

Division 7 – Thermal and Moisture Protection

- 07.1. While Division 7 – Thermal and Moisture Protection, shall include specific components of the building envelope, the A/E shall provide a Division 1 specification section on the Exterior Enclosure Air Barrier Systems defining how all the components work together, and the responsibilities of the general contractor to coordinate disciplines critical to envelope success.
- 07.2. Use latest standard for ASHRAE standard 90.1 and Virginia Energy Conservation Code for Building envelope insulation requirements.
- 07.3. The A/E and the Contractor shall refer to **CPSM CHAPTER 4 FOR REROOFING REQUIREMENT** and **CPSM APPENDIX A - DEB ROOFING POLICY & TECHNICAL STANDARDS FOR STATE-OWNED BUILDINGS** shall be followed.
- 07.4. An ODU Project Inspector, or third party roof inspector, shall be present during any roofing installation – both re-roofing and new roof conditions.
- 07.5. Preparation for low Slope Re-Roofing
 - a. The A/E shall ascertain that projected roof repairs, especially those involving new roof penetrations, do not void existing roof warranties. The ODU Project Manager shall provide the A/E copies of existing roof warranties and existing construction documents.
 - b. The A/E shall conduct a pre-design roof survey to photo document existing conditions, including the spaces directly below the roof including above ceiling investigations.
 - c. The A/E shall provide details of boots, sleeves, flashing, counter-flashing, curbs, etc. compatible with the roofing systems.
 - d. Construction of a curb around roof openings/penetrations is the preferred method for flat roofs, small (smaller than 12" square) penetrations do not require curbs.
 - e. The reuse of existing counter flashing materials shall be preapproved by ODU Project Manager.
 - f. The A/E shall specify the installation of new counter flashing in materials matching the appearance of the existing materials and compatible with them.
 - g. A/E shall confirm with the ODU Project Manager all rooftop equipment assumed to be abandoned and removed. The A/E shall also confirm where decking repairs are anticipated around equipment on re-roofing projects.
 - h. The A/E and Contractor shall assume all areas of an existing building will be occupied during roofing operations.
 - i. The contractor shall provide a qualified roofer, certified by the manufacturer of the roof system being installed, on site at all times when construction activity is present. Certification shall be submitted to the ODU project Manager prior to start of construction.
 - j. The contractor, accompanied by the ODU Project Inspector, FM representative and the ODU Project manager, shall conduct a second photographic survey of all spaces directly below the area of re-roofing prior to the start of construction to document existing conditions, equipment etc.
 - k. The Contractor is responsible for placing protective dust or water leakage covers over Owner's equipment and/or furnishings. Contractor shall protect all roof drainage systems during all roof repairs and all roof work. If these roof drainage systems are not protected, maintained or remain open, the Contractor shall be held liable for all damages in the building and on the roof resulting from this failure to protect.
 - l. Conduct re-roofing so University operations will not be disrupted. Provide the ODU Project Manager at least 72 hours' notice of activities that may affect University operations, as determined by the ODU

- Project Manager – see ***DIVISION 1 – GENERAL REQUIREMENTS*** of these standards for additional information.
- m. Coordinate work activities daily with the ODU Project Inspector. Provide a written workplan for the next day's activities to the ODU Project Inspector. Notify the ODU Project Inspector, each day, the extent of roof tear-off proposed for the following day. Notify the ODU Project Inspector of any changes in the written work plan each day.
 - n. Protect building to be re-roofed, adjacent buildings, walkways, impervious pavers, BMP's, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations. Protection is especially important at impervious pavers and BMP's.
 - o. Maintain access to existing walkways, corridors, and other adjacent occupied facilities. Identify and maintain access to emergency egress routes from buildings to designated evacuation gathering areas.
 - p. Coordinate with the ODU Project Manager the shutdown of HVAC, fire-alarm and/or smoke-detection equipment if needed.
 - q. Application of a new roofing system over an existing system, roof-over or re-cover, is not acceptable. Complete removal of the existing roofing system to the surface of the roof deck is required by the Contractor. The Contractor shall take all necessary steps to insure that while removing the existing roof system, that the Contractor does not damage the existing roof deck. Once uncovered, if the roof deck is found to be structurally impaired, or any other unknown condition, immediately notify the ODU Project Manager to evacuate occupants from below the affected area. Also immediately notify A/E of conditions and do not proceed with installation until directed by the A/E. Verify that occupants below the work area have been evacuated before proceeding with work over the impaired deck area.
 - r. Proceed with re-roofing preparation only when existing and forecasted weather conditions permit work to proceed without water entering existing roofing system or building.
 - s. Coordinate with the ODU Project Manager shut down air-intake equipment in the vicinity of the Work. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.
 - t. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.
 - u. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.
 - v. If roof drains are temporarily blocked or unserviceable due to roofing system removal or partial installation of new membrane roofing system, provide alternative drainage method to remove water and eliminate ponding. Do not permit water to enter into or under existing membrane roofing system components that are to remain.
 - w. Verify that rooftop utilities and service piping have been shut off before beginning roofing work.
 - x. When existing base flashings are removed around parapets, curbs, walls, and penetrations, clean substrates of contaminants such as asphalt, sheet materials, dirt, and debris.
 - y. If project conditions warrant, identify to the ODU Project Manager components (e.g. mechanical equipment) that are required to be removed to facilitate roof repairs and upgrading.

