**ADDENDUM ONE – Date: December 21, 2020**

**TO ALL BIDDERS:**

The following Addendum shall be incorporated in the Contract Documents of the above project, and all requirements herein are fully a part of the Contract Documents.

All Bidders are reminded to acknowledge receipt of Addenda in the space provided on the Bid Form.

**A. Calabasas School – SFB Project #: 120235130-9999-012 BRG**

DOCUMENTS ISSUED: None.

SPECIFICATIONS:

1. Section 075216 Styrene-Butadiene-Styrene (SBS) Modified Bituminous Membrane Roofing, Paragraph 2.8 Insulation Accessories, Subparagraph E Cover Board: revise as follows:

   *E. Cover Board: ASTM C208, Type II, Grade 2, cellulosic-fiber insulation board, integral coated six sides, 1/2 inch thick.*

DRAWINGS: None.

**B. Coatimundi Middle School – SFB Project #: 120235110-9999-014 BRG**

DOCUMENTS ISSUED: Structural Assessment.

SPECIFICATIONS:

1. Add Structural Assessment.

DRAWINGS: None.

**C. Mountain View Elementary School – SFB Project #: 120235120-9999-013 BRG**

DOCUMENTS ISSUED: None.

SPECIFICATIONS: None.

DRAWINGS: None.

**D. Rio Rico High School – SFB Project #: 120235200-9999-011 BR**

DOCUMENTS ISSUED: 075216 Rev.

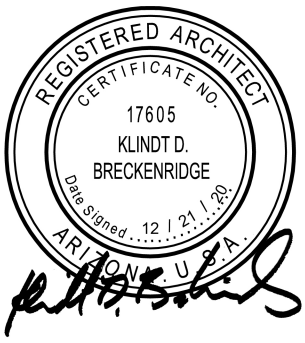
SPECIFICATIONS:

1. Section 075216 Styrene-Butadiene-Styrene (SBS) Modified Bituminous Membrane Roofing, replace Section.

DRAWINGS: None.

**GENERAL COMMENTS / CLARIFICATIONS:**

1. Bid Due Date shall be January 8, 2021 at 10:00 AM.




REGISTRATION EXPIRATION DATE: 3/31/2023

**END OF ADDENDUM ONE FOR IFB 21-04**

E-mailed to: kbreckenridge@breckenridgearchitects.com

December 21, 2020

MARTIN WHITE GRIFFIS
STRUCTURAL ENGINEERS, INC

Mr. Klindt Breckenridge, AIA
1735 East Fort Lowell Road, Suite 12
Tucson, AZ 85719

Re: Coatimundi Middle School
SFB #120235110-9999-014BRG
MWG #: 20067.00

Dear Klindt,

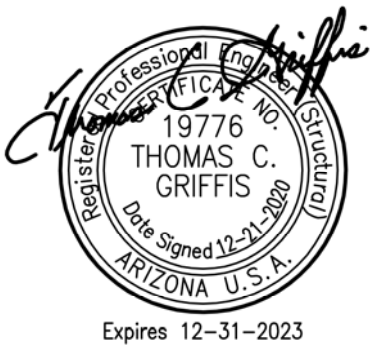
In accordance with your request, we have completed a structural review of the roofing plans for the Coatimundi Middle School roof replacement at Santa Cruz Valley United School District. The evaluation included the review of the photos taken during the architectural investigation and the architectural drawing prepared for the roof replacement. Neither the review nor this report is intended to cover mechanical, electrical, or architectural features.

The architectural photos indicate the existing roof of cementitious spray foam or built-up roofing need to be replaced. The architectural drawings indicate a new sheet underlayment over the (E) roof substrate with roof insulation, coverboard and a HPR modified membrane. New roof loads will in essence not differ from existing roof loads. It is imperative the structural deck and framing be field verified follow the removal of the existing roof materials. The contractor shall contact the Architect with results of condition verification. Any unsound conditions shall be reported to the structural engineer for review and repair guidelines.

This report is based on visual observations and there is not claim, either stamped or implied, that all conditions were observed. If the contractor or architect identified area of concern during the repair of the existing roof materials, our office should be contacted for further evaluation.

Please do not hesitate to call if you have any questions.

