Thermal and Moisture Protection

I. Thermal and Moisture Protection

A. General

1. All buildings and structures shall be impervious to water infiltration from **ALL** surfaces.

a. Where existing buildings are to be renovated, and it is not feasible to provide a complete waterproofing system below grade, provisions shall be made to direct all infiltrating water to an interior drainage and discharge system.

II. Roofing

A. General

1. All roofing shall comply with the current version of the NRCA Roofing and Waterproofing Manual and the SMACNA Architectural Sheet Metal Manual.

2. Roof insulation, overlay boards and fasteners/adhesive are to be considered components of a total roof system assembly, and must be included in a "total system" warranty/guaranty issued by the roofing system manufacturer and installer. In addition, insulation, overlay boards, and fasteners / adhesive must be specifically listed as a component of a Factory Mutual (FM) tested and approved roof system assembly in the latest edition of the FM Approval Guide for Building Materials or other written approval or acceptance from Factory Mutual.

B. Roofing System

1. Roofing systems shall, where appropriate, consist of the following:

2. Roofs with a slope greater than 2:12 shall be standing seam metal type with concealed fasteners. Where appropriate and with Amtrak written approval, asphalt shingles may be used.

3. Roofs with a slope less than or equal to 2:12 shall be a multi-ply styrene butadiene styrene (SBS) modified bitumen roofing system. Where appropriate and with Amtrak written permission a 90-milethylene propylene diene monomer (EPDM) rubber membrane roofing system may be used. Low-slope roof systems shall be designed with 1/4" per foot (min.) slope to drains, but not greater than the recommended limits of the specified system.

4. Provide walkway protection pads leading from roof access points to and/or around all serviceable mechanical equipment and appurtenances for all membrane roofing.

5. Other systems shall only be allowed where the specified system must match an existing roof or is subject to historic commission approval.

C. Warrantees and Maintenance:

1. General: The entire roofing system shall be covered by the manufacturer’s warranty including, without limit, the insulation and any recovery board, the roofing material, the flashings, gutter assemblies, any through-penetration systems or fabrications, equipment mounting curbs or saddles, etc.

a. As a minimum, all roof types shall include a Manufacturer Warranty of no less than 30 years

b. In addition to Warrantees listed, The General Contractor shall provide a full 5-year labor and materials “no dollar limit” guarantee starting from the date of Substantial Completion. The guarantee shall be a total system, term type, without deductibles or limitations on coverage amount. The guarantee will include a minimum of (2) Amtrak-supervised inspections by the contractor at 2 and 4 years following Substantial Completion date with remedial action to be performed before the end of the guaranteed term.

2. **SBS Modified Bitumen or EPDM rubber membrane**: A minimum 30-year "no dollar limit" manufacturer's warranty shall be specified in the construction documents for the roofing system.
3. **Standing Seam Metal / Metal Roof Panels**: A minimum 30-year substrate warranty with a 35-year non-prorated paint warranty shall be specified in the construction documents for the roofing system
4. **Asphalt Roofing Shingles**: A minimum 30-year warranty for asphalt shingles and accessories shall be specified in the construction documents for the roofing system.

D. Roofing Materials

1. General

a. The use of wood shingles and shakes should be limited to projects that are existing and/or historic and where the new roof surfaces are intended to match the existing or replace the existing "in-kind".

2. Asphalt Shingles

a. **General**

i. The use of asphalt shingles should be limited to projects that are existing and/or historic and where the new roof surfaces are intended to match the existing or replace the existing "in-kind".

ii. Asphalt shingle roofs should have slopes no less than a 4:12 pitch, or as required by the roofing manufacturer to obtain the warranty required by the Warranties and Maintenance section.

b. **Materials**

i. The shingle roof shall be a glass-fiber-reinforced asphalt shingle roof system. This roof system shall be applicable to the location and climate chosen to be used. Glass-fiber-reinforced asphalt shingle roof systems shall comply with ASTM D 3462. The glass-fiber-reinforced asphalt shingle roof system shall be laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.

ii. All shingle roof systems granules shall be algae resistant. Color and blends of the glass-fiber-reinforced asphalt shingle roof system shall match the existing in kind as best as possible and the style of the building. Glass-fiber-reinforced asphalt shingle roof system laminated, and three-tab strips must comply with UL 2218, Class IV.