- z. A/E, as part of their basic services, to provide deck repair details covering deck damage as part of the working drawing package. Repair details shall cover conditions including rusted decks, deck holes, and deck cuts that occur during re-roofing operations. The intent is to limit the loss time when these conditions invariably occur during re-roofing. The A/E shall indicate conditions by which repairs can be made and indicate the limits of said repairs. This does not preclude additional details becoming necessary for additional conditions uncovered during re-roofing operations.
 - aa. The general contractor shall coordinate the use of existing loading docks with the ODU Project Manager. Existing loading docks cannot be occupied for the duration, their use is limited to scheduled deliveries.
 - bb. Project Management and Coordination: Review methods and procedures related to roofing system including, but not limited to, the following:
 - i. Review temporary protection requirements for existing roofing systems that is to remain, during and after installation.
 - ii. Review roof drainage during each stage of re-roofing and review roof drain plugging and plug removal procedures.
 - iii. Review structural loading limitations of deck during re-roofing.
- 07.6. Bituminous Damproofing (Not Used)
- 07.7. Waterproofing
- a. Provide heavy duty permanent water-resistant Modified Bituminous Sheet Waterproofing: Minimum 60-mil nominal thickness, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated on one side to a 4-mil- thick, polyethylene film reinforcement, and with release liner on adhesive side; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
 - b. The A/E shall include a ten-year installer experience clause in the specifications.
 - c. For horizontal application under elevator pit slabs provide bonded HDPE or Polyethylene Blindside Sheet Waterproofing: Uniform, flexible, multilayered-composite sheet membrane consisting of an HDPE film coated with pressure-sensitive adhesive and protective release liner, total 46-mil thickness, or a cross-laminated film of low- and medium-density polyethylene, coated with a modified asphalt layer and a nonwoven geotextile-fabric final layer, total 95-mil thickness.
 - d. Compatibility with water stop materials as may be required at joints shall be determined by the A/E and coordinated with the CPSM.
- 07.8. Traffic Coatings (Reserved) Cold liquid-applied waterproof-barrier coatings with integral wearing surface.
- 07.9. Water Repellents
- a. Water repellent coatings should be specified for all restored brick, concrete masonry and architectural pre-cast concrete. Products specified should be breathable silanes or siloxanes as appropriate for the surface to be coated. Film forming surface coatings such as silicones, acrylics, mineral gum resins and blends should not be used. Water Repellent shall be penetrating, colorless, non-staining, and mildew resistant.
 - b. Products specified should be those which have an estimated life expectancy of no less than 10 years.
 - c. Specify that adjacent and nearby surfaces be protected from spillage or overspray from repellents. Require that live plants, grass, windows and other areas be covered.

- d. The A/E shall coordinate and specify water repellents with graffiti-resistant coatings from the same manufacturer ensuring compatibility.

07.10. Thermal Insulation

- a. Building insulation is one component of the exterior envelope system. Insulation provided only in the stud wall cavity is not allowed, but is allowed if in combination with the continuous insulation noted above. The A/E shall provide a dew point analysis for the exterior envelope design to the University Architect at Preliminary Design for review.
- b. Fiberglass batt insulation shall be installed to minimize exposed fiberglass in areas needing to be accessed for inspections, maintenance, etc. Designs shall encapsulate fiberglass using foil or pre-applied backing, plastic or gypsum board covering.
- c. Maximize insulation value to conserve energy; avoid insulation containing formaldehyde or ammonium sulfate or foams expanded with hydro chlorofluorocarbons (HCFC's); consider insulation with recycled content.
- d. Provide 2" rigid perimeter insulation, extend 24" under the slab horizontally and vertically to top of grade beam or other concrete foundation member. On vertical surfaces, set units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer. Extend insulation to full footing depth. Protect below-grade insulation on vertical surfaces from damage during backfilling and site work by applying protection board.

07.11. Foamed-in-Place Insulation

- a. Refer to **CPSM 4.1.2.11 NFPA 285 ACCEPTANCE CRITERIA IN EXTERIOR WALLS AND BCOM NEWSLETTER #11 NOVEMBER 2015** for specific instructions related to assemblies utilizing combustible foam plastic insulation and required compliance with NFPA 285. Note: "BCOM will enforce IBC 2012 Section 2603.5.5 Vertical and Lateral Fire Propagation as written. NFPA 285 is a unique 'Assembly Test' where the replacement and/or modification of a specific component will void the Assembly Listing." Provide design and detailing to completely separate foam plastic insulations from the interior of the building with appropriate thermal barriers. The A/E is responsible for coordinate with the Contractor that the individual submitted components of the assembly does not deviate from a tested assembly. The Contractor is responsible for constructing assemblies that do not deviate from the tested assembly.

07.12. EIFS

- a. Exterior Insulation and Finish Systems (EIFS) shall not be used, unless a variance is submitted and approved by the University Architect and the Director of Design and Construction.

07.13. Vapor Retarders

- a. The A/E shall require, as part of the specifications, the contractor provide complete details for the vapor barrier installation as part of their submittals.
- b. Under Slab Vapor Retarders used on contact with soil or granular fill shall be Class A, with a maximum permeance of 0.01 perm and a minimum thickness of 15 mils, intentionally more restrictive than the ASTM E1745 Standard, appropriate for local conditions. Provide a complete system including mastic, adhesive, seam tape, and other materials recommended by vapor retarder manufacturer.
- c. Provide effective, continuous, unbroken, undamaged vapor retarders sealed to adjacent construction, perimeters, and penetrations. Comply with ASTM E1643 Standard Practice for Installation of Water Vapor Retarders

