SECTION 073213 - CLAY ROOF TILES

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
	* + 1. RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

* + - * 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			1. SUMMARY
				1. Section Includes:

Clay roof tiles.

Underlayment materials.

Ridge vents.

Metal flashing and trim.

Refer to sections listed below for cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections. Sections listed below are for spec editor’s and design team coordination and are to remain as Editor’s Notes. Remove referenced specification sections within the body of the specification if not applicable to the project.

Section 077253 "Snow Guards" for snow guards.

* + - 1. DEFINITIONS
				1. Roofing Terminology: See ASTM D1079 and glossary in TRI/WSRCA's "Concrete and Clay Roof Tile Installation Manual" for definitions of terms related to roofing Work in this Section.
			2. PREINSTALLATION MEETINGS

Retain "Preinstallation Conference" paragraph below if Work of this Section is extensive or complex enough to justify a conference.

* + - * 1. Preinstallation Conference: Conduct conference at Project site.

Attendees shall include, at a minimum:

Contractor’s Project Manager and Foreman.

Facility Representatives as deemed appropriate by Director.

Director’s Representatives for the management of the project.

Designers of Record.

Topics of discussion shall include but are not limited to:

General scope of work, including site walk to review stucco conditions

Submittals, mock-ups, and quality assurance procedures outlined in the specifications

Phasing, schedule, and coordination with other work

Contractor’s means to scaffold or otherwise access the areas of work

Equipment and material storage and material preparation areas

Safety provisions for visitors, staff, patients, and vehicular traffic

Shop drawings, including details and products

Alternates, if applicable

Snow guards

Notify Director's Representative a minimum of fourteen (14) calendar days in advance of scheduled meeting date.

* + - 1. SUBMITTALS
				1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: For the following:

Clay roof tiles.

Underlayment materials.

Ridge vents.

Asphalt roofing cement.

Butyl sealant.

Elastomeric sealant.

Mortar.

Eave closure.

Manufacturer’s installation instructions for Roof Tile assembly.

* + - * 1. Sustainable Design Submittals:

Retain "Shop Drawings" paragraph below if Drawings do not fully detail metal flashing and trim specified in Part 2 or to verify requirements specified in Part 2.

* + - * 1. Shop Drawings: For metal flashing and trim.

Retain "Samples" paragraph below for single-stage Samples. Retain "Samples for Initial Selection" and "Samples for Verification" paragraphs for two-stage Samples.

* + - * 1. Samples: For each exposed product and for each color and texture specified, in sizes indicated.

Clay Roof Tiles: Full size, showing full range of color values and blends.

Accessory Tiles: Full size, each type.

Metal Flashing: 12 inches square.

Ridge Vents: 12-inch long Sample.

Eave Closures: In manufacturer's standard size.

* + - * 1. Samples for Initial Selection: For each type of clay roof tile and accessory tile.

Include Samples of accessories involving color selection.

* + - * 1. Samples for Verification: For the following products, in sizes indicated:

Clay Roof Tiles: Full size, showing full range of color values and blends.

Accessory Tiles: Full size, each type.

Metal Flashing: 12 inches square.

Ridge Vents: 12-inch long Sample.

Eave Closures: In manufacturer's standard size.

* + - * 1. Quality Control Submittals:

Retain "Material Test Reports" paragraph below for material test reports that are Contractor's responsibility.

Material Test Reports: For each type of clay roof tile, based on evaluation of comprehensive tests performed by a qualified testing agency.

Research Reports: From [**an agency acceptable to authorities having jurisdiction] [UNIFORM CODE-ES] <Insert evaluation agency**>, indicating that product is suitable for intended use under applicable building codes for the following:

Design Consultant to review code references and verify that the referenced sections/tables are current. Note that code references shall be based on the current version of the Uniform Code.

Retain applicable subparagraphs below to suit Project. The BCNYS and the RCNYS do not address mortar- or adhesive-set tile, wire-tie tile-attachment systems, and polymer-modified bitumen sheet and synthetic underlayments.

[**Mortar] [Adhesive**] tile-attachment systems.

Wire-tie tile-attachment systems.

Polymer-modified bitumen sheet underlayment.

Synthetic underlayment.

Sample Warranty: For manufacturer's materials warranty.

* + - * 1. Contract Closeout Submittals:

Maintenance Data: For roofing to include in maintenance manuals.

Materials warranties.

Roofing Installer's warranty.

* + - * 1. Maintenance Material Submittals:

Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

Revise "Clay Roof Tiles" subparagraph below if different quantities of different types of tiles are required; for example, special shapes or colors.

Clay Roof Tiles: [**100 sq. ft.] <Insert area**> of each type, in unbroken bundles.

* + - 1. QUALITY ASSURANCE
				1. Benchmarks: Build Benchmarks to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

Build Benchmarks for clay roof tiles including related roofing materials.

Size: [**48 inches long by 48 inches wide] <Insert dimensions**>.

Retain first subparagraph below if required; insert other mockup requirements to suit Project.

Include gutter and downspout complying with requirements in [**Section 076200 "Sheet Metal Flashing and Trim."] [Section 077100 "Roof Specialties**."]

Approval of Benchmarks does not constitute approval of deviations from the Contract Documents contained in Benchmarks unless Director’s Representative specifically approves such deviations in writing.

Retain subparagraph below if the intention is to make an exception to the default requirement for demolishing and removing Benchmarks.

Subject to compliance with requirements, approved Benchmarks may become part of the completed Work if undisturbed at time of Substantial Completion.

* + - 1. DELIVERY, STORAGE, AND HANDLING
				1. Store underlayment rolls in a dry, well-ventilated location protected from weather, sunlight, and moisture in accordance with manufacturer's written instructions.

Store on end, on pallets or other raised surfaces. Do not double-stack rolls.

* + - * 1. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing Work is not in progress.
				2. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.
			1. FIELD CONDITIONS
				1. Environmental Limitations: Proceed with installation only when existing and forecasted weather conditions permit product installation and related Work to be performed in accordance with manufacturer's written instructions and warranty requirements.

Retain subparagraph below for self-adhering, polymer-modified bitumen sheet used as water protection, an ice barrier, or underlayment.

Install self-adhering, polymer-modified bitumen sheet underlayment within the range of ambient and substrate temperatures recommended in writing by manufacturer.

* + - 1. WARRANTY

When warranties are required, verify with Director’s Representative that warranties stated in this article are not less than remedies available to the Facility under prevailing local laws.

* + - * 1. Materials Warranty: Manufacturer agrees to repair or replace clay roof tiles that fail in materials within specified warranty period.

Verify available warranties and warranty periods.

Warranty Period: **[50] <Insert number**> years from date of Substantial Completion.

Retain "Roofing Installer's Warranty" paragraph below, with "Roofing Installer's Warranty" Article, if required.

* + - * 1. Roofing Installer's Warranty: On warranty form at end of this Section, signed by Installer, in which Installer agrees to repair or replace components of clay-tile roofing that fail in materials or workmanship within specified warranty period.

Warranty Period: [**Two] [Five] <Insert number**> years from date of Substantial Completion.

* + - * 1. Special Warranty: The one year period required by Paragraph 9.8 of the General Conditions is extended to 2 years for the Work of this Section. Refer to Supplementary Conditions.
1. PRODUCTS

Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications. For definitions of terms and requirements for Contractor's product selection.

* + - 1. SOURCE LIMITATIONS
				1. Obtain each type of product from single source from single manufacturer.
			2. PERFORMANCE REQUIREMENTS

Retain "Exterior Fire-Test Exposure" paragraph below for classified roof assemblies on combustible decks and revise to suit Project. Roof tiles are only exempt from testing if installed on noncombustible roof decks. Verify requirements of authorities having jurisdiction for roof assembly.

