

**SECTION 02 50 00**  
**SITE WORK**

**INDEX**

**PART 1 – GENERAL**

- 1.1 DEMOLITION
- 1.2 PROTECTION
- 1.3 SITE REPAIR
- 1.4 CLEAN-UP AND DAMAGE REPAIR

**PART 1 - GENERAL**

- 1.1 DEMOLITION
  - A. This section includes removal and disposal of the existing building roofing material and other construction related debris and material as required.
  
- 1.2 PROTECTION
  - A. Protection shall be provided for, but not necessarily limited to, the following:
    - 1. Lawn area and adjacent structures.
    - 2. Existing paving/curbs for streets, alleys and driveways.
    - 3. Building walls, windows, etc.
    - 4. Building equipment adjacent or impacted by project.
    - 5. Building interior, including contents.
  - B. Protection shall be defined as the minimum requirements necessary to ensure that when the project is completed, the Owner's and any property will be left in the same condition as it was when the project started.
  - C. Any damage to interior or exterior contents due to leakage due to related project work by Contractor shall be restored to original condition at Contractor's expense.
  
- 1.3 SITE REPAIR
  - A. Repair or replace any damaged curbs, sidewalks, rutted yard areas, shrubs, trees, sprinkler system, etc.
  - B. Restore areas and items to their original condition prior to construction at the Contractor's expense.
  
- 1.4 CLEAN-UP AND DAMAGE REPAIR
  - A. Any existing items, structures, or areas damaged during the course of the construction shall be repaired and restored to a condition at minimum, equal to than it was prior to commencement of work.

**END OF SECTION 02 50 00**

**SECTION 06 10 53  
ROUGH CARPENTRY**

**INDEX**

**PART I - GENERAL**

- 1.1 SCOPE OF THIS SECTION
- 1.2 DEFINITIONS
- 1.3 SUBMITTALS
- 1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

**PART II - PRODUCTS**

- 2.1 MATERIALS
- 2.2 GRADING
- 2.3 TREATMENT

**PART III - EXECUTION**

- 3.1 INSTALLATION
- 3.2 FIELD QUALITY CONTROL

**PART I - GENERAL**

- 1.1 SCOPE OF THIS SECTION
  - A. Wood blocking, furring, grounds, curbs, nailers and other rough wood items.
  - B. Exterior plywood and rough plywood used in concealed or semi-concealed areas.
  - C. Rough hardware.
- 1.2 DEFINITIONS
  - A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
    - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
    - 2. NLGA: National Lumber Grades Authority.
    - 3. RIS: Redwood Inspection Service.
    - 4. SPIB: The Southern Pine Inspection Bureau.
    - 5. WCLIB: West Coast Lumber Inspection Bureau.
    - 6. WWPA: Western Wood Products Association.
- 1.3 SUBMITTALS
  - A. Certification as requested by Engineer:
    - 1. Preservative treated wood: Submit certification that moisture content was reduced to 10% maximum, after treatment.
- 1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING
  - A. Immediately upon delivery to job site, place materials in area protected from weather.
  - B. Store materials above ground and cover.
  - C. Do not store seasoned materials in wet or damp portions of building.
  - D. Protect sheet materials from corners breaking and damaging surfaces, while unloading.

**PART II - PRODUCTS**

- 2.1 MATERIALS
  - A. Rough Hardware:
    - 1. Anchor bolts shall be steel complete with nuts and washers.
    - 2. Lag bolts and miscellaneous bolts and screws shall be type, size and finish best suited for intended use.
    - 3. Expansion shields shall be type and size best suited for intended use.
    - 4. Nails and staples shall be size and type best suited for the purpose, in accordance with Fed Spec FF-N-105 when applicable to type used. Recommend nailer head to be 3/16" diameter, minimum.
    - 5. Roofing nails for wood nailers shall be 11 gauge, barbed, zinc-coated nails with 7/16 to 1-inch diameter heads. Nails shall be long enough to penetrate into the bottom wood nailer at least 1 ¼

- inch.
- B. Wood:
1. For items of dimension lumber size, provide Construction or No. 2 and any of the following species:
    - a. Hem-fir (north); NLGA.
    - b. Mixed southern pine; SPIB.
    - c. Spruce-pine-fir; NLGA.
    - d. Hem-fir; WCLIB or WWPA.
    - e. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
    - f. Western woods; WCLIB or WWPA.
    - g. Northern species; NLGA.
    - h. Eastern softwoods; NeLMA.
  2. Blocking, grounds, nailing strips, sleepers, cant strips, nailers, roof opening curbs, and other non-stress graded members shall conform to the "National Grading Rule for Dimension Lumber" established in conformance with Section 10, Product Standard PS 20.
  3. Wood blocking in contact with exterior concrete, exposed exterior wood, exterior masonry, or wood embedded in concrete shall be lumber treated with pressure preservative meeting AWPB LP-2.

## 2.2 GRADING

- A. Moisture content shall not exceed 18%. Materials with a nominal thickness of 3" or less shall be kiln dried. Lumber shall be new S4S unless noted otherwise, sound, seasoned and free from warp that cannot be corrected in process of nailing or bridging.
- B. Grade and trademark shall be required on each piece of lumber or on each bundle in bundled stock, unless shipment is accompanied by certificate of inspection issued by grading organization.

## 2.3 TREATMENT

- A. Blocking used on the exterior of the building, including all new blocking within the roofing system, shall be not be pressure treated wood.

## PART III - EXECUTION

### 3.1 INSTALLATION

- A. General:
  1. Members shall be closely fitted with minimum space, accurately set to required lines and levels and rigidly secured in place.
  2. No wood material shall be left exposed to the elements after installation for more than 5 days. Such material shall be removed and replaced with new at the Contractors' own cost.
- B. Method of Fastening:
  1. Fasten carpentry items to building construction to provide a secure, permanent installation. Use spacings and sizes of bolts screws, and nails which exceed the strength of members being fastened. Failure due to over-stressing must occur in the members before occurring in the fastenings.
  2. Fastenings shall be as follows:
    - a. Nailing shall be as required to assemble and secure wood construction.
    - b. Existing edge nailers shall be in good condition with no rotted wood or splits. Existing fasteners shall be adequate to resist the design wind load and not be corroded or missing. Consult Engineer/Owner for removal and replacement of such prior to installation.
    - c. Bolts anchoring wood nailers to concrete block walls shall be spaced 4 feet apart. At outside building corners bolts shall be maximum 2 feet apart, 8 feet each way from the corner.
    - d. Nailer installed parallel to ribs of steel deck: Attach nailer to each roof joist with a 3/4" diameter bolt or secure nailer with 2 rows of No. 10 (5 mm) galvanized sheet metal screws at 24 inches on center, using a 5/8 inch outside diameter washer under the heads.
    - e. Nailer installed at right angle to ribs of steel deck: Attach nailer with 2 rows of No. 10 (5 mm) galvanized sheet metal screws at 24 inches on center.

- f. Top nailers to other wood members shall be fastened at 24 inches, two rows, on center, staggered. At 8 feet from each outside corner, spacing shall be maximum of 12 inches on center. Embed nails a minimum 1 ¼" into bottom nailer.
- g. Members of multiple board configuration shall have each layer nailed individually and have interlocked (dovetailed) corners.
- h. Fastener load to be minimum 200 pounds/foot or meet wind load requirements as determined by ANSI/SPRI/FM/ES-1- *Wind Design Standard for Edge Systems used with Low Slope Roofing Systems*. If design load is suspected of not being met, Engineer or Owner has option to perform pullout test. If test results show load requirements not being met, removal of fastener and installation of such to meet load requirement is at no additional cost to Owner.

### 3.2 FIELD QUALITY CONTROL

- A. Selection of Lumber Pieces
  - 1. Select individual pieces so that knots and obvious defects will not interfere with placing bolts or proper nailing or making proper connections.
  - 2. Cut out and discard all defects, which will render a piece unable to serve its intended function.
  - 3. Lumber may be rejected by the Engineer, whether or not it has been installed; for excessive warp, twist, bow, crook, mildew, fungus, or mold, as well as for improper cutting and fitting.
- B. Cutting and Fitting
  - 1. All necessary cutting and fitting of wood construction for mechanical, electrical, and other trades shall be done by workers experienced in the carpentry trade.
  - 2. Make all necessary repairs to wood construction after the completion of work by other trades.