c. **Underlayment**

i. 30 lb. asphalt saturated roofing felt, or high-performance synthetic underlayment approved by the roofing manufacturer.

ii. Ice & Water Shield, as manufactured by GCP Applied Technologies, or similar waterproofing membrane, at roof edges & penetrations.

d. **Accessories**

i. Ridge vents shall be manufacturer's rigid section high-density polypropylene or other UV-stabilized plastic ridge vent with nonwoven geotextile filter strips and external deflector baffles for use under ridge shingles.

ii. Sealants for shingle roof system shall be JS-2: urethane self-leveling paving sealant; traffic bearing, 2-part, movement capability plus/minus 25 percent. ASTM C920, Type M, Grade P, Class 25-minumum.

e. **Installation**

i. Install roofing and all components in strict accordance with manufacturer's instructions.

ii. Provide metal flashings and drip edges per code, standard practice, and system requirements and trim at all valleys, roof to wall connections, changes in slope, at all locations indicated or required by the roofing

manufacturer and at all locations indicated in the NRCA Roofing and Waterproofing Manual and the SMACNA Architectural Sheet Metal Manual.

3. Wood Shingles and Shakes

a. **General**

i. The use of wood shingles and shakes should be limited to projects that are existing and/or historic and where the new roof surfaces are intended to match the existing or replace the existing “in-kind”.

ii. Wood roofs should have slopes no less than a 4:12 pitch.

b. **Materials**

i. Wood shingles and shakes shall be clear, premium grade, heart cedar.

c. **Underlayment**

i. Drainage and Ventilation Underlayment.

ii. 30 lb. asphalt saturated roofing felt or high-performance synthetic underlayment.

iii. Ice & Water Shield, as manufactured by GCP Applied Technologies, or similar waterproofing membrane, at roof edges & penetrations.

d. **Accessories**

i. Nails:

(i) Standard round wire shingle type, hot dipped zinc coated steel or stainless steel of sufficient length to penetrate roof sheathing.

e. **Installation**

i. Shingles to be spaced 1/4" apart.

ii. Shakes to be spaced 1/2" apart.

iii. Double first course with drip edge of 1 inch.

iv. Joints spaced minimum of 1-1/2" from adjacent course.

4. Underlayment

a. **Examination**

i. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

ii. Examine sheathing to verify that joints are supported by framing and blocking, or metal clips and that installation is within flatness tolerances, substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through roofing.

iii. Proceed with installation only after unsatisfactory conditions have been corrected.

b. **Self-Adhering Sheet Underlayment (Ice and Water Shield)**

i. Material:

(i) Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970, minimum of 55 mils thick; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release-paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.

ii. Installation:

(i) Install self-adhering sheet underlayment, wrinkle free, on substrate. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations required by the roofing manufacturer and all locations indicated in the NRCA Roofing and Waterproofing Manual and the SMACNA Architectural Sheet Metal Manual. Lap in direction to shed water not less than 3- 1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days

c. **Felt**

i. Material:

(i) 30# asphalt-saturated organic felt that meets or exceeds the minimum physical property values listed in ASTM D 226, Type II, non-perforated.

ii. Installation:

(i) Single-Layer Felt Underlayment: Install single layer of roof felt underlayment on substrate perpendicular to slope in parallel courses. Lap sides a minimum of 2 inches over underlying course. Lap ends a minimum of 4 inches. Stagger end laps between succeeding courses at least 72 inches. Fasten with felt underlayment nails.

(ii) Double-Layer Felt Underlayment: Install double layers of felt underlayment on substrate perpendicular to slope in parallel courses. Install a 19-inch-wide starter course at eaves or base of wall and completely cover with full-width second course. Install succeeding courses lapping previous courses 19 inches in shingle fashion. Lap ends a minimum of 6 inches. Stagger end laps between succeeding courses at least 72 inches. Fasten with felt underlayment nails.

d. **Synthetic High-Performance Underlayment**

i. May be used when the roofing manufacturer has approved the material and installation method in writing.

ii. Install in strict compliance with the underlayment and roofing manufacturer's written instructions.

e. **Drainage and Ventilation Underlayment**

i. Material:

(i) non-woven plastic mesh ventilating underlayment

ii. Installation:

(i) Install horizontally over surface to receive siding or roofing in parallel courses, butting edges and ends to form a continuous layer, and fasten to substrate.

f. **Slip Sheet**

i. Red rosin paper or other type of slip sheet that is approved in writing by the roofing or sheet metal manufacturer for the specific application. Install as per the NRCA Roofing and Waterproofing Manual and the SMACNA Architectural Sheet Metal Manual.