* + - * 1. Exterior Fire-Test Exposure: Provide clay roof tiles and related roofing materials identical to those of assemblies tested for Class A fire resistance in accordance with ASTM E108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

Retain "Energy Performance, ENERGY STAR" paragraph below if required. To bear the ENERGY STAR label, roof tiles must have initial solar reflectance of 0.25 or greater and maintain a solar reflectance of 0.15 or greater three years after installation under normal conditions.

* + - * 1. Energy Performance, ENERGY STAR: Provide roof tiles that are listed on the DOE's "ENERGY STAR Roof Product List" for steep-slope roof products.
			1. CLAY ROOF TILES
				1. Clay Roof Tiles: ASTM C1167, molded- or extruded-clay roof tile units of shape and configuration indicated, kiln fired, and free of surface imperfections. Provide with fastening holes prepunched at factory before firing.

Durability: [**Grade 1] [Grade 2] [Grade 3**].

Retain "High-Profile Shape," "Low-Profile Shape," or "Flat Shape" subparagraph below to suit Project.

High-Profile Shape: Type I, [**Spanish or "S"] [two-piece tapered mission] [two-piece straight mission] [two-piece straight barrel mission] [two-piece Greek] [two-piece Roman] <Insert shape>**.

Accessory Tiles: [**Ridge] [ridge vent] [ridge end] [hip and hip starter] [header course] [L-shaped rake edge] [roll rake edge] [starter] [end band] [terminal] [eave closure] [and] [top fixture] <Insert accessory**> units.

Low-Profile Shape: Type II, [**French interlocking] <Insert shape**>.

Accessory Tiles: [**Ridge] [ridge vent] [ridge end] [hip and hip starter] [header course] [L-shaped rake edge] [roll rake edge] [starter] [end band] [terminal] [eave closure] [and] [top fixture] <Insert accessory**> units.

Flat Shape: Type III, [**flat shingle] [flat interlocking] <Insert shape**>.

Accessory Tiles: [**Ridge and closed ridge end] [hip and hip starter] [header course] [L-shaped rake edge] [starter] [end band] [and] [terminal] <Insert accessory**> units.

Size: <**Insert length and width dimensions**>.

Manufacturers often provide special units. Retain first subparagraph below if applicable.

Provide clay roof tiles of diminishing widths for circular bays or round towers.

Matte finish is also called "as-fired" or "kiln-run" finish.

Finish and Texture: [**Matte, smooth] [Matte, striated] [Glazed, smooth] <Insert finish and texture**>.

Colors range from those produced naturally during firing to those produced from glazes applied after firing. Options in "Color" subparagraph below are examples only. Glazed colors may be available; consult manufacturers. Insert color blends if several colors are required.

Color: [**Terra cotta] [Brown] [Red] [Blended red] [Buff] <Insert description**>.

* + - 1. UNDERLAYMENT MATERIALS

See "Underlayment," "Model-Code Underlayment Requirements," "NRCA Underlayment Recommendations," "Felt and Roll-Roofing Underlayment," "Synthetic Underlayment," "Polymer-Modified Bitumen Sheet Underlayment," and "Self-Adhering, Polymer-Modified Bitumen Sheet Underlayment" articles in the Evaluations for a discussion of various underlayment options.

Retain one of three options in "Felt" paragraph below to suit Project. The BCNYS and the RCNYS recognize ASTM D226 Type II and ASTM D2626 felts as acceptable single-layer roof-tile underlayments for slopes equal to or greater than 4:12. The BCNYS and the RCNYS require a double-layer installation for slopes from 2-1/2:12 to 4:12. NRCA does not recommend using ASTM D226 or ASTM D2626 felts as underlayment for roof tile. NRCA only recommends using ASTM D4869 Type IV felt as a top layer installed over an anchor layer of polymer-modified bitumen sheet in a two-layer installation. ASTM D226 Type II and ASTM D4869 Type IV felts both weigh 26 lb/100 sq. ft. ASTM D2626 felts weigh 37 lb/100 sq. ft.

* + - * 1. Felt: [**ASTM D226 Type II, asphalt saturated] [ASTM D4869 Type IV, asphalt saturated] [ASTM D2626, asphalt saturated and coated, mineral-granule surfaced on weather (top) side**], unperforated.

Retain "Asphalt Roll-Roofing" paragraph below if required. ASTM D6380, Class M, Type II, felts weigh 71.5 lb/100 sq. ft.

* + - * 1. Asphalt Roll-Roofing: ASTM D6380, Class M, Type II, asphalt-saturated and -coated organic felt; mineral-granule surfaced on weather (top) side.

If retaining "Synthetic Underlayment" paragraph below, verify that products comply with requirements of authorities having jurisdiction and are recommended for use under roof tile. NRCA only recommends using synthetic underlayment as a top layer installed over an anchor layer of mechanically fastened or self-adhering, polymer-modified bitumen sheet in a two-layer installation. See "NRCA Underlayment Recommendations" Article in the Evaluations.

* + - * 1. Synthetic Underlayment: UV-resistant polypropylene, polyolefin, or polyethylene polymer fabric with surface coatings or treatments to improve traction underfoot and abrasion resistance; recommended, in writing, by manufacturer for use under roof tile; and evaluated and documented to be suitable for use as a roof underlayment under applicable codes by a testing and inspecting agency acceptable to authorities having jurisdiction.

Retain "Polymer-Modified Bitumen Sheet" paragraph below for products marketed as underlayment or valley flashing. Revise to suit Project. NRCA recommends using polymer-modified bitumen sheet, including products used as base sheets in low-slope membrane roof systems and products marketed as underlayment, for roof-tile underlayment. Sheets are mechanically fastened or, where used as an adhered top layer in a two-layer installation, set in a continuous layer of hot roofing asphalt or cold adhesive. See "NRCA Underlayment Recommendations" and "Polymer-Modified Bitumen Sheet Underlayment" articles in the Evaluations.

* + - * 1. Polymer-Modified Bitumen Sheet: Styrene-butadiene-styrene- (SBS) modified asphalt, glass-fiber-mat-reinforced sheet; minimum [**55-mil] [40-mil] <Insert dimension**> nominal thickness; recommended in writing by manufacturer and acceptable to authorities having jurisdiction for use as underlayment in tile steep-slope roofing systems; and designed for mechanical fastening or adhesive attachment using roofing asphalt or cold-applied adhesive.

< **Insert testing requirements**>.

If required, insert specific testing requirements for polymer-modified bitumen sheet products here. Product testing varies among manufacturers.

Retain "Self-Adhering, Polymer-Modified Bitumen Sheet" or "Self-Adhering, Polymer-Modified Bitumen Sheet, High Temperature" paragraph below to suit Project. Self-adhering, polymer-modified bitumen sheet commonly covers the entire roof deck under clay tile and is also used for water and ice-dam protection in roof areas vulnerable to leakage. NRCA suggests covering self-adhering sheet with a top layer of a different type of underlayment. See "Self-Adhering, Polymer-Modified Bitumen Sheet Underlayment" Article in the Evaluations.

Retain thickness option in "Self-Adhering, Polymer-Modified Bitumen Sheet" paragraph to suit Project. ASTM D1970 requires a minimum thickness of 40 mils; however, product thicknesses vary.

* + - * 1. Self-Adhering, Polymer-Modified Bitumen Sheet: ASTM D1970, minimum [**55-mil] [50-mil] [40-mil] <Insert dimension**> thick sheet; glass-fiber-mat-reinforced, polymer-modified asphalt; with slip-resistant top surface and release backing; cold applied; and recommended in writing by manufacturer for use in tile roofing system required.[ **Provide primer for adjoining concrete, masonry, and metal surfaces to receive underlayment**.]