**END OF SECTION 06 10 53**

**SECTION 07 21 00  
ROOF AND DECK INSULATION**

**INDEX**

**PART 1 - GENERAL**

- 1.1 SECTION INCLUDES
- 1.2 REFERENCES
- 1.3 SYSTEM DESCRIPTION
- 1.4 SUBMITTALS
- 1.5 DELIVERY, STORAGE, AND HANDLING
- 1.6 QUALITY CONTROL

**PART 2 – PRODUCTS**

- 2.1 INSULATION MATERIALS
- 2.2 INSULATION ADHESIVE

**PART 3- EXECUTION**

- 3.1 INSPECTION OF SURFACES
- 3.2 INSULATION INSTALLATION

**PART 1 - GENERAL**

- 1.1 SECTION INCLUDES
  - A. Rigid Board Insulation
  - B. Installation
- 1.2 REFERENCES
  - A. ASTM C 165 Recommended Practice for Measuring Compressive Properties of Thermal Insulation
  - B. ASTM C 177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus
  - C. ASTM C 272 Test Method for Water Absorption of Core Materials for Structural Sandwich Construction
  - D. ASTM C 390 Standard Criteria for Sampling & Acceptance of Preformed Thermal Insulation Lots
  - E. ASTM C 518 Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter
  - F. ASTM C1289 Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation
  - G. ASTM D 41 Specification for Asphalt Primer Used in Roofing and Waterproofing
  - H. ASTM D1621 Test Method for Compressive Properties of Rigid Cellular Plastics
  - I. ASTM D1622 Test Method for Apparent Density of Rigid Cellular Plastics
  - J. ASTM D2126 Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
  - K. ASTM D4601 Specification for Asphalt Coated Glass Fiber Base Sheet Used in Roofing
  - L. ASTM E84 Test Method for Surface Burning Characteristics of Building Materials
  - M. ASTM E96 Test Methods for Water Vapor Transmission of Materials
- 1.3 SYSTEM DESCRIPTION
  - A. Level A High Roof : Remove existing insulation to existing metal deck material noted on plans.
  - B. On roof area Level A: Install new 4.5 inches of polyisocyanurate insulation (2 layers: one layer 2 inches, second layer – 2.5 inches) with mechanical fasteners at density of one fastener per 2.67 s.f. (12 fasteners per 4' x 8' board) in field and perimeter. Corners install one fastener per 2.s.f. Install new ½ inch high density polyisocyanurate insulation in insulation adhesive over base insulation (12 inches bead spacing -field, 9 inches bead spacing for 12 foot perimeter, 6 inch bead spacing corner - 12 x 12').
  - C. Design uplift loads Level A (perimeter and corner areas defined as 12 feet)
    - Field - 35 psf
    - Perimeter - 59 psf
    - Corners - 88 psf
  - D. Level B Low Roof : Remove existing EPDM sheet to existing insulation material noted on plans. Remove existing wet gypsum cover board or polyiso insulation and replace with new thickness match existing. Include 500 s.f. of gypsum coverboard and 500 s.f of 3 inch polyiso to remove and replace in Base Bid.

- E. On roof area Level B: Install new 1.5 inches of polyisocyanurate insulation with mechanical fasteners at density of one fastener per 2.67 s.f. (12 fasteners per 4' x 8' board) in field and perimeter. Corners install one fastener per 2.s.f. and ½ inch high density polyisocyanurate insulation in insulation adhesive over base insulation (12 inches bead spacing – field, 9 inches bead spacing for 6 foot perimeter, 6 inch bead spacing corner – 6' x 6').
- F. Design uplift loads Level B (perimeter and corner areas defined as 6 feet)
  - Field - 33 psf
  - Perimeter - 55 psf
  - Corners - 82 psf

#### 1.4 SUBMITTALS

- A. As requested by Engineer, provide manufacturer's specification data for insulation, adhesive and mechanical fasteners.
- B. Provide layout pattern for mechanical fasteners for the top layer of insulation that is fastened, if requested by Engineer.
- C. Provide a sample of each insulation type, if requested by Engineer.
- D. Provide one sample of each type of mechanical fastener and plate, if requested by Engineer.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store all insulation materials in a manner to protect them from the wind, sun, and moisture damage prior to and during installation. Any insulation that has been exposed to any moisture shall be removed from the project site.
- B. Keep materials enclosed in a watertight, yet ventilated enclosure (i.e., tarpaulins).
- C. Store materials off of the ground on pallets or other suitable means. Any warped or broken insulation boards shall be removed from the site.
- D. Deliver materials to job site in manufacturer's original wrapping marked with name of manufacturer and density of insulation.
- E. Materials stored on the roof shall be placed so as not to impede or disturb existing drainage flow.

#### 1.6 QUALITY CONTROL

- A. Engineer or Owner has right to test any shipment, per ASTM C390, for specifications at their own expense, if shipment meets specifications. If shipment is determined not to meet the specifications, then that shipment of material will be removed from the job site and other shipments will be tested at no expense to Owner or Engineer.

### PART 2 - PRODUCTS

#### 2.1 INSULATION MATERIAL

- A. Polyisocyanurate Insulation - Base Layer
  - 1. Acceptable Manufacturers
    - a. Johns Manville
    - b. Hunter panels
    - c. Atlas Energy Products
    - d. RMax, Inc.
    - e. Firestone
    - f. Carlisle
    - g. Versico
    - h. Approved Equivalent
  - 2. Insulation board shall meet the following requirements:
    - a. Federal Specification HH-I-1972, Class I
    - b. UL listed
    - c. ASTM C1289 - Type II (fibrous felt or glass facer both sides)
    - d. Design R-value - 5.6 per one inch
    - e. Meet Factory Mutual specs for FM 4450 & 1-60 uplift

3. Physical Properties

Property	Test Method	Specifications
Dimensional Stability	ASTM D2126	2% max.
Compressive Strength	ASTM D1621	20 psi min.
Vapor Permeability	ASTM E96	1 perm max.
R-Factor HR (Ft. squared per ASTM C518 degree Fahrenheit per BTU) per inch thickness	ASTM C177 or ASTM C518	5.6

B. High Density Polysiocyanurate (cover board)

1. Acceptable Manufacturers
  - a. Hunter Panel - H-Shield HD
  - b. Atlas Foam-AC Foam HD
  - c. Firestone-Isogard HD
  - d. Carlisle & Versico-SecurShield HD Plus
  - e. Johns Manville-Invinso Roof Board
  - f. Pre-approved equal
2. Requirements
  - a. Composition: Faced with coated or uncoated polymer bonded glass fiber mat facers on both major surfaces of the core.
  - b. Meets ASTM C1289-16, Type II, Class 4 Grade 1 minimum
  - c. 1/2" thickness: 4'x4' size
3. Physical Properties

Property	Test Method	Specifications
Compressive Strength	ASTM D1621	80 psi min.

2.2 INSULATION ADHESIVE

- A. Polyurethane adhesive, dispensed from pre-pressurized containers requiring no external power source.
- B. Approved Products - A two component (Part A and B) polyurethane low-rise adhesive for bonding insulation to approved compatible substrates.
  1. Millennium Adhesives
  2. Oly-Bond by Olympic Mfg.
  3. Firestone
  4. Carlisle
  5. Verisco
  6. Engineer approved equivalent prior to bid.

2.3 FASTENERS

- A. Metal Deck
  1. Acceptable Manufacturers
    - a. Construction Fasteners, Inc.
    - b. ITW Buildex
    - c. Tru-Fast Corp
    - d. The Rawlplug Company, Inc.
    - e. Olympic Fastener
    - f. Firestone

- g. Carlisle SynTec
- h. Approved Equivalents
- 2. Requirements
  - a. Plates shall be a minimum three inches in diameter and composed of galvanized steel or plastic.
  - b. Fastener and plate shall meet the requirements of FM Standard 4470 passing the SPRIU Corrosion Test Procedures - Kesternich DIN-50018 with 15% red rust allowable.
  - c. Fastener and plate shall be approved within applicable FM tested roof system.
- B. Wood Components
  - 1. Used Factory Mutual approved fasteners and fastening pattern to install wood blocking and nailers. Minimum pull-out load to be 200 pounds/foot or meet wind load requirements as determined by ANSI/SPRI/FM/ES-1 - *Wind Design Standard for Edge Systems used with Low Slope Roofing Systems*.

### **PART 3-EXECUTION**

#### **3.1 INSPECTION OF SURFACES**

- A. Examine surfaces for adequate anchorage, foreign materials, moisture and other conditions which would adversely affect the roofing application and performance.
- B. The roofing contractor shall be responsible for preparing substrate to install insulation. Any conditions which require revision of Contract Documents shall be brought to Engineer's or Owner's attention for resolution.
- C. Existing decks containing residual asphalt must be cleaned and scraped as smooth as possible.