5. Metal Roof Panels

a. **General**

i. Fabricate sheet metal roofing and accessories to comply with the design, details, dimensions, metal and all recommendations in the NRCA Roofing and Waterproofing Manual and SMACNA "Architectural Sheet Metal Manual".

b. **Materials**

i. Metal Roof Panels

Metal roof panels vary in configuration, including seam style and height, pan stiffening, metal type, and metal thickness. During the design phase, it is the responsibility of the Design Contractor to confirm that potential metal roof panels can be installed in accordance with the details developed using NRCA and SMACNA.

(i) Metal roof panels should not be installed on slopes less than the manufacturer's minimum or in situations that would not be eligible for warranty.

(ii) Installation shall be of a "concealed fastener" type.

c. **Underlayment for Metal Roof Panels**

i. Slip sheet between metal and underlayment.

ii. Ice & Water Shield, as manufactured by GCP Applied Technologies, or similar waterproofing membrane, at roof edges hips, valleys, and penetrations.

iii. Double layer 30 lb. asphalt saturated roofing felt or synthetic high-performance underlayment when approved by the metal roof manufacturer.

d. **Metal Roof Accessories**

i. All roof penetrations shall be protected with metal flashings to match the roofing material.

ii. All metal roof systems shall incorporate snow guards at all roof eaves.

iii. The selection of the type of snow guard accessories, mounting locations and the appropriate anchorage details are a function of the slope of the roof and the local climate conditions and should be coordinated with the snow guard manufacturer and anticipated design conditions.

iv. To the greatest extent feasible, snow guards shall be mounted in to avoid penetration of the metal panels; where anchorage to the structural substrate is required, all penetrations shall be sealed as per the metal roofing system manufacturer's instructions.

e. **Installation**

i. Installation shall be in strict accordance with the NRCA Roofing and Waterproofing Manual and SMACNA "Architectural Sheet Metal Manual".

ii. Touch-up: Only minor scratches and abrasions shall be allowed to be touched up. Any other damaged materials shall be replaced.

6. Membrane Roofing

a. **Materials**

i. Membrane roofing shall be one of the following systems (not listed in order of preference):

(i) Modified Bituminous Membrane Roofing.

(ii) Ethylene-Propylene-Diene-Monomer (EPDM) Roofing.

(iii) Vegetated Protected Membrane Roofing.

b. **Accessories**

i. Cover Board

(i) Where approved by the membrane manufacturer and appropriate to the application, use a polyisocyanurate cover board to increase the overall roof insulation value and protect the underlying roof insulation.

ii. Vegetated Protected Membrane Roofing

(i) Supply and install engineered soil mix.

(ii) Supply plants as recommended by the manufacturer for the geographic location and specific application.

1. Plantings shall be installed as densely spread cuttings or pre-grown trays.

c. **Installation**

i. Install roofing membrane and all flashings in strict accordance with the drawings and with the manufacturer's instructions and details.

ii. Substrate:

(i) Provide smooth substrate surface of material approved by membrane manufacturer.

(ii) Preparation and installation shall by a contractor that has experience with the specified product and is approved and certified by the manufacturer.

(iii) All preparation, installation, and protection shall be in strict accordance with the manufacturer's written instructions.

(iv) Test membrane as per manufacturer's recommendations.

III. Moisture Protection

A. Below Grade Applications

1. Exterior Applied Waterproofing:

a. Provide exterior applied waterproofing at foundation walls where there are any spaces below finished grade or in slab-on-grade locations where the geotechnical report indicates a high potential risk for water infiltration.

b. All components of the waterproofing system shall be obtained from a single source.

c. Preparation of the substrate and installation of the waterproofing shall be by installers approved and certified by the manufacturer.

d. Protect waterproofing or damp-proofing systems with insulation and/or drainage and protection board as per manufacturer's requirements and Section IV - Thermal Insulation.

e. Waterproofing Installation Testing:

i. All waterproofing shall be tested before the foundation walls are backfilled or otherwise covered. Testing shall be performed per manufacturer's requirements to obtain the warranty and also as required to satisfactorily demonstrate water infiltration does not occur.

ii. Waterproofing shall be inspected by the manufacturer's on-site representative before and after testing and prior to backfill operations.

f. Warranty:

i. All waterproofing installations shall be furnished with a 15-year warranty.