Retain "Top Surface" subparagraph below if a specific surface is required. Polymer-film- and polyester-surfaced products cost more and might form better-quality laps than sand- and granule-surfaced products. Tiles might stick to sand- and granule-surfaced products where they contact, which makes roof repairs more difficult. To prevent this problem, cover self-adhering sheet with another type of underlayment. Installer preference based on experience and the slip-resistance characteristics of the various surface options might be a good reason to choose one type of surface over another.

Top Surface: [**Sand] [Granule] [Textured polymer film] [Polyester**].

* + - * 1. Self-Adhering, Polymer-Modified Bitumen Sheet, High Temperature: ASTM D1970, minimum [**55-mil] [50-mil] [40-mil] <Insert thickness**> thick sheet; glass-fiber-mat-reinforced, polymer-modified asphalt; with slip-resistant top surface and release backing; cold applied; and recommended in writing by manufacturer for use in tile roofing system required.[ **Provide primer for adjoining concrete, masonry, and metal surfaces to receive underlayment**.]

Thermal Stability: Stable after testing at 240 deg F in accordance with ASTM D1970.

Retain "Top Surface" subparagraph below if a specific surface is required. Polymer-film- and polyester-surfaced products cost more and might form better-quality laps than granule-surfaced products. Tiles might stick to granule-surfaced products where they contact, which makes roof repairs more difficult. To prevent this problem, cover self-adhering sheet with another type of underlayment. Installer preference based on experience and the slip-resistance characteristics of the various surface options might be a good reason to choose one type of surface over another.

Top Surface: [**Granule] [Textured polymer film] [Polyester**].

* + - 1. RIDGE VENTS

Retain this article for rigid-plastic or flexible ridge vents installed under ridge tiles. Sheet metal ridge vents are specified in "Metal Flashing and Trim" Article. If retaining, verify that products can withstand the weight of clay tile over several decades and indicate details of ridge vents on Drawings.

* + - * 1. Rigid-Plastic Ridge Vent: Manufacturer's standard, rigid section high-density polypropylene or other UV-stabilized plastic ridge vent for use under ridge tiles.

Minimum Net Free Area: <**Insert area**>.

Width: <**Insert dimension**>.

Thickness: <**Insert dimension**>.

* + - * 1. Flexible Ridge Vent: Manufacturer's standard roll-form ridge vent that protects against driven rain and snow and is recommended in writing by manufacturer for installation with roof tile indicated.

Width: <**Insert dimension**>.

Features: [**Butyl adhesive strips at sides] [Corrugated aluminum strips at sides**].

* + - 1. ACCESSORIES
				1. Asphalt Roofing Cement: ASTM D4586 Type II, asbestos free.
				2. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied.

Revise "Elastomeric Sealant" paragraph below if a specific polymer, class, and use are required.

* + - * 1. Elastomeric Sealant: ASTM C920, Type S, Grade NS, one-part, non-sag, elastomeric polymer sealant of class and use classifications required to seal joints in clay-tile roofing and remain watertight; recommended in writing by manufacturer for applications indicated.

Retain "Roofing Asphalt" paragraph below if adhering top layer of underlayment to the anchor layer with hot asphalt.

* + - * 1. Roofing Asphalt: ASTM D312 Type IV.

Retain "Cold-Applied Adhesive" paragraph below if adhering top layer of underlayment to anchor layer with cold-applied adhesives.

* + - * 1. Cold-Applied Adhesive: Manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with underlayments.

Retain "Mortar" or "Foam Adhesive" paragraph below if required for tile closures or an adhesive-set roof in climates not subject to freeze-thaw cycles. Although TRI/FRSA and TRI/WSRCA publications and NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" include adhesive-set installation, the BCNYS and the RCNYS do not. UNIFORM CODE-ES AC152 provides criteria for code acceptance of adhesive attachment of roof tiles. For mortar- or adhesive-set installation, consult manufacturer, require "Research Reports" paragraph in "Informational Submittals" Article for attachment systems, and verify requirements of authorities having jurisdiction.

* + - * 1. Mortar: ASTM C270, Type M, [**natural color] [with ASTM C979, pigmented mortar matching the color of clay roof tiles for exposed-to-view mortar, and natural color for concealed-from-view mortar**].

If retaining "Foam Adhesive" paragraph below, verify years of in-service experience with adhesive recommended by roof-tile manufacturers.

* + - * 1. Foam Adhesive: Two-component, polyurethane expanding adhesive recommended in writing for application by clay-roof-tile manufacturer.

Retain "Eave Closure" paragraph below if not using an accessory tile, mortar, or foam for eave closure.

* + - * 1. Eave Closure: Manufacturer's standard [**EPDM] [copper] [stainless steel] [galvanized-steel] [aluminum, mill finish] <Insert material**> eave closure formed to shape of clay roof tiles.

Retain "Wood Nailers" paragraph below if above-roof-deck wood components, including cants and battens, are required. Revise to insert material requirements if preferred.

* + - * 1. Wood Nailers: Comply with requirements for pressure-preservative-treated wood in [**Section 061000 "Rough Carpentry**."]

Retain "Mesh Fabric" paragraph below if using insect-screen materials to seal roof-deck openings at sheet metal ridge vents.

* + - * 1. Mesh Fabric: 18-by-14 mesh of PVC-coated, glass-fiber thread.
			1. FASTENERS

Retain "Roofing Nails" paragraph below for direct deck installation method.

* + - * 1. Roofing Nails: ASTM F1667, [**hot-dip galvanized-steel,** 0.120-inch**] [stainless steel,** 0.120-inch**] [copper,** 0.135-inch**] [silicon-bronze,** 0.120-inch] diameter shank, sharp-pointed, conventional roofing nails with barbed shanks; minimum 3/8-inch diameter head; of sufficient length to penetrate 3/4 inch into substrate or extend at least 1/8 inch through thickness of the sheathing, whichever is less.

Where nails are in contact with metal flashing, use nails made from same metal as flashing.

* + - * 1. Underlayment Nails: Aluminum, stainless steel, or hot-dip galvanized-steel wire nails with low-profile metal or plastic caps, 1-inch minimum diameter.

Retain subparagraph below to comply with BCNYS requirements for locations where the basic design wind speed (three-second gust per ASCE/SEI 7) is equal to or greater than 140 mph or with RCNYS requirements for locations where the ultimate design wind speed (as defined in the RCNYS) is equal to or greater than 140 mph.

Provide with minimum 0.0134-inch thick metal cap, 0.010-inch thick power-driven metal cap, or 0.035-inch thick plastic cap; and with minimum 0.083-inch thick ring shank or 0.091-inch thick smooth shank of length to penetrate at least 3/4 inch into roof sheathing or to penetrate through roof sheathing less than 3/4 inch thick.

* + - * 1. Nails for Wood Nailers: ASTM F1667; common or box, steel wire, flat head, and smooth shank.

Retain "Wire Ties" paragraph below for miscellaneous wiring of valley or other cut clay roof tiles.

* + - * 1. Wire Ties: [**Copper] [Brass] [Stainless steel**], 0.083-inch minimum diameter.

Retain "Twisted-Wire-Tie System" paragraph below if required. This system is an alternative to the direct deck installation method. Revise twisted-wire tie to flat metal strip if required. Verify applicability for roof slope and tile shapes required with manufacturers.

* + - * 1. Twisted-Wire-Tie System: Continuously twisted, two-wire unit with loops formed 6 inches apart, minimum [**0.101-inch** diameter copper wire and **0.064-inch** diameter copper tie wires] [**0.090-inch** diameter stainless steel wire and **0.063-inch** diameter stainless steel tie wires] [**0.105-inch** diameter galvanized-steel wire and **0.063-inch** diameter galvanized-steel tie wires] <Insert requirements>, with matching-metal folding clip anchors.