- d. Coordinate installation of under slab insulation, installing vapor retarder over insulation. Provide continuous, air tight, vapor retarders, installed continuously in largest practical sheets to minimize seams. Orient seams so that concrete placement operations will be parallel to seams. Overlap seams at least a minimum of 6 inches and tape continuously. Cut and fit vapor retarder precisely to perimeter of area. Turn vapor barrier edge up against foundation wall 6 inches. Continuously tape the top of the vapor retarder to the foundation wall with vapor tape. Clean substrates to ensure tape sticks. Provide a loose 2 inch fold of vapor retarder at the horizontal and vertical transition to accommodate differential movements and slab settlement.
- e. Cut and fit vapor retarders accurately to penetrations, making the minimum size holes to minimize patching and repairs. Effectively cover, patch, and repair all holes, tears, seams, and penetrations. Tape the vapor retarder continuously to the penetration. Form a "**boot**" around each penetration similar to roofing flashing boots. Ensure that air and water vapor cannot pass between the vapor retarder and the penetration. Provide a loose 2 inch fold of vapor retarder at the horizontal and vertical transition to accommodate differential movements. Ensure the seam seals, edge seals, and penetration seals are intact.
- f. When the concrete slab is directly over the vapor retarder, provide additional measures to minimize slab curling, consider the following:
 - i. Reducing construction joint spacing in concrete to 20 feet on center both directions.
 - ii. Use a special concrete mix with low potential for shrinkage.
 - iii. Cure with moisture retaining curing covers only, avoid use of curing compounds.
- g. Protect installed vapor retarder from physical damage and deterioration. Monitor all work above the installed vapor retarder to ensure the work does not damage the vapor retarder. The following activities are prohibited:
 - i. Form stakes driven through installed vapor retarders
 - ii. Intentional penetration or puncturing of vapor retarders to promote drainage
 - iii. Intentional penetration or puncturing of vapor retarders to promote slab drying or curing
 - iv. Removal of vapor retarder to foundation wall edge seals for grade lines or other reasons
 - v. Careless placement of reinforcing steel and welded wire mesh of all types.
 - vi. Careless raking of concrete which results in damage to the installed vapor retarder.
 - vii. Careless lifting of reinforcing mesh which results in damage to the installed vapor retarder.

07.14. Air Barriers

- a. Provide building air infiltration barrier where appropriate; Air barrier shall be capable of performing as a continuous vapor-retarding air barrier and as a liquid-water drainage plane. Air barrier to be flashed to discharge. All incidental condensation or incidental water penetration shall discharge to the exterior. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage.
- b. Air barrier system shall be from the same manufacturer as flexible flashing.
- c. Provide a complete air barrier system from one manufacturer including, without limitation, primers, sealers, surface conditioners, edge sealants, fillers, adhesives, cants, mastics, and other materials and accessories required or recommended by system manufacturer.
- d. Air Barrier Systems shall meet the following performance requirements:

- i. Air Permeance: Maximum 0.004 cubic feet per minute per square foot at 0.3 inch water gage [1.57 psf] pressure difference. Per ASTM E2178 Standard Test Method for Air Permeance of Building Materials
 - ii. Water Vapor Permeance: Minimum 6.0 perms over Wood Panel Sheathing, maximum 0.1 perm over Gypsum Sheathing, per ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
 - iii. Liquid Water Leakage: None at 5 gallons per square foot per hour at 6.24 psf pressure difference.
 - iv. Peel Adhesion: Minimum 3 pounds per linear inch of bond line; 180 degree peel, per ASTM D903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
 - v. Pull Adhesion: Minimum 12 pounds per square inch.
 - vi. Puncture Resistance: Minimum 30 pound-feet.
 - vii. Fasteners installed through cured air barrier shall be sealed so that no increase in air permeance or liquid water leakage around fasteners shall occur.
 - e. Apply a continuous air barrier system, with equipment and techniques recommend by manufacturer, over 100 percent of all wall surfaces free of defects including wrinkles, fish mouths, air pockets, bubbles, blisters, pin holes, slump, sag, runs and sponginess. Fully adhere air barrier system to substrates. Inspect installed air barrier and repair all damage before concealing using manufacturer's recommended repair and patching procedures.
 - f. Additionally, for sheet applied air barrier systems provide minimum 3 inch overlaps at horizontal joints and seams and minimum 6 inch overlaps at vertical joints and seams per manufacturers' recommendations. Continuously seal exposed sheet edges with air barrier system's liquid sealant. Use mechanical fasteners to staple top edge of each air barrier membrane course and layer to sheathing, when recommended by air barrier manufacturer.
 - g. Additionally, for fluid applied air barrier systems seal substrate joints, cracks, and seams up to 0.125 inch wide with continuous fiberglass reinforcing tape and 12 inches wide first coat of air barrier material centered over the joint. Seal substrate joints, cracks, and seams 0.125 inch wide and wider with continuous minimum 6 inches wide crack membrane. Seal and flash penetrations, but not fasteners, with continuous crack membrane to form waterproof flashing "boots" around each penetration. Do not trap moisture between coats or layers.
 - h. The A/E shall provide standard details for air barrier installation as part of the contract documents. The A/E shall specify how contractor shall address how penetrations through the air barrier shall be sealed post system installation (i.e. signage electrical conduits).
- 07.15. Shingles
- a. On the Williamsburg Lawn historic section of the campus, existing Spong and Rollins Halls have slate shingle roofs. Replacement of the Spong and Rollins Halls slate shingles will be considered on a project specific basis.
 - b. Asphalt shingles should not be considered for new construction on campus.
- 07.16. Metal Roof Panels
- a. Refer to **CPSM A.4 METAL ROOFING**. Metal roofing shall comply with the latest edition of the SMACNA Architectural Sheet Metal Manual or the NCRA Metal Roofing Manual.
 - b. Roof Panels shall be:

- i. Double lock seam or flat seam terne coated metal, copper, zinc, aluminum or stainless steel roofs are acceptable when they comply with the latest editions of SMACNA Architectural Sheet Metal Manual, or the NCRA Metal Roofing Manual.
 - ii. Lapped rib panels with exposed fasteners are acceptable only for utility structures such as sheds or pre-engineered buildings where the manufacturer is responsible for water tightness.
 - iii. Architectural systems installed over a solid deck are acceptable for roof slopes 4:12 or greater.
 - iv. Mechanically seamed cap strip with factory applied weather stripping.
 - v. Finish: Manufacturer's standard color kynar 500 fluoropolymer.
 - c. Standing seam spacing shall be coordinated with the University Architect to insure proper aesthetic spacing for the building. Standing seams spaced 12" on center or 16" on center are typical spacing dimensions. 18" on center may be considered. 24" on center standing seam spacing is not acceptable. Panel Length shall ensure no panel end seams.
 - d. Provide lead coated copper or terne coated stainless steel for counter flashing, cleats, drip edges, exposed metal trim/ridge cap, cant strips, and, exposed metal valleys typical.
 - e. 60 mil, self-adhesive polymer-modified bituminous sheet sealable ice and water barrier shield shall extend continuously: from outer edges of eaves and gutters to 30" minimum upslope beyond the line of the exterior wall below, 30" from rake edges and roof penetrations, and 36" to both sides of valleys.
 - f. The Manufacturer shall provide a minimum 30 year system warranty. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - g. Refer to **DIVISION 1 – GENERAL REQUIREMENTS**, of these standards, regarding roofing mock ups.
- 07.17. Metal Wall Panels
- a. The university allows aluminum composite metal panels on campus buildings. Panels shall be a minimum of 4 mm thick with an aluminum smooth, non-embossed panel skin gage of a minimum 0.020 inch. All panels shall be oriented so the directional grain is in one direction. Panels shall have a fire retardant core.
 - b. Steel panels are allowed, with approval by the ODU Project Manager in concurrence with the University Architect.
 - c. When panels are applied to a curved condition, provide true curved panels, do not provide flat faceted approximations of curves.
 - d. Shop Drawings for metal wall panels shall include details of concealed stiffener locations, corner reinforcing and fasteners.
 - e. Make each panel individually removable for repair and maintenance
- 07.18. Metal Soffit Panels - *Concealed-fastener, lap-seam panels, with and without perforations.* (Reserved)
- 07.19. Fiber Cement Wall Panels (Reserved)
- 07.20. Fiber Cement Lap Siding shall not be used on campus, without prior approval by the University Architect is
- 07.21. Roofing
- a. It is critical that the A/E, along with the ODU project Manager, set up a roofing design meeting during Preliminary Design with the appropriate roofing personnel from Facilities Management to review proposed roof systems.
 - b. Roof covering choice shall consider the views from higher elevated structures.

- c. All low-slope roofs shall obtain primary and secondary roofing and insulation materials from the roof system manufacturer to ensure a single-source responsibility for entire roofing system.
- d. Vapor retarders shall have a perm rating of 0.5 or below in accordance with ASTM E96. Typically, a two ply organic membranes recommended under hot applied system; a polyethylene sheet under single plies
- e. Maximize insulation value to conserve energy.
- f. The following, 60 mil minimum, systems are used on University Buildings, in order of preference, when appropriate:
 - i. THERMOPLASTIC POLYOLEFIN (TPO) ROOFING fully adhered systems.
 - ii. POLYVINYL-CHLORIDE (PVC) ROOFING, with KEE, fully adhered systems
 - iii. ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING fully adhered system
- g. Roof Insulation
 - i. Polyisocyanurate board insulation shall have a nominal average compressible strength of 25 psi. Material provided shall be labeled to show compliance with this requirement.
 - ii. Board insulation shall be installed with a minimum of two layers with staggered joints in both directions, installed per manufacturer's installation instructions. Maximum single board thickness for flat insulation shall be 2-inches.
 - iii. Board insulation shall be installed with a minimum of two layers. Fit boards together with no gaps to achieve a complete thermal envelope.
 - iv. Daily installation of roof insulation materials shall be limited to that amount which can be covered with the roofing membrane prior to the end of the day or prior to the onset of inclement weather.
 - v. Anchor roof insulation in accordance with manufacturer's recommendations for fastener type, size, placement and density. Installation shall comply with Factory Mutual 1-90 rating against uplift.
- h. All roofs shall have electrical outlets located no more than 200' apart.
- i. Whenever possible provide a frost-protected hose bib on each roof.
- j. All roof drain strainers shall be metal.
- k. Preference is for a combined roof drain and overflow drain in a single bowl.
- l. Rooftop piping, conduits and equipment shall be mounted on supports specifically manufactured for roofing. Wood blocking is not an acceptable means of support.
- m. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof drain plugs specifically designed for this purpose. Remove roof drain plugs at end of each work day, when no work is taking place or when rain is forecast.
 - i. If roof drains will be temporarily blocked or unserviceable due to roofing systems removal or partial installation of new membrane roofing system, provide alternative drainage method to remove water and eliminate ponding. Do not permit water to enter into or under existing membrane roofing system components that are to remain.
- n. Warranty
 - i. Review warranty requirements during preliminary design. Review sample warranty included with required submittals before contractor starts work.

