manville Corp., Denver, CO
      - 1) ENRGY 3
  5. Insulation board stock larger than 4 feet by 4 feet is not acceptable under any circumstances.
  6. Thermal Value: the combined "R" value over conditioned space shall be equal to or greater than 30.00. That value shall be achieved as follows:
    - a. Roof Areas:

- 1) Two layers of 2.60-inch polyisocyanurate board as specified, in sheets not to exceed 48 inches by 48 inches.
- 2) One layer of 1/2-inch HD polyisocyanurate cover board as specified.

## 2.2 TAPERED INSULATION CRICKETS

- A. Tapered Rigid Insulation Crickets factory-fabricated from approved manufacturer. Use in roof areas shown on drawings.
  1. All crickets shall have a counter-slope of twice the underlying slope or a slope sufficient to result in a 1/4-inch per foot counter-slope, unless otherwise approved.
- B. Tapered edge strips, 1/2-inch to 0-inch, rigid perlite insulation transition pieces shall be installed along the roof “kickers” as needed to create a smooth transition.

## 2.3 COVER BOARD

- A. High-Density Polyisocyanurate Roof Board Cover Board - Rigid, hard, impact and moisture resistant cover board shall be low-rise adhesive compatible and approved by manufacturer of specified roofing system.
  1. Acceptable products and manufacturers listed below are intended to be equivalent in performance:
    - a. Cover Board:
      - 1) High-Density polyisocyanurate board, 1/2-inch thick as manufactured by Carlisle Syntec (SecurShield HD Polyiso)
      - 2) High-Density polyisocyanurate board, 1/2-inch thick as manufactured by Firestone (ISOGARD HD Cover Board)
      - 3) High-Density polyisocyanurate board, 1/2-inch thick as manufactured by Johns Manville (ProtectoR HD)

## 2.4 INSULATION ADHESIVE MATERIALS AND FASTENERS

- A. Low-Rise Foam Adhesives - The following foam adhesive products are approved for such applications provided they meet wind uplift requirements.
  1. Carlisle, Carlisle, PA
    - a. Flexible FAST Insulation Adhesive
  2. Firestone, Carmel, IN
    - a. ISO Twin Pack Insulation Adhesive

3. OMG, Agawam, Massachusetts
  - a. OlyBond Adhesive Fastener
4. Adhesive recommended by roof system manufacturer for their rated assembly.

## **2.5 SELF-ADHERED UNDERLAYMENT**

- A. The following self-adhered underlayment shall be approved by manufacturer of specified roofing system provided they meet wind uplift requirements.
  1. Carlisle, Carlisle, Pennsylvania
    - a. VapAir Seal 725TR Air and Vapor Barrier
  2. Firestone, Carmel, Indiana
    - a. V-Force Vapor Barrier Membrane
  3. Johns Manville, Denver, Colorado
    - a. JM Vapor Barrier

## **PART 3 EXECUTION**

### **3.1 COORDINATION**

- A. Coordinate installation of insulation with work specified in Section 02 41 20, Section 07 54 23 Thermoplastic-Polyolefin (TPO) Roofing, and Section 07 62 00-Sheet Metal Flashing and Trim.
- B. Do not install more insulating material than can be made watertight by the end of the work day.
- C. Do not install roofing materials when rain is imminent. Do not remove excessive quantity of existing roof membrane ahead of reroofing.

### **3.2 INSPECTION AND PREPARATION OF SUBSTRATE**

- A. Examine the surface condition of the substrate and the conditions under which roofing work is to be performed. Do not proceed with the new installation until unsatisfactory conditions have been corrected in a manner approved by the Owner.
- B. Clean the substrate of projections and substances detrimental to the work. Voids, cracks and holes shall be filled with an approved material and be struck flush with adjoining surfaces.
- C. All surfaces must be clean, dry, hard, and able to withstand the minimum pullout resistance necessary to meet the wind uplift requirements of the Specifications.



- D. Proceeding with the work shall signify the Contractor's acceptance of the substrate being covered by the new installation.

### 3.3 POLYISOCYANURATE INSULATION INSTALLATION

- A. Insulation, having been protected as stipulated elsewhere in these Specifications, shall be installed in the following manner in accordance with the manufacturer's printed instructions:
1. Edges - At edge details, or where edge nailers are present at the perimeter, butt the outside edge of the insulation terminating piece against the roofside edge of the nailer. Do not extend the insulation out onto the nailer.
  2. Where wind uplift requirements or standards require wood nailers to be installed at the perimeter, such nailers shall be attached by using suitable fasteners with pre-drilled holes. Attachment with nail guns is not permitted. Joints shall be staggered and subsequent layers attached with screws, not nails. The combined thickness or height of nailers shall be equivalent to the combined layers of all insulation and cover boards.
  3. Perimeter and corner fastening of insulation shall be in conformance with assemblies tested according to project wind uplift requirements. The Contractor shall submit the fastening pattern and testing report with other submittals.
  4. Where field observation determines fasteners to be installed at a greater spacing than specified, one additional fastener shall be installed between each existing fastener as remedial measure. Failure to install fasteners at the required spacing interval will be considered a serious act of defective workmanship and may cause replacement of the entire roof system.
  5. Joints of all layers of insulation shall be tight, square, and not exceeding 1/4-inch. Joints shall be staggered half the length of the board in both directions. If alignment gets out of square, do not continue. Stop the installation, lay a chalk line, cut the insulation smoothly using a power cutter or other device, and square up the installation. After obtaining a straight and square installation resume laying the insulation in a pattern to accommodate the revised and squared up alignment. All corner pieces should be carefully mitered to product a snug fit without excessive voids at penetrations, projections, curbs, or terminations.
- B. Over the existing steel deck (where applicable and shown on Drawings), mechanically attach base layer of 2.60-inch thick polyisocyanurate insulation. Fasten insulation according to project wind uplift requirements.
1. Unless more stringent fastening quantities are required by roofing manufacturer and/or FM Global; increase fastening at perimeter (50% increase over field) and corners (100% increase over field). Using a power screwdriver, drive the fastener until a slight depression is visible in the insulation around the plate or a dimple is visible in the surface of the plate.

Take care not to overdrive the fasteners and fracture the facer sheet of the insulation. Fasteners must be tight enough that the plate does not turn.

- C. Polyisocyanurate Insulation Attachment (Base Layer to Wood Deck)
  - 1. Mechanically attach the base layer of polyisocyanurate insulation boards with heavy-duty deck screws and 3-inch metal plates. Quantity and spacing of fasteners to provide wind uplift resistance according to project wind uplift requirements. Reference uplift plan on Sheet A102 of the Drawings.
    - a. Zone I (Field Pressure) FM1-90
    - b. Zone II (Perimeter Pressure) FM1-90
    - c. Zone III (Corner Pressure) FM1-90
- D. Polyisocyanurate Insulation Attachment: Over the base layer of insulation, install layer of polyisocyanurate insulation, tapered insulation crickets, and HD cover board, in a uniform ribboned layer of Carlisle Flexible FAST low-rise adhesive (or approved equal). Adhesive

application to comply with U.S. Class A and FM Class 1A-90 (minimum) fire and uplift. “Walk-in” the individual boards before the adhesive dries to ensure maximum contact. Keep each individual board weighted until maximum adhesion is achieved (minimum of 10-15 minutes). The time required for adhesive foam to rise before setting the insulation varies by manufacturer and with weather conditions. Confirm adhesive installation requirements with the manufacturer prior to installation.

1. Unless more stringent ribbon spacing are required by the roofing manufacturer for specified wind uplift Classification, the minimum low-rise adhesive pattern shall be:
    - a. Zone I – 12-inch on-center
    - b. Zone II – 6-inch on-center
    - c. Zone III – 4-inch on-center
  2. Uplift Pressures (noted on Drawings)
- E. Any boards with non-attached corners or interior areas (that can be lifted by hand) will be considered defective workmanship and will be rejected.
- F. Stagger seams and end joints of rows of insulation a minimum of 12-inches and staggering top layer of insulation of a minimum of 12-inches from bottom layer.
- G. The top surface of each layer shall be broomed clean of debris prior to the installation of each subsequent layer.
- H. Do not install more polyisocyanurate insulation than can be covered with completed roofing in the same day. Under no circumstances shall applied insulation be left overnight without covering in place. Any roof insulation installed, but not covered by roofing material prior to the end of the work day, shall be torn off and replaced the following day.

### **3.4 TAPERED INSULATION CRICKETS**

- A. Over the base insulation, install tapered polyisocyanurate crickets to provide positive drainage upslope of curbs greater than 24-inches in width and between roof drainage scuppers as shown on the Drawings. All crickets shall have a counter-slope of twice the underlying slope or a slope sufficient to result in a 1/4-inch per foot counter-slope, unless otherwise approved.
- B. Crickets are to be installed in sequence with the insulation, not after the cover board or roof membrane is installed. No cover board or roofing are to be installed between the cricket materials and the top layer of insulation.

**3.5 CLEANUP**

- A. Perform final cleanup per Division 1 - Section 01 74 00 and Division 2 - Section 02 41 20 requirements.
- B. Remove trash, debris, and equipment from the jobsite.
- C. Repair damage and remove stains caused by the Work.

**END OF SECTION**

## SECTION 07 50 00

### ROOFING SPECIAL REQUIREMENTS

#### PART 1 GENERAL

##### 1.1 INSPECTION OF SITE

- A. Inspection of Site – The Contractor shall carefully inspect the Project site, and that from the Contractor’s own investigation, the Contractor shall satisfy itself as to the nature and location of the Work and the character, quality, quantities, materials, and difficulties to be encountered; the kind and extent of equipment and other facilities needed for the performance of the Work; the general and local conditions and other items which may in any way affect the Work or its performance; and the Contractor has correlated the Contractor’s site observations with the requirements of the Contract Documents. The Contractor shall make such tests of its own to satisfy itself of hidden conditions insofar as is reasonably practicable; if roof cores are taken, the core and the repair must be performed and repaired in a manner acceptable to the manufacturer of the existing roofing system (when applicable). The Contractor understands and accepts the difficulties and costs associated with the Work and the Project site and the potential delays, disruptions in Work, and costs associated therewith, and has included such considerations in its construction schedule and the bid amount.
- B. Coordination with Other Trades - The Contractor shall coordinate all Work with other Trades and employers to integrate properly all Work into the intent of the Specifications in compliance with industry authorities including, but not limited to the National Roofing Contractors Association.