Retain "Single-Line, Wire-Tie System" paragraph below if required for use with clay roof tiles. This system is also called "interlocked attachment" or "hook and loop." Verify applicability for roof slope and tile shapes required with manufacturers.

* + - * 1. Single-Line, Wire-Tie System: Interconnecting eave-to-ridge system, minimum [**0.101-inch diameter copper] [0.090-inch diameter stainless steel] [0.105-inch diameter galvanized-steel] <Insert requirements**> wire, preformed to accommodate clay roof tile type and application indicated.

Retain "Hook Nails" paragraph below in high-wind areas and on roofs steeper than 7:12. Hook nails are also called "wind locks."

* + - * 1. Hook Nails: One-piece wind lock and clay-roof-tile fastener system, minimum [**0.135-inch diameter brass] [0.135-inch diameter copper] [0.120-inch diameter stainless steel] [0.120-inch diameter galvanized-steel] <Insert requirements**> wire, for direct deck nailing.

Retain "Tile Locks" paragraph below if required for use with direct-deck, twisted-wire-tie system, or single-line wire-tie system fastening methods. Tile locks, also called "butt hooks," "nose clips," "nose hooks," and "wind locks," help reduce wind-induced chatter of clay roof tiles and limit stress on the primary fastener at top of the clay roof tile.

* + - * 1. Tile Locks: [**Brass] [Copper] [Stainless steel] [Hot-dip galvanized-steel**], nominal 0.1-inch diameter wire device designed to secure butt edges of overlaid clay roof tiles.

Retain "Storm Clips" paragraph below if additional wind-uplift resistance is required. Storm clips are also called "hurricane clips," "storm lock side clips," or "grip clips."

* + - * 1. Storm Clips: [**Brass, minimum 0.048-by-1/2-inch] [Stainless steel, minimum 0.048-by-1/2-inch] [Hot-dip galvanized-steel, minimum 0.048-by-1/2-inch] <Insert requirements**> strap-type, L-shaped retainer clips designed to secure side edges of clay roof tiles. Provide with two fastener holes in base flange.
			1. METAL FLASHING AND TRIM
				1. General: Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

Sheet Metal: [**Copper] [Stainless steel] [Zinc-tin alloy coated copper] [Anodized aluminum] [Aluminum, mill finished] <Insert requirements**>.

* + - * 1. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for design, dimensions, metal, and other characteristics of the item unless otherwise specified in this Section or indicated on Drawings.

Retain "Apron Flashings," "Step Flashings," "Channel Flashings," "Rake Pan Flashings," "Cricket and Backer Flashings," "Counterflashings," "Valley Flashings," and "Drip Edges" subparagraphs below if Drawings do not fully detail these flashing conditions. Review recommendations in SMACNA's "Architectural Sheet Metal Manual" and NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems"; revise to suit Project.

Apron Flashings: Fabricate with lower flange extending a minimum of **[4 inches] [6 inches] <Insert dimension> over and [4 inches] <Insert dimension**> beyond each side of downslope tile roofing and [**6 inches] <Insert dimension**> up the vertical surface.

Retain "Step Flashings" subparagraph below for interweaving metal step flashings between succeeding courses of flat roof tile that abut vertical surfaces such as chimneys, sidewalls, and skylights.

Step Flashings: Fabricate with a headlap of 4 inches and a minimum extension of [**4 inches] [5 inches] <Insert dimension**> both horizontally and vertically.

Retain "Channel Flashings" subparagraph below for metal pan or channel flashings acting as an internal gutter under sloping high-profile roof tile abutting vertical surfaces such as chimneys, sidewalls, and skylights.

Channel Flashings: Fabricate with vertical surface extending a minimum of [**4 inches] [5 inches] <Insert dimension**> above the clay roof tile and **[4 inches] [6 inches] <Insert dimension>** beneath the tile roofing, with a [**1-inch] <Insert dimension**> high vertical return to form a runoff channel.

Retain "Rake Pan Flashings" subparagraph below for metal pan or channel flashings acting as an internal gutter at rake edge fasciae.

Rake Pan Flashings: Fabricate with vertical surface extending over fasciae and **[**6 inches**] <Insert dimension**> beneath the tile roofing, with a [1-inch**] <Insert dimension**> high vertical return to form a runoff channel.

Retain "Cricket and Backer Flashings" subparagraph below if required.

Cricket and Backer Flashings: Fabricate with concealed flange extending a minimum of [24 inches**] <Insert dimension**> beneath upslope tile roofing, [6 inches**] <Insert dimension**> beyond each side of [**chimney] [skylight**], and [6 inches**] <Insert dimension**> above the roof plane.

Retain "Counterflashings" subparagraph below to protect top edges of apron, step, channel, cricket, and backer flashings from water intrusion.

Counterflashings: Fabricate to cover [4 inches**] <Insert dimension**> of base flashing measured vertically; and in lengths required so that no step exceeds [8 inches**] <Insert dimension**> and overall length is no more than [10 feet**] <Insert dimension**>.

Provide metal **[reglets] [receivers**] for installation.

Retain "Valley Flashings" subparagraph below if required and revise to suit Project. Both closed and open valleys require metal flashings. The BCNYS and the RCNYS include prescriptive requirements for valley flashings; verify requirements of authorities having jurisdiction.

Options in "Valley Flashings" subparagraph below are coordinated. First option reflects the BCNYS and the RCNYS requirement for minimum 24-inch wide sheet metal; remaining options reflect NRCA fabrication recommendations for 24-inch wide sheet metal. SMACNA recommends a minimum 1-inch high, inverted-V profile and a 2-inch high, inverted-V profile for slopes greater than 6:12 and for where dissimilar slopes join. Revise subparagraph to suit Project.

Valley Flashings: Fabricate from metal sheet not less than **[**24 inches**] <Insert dimension**> wide in lengths not exceeding [10 feet**] <Insert dimension**>, with [1-inch**] <Insert dimension>** high, inverted-V profile water diverter at center of valley and equal flange widths of not less than [11 inches**] <Insert dimension**>.

Retain first subparagraph below if securing flange edges with cleats.

Hem flange edges for fastening with metal cleats.

Retain "Drip Edges" subparagraph below if required at eave or rake edges.

Drip Edges: Fabricate in lengths not exceeding [**10 feet] <Insert dimension**>, with minimum 2-inch roof-deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge.

Retain "Sheet Metal Ridge Vent" paragraph below if required and revise to suit Project. Indicate details of sheet metal ridge vents on Drawings.

* + - * 1. Sheet Metal Ridge Vent: Fabricate from 16-oz./sq. ft. thick copper sheet, terminating each side in V-shaped external baffles with venting holes producing net free ventilation area of 2.65 sq. in./ft..

Retain "Vent-Pipe Flashings" paragraph below for plumbing vents that penetrate roof. Revise if another flashing material is required, or delete paragraph and include requirements in Section 076200 "Sheet Metal Flashing and Trim."

* + - * 1. Vent-Pipe Flashings: ASTM B749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof and extending at least 4 inches from pipe onto roof.

Insert requirements for snow guards using Section 077253 "Snow Guards" as a basis if not specifying them in that Section.

* + - * 1. <**Insert snow-guard requirements**>.
1. EXECUTION
	* + 1. EXAMINATION
				1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.

Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored and that provisions have been made for flashings and penetrations through roofing.

Verify that vent stacks and other penetrations through roofing are installed and securely fastened.

* + - * 1. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
				2. Proceed with installation only after unsatisfactory conditions have been corrected.
			1. INSTALLATION OF UNDERLAYMENT MATERIALS

Underlayments installed parallel to eaves are installed perpendicular to sloped roof deck. Underlayments installed parallel to the rake are installed parallel to sloped roof deck.