- ii. Manufacturer's Warranty: After final inspection and approval by roofing manufacturer's representative, provide written warranty signed by manufacturer of primary roofing materials and his authorized Installer, agreeing to replace/repair defective materials and workmanship as required to maintain roofing system in watertight condition. Warranty period is a minimum of 20 years from date of substantial completion, with no dollar limit.
- iii. Contractor's Warranty: Submit two executed copies of the Contractor's Roofing Warranty, signed by the Installer (Roofer), agreeing to warrant the roof system. Warranty period is 2 years from date of substantial completion.
- iv. Insulation shall be supplied by the membrane manufacturer and included in the required 20-year system warranty.
- v. The contractor shall schedule a roof warranty inspection at the time of substantial completion, to include the ODU Project Manager, ODU Project Inspector, third party roof inspector.
- o. All components shall be provided by a single manufacturer and installed by a single installer.
- p. Manufacturer approved installer with not less than 10 years of successful experience with roofing membrane specified.
- q. Pipe seals shall be pre-manufactured neoprene boots.
- r. Wood members used in conjunction with roof system shall be pressure treated with water-borne preservatives for above ground use in compliance with AWPB LP-2.
- s. Interior roof drain connections' installation must be coordinated between all trades (roofing, plumbing and general trades) and clearly detailed on the drawings by the A/E.
- t. Provide tapered installation with positive slope to drain per manufactures' recommendations.
- u. Refer to the CPSM for requirements associated with water evaporation time limits.

07.22. Sheet Metal Flashing and Trim

- a. For all warranties, specify wind speed.
 - i. Warranty for "Gravel Stop" Roof Edge: 20 years
 - ii. Warranty for Coping: 25 years
 - iii. Warranty for Through Wall Scupper: 20 Years
- b. Stone precast concrete or metal coping systems require a complete thru wall flashing system. Flash the roof side of parapet walls the full height.
- c. Roofing system flashing and miscellaneous sheet metal work, shall be installed in accordance with the manufacturer's published instructions and furnish a 50 year warranty.
- d. Metal for exposed flashing and drip edge shall be copper, not less than sixteen ounces (16oz.), concealed flashing shall not be less than twelve ounces (12 oz.). When flashing occurs extensively in connection with aluminum items, stainless steel (grade 304) or aluminum flashing not less than 0.032" thick shall be used. All flashing joints shall overlap 4" minimum and shall be sealed with a manufacturer approved elastomeric sealant.
- e. All flashing and sheet metal work shall be as recommended by the sheet roofing membrane manufacturer and shall be included in the roof guarantee.
- f. All metal shall be compatible with abutting systems.
- g. Fascias and gravel stops shall be extruded aluminum, copper, stainless steel or color coated metal.
- h. The top of flashing (bottom of counter-flashing) shall be a minimum of 8" above the plane of the roof.

- i. Items penetrating roof should be flashed with pre-formed accessories, secured to the roof and penetrating items, do not use pitch pans.
- j. Relief vents shall not be installed unless roof no longer is under warranty and vents are recommended by the manufacturer of the sheet roofing membrane. For roofs being constructed or under warranty, all wet insulation shall be replaced.
- k. Where dissimilar metals will contact each other or corrosive substrates, protect galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
- l. Solder all non-expansion joints in copper or zinc metal work.
- m. All thru-wall flashing shall be stainless steel backplate with 40 mil rubberized asphalt peel and stick over the top for a seamless system
- n. Thru-Wall Flashing: Contractor shall inspect and certify proper installation of all thru-wall flashing. Prior to installation of first piece of thru-wall flashing related to the wall system and prior to the first piece of thru-wall flashing related to the roof system, the Contractor shall coordinate an on-site meeting so that the ODU Project Inspector and the A/E can be on site and witness the installation prior to it being covered up. It is the responsibility of the Contractor to allow time in the schedule for each of these initial inspections. The Contractor shall create and maintain a Thru-Wall Flashing Log listing the date, time, and area inspected and provide copies of the log at each job site meeting. The Contractor shall photo document inspections and each photo shall have a date and time stamp. The Contractor shall provide digital copies of the photos within 24 hours upon the Project Manager's request. The log and photos shall be part of the close-out documentation.
- o. Metal flashing, counter flashing, cleats, clips, drip edges, exposed metal trim/ridge cap, cant strips, scuppers, eyebrow roof vents, and exposed metal valleys shall be terne-coated stainless steel.
- p. Continuous cleats are required.
- q. Built-in through wall flashing shall be used for all new wall-flashing terminations. Surface applied reglets shall only be used on existing buildings where installation of built-in reglets is not possible.

07.23. Roof Specialties

- a. Comply with SMACNA "Architectural Sheet Metal Manual".
- b. On sloped roofs, provide adequately sized and securely installed gutters of aluminum, stainless steel or PVDF-coated steel. A minimum slope of 1/16-inch per foot for gutters is required. Counter flash top back edge of gutter under roof edge/fascia. Do not allow roof water to run down wall behind gutter. Space gutter hangers maximum 30 inches on center. Anchor gutter into structure, framing, or blocking. Cap gutter ends with shop fabricated terminations. Space gutter expansion joints a maximum of 30 feet on center and coordinate with downspout locations.
- c. Downspouts shall be a minimum of 16-gauge, shall be adequately sized and securely fastened to the vertical plane, and shall empty into a cast iron boot at grade connected to a storm water system or BMP. A minimum of two downspouts for each drain area shall be provided. Coordinate downspout locations with gutter expansion joints. For existing facilities where this is not possible, water will be directed away from the building and new splash blocks will be provided. Attach to wall with hangers and spacers. Provide at least two hangers per downspout a maximum of 8 feet on center. Install all hangers at same heights. Provide fittings and offsets to make downspout follow wall profile. Provide 12 to 24 inches high, replaceable bottom outfall coordinated with drain method.