##### 1.2 VERIFICATION OF DRAWINGS AND SPECIFICATIONS

- A. Notification of Conflicts in Drawings and Specifications - In the event the Contractor determines that such field conditions exist which may prevent or interfere with the execution of the Work required hereunder, the Contractor shall notify the Architect/Engineer in writing of such field conditions or any deficiencies in the Drawings and Specifications which may require changes at least four (4) days prior to the opening of proposals. Failure to notify the Owner of conflicting field conditions or contradictions in advance of commencement of Work shall indicate that the Contractor determines no conditions exist which will hinder satisfactory performance of the Work as specified and for the price proposal.
- B. Notification of Conflicts with Warranty Requirements - The Contractor shall make such investigations and inspections as required to verify that no conditions exist which may conflict with requirements for obtaining warranties by roofing material manufacturers, and should such conditions be found to exist, the Contractor shall notify the Architect/Engineer in writing in time for adjustments to be made to accommodate such conditions or manufacturers' requirements. If contradictions were found to exist between these Specifications and manufacturer’s requirements, the most stringent requirements shall govern except where such more stringent requirements would interfere with the issuance of a warranty by the manufacturer in which case the manufacturer’s requirements shall govern.
- C. All Dimensions Approximate - All Specifications and Details are intended to reflect the intent of compliance with accepted industry authorities and to that end all dimensions are intended to be approximations. Prior to commencement of Work, the Contractor shall verify all dimensions, and

if field conditions require significant deviations from such dimensions, the Contractor shall submit a Request for Information (RFI) in advance of commencing Work.

### 1.3 ROOFING CONSULTANT'S AUTHORITY

- A. The Contractor is advised that the Roof Consultant's Field Observer has the following limitations on his/her authority.
  - 1. The Field Observer has no authority to change the Contract, Construction Documents, or design.
  - 2. The Field Observer has no authority to create or enforce safety requirements.
  - 3. The Field Observer has no authority to approve any item involving an increase in cost to the Owner.
  - 4. The Field Observer has no authority to approve any reduction in scope without an appropriate credit to the Owner.
  - 5. The Field Observer has no authority to "trade" one requirement for another.
  - 6. The Contractor shall not proceed with any proposed change without written approval of the Consultant and Owner.
  - 7. The Contractor proceeds with any verbal authorization of any change, no matter how minor, at his own risk in the absence of a signed written approval by an authorized person.
  - 8. "Fit and finish" conditions can be interpreted in the field by the Field Observer and is not considered a change to the contract documents.

### 1.4 ROOFING CONSULTANT FEES REIMBURSEABLE BY CONTRACTOR TO OWNER.

- A. After Contractual Date Of Substantial Completion - The Owner will be responsible for Roof Consultant and field inspection fees in connection with the satisfactory completion of the job up to and including the ***Contractual Date of Substantial Completion***. The Contractor shall reimburse the Owner for all consulting Roof Consultant and field observation fees plus travel and incidental expenses incurred after the ***Contractual Date of Substantial Completion*** adjusted for time extensions granted pursuant to the Contract. Such fees and expenses shall be charged at the rates in the agreement between the Owner and the Roof Consultant. Such fees and expenses will be charged to the Contractor as a credit Change Order prior to release of final payment or retainage. If Contractor's failure to complete the closeout or final punch list causes the Roof Consultant to make more than three field observation trips to the site to verify or confirm completion of the punch list, the Contractor shall reimburse the Owner the Roof Consultant's time and expenses for such trips.
- B. Overtime, Weekends, And Holidays for Contractor's Convenience – If Roof Consultant or field observation Work is requested by the Owner for the Owner's convenience to be performed on overtime, weekends, or holidays, the Owner shall be responsible for payment for such fees and expenses to the Roof Consultant. However, if the Contractor requests to work on overtime, weekends, or holidays to catch up or make up time due to the Contractor's failure to maintain the schedule in this agreement, or otherwise for his convenience, the Contractor shall be responsible for Roof Consultant and field observation fees and expenses incurred by the Roof Consultant.

### 1.5 ROOF MEETINGS

- A. Pre-Roofing Conference - ***Upon approval of all roof-related submittals including items requested for resubmittal***, but prior to delivery of any roofing materials to the jobsite, the Contractor shall arrange a Pre-roofing Conference at the jobsite a minimum of two (2) weeks prior to delivery of materials and commencement of roofing Work, and shall arrange for the following firms or individuals to be represented:

1. Owner's Representative
  2. Roof Consultant
  3. Roofing Contractor
  4. Roofing Material Manufacturer's Technical Representative
  5. Mechanical Contractor (if applicable)
  6. Plumbing Contractor (if applicable)
  7. Masonry Contractor (if applicable)
  8. Stucco Contractor (if applicable)
  9. EIFS Contractor (if applicable)
  10. Lightning Protection Contractor (if applicable)
- B. Agenda - The pre-roofing conference will be scheduled upon completion, receipt, and complete approval of all roof related submittals. No pre-roofing conference will be scheduled until such conditions are met in full. The purpose and agenda of the pre-roofing conference shall be to cover the following points, and all parties shall be informed of this agenda and be prepared to discuss such items:
1. Drawings and Specifications
  2. Preparatory Work such as decking, carpentry, and mechanical curbs
  3. Roof protection from damage by other Trades
  4. Roofing materials
  5. Sheet metal materials and details
  6. Material delivery and storage
  7. Field supervision
  8. Owner convenience matters
  9. Equipment set-up and protection
  10. Parking
  11. Job-site safety
  12. Personal protective clothing
  13. Leak prevention during Work
  14. Cutting, patching, and tie-in with other roofing
  15. Building entry and exit requirements
  16. Daily cleanup and housekeeping
  17. Project sequence and scheduling
  18. Project quality control/required mock-ups
  19. Inspection and testing requirements
  20. Fire protection and prevention procedures
  21. Punch list completion
  22. Warranty documentation

## **1.6 PERFORMANCE STANDARDS**

- A. Safety - The contractor is responsible for meeting all Federal, State, Local, Owner, and other applicable safety requirements for the specific location and construction type. Any safety related topics discussed herein are simply suggestions for contractor review. WJE maintains that everyone has the right to stop any work or activities that appear to endanger anyone onsite.
- B. Brand Names - Specific brand names are intended to impute a quality and performance standard, and are not intended to discriminate against products not specifically listed.
- C. UL and FM Global Approved Products - All materials, products, systems, and components shall comply with UL and FM Global standards for fire rating and wind blow-off resistance.

- D. Wind Resistant Construction - Where the geographical location of the Project is in coastal or other high wind areas as defined by the International Building Code, the local code authority, or FM Global, all attachments of roof and related components shall comply with the most stringent applicable method. All edge details shall comply with FM Global Bulletin 1-49 at a minimum.
- E. Roofing Membrane Manufacturer Components - In addition, all roofing system components shall be manufactured, labeled, or specifically approved in writing by the membrane manufacturer issuing the roofing system warranty. In such cases where conflicting requirements exist between FM Global, Underwriters Lab, and the manufacturer's requirements, the most stringent requirements shall govern.

## 1.7 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following Record Documents; record actual revisions to the Work:
  - 1. Drawings
  - 2. Specifications
  - 3. Addenda
  - 4. Change Orders and other modifications to the Contract
  - 5. Submittals
  - 6. Reviewed Shop Drawings, Product Data, and Samples

## 1.8 PROJECT SIGNAGE

- A. Safety Warning Signs
  - 1. The contractor is responsible for meeting all Federal, State, Local, Owner, and other applicable safety signage requirements for the specific location and construction type. Any safety signage related items discussed herein are simply suggestions for contractor review.
  - 2. Safety Warning Signs - Signs to warn the general public of safety hazards involving the Project shall be posted as described herein.
  - 3. Such signs shall be made of exterior grade plywood and at least 4-foot by 4-foot in size.
  - 4. Warning signs shall be painted professionally in letters large enough to be read clearly and legibly from a distance of 75 feet by a person with normal eyesight. The signs shall be firmly attached at an elevation high enough not to be obscured by parked cars or vans.
  - 5. Safety Warning Signs shall be painted "safety yellow" with letters of black or red.
  - 6. The signs shall be posted in the following locations:
    - a. Near the roofing kettle, trash dumpster, and debris removal chute.
    - b. Over entrances or exits in the vicinity of Work.
    - c. In parking areas where cars may be exposed to damage from falling or windblown debris or trash.
  - 7. Signs shall be in sufficient number and located in such a manner as to warn members of the general public approaching from different directions of the hazards or danger.
  - 8. All signs shall be permanently mounted on posts in the ground, or firmly fixed in place on the roof. Supporting signs with roof equipment, materials, or other temporary devices is not acceptable. Such supports shall be capable of withstanding a minimum of 60 mile per hour winds.
  - 9. Signs shall be designed as shown below:



**WARNING**

**ROOF WORK IN PROGRESS**

**FALLING OBJECTS AND DEBRIS**

**STAY CLEAR OF DANGER  
AND  
PARK AT YOUR OWN RISK**

**B. Warranty Notification Signs**

1. Warranty Notification Signs - Upon completion of the job, Warranty Notification Signs shall be located at or near all roof entry points as described herein. There shall be a minimum of one Warranty Notification Sign for each building or discreet, separate roof access point (i.e. roof hatches, fixed roof ladders, etc.)
2. Appearance - The sign shall be constructed of 24-gauge metal, at least 18 inches by 24 inches in size and shall be painted professionally by a person or firm experienced in the trade. Painting procedures shall be in accordance with the industry practice for priming, number of coats, and type of paint normally used for Work of this type.
3. Attachment - Such signs shall be firmly affixed in accordance with standard roofing practice as defined by NRCA details and in such a manner as not to jeopardize the waterproof integrity of the roofing, flashing, or waterproofing system.
4. The signs shall present the information shown herein.