* + - * 1. Comply with clay-roof-tile and underlayment manufacturers' written installation instructions and with recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" applicable to products and applications indicated unless more stringent requirements are specified in this Section or indicated on Drawings.

Cover [**ridge] [hip**] wood nailers with underlayment strips.

Retain "Felt" paragraph below if required. Verify recommendations of local installers and roof-tile manufacturers.

* + - * 1. Felt: Install parallel with and starting at eaves and fasten with underlayment nails.

Retain "Single-Layer Installation," "Top-Layer Installation," or "Double-Layer Installation" subparagraph below to suit Project. The BCNYS and the RCNYS require two layers of underlayment for slopes from 2-1/2:12 to 4:12. Because of roof tiles' long service lives, NRCA only recommends using felt as a top layer in a two-layer installation over an anchor layer of polymer-modified bitumen sheet.

Single-Layer Installation: Install on roof deck.

Usually, retain first option in first subparagraph below for 2-inch minimum side laps, except for where the limiting design wind speed is equal to or greater than 140 mph. In that case, the BCNYS and the RCNYS require at least 4-inch side laps. Verify requirements of authorities having jurisdiction.

Lap sides a minimum of [**2 inches] [4 inches**] over underlying course.

Lap ends a minimum of 4 inches.

Stagger end laps between succeeding courses at least 72 inches.

Top-Layer Installation: Install as second layer over anchor-layer underlayment, with side laps offset halfway between side laps of underlying anchor layer.

Usually, retain first option in first subparagraph below for 2-inch minimum side laps, except for where the limiting design wind speed is equal to or greater than 140 mph. In that case, the BCNYS and the RCNYS require at least 4-inch side laps. Verify requirements of authorities having jurisdiction.

Lap sides a minimum of [**2 inches] [4 inches**] over underlying course.

Lap ends a minimum of 4 inches.

Stagger end laps between succeeding courses at least 72 inches.

Side lap and starter course dimensions in "Double-Layer Installation" subparagraph below are based on 36-inch wide rolls of felt underlayment and are needed to maintain double-layer felt underlayment coverage with 2 inches to spare. Verify requirements of authorities having jurisdiction.

Double-Layer Installation: Install on roof deck.

Install a 19-inch wide starter course at eaves and completely cover with a 36-inch wide second course.

Install succeeding 36-inch wide 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.

Retain first subparagraph below if cemented double layers of felt serve as water and ice-dam membranes or if required for additional protection. Self-adhering, polymer-modified bitumen sheet has largely replaced cemented double layers of felt as water and ice-dam protection.

Apply a continuous layer of asphalt roofing cement over starter course and on felt surface to be concealed by succeeding courses as each felt course is installed. Apply [**over entire roof] [at locations indicated on Drawings**].

Retain first subparagraph below for areas subject to high wind speeds. The BCNYS requires fastening of underlayment in grid pattern described below where the basic design wind speed is equal to or greater than 140 mph. The RCNYS requires the same fastening pattern where the ultimate design wind speed is equal to or greater than 140 mph.

Install fasteners in a grid pattern of 12 inches between side laps with 6-inch spacing at side and end laps.

Retain first subparagraph below if combining felt with self-adhering, polymer-modified bitumen sheet. NRCA recommends covering water and ice-dam protection with the roof-field underlayment.

Install felt over areas protected by self-adhering, polymer-modified bitumen sheet.

Retain first option in subparagraph below if desired for areas where roof deck is covered by self-adhering, polymer-modified bitumen sheet against walls and other roof projections.

Terminate felt [**flush] [extended up not less than 4 inches] <Insert requirements**> against sidewalls, curbs, chimneys, and other roof projections.

Retain "Asphalt Roll-Roofing" paragraph below if required. Verify recommendations of local installers and roof-tile manufacturers.

* + - * 1. Asphalt Roll-Roofing: Install parallel with and starting at eaves.

Retain "Single-Layer Installation," "Top-Layer Installation," or "Double-Layer Installation" subparagraph below to suit Project. The IBC and the IRC require two layers of underlayment for slopes from 2-1/2:12 to 4:12.

Single-Layer Installation: Install on roof deck.

Usually, retain first option in first subparagraph below for 2-inch minimum side laps, except for where the limiting design wind speed is equal to or greater than 140 mph. In that case, the BCNYS and the RCNYS require at least 4-inch side laps. Verify requirements of authorities having jurisdiction.

Lap sides a minimum of [**2 inches] [4 inches**] over underlying course.

Lap ends a minimum of 4 inches.

Stagger end laps between succeeding courses at least 72 inches.

Fasten with underlayment nails.

Top-Layer Installation: Install as second layer over anchor-layer underlayment, with side laps offset halfway between side laps of underlying anchor layer.

Usually, retain first option in first subparagraph below for 2-inch minimum side laps, except for where the limiting design wind speed is equal to or greater than 140 mph. In that case, the BCNYS and the RCNYS require at least 4-inch side laps. Verify requirements of authorities having jurisdiction.

Lap sides a minimum of [**2 inches] [4 inches**] over underlying course.

Lap ends a minimum of 4 inches.

Stagger end laps between succeeding courses at least 72 inches.

[**Fasten with underlayment nails] [Adhere to anchor layer in solid mopping of hot** **roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature] [Adhere to anchor layer in uniform coating of cold-applied adhesive] [Adhere to anchor layer in uniform coating of asphalt roofing cement**].

Side lap and starter course dimensions in "Double-Layer Installation" subparagraph below are based on 36-inch-wide rolls of underlayment and are needed to maintain double-layer underlayment coverage with 2 inches to spare. Verify requirements of authorities having jurisdiction.

Double-Layer Installation: Install on roof deck.

Install a 19-inch wide starter course at eaves and completely cover with a 36-inch wide second course.

Install succeeding 36-inch wide 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 underlayment nails.

Retain first subparagraph below if cemented double layers of roll roofing serve as an ice-dam membrane or if required for additional protection. Self-adhering, polymer-modified bitumen sheet has largely replaced cemented double layers of underlayment as ice-dam protection.

Apply a continuous layer of asphalt roofing cement over starter course and on roll-roofing surface to be concealed by succeeding courses as each roll-roofing course is installed. Apply [**over entire roof] [at locations indicated on Drawings**].

Retain first subparagraph below for areas subject to high wind speeds. The BCNYS requires fastening of underlayment in grid pattern described below where the basic design wind speed is equal to or greater than 140 mph. The RCNYS requires the same fastening pattern where the ultimate design wind speed is equal to or greater than 140 mph.

Install fasteners in a grid pattern of 12 inches between side laps with 6-inch spacing at side and end laps.

Retain first subparagraph below if combining roll roofing with self-adhering, polymer-modified bitumen sheet. NRCA recommends covering water and ice-dam protection with the roof-field underlayment.

Install roll roofing over areas protected by self-adhering, polymer-modified bitumen sheet.

Retain first option in subparagraph below if desired for areas where roof deck is covered by self-adhering, polymer-modified bitumen sheet against walls and other roof projections.

Terminate roll roofing [**flush] [extended up not less than 4 inches] <Insert requirements**> against sidewalls, curbs, chimneys, and other roof projections.

Retain "Synthetic-Underlayment Top Layer" paragraph below if required as a top layer over an anchor layer of mechanically fastened, polymer-modified bitumen sheet or an anchor layer of self-adhering, polymer-modified bitumen sheet.

* + - * 1. Synthetic-Underlayment Top Layer: Install in accordance with manufacturer's written installation instructions and as second layer over anchor-layer underlayment.

Completely cover anchor-layer underlayment and install parallel with and starting at the eaves, with side laps offset halfway between side laps of underlying anchor layer.