2. Damp Proofing:

a. Damp-proofing shall only be allowed at foundation walls below grade if there are no spaces below finished grade and a geotechnical report indicates that there is minimal risk for ground water infiltration at the building.

b. Top of the slab damp-proofing is only acceptable in conditions where the water table is at least 12 inches below the slab and footing drains are installed. The damp-proofing should only be applied at one side of the slab: the topside or the bottom side.

c. Asphalt damp-proofing shall be cut-back asphalt complying with ASTM D 4479, Type I. Acceptable alternative is asphalt emulsion complying with ASTM D 1227, Type III or IV if it is acceptable to the designer of record as equivalent.

B. Slab Waterproofing

1. When recommended by the project's geotechnical or civil engineer, or where the water table is known or suspected to be within 12" of the lowest floor, provide under slab waterproofing.

a. Under slab waterproofing shall connect to, be compatible with, and form a continuous waterproof barrier with the waterproof system employed at the walls.

C. Drainage

1. Where recommended by the project's geotechnical engineer or civil engineer, provide a foundation drainage system that prevents hydrostatic pressure

2. Connect foundation drainage piping to the site's stormwater management system.

3. Provide additional drainage as may be required by actual site conditions.

D. Above-Grade Applications

1. Materials

a. For walls above grade, provide a fluid-applied membrane air/vapor and liquid moisture barrier complying with the following criteria:

i. Exceeds Air Barrier Association of America (ABAA) Section 07262 requirements for fluid-applied air barriers.

ii. Exceeds ABAA maximum air permeance requirements when tested in accordance with ASTM E 2178.

iii. Exceeds ABAA maximum assembly air leakage requirements when tested in accordance with ASTM E 2357

b. The product shall be self-sealing.

c. The fluid-applied membrane shall have a V.O.C. content of 0.0 g/L and shall produce no harmful odors.

d. All components of the waterproofing system, including flashing, shall be fully compatible to form a cohesive system.

2. Installation

a. Preparation and installation shall be by a contractor that has experience with the specified product and is approved and/or certified by the manufacturer to install the material.

b. All preparation, installation, and protection shall be in strict accordance with the manufacturer's written instructions.

3. Warranty

a. Furnish manufacturer's 5-year warranty.

IV. Thermal Insulation

A. General

1. Insulation values shall meet or exceed those required by applicable codes.

2. Provide exterior continuous insulation at all exterior wall and roof surfaces to prevent thermal bridging.

B. Materials:

1. Rigid Insulation

a. Extruded Polystyrene.

b. Polyisocyanurate.

2. Foamed-in-place insulation

a. General Cavity Insulation

i. Water blown, two-part, closed cell, soy based, polyurethane foam.

b. Small gaps around windows, doors, and other components where high-pressure expansion may affect the operation of components.

i. Low Pressure One-Component Closed Cell Polyurethane Foam Insulation

3. Glass-Fiber Blanket Insulation (Batt Insulation)

a. Batt insulation shall only be used as thermal insulation in renovations where use of other insulation is not feasible or advisable.

b. Facing: Unfaced

c. Thickness: Provide the maximum thickness of insulation within cavities without compressing the insulation

4. Primary and Secondary Insulation:

a. Installations in colder climates may warrant the use of a primary method of insulation supplemented by a secondary.

C. Accessories

1. Vapor Retarders

a. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.

b. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

2. Eave Ventilation Troughs:

a. Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

D. Thermal Insulation Installation

1. Rigid Insulation

a. Bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

b. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

2. Foamed-in-Place Insulation

a. Foamed-in-place insulation must be installed by certified installers who have successfully completed a manufacturer approved training program and have installed the product in at least 3 other locations.

b. Fill all voids, crevices and building cavities at exterior envelope unless specifically noted otherwise

c. Completely fill all voids, shim spaces, and other small gaps with low pressure expanding foam insulation.

d. Install and trim foam in strict accordance with manufacturer's written instructions.