**DO NOT MAKE ALTERATIONS  
OR REPAIRS TO THIS ROOF  
WITHOUT APPROVAL FROM OWNER**

**This roof is under warranty until  
(date)  
Warranty Number \_\_\_\_\_  
by (Contractor's name  
Manufacturer name,  
address,  
city, state, zip code  
and phone number)**

**1.9 ENVIRONMENTAL PROTECTION**

**A. Landscaping**

1. Landscaping and Grounds Protection - Provide protective coverings as necessary to prevent damage to buildings, grounds, and parking lots. Protect all plants from chemical or mechanical damage. If applicable, cut grass inside of storage area and prevent the growth of weeds or other unsightly vegetation.
2. Trash Dumpster Protection - If commercial trash receptacles are dropped at the site, provide wooden skids as necessary to prevent damage to paved areas and cover receptacles daily to prevent debris from blowing around the site.

3. Return Landscaping to Original Condition - Parking lots, landscaping, yards, beds, or grassy areas shall be repaired in a manner to return the area to the original condition immediately following completion of the Work.
  4. Only Approved Dirt or Replacement Soil - Contractor shall submit samples of proposed soil to be used to repair landscaping in advance with the name and location of the proposed source quarry. The Owner shall have the opportunity to inspect the soil source quarry prior to delivery of any soil to the jobsite, and the Contractor shall not proceed with bringing any such materials on the site until the Owner has provided written approval.
- B. Chemical Storage Protection
1. The contractor is responsible for meeting all Federal, State, Local, Owner, and other applicable chemical storage requirements for the specific location and construction type. Any chemical storage related topics discussed herein are simply suggestions for contractor review.
  2. Chemical Storage - No chemicals, or any materials classified as such, shall be brought on site until all MSDS sheets have been provided to the Owner and both the materials and the storage and maintenance methodology approved in writing by the Owner.
  3. Double Containers - All chemicals shall be stored in double containers for leak protection. The Contractor shall provide a written plan for such protection with his submittals.
  4. Storage Maintenance - Maintain storage in such a manner as to prevent leaking of chemicals, liquids, or other materials, whether hazardous, toxic, or not, and to prevent mixing of chemicals of any sort. Leaking containers shall be immediately removed from the site and all leak residue cleaned up in accordance with all federal, state, and local laws or ordinances.
- C. Noise Protection
1. Noise Control - The Contractor shall take maximum precautions to avoid excessive noise which may disrupt the Owner's normal operations. Instruct all workmen in noise control procedures. Such conditions shall be the Owner's determination.
- D. Air Intake Protection
1. The Contractor shall coordinate with the Architect/Engineer and Owner to create a schedule for all rooftop air handler intake protection during the project.
    - a. Rooftop Air Intakes - The Owner will close or otherwise adjust rooftop air intakes for minimum attraction of roofing material fumes from rooftop work.
    - b. Vent Covers - Contractor shall furnish plastic or other suitable covers for air intake vents, and shall install and remove such covers where requested to do so by the Owner.

## **1.10 WEATHER CONTINGENCIES**

- A. Risk - Means, method, and scheduling are the responsibility of the Contractor within any constraints stipulated elsewhere in the Construction Documents. All weather risks are the responsibility of the Contractor, and protection of materials, building, and contents is the sole responsibility of the Contractor.
- B. Protection Against Sudden Weather Changes - Protection of the building, tenants, and contents shall be a primary concern at all times during construction. At no time shall the Contractor remove more roofing or equipment or expose more of the building or contents to the weather than can be protected immediately in the case of sudden weather changes. If the Contractor must apply temporary measures to protect the building or its contents during sudden weather changes, such

temporary protection or measures shall be removed and replaced prior to commencement of further Work.

- C. Precipitation - Roofing shall not be applied during precipitation and shall not be started in the event there is a probability of precipitation during application greater than normal industry practice.

### 1.11 GOVERNING AUTHORITIES

- A. With respect to industry details, methodology, performance standards, or resolution of conflicts, the most stringent standards of those authorities listed below shall govern for the specific geographical location of the project. Where such governing authorities and standards are listed, it is understood that the latest and most current version of such standards are required, and it is the Contractor's duty to know and understand such standards which are in effect at the time this Project is proposed.
  1. Occupational Safety and Health Administration (OSHA)
  2. FM Global Engineering (FM)
  3. Underwriters Laboratory (UL)
  4. National Roofing Contractors Association (NRCA)
  5. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
  6. ASTM International
  7. International Building Code (IBC), Current Edition
  8. International Plumbing Code (IPC), Current Edition
  9. International Mechanical Code (IMC), Current Edition
  10. International Energy Conservation Code (IECC), Current Edition
  11. Approved Roofing Material Manufacturer
  12. Revere Copper "Copper and Common Sense" Manual

### 1.12 FIELD SUPERVISION

- A. Supervisor Designation - The Roofing Contractor shall designate a Field Supervisor who shall be the Contractor's on-site representative and agent at all times. The Field Supervisor shall be experienced in running Work of this size, type, and complexity. ***The Field Supervisor shall be non-working and on-site full-time during the course of the job, except for rain days.*** On rain days, the Field Supervisor shall show up, confer with the Owner regarding leaks or emergencies, if any, and have available emergency personnel to deal with such eventualities. With the Owner's approval, the Architect/Engineer has the authority to have the Contractor remove a Field Supervisor for being unqualified, or otherwise failing to comply fully with the Construction Documents' requirements, and have a new Field Supervisor assigned acceptable to the Owner and Architect/Engineer.
- B. English-speaking Required - The Field Supervisor shall be English-speaking, and shall by virtue of experience, education, and training be fully qualified to organize, plan, supervise, and manage all phases of the Work. It is not the intent of the language requirement to discriminate against any person, nor to deny any person the right to serve in a supervisory capacity on this Project, but instead to ensure that the Field Supervisor can communicate at all times with the Architect/Engineer/Roof Consultant or Owner's Representative in the interest of safety of the workers and occupants of the buildings.
- C. Scope of Field Supervisor Responsibilities - The Field Supervisor shall be responsible for all on-site activities beginning with the delivery of the materials and job set-up, and shall be available and accessible to the Owner or Roofing Architect/Engineer at all times whether Work is in

progress on a particular day or not. A Working Foreman is not a Field Supervisor, and the Field Supervisor shall be in addition to a Working Foreman.

- D. Safety Enforcement - Safety is the responsibility of the Contractor. The Field Supervisor shall enforce all provisions of the job safety requirements at all times, and shall dismiss from the jobsite any employee failing to comply. Safety of the general public shall be a paramount concern and focus of the Project, and any person failing to comply with OSHA or any other applicable safety requirements may be dismissed from the jobsite.
- E. On-Call Emergency Service - The Contractor shall provide an emergency phone number for weekends and nights and home phone numbers for the Company President and the Field Supervisor. Such emergency access is to be used in the event of severe leakage during progress of the job in a heavy rain at night or on weekends.

### **1.13 CONSTRUCTION PERSONNEL BEHAVIOR**

- A. Contractor personnel and subcontractors shall be instructed in the following behavioral matters:
  - 1. Authorized Company Personnel - Contractor employees must either wear company uniforms or have other forms of visible identification showing they are an authorized employee of the Contracting firm. Unauthorized or unidentified personnel shall be dismissed from the jobsite.
  - 2. Security
    - a. Provide security and facilities to protect Work, and Owner's operations from unauthorized entry, vandalism, or theft.
    - b. Coordinate with Owner's security program.
  - 3. Chemical and Tobacco Free - The jobsite is a smoke-free workplace, and smoking is prohibited on the jobsite. No non-prescription drugs, alcohol, or tobacco of any type are permitted on the jobsite.
  - 4. Personal Contact - The Contractor's personnel and subcontractors are to have no contact, verbal or otherwise, with the public or Owner personnel in or around the property or jobsite. The Contractor shall notify all personnel and subcontractors that any person making remarks to any of the above shall be dismissed permanently from the jobsite.
  - 5. Access to Jobsite Facilities - The Contractor's personnel and subcontractors are not to enter school buildings or use Owner's restrooms, telephones, water fountains, or any other facilities unless advance permission is granted and the person is escorted by an authorized Owner's Representative for reasons relating to the Work being performed.
  - 6. Vacate Jobsite at End of Day - At the end of each workday, Contractor employees are to vacate the school grounds, and are not to loiter on school property.

### **1.14 PLANNING AND PREPARATION**

- A. Read the Specifications - The Field Supervisor shall become thoroughly familiar with requirements for the job including, but not limited to, reading and understanding the Drawings and Specifications. The Field Supervisor shall determine the proper sequence and schedule for all Work, and shall determine the proper tools, equipment, means, methods, and techniques to perform the Work in accordance with all Contract Documents and shall ensure timely delivery of all equipment, tools, personnel, materials, and components required for the timely completion of all Work in accordance with the established schedule.
- B. Mechanical and Electrical Equipment Verification - The Contractor shall verify performance and operation of all mechanical and electrical equipment prior to commencement of Work. It may be necessary to extend, retract, relocate, terminate, or otherwise modify the existing mechanical

and/or electrical equipment as part of the project. The contractor is responsible for ensuring all structural and building enclosure details are followed when modified the existing mechanical and electrical systems. The contractor may not begin any mechanical or electrical work until all necessary tools and materials are available for proper installation. The timely execution of this work with minimal shutdown time shall be a priority. The Contractor shall be responsible for ensuring that each piece of mechanical equipment is restored to its former operating condition upon completion of all Work.

- C. Inspection for Prior Damage - Prior to commencement of Work, the Contractor shall inspect the interior of the building and all exposed surfaces for damage, scratches, abrasions, leaks, and bitumen drippage, and report such findings to the Owner in writing or supported with photographs as necessary. The Owner reserves the right to hold the Contractor responsible and liable for building damage not reported and confirmed in advance of the commencement of Work.
- D. Location of Fixtures Below Roof Deck - The Contractor shall inspect the underside of all decks and become aware of the locations of all conduit, fixtures, suspended ceiling supports, fire proofing, spray insulation, or other mechanical and electrical equipment supported by or attached to the underside of the deck. The Contractor shall be responsible for reconnecting, replacing, or repairing, any damage to or dislocation of items, fixtures, or supports connected to the deck required by the circumstances of the Project or accidentally caused by Work performed under this Contract.

#### **1.15 DAMAGE TO BUILDING INTERIOR**

- A. Protection From Damage - The Contractor shall take all necessary precautions to prevent damage to the interior of the building or its contents. Dirt, dust, or other contamination of interior surfaces shall be cleaned up by the Contractor or at the Contractor's expense.
- B. Coordination with Occupants - The Contractor's Field Supervisor shall communicate daily with the designated owner contact if power, heating, ventilation, or air conditioning units are to be shut-off, and, subject to the scheduling requirements of the job, the Contractor shall perform Work in a sequence to minimize inconvenience to occupants. Nothing in this paragraph, however, shall constitute interference with or a change to the Contractor's status as an independent Contractor and the Contractor's right to control means and methods and schedule Work in the most efficient manner to comply with the performance requirements of all Work hereunder.

#### **1.16 FIELD OBSERVATION AND TESTING**

- A. Requirements
  - 1. Periodic site observations will be performed by the Architect/Engineer's/Roof Consultant's field observer. The field observer will document the roof installation and note deficiencies or deviations in the installation(s).
    - a. All new roofing operations, new sheet metal mock-ups, and before the installation of cap sheet shall require a site observation by the Architect/Engineer's/Roof Consultant's field observer. The roofing contractor will provide at least 72 hour notice to Architect / Engineer before the site observations are required, including mock-ups and completion of major operations. If the roofing contractor continues operations and moves onto the next phase of roofing without a field observation, the contractor does so at their own risk.
    - b. Contractor shall cooperate with the field observer to facilitate the execution of its required services, including providing safe access to the roof and access to all materials stored on site.

- c. Employment of the field observer shall in no way relieve Contractor's obligations to perform the Work of the Contract.
  2. The Owner reserves the right to employ and pay (except as specified otherwise) for the services of an Independent Testing Laboratory approved by Architect/Engineer to perform specified testing. The Contractor shall pay the cost of re-testing required due to failure.
    - a. Contractor shall cooperate with the laboratory to facilitate the execution of its required services.
    - b. Employment of the laboratory shall in no way relieve Contractor's obligations to perform the Work of the Contract.
- B. Contractor's Responsibilities
  1. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.
  2. Provide to the laboratory the preliminary requirements proposed to be used for correct roofing practice, and other materials mixes that require control by the testing laboratory. Costs of all roofing samples shall be the Contractor's responsibility.
  3. Furnish incidental labor and facilities:
    - a. To provide access to Work to be tested.
    - b. To obtain and handle samples at the Project site or at the source of the product to be tested.
    - c. To facilitate inspections and tests.
    - d. For storage and curing of test samples.
  4. Notify laboratory sufficiently in advance of operations to allow for pick-up, laboratory assignment of personnel, and scheduling of tests. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to Contractor's negligence.
  5. Make arrangements with laboratory and pay for additional samples and tests required for Contractor's convenience.
  6. Cut or prepare all samples to be tested in the presence of either the Owner's Representative, the Architect/Engineer/Roof Consultant, a registered Deputy Building Inspector, or the Engineer from the testing laboratory, and secure the witness' initials on each sample prepared.
  7. Any tests, inspections, or sampling required by the Building Inspector for the performance of special Trades not included in this Section shall be paid for as a part of the Work of the Trades being tested.

### **1.17 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary utilities, equipment, facilities, and materials, prior to Substantial Completion/Final Application for Payment inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing and permanent facilities used during construction to original condition.

### **1.18 CLEANUP**

- A. Daily Cleanup - Daily cleanup is a part of the job. A clean workplace is a safe workplace. The jobsite is to be kept clean and safe from fire or tripping hazards daily.
- B. Trash Containers - Provide trash bags or containers for all trash, debris, and material residue. Trash subject to being blown by the wind shall be stored in a secure container. Trash includes

material containers, wrappers, and covers in addition to food containers, drinking cups, paper bags, and all other trash of any kind resulting from on-going roofing operations. Trash is to be removed from the jobsite daily.

- C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned. Clean all bituminous materials from all masonry surfaces, equipment, pipes, conduits, paved areas, and grounds.
- D. Clean debris from roofs, gutters, downspouts, and drainage systems as applicable.
- E. Clean site; sweep paved areas, rake clean landscaped surfaces.
- F. Remove waste and surplus materials, rubbish, and construction facilities from the site. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- G. Broom and vacuum clean interior areas prior to the start of surface finishing, and continue cleaning to eliminate dust.

#### 1.19 DEFINITION OF ROOFING SUBSTANTIAL COMPLETION

- A. Substantial Completion of the roof is defined on this Project as that stage in the progress of the job where all integral components covered under the Contract are in place without material defect and performing their intended function. Substantial Completion requires the following specific performance:
  - 1. All roofing and sheet metal must be installed except for minor field painting or touch up of metal.
  - 2. All construction equipment must be disassembled and/or removed from the jobsite.
  - 3. All leftover or excess materials must be removed from the jobsite.
  - 4. The grounds must be cleaned and repaired in substantial accordance with the Contract Documents.
  - 5. Minor punch list items may still be pending.

#### 1.20 WARRANTIES, GUARANTEES, AND CLOSEOUT DOCUMENTATION

- A. Submit documents to Architect/Engineer with the final Application for Payment. Please check all documents for accuracy and completeness paying particular attention to the following items:
  - 1. Be sure the **Owner's Project Number**, if any, appears on all Applications for Payment and warranties.
  - 2. Check all arithmetic to be sure that columns and rows tabulate and cross-tabulate, i.e. they add up in both directions.
  - 3. Required Documents - Submit one digital copy of the documents listed below for closeout.
    - a. Pending Change Orders - All pending or disputed change orders must be resolved, dismissed, or approved, and a written change order signed by all parties prior to the final application for payment. Such change orders must be noted in the Change Order Summary AIA G702, all having **previously** been approved.
    - b. Reconciliation of Unit Priced Allowances - Using the form required, submit a detailed breakdown of quantities consumed from the Unit Price Allowances. This form should be submitted immediately upon completion of tear-off in the case of reroofing, since by that time all such units should be known.
    - c. Certificate of Substantial Completion - Execute a Certificate of Substantial Completion.

- d. Certificate of Asbestos-Free Construction - Execute and have notarized the Certificate of Asbestos-free construction.
- e. Certificate of Guarantee - The Contractor's two (2) year Certificate of Guarantee must be signed on the form provided in the Specifications, a clean copy of which will be sent with a hard copy of this document. Separate guarantees are to be provided for each campus even where multiple campuses are included on the same Contract. Where **multiple buildings** within a campus are covered, an attached Supplement A listing the specific buildings must be attached to the Guarantee. The effective date shall be the date of substantial completion as certified by the Architect/Engineer.
- f. Manufacturer's Warranty - Provide the manufacturer's warranty on the form required in the Specifications, a clean copy of which will be provided to Contractor. Separate warranties are to be provided for each campus even where multiple campuses are included on the same Contract. Where **multiple buildings** within a campus are covered, an attached Supplement A listing the specific buildings must be attached to the Warranty. The date shall be the same as the Contractor's Certificate of Guarantee.
- g. Manufacturer's Total System Warranty - Provide the manufacturer's total system warranty on the form provided in the Specifications, a clean copy of which will be provided to Contractor. Separate warranties are to be provided for each campus even where multiple campuses are included on the same Contract. Where **multiple buildings** within a campus are covered, an attached Supplement A listing the specific buildings must be attached to the Warranty. The date shall be the same as the Contractor's Certificate of Guarantee.
- h. Consent of Surety - Enclose, or have bonding company send to Architect/Engineer directly, the Consent of Surety form authorizing final payment to be made to the Contractor.
- i. Affidavit of Bills Paid From Mechanic's and Materialmen - The form enclosed in the Contract Documents must be signed and notarized as requested. This form must also be provided from **each and every subcontractor** hired and used on the job.
- j. Final Application for Payment - The final application for payment should include all pending change orders and show credit for the unused portion of the contingency allowance. The contingency allowance will be credited on the final change order, if any. Otherwise a credit change order will be issued at the end of the job for the credit due the Owner and signed by all parties as a regular change order.
- k. Confirmation from the appropriate jurisdiction that permits associated with this project have been closed.

## **PART 2 PRODUCTS**

### **2.1 NOT USED.**

## **PART 3 EXECUTION**

### **3.1 NOT USED.**

**END OF SECTION**



## **SECTION 07 54 23**

### **TPO SINGLE-PLY MEMBRANE ROOFING**

#### **PART 1 GENERAL**

##### **1.1 RELATED DOCUMENT**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01-Specification sections, apply to work of this section.

##### **1.2 DESCRIPTION**

- A. Work Included: Work consists of furnishing all labor, materials and equipment necessary to effectively install a fully adhered TPO single-ply roofing membrane system, including but not necessarily limited to, the following:
  - 1. Roofing membrane.
  - 2. Miscellaneous accessories.
- B. Related Work Specified Elsewhere
  - 1. Roof Insulation: Section 07 20 00.
  - 2. Sheet Metal Flashing and Trim: Section 07 62 00.
  - 3. Sealants: Section 07 92 00.