#### **3.2 INSULATION INSTALLATION**

- A. Roof Insulation
  - 1. Insulation shall be laid in parallel courses with all joints staggered between courses.
  - 2. Insulation shall be neatly fitted to all roof penetrations, projections and nailers with no gaps greater than 1/4-inch. Tapered/field cut insulation shall be installed around roof drains in such a way as to provide adequate slope for runoff into drain. Under no circumstances will the membrane be left un-supported in an area greater than 1/4-inch.
  - 3. When more than one layer of insulation is used, joints shall be staggered where possible with relation to the layer beneath. Each layer shall be fully attached to the roof deck as described in the Contract Documents.
  - 4. No more insulation shall be placed on the surface to receive roof membrane than can be covered with roofing membrane before the end of the day's work or before the onset of inclement weather.
  - 5. Insulation shall be dry when installed and protected from weather during application. Any insulation exposed to weather including polyisocyanurate, after delivery to the site will be required to be removed from the project site and not used on the project. Testing of the insulation shall be done at no additional expense of Engineer or Owner to verify insulation is acceptable for use on the project. All materials, which become wet or warped, shall be removed from the site and replaced with new dry materials.
  - 6. Provide insulation saddles at walls, curbs and other penetrations where noted or described per the Contract Documents.
  - 7. All loose debris and pea gravel shall be removed from the final insulation surface that the membrane will be applied to. Use of a gas powered leaf blower is recommended.
- B. Attachment with Mechanical Fasteners
  - 1. Approved insulation board shall be fully attached to the deck with an approved mechanical fastening system. For bidding purposes, fastener density shall be one fastener per 2.67 square feet of board and as noted in previous Section for field and perimeter area. One fastener per 2 square feet for corner area. Install additional fasteners if required by membrane manufacturer. Verify manufacturers' recommendations prior to bid for cost to be included in the bid.  
A density number lower for the field, perimeter and corners than this may be approved if information provided to Engineer for review and acceptance prior to construction. If accepted after bid and before construction, a change order, if appropriate, shall be processed for this revision.
  - 2. Filler pieces of insulation require at least two fasteners if size of insulation is less than four



- square feet.
3. Spacing pattern of fasteners shall be as per manufacturer's recommendations to meet the wind uplift requirements. Placement of the center of any fastener from edge of insulation board shall be a minimum of four (4) inches and a maximum of six (6) inches.
  4. Minimum penetration into deck shall be as recommended by the fastener and insulation manufacturer.
  5. For all deck types, fastener must penetrate deck a minimum 1/2". Verify attachment in metal deck is to top of flute for metal deck. Do not over drive or under drive fastener. Install fastener so it is properly seated in the plate. Any fastener not properly seated shall be removed and replaced by Contractor at his own expense.
- C. Insulation Attachment with Polyurethane Adhesive
1. Contractor shall coordinate project start-up with the insulation adhesive representative at least 5 working days prior to the beginning of the roof system installation.
  2. Adhesive containers shall be stored between 45° F, and 75°F. The minimum ambient and surface temperatures are to be 40° F.
  3. Before dispensing adhesive the applicator shall observe the following precautions: wear protective clothing, work gloves and eye protection. A self-contained breathing apparatus (SCBC) is required in areas of insufficient ventilation.
  4. Surfaces shall be free of any debris, dirt, grease, oil, diesel fuel and water.
  5. Maximum insulation board shall be no larger than 4 foot (4' x 4') square. If required, cut larger boards. If insulation and adhesive manufacturer allow larger boards for installation a written letter noting board size and acceptance to maintain warranty coverage from the manufacturer will be provided to Consultant and/or Owner prior to installation.
  6. Damaged or broken corners shall be cut out and replaced with a minimum 12" square piece secured in adhesive.
  7. Perform Field Test on substrate to verify that good adhesion will be provided.
    - a. Apply the adhesive to the substrate per recommended application rates and methods (12" o.c., 1/2" to 3/4" bead in the field). See paragraph 1.3 for perimeter and corners.
    - b. Allow the adhesive a **minimum of 60 minutes to cure**. This period should be sufficient in almost any temperature to indicate the adhesion values required for the test.
    - c. After the adhesive has been allowed to cure, pull up on the adhered board by placing a hand under the corner or end of the board in the same direction as the ribbons. Make sure that the board is **lifted by hand**. Using tools to scrape the board sometimes dis-bonds the adhesive from the deck. This will not show whether the adhesive is performing under uplift considerations (If a tool is used, it should be used to **pry or pop the board up**).
    - d. Observe the insulation and deck. The desired result is a delamination of the surface or board facer with adhesive and facer residue remaining on the deck or the board breaks apart remaining adhered to the deck at the ribbons.
    - e. **If the board is lifted and the adhesive pulls/peels off the deck or decking is pulled up with the board, Contact the Adhesive Manufacturer's Technical Department.**
  8. Adhesive is to be mixed prior to use by firmly holding the container on its side and agitating the contents in a side to side motion for a minimum of one minute. Mix according to manufacturer's recommendations.
  9. Attach the dispensing wand kit to the container. A multi-bead applicator is recommended for open areas of the roof deck.
  10. To prevent pressure loss, adhesive container shall be stored and used in an upright position.
  11. Insulation boards shall be placed into the beads of adhesive within 3 minutes and "walked-in" immediately to spread the beads for maximum contact. Continue to "walk-in" the insulation board every 5 to 7 minutes until the insulation is firmly attached.
  12. Use a parapet wall or gutter as a straight edge guide when dispensing the first bead of insulation adhesive. Turn on the cylinder valve, slowly open the brass valve and dispense parallel 3/4"-1" beads.
  13. Under the normal application rate, place the first bead 3" inside the outside edge of the insulation board to be attached.
  14. Multi-Bead Applicator
    - a. Squeeze the valve to dispense four beads of insulation adhesive, pulling the MBA as you dispense the 3/4"-1" beads.

- b. Place the insulation boards onto the insulation adhesive beads within 3 minutes and walk on the boards spreading the insulation adhesive for maximum contact.
  - c. Additional walkings are required every 5-7 minutes until firmly attached (usually 20-45 minutes).
15. Spray Application
- a. Immediately set the insulation boards after spraying the Insulation Adhesive. The insulation adhesive will rise (under the insulation) approximately 1/8"-1/4". If the adhesive does not rise, stop spraying; troubleshooting is required to determine why the adhesive is not rising.
  - b. Performance of adhesive should be periodically monitored during the workday to verify that sufficient rise, adhesion and full mating of the insulation in adhesive is occurring.
  - c. Review applicable Material Safety Data Sheets (MSDS) sheets prior to use.
  - d. Review method of application prior to use with Spray Equipment Supplier.
  - e. Review spray equipment prior to use. Insure that all is in good working order: generator, air compressor, mix/meter/dispense spray unit, transfer pumps, heated hoses, spray gun, etc. Ground spray unit per dispensing equipment manufacturer's requirements. Refer to Training Manual for specifics.
  - f. Avoid contact with eyes and skin.
  - g. Avoid breathing of vapors.
  - h. Wear respirators, long sleeves and long pants. Use gloves when handling or dispensing adhesive. Wash thoroughly after handling.
  - i. Protect all areas subject to over-spray of the Insulation Adhesive. This includes, but is not limited to: cars parked adjacent to the building receiving the adhesive, air intakes/exhausts on the building, roof mounted HVAC units, roof drains, access hatches and windows/skylights accessible to the roof, and any other item or personnel which may be downwind from spraying the insulation adhesive. There will be days that the wind conditions, as well as temperature conditions, prevent the use of insulation adhesive. Do not attempt to spray adhesive when the wind speed exceeds 15 mph. This can be estimated by observing a flag: when a flag is wind blown to the extent that it flies approximately "straight out", the wind is too extreme to use Insulation Adhesive on that particular workday.
  - j. Begin dispensing adhesive only when Part A and B pre-heaters have reached 135-145°F or temperature as recommended by manufacturer in the mix/meter/dispense unit. Maintain temperature throughout the heated hoses.
  - k. It is imperative that freshly installed insulation is continuously weighted until such time as the adhesive sets up and the board is held in place by the adhesive.
  - l. Use caution when removing drum bungs as contents may develop pressure. Loosen bungs 3/4" and allow gas to escape before completely removing bungs. Do not burn or torch-cut empty drums. Empty B component drums can be reconditioned at drum re-conditioners. Empty A or B component drums should be disposed of in accordance with local, state and federal regulations.
16. Immediately after setting the board, weight each board using full pails of Bonding Adhesive or other available source of weight that will not damage the roof insulation. This insures the board makes continuous contact with the adhesive during the critical set-up period (which will vary depending on ambient conditions). Pay particular attention to corners of insulation boards. Loose or unattached corners in insulation boards shall be repaired by the addition of fasteners and insulation plates or other methods as required. Depending on the humidity at the time of installation, the walk-in period may be extended greatly. In such an instance, continuous weighting must be used.
17. On roofs with slope at 1/2" per foot or greater begin adhering insulation at low end and work upslope to avoid slippage.
18. Additional adhesive is required around all roof penetrations and drains.
19. Verification & Quality Assurance - Insulation adhesive
- a. Upon completion of the installation in each area, visually inspect and verify that all components are complete and properly installed. Provide adhesive manufacturer's adhesion warranty to meet the roofing system warranty requirements to Engineer and Owner.