3. Batt Insulation

a. Do not compact or compress insulation in cavities.

b. Insulation to be cut neatly and installed around and behind outlet boxes.

c. Insulation to be split and installed both behind and in front of electrical wires that intrude into stud wall cavity.

d. Insure there are no gaps between framing and insulation.

e. Completely fill all voids, shim spaces, and other small gaps with low pressure expanding foam insulation.

f. Baffles to be installed at all eaves to insure adequate airflow.

g. Install vapor barriers on the conditioned side of the insulation in cold regions of the country; delete vapor retarders in hot and humid regions.

i. Verify selection and placement of vapor retarders with manufacturers in coordination with wall construction, cladding and geographic location.

ii. Tape joints and ruptures in vapor retarder and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

h. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

V. Exterior Finishes

A. Exterior Insulation and Finish Systems (EIFS)

1. EIFS systems should be limited to use in mechanical penthouses or facilities. When required, only the "hard coat systems defined as Class PM, Type A, polymer modified protective finish coating, externally reinforced as developed by the Exterior Insulation Manufacturers Association (EIMA) may be used. Such systems require mechanical fastening of extruded polystyrene insulation and reinforcing mesh, and rigid acrylic modified cement plaster finish.

2. The EIFS system shall be completely drainable and shall be installed over a waterproof membrane.

3. Pay special attention to locations of crack control joints and details of flashing and sealing at penetrations to insure a properly designed and watertight installation.

B. Direct Applied Exterior Finish Systems (DEFS)

1. General

a. Direct applied exterior finish system (DEFS), synthetic stucco may be used at exterior soffits where cement plaster may otherwise be employed as a finish.

b. DEFS may be used to create a seamless finish within high-humidity areas at the building interior such as shower or adjacent locker rooms.

2. Installation

a. Install DEFS, all components and accessories per manufacturer's instructions.

b. Install DEFS over either cement board or exterior glass mat-faced gypsum sheathing board.

c. When installed at a soffit, the enclosed space above the soffit should be properly ventilated with metal vents at the soffit perimeter.

C. Air Barriers

1. General

a. Install a continuous air barrier system at all new construction and major renovations.

b. The air barrier system shall be a complete assembly consisting of all materials and components and installed as per ASTM E 2357

c. Amtrak prefers fluid applied systems but will allow other systems when appropriate.

d. All components of the air barrier system shall be obtained from a single source.

2. Air Barrier Installation

a. The air barrier system shall be joined in an airtight and flexible manner to the air barrier of the adjacent systems to allow for the relative movement of systems.

b. Specific considerations should be given to the connections between the following systems:

i. Foundation and walls

ii. Walls and windows or doors

iii. Different wall systems

iv. Wall and roof

v. Wall and roof over conditioned space

vi. Walls, floor, and roof across construction, control, and expansion joints

vii. Walls, floor, and roof to all penetrations

viii. Walls, floor, and roof to all flashings

c. The substrate shall be prepared as per the manufacturer's written instructions for substrate preparation.

d. The air barrier system shall be installed in strict accordance with the manufacturer's written instructions.

e. The air barrier system shall be installed by a contractor licensed by the Air Barrier Association of America (ABAA).

f. The air barrier system shall be tested as part of the envelope commissioning process before and after any siding or veneer is installed.

D. Siding

1. General

a. Where feasible, all siding systems shall be designed as a rain screen with an air/drainage space behind the siding, vents at the top and weeps at the bottom.

2. Materials

a. The sections below outline the siding that is acceptable.

3. Accessories

a. Flashing:

i. Flashing complying with code and system requirements to be documented in Division 7 Section "Sheet Metal Flashing and Trim".

4. Installation

a. Comply with details and siding manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

b. Prior to the installation of siding, examine the integrity of the air barrier and/or underlayment. Siding or veneer installed without Design Contractor’s site visit and approval will be rejected.

E. Metal Siding

1. General

a. Metal siding system shall include all panels, attachment system components, miscellaneous metal framing, and all accessories necessary for a complete weather tight wall system.

b. All siding system components and accessories shall be obtained from a single source and single manufacturer.

2. Materials

a. Metal siding shall be concealed-fastener type with lapped-seams.

3. Underlayment

a. Slip sheet for instances where metal is in direct contact with barrier.

b. Continuous Rigid Insulation.

c. Air barrier.

4. Accessories

a. The wall panel system shall include all accessories and components required for weather tight system with a finished appearance, including but not limited to trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. All exposed and semi-exposed components shall match material and finish of metal wall panels.

b. Provide closure strips where necessary to ensure weather tight construction. Closure strips shall be closed-cell, expanded cellular, rubber or cross linked, polyolefin-foam or closed-cell laminated polyethylene; with minimum thickness, flexible closure strips; cut or pre-molded to match metal wall panel profile.