##### **1.3 QUALITY CONTROL**

- A. Reference Standards: Except as modified by the Drawings and Specifications, the following documents, or applicable portions thereof, govern the work.
  - 1. American National Standards Institute (ANSI)/Single Ply Roofing Industry (SPRI):
    - a. ANSI/SPRI FX-1: Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
  - 2. American Society of Civil Engineers (ASCE)/Structural Engineering Institute (SEI):
    - a. ASCE/SEI 7: Minimum Design Loads for Buildings and Other Structures.
  - 3. National Roofing Contractors Association (NRCA) "Roofing and Waterproofing Manual - Fifth Edition."

4. NRCA "2019 Membrane Roof Systems."
  5. Factory Mutual (FM) Global Standards
    - a. FM Global Property Loss Prevention Data Sheet 1-28 Wind Design.
    - b. FM Global Property Loss Prevention Data Sheet 1-34 Hail Damage.
    - c. FM Global Property Loss Prevention Data Sheet 1-49 Perimeter Flashing.
    - d. FM Global Roof Nav ([www.roofnav.com](http://www.roofnav.com)) Roof Assemblies.
- B. Qualifications:
1. Prior to the Notice of Award, the Contractor shall submit evidence of the following:
    - a. Is currently an approved applicator for the specific material manufacturer(s).
    - b. Provide manufacturer(s) applicator certification level:
      - 1) Firestone Master Contractor or Partner in Quality
        - a) Provide Firestone Quality Incidence Rating (QIR) and certification level (Inner Circle, Partner in Quality).
      - 2) Carlisle ESP
        - a) Provide certification level (ESP Premier, Honorary ESP)
      - 3) Johns Manville Peak Advantage
        - a) Provide certification level (Summit, Pinnacle, 5280).
- C. Manufacturer's Products: Obtain roofing materials from only one manufacturer. Provide materials not available from the manufacturer from sources which are recommended and approved by the manufacturer.
- D. Underwriters Laboratories (UL) Listed Products: Provide materials which have been tested and listed by UL, and bear UL label on each package, or are shipped to the project with a UL certification of compliance.
- E. Fire and Insurance Ratings: Comply with ratings as required by governing authorities and codes, and comply with the following:
1. Underwriters Laboratories (UL) "Class A" rating.
  2. Factory Mutual (FM) "1-90" minimum rating.

- F. Roof system must meet uplift requirement for code design wind speed of **V-ult (uplift) = 140 mph** (3-second gust).
- G. Roofing System Design: Provide a membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist the factored design uplift pressures calculated according to SPRI's "Wind Load Design Guide for Fully Adhered and Mechanically Fastened Roofing Systems."
- H. Additional Performance Standards: All roofing system components shall be manufactured, labeled, or specifically approved in writing by the membrane manufacturer issuing the roofing system warranty. In such cases where conflicting requirements exist between FM Global, Underwriters Lab, the project design pressures listed on the Drawings (ASCE 7-16), and the manufacturer's requirements, the most stringent requirements shall govern.

#### 1.4 SUBMITTALS

- A. Required Prior to Commencement of Work
  - 1. Manufacturer's literature, Material Safety Data Sheets and application instructions. All submittals shall be made in triplicate. When submitting manufacturer's literature, highlight all items pertaining to this project.
  - 2. Sample copies of applicable guarantees.
  - 3. Copy of the completed manufacturer's guarantee application.
  - 4. Submit documentation from roofing manufacturer stating that:
    - a. Manufacturer has examined specifications and warranty requirements.
    - b. The products herein specified are acceptable for and compatible with the roofing and flashing system design.
    - c. Manufacturer will issue the specified warranty if the roofing and flashing system is installed in accord with their instructions.
    - d. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other Work.
      - 1) base flashings and membrane terminations;
      - 2) tapered insulation, including slopes; and
      - 3) insulation fastening patterns;

5. Where UL or manufacturer's requirements are specified, provide documentation that shows that the roofing system to be installed is UL-Classified and FM-approved, as applicable; include data itemizing the components of the classified or approved system.
  - a. Factory Mutual Global Standards:
    - 1) Roof Areas A-1 and A-2 shall utilize the roofing assembly and meet specified wind uplift classification (including system manufacturer's specified board insulation, cover board, and accessories) required by FM. ***FM Global RoofNav Assembly provided by contractor.***
  - B. Required After Completion of Work
    1. Contractor's warranty per Section 01 77 00.
    2. Copy of membrane manufacturer's guarantee inspection report.
    3. Manufacturer's guarantee per Section 07 54 23.

## 1.5 PRODUCT DELIVERY AND STORAGE

- A. Delivery of Materials: Deliver material to jobsite in sealed, undamaged containers. Identify each container with material name, date of manufacturer, and lot number.
- B. Keep all materials dry while they are transported, stored and installed. Do not allow materials to be exposed to any moisture anywhere, at any time, during transportation, storage, handling and installation. Reject any new materials which exhibit evidence of moisture during application, or have been exposed to moisture.
- C. Store all materials on raised platforms with weather protective coverings. The manufacturer's standard packaging and covering is not considered adequate weather protection. Tarpaulins are preferred for protection of all roof materials. If visqueen coverings are used, venting of each package is required.
- D. Materials stored on roofs shall be limited to the safe loading of installed materials, decking and structural framing. Ballast shall be stockpiled on the roof in small mounds or rows on the completed roofing

## 1.6 JOB CONDITIONS

- A. All dimensions and existing details shall be field-verified by contractor prior to bidding and acquisition or installation of materials. Contractor shall notify the consultant of any existing condition found to be different than that indicated in the contract documents. Engineer shall review the situation and inform contractor of necessary changes, if any.

- B. Install materials in strict accordance with all safety and weather conditions required by manufacturer, product literature, Material Safety Data Sheets, or of local, state, and federal rules and regulations.
- C. Observe all fire, safety and pollution regulations of governing authorities.

## **1.7 PROTECTION**

- A. Temporary tie-offs and water cut-offs shall be provided by the Roofing Contractor at the end of each day, and where and when a danger exists that water caused by precipitation may get under the new roofing membrane. Tie-offs or cut-offs shall extend beyond new insulation and membrane, and be adhered to the new underlayment. All temporary tie-offs and water cut-offs

shall be removed prior to proceeding with the work by uncovering the edge of the insulation and removing all temporary materials.

- B. When installing temporary tie-offs or water cut-offs, do not cut any staggered insulation pieces that are already installed. Rather, straighten the staggered insulation with unattached pieces of insulation. Remove all temporary insulation pieces prior to proceeding with the work.
- C. Avoid heavy traffic on completed work. Schedule and execute work to prevent excessive traffic on completed roof sections.
- D. Restore to original condition or replace all work and materials damaged by roofing operations.
- E. Protect paving and building surfaces adjacent to hoists and other roofing equipment.
- F. Do not disrupt activities in occupied spaces.
- G. Remove protection upon completion of roofing work.

## **1.8 WARRANTIES**

- A. Warranty (by contractor to the Owner). Applies to all reroofed areas (refer to Section 00 70 00).
- B. Manufacturer's 20-year "No Dollar Limit" Roof System Guarantee (by Materials Manufacturer to the Owner). Applies to all reroofed areas.
  - 1. Wind speed warranty shall be 72 miles per hour.
  - 2. Edge-to-Edge Carlisle Golden Seal Total System Roofing Warranty with limited coverage for accidental punctures and hail (or approved equal).
  - 3. Contractor must contact membrane manufacturer prior to bidding to confirm that all proposed system components are acceptable.
  - 4. Paid for by contractor.

## **1.9 CHANGES IN THE WORK**

- A. During reroofing work, the contractor may encounter existing conditions which are not now known or are at variance with the drawings or specifications (discovery). Such conditions may interfere with reroofing work and may consist of damage or deterioration to the deck or surrounding materials or components which could jeopardize the integrity of the new roof.

The contractor shall notify the engineer of all discoveries he believes may interfere with proper execution of the work or jeopardize the integrity of the new roof prior to proceeding with work related to such discoveries.

- B. In the event of discrepancies within the Drawings, within the Specifications, or between the Drawings and Specification, the more stringent of the two items shown or described shall be considered to be shown or specified at all locations where the discrepancies occur. The Engineer shall be notified of such discrepancies.
- C. When a substitute or alternate is requested by the Contractor, and such substitute or alternate is accepted by the Consultant, the Contractor shall bear all additional costs which may arise directly or indirectly from the use of the substitute or alternate.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. TPO Single-Ply Roofing Membrane
  - 1. Carlisle
  - 2. Firestone
  - 3. Johns Manville

### **2.2 MATERIALS**

- A. General:
  - 1. FM Global Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FM Global Class Number 4450 and 4470 as part of roofing system that are listed in FM Global Approval Guide for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
    - a. Fire/Windstorm Classification: ASTM E108, Class 1A-90.
    - b. Hail Resistance: SH.
  - 2. Roofing-system Design Pressure (Service Level):
    - a. Zone I': 11 psf
    - b. Zone I: 21 psf
    - c. Zone II: 29 psf
    - d. Zone III: 40 psf
  - 3. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing-system manufacturer based on testing and field experience.