**END OF SECTION 07 21 00**

**SECTION 07 53 23**  
**ELASTOMERIC SHEET ROOFING - FULLY ADHERED**

**INDEX**

**PART I - GENERAL**

- 1.1 SCOPE
- 1.2 REFERENCES
- 1.3 SYSTEM DESCRIPTION
- 1.4 QUALITY ASSURANCE
- 1.5 SUBMITTALS
- 1.6 PRODUCT HANDLING, STORAGE, AND DELIVERY
- 1.7 JOB CONDITIONS
- 1.8 WARRANTIES

**PART II - PRODUCTS**

- 2.1 ELASTOMERIC MATERIALS

**PART III - EXECUTION**

- 3.1 PRE-CONSTRUCTION MEETING
- 3.2 INSPECTION OF SURFACES
- 3.3 APPLICATION - GENERAL
- 3.4 SEQUENCING/SCHEDULING
- 3.5 MEMBRANE INSTALLATION
- 3.6 SHEET METAL WORK
- 3.7 TEMPORARY WATER CUTOFFS
- 3.8 FINAL INSPECTION

**PART I - GENERAL**

- 1.1 SCOPE
  - A. Elastomeric Sheet Roofing
  - B. Flexible Flashings
  - C. Other Components as Required
- 1.2 REFERENCES
  - A. ASTM C471: Standard Test Method for Rubber Property - Effect of Liquids
  - B. ASTM D4637 : Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane
  - C. ASTM D4811 : Standard Specification for Rubber Sheet, Non-vulcanized, Used as Roof Flashing
- 1.3 SYSTEM DESCRIPTION
  - A. BASE BID - Fully adhered unreinforced black 90 mil thick EPDM (ethylene propylene diene monomers) membrane. Roof system shall meet minimum requirements of UL Class "B" System. 30 year system warranty for Level A and 25 year system warranty for Level B.
- 1.4 QUALITY ASSURANCE
  - A. The entire installation of roofing, insulation, flashing, and sheet metal work shall be of the quality required for acceptance by the manufacturer in order to obtain the specified material and workmanship warranties offered by the manufacturer for the Bid.
  - B. Comply with the requirements of the regulatory agencies as specified herein.
  - C. Applicator:
    - 1. Acceptable to the manufacturer of the roofing materials and factory trained by the manufacturer.
    - 2. Successfully completed projects of similar magnitude, using similar materials.
    - 3. As an approved applicator, will have all knowledge of all items required by the manufacturer in the installation of the manufacturer's system. These items will be included in the work.
  - D. The roofing contractor shall verify that all roofing materials (i.e., membrane, insulation, fasteners, adhesives, sealants, etc.) are compatible with each other and the substrates which they will be in contact with. Notify Engineer/Owner of any discrepancies or incompatibilities.
  - E. Contractor shall coordinate construction activities with Owner and/or Engineer so a representative can be on-site during critical phases of construction. Contractor shall notify Engineer and Owner 24 hours before

installation starts. Coordination of schedule shall be discussed in the first week of construction and during the construction process with the foreman and the Engineer's representative.

- F. Amount of patches due to Contractor's improper protection or application on new membrane shall be less than 15% of total roof area. If patches total that percentage, Contractor shall remove or overlay with new membrane at his own expense.

#### 1.5 SUBMITTALS

- A. The following items are required to be submitted to Owner or Engineer prior to commencement of construction.
1. Water cutoff method for end of day construction
  2. Construction schedule
- B. Contractor shall submit the following items, if specifically requested by Engineer or Owner.
1. Shop Drawings:
    - a. Indicate the following:
      1. Locations sizes, and types of penetrations
      2. Outline of roof and dimensions
      3. Location of field seams
  2. Manufacturer's Product Data Sheets:
    - a. Showing complete details of the system
    - b. Material characteristics
    - c. Test data
    - d. Installation recommendations
  3. Certificates: Submit manufacturer's Certificate of Compliance
  4. Manufacturer's Instructions: furnish manufacturer's printed instructions for installation of membrane and insulation, including procedures and materials for flashing, splicing, and bonding.
  5. Membrane manufacturer's written approval that the roofing contractor is an authorized applicator of its products.
  6. Membrane manufacturer's written approval that the technical specifications and plans are in accordance with their published specifications and details.
  7. Samples: Membrane material; Minimum size; 6" x 6" sample
  8. Copies of all field site visits and inspections by manufacturer's representative. The warranty inspection report is to be delivered to the Engineer/Owner shortly after such inspection is made. Contractor responsible to Notify manufacturer of this requirement.
- C. All submittals shall be subject to Engineer's and/or Owner's review. Review of any submittal shall be for compliance only and does not denote specific approval.

#### 1.6 PRODUCT HANDLING, STORAGE, AND DELIVERY

- A. Materials shall be stored in their original, tightly sealed containers or unopened packages and shall be clearly labeled with the manufacturer's brand name and such identifying reference numbers as are appropriate.
- B. Materials shall be stored in a neat, safe manner, so as not to exceed allowable live load of the storage area, and out of the weather in a clean, dry area.
- C. Splice cleaner and bonding adhesives are extremely flammable. Do not use near fire or flame or in unventilated areas. Dispense from UL approved containers and consult material safety data sheets for specific information.
- D. Any materials damaged in handling or storage are not to be used.
- E. Coal tar base, oil base, or plastic roof cements are not to be used in direct contact with steam or steam source.
- F. Do not allow the EPDM material to come into direct contact with steam or steam source.
- G. All bonding, splicing and sealing surfaces must be free of dirt, moisture and any other contaminants.
- H. Installation may continue in cold weather provided adhesives and sealants are stored at room temperature prior to application and used within a 4-hour period after being brought to the roof, if approved by the manufacturer. Follow manufacturer's recommendations for special precautions for installation below 40°F.
- I. Remove wet material that gets wet at the site or is delivered wet to the project site.
- J. Comply with fire and safety regulations.

#### 1.7 JOB CONDITIONS

- A. Apply roofing in dry weather.

- B. If the newly constructed underlying roof materials or insulation becomes wet due to rainstorm, faulty water cutoff, or other reasons, the Contractor shall remove and dispose of all wet materials, dry the affected roof area, and reconstruct the roof in accordance with these specifications, at no additional cost to the Contract.
- C. The roof surface shall be free of ponded water, ice, snow, or algae prior to installing the new roof system. Contractor shall take whatever methods are necessary to provide such conditions.

## 1.8 WARRANTIES

- A. The Contractor shall provide Owner with a written Contractor's warranty guaranteeing all roofing work including membrane, flashing, counter-flashing, sealant and associated work required by the Contract Documents to be water tight for a period of five years from date of final acceptance of construction. Language in the guarantee shall be acceptable to Owner prior to acceptance. Guarantee shall include all materials and workmanship required to repair any leaks that develop due to defects in material or workmanship.
- B. The membrane manufacturer shall issue a 40-year material warranty for both roofs. For the 90 mil EPDM for Level A roof. A 30 year system warranty. For level B roof provide a 25 year system warranty. If insulation fasteners or insulation adhesive are not covered by EPDM manufacturer's warranty then that shall be so noted in warranty documents.
- C. For both roofs, provide puncture damage warranty due to unintentional damage due to normal maintenance and service on the roof for a minimum 32 man-hours per year for repairs of such and leaks due to hail damage from hail stone impact- maximum size of 2 inches.

## PART II - PRODUCTS

### 2.1 ELASTOMERIC MATERIALS

- A. Fully adhered unreinforced black EPDM Membrane
  - 1. Acceptable Manufacturers
    - a. Carlisle SynTec Systems
    - b. Firestone Building Products Company
    - c. Versico, Inc.
    - d. Approved equivalent (Prior to receipt of bids)
  - 2. Requirements
    - a. EPDM membrane will meet the requirements for a UL Class "B" system.
    - b. All 90 mil thick materials and components shall be such that the membrane manufacturer's 30 year (Level A) and 25 year (Level B) leak and workmanship warranty and 40-year non-prorated material warranty will be obtained for the project.
  - 3. Physical Properties: Meet ASTM D 4637-15, Type I, un-reinforced sheet.
  - 4. Related Materials:
    - a. Flashing: as recommended and furnished by the membrane manufacturer. Minimum thickness as recommended by membrane manufacturer. If uncured flashing used - meet ASTM D 4811, Type I, Grade I, Class V.
    - b. Bonding Adhesive: Compatible with materials as recommended by the membrane manufacturer.
    - c. Splice Cleaner: Furnished or recommended by the membrane manufacturer.
    - d. Lap Sealant: Furnished by membrane manufacturer.
    - e. Water cutoff mastic: Compatible with materials as recommended by manufacturer.
    - f. Factory molded pipe flashing: Configuration as required and compatible with materials as recommended by the manufacture.
    - g. Night seal: Compatible with materials as recommended by the membrane manufacturer
    - h. Lap primer: Compatible with materials as recommended by the membrane manufacturer. Primer in marked cans only will be used.
    - i. Nailing strips and termination bars: Use extruded nailing strips and fasteners as recommended by the membrane manufacturer.
      - 1. Minimum thickness - 0.05"
      - 2. Width - 1"
    - j. Seam tape: Furnished by manufacturer
- B. Reinforced Perimeter Fastening Strip
  - 1. Acceptable Manufacturer

- a. Manufacturer of EPDM material
- 2. Physical Properties
  - a. Same as EPDM material
  - b. Thickness - 0.045 inches

### **PART III - EXECUTION**

#### **3.1 PRE-CONSTRUCTION MEETING**

- A. Prior to the start of roofing work, a meeting will be held at the job site for the purpose of reviewing materials, methods, coordination of schedule and procedures to facilitate proper and timely construction of the roofing system.
- B. A responsible representative from each of the following organizations shall be in attendance:
  - 1. Roofing contractor (as a minimum, the field foreman assigned to the job).
  - 2. Terracon Consultants.
  - 3. Owner, as available

#### **3.2 INSPECTION OF SURFACES**

- A. Examine surfaces for adequate anchorage, foreign materials, moisture, and other conditions which would adversely affect the roofing application and performance.
- B. The roofing contractor shall be responsible for preparing existing surfaces to receive insulation, roofing, and flashing. Any deviation from Contract Documents shall be brought to the attention of Engineer or Owner for resolution.