5. Installation

a. Factory-formed metal siding systems shall be designed to be field assembled by lapping and interconnecting side edges of adjacent panels. The factory-formed metal panels shall be mechanically attached through panels to supports using concealed fasteners in side laps.

b. Metal siding shall be coordinated with flashings and other adjoining construction installations to ensure proper sequencing and building water tightness.

6. Warranty

a. The standard form of a warranty for metal siding systems shall require the manufacturer to replace siding and other components of the system that fail in materials or workmanship within the warranty period. The period of the warranty is a minimum of 15 years. The warranty for metal siding systems shall encompass the color-fastness and fading-resistance of the finish. The minimum requirement is that after a year of cleaning with

products recommended by the siding manufacturer if more than 4 Hunter color- difference units occur, as measured according to ASTM D 2244, the system must be fully replaced.

F. Wood Siding

1. General

a. The use of wood siding should be limited to projects that are existing and/or historic and where the new wall surfaces are intended to match the existing or replace the existing “in-kind”.

2. Materials

a. Wood siding shall be clear, premium grade, heart cedar.

3. Underlayment

a. Drainage and ventilation underlayment.

b. Continuous rigid insulation.

c. Air barrier.

4. Accessories

a. Nails:

i. Standard round wire shingle type, hot dipped zinc coated steel, or stainless steel of sufficient length to penetrate sheathing and studs.

5. Installation

a. Prime all sides of wood siding after final cutting.

b. Double or triple shingles at foundation.

c. Shingles to be spaced 1/8" - 1/4" apart.

d. Joints to be minimum 1-1/2" from joints of adjacent course.

e. Exposure to match existing.

f. Corner treatment to match existing.

G. Plastic Siding

1. Vinyl Siding Wall, Trim, and Soffit Systems:

a. Vinyl products are not acceptable.

H. Mineral-Fiber Cement Siding

1. Materials

a. Fiber Cement siding, panels shall be Type A, Grade II as per ASTM C 1186.

b. The fiber cement shall be non-combustible as per ASTM E 136 and have a flame-spread index of 25 or less when tested according to ASTM E 84.

c. Fiber cement siding shall be installed as part of a ventilated and drainable rain screen system over a waterproof barrier.

2. Accessories

a. Use accessories as provided by or as recommended by the manufacturer for the specific installation.

b. Where feasible, fasteners and accessories shall be stainless steel and concealed.

3. Mineral-Fiber Cement Siding Finish

a. All fiber cement shall be factory primed by the manufacturer.

b. In addition to factory priming, where feasible all fiber cement shall be factory finished otherwise final finish shall be as per specification section 09 91 00 Painting.

4. Installation:

a. Installation shall be as per the manufacturer's written instructions.

b. All cut surfaces shall be straight and smooth and shall be finished with the manufacturer provided primer and finish touch up paint.

5. Warranty:

a. The Standard form of a warranty for fiber wall systems shall be in which the manufacturer agrees to replace sidings and soffits that fail in materials or workmanship within the warranty period. The period of the warranty is a minimum of 50 years preferred.

VI. Sheet Metal Flashing and Trim

A. General

1. Fabricate sheet metal flashing and trim to comply with the details and with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics.

B. Materials

1. All metal flashings, copings, fasciae, termite shields or other metal moisture protection systems shall be fabricated from one of the following sheet metals:

a. Min. 20 oz. copper.

b. Min. 24 ga. stainless steel.

c. Alloy coated copper or stainless steel of the same thickness indicated above.

2. Lead or lead alloy sheet metal or coatings will not be accepted.

C. Accessories

1. All accessories including nails, clips, cleats, etc. shall be of the same or compatible metal with the sheet metal.

D. Fabrication and Installation:

1. General

a. Fabricate and install in strict accordance with the details of the latest addition of the Architectural Sheet Metal Manual by SMACNA.

b. Fabricate continuous flashings in sections not less than 96".

c. Flashing details shall not rely on sealant for watertightness. Sealants shall only be a secondary means of preventing water infiltration and should only be used where required for movement in control joints (as a secondary seal).

i. Joints in metal flashing shall be joined with 1 inch lock seams and soldered, except at slip joints.

d. Metal flashings and trims shall only be secured with concealed fasteners.

e. Back paint sheet metals with bituminous paint, where expected to be in contact with cementitious materials or dissimilar metals.