4. Source Limitations: Obtain components for roofing system from or approved by roofing-system manufacturer.

B. Single-Ply Membrane

1. Membrane: Flexible, heat weldable sheet composed of thermoplastic polyolefin polymer and ethylene propylene rubber; complying with ASTM D 6878, with polyester weft inserted reinforcement and the following additional characteristics:
  - a. U.L. Class A, FM "1-90" - fully adhered:
    - 1) Carlisle Sure-Weld TPO with APEEL Protective Film (60-mil).
    - 2) Firestone UltraPly TPO (60-mil).
    - 3) Johns Manville 60-mil TPO
  - b. Thickness: 0.060 inch plus/minus 10 percent, with coating thickness over reinforcement (scrim) of 0.034 inch (0.864 mm) plus/minus 10 percent.
  - c. Sheet width: Provide the widest available sheets to minimize field seaming.
  - d. Puncture resistance: 400 lbf (kN), minimum, when tested in accordance FTM 101C Method 2031.
  - e. Initial Solar reflectance: 0.79, minimum, when tested in accordance with ASTM C 1549.
  - f. Color: White.
2. Pipe and Penetration Flashings
  - a. Manufacturer's standard molded TPO pipe flashing. Use field fabricated seals where molded pipe flashings cannot be installed for roof penetrations.
3. Membrane Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.
4. Curb and Parapet Flashing: Same material as membrane, with encapsulated edge which eliminates need for seam sealing the flashing-to-roof splice; precut to 18 inches (457 mm) wide.
5. Formable Flashing: Non-reinforced, flexible, heat weldable sheet, composed of thermoplastic polyolefin polymer and ethylene propylene rubber.
  - a. Thickness: 0.060 inch (1.52 mm) plus/minus 10 percent.



- b. Tensile strength: 1550 psi (10.7 MPa), minimum, when tested in accordance with ASTM D 638 after heat aging.
  - c. Elongation at break: 650 percent, minimum, when tested in accordance with ASTM D 638 after heat aging.
  - d. Tearing strength: 12 lbf (53 N), minimum, when tested in accordance with ASTM D 1004 after heat aging.
  - e. Color: Tan.
- 6. Tape Flashing: 5-1/2 inch (140 mm) nominal wide TPO membrane laminated to cured rubber polymer seaming tape, overall thickness 0.065 inch (1.6 mm) nominal, as required by Manufacturer.
  - 7. Bonding Adhesive: Nitrile rubber based fluid, formulated for compatibility with the membrane other substrate materials, including masonry, wood, and insulation facings.
  - 8. Pourable Sealer: Two-part polyurethane, two-color for reliable mixing; Pourable Sealer, as required by Manufacturer.
  - 9. Seam Plates: Steel with barbs and Galvalume coating; corrosion-resistance complying with FM 4470.
  - 10. Termination Bars: Aluminum bars with integral caulk ledge; 1.3 inches (33 mm) wide by 0.10 inch (2.5 mm) thick, as required by Manufacturer.
  - 11. Cut Edge Sealant: Synthetic rubber-based, for use where membrane reinforcement is exposed, as required by Manufacturer.
  - 12. General Purpose Sealant: EPDM-based, one-part, white general purpose sealant, as required by Manufacturer.
  - 13. Molded Flashing Accessories: Unreinforced TPO membrane pre-molded to suit a variety of flashing details, including pipe boots, inside corners, outside corners, etc., as required by Manufacturer.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates and conditions, with Installer and roofing-system manufacturer's representative for compliance with requirements and for other conditions affecting performance of roofing system.

1. Perform testing according to ANSI/SPRI FX-1 to verify that fastener pull-out values meet or exceed those required by manufacturer and project wind uplift requirements.
- B. Notify Architect in writing of conditions which may adversely affect installation or performance of roof system and recommend corrections.
- C. Commencing roof Work constitutes acceptance of Work surfaces and conditions.

### **3.2 COORDINATION**

- A. Coordinate membrane roofing work with the removal of the existing roofing specified in Section 02 41 20, and installation of new roof insulation, roof boards, and wood blocking specified in Section 07 20 00 - Roof Insulation.
- B. Coordinate base flashing work with new sheet metal installations specified in Section 07 62 00 - Sheet Metal Flashing and Trim.
- C. Do not install roofing materials when rain is imminent. Do not remove excessive quantity of existing roof membrane ahead of reroofing.
- D. Install only as much insulation, roof boards, and roofing as can be covered by TPO membrane and completed by the end of each work day.

### **3.3 PROTECTION**

- A. Take precautions to ensure safety of people, including building users, passers-by, and workmen, and animals, and protection of property, including adjacent building elements, landscaping, and motor vehicles.
- B. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
- C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.
- D. Limit access to Work areas.
- E. Erect temporary protective canopies, as necessary, over walkways and at points of pedestrian and vehicular access that must remain in service during work.
- F. Comply with roofing-system manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products.
- G. Cover adjacent surfaces with materials that are proven to resist roofing materials.

- H. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

### 3.4 PREPARATION OF SUBSTRATE

- A. Examine the surface condition of the substrate and the conditions under which roofing work is to be performed. Do not proceed with the work until unsatisfactory conditions have been corrected in an approved manner.
- B. Remove existing roofing system and other materials to expose substrate.
  - 1. Remove only as much of existing roofing as can be prepared and new temporary roof/vapor retarder (if applicable) or new roofing system installed in one day, unless provisions are implemented to maintain watertightness in interim or larger removal areas are approved by Owner's Representative.
  - 2. Provide temporary protection as needed if watertightness is compromised.
  - 3. Do not begin removal of existing roofing system when weather conditions are not conducive to maintain watertightness or for application of new construction.
- C. Clean the substrate of projection and substances detrimental to the work.
- D. Clean and prepare plywood substrate according to roofing-system manufacturer's written instructions. Provide clean, dust-free, and dry substrate for roofing application.
  - 1. Remove and replace plywood that is damaged, that cannot easily be cleaned, or that does not meet the requirements of roofing-system manufacturer. Use exterior-grade plywood that conforms to APA standards.
  - 2. Verify that plywood is fastened with non-projecting screws. If not, supplement existing fastening with new corrosion-resistant screws.
- E. Close off roof drains and other penetrations to prevent materials from entering and clogging drains and conductors, and from spilling or migrating onto adjacent surfaces. Remove roof-drain plugs when no work is taking place or when rain is forecast and prior to the end of each work day.
- F. Comply with the manufacturer's instructions for the preparation of the substrate to receive the roof system. Installer and roofing-system manufacturer's representative shall examine substrate to ensure that it is properly prepared and ready to receive roofing system. Roofing-system manufacturer's representative shall report in writing to Installer and Architect conditions which will adversely affect roofing-system installation or performance. Do not proceed with roofing-system installation until these conditions have been corrected and reviewed by Architect.

- G. Raise and reset all rooftop equipment as required for proper installation of membrane and flashings. Include any electrical, duct, and piping disconnections, reconnections and extensions required to complete the work.
- H. Take appropriate measures to ensure that fumes from adhesive solvents are not drawn into the building through air intakes. Coordinate all work with Owner.
- I. Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease, and other materials that may damage the membrane. Proceed with installation only after unsatisfactory conditions have been corrected. Commencing installation constitutes acceptance of Work surfaces and conditions.

### **3.5 MEMBRANE INSTALLATION**

#### **A. General**

1. Install roofing and flashing system and all accessory items including seaming, adhesives, flashing, self-flashing, reinforcement (if any) and surfacing in strict accord with roofing manufacturer's printed instructions current at date of bidding.
2. Cut sheets to the maximum size possible, in order to minimize seams and to accommodate contours of roof deck and proper drainage across the shingled laps of the sheets.
3. Install flashing accessories and other items as recommended by the manufacturer, even though not shown on the drawings.
4. Flash roof drains and all penetrations in accordance with manufacturer's recommendations. All flashings shall be covered by counterflashing or other appropriate type of covering, as recommended by the manufacturer.
5. Provide adequate protection of completed work until substantial completion. Prevent traffic, storage or movement of materials or equipment on completed roofing.
6. Prevent materials from entering and clogging drains and from spilling or migrating onto surfaces of other work.
7. Beginning at low point of roof, place membrane without stretching over substrate and allow to relax at least 30 minutes before attachment or splicing; in colder weather allow for longer relax time.
8. Lay out the membrane pieces so that field and flashing splices are installed to shed water.
9. Install membrane without wrinkles and without gaps or fishmouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions and details.

10. Edge Securement: Secure membrane at all locations where membrane terminates or goes through an angle change greater than 2 in 12 inches (1:6) using mechanically fastened reinforced perimeter fastening strips, plates, or metal edging as indicated or as recommended by roofing manufacturer.
  - a. Exceptions: Round pipe penetrations less than 18 inches (460 mm) in diameter and square penetrations less than 4 inches (200 mm) square.
11. Install materials in strict accordance with safety requirements required by roofing-system manufacturer; Safety Data Sheets (SDS); and local, state, and federal rules and regulations.
12. Follow safety procedures of OSHA and other applicable governing agencies. Assume responsibility for Work area safety at all times.
13. Maintain adequate ventilation during installation of roofing materials. Notify Owner's Representative at least one week in advance of Work with materials with noxious vapors. Review application schedule and venting precautions with Owner's Representative prior to beginning application.

### **3.6 FLASHING AND ACCESSORIES INSTALLATION**

- A. Install flashings including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.

### **3.7 FIELD QUALITY CONTROL**

- A. Architect will perform periodic site visits at various stages of construction to observe the Work.
- B. Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes (i.e., not a sales person).
- C. Perform all corrections necessary for issuance of warranty.

### **3.8 CLEANUP**

- A. At the end of each workday, clean Site and Work areas and place rubbish, empty cans, rags, and other discarded materials in appropriate containers.
- B. Clean spillage and soiling from adjacent surfaces using cleaning agents and procedures recommended by manufacturer of affected surface. Exercise care to avoid scratching or damage to surfaces.
- C. Collect surplus roofing materials that cannot be reused and deliver to recycling or disposal facility.

- D. Treat materials that cannot be reused as hazardous waste and dispose of in an appropriate manner.

**END OF SECTION**

## **SECTION 07 72 00**

### **ROOF ACCESSORIES**

#### **PART 1 GENERAL**

##### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1-Specification sections, apply to work of this section.

##### **1.2 DESCRIPTION**

- A. Work Included: Work consists of furnishing all labor, materials and equipment necessary to effectively install new pre-manufactured utility supports and to seal dissimilar materials at critical junctions, but not necessarily limited to the following:
  - 1. Utility supports.
  - 2. Walkway Protection
  - 3. Miscellaneous accessories.
- B. Related Work Specified Elsewhere
  - 1. Selective Demolition (Roof Removal): Section 02 41 00.
  - 2. Thermoplastic Polyolefin (TPO) Roofing: Section 07 54 23
  - 3. Joint Sealants (Roofing): Section 07 92 00.