Sincerely,




Thomas C. Griffis, P.E., S.E.
Principal

TCG:mjo

**SECTION 075216**
**STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS MEMBRANE ROOFING**

GENERAL

1.1 SUMMARY

A. Section Includes:

1. Styrene-butadiene-styrene (SBS)-modified bituminous membrane roofing.
2. Roof insulation.
3. Cover board.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness of insulation.
2. Base flashings and membrane terminations.
3. Flashing details at penetrations.
4. **Tapered insulation, including slopes.**
5. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
6. **Crickets, saddles, and tapered edge strips, including slopes.**
7. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

C. Wind Uplift Resistance Submittal: For roofing system indicating compliance with wind uplift performance requirements.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

a. Submit evidence of complying with performance requirements.

2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

B. Product Test Reports: For roof membrane and insulation, tests performed by a qualified testing agency, indicating compliance with specified requirements.

1. Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147. Membranes must meet or exceed all performance characteristics including tensile strengths, tear strengths, elongation and recycled content. Testing must be performed at 73.4 deg. F +/- 3.6 deg. F.

C. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

D. Sample Warranties: For manufacturer’s special 20-year non-prorated no dollar limit warranty and installer’s sample two-year warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.7 PRODUCT INFORMATION REQUIRED WITH BID SUBMITTAL AND DUE AT BID OPENING

A. Required Product Information to be submitted with bid:

1. Product Identification: Include manufacturer's current literature and manufacturer's name and address. Submittal shall be limited to one roofing system manufacturer. Submittal of more than one roofing system manufacturer will not be accepted.
2. Test Reports: Provide independent test data for all modified surfacing sheets. Certification must be from an accredited independent testing laboratory comparing the physical and performance characteristics of the proposed material with those of the specified materials. Test results must be dated, notarized, and on testing laboratory stationary.
3. Manufacturer's Fire Compliance Certificate: Certify that the roofing system furnished is approved by Factory Mutual (FM), Underwriters Laboratories (UL), Warnock Hersey

(WH), or approved third party testing facility in accordance with ASTM E108, Class A for external fire and meets local or nationally recognized building codes.

4. List of at least five projects completed within the past five years, where the proposed material was used under similar climate conditions. Include project names, addresses, and contact information of installer and owner. These projects must be available for inspection by the Architect.
5. Statement from the roofing system manufacturer stating that all Bid Documents have been reviewed and approved, the site conditions are acceptable for the roofing assembly being installed, and the roofing system manufacturer will provide field inspections during construction as appropriate to the complexity and progress of the work, but no less than once per week, and until all construction work is completed and accepted by the Owner and Architect. Inspections shall be performed by a Manufacturer's Representative who is a full-time employee of the manufacturer. Manufacturer's Representative shall send to Architect electronically a written summary of details of inspection with photo documentation.

B. Products will not be considered if:

1. More than one roofing system manufacturer is submitted with bid.
2. Product or method of major waterproofing field components to be considered does not have a minimum of five years of successful performance in roofing and reroofing applications in the United States.
3. Roofing system manufacturer is unable to provide field inspections by a Manufacturer's Representative as appropriate to the complexity and progress of the work, but no less than once per week.
4. Independent test data from an independent testing agency is not provided with the Bid Documents.
5. The independent test data does not meet or exceed the minimum performance standards specified.
6. Acceptance will require substantial revision of Contract Documents.
7. Architect/Owner reserves the right to be the final authority on the acceptance or rejection of any and all products.

## 1.8 MANUFACTURER'S INSPECTIONS

A. While the project is in progress, the roofing system manufacturer will provide the following:

1. Report progress and quality of the work as observed.
2. Provide periodic job site inspections no less than once per week followed by emailed photo reports documenting the inspection on those days.
3. Report to the Owner and Architect in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
4. Confirm after completion that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.

## 1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

C. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

D. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

E. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

B. Do not apply roofing materials or membrane to damp deck surface.

C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.

1. Special warranty without monetary limit (non-prorated no dollar limit) that includes roofing membrane, base flashings, fasteners, cover boards, substrate boards, roofing accessories, and other components of roofing system. Failure includes roof leaks, blisters, ponding, sliding materials, loss of granules, etc.
2. Warranty Period: 20 years minimum from date of Substantial Completion.

B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of roofing system such as roofing membrane, base flashing, fasteners, cover boards, and substrate boards, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.

B. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746/D3746M, ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.