Usually, retain first option in first subparagraph below for 2-inch minimum side laps, except for where the limiting design wind speed is equal to or greater than 140 mph. In that case, the BCNYS and the RCNYS require at least 4-inch side laps. Verify requirements of manufacturers and authorities having jurisdiction.

Lap sides and ends as recommended in writing by manufacturer, but not less than [**2 inches] [4 inches]** for side laps and 6 inches for end laps.

Stagger end laps from anchor-layer end laps and between succeeding top courses at interval recommended in writing by manufacturer, but not less than 72 inches.

Fasten with underlayment nails.

Retain subparagraph below for areas subject to high wind speeds. The BCNYS requires fastening of underlayment in grid pattern described below where the basic design wind speed is equal to or greater than 140 mph. The RCNYS requires the same fastening pattern where the ultimate design wind speed is equal to or greater than 140 mph.

Install fasteners in a grid pattern of 12 inches between side laps with 6-inch spacing at side and end laps.

Retain "Polymer-Modified Bitumen Sheet" paragraph below if required. NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" recommends using polymer-modified bitumen sheet for single- and double-layer installations; as an anchor layer under a mechanically fastened top layer of polymer-modified bitumen sheet, felt, or synthetic underlayment; and as an anchor layer under a top layer of polymer-modified bitumen sheet adhered using hot bitumen or cold adhesive or a top layer of self-adhering, polymer-modified bitumen sheet.

* + - * 1. Polymer-Modified Bitumen Sheet: Install parallel with and starting at eaves.

Retain one of first three installation subparagraphs below to suit Project.

Retain second option in first subparagraph below with "Top-Layer Installation" subparagraph for one method of two-layer installation recommended by NRCA. NRCA also recommends using self-adhering, polymer-modified bitumen sheet for the anchor layer. Delete both subparagraphs and retain "Double-Layer Installation" subparagraph for another installation method recommended by NRCA.

[**Single-] [Anchor-]**Layer Installation: Install on roof deck.

Usually, retain first option in first subparagraph below for 2-inch minimum side laps, except for where the limiting design wind speed is equal to or greater than 140 mph. In that case, the BCNYS and the RCNYS require least 4-inch side laps. Verify requirements of authorities having jurisdiction.

Lap sides a minimum of **[2 inches] [4 inches**] over underlying course.

Lap ends a minimum of 6 inches.

Stagger end laps between succeeding courses at least 72 inches.

Fasten with underlayment nails.

Top-Layer Installation: Install as a second layer over anchor-layer underlayment, with side laps offset halfway between side laps of underlying anchor layer.

Usually, retain first option in first subparagraph below for 2-inch minimum side laps, except for where the limiting design wind speed is equal to or greater than 140 mph. In that case, the BCNYS and the RCNYS require at least 4-inch side laps. Verify requirements of authorities having jurisdiction.

Lap sides a minimum of [**2 inches] [4 inches**].

Lap ends a minimum of 6 inches.

Stagger end laps from anchor-layer end laps and between succeeding top-layer courses at least 72 inches.

[**Fasten with underlayment nails] [Adhere to anchor layer in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature**] [**Adhere to anchor layer in uniform coating of cold-applied adhesive**].

Double-Layer Installation: Install on roof deck in overlapping layers with a half-width plus 1-inch wide starter course at eaves completely covered by full-width second course.

Install succeeding courses lapping previous courses by a half-width plus 1 inch in shingle fashion.

Lap ends a minimum of 6 inches.

Stagger end laps between succeeding courses at least 72 inches.

Fasten with underlayment nails.

Retain first subparagraph below for areas subject to high wind speeds. The BCNYS requires fastening of underlayment in grid pattern described below where the basic design wind speed is equal to or greater than 140 mph. The RCNYS requires the same fastening pattern where the ultimate design wind speed is equal to or greater than 140 mph.

Install fasteners in a grid pattern of 12 inches between side laps with 6-inch spacing at side and end laps.

Retain first subparagraph below if combining polymer-modified bitumen sheet with self-adhering, polymer-modified bitumen sheet. NRCA recommends covering water and ice-dam protection with the roof-field underlayment.

Install sheets over areas protected by self-adhering, polymer-modified bitumen sheet.

Retain first option in subparagraph below if desired for areas where roof deck is covered by self-adhering, polymer-modified bitumen sheet against walls and other roof projections.

Terminate sheets [**flush] [extended up not less than 4 inches] <Insert requirements**> against sidewalls, curbs, chimneys, and other roof projections.

Retain "Self-Adhering, Polymer-Modified Bitumen Sheet" paragraph below if required. NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" recommends using a single layer of self-adhering, polymer-modified bitumen sheet over the entire roof deck, although NRCA suggests covering it with a layer of another type of underlayment, and using it for a top layer over mechanically fastened polymer-modified bitumen sheet.

* + - * 1. Self-Adhering, Polymer-Modified Bitumen Sheet: Install, wrinkle free.

Comply with low-temperature installation restrictions of underlayment manufacturer.

Install lapped in direction that sheds water.

Lap sides not less than 4 inches.

Lap ends not less than 6 inches, staggered 24 inches between succeeding courses.

Roll laps with roller.

Retain first subparagraph below if primer is required to enhance adhesion to concrete and masonry surfaces, such as chimneys or walls, and metal surfaces, such as valley flashing.

Prime concrete, masonry, and metal surfaces to receive self-adhering, polymer-modified bitumen sheet.

Retain "Single-Layer Installation" subparagraph below if self-adhering, polymer-modified bitumen sheet covers the entire roof deck. NRCA suggests installing a second layer of another type of underlayment over self-adhering, polymer-modified bitumen sheet.

Single-Layer Installation: Install over entire roof deck.

Retain "Top-Layer Installation" subparagraph below if required. Verify manufacturers' written instructions for top-layer installation and revise to suit Project.

Top-Layer Installation: Install as second layer over anchor-layer underlayment.

Completely cover anchor-layer underlayment.

Offset side laps halfway between side laps of underlying anchor layer and offset end laps from those of underlying anchor layer at least 72 inches.

Retain "Water and Ice-Dam Protection Installation" subparagraph below if a layer of self-adhering, polymer-modified bitumen sheet partially covers roof deck in areas vulnerable to moisture penetration; revise to suit Project. Because of tile's long service life, NRCA recommends extending the underlayment covering the roof field over the water and ice-dam protection layer.

Water and Ice-Dam Protection Installation: Install on roof deck where indicated [**below] [on Drawings**].

Retain one or more of first eight subparagraphs below if locations are not indicated on Drawings. Revise to suit Project.

Eaves: Extend from edges of eaves [**24** **inches] [36 inches] <Insert dimension**> beyond interior face of exterior wall.

Rakes: Extend from edges of rakes [**24 inches] [36 inches] <Insert dimension**> beyond interior face of exterior wall.

Verify requirements of authorities having jurisdiction for valley underlayment.

Valleys: Extend from lowest to highest point [**18 inches] <Insert dimension**> on each side of centerline.

Hips: Extend [**18 inches] <Insert dimension**> on each side.

Ridges: Extend [**36 inches] <Insert dimension**> on each side [ **without obstructing continuous ridge vent slot**].

Sidewalls: Extend [**18 inches] <Insert dimension**> beyond sidewalls and return vertically against sidewalls not less than [**4 inches] <Insert dimension**>.

Dormers, Chimneys, Skylights, and Other Roof-Penetrating Elements: Extend [**18 inches] <Insert dimension**> beyond penetrating elements and return vertically against penetrating elements not less than [**4 inches] <Insert dimension**>.

Roof-Slope Transitions: Extend [**18 inches] <Insert dimension**> on each roof slope.

Cover underlayment within seven days.