##### **1.3 QUALITY CONTROL**

- A. Requirements of Regulatory Agencies: The Work under this section shall be subject to all applicable provisions of the state and local building and safety codes.
- B. Qualifications
  - 1. Prior to the Notice of Award, the Contractor shall submit evidence that his existing company has five (5) years continuous successful experience in applying specified material(s) and is currently an approved applicator for the specific material manufacturer(s).
- C. Reference Standards: Except as modified by the Drawings and Specifications, the following documents or applicable portions thereof, govern the work.

1. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) “Architectural Sheet Metal Manual - Fourth Edition.”
2. National Roofing Contractors Association (NRCA) “Roofing and Waterproofing Manual- Fifth Edition.”

#### **1.4 SUBMITTALS**

- A. Required Prior to Commencement of Work
  1. Manufacturer’s literature, Material Safety Data Sheets and application instructions. All submittals shall be made in triplicate. When submitting manufacturer’s literature, highlight all items pertaining to this project.
  2. Shop drawing of new roof accessory.
- B. Required After Completion of Work
  1. Contractor’s Warranty per Section 00 70 00.

#### **1.5 PRODUCT DELIVERY AND STORAGE**

- A. Delivery of Materials: Deliver material to jobsite in sealed, undamaged containers. Identify each container with material name, date of manufacturer, and lot number.

#### **1.6 JOB CONDITIONS**

- A. All dimensions and existing details shall be field-verified by Contractor prior to bidding and acquisition or installation of materials. Contractor shall notify the engineer of any existing condition found to be different than that indicated in the Contract Documents. Engineer shall review the situation and inform Contractor of necessary changes, if any.
- B. Install materials in strict accordance with all safety and weather conditions required by manufacturer, product literature, Material Safety Data Sheets, or of local, state, federal rules and regulations, and standard practice.

#### **1.7 WORK SEQUENCE**

- A. Do not install roof specialties and accessories materials when rain is imminent. Do not remove excessive quantity of existing materials ahead of re-installing new.
- B. Installation of new roof specialties and accessories shall be coordinated with roof removal operations defined in Section 02 41 00 - Selective Demolition.



## 1.8 CHANGES IN THE WORK

- A. During reroofing work, the Contractor may encounter existing conditions which are not now known or are at variance with the Drawings or Specifications (discovery). Such conditions may interfere with reroofing work and may consist of damage or deterioration to the deck or surrounding materials or components which could jeopardize the integrity of the new roof. The Contractor shall notify the Engineer of all discoveries he/she believes may interfere with proper execution of the work or jeopardize the integrity of the new roof prior to proceeding with the work related to such discoveries.
- B. In the event of discrepancies within the Drawings, within the Specifications, or between the Drawings and Specifications, the more stringent of the two items shown shall be considered to be shown or specified at all locations where the discrepancies occur. The Engineer shall be notified of such discrepancies.
- C. When a substitute or alternate is requested by the Contractor, and such substitute or alternate is accepted by the Engineer, the Contractor shall bear all additional costs which may arise directly or indirectly from the use of the substitute or alternate.

## 1.9 WARRANTY

- A. Contractor's Warranty: (by Contractor to Owner). Applies to all installed roof specialties and accessories (refer to Section 00 70 00).

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Utility Supports
  - 1. Utility Supports: Type suitable for height and size of pipe over utility line as manufactured by Cooper B-Line of Highland, Illinois, or Engineer-approved equal.
  - 2. Modify existing supports to accommodate slope of new roof system.
- B. Walkway Protection
  - 1. Flexible Walkway: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16-inch thick; approved by roofing-system manufacturer.
  - 2. Color approved by Owner.

## **PART 3 EXECUTION**

### **3.1 PREPARATION OF SUBSTRATE**

- A. Examine the surface condition of the substrate under which support is to be installed. Do not proceed with the new installation until unsatisfactory conditions have been corrected in a manner approved by the Architect/Engineer.
- B. Clean the substrate of obstructions and substances detrimental to the work.
- C. Proceeding with the work shall signify the Contractor's acceptance of the substrate being used under supports.

### **3.2 UTILITY SUPPORT INSTALLATION**

- A. Install protection over roofing and under support.
- B. Install new supports as needed; adjust to slope of roof and height of utilities.
- C. Utility lines must be properly supported and will not require raising or lowering for installation of supports.

### **3.3 WALKWAY PROTECTION INSTALLATION**

- A. Install walkways on roof membrane at doors; on three sides of hatches; below equipment and supports; at base and top of roof access ladders; at base of HVAC access ladders; below prefabricated, service-line supports; below duct supports, service lines, and condensate lines; and at other locations indicated.
- B. Installation and location of walkway shall adhere to the requirements of OSHA.
- C. Installation of walkways shall be in strict accordance with the manufacturer's requirements. Any walkway material that is found to be in non-conformance with the contract documents, manufacturer's requirements, or OSHA shall be removed and replaced. If removal is determined to be more detrimental to the work than leaving in-place, the contractor shall reimburse the owner for each walkway pad found to be in non-conformance.
- D. Use only full-size units, except partial units at corners if necessary to provide neat, finished appearance. Walkway material shall not conflict or be installed over membrane detail flashings or field seams.
- E. Provide 2-inches minimum between adjacent units. Extend walkway 6-inches minimum beyond edges of equipment supports.
- F. Sweep loose surfacing material from walkway locations.

- G. Adhere pads or rolls to substrate with compatible adhesive, in accordance with recommendations of walkway and roofing-system manufacturers.

### **3.4 CLEANUP**

- A. Remove trash, debris, and equipment from the jobsite.
- B. Repair damage and remove stains caused by the Work.

**END OF SECTION**

## **SECTION 07 92 00**

### **JOINT SEALANTS (ROOFING)**

#### **PART 1 GENERAL**

##### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1-Specification sections, apply to work of this section.

##### **1.2 DESCRIPTION**

- A. Work Included: Work consists of furnishing all labor, materials and equipment necessary for complete application of all sealant, as shown on Drawings or described in these Specifications, including, but not necessarily limited to, the following:
  - 1. Surface preparation including primers.
  - 2. Joint backup material.

##### **1.3 QUALITY CONTROL**

- A. Requirements of Regulatory Agencies: Work under this section shall be subject to all applicable provisions of federal, state and local rules and regulations.
- B. Applicator: Company specializing in application of sealants with five (5) years minimum experience and be acceptable to manufacturer.
- C. Adhesion tests: Prior to any sealant application, perform adhesion tests as directed by sealant manufacturer's technical representative.

##### **1.4 SUBMITTALS**

- A. All submittals required under this section will be submitted to the Engineer.
- B. Submittals: Manufacturer's literature, Material Safety Data Sheets and application instructions for each type of material used.

##### **1.5 PRODUCT DELIVERY AND STORAGE**

- A. Delivery: Deliver materials to jobsite in sealed, undamaged containers. Identify each container with material name, date of manufacture, and lot number.

## 1.6 JOB CONDITIONS

- A. Install sealant materials in strict accordance with all safety and weather conditions recommended by manufacturer, product literature, or Material Safety Data Sheets. Do not proceed with installation of sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation. Proceed only when forecasted weather conditions are favorable for proper cure and development of high-early bond strength. Wherever joint width is affected by ambient temperature variations, install elastomeric

sealants only when temperatures are in lower third of manufacturer's recommended installation temperature range.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

#### **A. Approved Sealants**

1. One-Component polyurethane low-modulus, non-sag sealant: Tremco "Dymonic," Pecora "Dynatrol I," Sonneborn "Sonolastic NP-1," Sika "Sikaflex 1a" or Sikaflex 15 LM."
2. Tape: For concealed metal-to-metal contact, use polyisobutylene type, non-skinning, non-drying tape: 1-inch minimum width, 1/16-inch minimum thickness Presstite "579 Series," PPG" Duribbon 1072, "Tremco "440 TAPE."

#### **B. Sealant Primer**

1. Use primer recommended by manufacturer of sealant used, for each specific application.

#### **C. Backup Material for All Sealants**

1. Sealant Backer Rod: Compressible rod stock of closed cell polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible permanent, durable non-absorptive material as recommended by sealant manufacturer for compatibility with sealant used.
2. Bond Breaker Tape: Polyethylene tape or other bond breaker as recommended by sealant manufacturer to be applied to sealant contact surfaces where bond to the substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape wherever applicable.
3. Expansion Joint Filler: Closed cell polyethylene foam, as recommended by sealant manufacturer and compatible with sealants used.

#### **D. Colors: For exposed materials provide color as selected by Owner from manufacturer's standard colors. For concealed materials, provide the natural color which has the best overall performance characteristics.**

#### **E. Compatibility: Before purchase of each required material, confirm its compatibility with each other material it will be exposed to in the joint system.**

## **PART 3 EXECUTION**

### **3.1 PREPARATION**

- A. Preparation must be done in a good and workmanlike manner which meets recommendation of manufacturer and the following minimum requirements or standards.

### **3.2 INSPECTION**

- A. Examine surfaces where sealant is to be applied for:
  - 1. Defects or coatings on substrate that will adversely affect adhesion of sealants, or execution or quality of work.
  - 2. Deviations beyond allowable tolerances for installation of sealants.
- B. Do not start Work until unsatisfactory conditions are corrected.
- C. Beginning of installation means acceptance of substrate.

### **3.3 JOINT DESIGN**

- A. Sealant depth is measured at the center (thin) section of sealant bead.
- B. Install sealants to depths and widths as recommended by sealant manufacturer. Also, conform to the following general limitations if not in conflict with sealant manufacturer's recommendations:
  - 1. For normal moving joints not subject to traffic, fill joints to a depth equal to 50 percent of joint width, but neither more than 5/8 inch deep nor less than 1/4 inch deep.
  - 2. Depth of sealant must not exceed width of joint.
  - 3. Sealant joints shall not be less than 1/4 inch in width and 1/4 inch in depth.

