

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 -**

- 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

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

- 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 dam

- 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 RTIcti

- i. Double lock seam or flat seam terne coated

- 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



- 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.

- i. Items penetrating roof should be flashed with pre-formed accessories, secured to the roof and penetrating items, do not use pitch pans.

- 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 be terne-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

- 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 verificati

- 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.

- 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 an

- 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 – door