2. Wall Flashing

a. Provide preformed end dams at edges of all sills and at all locations where flashing is interrupted by openings or a change in construction.

3. Through-wall flashing

a. Through-wall/counter flashing shall be two-piece type with receiver and removable counterflashing of the same material to allow for future re-roofing.

b. Through-wall embedded metal flashing shall be fabricated with ribs at 3-inch intervals along the length of flashing. This feature is intended to provide an integral mortar bond with the masonry and the flashing material. Through-wall flashing shall be fabricated with drip edges and sealant stops.

4. Roof Flashing

a. Flashings at roof penetrations, curbs, and transitions should extend up a minimum of 8” above the surface of the roof.

b. Valley flashings are to have 1” raised center rib, continuous intermediate “S” bend to receive hemmed edge of roof panels and continuous hemmed edge to receive fastening cleats, similar to NRCA Manual Figure 4.13C. All valleys should have “Ice and Water Shield,” or similar underlayment membrane installed, and covered with rosin paper, prior to the installation of the metal valley flashing. Metal panels are to be hemmed onto valley flashing and shall not utilize exposed fasteners.

c. Metal crickets are to be used on the upslope side of all chimneys and curbs.

5. Gutters and Downspouts

a. The sizing of gutters and spacing and sizing of the associated downspouts shall be calculated based upon the tributary areas of the roofs and shall utilize SMACNA and the applicable building code provisions for sizing. The calculations developed for the gutters and downspouts shall be included in the PDR.

b. Gutters and downspouts for sloped roofs shall have shapes and sizes that match the style of the building. For historic structures, match the existing gutters and downspouts in-kind. All corners are to be mitered and soldered.

c. The following features are to be provided and fabricated from the same metal as the gutters and downspouts.

i. Downspout starters (fascia sump) with downspout starter hole.

ii. Flow-through gravel stop with perforated vertical leg.

6. Heat Tracing:

a. Gutters and downspouts that are exposed to freezing conditions shall be insulated and heat traced.

7. Warranty

a. Warranty shall not be less than what is required within the Warrantees and Maintenance section.

VII. Joint Sealants

A. General

1. Provide sealants meeting applicable specifications where they are shown on the drawings and elsewhere as required to provide a positive barrier against moisture and passage of air while allowing for movement of dissimilar materials.

2. The sealant systems selected shall be commercial or heavy-duty grade, be durable, easy to maintain and be able to withstand deicing chemicals. Use the manufacturers' recommendations in specifying sealants and include adhesion testing, as applicable. The colors shall match the aesthetics of the building.

B. Materials:

1. Sealants:

a. shall be high quality, non-hardening, non-sagging compatible with intended locations and adjacent materials.

b. Pay special attention to the use and misuse of the word "caulk". Such materials are generally no longer used in modern construction and consist of oil-based materials used to glaze windows. "Caulk" shall not be used as a sealant in exterior joints.

c. The use of 2-part polysulfide, 2-part polyurethane or silicone-synthetic rubber type sealants is preferred. The Design Contractor shall determine with sealant manufacturer which particular sealant type is best suited to each individual condition or application.

i. Specify pourable urethane base sealants for construction joints in traffic bearing locations such as concrete walks, steps, and similar locations.

2. Back-up materials and primers:

a. Shall be as required and recommended by the manufacturers of the sealant.

C. Installation of sealants:

1. All sealing operations shall be performed by workmen thoroughly experienced in this type of work.

2. Prepare surfaces and install joint sealants in accordance with manufacturer's recommendations.

a. Surfaces shall be clean and free of all dust, oils, and any other material which may reduce the bond between the sealant and the substrate.

3. Before application of sealant, all surfaces adjacent to the area shall be masked with masking tape or painter's tape to ensure a neat sealant line and to allow pressure tooling of the material. Grade gun sealants shall be applied with pressure equipment and tooled in such a way as to solidly fill the groove and be flush contoured. Special care shall be exercised when sealing in the vicinity of porous surfaces.

4. Masking tape shall be removed immediately after application and finishing the joint of sealant. All adjacent surfaces shall be thoroughly cleaned of any surplus sealant material immediately and left in a neat condition.

D. Warranty

1. The sealant installation shall be warranted for a minimum of 10 years. The sealant manufacturer should have and provide a full labor and materials total system guarantee.