### **3.4 SURFACE PREPARATION**

- A. Preparation work shall result in clean surfaces in all areas where sealant is to be adhered. Such surfaces shall be free of any old sealant, contaminants and impurities which are deleterious to bonding or adhesion of primers or sealant.
- B. Clean ferrous metals of all rust, mill scale and coatings by wire brush or grinding. Any equipment used to remove rust shall be free of oil contaminants.
- C. Wire brush masonry joint surfaces, then blow clean with oil-free compressed air.

- D. Wipe all glass and aluminum surfaces clean per manufacturer's recommendations as needed to remove surface contamination.
- E. Apply primer per manufacturer's recommendations. Allow primer to dry prior to applying sealant.
- F. Do not caulk joints until they are clean, dry, and free of dust, loose mortar, old sealant, foreign matter or other bond inhibiting materials, and in compliance with requirements of manufacturer of materials, details shown on Drawings, and specific requirements of other sections of Specifications.

### **3.5 JOINT BACKING**

- A. Use joint backing to control depth of joint to specified thickness.
- B. Select joint backing size to allow for 25 percent compression of backing when inserted into joint.
- C. Where depth of joint will not permit use of joint backing, or wherever recommended by sealant manufacturer, install bond-breaker tape to prevent three-sided adhesion.
- D. Do not leave voids or gaps between ends of joint backing units.

### **3.6 APPLICATION OF SEALANT**

- A. Apply sealants neatly, in a good and workmanlike manner which meets following minimum requirements or standards. Specific instructions of manufacturer must also be followed.
- B. Apply sealant using a gun with proper size nozzles. Use sufficient pressure to fill all voids and joints solid to backup material, with complete wetting of all joint bond surfaces.
- C. Applied sealant shall form a full, smooth, uniform bead, free of ridges, wrinkles, sags, air pockets and embedded impurities.
- D. After joint has been completely filled with sealant, neatly tool joint sealant to eliminate air pockets or voids, and to provide a smooth, slightly concave, neat appearing finish, with sealant surface slightly below adjoining surfaces. Wetting of finished surface will not be allowed.
- E. Where horizontal joints are located between a horizontal surface and vertical surface, fill joint to form a slight cove, so joint will not trap moisture and dirt.
- F. Protect adjacent surfaces and systems from sealant material. Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.



### **3.7 CURE AND PROTECTION**

- A. Cure sealants in compliance with manufacturer's instructions and recommendations, to obtain high-early bond strength, internal cohesive strength and surface durability. Protect joint sealers during construction period so they will be without deterioration or damage (other than normal wear and weathering) at time of acceptance by Owner.

### **3.8 JOBSITE CLEANUP**

- A. Sealant applicator must remove all excess materials from jobsite.
- B. Leave all surrounding areas where joint sealant has been applied free of excess sealant, debris and foreign substances.

**END OF SECTION**

## SECTION 23 00 75

### ROOF RELATED MECHANICAL WORK

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Disconnect, rewire, and reconnect all electrical connections, junction boxes, and switches of all kinds relating to the air conditioning or air handling equipment, and reconnect in accordance with all provisions of the International Building Code.
- B. Install new cutoff switches as required for Code compliance.
- C. Disconnect all gas lines on the rooftop and raise all elbows a minimum of 12 inches above the plane of the finished roof. Reconnect and test in accordance with Code requirements.
- D. Furnish all new curbs required for proper sizing of new equipment. Existing curbs may be reused where sizes match.
- E. Install structural bracing as needed beneath each curb for proper support and structural integrity.
- F. Provide new guardrails for any existing or new equipment that is located closer than 10 feet to a roof edge, unless the edge is a parapet that is at least 44 inches high.
- G. Paint all gas lines “safety yellow”.

##### 1.2 ROOF MEMBRANE PROTECTION REQUIREMENTS

- A. Wherever a contractor is working on an existing roof membrane, the Contractor shall protect all traffic points where equipment is being lifted, set, or moved across the roof and all work areas by the workers or crews.
- B. Such rooftop protection shall extend to not overloading the structure, denting, deflecting, crushing, or compressing the roof deck or roof insulation beneath the roof membrane.
- C. The Contractor shall set all loads over columns or structural beams designed to support such loads. Wherever equipment is to be set on the roof membrane temporarily, the roof shall be protected in the following manner.
  - 1. 1/2-inch plywood shall be laid over the roof membrane, and the equipment set either on pallets, wood runners, or timbers of a suitable size, resting on the plywood to spread the load over a larger area and avoid point or concentrated loads.
- D. In addition to protecting the roof temporarily from concentrated loads, plywood shall be laid in all areas where workers will be standing or setting tools, or equipment used in the rooftop MEP work. The roof is not to be used as a work surface without 1/2-inch plywood laid over the area. This extends not only to foot traffic, but also to such equipment as sawhorses, pipe cutters, and other similar devices.
- E. Wherever personnel are to traffic, or equipment is to be transported across the roof, plywood runways shall be laid across the roof as a temporary walkway to protect the roof from damage

from such traffic or transportation. At the end of each day, all plywood protection of any type is to be taken up, banded, and bundled in such a manner as to protect it from causing wind damage. Such plywood shall be stored on the roof in a safe and secure manner, and any damage to the roof or other building components or features from blowing of any protection materials or any other loose components, parts, or pieces shall be the responsibility of the Contractor.

- F. Upon completion of the Work, the roof is to be cleaned completely of all debris, trash, pieces, parts, screws, metal slivers, or any other items left over from the Work.

### **1.3 WARRANTY**

- A. Contractor's Warranty - Furnish a two (2) year warranty against defects in workmanship and materials.

### **1.4 QUALITY ASSURANCE**

- A. Authorities - All Work shall be installed in strict compliance with the following authorities:
  1. (NFPA) National Fire Protection Association
  2. (OSHA) Occupational Safety and Health Administration
  3. (NEC) National Electrical Code
  4. (ASHREA) American Society of Heating And Refrigeration Engineers
  5. (IBC) International Building Codes
  6. (EPA) Environmental Protection Agency
  7. (IMC) International Mechanical Codes
- B. Where licenses or certifications are required, all such workers performing said work shall be licensed or certified as required including but not limited to.
  1. Plumbing
  2. HVAC
  3. Electrical
  4. Controls, Data, and Security

## **PART 2 PRODUCTS**

### **2.1 PRODUCTS**

- A. Approved Manufacturers - All replacement parts, components, and fittings shall be as specified by the original manufacturer of the equipment.

## **PART 3 EXECUTION**

### **3.1 FIELD QUALITY CONTROL**

- A. The Contractor shall inspect each piece of equipment prior to commencing Work, verify its performance in the presence of the Roofing Architect/Engineer, and note any deficiencies in performance in writing.

### **3.2 DISCONNECTION**

- A. All electrical and plumbing equipment shall be disconnected by licensed electricians or plumbers and safely deactivated prior to any Work by Contractor's own forces.

### **3.3 TEMPORARY RELOCATION**

- A. Units shall be moved aside and stored on wood blocking and plywood in order to provide access to roofing membrane beneath equipment. All metal flashings tying directly into the existing roof membrane shall be removed and replaced.

### **3.4 CURB-TYPE FLASHINGS**

- A. All penetration flashings shall be replaced with wood curbs fastened securely to the deck with wood cants as detailed elsewhere. All curbs shall extend a minimum of 16 inches above the plane of the finished roof. All curbs shall be sized in such a manner as to permit 1-inch clearance on all sides between the curb and mechanical or electrical device resting on the curb. Such clearance is required to permit proper roofing material flashings without gouging the corners.
- B. Curbs may be prefabricated (such as Thycurb LM) or constructed with lumber and plywood, but the configuration must match the details in the Drawings when finished. Linear curbs are not permitted unless specifically shown and noted on the Drawings.

### **3.5 ELECTRICAL AND PLUMBING CONNECTIONS**

- A. All electrical conduit (flexible or rigid) shall be neatly collected and gathered into one uniform bundle, banded at 6-inch intervals, and run in the most direct way from either end of the connections. However, the conduit and plumbing lines shall not be stretched or laid on the roof membrane itself. Such lines shall be supported as detailed.

### **3.6 DRIP LOOPS**

- A. All conduit or condensation lines run from curb type flashings with metal covers shall be sloped downward from the highest point in such a manner as to cause rain water to flow away from the flashing.

### **3.7 HOODED FLASHINGS**

- A. All conduit and piping shall be flashed using permanent wood or steel curbs with hooded covers. Pitch pans are not permitted for any reason. All hooded flashings shall have all joints and connections soldered or welded as appropriate for the metal gauge being employed. Joints using sealant as the primary waterproofing agent are not acceptable.

### **3.8 COUNTERFLASHINGS**

- A. Equipment cannot be its own counterflashing. All mechanical and electrical devices shall have a two-piece counterflashing/receiver installed over the bituminous roof flashing prior to installation of the mechanical or electrical device.

### **3.9 CLEAN-UP**

- A. All bitumen, plastic cement, primer, and other bituminous material shall be cleaned off all mechanical equipment, sheet metal flashings, and conduit thus providing a neat, clean, and professional appearance.

### **3.10 OPERATION AND TESTING**

- A. Upon reconnection, each unit shall be tested in the presence of the Roofing Architect/Engineer and Owner's representative. All units shall be placed in the operating condition existing upon commencement of the job. Repairs resulting from damage to units from moving, relocation, disconnection, and reconnection shall be the Contractor's responsibility.

### **3.11 HEATER EXHAUST VENTS**

- A. All heater exhaust vents shall be installed in such a manner as to avoid contact between a heated pipe and wood decking or framing of any sort. The hole shall be enlarged and framed as necessary to accommodate the heated pipe with clearances as required to meet the Code.

**END OF SECTION**