C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:

1. Zone 1 (Roof Area Field): **29.2** lbf/sq. ft.
2. Zone 2 (Roof Area Perimeter): **38.5** lbf/sq. ft.

a. Location: From roof edge to **18 ft. 0 in.** inside roof edge.

3. Zone 3 (Roof Area Corners): **38.5** lbf/sq. ft.

a. Location: **18 ft. 0 in.** in each direction from each building corner.

D. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system and shall be listed in SPRI's Directory of Roof Assemblies for roof assembly identical to that specified for this Project.

1. Wind Uplift Load Capacity: 90 psf.

E. ENERGY STAR Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.

F. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency.

1. Identify products with appropriate markings of applicable testing agency.

G. In a multi-ply BUR assembly, not to exceed three layers, the sum/composite of all layers must meet or exceed 850 lbf of tear strength and 500 lbf/in of tensile strength in both machine direction (MD) and cross machine direction (XD) when tested per ASTM D5147 at 73.4 +/- 3.6 deg. F.

## 2.2 MANUFACTURERS

A. It is the intent of this specification to set standards based performance. Performance criteria were based on product performance, specification requirements, financial stability to stand behind a provided warranty, system compatibility, and single source responsibility, service and design criteria.

B. Source Limitations: Obtain components including roof insulation, fasteners, coatings, mastics, sealants, and roof accessories for roofing system from roof membrane manufacturer or manufacturer approved by roof membrane manufacturer.

## 2.3 BASE SHEET MATERIALS

A. SBS-Modified Bitumen Polyester and/or Fiberglass Mat Base Sheet: ASTM D6162/D6162M, ASTM D6163/D6163M, or ASTM D6164/D6164M, Type III, Grade S, SBS-modified asphalt sheet, reinforced with a combination of polyester and/or fiberglass fabric, smooth surfaced, suitable for hot asphalt application method.

1. Tensile Strength, ASTM D5147:

    a. MD 340 lbf./in. XD 340 lbf./in., 2 in/min @ 73.4 +/- 3.6 deg. F.

2. Tear Strength, ASTM D5147:

    a. MD 650 lbf. XD 650 lbf., 2 in./min. @ 73.4 +/- 3.6 deg. F.

2.4 STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS CAP SHEET

A. Granule-Surfaced Roofing Cap Sheet: ASTM D6162/D6162M, ASTM D6163/D6163M, or ASTM D6164/D6164M, Type III, Grade G, SBS-modified fire retardant asphalt sheet, reinforced with a combination of polyester and/or fiberglass fabric, suitable for hot asphalt application method.

1. Tensile Strength, ASTM D5147:

    a. MD 160 lbf./in. XD 160 lbf./in., 2 in/min @ 73.4 +/- 3.6 deg. F.

2. Tear Strength, ASTM D5147:

    a. MD 200 lbf. XD 200 lbf., 2 in./min. @ 73.4 +/- 3.6 deg. F.

2.5 BASE FLASHING SHEET MATERIALS

A. Backer Sheet: ASTM D6162/D6162M, ASTM D6163/D6163M, or ASTM D6164/D6164M, Type III, Grade S, SBS-modified asphalt sheet, reinforced with a combination of polyester and/or fiberglass fabric, smooth surfaced; suitable for application method specified.

1. Tensile Strength, ASTM D5147:

    a. MD 340 lbf./in. XD 340 lbf./in., 2 in./min. @ 73.4 +/- 3.6 deg. F.

2. Tear Strength, ASTM D5147:

    a. MD 650 lbf. XD 650 lbf., 2 in./min. @ 73.4 +/- 3.6 deg. F.

B. Flashing Cap Sheet: ASTM D6754/D6754M, high-performance fabric reinforced fleece-backed thermoplastic membrane; suitable for application method specified and approved by roofing membrane manufacturer.

1. Thickness: 60 mils.
2. Exposed Face Color: White.

C. Glass-Fiber Fabric: Woven glass-fiber cloth, treated with asphalt, complying with ASTM D1668/D1668M, Type I.

D. Liquid Flashing System: Roof membrane manufacturer's standard one- or two-part moisture curing resin with low solvent content, consisting of a primer, flashing cement, and scrim.

2.6 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing manufacturer for intended use and compatible with roofing.

1. Adhesives and Sealants: Comply with VOC limits of authorities having jurisdiction.

B. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.

C. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

D. Flashing Cap Sheet Adhesive: Roofing manufacturer's recommended low-rise polyurethane foam adhesive specially formulated for compatibility and use with flashing applications.

E. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required by roofing system manufacturer for application.

F. Mastic Sealant: White, polyether, trowel grade, flashing mastic for cold-applied applications.

G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

H. Roofing Granules: Ceramic-coated roofing granules, No. 11 screen size with 100 percent passing No. 8 sieve and 98 percent of mass retained on No. 40 sieve; bright white color.

I. Flood Coat: highly reflective, aliphatic polyurea liquid-applied waterproofing membrane designed to maintain, restore, and upgrade the performance of existing membranes; suitable for application by squeegee and/or roller. For use in drains, scuppers, waterways, and bird bath areas.

J. Surface Coating: Liquid applied acrylic elastomer emulsion coating, formulated for use on bituminous roof surfaces and complying with ASTM D6083.

1. Color: White.

K. Miscellaneous Accessories: Provide those recommended by roofing system manufacturer.

2.7 ROOF INSULATION

A. Preformed insulation boards approved by roofing system manufacturer, selected from manufacturer’s standard sizes suitable for application.

B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 3, felt or glass-fiber mat facer on both major surfaces.

1. Thickness: **1.5 inches**.

C. Tapered Insulation: Provide factory-tapered insulation boards.

1. Material: ASTM C 1289, Type II, Class 1, Grade 3, felt or glass-fiber mat facer on both major surfaces.

2. Minimum Thickness: 1/4 inch.
3. Slope:

    a. Roof Field: 1/4 inch per foot unless otherwise indicated on Drawings.
    b. Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings. All saddle and cricket slopes shall be twice that of the roof field, if possible.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

## 2.8 INSULATION ACCESSORIES

A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer.

C. Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

D. Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

E. Cover Board: **ASTM C208, Type II, Grade 2, cellulosic-fiber insulation board, integral coated six sides, 1/2 inch thick.**

## 2.9 ASPHALT MATERIALS

A. Roofing Asphalt: ASTM D312/D312M, Type IV, low-odor.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation (if specified).
3. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
4. Any substrate found to be unsound shall be removed and replaced or repaired prior to the start of the roof installation.

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

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 ROOFING INSTALLATION, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions, SPRI's Directory of Roof Assemblies listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.

B. Complete terminations and base flashings, and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast.

1. Remove and discard temporary seals before beginning work on adjoining roofing.

C. Install roof membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition.

D. Asphalt Heating:

1. Heat asphalt to its equiviscous temperature, measured at the mop cart or mechanical spreader immediately before application.

a. For cap sheets, heat asphalt according to cap sheet manufacturer's recommendations.

2. Circulate asphalt during heating.
3. Do not raise asphalt temperature above equiviscous temperature range more than one hour before time of application.

a. For cap sheets, comply with cap sheet manufacturer's recommendations.

4. Do not exceed asphalt manufacturer's recommended temperature limits during asphalt heating.
5. Do not heat asphalt within 25 deg F of flash point.
6. Discard asphalt maintained at a temperature exceeding finished blowing temperature for more than four hours.
7. Apply hot roofing asphalt within plus or minus 25 deg F of equiviscous temperature.

a. For cap sheets, comply with cap sheet manufacturer's recommendations.

E. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.4 INSTALLATION OF INSULATION

A. Coordinate installing roofing system components, so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing system with vertical surfaces or angle changes greater than 45 degrees.

D. Installation Over Metal Decking:

1. Install base layer of insulation with end joints staggered not less than 12 inches in adjacent rows and with long joints continuous at right angle to flutes of decking.

    a. Locate end joints over crests of decking.
    b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    d. At internal roof drains, slope insulation to create a square drain sump, with each side equal to the diameter of the drain bowl plus 24 inches.

        1) Trim insulation, so that water flow is unrestricted.

    e. Fill gaps exceeding 1/4 inch with insulation.
    f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
    g. Mechanically attach base layer of insulation using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.

        1) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

2. Install upper layers of insulation and tapered insulation, with joints of each layer offset not less than 12 inches from previous layer of insulation.

    a. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
    b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    d. At internal roof drains, slope insulation to create a square drain sump, with each side equal to the diameter of the drain bowl plus 24 inches.

        1) Trim insulation, so that water flow is unrestricted.

    e. Fill gaps exceeding 1/4 inch with insulation.
    f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
    g. Mechanically attach each layer of insulation to substrate using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.