Retain "Valley Underlayment" paragraph below if required and if installing self-adhering, polymer-modified bitumen sheet is not specified for water and ice-dam protection at valleys. Paragraph is applicable if using felt, roll-roofing, or polymer-modified bitumen sheet underlayment. Paragraph is based on NRCA recommendations and BCNYS and RCNYS requirements. The BCNYS and RCNYS require using "Type I" underlayment on top of roof-field underlayment, presumably ASTM D226 Type I. Verify requirements of authorities having jurisdiction and revise to suit Project.

* + - * 1. Valley Underlayment: Install one layer of 36-inch wide underlayment centered in valley, running full length of valley, and on top of underlayment on field of roof that is woven through valley. Install all layers of underlayment in and through valley tight with no bridging.

Revise first subparagraph below to suit Project.

Use [**same underlayment as installed on field of roof] <Insert requirements**>.

Lap ends at least 12 inches in direction that sheds water, and seal with asphalt roofing cement.

Fasten to roof deck with underlayment nails located as far from valley center as possible and only to extent necessary to hold underlayment in place until installation of valley flashing.

Subparagraph below is based on BCNYS and RCNYS requirements for roof slopes less than 7:12 in areas where there is a possibility of ice forming along eaves causing a backup of water. Verify requirements of authorities having jurisdiction.

Solidly cement valley underlayment to roof-field underlayment that is woven through valley using asphalt roofing cement.

* + - 1. INSTALLATION OF METAL FLASHING AND TRIM
				1. Install metal flashings and other sheet metal to comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

Install in accordance with clay-roof-tile manufacturer's written instructions and recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems."

Retain "Apron Flashings" paragraph below to provide a weatherproofing transition material where a roof area intersects a head wall. Common locations for apron flashings include the front downslope side of a dormer or chimney, curbed roof penetrations, and clerestory transitions.

* + - * 1. Apron Flashings: Extend lower flange over and beyond each side of downslope tile roofing and up the vertical surface.

Retain "Step Flashings" paragraph below for interweaving metal step flashings between succeeding courses of flat roof tile that abut vertical surfaces such as chimneys, sidewalls, and skylights.

* + - * 1. Step Flashings: Install with a headlap of 4 inches and extend both horizontally and vertically. Install with lower edge of flashing just upslope of, and concealed by, butt of overlying tile. Fasten to roof deck only.

Retain "Cricket and Backer Flashings" paragraph below if required.

* + - * 1. Cricket and Backer Flashings: Install against roof-penetrating elements, extending concealed flange beneath upslope tile roofing and beyond each side.
				2. Channel Flashings: Install over underlayment materials and fasten to roof deck.
				3. Rake Pan Flashings: Install over underlayment materials and fasten to roof deck.
				4. Counterflashings: Coordinate with installation of base flashing and fit tightly to base flashing. Lap joints a minimum of 4 inches secured in a waterproof manner.

Install in reglets or receivers.

Retain "Valley Flashings" paragraph below if required. Both open and closed valleys require sheet metal flashings.

* + - * 1. Valley Flashings: Install centered in valleys, lapping ends at least [**8 inches] <Insert dimension**> in direction that sheds water. Fasten upper end of each length to roof deck beneath overlap.

Retain one of first two subparagraphs below, or both, if required. NRCA recommends using cleats and stripping-in flashing using self-adhering, polymer-modified bitumen sheet strips adhered to metal flanges and similar valley underlayment in climates prone to heavy accumulations of snow and ice or regular freeze-thaw cycling.

Secure hemmed flange edges into metal cleats spaced [**12 inches] [24 inches] <Insert dimension>** apart and fastened to roof deck.

Adhere minimum [**9-inch] <Insert dimension**> wide strips of self-adhering, polymer-modified bitumen sheet to metal flanges and to **[underlying self-adhering, polymer-modified bitumen sheet] <Insert requirements**>. Place strips parallel to and over flanges so that they will be just concealed by installed tile.

Retain subparagraph below for climates prone to heavy accumulations of snow and ice or regular freeze-thaw cycling.

Provide a closure at the end of the inverted-V profile of the valley metal to minimize water and ice infiltration.

* + - * 1. Rake Drip Edges: Install over underlayment materials and fasten to roof deck.
				2. Eave Drip Edges: Install below underlayment materials and fasten to roof deck.

Retain "Sheet Metal Ridge Vents" paragraph below if required.

* + - * 1. Sheet Metal Ridge Vents: Install centered on and mechanically fasten to wood ridge. Adhere each side to clay roof tile with elastomeric sealant.

Install fabric mesh over roof-deck air ventilation gaps to prevent insect entry.

* + - * 1. Pipe Flashings: Form flashing around pipe penetrations and tile roofing. Fasten and seal to tile roofing.
			1. INSTALLATION OF WOOD NAILERS

Retain first paragraph below for high-profile clay roof tiles.

* + - * 1. Install wood nailers securely fastened to roof deck at the following locations:

Hips.

Ridges.

Rakes.

* + - * 1. Install beveled wood-cant nailers at eaves and securely fasten to roof deck.

Retain paragraph below if battens are required. Wood battens installed perpendicular to sloped roof deck are installed horizontally or parallel to eaves. Counter battens installed parallel to sloped roof deck are installed vertically or parallel to rakes. This Section specifies conventional clay-roof-tile installation with battens installed horizontally and counter battens installed vertically.

* + - * 1. Install nominal 1-by-2-inch wood-batten nailers horizontally [**over 1/2-inch high, pressure-preservative-treated wood lath strips] [in 48-inch lengths with ends separated by 1/2 inch**], at spacing required by clay-roof-tile manufacturer, and securely fasten to roof deck.

Retain subparagraph below if counter battens are required.

Install nominal 1-by-2-inch wood counter battens vertically spaced [**24 inches] <Insert dimension>** apart and securely fasten to roof deck.

* + - 1. INSTALLATION OF CLAY ROOF TILES
				1. Install clay roof tiles in accordance with manufacturer's written instructions and recommendations in TRI/WSRCA's "Concrete and Clay Roof Tile Installation Manual" and NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" unless more stringent requirements are specified in this Section or indicated on Drawings.

Generally, retain first subparagraph below and indicate design wind speeds on Drawings with design wind forces determined by Project's structural Director’s Representative.

Install to resist wind forces resulting from design wind speeds indicated on Drawings.

Maintain uniform exposure and coursing of clay roof tiles throughout roof.

Extend tiles 2 inches over eave fasciae.

Retain one or more of "Nail Fastening," "Wire-Tie Fastening," "Mortar Setting," and "Foam-Adhesive Setting" subparagraphs below to suit Project. Although TRI/FRSA and TRI/WSRCA publications and NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" include adhesive-set installation for use in climates not subject to freeze-thaw cycles, the BCNYS and the RCNYS do not. UNIFORM CODE-ES AC152 provides criteria for code acceptance of adhesive attachment of roof tiles. Verify requirements of authorities having jurisdiction.

Nail Fastening: Drive nails to clear the clay roof tile so the tile hangs from the nail and is not drawn up.

Install wire through nail holes of cut tiles that cannot be nailed directly to roof deck, and fasten to nails driven into deck.

Wire-Tie Fastening: Install wire-tie systems and fasten clay roof tiles in accordance with manufacturer's written instructions.

Mortar Setting: Install clay roof tiles in accordance with manufacturer's written instructions and acceptance criteria of authorities having jurisdiction.

Foam-Adhesive Setting: Install clay roof tiles in accordance with adhesive and tile manufacturers' written instructions and acceptance criteria of authorities having jurisdiction.

Retain "Storm Clips" subparagraph below for additional side fastening of clay roof tiles.

Storm Clips: Install to capture edges of longitudinal sides of clay roof tiles and securely fasten to roof deck.

Retain "Tile Locks" subparagraph below to lock butt edges of overlying clay roof tiles to heads of underlying tiles.