#### **3.3 APPLICATION - GENERAL**

- A. Install in accordance with the accepted roofing manufacturer's current written specifications and recommended details by the manufacturer during the time of bid and Contract Documents. If there is a discrepancy between the two, the more stringent of the two shall apply, unless otherwise directed by Engineer or Owner.
- B. Roof surfaces shall be thoroughly dry before application of roofing. Clean and sweep all construction areas daily.
- C. Inspection of the roofing shall be made by a responsible representative of the roofing manufacturer during application and after completion.
- D. Take all precautions required to prevent blowing or tracking of aggregate from the existing roof that is being removed from entering into new work area. Assure that aggregate is not tracked into new roof installation area on workers' shoes or equipment wheels. Utilize a gas leaf blower to remove existing debris prior to membrane installation. Excess debris/insulation under or within the new membrane shall be cut out and the membrane patched per specifications.
- E. Roofing insulation shall be dry when installed and shall be protected from the weather during installation. All materials which become wet shall be removed and replaced with new dry materials that meet specifications.
- F. When application of roofing is begun, the total roofing system in the area where insulation and /or tearoff is performed shall be covered and watertight before the contractor's crew leaves the area for the day and before any moisture can enter into the completed roof assembly.
- G. Install temporary water cutoffs at the completion of each day's work and remove temporary materials upon resumption of the work. Any leaks and damage due to insufficient water cutoffs, accidents or neglect by Contractor shall be repaired and compensated for by the Contractor at no cost to the Owner.
- H. Application workmen shall wear soft rubber-soled shoes for all work where they may be walking on the in-place roofing membrane. Precautions shall be taken to protect the membrane from puncture.
- I. If materials are stored on the roof, the materials will be stored on pallets off of the existing roof. Materials shall be stored so no damage occurs to the existing roof.
- J. Special care will be taken to prevent distress on the building structure when storing and handling materials on the roof.
- K. Any materials stored on the roof shall be so situated that the existing drainage flow is not impeded or disturbed.

#### **3.4 SEQUENCING/SCHEDULING**

- A. Notify the Owner and Engineer 24 hours before the first day of construction.
- B. Coordinate with Engineer during construction so that the Engineer or his representative can schedule to be

at project to observe first day installation of insulation, membrane, flashings and typical installations after the first day.

- C. Contact Engineer when construction is substantially complete for review

### 3.5 MEMBRANE INSTALLATION

#### A. General

1. Membrane materials, splicing, perimeter attachment, bonding, flashing, molded pipe flashing, temporary water cutoffs and other related work shall be installed in accordance with the manufacturer's printed instructions and reviewed shop drawings.

#### B. Membrane Placement

1. Place membrane without stretching over the acceptable substrate. Allow membrane to relax a minimum of 30 minutes before bonding.
2. Install field seams so that the seams shed or run parallel to the flow of water.
3. Fold membrane back after making sure the sheet is placed in its final position, fold it back evenly onto itself so as to expose the underside. The sheet should lay smooth so as to minimize the formation of wrinkles during and after installation.
4. Provide special emphasis to remove all stones, pebbles, and other material before gluing sheets to substrate.
5. Remove dust and dirt by sweeping the mating surface of the membrane with a stiff broom to remove excess dusting agent (if any) or other contaminants from the mating surface.
6. Apply bonding adhesive at about the same time to both the exposed underside of the sheet and the substrate to which it will be adhered so as to allow approximately the same drying time. Apply bonding adhesive evenly so as to avoid globs.
  - a. Apply bonding adhesive with a roller: Apply the bonding adhesive and roll the adhesive on to the mating surfaces.
  - b. Apply bonding adhesive by spraying and then rolling: Spray on bonding adhesive and then roll out with a solvent resistant paint roller.
7. Stop bonding adhesive short of seam area using care not to apply bonding adhesive over an area that is to be later cleaned and spliced to another sheet or flashing.
8. Apply bonding adhesive at specified coverage rate:  
Apply bonding adhesive as specified per manufacturer. Coverage rate will differ with various substrates and/or climatic conditions.
9. Test bonding adhesive for readiness:  
Allow bonding adhesive to flash off until tacky. Touch the bonding adhesive surface with a clean, dry finger to be certain that the adhesive does not stick or string. As you are touching the adhesive, pushing straight down to check for stringing, also push forward on the adhesive at an angle to ensure that the adhesive is ready throughout its thickness. If either motion exposes wet or stringy adhesive when the finger is lifted, then it is not ready for mating. Flash off time will vary depending on ambient air conditions.
10. Bond the membrane to the substrate:  
Starting at the fold, roll the previously coated portion of the sheet into the coated substrate slowly and evenly so as to minimize wrinkles.
11. Broom the membrane:  
To ensure proper contact, compress the bonded half of the sheet to the substrate with a stiff push broom.
12. Repeat procedure to complete the sheet installation:  
Fold the unadhered half of the membrane sheet back onto itself, and repeat the bonding procedure to complete the bonding of the sheet.

#### C. Membrane Lap Splicing - Seam Tape

1. Use on field splices only.
2. Position the sheet at the splice at the splice area by overlapping the membrane 5". Once the membrane is in place, mark the bottom sheet ½" to ¾" from the edge of the top sheet every 4 to 6 feet with a colored crayon or similar device. Tack the sheet back with manufacturer's priming solution at 5 feet centers and at factory splices or as required to hold back the membrane at the splice area.
3. Remove excess amounts of dusting agent from the sheet and at factory splices using a stiff push broom. Stir manufacturer's prime solution thoroughly prior and during usage. Dip the scrubber into the primer, keeping the scrubber flat. Apply the priming solution back and forth strokes with



an adequate amount of pressure along the whole length of the splicing area until the surfaces turn dark gray on color. Apply primer to both surfaces at the same time. At each 200 feet of 3 inch wide splice change the scrub pad, or when the pad will no longer retain the required amount of primer. Provide additional cleaning of contaminated areas or areas of excess dusting agent and at all factory splices.

4. Position the seam tape with the paper intact on the bottom sheet. Align the edge of the release paper with the markings. Immediately roll the splice tape with a 3 to 4" wide silicone sleeved steel hand roller or a short nap 3" paint roller.
  5. After the seam tape is installed the whole length of the splice, place the top sheet over the tape's paper backing. Trim the top sheet as required to provide 1/8" to 1/2" of the seam tape exposed on the finished splice.
  6. Roll back the membrane and peel the paper backing off the seam tape by pulling against the weight of the bottom sheet at a 45 degree angle to the tape and parallel with the roof surface. Allow the top sheet to fall freely onto the exposed seam tape. Broom the entire length of the splice as the release paper is removed.
  7. Roll the splice using a 1 1/2" to 2" wide silicone or silicone sleeved steel hand roller, first across the splice and then along the entire splice length.
  8. End laps
    - a. Overlap seam tape a minimum 1" when the splice length is larger than the tape.
    - b. Trim tape at T joints so that the edge of the tape and the membrane edge are flush under the joint.
    - c. Apply manufacturer approved flashing or joint cover over T-joint
    - d. If cured EPDM used as flashing, apply an 8" long section of flashing or joint cover material over the flashing and field splice intersection.
  9. Cold Conditions
    - a. Store tape in enclosure with temperature between 60 and 80 degrees F.
    - b. For ambient temperature 40 degrees F or less use heat gun on tape to provide appropriate mating conditions.
- D. Pre-taped sheets
1. Position the sheet rolls in the correct location and orientation to unroll and have the tape located for the seaming of the laps. Pre-taped rolls are marked with the tape location and direction of unroll. Panels need only to be marked to guide the application of primer to one sheet for side laps. Roll end laps require standard application of primer and seam tapes.
  2. Position and fold back the lap edge:
    - a) Position the membrane at the seam area by overlapping membrane 4" for 3" seam tape, 7" for 6" Seam tape. Once the membrane is in place, mark the bottom membrane 1/2" to 3/4" from the edge of the top membrane every 4' to 6' using the marking crayon provided with the seam tape.
    - b) Tack the membrane back with single-ply manufacturer's primer as necessary to hold back the membrane at the splicing area.
  3. Apply single-ply Manufacturer's primer to seam area:
    - a) Remove excess amounts of dusting agent on the membrane and at factory splices using a stiff push broom. In the case of adhered systems make sure there is no contamination of bonding adhesive in the tape area.
    - b) Stir single-ply manufacturer's primer thoroughly before and frequently during use. Dip the scrubber into the bucket of the manufacturer's primer keeping the pad flat.
    - c) Apply the single-ply manufacturer's primer uniformly at least 1" wider than seam tape application area, using long back and forth type strokes with pressure along the length of the splicing area until surfaces become dark gray in color. Do not over-work the single-ply manufacturer's primer.
  4. Pre-taped sheets only require primer applied to the non-taped, bottom sheet, panel mating surface for the side seams. End seams require two sided application of primer.
  5. Non-taped panels will need to have single-ply Manufacturer's primer applied to both sheet surfaces alternating between sheets while working down the seam area.
  6. Change the scrubber pad:
    - a) Pre-taped panel side laps are one side application and will result in approximately 400 feet of usage or other panels and pre-taped ends are two sided application and will result in 200 feet of seam or when the pad will no longer holds the proper amount of primer,

- whichever is less.
- b) Additional scrubbing is required at all factory seams and at areas that may have become contaminated or have excess amounts of dusting agent in the creases. Allow primer to dry, check using the Touch-Push test.
7. Apply the manufacturer's splice tape:
    - a) After allowing the primer to dry properly, using the Touch-Push Test to verify.
    - b) Pre-taped products require end laps be done, for side laps skip to 8 below.
    - c) On other panels, apply the manufacturer's splice tape to the bottom membrane, aligning the edge of the release paper with the markings. Refer to lap splice detail appropriate for system being installed.
    - d) Immediately roll the splice tape with a 1 ½" to 2" wide silicone hand roller or a clean scrubber pad and handle.
  8. Position the membranes, check the Splice Tape Alignment:
    - a) Place the top membrane to rest on bottom membrane with the tape's release backing still in place.
    - b) Pre-taped panels: Confirm the tape will be in full contact with primer treated membrane on side laps. End laps should follow instructions given below.
    - c) Other panels: trim the top panel as necessary to assure that 1/8" to 1/2" of the seam tape will be exposed on the finished seam. Confirm the tape will be in full contact with the primed membrane.
  9. Remove Release Backing:
    - a) Allow the top membrane to fall freely onto the bottom membrane prior to removal of the release backing.
    - b) Start to peel the release backing off the splice tape by pulling against the weight of the panel at approximately a 45° angle to the tape and parallel with the roof surface.
    - c) Broom the entire length of the seam at a 45° angle as the release paper is being removed.
  10. Roll the Seam  
 Roll the seam as appropriate, using the manufacturer's roller and 2'-3' strokes working from one side of the seam to the other along the seam length, or a 1-1/2" to 2" wide silicone hand roller, first across the width of the seam and then along the entire length and width of the seam.
  11. Special Considerations (Factory laps, End Laps, "T" Joints, transition patches, and others.)
    - a) End Laps of tape - When the seam is greater in length than the tape, the adjoining
    - b) Seam splice tape must be overlapped a minimum of 1" and detailed per manufacturer's details.
    - c) Trim splice tape at "T" Joints - Trim splice tape so that the edge of splice tape and the edge of the membrane are flush beneath the "T" Joint area per manufacturer's details.
    - d) "T" Joints - Apply a section of manufacturer's flashing or seam joint cover over the "T" joint area per manufacturer's details.
    - e) Use of 6" or 7" splice tape with Cured EPDM as Flashing - If cured EPDM is used as flashing, apply a 9" long section of splice tape and cover with primed membrane or a 9" section of manufacturer's joint cover over the intersection of the flashing and field seams per manufacturer's details.
- E. Flashing- Walls, Parapets, Mechanical Equipment Curbs, Skylights, Etc.
1. Using the longest pieces practical, flash all walls, parapets, curbs, etc., to the height as specified by the project designer.
  2. Evaluate substrate: The following substrates require an over layment of ½" exterior grade or "Wolmanized" plywood mechanically fastened in accordance with the project designer's requirements.
    - a. Gypsum board
    - b. Stucco
    - c. Cobblestone
    - d. Textured masonry
    - e. Corrugated metal panels
    - f. Other uneven substrates
  3. Evaluate existing flashings:
    - a. Remove existing roof flashing material
  4. Use membrane manufacturers reinforced perimeter fastening strip material for flashing for EPDM manufacturers that make material.

- a. Unroll the RPF strip over installed insulation and position per manufacturer's specifications.
  - b. Fasten with 2" seam plates and screws, or batten strips.
  - c. Sealant required on all fastener heads when batten strips are used.
  - d. Clean the dry mating surfaces using clean cotton cloths with splice wash to remove all dirt and other contaminants that will affect the finished bond strength. Allow to dry.
  - e. Brush apply, splice adhesive to both surfaces and mate according to manufacturer's specifications.
  - f. Roll finished base tie-in with a 2"-3" wide silicone or silicone sleeved steel hand roller to ensure proper adhesion.
  - g. Maximum fastener length is 6".
  - h. Do not install over uneven substrates.
5. Splice to roof sheet first:  
Complete the splice between flashing and the main roof sheet with splice adhesive before flashing to the vertical surface. Provide lap splices in accordance with manufacturer's details.
6. Apply bonding adhesive to the vertical surface:
- a. Apply bonding adhesive at about the same time to both the flashing and the surface to which it is being bonded so as to allow approximately the same drying time. Apply bonding adhesive evenly so as to avoid globs.
  - b. Apply bonding adhesive with a roller:
  - c. Apply bonding adhesive and roll the adhesive onto the mating surfaces.
- OR
- Apply bonding adhesive by spraying and then rolling:
- d. Spray on bonding adhesive and then roll out with a solvent resistant paint roller.
7. Apply bonding adhesive as at coverage rate specified by manufacturer. Coverage rate will differ with various substrates and/or climatic conditions.
8. Test bonding adhesive for readiness:  
Allow bonding adhesive to flash off until tacky. Touch the bonding adhesive surface with a clean, dry finger to be certain that the adhesive does not stick or string. As you are touching the adhesive, pushing straight down to check for stringing, also push forward on the adhesive at an angle to ensure that the adhesive is ready throughout its thickness. If either motion exposes wet or stringy adhesive when the finger is lifted, then it is not ready for mating. Flash off time will vary depending on ambient air conditions.
9. Roll the flashing into the adhesive evenly and carefully so as to minimize wrinkles.
10. Broom the flashing:  
To ensure proper contact, compress the flashing to the substrate with a stiff push broom.
11. Provide termination directly to the vertical substrate as shown by project drawings and manufacturer's details.
12. Flashing details shown on plans are for general guidance and may be modified by Contractor after review and approval of Engineer. Contractor shall review any particular flashing requirements of membrane manufacturer for warranty securement prior to construction with Engineer.
- F. Membrane Repair
1. Repair wrinkles within 18" of a splice or roof drain bowl or a puncture in the membrane:
    - a. A fishmouth or wrinkle, running toward a splice, within 18" of a splice must be repaired. The wrinkle must be cut out and patched with a piece of EPDM membrane having no factory seams. Provide a splice that extends a minimum of 3" beyond the boundaries of the cut in all directions.
    - b. If the wrinkle occurs through uncured flashing, then uncured flashing shall be used for repair, but the uncured flashing may not extend onto the roof surface more than 6". If repairing the same wrinkle must continue, the EPDM membrane must be used; install EPDM membrane first. Round all corners of repair piece.
    - c. Repair a puncture in the EPDM membrane with EPDM membrane. The repair must extend a minimum of 3" beyond the boundary of the affected area in all directions. Round all corners of the repair piece. (Example: A pinhole will require a 6"x 6" surface splice.)
  2. Clean the membrane:  
When repairing membrane which has been in service for some time, it is necessary to remove accumulated field dirt. Proper membrane preparation is made by first scrubbing the membrane with a scrub brush and warm soapy water, then rinsing with clear water and drying with clean

cotton cloths. Clean the area using clean cotton cloths with unleaded gas, white gas, splice primer, or heptane. A second cleaning using clean cotton cloths with unleaded gas, white gas, splice primer, or heptane is often necessary.

3. Install splice: Repairs must be made with splice adhesive. Refer to manufacturer's specifications for splicing procedures.
  4. Membrane repairs due to lack of traffic protection, carelessness by Contractor, improper relaxation of sheet, or other factors that are the Contractor's responsibility shall be kept to a minimum.
  5. If the amount of patches on a roof comprise 15% of the total roof area, Contractor will be required to replace or install new membrane over existing at his own expense.
- G. Existing supports/roof access/ladder access locations
1. Contractor shall install new membrane manufacturer's walkway pad under all existing or new pipe supports and at all ladder location/landings and other access points on the roof. Walkway pad shall be of sufficient size for all of these locations.
- H. New field seams within "ponding areas"
1. In areas where ponding may not be removed totally from new roof installation, Contractor shall cover any seams within additional ponding areas with another piece of EPDM material for a "double seam" cover. In this case the definition of "ponding" is any significant amount (1/4" depth minimum) of water over seam for even a short duration of time (4 hours).

### 3.6 SHEET METAL WORK

- A. Counterflashings, copings, and other perimeter or penetration metal work shall be properly fastened and sealed by the roofing contractor or others, and it shall be their responsibility to maintain this work in a watertight condition. Care should be taken to assure the membrane is not in contact with sharp edges and is not unsupported for more than ¼" gap.

### 3.7 TEMPORARY WATER CUTOFFS – (Optional method)

- A. Water cutoffs shall be installed to prevent water from flowing beneath the completed roof assembly during inclement weather. The following is a suggested method as an option for use. Other methods that have worked successfully in the past for the Contractor are also recommended to be used.
- B. Other methods for temporary seal shall be submitted to Owner and/or Engineer for review and acceptance at the Pre-construction meeting. Acceptance of such method does not alleviate the Contractor from providing a watertight interface at his cost at the end of each day on the project site. This watertight tie-off/connection is a part of the means and methods the Contractor is responsible for during the project.
- C. The roof membrane shall be extended at least 2 feet over the last row of insulation (where applicable) and a continuous layer of water tight sealant applied onto the substrate a minimum of 10 inches from the membrane edge. Mating surfaces must be smooth, clean, and free from any loose foreign material.
- D. Firmly embed roof membrane into sealant and provide continuous pressure over the length of the cutoff by using sufficient ballast.
- E. Where applicable, use asphaltic bitumen and strip of roof membrane for tie-off.
- F. Water cutoff is suggested as follows:
1. Using asphalt roofing cement, apply water cutoffs consisting of two strips of waterproof sheet material at exposed edges of the completed insulation and roofing membrane. Extend the first strip of sheeting 6 inches on top of the applied felts. The second strip shall lap the first strip by 3 inches on each side. Apply the strips to the roof deck, applied felts, and to each other.
  2. Withhold roofing cement from the edges of the insulation.
  3. When the application of the insulation and roofing system is resumed, cut the strips of sheet material along the vertical edges of the insulation, exposing the edges of the insulation, and remove the cutoff sheets and materials from the deck flutes.

### 3.8 FINAL INSPECTION

- A. Upon completion of the installation, an inspection shall be made by a field technical representative of the membrane manufacturer for issuance of a warranty. Owner and/or Engineer shall be notified 48 hours in advance if possible of the final inspection time for their schedule.
- B. Shortly after completion of the warranty inspection by the field technical representative, the Contractor or membrane manufacturer shall submit to the Owner and/or Engineer a written report of the field technical representative's findings.
- C. Final retainage/payment will not be processed until submittal of this report. The manufacturer's warranty document(s) are required for project closeout and final payment.

- D. Owner and/or Engineer shall also provide a punch list of items that relate to the project. The punch list should be completed within 20 days (weather allowing) after the Contractor receives all punch list items.

**END OF SECTION 07 53 23**

**SECTION 07 62 00  
FLASHING AND SHEET METAL**

**INDEX**

**PART I - GENERAL**

- 1.1 DESCRIPTION OF WORK
- 1.2 SUBMITTALS
- 1.3 GUARANTEE

**PART II - PRODUCTS**

- 2.1 SHEET METAL
- 2.2 FASTENERS

**PART III - EXECUTION**

- 3.1 INSPECTION
- 3.2 PREPARATION
- 3.3 INSTALLATION
- 3.4 SHOP OR FIELD FABRICATED METAL
- 3.5 GRAVEL STOPS, FASCIA, COUNTER-FLASHING
- 3.6 GUTTERS AND DOWNSPOUTS
- 3.7 WORKMANSHIP
- 3.8 REPAIRING
- 3.9 CLEANING

**PART 1- GENERAL**

- 1.1 DESCRIPTION OF WORK
  - A. The types and extent of flashing and sheet metal work includes but is not limited to:
    - 1. Roof edge and counter flashing.
    - 2. Roof penetrations.
    - 3. Gutters and downspouts.
  - B. Perimeter metal roof edge shall be manufactured and installed to meet SMACNA Technical Resources Bulletin dated May 1, 2009 to meet requirements of the current International Building Code enforced by the governing body and meet requirements of ANS/SPRI 4435 ES-1 Wind Design Standard for Edge Systems for Low-Slope Roof Systems.
- 1.2 SUBMITTALS
  - A. Shop Drawings (As requested):
    - 1. Submit shop drawings as requested by Engineer or Owner for gravel stops, gutters and downspouts, and counter flashing.
    - 2. Drawings to show joints, types and locations of fasteners and special shapes.
  - B. Samples (As requested):
    - 1. Show pattern, finish, color and thickness of materials not receiving paint.
  - C. Manufacturer's literature for prefinished materials, if requested by Engineer.
- 1.3 GUARANTEE
  - A. Contractor shall guarantee materials and workmanship against defects or leaks for five years starting on the date of final acceptance by Owner.
  - B. Pre-finished metal shall have a minimum 20-year warranty against chalking, fading, and rusting.
  - C. Submit all warranties at time of project closeout.

**PART 2- PRODUCTS**

- 2.1 SHEET METAL
  - A. Galvanized Steel:
    - 1. Flat type min. 1 lb. per square foot.
    - 2. FS QQ-S-775E, Class d rating. (ASTM A525 & ASTM A526)
  - B. Prefinished Galvanized Metal:

1. 24 gage Galvanized metal with Kynar 500 coating except see requirements below for perimeter edge metal
  - a. Perimeter edge metal
    1. 24 gage minimum for 8 inches of total exposed face
    2. 22 gage minimum for 8 to 10 inches of total exposed face
    3. 20 gage minimum for 10 to 16 inches of total exposed face
  - b. Gutter, downspouts and conductor heads Thickness noted on plan.
2. Acceptable Manufacturers :
  - a. Vincent Metals - "Colorklad"
  - b. Peterson Aluminum Co. - "Pac-Clad"
  - c. Firestone – "Una-Clad"
  - d. Approved Equivalent
3. Properties
  - a. Finish face shall have a removable material film for protection during shipping and fabrication and installation.
  - b. Color to be selected by Engineer and Owner.
4. Warranty
  - a. Manufacturer shall provide a written minimum 20 year labor and materials, non-prorated warranty covering chalking, fade, and film integrity.
  - b. Material shall not show a color change greater than 5 NBS color units per ASTM D-2244 or chalking in excess of 8 units per ASTM D-659. If either occurs, during the 20 year period, material shall be replaced under terms of the warranty.

## 2.2 FASTENERS

- A. Nail heads and screws for continuous hook strips to be minimum of 3/16 inch.
- B. Fasteners shall be corrosion resistant steel or treated for corrosion resistance.
- C. Fasteners for exterior side of metal coping shall be No. 10 (5 mm) galvanized screws.
- D. All exposed fasteners shall be neoprene washered.

## **PART 3- EXECUTION**

### 3.1 INSPECTION

- A. Verify that substrates are smooth and clean to the extent needed for sheet metal work.
- B. Verify that reglets, nails, cants, and blocking to receive sheet metal are installed and free of concrete and dirt.
- C. If an existing sheet metal receiver is apparent on wall adjacent to roof, connect new metal flashing to existing receiver. Do NOT cover up existing receiver without consultation with Engineer/Owner.
- D. Do not start sheet metal work until conditions are satisfactory for installation.

### 3.2 PREPARATION

- A. Before installing sheet metal, verify shapes and dimensions of surface to be covered.

### 3.3 INSTALLATION

- A. General:
  1. Install work watertight, without waves, warps, buckles, fastening stress or distortion, allowing for expansion and contraction.
  2. Hem exposed edges.
  3. Angle bottom edges or exposed vertical surfaces to form drips.
  4. Fabricate all items in maximum lengths specified and per industry standards. Joints shall be held to a minimum. No section of visible sheet metal shall be longer than 10 feet.
- B. Install sealant at joint locations by applying minimum 1/4 inch diameter bead, centered on full length of joint.
- C. Install flashing and sheet metal to comply with Architectural Sheet Metal Manual, Sheet Metal and Air Conditioning Contractor's National Association, Inc. As a minimum, the following fastening requirements with approved fasteners will be met :
  1. Metal flanges at top of wall perimeter
    - a. Attach at annular ring or barb shank nails, 3" on center - staggered
    - b. Minimum width 3 3/4", maximum 4 1/4", recessed 1/2" from interior nailer edge.

- c. Corners shall be formed, mitered, lapped, notched, sealed, welded, or soldered as necessary to provide a continuous system not more susceptible to leaks than straight sections.
  - 2. Exterior wall continuous clip: 24" on center, length of clip not to exceed 12 feet.
    - a. Fasten clip to the bottom piece of wood blocking. Do not fasten into joints of wood blocking. Minimum distance for vertical leg of clip to be 3".
    - b. Clip shall be minimum one gauge heavier than fascia or cap.
    - c. Bottom edge of clip shall extend a minimum of 1 inch below bottom edge of blocking or surface that clip is attached to. Minimum length of bent clip leg shall be 5/8". Maximum angle from the vertical face to be 30°.
  - 3. Metal sections for exterior wall fascia and gravel stops should be secured on the flange with two nails through slotted holes for expansion and contraction. Nail heads should be somewhat larger than the slotted holes. Perimeter edge metal shall be fastened to meet the requirements of the SMACNA Technical Resources Bulletin dated May 1, 2009 to meet requirements of the IBC and ANS/SPRI 4435 ES-1 Wind Design Standard for Edge Systems for Low-Slope Roof Systems.
  - 4. New counter-flashing attached to existing through wall counter-flashing or receiver: 18" on center.
  - 5. Surface mounted counter-flashing : 24" on center
  - 6. Expansion joint cap and coping caps: 24" on center (for interior side of copings)
  - 7. Decrease distance to meet FM I-60 uplift OR per FM Loss Prevention Data Sheet 1-49 design requirements OR to prevent any gaps on top edge of metal.
- D. Fastener Installation
  - 1. Screws shall penetrate substrate a minimum of 1 inch.
  - 2. Nails shall penetrate substrate a minimum of 1-1/4 inch.
- E. Prefinished Metal Installation
  - 1. All metal corners shall be lapped a minimum of 3 inches with adjoining faces connected and set in sealant.
  - 2. Use touch up paint and fasteners that match color of metal.
  - 3. Remove prefinished coating by mechanical method if soldering required
  - 4. Fabricate and install with strippable film in place.
  - 5. Remove strippable film immediately after installation complete. Extended exposure of film to sunlight may damage prefinished coating.

### 3.4 SHOP OR FIELD FABRICATED METAL

- A. Fabrication shall be in accordance with current SMACNA recommendations and acceptable sheet metal practice.
- B. Perimeter metal roof edge shall be manufactured and installed to meet SMACNA Technical Resources Bulletin dated May 1, 2009 to meet requirements of the current International Building Code enforced by the governing body and meet requirements of ANS/SPRI 4435 ES-1 Wind Design Standard for Edge Systems for Low-Slope Roof Systems.
- C. All accessories or other items essential to the completeness of the normal sheet metal installation, whether specifically specified or not, shall be provided and installed as required.

### 3.5 GRAVEL STOPS, FASCIA, COUNTER-FLASHING

- A. See drawings for particular requirements.
- B. Existing gravel stops, fascia and counter flashing that are removed may only be reused if their condition is acceptable to Engineer and Owner.
- C. Install gravel stops and fascia sections with 1/4" opening between sections. Install 6" cover-plate formed to the profile of the metal. Place sealant approximately 1 inch from the edges of each metal section. Nail the plate through the opening between the sections and loose lock the plate to the exterior wall side to the drip edge.
- D. Counter-flashing sections shall be lapped a minimum of 2 inches.

### 3.6 GUTTERS & DOWNSPOUTS

- A. Downspouts to be installed as shown on plan. Coordinate locations to lineup with existing vertical storm sewer pipe connections. Terminate into existing vertical circular pipe for storm sewer system and provide 6 inch vertical enclosure plate at connection. Color of downspout to match existing wall color.



Install a 45 degree bend for downspout to transition from gutter to attach to wall within upper 4 feet of downspout. Exterior lip of downspout to be 1/4" wide.

- B. Downspout to be open-faced as unless otherwise noted on plans. A deflector shield bent at a 45° angle will be installed from the bottom edge of the enclosed portion at the top (minimum 8 inches) of the downspout. Install 6 inch vertical enclosure plate at approximately every 5 feet of downspout. Reinforcing braces and supports to be a minimum of 1/16 inch x 1" flat stock material and of same material as downspout. The first reinforcing brace to be located a maximum of 6 feet from ground level. The maximum spacing distance for wall supports to be 10 feet.
- C. Gutter to be size noted on plans.
- D. Outlet tube to be a minimum of 4" length.
- E. End joints for downspouts shall be lapped in the direction of water flow.
- F. Install expansion joints in gutter section for lengths greater than 40 feet unless otherwise noted on the plans.

### 3.7 WORKMANSHIP

- A. Work shall be accurately formed to sizes, shapes and dimensions indicated and detailed.
- B. All angles and lines shall be in true alignment.
- C. All work shall be straight, sharp and erected plumb and level in proper plane without bulges or waves.

### 3.8 REPAIRING

- A. Repair or replace any damaged work due to construction operation with new work.
- B. Any installation deemed as poor workmanship shall be removed and replaced or corrected to satisfaction of Owner and Engineer.

### 3.9 CLEANING

- A. Leave work clean and free of stains, scraps and debris.
- B. Any construction materials that are on any new or existing exposed sheet metal shall be removed or the metal removed and replaced.

**END OF SECTION 07 62 00**

**SECTION 07 92 13  
SEALANTS**

**INDEX**

**PART I - GENERAL**

- 1.1 WORK OF THIS SECTION
- 1.2 REFERENCE
- 1.3 SUBMITTALS
- 1.4 DELIVERY AND STORAGE
- 1.5 WARRANTY

**PART II - PRODUCTS**

- 2.1 MATERIAL

**PART III - EXECUTION**

- 3.1 FIELD CONDITIONS
- 3.2 APPLICATION
- 3.3 PROTECTION

**PART I - GENERAL**

- 1.1 WORK OF THIS SECTION
  - A. Sealants
- 1.2 REFERENCE
  - A. ASTM C920 Standard Specification for Elastomeric Joint Sealants
  - B. ASTM C1193 Standard Guide for Use of Elastomeric Joint Sealants
- 1.3 SUBMITTALS
  - A. Samples, if requested by Construction Manager or Engineer:
    - 1. Submit samples of full range of colors of each type sealant for selection.
  - B. Product data, if requested by Construction Manager or Engineer:
    - 1. Submit manufacturer's descriptive literature for each material.
  - C. Location identification, as requested by Construction Manager or Engineer:
    - 1. Submit list of locations for each type of material
- 1.4 DELIVERY & STORAGE
  - A. Deliver materials to job site in the manufacturer's original containers. Containers shall contain following information:
    - 1. Name of supplier and material
    - 2. Specification number or formula, lot number
    - 3. Instructions for mixing, application, curing time and storage
    - 4. Shelf life
  - B. Store and install backer and sealant tape to prevent deformation of the material.
- 1.5 WARRANTY
  - A. Contractor/installer shall provide a five year maintenance warranty on all labor and materials furnished under this specification. The warranty will be delivered to the Owner prior to time of project close out. Warranty shall commence at Substantial Completion inspection date or as agreed to by Engineer/Owner. Warranty work performed during five year period shall be at no cost to Owner or Engineer.
  - B. Defective work covered by the warranty shall include:
    - 1. Moisture infiltration through sealant
    - 2. Hardening and cracking of sealant
    - 3. Crumbling, melting or shrinkage of sealant
    - 4. Excess flow or staining of adjacent building components

## **PART II - PRODUCTS**

### **2.1 MATERIAL**

- A. Polyurethane, One-Component Sealant (typical exterior use for roof related flashing):
  - 1. Sealant shall meet or exceed the requirements of ASTM C920., Type S, Class 25, Grade NS, Use NT, M, A, T, O & I
  - 2. Approved manufacturers:
    - a. Tremco Vulkem® 116
    - b. BASF Masterseal "NP 1"
    - c. Approved equivalent
  - 3. Properties : Withstand movement to 25% extension and 25% compression. Gun-grade, non-sagging
- B. Backer-rod Material ;
  - 1. Polyolefin, polyethylene, urethane, neoprene closed-cell foam backer rod.
  - 2. Size: oversize 25% of joint width
  - 3. Chemically compatible with primers and sealants.
  - 4. Round solid rod, Shore A hardness 70
- C. Bond breaker tape - Polyethylene bond breaker tape that will not bond to sealant
- D. Color : Submit color selection to Owner and Consultant for verification of color.
- E. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- F. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- G. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## **PART III - EXECUTION**

### **3.1 FIELD CONDITIONS**

- A. Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 degrees F.
  - 2. When joint substrates are wet.
  - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

### **3.2 APPLICATION**

- A. General: Follow requirements of ASTM C1193
  - 1. No sealant shall be applied on damp, wet or frosty surfaces. Apply only when temperature is between 40°F and 80°F.
  - 2. Where the possibility of primer or sealant staining of adjacent areas or materials exists, joints shall be masked prior to application. Masking tape shall not be removed before joints have been tooled and initial cure of sealant has taken place. Work stained due to failure of proper masking precautions will not be accepted.
  - 3. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- B. Cleaning:
  - 1. Painted surfaces: Follow manufacturers recommended cleaning procedures prior to primer or sealant application.
  - 2. Metals, unpainted:
    - a. Galvanized steel: Clean and degrease with xylene or toluene.

- C. Back-up Material
  - 1. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 2. Do not leave gaps between ends of sealant backings.
  - 3. Do not stretch, twist, puncture, or tear sealant backings.
  - 4. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
  - 5. Verify the compatibility of back-up material with sealant before installation.
  - 6. Use back-up material ½" wider than width of joint so that sufficient pressure is exerted by material to provide substantial resistance to displacement.
- D. Release Agent
  - 1. Provide release agent or bond-breaker strip in joint to be sealed on top of back-up material to prevent adhesion of sealant to the back-up material per manufacturer's recommendations.
- E. Sealant Application:
  - 1. Apply materials in accordance with the manufacturer's recommendations. Take care to produce beads of proper width and depth; to tool as recommended by the manufacturer, and to immediately remove surplus sealant.
  - 2. Apply materials only within manufacturer's specified application life period. If inspection indicates that application life is expired or if the prescribed application period has elapsed, remainder of sealant shall be discarded.
  - 3. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 4. Place sealants so they directly contact and fully wet joint substrates.
  - 5. Completely fill recesses in each joint configuration.
  - 6. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.
- G. On all metal laps, embed laps fully into sealant
- H. Sealant applications include but are not limited to the following:
  - 1. Expansion and control joint covers (interior and exterior)
  - 2. Counter flashing joints
  - 3. Joints for metal edge
  - 4. All open joints or holes to seal building from the weather
  - 5. All exposed fasteners.
- I. Clean Up: Any adjacent surface to sealant material that is smeared or has excess material on, shall be cleaned by the Contractor at no additional cost to the Owner.

### 3.3 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

**END OF SECTION 07 92 13**