        1) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

E. Installation Over Wood Panel Decking:

1. Install base layer of insulation with end joints staggered not less than 12 inches in adjacent rows.

    a. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
    b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    d. At internal roof drains, slope insulation to create a square drain sump, with each side equal to the diameter of the drain bowl plus 24 inches.

        1) Trim insulation, so that water flow is unrestricted.

    e. Fill gaps exceeding 1/4 inch with insulation.
    f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
    g. Mechanically attach base layer of insulation using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to wood panel decks.

        1) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

2. Install upper layers of insulation and tapered insulation, with joints of each layer offset not less than 12 inches from previous layer of insulation.

    a. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
    b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    d. At internal roof drains, slope insulation to create a square drain sump, with each side equal to the diameter of the drain bowl plus 24 inches.

        1) Trim insulation, so that water flow is unrestricted.

    e. Fill gaps exceeding 1/4 inch with insulation.
    f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
    g. Mechanically attach each layer of insulation to substrate using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to wood panel decks.

        1) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

## 3.5 INSTALLATION OF COVER BOARDS

A. Install cover boards over insulation with long joints in continuous straight lines, with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.

1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
2. At internal roof drains, conform to slope of drain sump.

    a. Trim cover board, so that water flow is unrestricted.

3. Cut and fit cover board tight to nailers, projections, and penetrations.
4. Mechanically attach cover board using mechanical fasteners specifically designed and sized for fastening specified board-type cover board to wood panel decks.

    a. Fasten cover board to resist specified uplift pressure at corners, perimeter, and field of roof.

## 3.6 INSTALLATION OF ROOFING MEMBRANE, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."

B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

C. Where roof slope exceeds 3/4 inch per 12 inches, install roofing membrane sheets parallel with slope.

1. Backnail roofing sheets to nailer strips or substrate according to roofing system manufacturer's written instructions.

D. Coordinate installation of roofing system so insulation and other components of the roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

1. Provide tie-offs at end of each day's work to cover exposed roofing sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt, with joints and edges sealed.
2. Complete terminations and base flashings, and provide temporary seals to prevent water from entering completed sections of roofing system.
3. Remove and discard temporary seals before beginning work on adjoining roofing.

## 3.7 INSTALLATION OF BASE SHEET

A. Before installing, unroll base sheet, cut into workable lengths, and allow to lie flat for a time period recommended by manufacturer for the ambient temperature.

B. Installation of SBS-Modified Bitumen Polyester and Fiberglass-Mat Base Sheet:

1. Install base sheet according to roofing manufacturer's written instructions, starting at low point of roofing system.
2. Extend roofing sheets over and terminate above cants.
3. Install base sheet in a shingle fashion.
4. Adhere to substrate in a solid mopping of hot roofing asphalt.
5. Install base sheet without wrinkles, tears, and free from air pockets.
6. Laps: Accurately align roofing sheets, without stretching, and maintain uniform side and end laps.

a. Lap side laps as recommended by roof membrane manufacturer but not less than 4 inches
b. Lap end laps as recommended by roof membrane manufacturer but not less than 8 inches.
c. Stagger end laps not less than 36 inches.
d. Completely bond and seal laps, leaving no voids.
e. Roll laps with a 20-pound roller.

7. Repair tears and voids in laps and lapped seams not completely sealed.
8. Apply pressure to the body of the base sheet according to manufacturer's instructions, to remove air pockets and to result in complete adhesion of base sheet to substrate.

## 3.8 INSTALLATION OF SBS-MODIFIED BITUMINOUS CAP SHEET

A. Before installing, unroll cap sheet, cut into workable lengths, and allow to lie flat for a time period recommended by manufacturer for the ambient temperature at which cap sheet will be installed.

B. Install modified bituminous roofing cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system.

1. Extend cap sheet over and terminate above cants.
2. Install cap sheet in a shingle fashion.
3. Install cap sheet as follows:

a. Adhere to substrate in a solid mopping of hot roofing asphalt applied at asphalt temperature recommended by cap sheet manufacturer.

4. Install base sheet without wrinkles, tears, and free from air pockets.
5. Install cap sheet, so side and end laps shed water.