- d. Gutter Debris Guards shall be included on all gutters for sloped roofs that are located under a canopy of trees or will be susceptible to leaf collection. Debris guard material shall be compatible with gutter material to avoid galvanic corrosion. Coordinate with ODU Project Manager.
 - e. If conductor drains are utilized, they shall have guards to prevent pigeons from nesting.
 - f. Lap joints are not allowed for built in gutters.
 - g. Built-in gutters are only permitted with approval of Design & Construction and Facilities Management. Where approved, built-in metal gutter liner shall beterne-coated stainless steel.
 - h. Remove spilled sealant, finger prints, soiling, stains, and contamination from gutters and downspouts. Clean with potable water and soft bristle brushes, being careful to not scratch or damage surfaces. Do not use chemical cleaners or detergents without approval as they may damage the building.
- 07.24. Manufactured Roof Expansion Joints (Reserved) Factory-fabricated, bellows-type, and aluminum roof expansion-joint assemblies.
- 07.25. Roof Accessories
- a. Rooftop equipment must be screened from view of other buildings, streets and walkways. A/E shall provide 3D views of the building design from various locations to demonstrate the full extent of the equipment screening during preliminary design. Consider views from adjacent building windows and consider future adjacent buildings who might have visual access to the roof.
 - b. Roof Access:
 - i. Roof access shall be provided from inside the building to accommodate inspections, repairs, and drain cleaning, Man door access is preferred. Permanent ladders or stairs shall be provided as necessary to access each roof level. A/E shall demonstrate how ALL roof areas can be accessed for maintenance as part of the preliminary design review.
 - ii. Roof Access Preferences:
 - a. Buildings 3 stories or less: Provide a 48 inch roof hatch with a ships ladder.
 - b. Buildings 4 or more stories: Provide a stair to the roof, with an oversize door (42 inches) to the roof.
 - c. Buildings greater than 6 stories: Provide an elevator that opens level with the roof surface
 - iii. Buildings with significant mechanical equipment located on the roof shall endeavor to provide elevator access.
 - iv. Roof hatches shall be insulated and feature thermally broken construction and have frangible (break away) type padlocks.
 - c. Elevated equipment must have permanently installed ladders and platforms to all equipment access panels and items requiring ongoing maintenance.
 - d. Where parapets are below 42" in height, the A/E shall specify and detail roof tie-offs.
 - e. Roof Curbs: Roof-mounted equipment such as fume hoods fans, motor starters, etc. shall be installed on fully flashed curbs. When set on stands, allow 24 inches minimum clearance, under equipment, to facilitate repairs to equipment and allow for roof repair and reroofing. Equipment is not allowed to be mounted on pressure-treated wood, plastic pads or panels set directly on roof surface. Curb caps shall not be penetrated by attachment of motors or equipment. Install raised brackets that attach thru the side of curbs and allow equipment attachment without penetrating curb cap.

- f. Fasteners: Same metal as metals being fastened or non-magnetic stainless steel or other non-corrosive metal as recommended by the manufacturer. Match finish of exposed fasteners with finish of material being fastened.
- g. Provide tie-off connections for life safety lines.
- h. Keep any rooftop equipment and drains a minimum of 10 feet from any building edge to avoid the addition of roof guardrails.
- i. Where new rooftop equipment or repair/replacement of existing rooftop equipment is approved, the project must incorporate the following:
 - i. Provide adequate space and appropriate lighting for access and maintenance of the equipment.
 - ii. Provide durable walk pads from roof access point to and around all rooftop equipment. Walk pads must be at least 2' wide and extend 6' from the equipment on the sides requiring service accessibility. Walk pads to be installed per manufacturer's instructions. A/E to specify that walk pad installed to be certified in walk pad installation by the manufacturer. Construction drawings shall clearly show these traffic pad locations and dimensions. Enlarge roof pad area at roof access points for equipment staging.
 - iii. Provide 12" clearance under rooftop equipment and horizontal supporting members to finished roof (24" clearance if the equipment is > 24" wide). Supports shall be mounted and fastened to structural deck or framing, not insulation.
 - iv. Use of wood sleepers for rooftop equipment is prohibited.
 - v. Equipment curbs shall not be placed in drainage valleys. Crickets shall be installed on upslope sides of equipment curbs.
- j. Install roof anchors on all new buildings that require windows and skylights to be washed via suspension system (such as boatswain's chair, rope descent, or temporary scaffolding) and for other equipment maintenance activities that would be considered a fall hazard.
- k. OSHA approved fall protection including safety tie-back anchors shall be installed on all new roofing and reroofing projects. Tie-backs as required shall be securely anchored to the building structure.

07.26. Snow Guards

- a. Review snow and ice guards on all steep slope roofs during Preliminary Design, paying special attention to all entrances and exits. Snow guards are required for all roofs with a slope of 4 in 12 or greater and over all entrances regardless of slope.
- b. A minimum of three staggered rows is required. Snow guards shall be copper, stainless steel or bronze, butterfly type. Adhered plastic snow guards and wire snow guards are not acceptable.
- c. Confirm design and layout of snow guard system as appropriate for size and slope of roof. Larger roofs may require intermediate rows of snow guards.

07.27. Fireproofing

- a. Coordinate shop applied coatings with fireproofing manufacturer. Do not apply fireproofing to painted substrates if the fireproofing manufacturer prohibits or does not recommend application over painted substrates.
- b. Intumescent Fireproofing. When structural steel is specified to receive intumescent fireproofing, coordinate the steel shop primer, or recommend steel to receive intumescent fire proofing be erected without primer. Steel shop primer, if any, must be approved by thin film fireproofing manufacturer. Commercial Blast surface prep is required under primer and intumescent fireproofing.

- c. Refer to **CPSM SECTIONS 4.12.6 REMOVAL AND REPLACEMENT OF SPRAYED-ON FIREPROOFING AND 5.8.6.9.10 APPLIED FIRE RESISTANT MATERIALS.**
- d. Sprayed-on fireproofing shall be 100 percent asbestos free and a cementitious type. Specify higher density products if needed based on project requirements.
- e. Specify field quality control testing of sprayed-on fireproofing by an independent testing agency to verify that installed fireproofing complies with specified thickness, density and bond strength prior to ductwork installation.
- f. Coordinate the extent of fireproofing between structural and architectural documents.
- g. Coordinate specifications and manufacturer's requirements for structural steel that is to receive fireproofing shall not be prime painted. Such steel shall be properly stored and protected to prevent surface rust. Require that applicators prepare steel in accordance with fireproofing manufacturer's recommendations to ensure proper bond.
- h. Repair of Existing Fireproofing
 - i. Where renovation work disturbs existing fireproofing, repairs shall be made by the contractor. Match the original fire resistance performance and original fireproofing density and thickness or provide compatible materials. Provide primers, bonding agents, mold inhibitor, and surface sealers recommended by fireproofing manufacturer. Patch and restore fireproofing to match original installation. Control curing of new fireproofing. Apply surface sealer if original fireproofing was surface sealed. Clean up and remove over spray. Contractor shall have the fireproofing installation reviewed and approved by the AHJ immediately before concealing.

07.28. Firestopping

- a. Refer to **BCOM NEWSLETTER #35 NOVEMBER 2017** for information regarding firestopping.
- b. Contractor shall be required to provide verification of purchase to ODU of product provided for fire stopping penetrations through rated partitions.
- c. ODU reserves the right to verify that the correct thickness of material has been provided at fire-stopped penetrations by cutting out sections at random at no extra cost to ODU.
- d. Fire stop installer shall post labels at all fire stopped penetrations to identify "hour rating", UL System, etc. Submit samples with shop drawing submittals.
- e. The installing contractor shall be trained and authorized by the manufacturer of the fire stop product used to do the work; authorization shall be included in product submittals.
- f. The manufacturer's local representative shall be required to periodically visit the site to review the work done and make recommendations to ODU on the work performed. A site visit report shall be submitted to the Project Manager.
- g. Floor penetrations in all mechanical spaces shall be sealed and water-proofed. On new construction sleeves shall be cast-in-place schedule 40 pipe and shall project 3" above the floor in all rooms housing mechanical equipment.
- h. Engineering Judgment: For each fire stop condition for which there are no UL, or equal, system number, provide a Project specific custom designed fire stop system and a dimensioned drawing prepared, professionally sealed, and signed by a registered professional engineer.
 - i. Show all conditions, assemblies, penetrations, annular spaces, if any, and other conditions.
 - ii. Identify all fire stop materials proposed for use including installation locations and thicknesses.
 - iii. Attach product data sheets for each fire stop material proposed.

- iv. Include engineer's opinion and judgment of custom designed fire stop system.
 - v. Obtain approval of AHJ prior to constructing the fire stop system.
 - i. Fire stopping between slab edge and glazed curtainwall assemblies, provide UL "Perimeter Fire Containment Systems XHDG, CW-D" series or equivalent as appropriate for specific project conditions. For mineral fiber board which compresses and rebounds greater in one direction than the other direction, install mineral fiber board with greatest compression/rebound direction oriented horizontal between slab edge and back of curtain wall.
- 07.29. Preformed Joint Seals (Reserved)_Expandable foam joint seals, and precured, extruded silicone joint seals.
- 07.30. Joint Sealants
- a. Sealants shall be specified for all exterior applications and those interior applications where caulking compounds are not suitable. Including the following locations:
 - i. At all joints, seams, and intersections between dissimilar materials. Consider different types of masonry as dissimilar materials.
 - ii. At all gaps and voids within or between similar materials.
 - iii. At interior control joints.
 - iv. At perimeters of door frames, other frames, and trims.
 - v. At top of wall base along irregular walls.
 - vi. At joint between acoustical ceiling edge trim and irregular walls.
 - vii. At counter tops and splashes to make counter tops watertight.
 - viii. Completely around all plumbing fixtures, fittings, and trim at counter tops, walls, and floors.
 - ix. At perimeters of all exterior penetrations.
 - x. At exterior control joints including at pavement and site walls.
 - b. Manufacturers' Warranty Period for Exterior Sealants: 30 years, where possible, 20 year minimum.
 - i. Sealants are to remain flexible to prevent cracking and water infiltration within the warranty period.
 - ii. A written warranty for all joint sealants shall be provided by the Contractor and the sealant subcontractor agreeing to replace all materials which fail within five years from the date of substantial completion, at no cost to the University.
 - c. A/E shall provide a joint sealant schedule as part of the specifications and coordinated with the drawings.
 - i. Interior, Dry, No Traffic: White, paintable, siliconized acrylic
 - ii. Interior, Wet, No Traffic: Low odor, mildew resistant, fungus resistant, sanitary silicone.
 - iii. Exterior, No Traffic, Silicone: Neutral cure, medium modulus.
 - iv. Traffic Bearing: Traffic bearing, chemically curing, polyurethane selected for slope.
 - d. Specify preconstruction and field adhesion testing where appropriate.
 - e. The sealant specifications shall include all accessories such as seals, water stops, backer rod, bond break tape and primer.
 - f. For horizontal construction joints in concrete pavements or walks, use pourable urethane base sealant.
 - g. Five years' experience of applicator shall be certified to the A/E prior to the installation of any sealants.
 - h. Joint Sealant Installation:

- i. Installation of sealant materials shall be as late in the project as possible, but between cleaning operations and paint application. Do not install sealants when the temperature is below 40 degrees F. unless approved by the manufacturer and the A/E.
- ii. Acceptance of conditions for application of sealant materials shall be solely the responsibility of the sealant sub-contractor.
- iii. Comply with manufacturer's instructions and recommendations including, without limitation, environmental limits and substrate temperature limits. Follow ASTM C1193 Standard Guide for Use of Joint Sealants.
- iv. Remove loose and friable materials down to sound materials.
- v. Etch and roughen surfaces to which sealant is adhered to improve bond.
- vi. Clean joint surfaces immediately before installation, removing laitance, soil, grease, oil, and all contamination. Mask adjacent surfaces to control spillage and prevent damage to other surfaces. Prime all substrates prior to installation of sealants and apply sealant within same work period as primer application.
- vii. Install backer rods wherever possible, without twisting or distortion. Do not puncture or damage closed cell back rods to prevent outgassing and sealant bubbles. Control depth of backer rod to control sealant shape and sealant thickness. Control depth of backer rod so compressed sealant does not protrude from joint.
- viii. Comply with sealant manufacturer's recommendations for sealant width and depth. Sealant cross section shall be "hour glass" shape with broad adhesion and thin center. Where backer rod is not possible, provide bond breaker tape at back of joint.
- ix. Do not obstruct weep holes.
- x. Force sealant into joints, do not drag sealant into joints. Fill joints with sealant to form dense, continuous sealant beads without air gaps and voids. Dry tool sealants to provide smooth, uniform, continuous visible sealant surfaces, do not wet tool. Tool visible sealant surface slightly concaved, except make flush in very hot weather.
- xi. Avoid intersections between incompatible sealants. Where intersection between incompatible sealants is unavoidable, provide a 0.032 inch thick aluminum septum between the incompatible sealants and adhere both sealants to the septum.
- i. Color and appearance of joint seals shall be approved by the University Architect as part of the exterior building Mock-Up, see [CHAPTER ONE - PROJECT GENERAL REQUIREMENTS](#)

07.31. Acoustical Joint Sealants

- a. Interior Acoustical Sealant helps ensure that partition sound performance matches the promise of sound tests by sealing off spaces at partition perimeters and around cutouts. Sound transmission between spaces is an important consideration by ODU. The A/E shall indicate the location of acoustical sealants on all partition types and shall include acoustical joint sealants in the specifications.
- b. Follow ASTM C919 Standard Practice for Use of Sealants in Acoustical Applications. Provide uniform, continuous sealant without air gaps and voids. Remove spilled and excess sealant. At all partition application provide acoustical sealant:
 - i. Horizontally between gypsum board edge and the subfloor or dissimilar material.
 - ii. Vertically between gypsum board edge and all dissimilar materials.

- c. At the top of interior partitions fill the space between the top of the partition and the structural deck with acoustical insulation. Continuously seal both faces of the partition with acoustical joint sealant. Conceal the acoustical insulation. If intended to be exposed to view, provide neatly installed and tooled paintable sealant. Install visible face of sealant flush with adjacent surfaces or slightly recessed. Provide and remove temporary masking tape as needed. Do not smear sealant onto adjacent surfaces. Provide straight line sealant bead edges and terminations.
 - d. Acoustical Joint Sealants at Interior Partitions – STC less than 45: Provide one row of continuous liquid sealant on one side of the partition.
 - e. Acoustical Joint Sealants at Interior Partitions – STC less than 45 to 49: Provide two rows of continuous liquid sealant, one on each side of the partition.
 - f. Acoustical Joint Sealants at Interior Partitions – STC 50 and higher: Provide four rows of continuous liquid sealant, two on each side of the partition.
 - g. Acoustical Joint Sealant at interior frames – doors, sidelights, borrow lights, and windows: Provide four rows of concealed continuous liquid sealant, one on each side of partition between partition framing [stud and header] and frame and one on each side of partition between gypsum board edge and frame.
 - h. Acoustical Joint sealant at interior control joints: Provide continuous liquid sealant on each side of the partition directly behind the control joint. Fill the entire cavity behind the control joint and acoustical sealant with acoustical insulation.
 - i. Acoustical joint sealants at partition penetrations – not fire-rated: Provide anchored and grouted sleeves into partitions. Seal penetrations. Pack acoustical insulation around sleeve. Pack acoustical insulation between sleeve and penetration. Continuously seal both faces of the partition with acoustical joint sealant.
 - j. Acoustical Putty Pads at Electrical Boxes: Comply with manufacturer's instructions and recommendations. Cover entire back and all accessible sides of electrical box with putty pad. Seal putty pad to framing supporting electrical box.
- 07.32. Expansion Joint Covers
- a. Location and details of expansion joints and covers shall be reviewed at Preliminary Design, including roofs, ceilings, walls (interior and exterior), and floors. Expansion Joint covers shall be coordinated with building systems and finishes.