Tile Locks: Install to support and lock overlying tile butts to underlying tiles.

Cut and fit clay roof tiles neatly around roof vents, pipes, ventilators, and other projections through roof. Fill voids with mortar.

Install clay roof tiles with color blend approved by Architect.

Retain "Flat-Shingle Clay-Roof-Tile Installation" paragraph below if required.

* + - * 1. Flat-Shingle Clay-Roof-Tile Installation:

Maintain 2-inch headlap between succeeding courses of clay roof tiles.

Offset joints by half the clay-roof-tile width in succeeding courses.

Extend clay roof tiles 1 inch over fasciae at rakes.

Install ridge tiles in [**V-ridge] [saddle] [mitered**] configuration with laps facing away from prevailing wind. Seal laps with [**asphalt roofing cement] [butyl sealant] [elastomeric sealant**].

Retain first subparagraph below for closing void at junction of ridge tiles with high-profile clay roof tiles. Special ridge closure tiles are also called "top fixture tiles."

Close voids where ridge tiles meet clay roof tiles with [ridge closure] [mortar struck with face of ridge cover] tiles.

Install hip tiles in [**V-ridge] [saddle] [mitered**] configuration. Seal laps with [**asphalt roofing cement] [butyl sealant] [elastomeric sealant**].

Retain subparagraph below for mortar-filling voids at junction of hip tiles with high-profile clay roof tiles.

Fill voids with mortar where hip tiles meet clay roof tiles, and strike mortar flush with face of hip cover tiles.

Retain "Flat Interlocking Clay-Roof-Tile Installation" paragraph below if required.

* + - * 1. Flat Interlocking Clay-Roof-Tile Installation:

Provide minimum 3-inch lap between succeeding courses of clay roof tiles.

Offset joints by half the clay-roof-tile width in succeeding courses.

Install L-shaped rake tiles.

Install ridge tiles in [**V-ridge] [saddle] [mitered**] configuration with laps facing away from prevailing wind. Seal laps with [**asphalt roofing cement] [butyl sealant] [elastomeric sealant**].

Retain first subparagraph below for closing void at junction of ridge tiles with high-profile clay roof tiles. Special ridge closure tiles are also called "top fixture tiles."

Close voids where ridge tiles meet clay roof tiles with [ridge closure] [mortar struck with face of ridge cover] tiles.

Install hip tiles in [**V-ridge] [saddle] [mitered**] configuration. Seal laps with [**asphalt roofing cement] [butyl sealant] [elastomeric sealant**].

Retain subparagraph below for mortar-filling voids at junction of hip tiles with high-profile clay roof tiles.

Fill voids with mortar where hip tiles meet clay roof tiles, and strike mortar flush with face of hip cover tiles.

Retain "Low-Profile, Interlocking Clay-Roof-Tile Installation" paragraph below if required.

* + - * 1. Low-Profile, Interlocking Clay-Roof-Tile Installation:

Provide minimum 3-inch lap between succeeding courses of clay roof tiles.

Install rake tiles indicated.

Install ridge tiles with laps facing away from prevailing wind. Seal laps with [**asphalt roofing cement]** [**butyl sealant] [elastomeric sealant**].

Retain "High-Profile Clay-Roof-Tile Installation" paragraph below if required. High-profile tiles include interlocked and overlapped tiles, such as one-piece Spanish or "S" tiles and two-piece barrel mission tiles.

* + - * 1. High-Profile Clay-Roof-Tile Installation:

Install [**tile] [sheet metal] [EPDM**] eave closure.

Provide minimum 3-inch lap between succeeding courses of clay roof tiles.

Install rake tiles indicated.

Install ridge tiles with laps facing away from prevailing wind. Seal laps with [**asphalt roofing cement] [butyl sealant] [elastomeric sealant**].

Retain "Open Valleys" paragraph below if required.

* + - * 1. Open Valleys: Cut clay roof tiles at open valleys to form straight lines. [**Maintain uniform width of exposed open valley] [Widen exposed portion of open valley 1/8 inch in 12 inches**] from highest to lowest point.

Drill or notch cut valley tiles and wire-tie to fastener placed clear of valley metal flashings.

Do not nail tiles to metal flashings.

Retain "Closed Valleys" paragraph below if required.

* + - * 1. Closed Valleys: Cut clay roof tiles at closed valleys to form straight lines, trimming upper concealed corners of tiles. Maintain uniform gap of [**1/2 to 3/4 inch] [3/4 to 1 inch] <Insert dimension**> on either side of water diverter at valley centerline.

Drill or notch cut valley tiles and wire-tie to fastener placed clear of valley metal flashings.

Do not nail tiles to metal flashings.

* + - * 1. Remove and replace damaged or broken clay roof tiles.
			1. INSTALLATION OF RIDGE VENTS
				1. Rigid-Plastic Ridge Vents: Install continuous ridge vents over clay roof tiles in accordance with manufacturer's written instructions. Fasten with nails of sufficient length to penetrate substrate.
				2. Flexible Ridge Vent: Install continuous-roll ridge vents over clay roof tiles in accordance with manufacturer's written instructions.
			2. ROOFING INSTALLER'S WARRANTY

Retain this article if required. Revise to include another Roofing Installer's Warranty form or as advised by Director’s Representative. Coordinate with "Warranty" Article.

* + - * 1. WHEREAS <**Insert name**> of <**Insert address**>, herein called the "Roofing Installer," has performed roofing and associated work ("the work") on the following project:

Director’s Representative: <**Insert name of Director’s Representative**>.

Director’s Representative Address: <**Insert address**>.

Building Name/Type: <**Insert information**>.

Building Address: <**Insert address**>.

Area of the Work: <**Insert information**>.

Acceptance Date: <**Insert date**>.

Warranty Period: <**Insert time**>.

Expiration Date: <**Insert date**>.

* + - * 1. AND WHEREAS Roofing Installer has contracted (either directly with Director’s Representative or indirectly as a subcontractor) to warrant the work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
				2. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that, during Warranty Period, Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of the work as are necessary to correct faulty and defective work and as are necessary to maintain the work in a watertight condition.
				3. This Warranty is made subject to the following terms and conditions:

Specifically excluded from this Warranty are damages to the work and other parts of the building, and to building contents, caused by:

Lightning;

Insert required wind speed in first subparagraph below.

Peak gust wind speed exceeding <**Insert wind speed**> mph ;

Fire;

Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;

Faulty construction of copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;

Vapor condensation on bottom of roofing; and

Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Director’s Representative.

When the work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Director’s Representative or by another responsible party so designated.

Roofing Installer is responsible for damage to the work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of the work.

During Warranty Period, if Director’s Representative allows alteration of the work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of the alterations, but only to the extent the alterations affect the work covered by this Warranty. If Director’s Representative engages Roofing Installer to perform the alterations, Warranty shall not become null and void unless Roofing Installer, before starting the alterations, notified Director’s Representative in writing, showing reasonable cause for claim, that the alterations would likely damage or deteriorate the work, thereby reasonably justifying a limitation or termination of this Warranty.

During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a use or service more severe than originally specified, this Warranty shall become null and void on date of the change, but only to the extent the change affects the work covered by this Warranty.

Director’s Representative shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect the work and to examine evidence of such leaks, defects, or deterioration.

This Warranty is recognized to be the only warranty of Roofing Installer on the work and shall not operate to restrict or cut off Director’s Representative from other remedies and resources lawfully available to Director’s Representative in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of the work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Director’s Representative or a subcontract with Director’s Representative General Contractor.

* + - * 1. IN WITNESS THEREOF, this instrument has been duly executed this <**Insert day> day of <Insert month>, <Insert year**>.

Authorized Signature: <**Insert signature**>.

Name: <**Insert name**>.

Title: <**Insert title**>.

END OF SECTION 073213