C. Laps: Accurately align roofing sheets, without stretching, and maintain uniform side and end laps.

1. Lap side laps as recommended by roof membrane manufacturer but not less than 4 inches.
2. Lap end laps as recommended by roof membrane manufacturer but not less than 8 inches.
3. Stagger end laps not less than 36 inches.
4. Completely bond and seal laps, leaving no voids.
5. Roll laps with a 20-pound roller.
6. Repair tears and voids in laps and lapped seams not completely sealed.

D. Apply pressure to the body of the cap sheet according to manufacturer's instructions, to remove air pockets and to result in complete adhesion of base sheet to substrate.

E. Apply roofing granules of same color as roof membrane to cover exuded bead at laps while bead is hot, to provide a continuous color appearance.

F. Flood Coat:

1. Flood coat a 4-foot by 6-foot area around all drains, scuppers, and waterways, and 3-foot wide area around roof hatches as recommended by roofing manufacturer; flood coat bird bath areas if discovered.

2. Install after cap sheets and modified flashing, tests, repairs and corrective actions have been completed and approved.
3. All laps in area to be coated shall receive a 45-degree troweling of manufacturer's approved sealant to prevent the liquid membrane from self-leveling off the vertical lap edge. Apply base coat at a rate of 2 gallons/square. Broadcast dry, bright white marble chip roof granules into wet coating and immediately back-roll to set. After base coat cures, but no more than 72 hours later, apply second coat at a rate of 1 gallon/square to clean and dry base coat.

G. Surface Coatings: Apply coating according to manufacturer's written instructions, by spray, roller, or other suitable application method.

## 3.9 INSTALLATION OF FLASHING AND STRIPPING

A. Install base flashing over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:

1. Prime substrates with asphalt primer if required by roofing system manufacturer.
2. Backer-Sheet Application:

    a. Adhere backer sheet to substrate in a solid mopping of hot roofing asphalt.
    b. Seal all laps.

3. Flashing Sheet Application:

    a. Adhere flashing sheet to substrate in a solid mopping of hot roofing asphalt applied at asphalt temperature recommended by flashing sheet manufacturer. Apply hot roofing asphalt to back of flashing sheet if recommended by roofing system manufacturer.
    b. At walls higher than 30", adhere flashing sheet to substrate in low-rise polyurethane foam adhesive at rate required by roofing system manufacturer.

B. Extend base flashing up walls or parapets a minimum of 8 inches above roofing membrane and 4 inches onto field of roofing membrane.

C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing at a rate given by roofing system manufacturer.

1. Seal top termination of base flashing with a strip of glass-fiber fabric set in asphalt roofing cement over a metal termination bar.
2. Termination Bar: Provide a metal termination bar or approved top edge securement at the terminus of all flashing sheets at walls and curbs. Fasten the bar a minimum of 8 inches o.c. to achieve constant compression. Provide suitable, sealant at the top edge if required.

D. Install liquid flashing system according to manufacturer's recommendations.

1. Extend liquid flashing not less than 3 inches in all directions from edges of item being flashed.
2. Embed granules, matching color of roof membrane, into wet compound.

E. Install roofing cap-sheet stripping where metal flanges and edgings are set on roofing according to roofing system manufacturer's written instructions.

F. Roof Drains: Set 30-by-30-inch 4-pound lead flashing in bed of asphaltic adhesive on completed roofing membrane.

1. Cover lead flashing with roofing cap-sheet stripping, and extend a minimum of 4 inches beyond edge of metal flashing onto field of roofing membrane.
2. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.
3. Install stripping according to roofing system manufacturer's written instructions.

## 3.10 FIELD QUALITY CONTROL

A. Inspection: Provide manufacturer's field observations no less than once per week.

1. Warranty shall be issued upon manufacturer's acceptance of the installation.
2. Field observations shall be performed by a Technical Representative employed full-time by the manufacturer and whose primary job description is to assist, inspect and approve membrane installations for the manufacturer.
3. Provide observation reports from the Technical Representative indicating procedures followed, weather conditions and any discrepancies found during inspection.
4. Provide a final report from the Technical Representative, certifying that the roofing system has been satisfactorily installed according to the project specifications, approved details and good general roofing practice.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

1. Notify Architect and Owner 48 hours in advance of date and time of inspection.
2. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.
3. Repair or replace deteriorated or defective work found at time above inspection as required to a produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
4. Notify the Owner and Architect upon completion of corrections.
5. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.

C. Roofing system will be considered defective if it does not pass inspections.

1. Additional inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

## 3.11 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period.

1. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION