SECTION 01 11 00

SUMMARY OF WORK

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including the Conditions of the Contract and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

A. Section includes removal and disposal of the existing roofing systems, coping, insulation, flashings, and all construction related debris. Installation of the new roofing systems as specified with all applicable details for a complete watertight warrantied roofing assembly per the manufacturers instructions.

B. Materials specified in section 01 64 00 Owner Furnished Contractor Installed (O.F.C.I.) will be the responsibility of the contractor to receive, store, protect, and maintain in good condition throughout the course of the project.

C. Related Work Specified Elsewhere:

1. Section 01 - Owner Furnished Contractor Installed
2. Section 06 - Rough Carpentry
3. Section 07: Modified Built-up Roofing
4. Section 07: Asphalt Shingles
5. Section 07: Roofing Restoration
6. Section 07: Sheet Metal Flashing and Trim
7. Section 09: Painting

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Dixieland & La Vina Elementary School Re-Roofing Project

B. Project Location: Dixieland Elementary School 18440 Rd 19, Madera, CA 93637

C. Project Location: La Vina Elementary School 8594 Rd 23, Madera, CA 93637

D. Owner: Madera United School District 1205 Madera Ave. Madera, CA 93637

E. General scope of work but not limited to;

1. <u>Dixieland Elementary School -</u>
2. Includes removal and disposal of existing roofing system(s), insulation board, gutters, flashings, copings, etc. for a complete prepared roof surface.
3. Includes two hundred (200) square feet of decking replacement included in the base bid price. A per square foot price will be inserted into the bid form for anything needed and approved by the district over 200 square feet. Before and after photos of all dryrot replacement must be submitted with billing as justification, payment will not be made without proper documentation.
4. <u>Buildings B & C1 -</u>

5. Install one layer of rosin over the entire roof deck.

6. Install one layer of ½" wood fiber insulation board with screws and plates as specified per the ASCE 7-10 wind uplift requirements.

7. Install one layer of Stressbase 80 ply sheet in Weatherking Plus WC adhesive. Cut all T-joint corners at a 45 degree angle.

8. Install all new 4lb lead flashings at pipe penetrations. Install a factory lead cap counter flashing at all penetrations except those connected. Install at all connected penetrations a 4lb lead collar counter flashing, band, flare the top out, seal with Tuff Stuff sealant.

9. Install one layer of Stressply Plus FR Mineral cap sheet in Weatherking Plus WC adhesive. Cut all T-joint corners at a 45 degree angle.

10. Three course all base flashing laps, corners, etc. and add granules into the fresh mastic.

11. Attach all base flashing at 9" on center and three course the top of all base flashings prior to installation of skirt/counter flashing.

12. Install Garla Flex mastic at all gravel stop locations along the entire edge, allow to cure prior to installation of the roof coating.

13. Install Pyramic acrylic coating in two coats at 1.5 gal per sq per coat for a total of 3 gallons per square. Back roll both the base coat and top coat for complete adhesion, coverage, and mil thickness. Top coat is to be applied in a cross hatch pattern. Additional coats may be required for proper coverage.

14. Install new 24 gauge galvanized coping metal with internal butt plates and 22 gauge continuous cleat at all existing locations. Fasten coping at 18" on center on the internal leg. Continuous cleat is to be raised 1/2" at the outside edge to drain to the interior.

15. Install new 24 gauge surface mount counter flashing, install butyl tape between the surface mount and the wall prior to installation, fasten at 18" on center.

16. Install new PVC condensate lines from all HVAC units to the roof drains or condensate drain. Install new wood or rubber blocking at 6' on center to support the new condensate line.

17. Install walk pads from all roof access points to and around all mechanical equipment. Walk pads are to be installed after the white roof coating is installed and cured.

18. Prime & paint all galvanized sheet metal items, color to be chosen by the district.

19. <u>Buildings A & C -</u>

20. Install one layer of R-Mer Seal self adhering underlayment over the entire roof surface.

21. Install 24 gauge galvanized edge metal and strip in with one layer of R-Mer Seal self adhering underlayment.

22. Install new 24 gauge galvanized sheet metal gutter and downspouts at all existing locations. Install downspout screens at all downspout locations.

23. Install all new 4lb lead flashings at pipe penetrations. Install a factory lead cap counter flashing at all penetrations except those connected. Install at all connected penetrations a 4lb lead collar counter flashing, band, flare the top out, seal with Tuff Stuff sealant.

24. Install roof vents & roof jacks at all locations, do not re-use sheet metal vents.

25. Install a new composition shingle roofing system per all manufacturers instructions.

26. Install 2x4 wood blocking with a 24 gauge sheet metal cover and and flange to be roofed in for antenna supports. Strip in wood blocks with self adhering underlayment prior to installing the new sheet metal cover.

27. LaVina Elementary School -

28. Buildings A, B, C, D, & E -

29. Includes removal and disposal of existing roofing system(s), insulation board, gutters, flashings, copings, etc. for a complete prepared roof surface.

30. Includes two hundred (200) square feet of decking replacement included in the base bid price. A per square foot price will be inserted into the bid form for anything needed and approved by the district over 200 square feet. Before and after photos of all dryrot replacement must be submitted with billing as justification, payment will not be made without proper documentation.

31. Install one layer of R-Mer Seal self adhering underlayment over the entire roof surface.

32. Install 24 gauge galvanized edge metal and strip in with one layer of R-Mer Seal self adhering underlayment.

33. Install new 24 gauge galvanized sheet metal gutter and downspouts at all existing locations. Install downspout screens at all downspout locations.

34. Install all new 4lb lead flashings at pipe penetrations. Install a factory lead cap counter flashing at all penetrations except those connected. Install at all connected penetrations a 4lb lead collar counter flashing, band, flare the top out, seal with Tuff Stuff sealant.

35. Install roof vents & roof jacks at all locations, do not re-use sheet metal vents.

36. Install a new composition shingle roofing system per all manufacturers instructions.

37. HVAC units - Install new 24 gauge galvanized duct work roof jacks, new 24 gauge galvanized front and rear saddles with incorporated cricket in the rear saddle (not riveted), & new 24 gauge step flashing. Reseal all duct work connections with uni bond tape and white knight urethane coating.

38. Install 2x4 wood blocking with a 24 gauge sheet metal cover and and flange to be roofed in for antenna supports. Strip in wood blocks with self adhering underlayment prior to installing the new sheet metal cover.

39. Buildings C-1 & Walkways -

40. Includes cleaning and preparation for a complete prepared roof surface to receive a fluid applied restoration system as specified.

41. Pressure wash the existing roof surface, penetrations, HVAC units, and properly handle the water run off per all local and state regulations. Allow to dry properly prior to additional work.

42. Seal all penetrations with Flashing Bond roof mastic. Three course any splits or blisters in the existing roof with Flashing Bond mastic & Garmesh.

43. Cut the existing roofing system back from the gravelstop edge 2”, scrape all loose asphalt and debris for a clean surface. Prime the metal and 6” back onto the existing roofing surface with Garla-Prime WB VOC and allow to completely dry. Install one layer of Flashing Bond mastic, apply one layer of Garmesh 6” reinforcement, apply one more layer of Flashing Bond mastic.

44. Prime the entire roof surface at a rate of ½ gallon per square, cover within 48 hours.

45. Install Energizer K Plus FR at a rate of 3 gallons per square, embed polyester, install another coat of Energizer K Plus FR at a rate of 3 gallons per square, then embed 40 lbs per square of white roofing granules. This scope is to be done all in one pass and cannot be phased.

46. Allow to cure 30-45 day, remove all loose roofing granules then apply Pyramic acrylic base coat at a rate of 1.5 gallons per square, allow to cure then apply Pyramic top coat at a rate of 1.5 gallons per square.

47. Install new wood blocking with Apoc or Meadows walkway pad protection at all gas, electrical, and water lines a minimum of 10' apart or as needed for proper support.

48. Install 3'x4' walk pad Apoc, Meadows or equal to all filter access areas at each mechanical unit.

49. Install all new PVC condensate lines with blocking at all HVAC units and direct to a proper location to not disrupt operations underneath.

1.4 WORK COMPLETED BY THE DISTRICT

A. No work will be completed by the district.

1.5 TYPE OF CONTRACT

A. Work will be completed under a single prime contract.

1.6 USE OF PREMISES

A. General: Contractor will have limited use of premises for construction operations.

B. Use of site: Limit use of premises to work areas required. Do not disturb portions of the project site beyond areas in which the work is indicated.

C. The building interior is off limits to the contractor. All access shall be from the exterior.

D. The point of exterior access must be approved by the owner.

E. Entrances: Keep all entrances serving the building clear and available to the owner, owner's employees, and emergency vehicles.

F. Use of existing building: Maintain existing building in a weather tight condition throughout the construction period. Repair damage caused by construction operations. Protect building and occupants during construction.

G. Vehicle Parking: Contractor parking is available on site and will need to be approved by the owner.

H. Assume full responsibility for protection and safekeeping of materials stored on premises. Coordinate the location of materials and equipment to be stored on premises. Provide barricades, barriers, and enclosures as required to ensure safety.

1.7 OWNERS OCCUPANCY REQUIREMENTS

A. The owner will occupy the building during the entire construction phase. Cooperate with the owner during construction operations to minimize owner conflicts and facilitate owner usage. Perform the work as to not interfere with owners operations.

B. A minimum of 72 hours notice is needed for all activities that will affect the owners operations.

1.8 WORK RESTRICTIONS

A. On site work hours: Work shall generally be performed from the hours of 7:00 am – 5:00 pm Monday through Friday except as otherwise indicated or approved by the owner.

1. Weekend hours, early morning hours, utility shut down, and noisy activity requires owner's authorization a minimum of 72 hours in advance.

1.9 UNIT PRICES

A. The following unit prices will be used to add or deduct from the total contract amount.

a. Unit-1 Replacement of dryrot wood roof decking, add a line items per square foot cost to proposal form.

b. Unit-2 Replacement of dryrot wood fascia board, add a line item per square foot cost to proposal form.

1.10 SCHEDULE OF ALTERNATES

A. No alternates have been identified for this project.

1.11 PROJECT CONDITIONS

A. Proceed with roofing work only when existing and forecasted weather conditions will permit a unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements.

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

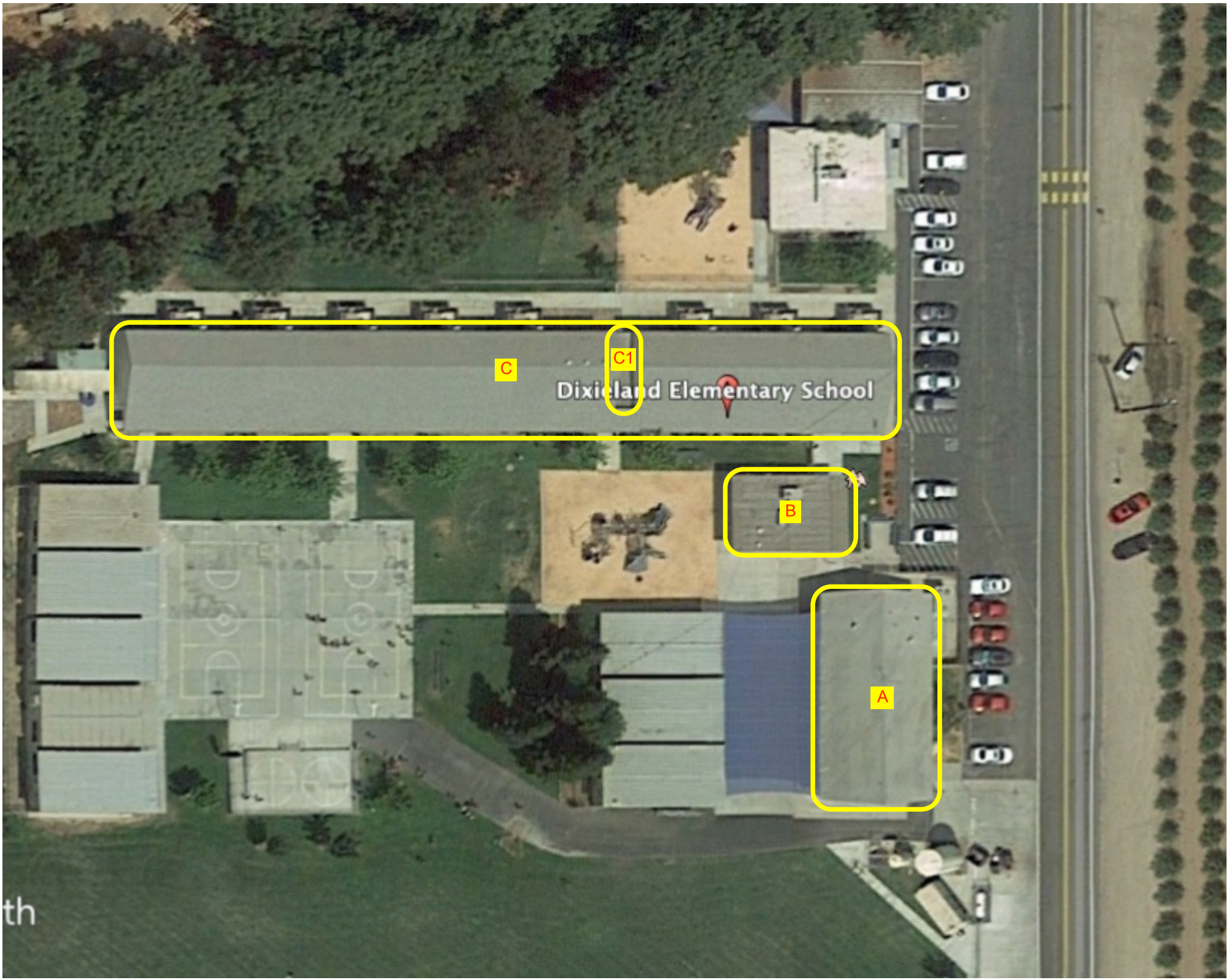
C. Do not expose materials subject to water or solar damage in quantities greater than can be weatherproofed during same day.

1.12 SEQUENCING AND SCHEDULING

A. Sequence installation of roofing with related units of work specified in other sections to ensure that roof assemblies, including roof accessories, flashing, trim and joint sealers, are protected against damage from effects of weather, corrosion and adjacent construction activity.

B. Complete all roofing field assembly work each day. Phased construction will not be accepted.

END OF SECTION 01 11 00 – SUMMARY OF WORK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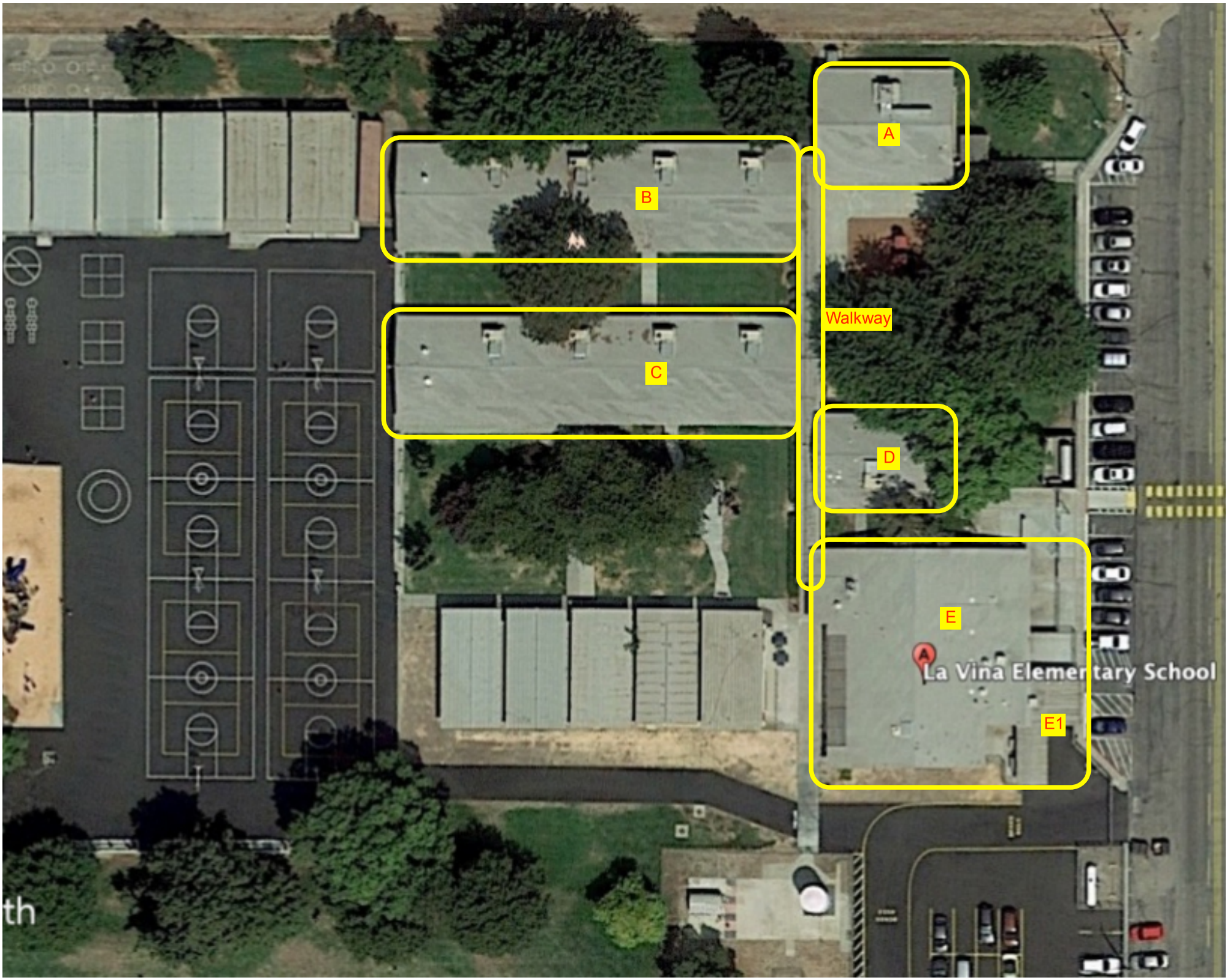
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E
E1
Walkway
La Vina Elementary School

Hazard Management Services
SINCE 1984

FRESNO OFFICE * 371 E BULLARD AVENUE SUITE 109 * FRESNO CA 93710
PHONE (559) 436-0277 * FAX (559) 436-0279 * WWW.HAZMANAGE.COM

January 11, 2016

Mr. Curtis Manganaan
Director of Maintenance and Operations
Madera Unified School District
1205 Madera Avenue
Madera, CA 93637

Limited Asbestos Survey for Roof Upgrades
Dixieland Elementary School
Buildings A, B, C and C-1
HMS Project No. F15186

Dear Mr. Manganaan:

This letter reports the results of the limited survey for asbestos-containing materials (ACM) performed on December 14, 2015, by Hazard Management Services, Inc. (HMS, Inc.) at the site referenced above. This survey was conducted at the district's request to identify asbestos-containing materials that may be disturbed during a re-roof project which will occur at this site. The survey was limited to sampling roofing materials on buildings which were identified by the district. (See attached bulk sample location map.)

The survey was performed by Fred Tarazon, who is an EPA accredited building inspector, under the supervision of Harry Stevens, a Cal/OSHA certified asbestos consultant. There were several building materials observed which are considered "suspect" under US EPA guidelines. Under current US EPA guidelines for conducting building inspections for ACM, all "suspect" building materials must be **assumed** to contain asbestos until otherwise determined by laboratory testing. A complete list of suspect materials in each building or group of buildings, which were discovered, sampled, and included in this survey are included in the following appendices.

INSPECTION PROTOCOL

The following inspection process was followed by HMS, Inc. at the above referenced site:

The roofs were accessible to the inspector.

The roofs were visually inspected for suspect materials.

Representative bulk samples of each suspect material were collected using a scraper, chisel, or power drill. Sample locations are indicated on the bulk sample chain of custody form included with this report. The samples were analyzed using polarized light microscopy with dispersion staining (PLM) by Forensic Analytical in Hayward, CA, a NVLAP accredited laboratory.

If any materials other than those included in this report are discovered which will be disturbed during the modernization, it must be assumed that those materials contain asbestos and the project should then be halted and re-evaluated.

BULK SAMPLES

HMS, Inc. collected eighteen (18) bulk samples of suspect materials identified at the site. See the attached appendices and laboratory reports for specific analysis information.

Hazard Management Services

US EPA, Cal/OSHA, & CSLB COMPLIANCE

US EPA

The US EPA NESHAP (40 CFR Part 61 - Nov. 20, 1990) requires materials containing greater than one percent asbestos be removed prior to renovation or demolition of a regulated building, if those materials are friable or likely to become friable due to the forces expected to act upon them during renovation or demolition. In California there are "delegated" counties which enforce the NESHAP regulations, and may have regulations more restrictive than the US EPA.

A 10 day waiting period is also required following demolition notification to the US EPA, regardless of the presence or absence of asbestos.

Cal/OSHA

Cal/OSHA worker health and safety regulations apply during any disturbance of ACM by a person while in the employ of another. This is true **regardless of friability or quantity disturbed**. If there is greater than 100 square feet of asbestos which will be affected by the demolition/renovation, a California Licensed Contractor who is registered with Cal/OSHA for asbestos is required. The regulations regarding asbestos are found in Title 8 CCR Section 1529, and also include formal notification requirements to Cal/OSHA at least 24 hours prior to removal.

Contractors State Licensing Board (CSLB)

Pursuant to current CSLB requirements, remediation contractors must carry each specific trade classification license for the materials and systems they will disturb, or carry the B General Contractor's license if they will disturb two or more trade areas. CSLB Asbestos certification is also required with either of these two options. The CSLB has recently added a third license option: effective January 1, 2015, contractors may obtain the C-22 asbestos abatement trade license in lieu of the former options. The C-22 license is an additional option for contractor compliance - it does not replace the previous framework. As noted above, DOSH registration for asbestos related work is required along with any of the CSLB licensing options.

DISCLAIMERS

The nature of renovation is such that materials can be uncovered which previously were unknown to exist. Therefore, HMS, Inc. cannot be responsible for "hidden materials", although every effort was made during the inspection to detect all suspect materials. If any materials other than those included herein are discovered during renovation or demolition, it must be assumed that the materials are asbestos-containing, and the project should then be halted and re-evaluated.

If you have any questions regarding this report, please contact our Fresno office at (559) 436-0277.

Sincerely,

Fred Tarazon
Project Manager

Reviewed by: Harry Stevens, CAC 95-1624
General Manager

Hazard Management Services

APPENDIX A

LIMITED ASBESTOS SURVEY FOR ROOF UPGRADE
DIXIELAND ELEMENTARY SCHOOL
HMS Project No. F15186

Survey Date: December 14, 2015

BUILDING DESCRIPTION

At Dixieland Elementary School, the roof on building A, consist of asphalt shingles with felt. Grey and black penetrations mastics and sealants were used sporadically on these roofs. See attached map for building designations

BULK SAMPLE RESULTS

Suspect materials that are expected to be disturbed during the planned roof upgrades were identified and were sampled and analyzed for asbestos content. The following suspect materials were identified on the roofs of Building A:

Shingled Roofing felt and tar
Roof Mastic (various)
Roof sealants (various)

Only materials found to contain asbestos are listed in the table below. All other sampled materials were found not to contain asbestos. Samples were analyzed using polarized light microscopy (PLM) with dispersion staining to estimate the percent of asbestos.

Material Description	*Material Location(s)*	*Asbestos Content*	*NESHAP Category* [1]
Roof mastic	Building A	10% Chrysotile	Category I Non-friable
Roof sealant	Building A	10% Chrysotile	Category I Non-friable

Asbestos-containing materials are categorized in accordance with National Emissions Standard for Hazardous Air Pollutants as Regulated Asbestos Containing Material (RACM), Category I Non-friable, or Category II Non-friable.

If any materials that are not listed above are discovered and may be disturbed during planned work, those materials must be assumed to contain asbestos or sampled and analyzed to determine asbestos content and handled accordingly.

Written by: Fred Tarazon, Project Manager

Date: January 11, 2016

Reviewed by: Harry Stevens, CAC 95-1624
General Manager

Date: January 11, 2016

Hazard Management Services

APPENDIX B

LIMITED ASBESTOS SURVEY FOR ROOF UPGRADE
DIXIELAND ELEMENTARY SCHOOL
HMS Project No. F15186

Survey Date: December 14, 2015

BUILDING DESCRIPTION

At Dixieland Elementary School, the roof on building B consist of composition rolled roofing with felt. Grey and black penetrations mastics and sealants were used sporadically on these roofs. See attached map for building designations

BULK SAMPLE RESULTS

Suspect materials that are expected to be disturbed during the planned roof upgrades were identified and were sampled and analyzed for asbestos content. The following suspect materials were identified on the roof of Building B:

Composition built-up roofing
Roof Mastic (various)
Roof sealants (various)

Only materials found to contain asbestos are listed in the table below. All other sampled materials were found not to contain asbestos. Samples were analyzed using polarized light microscopy (PLM) with dispersion staining to estimate the percent of asbestos.

Material Description	*Material Location(s)*	*Asbestos Content*	*NESHAP Category* [1]
Roof mastic	Building B	10% Chrysotile	Category I Non-friable

Asbestos-containing materials are categorized in accordance with National Emissions Standard for Hazardous Air Pollutants as Regulated Asbestos Containing Material (RACM), Category I Non-friable, or Category II Non-friable.

If any materials that are not listed above are discovered and may be disturbed during planned work, those materials must be assumed to contain asbestos or sampled and analyzed to determine asbestos content and handled accordingly.

Written by: Fred Tarazon, Project Manager

Date: January 11, 2016

Reviewed by: Harry Stevens, CAC 95-1624
General Manager

Date: January 11, 2016

Hazard Management Services

APPENDIX C

LIMITED ASBESTOS SURVEY FOR ROOF UPGRADE
DIXIELAND ELEMENTARY SCHOOL
HMS Project No. F15186

Survey Date: December 14, 2015

BUILDING DESCRIPTION

At Dixieland Elementary School, the roof on building C consist of asphalt shingles with felt, Building C has a roof well that is identified as C-1 on school map. The roof on C-1 is a composition rolled roofing with felt. Grey and black penetrations mastics and sealants were used sporadically on these roofs. See attached map for building designations

BULK SAMPLE RESULTS

Suspect materials that are expected to be disturbed during the planned roof upgrades were identified and were sampled and analyzed for asbestos content. The following suspect materials were identified on the roofs of Building C and C-1:

Shingled Roofing felt and tar
Roof sealants (various)
Composition built-up roofing
Roof Mastic (various)

Only materials found to contain asbestos are listed in the table below. All other sampled materials were found not to contain asbestos. Samples were analyzed using polarized light microscopy (PLM) with dispersion staining to estimate the percent of asbestos.

Material Description	*Material Location(s)*	*Asbestos Content*	*NESHAP Category* [1]
Roof mastic (black)	Building C-1	10% Chrysotile	Category I Non-friable
Roof mastic (black)	Building C-1	10% chrysotile	Category I Non-friable

Asbestos-containing materials are categorized in accordance with National Emissions Standard for Hazardous Air Pollutants as Regulated Asbestos Containing Material (RACM), Category I Non-friable, or Category II Non-friable.

If any materials that are not listed above are discovered and may be disturbed during planned work, those materials must be assumed to contain asbestos or sampled and analyzed to determine asbestos content and handled accordingly.

Written by: Fred Tarazon, Project Manager

Date: January 11, 2016

Reviewed by: Harry Stevens, CAC 95-1624
General Manager

Date: January 11, 2016

HMS Hazard Management Services

BULK MATERIAL Analysis Request Form for Hazard Management Services, Inc.

P.O. BOX 576848
MODESTO, CA 95357-6848
(209) 551-2000
FAX (209) 551-2005

371 E. BULLARD AVE. STE 109
FRESNO, CA 93710
(559) 436-0277
FAX (559) 436-0279

2124 F STREET, #C
BAKERSFIELD, CA 93301
(661) 636-0351
FAX (661) 636-0361

☐ ☒ ☐

Date: 15 December 2015

Special Instructions:

Collected By: Fred Tarazon

Date Collected: December 14, 2015

Job J.D.: F15186 Madera Unified S.D.

Job Site: Dixieland E. S.

Contact: H. Stevens

Bill: HMS, Inc.

Analysis Requested:

X **PLM with Dispersion Staining**

__ **2 hr.** X **24 hr.** __ **48 hr.** __ **Extended**

__ **AA Flame**

__ **TEM Bulk (5 Day)**

Laboratory: FALI

EMAIL RESULTS TO: hstevens@hazmanage.com and ftarazon@hazmanage.com and dspyle@hazmanage.com

SAMPLE #	RESULTS	MATERIAL DESCRIPTION/LOCATION
HMS MUSD DES F15186 01A		Shingle roof w/underlayment Building: A, Roof: South East Corner
HMS MUSD DES F15186 01B		Shingle roof w/underlayment Building: A, Roof: East side South of Center
HMS MUSD DES F15186 01C		Shingle roof w/underlayment Building: A, Roof: Centerline at Center
HMS MUSD DES F15186 01D		Shingle roof w/underlayment Building: A, Roof: West side North of Center
HMS MUSD DES F15186 01E		Shingle roof w/underlayment Building: A, Roof: Northwest Corner
HMS MUSD DES F15186 02A		Sealant (Grey) Building: A, Roof: Centerline at Antenna base
HMS MUSD DES F15186 03A		Sealant (White) Building: A, Roof: Centerline at Antenna base
HMS MUSD DES F15186 04A		Mastic (Black) Building: A, Roof Vent: East side North of Center at power switch
HMS MUSD DES F15186 05A		Sealant (Grey) Building: A, Roof: West side Near North edge at Center at Vent

Submitted By: [signature] **Date:** 15 DEC 15

Received By: [signature] **Date:** DEC 17 2015

RECEIVED

Hazard Management Services

BULK MATERIAL Analysis Request Form for Hazard Management Services, Inc.

P.O. BOX 576848
MODESTO, CA 95357-6848
(209) 551-2000
FAX (209) 551-2005

371 E. BULLARD AVE. STE 109
FRESNO, CA 93710
(559) 436-0277
FAX (559) 436-0279

2124 F STREET, #C
BAKERSFIELD, CA 93301
(661) 636-0351.
FAX (661) 636-0361

Date: 15 December 2015

Special Instructions:

Collected By: Fred Tarazon

Date Collected: December 14, 2015

Job I.D.: F15186 Madera Unified S.D.

Job Site: Dixieland E. S.

Contact: H. Stevens

Bill: HMS, Inc.

Analysis Requested:

X PLM with Dispersion Staining

___ 2 hr. X 24 hr. ___ 48 hr. ___ Extended

___ AA Flame

___ TEM Bulk (5 Day)

Laboratory: FALI

EMAIL RESULTS TO: hstevens@hazmanage.com and ftarazon@hazmanage.com and dspyle@hazmanage.com

SAMPLE #	RESULTS	MATERIAL DESCRIPTION/LOCATION
HMS MUSD DES F15186 06A		Roll Composition roofing with mastic and underlayment
		Building: B, Roof: Northeast Corner
HMS MUSD DES F15186 06B		Roll Composition roofing with mastic and underlayment
		Building: B, Roof: Centerline at center
HMS MUSD DES F15186 06C		Roll Composition roofing with mastic and underlayment
		Building: B, Roof: West side North of Center
HMS MUSD DES F15186 06D		Roll Composition roofing with mastic and underlayment
		Building: B, Roof: Southwest Corner
HMS MUSD DES F15186 07A		Silver tape
		Building: B, Roof: Center at HVAC ducting
HMS MUSD DES F15186 08A		Sealant (White)
		Building: B, Roof: Center at South end of HVAC unit (AC-1)
HMS MUSD DES F15186 09A		Penetration Sealant (White)
		Building: B, Roof: Center at west side of HVAC at electrical conduit
HMS MUSD DES F15186 10A		Penetration Sealant (Silver)
		Building: B, Roof: Northwest side of HVAC at junction box
HMS MUSD DES F15186 11A		Penetration Sealant (White)
		Building: B, Roof: West side at Center at Antenna base
HMS MUSD DES F15186 12A		Penetration Mastic (Grey)
		Building: B, Roof: West side South end at Vent

Submitted By: _____ Date: 15 DEC 15

Received By: _____ Date: _____

RECEIVED DEC 17

Hazard Management Services

BULK MATERIAL Analysis Request Form for Hazard Management Services, Inc.

P.O. BOX 576848
MODESTO, CA 95357-6848
(209) 551-2000
FAX (209) 551-2005

371 E. BULLARD AVE. STE 109
FRESNO, CA 93710
(559) 436-0277
FAX (559) 436-0279

2124 F STREET, #C
BAKERSFIELD, CA 93301
(661) 636-0351
FAX (661) 636-0361

☐ ☒ ☐

Date: 15 December 2015

Special Instructions:

Collected By: Fred Tarazon

Date Collected: December 14, 2015

Job I.D.: F15186 Madera Unified S.D.

Job Site: Dixieland E. S.

Contact: H. Stevens

Bill: HMS, Inc.

Analysis Requested:

X **PLM with Dispersion Staining**

__ **2 hr.** X **24 hr.** __ **48 hr.** __ **Extended**

__ **AA Flame**

__ **TEM Bulk (5 Day)**

Laboratory: FALI

EMAIL RESULTS TO: hstevens@hazmanage.com and ftarazon@hazmanage.com and dspyle@hazmanage.com

SAMPLE #	RESULTS	MATERIAL DESCRIPTION/LOCATION
HMS MUSD DES F15186 13A		Mastic (Black)
		Building: B, Roof: Center at PVC line Footers
HMS MUSD DES F15186 14A		Shingle roof w/underlayment
		Building: C, Roof: Southeast Corner of East wing
HMS MUSD DES F15186 14B		Shingle roof w/underlayment
		Building: C, Roof: Centerline at Center of East wing
HMS MUSD DES F15186 14C		Shingle roof w/underlayment
		Building: C, Roof: Northwest Corner of East wing
HMS MUSD DES F15186 14D		Shingle roof w/underlayment
		Building: C, Roof: Southeast Corner of West wing
HMS MUSD DES F15186 14E		Shingle roof w/underlayment
		Building: C, Roof: Centerline at Center of West wing
HMS MUSD DES F15186 15A		Roll Composition roofing with mastic and underlayment
		Building: C-1, Roof well: North end at Center
HMS MUSD DES F15186 15B		Roll Composition roofing with mastic and underlayment
		Building: C-1, Roof well: South of Center
HMS MUSD DES F15186 16A		Silver tape
		Building: C, Roof: North side West end of East wing at edge
HMS MUSD DES F15186 17A		Penetration Sealant (Black)
		Building: C, Roof: North Side East end of West wing at edge

Submitted By: [signature] **Date:** 15 Dec

Received By: [signature] **Date:**

RECEIVED DEC 17 2015

Hazard Management Services

18

BULK MATERIAL Analysis Request Form for Hazard Management Services, Inc.

P.O. BOX 576848
MODESTO, CA 95357-6848
(209) 551-2000
FAX (209) 551-2005

371 E. BULLARD AVE. STE 109
FRESNO, CA 93710
(559) 436-0277
FAX (559) 436-0279

2124 F STREET, #C
BAKERSFIELD, CA 93301
(661) 636-0351
FAX (661) 636-0361

Date: 15 December 2015

Special Instructions:

Collected By: Fred Tarazon

Date Collected: December 14, 2015

Job I.D.: F15186 Madera Unified S.D.

Job Site: Dixieland E. S.

Contact: H. Stevens

Bill: HMS, Inc.

Analysis Requested:

X PLM with Dispersion Staining

___ 2 hr. X 24 hr. ___ 48 hr. ___ Extended

___ AA Flame

___ TEM Bulk (5 Day)

Laboratory: FALI

EMAIL RESULTS TO: hstevens@hazmanage.com and ftarazon@hazmanage.com and dspyle@hazmanage.com

SAMPLE #	RESULTS	MATERIAL DESCRIPTION/LOCATION
HMS MUSD DES F15186 18A		Mastic (Black)
		Building: C-1, Roof well: Northwest corner of roof well
HMS MUSD DES F15186 19A		Sealant (Blak)
		Building: C-1, Roof well: Northwest corner of roof well
HMS MUSD DES F15186 20A		Mastic (Black)
		Building: C-1, Roof well: North center at lower flashing of roof well
HMS MUSD DES F15186 21A		Penetration Sealant (Black)
		Building: C-1, Roof well: South of center at lower flashing of roof well
HMS MUSD DES F15186 22A		Mastic (Black)
		Building: C-1, Roof well: South side center of roof well at wall
HMS MUSD DES F15186 23A		Penetration Sealant (Grey)
		Building: C, Roof: Center at roof well opening

Submitted By: [signature] Date: 15 Dec 15

Received By: [signature] Date:

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Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Hazard Mgmt. Services
Harry Stevens
Fresno Location
371 E. Bullard Ave., Ste. 109
Fresno, CA 93710

Client ID: 1636
Report Number: B214411
Date Received: 12/17/15
Date Analyzed: 12/18/15
Date Printed: 12/18/15
First Reported: 12/18/15

Job ID/Site: F15186 - Madera Unified S.D., Dixieland E.S.

Date(s) Collected: 12/14/2015

FALI Job ID: 1636
Total Samples Submitted: 35
Total Samples Analyzed: 35

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
HMS-MUSD-DES-F15186-01A	11714224						
Layer: Grey Roof Shingle			**ND**				
Layer: Grey Roof Shingle			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (15 %) Fibrous Glass (15 %)							
HMS-MUSD-DES-F15186-01B	11714225						
Layer: Grey Roof Shingle			**ND**				
Layer: Grey Roof Shingle			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (15 %) Fibrous Glass (15 %)							
HMS-MUSD-DES-F15186-01C	11714226						
Layer: Grey Roof Shingle			**ND**				
Layer: Grey Roof Shingle			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (15 %) Fibrous Glass (15 %)							
HMS-MUSD-DES-F15186-01D	11714227						
Layer: Grey Roof Shingle			**ND**				
Layer: Grey Roof Shingle			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (15 %) Fibrous Glass (15 %)							
HMS-MUSD-DES-F15186-01E	11714228						
Layer: Grey Roof Shingle			**ND**				
Layer: Grey Roof Shingle			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (20 %)							
Comment: Bulk complex sample.							

3777 Depot Road, Suite 409, Hayward, CA 94545 / Telephone: (510) 887-8828 (800) 827-FASI / Fax: (510) 887-4218

Report Number: B214411

Client Name: Hazard Mgmt. Services **Date Printed:** 12/18/15

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
HMS-MUSD-DES-F15186-02A	11714229						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
HMS-MUSD-DES-F15186-03A	11714230						
Layer: Clear Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
HMS-MUSD-DES-F15186-04A	11714231						
Layer: Black Mastic		Chrysotile	**10 %**				
Total Composite Values of Fibrous Components:		**Asbestos (10%)**					
HMS-MUSD-DES-F15186-05A	11714232						
Layer: Grey Semi-Fibrous Material		Chrysotile	**10 %**				
Total Composite Values of Fibrous Components:		**Asbestos (10%)**					
HMS-MUSD-DES-F15186-06A	11714233						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (15 %) Synthetic (15 %)							
Comment: Bulk complex sample.							
HMS-MUSD-DES-F15186-06B	11714234						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (15 %) Synthetic (15 %)							
Comment: Bulk complex sample.							
HMS-MUSD-DES-F15186-06C	11714235						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (15 %) Synthetic (15 %)							
Comment: Bulk complex sample.							

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Client Name: Hazard Mgmt. Services

Report Number: B214411
Date Printed: 12/18/15

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
HMS-MUSD-DES-F15186-06D	11714236						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (15 %)							
Comment: Bulk complex sample.							
HMS-MUSD-DES-F15186-07A	11714237						
Layer: Black Mastic			**ND**				
Layer: Foil			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
HMS-MUSD-DES-F15186-08A	11714238						
Layer: White Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
HMS-MUSD-DES-F15186-09A	11714239						
Layer: Beige Non-Fibrous Material			**ND**				
Layer: White Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
HMS-MUSD-DES-F15186-10A	11714240						
Layer: Silver Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
HMS-MUSD-DES-F15186-11A	11714241						
Layer: Beige Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
HMS-MUSD-DES-F15186-12A	11714242						
Layer: Beige Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
HMS-MUSD-DES-F15186-13A	11714243						
Layer: Black Mastic		Chrysotile	**10 %**				
Total Composite Values of Fibrous Components:		**Asbestos (10%)**					
Cellulose (Trace)							

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Report Number: B214411

Client Name: Hazard Mgmt. Services **Date Printed:** 12/18/15

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
HMS-MUSD-DES-F15186-14A	11714244						
Layer: Grey Roof Shingle			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (20 %)							
Comment: Bulk complex sample.							
HMS-MUSD-DES-F15186-14B	11714245						
Layer: Grey Roof Shingle			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (20 %)							
HMS-MUSD-DES-F15186-14C	11714246						
Layer: Grey Roof Shingle			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (20 %)							
Comment: Bulk complex sample.							
HMS-MUSD-DES-F15186-14D	11714247						
Layer: Grey Roof Shingle			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (20 %)							
Comment: Bulk complex sample.							
HMS-MUSD-DES-F15186-14E	11714248						
Layer: Grey Roof Shingle			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (20 %)							
Comment: Bulk complex sample.							

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Client Name: Hazard Mgmt. Services

Report Number: B214411
Date Printed: 12/18/15

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
HMS-MUSD-DES-F15186-15A	11714249						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Beige Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (20 %) Synthetic (10 %)							
Comment: Bulk complex sample.							
HMS-MUSD-DES-F15186-15B	11714250						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Beige Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (20 %) Synthetic (10 %)							
Comment: Bulk complex sample.							
HMS-MUSD-DES-F15186-16A	11714251						
Layer: Black Non-Fibrous Material			**ND**				
Layer: Silver Foil			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
HMS-MUSD-DES-F15186-17A	11714252						
Layer: Black Non-Fibrous Material			**ND**				
Layer: Silver Foil			**ND**				
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
HMS-MUSD-DES-F15186-18A	11714253						
Layer: Black Mastic		Chrysotile	**10 %**				
Total Composite Values of Fibrous Components:		**Asbestos (10%)**					
Cellulose (Trace)							
HMS-MUSD-DES-F15186-19A	11714254						
Layer: Black Non-Fibrous Material			**ND**				
Layer: Beige Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
HMS-MUSD-DES-F15186-20A	11714255						
Layer: Black Mastic		Chrysotile	**10 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (10%)**					
Cellulose (Trace)							

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Report Number: B214411

Client Name: Hazard Mgmt. Services **Date Printed:** 12/18/15

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
HMS-MUSD-DES-F15186-21A	11714256						
Layer: Dark Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
HMS-MUSD-DES-F15186-22A	11714257						
Layer: Black Mastic		Chrysotile	**10 %**				
Total Composite Values of Fibrous Components:		**Asbestos (10%)**					
Cellulose (Trace)							
HMS-MUSD-DES-F15186-23A	11714258						
Layer: Dark Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

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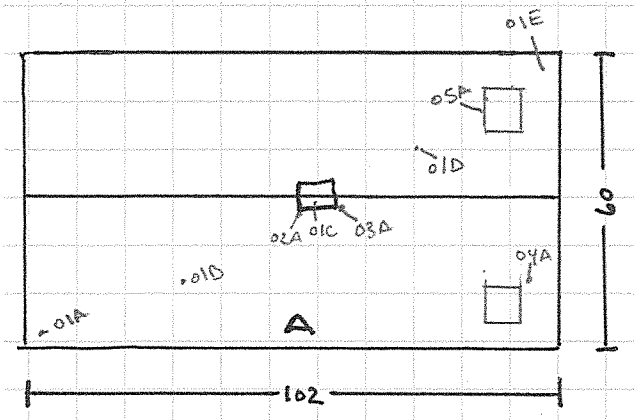
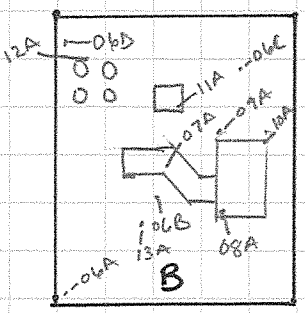
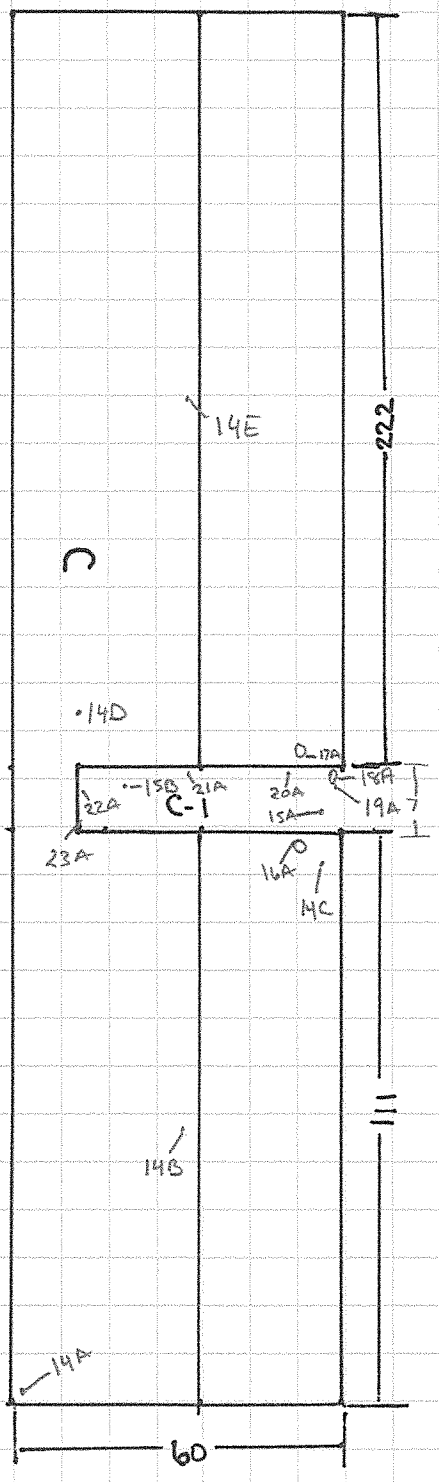
DIXIELAND
ELEMENTARY
SCHOOL

FIS186







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SECTION 01 30 00
SUBMITTALS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Contract General Conditions.

B. See also contract general conditions for additional requirements especially those regarding requests for ALTERNATIVES OR EQUALS and for SUBSTITUTIONS.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including:

1. Contractor's construction schedule
2. Submittal schedule
3. Shop Drawings
4. Product Data
5. Samples.

B. Administrative Submittals: Refer to other Division1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:

1. Permits
2. Applications for payment
3. Performance and payment bonds
4. Insurance certificates
5. List of Subcontractors.

1.03 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
      a. The Architect shall return without action any submittals requiring coordination with other submittals until related submittals are coordinated.
   3. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.
      a. See General Conditions and Supplementary General Conditions for additional requirements.
      b. If an intermediate submittal is necessary, process the same as the initial submittal.
      c. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.

B. Submittal Preparation: Place a permanent label or title block on each submittal for

identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Provide a space approximately 4" x 5" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
2. Include the following information on the label for processing and recording action taken:
   a. Project name
   b. Date
   c. Name and address of Architect
   d. Name and address of Contractor
   e. Name and address of subcontractor
   f. Name and address of supplier
   g. Name of manufacturer
   h. Number and title of appropriate Specification Section
   i. Drawing number and detail references, as appropriate.

C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Architect using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.

On the transmittal Record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

1.05 SHOP DRAWINGS

A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:

Dimensions
Identification of products and materials included
Compliance with specified standards
Notation of coordination requirements
Notation of dimensions established by field measurement.

C. Sheet Size: Except for templates, patterns and similar full size Drawings, submit Shop Drawings on sheets at least 81/2" x 11" but no larger than 30" x 42".

D. Submittals: Submit one correctable translucent reproducible print and six (6) blue or blackline print for the Architect's review; the reproducible and one print will be returned.

Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

1.06 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions,

catalog cuts, standard color charts, roughingin diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as “Shop Drawings.”

1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
   Manufacturer’s printed recommendations,
   Compliance with recognized trade association standards,
   Compliance with recognized testing agency standards,
   Application of testing agency labels and seals,
   Notation of dimensions verified by field measurement,
   Notation of coordination requirements.
2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

B. Submittals: Submit a minimum of six (6) copies of each required submittal as well as additional copies as required by the Architect, (the actual number of submittals and distribution required shall be determined by the Trustees Representative at the Preconstruction Conference). The Architect will return two sets marked with action taken and corrections or modifications required.

C. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities.

1. Do not proceed with installation until an applicable copy of Product Data applicable is in the installer’s possession.

2. Do not permit use of unmarked copies of Product Data in connection with construction.

1.07 SAMPLES

A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.

1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to include the following:
   Generic description of the Sample
   Sample source
   Product name or name of manufacturer
   Compliance with recognized standards
   Availability and delivery time.

2. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

B. Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.

Preliminary submittals will be reviewed and returned with the Architect’s mark indicating selection and other action.

C. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets; one will be returned marked with the action taken.

Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.

D. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work.

Field Samples specified in individual Sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.

1.08 ARCHITECTS ACTION

A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each submittal, mark to indicate action taken, and return promptly.

Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. Final Unrestricted Release: Where submittals are marked "Approved," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
2. Final-But-Restricted Release: When submittals are marked "Approved as Noted," that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
3. Returned for Resubmittal: When submittal is marked "Not Approved, Revise and Resubmit," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
   a. Do not permit submittals marked "Not Approved, Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.

   b. Note: Any work performed prior to receiving a FULLY APPROVED submittal shall be done at the contractors own risk and is subject to being replaced if any of the submittal requirements are not met.

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION NOT USED

END OF SECTION 01300

SECTION 01 64 00

OWNER FURNISHED CONTRACTOR INSTALLED
(O.F.C.I)

PART 1 - GENERAL

1. SUMMARY

A. DESCRIPTION: The Owner shall procure and provide certain products for installation as shown and specified per Contract Documents.

B. RELATED WORK SPECIFIED ELSEWHERE:

1. General: Products furnished and paid for by the Owner are described in the following technical sections and /or in the Drawings as O.F.C.I. materials.

2. Note that this project includes the installation of owner-supplied materials as noted in this specification section only. All materials not specifically listed below will be the responsibility of the contractor to provide and install.

2. DEFINITIONS

A. GENERAL: The following are used to identify products as noted on the Drawings.

B. OWNER FURNISHED CONTRACTOR INSTALLED (O.F.C.I.): Products or equipment furnished by the Owner for installation under this contract.

C. OWNER FURNISHED OWNER INSTALLED (O.F.O.I.): Products or equipment to be provided and installed by the Owner, but requiring surfacing, backing, utility connections or other preparation under this contract, for proper installation.

D. NOT IN CONTRACT (N.I.C.): Products or equipment to be provided and installed by Owner, not requiring surfacing, backing, utility connections or other preparation under this contract.

PART 2 - PRODUCTS

1. PRODUCTS

A. ROOFING MATERIAL FURNISHED BY OWNER (O.F.C.I.): District supplied material. Related specification sections include;

1. Section 07 - Asphalt Shingles
2. Section 07 - Roofing Restoration
3. Section 07 - Modified Bituminous Roofing
4. Section 07 - Sheet Metal Flashing and Trim

B. MATERIAL LIST

1. The Owner will only supply the quantity listed in the owner supplied materials section of this specification below. All additional materials and accessories will be the full responsibility of the contractor to provide and install per the specification and project requirements.

2. Any and all material or accessories required for the installation of the roof system in excess of the district provided material must be supplied and installed by the Contractor. It is up to the Contractor to determine the precise amount of material required for the completion of this project; and to provide excess material, as required. The cost to handle and break flashing metal from the District provided flat stock is contractor's responsibility.

3. All required flashings as required per each specification section for plumbing, electrical, gas, etc. will be the Contractors responsibility to provide and install as well as to be included in the bid cost.

4. All materials not specifically included in the owner supplied materials section will be the responsibility of the contractor to provide and install in compliance with the respective specification section.

5. Freight charges of owner supplied materials will be the responsibility of the Owner.

6. Contractor must coordinate and take delivery of materials, count all materials and ensure it matches the list below, unload and properly locate materials at the job site, and properly protect, cover and store at job site.

7. Contractor must be able to provide certification in writing from roof system manufacturer that the contractor is approved to install the specified roof system and provide all warranty requirements of each respective specification section.

8. <u>Dixieland Elementary School -</u>

   a. 27 each - Stressply Plus FR Mineral surface sheet (75 sq ft per roll)
   b. 14 each - Stressbase 80 Base Sheet (150 sq ft per roll)
   c. 1 each - Garla Prime VOC (5 gallon pail)
   d. 3 each - Flashing Bond Mastic (5 gal pail)
   e. 16 each - Weatherking Plus WC 5 gallon pail
   f. 10 each - Tuff Stuff Urethane Sealant (10.1 oz tube, white)
   g. 2 each - Garmesh (150' x 6" roll)
   h. 1 each - Pyramic Plus Lo Acrylic Coating (55 gallon drum)
   i. 20 each - Pre Finished Flat Stock 4' x 10'
   j. 3 each - Uni Bond ST, 4" x50' rl
   k. 2 each - 1/8" rivets - colored to match, 250 per bag
   l. 1 each - 1/8" closed end rivets, mill finish, 100 per bag
   m. 93 each - R-Mer Seal self adhering underlayment, 200 sq ft per rl
   n. 30 each - Garla-Flex, 10 oz tube
   o. 1 each - Freight to the Job Site

9. <u>Lavina Elementary School -</u>

   a. 3 each - Garla Prime VOC (5 gallon pail)
   b. 3 each - Grip Polyester Firm, 324' x3', 1000 sq ft per rl
   c. 10 each - Flashing Bond Mastic (5 gal pail)
   d. 30 each - Energizer K Plus FR, 5 gallon pail
   e. 30 each - Tuff Stuff Urethane Sealant (10.1 oz tube, white)
   f. 4 each - Garmesh (150' x 6" roll)
   g. 2 each - Pyramic Plus Lo Acrylic Coating (55 gallon drum)
   h. 20 each - Pre Finished Flat Stock 4' x 10'
   i. 6 each - Uni Bond ST, 4" x50' rl
   j. 2 each - 1/8" rivets - colored to match, 250 per bag

k. 1 each - 1/8” closed end rivets, mill finish, 100 per bag
l. 152 each - R-Mer Seal self adhering underlayment, 200 sq ft per rl
m. 1 each - Freight to the Job Site

PART 3 - EXECUTION

1. OWNER'S RESPONSIBILITIES

A. SUBMITTALS: Arrange for and deliver necessary shop drawings, product data and samples to Contractor.

B. DELIVERY:

1. General: Arrange and pay for product delivery to the site, in accordance with construction schedule.
2. Bill of Materials: Deliver supplier's documentation to Contractor.
3. Inspection: Inspect jointly with Contractor.
4. Claims: Submit for transportation damage and replacement of otherwise damaged, defective, or missing items.

C. GUARANTEES: Arrange for manufacturer's warranties, bonds, service, inspections, as required.

2. CONTRACTOR'S RESPONSIBILITIES

A. SUBMITTALS: Review shop drawings, product data and samples and submit to Architect and/ or Owner with notification of any discrepancies or problems anticipated in use of product.

B. DELIVERY:

1. General: Designate delivery date for each product in Progress Schedule.
2. Receiving: Receive and unload products at site. Handle products at the site, including un-crating, protection, and storage.
3. Inspection: Promptly inspect products jointly with Owner; record shortages, damaged or defective items. Shortages and/or damage must be noted at the time of delivery by the contractor no claims may be made after the fact.
4. Storage: Protect products from damage or exposure to elements per the manufactures requirements.

C. INSTALLATION:

1. General: Assemble, install, connect, adjust and finish products, as stipulated in the respective section of Specifications.
2. Repair and Replacement: Items damaged during handling and installation.
3. Install all O.F.C.I. products per the specifications and manufacturer instructions.
4. All products not supplied by the owner are the responsibility of the contractor to supply and install per manufacturers instructions.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to work of this section.

B. Related work specified elsewhere:

1. Division 01: Summary of Work
2. Division 07: Modified Built Up Roofing
3. Division 07: Standing Seam Metal Roofing
4. Division 07: Coping System
5. Division 07: Sheet Metal Flashing and Trim
6. Division 09: Painting

1.2 SUMMARY:

A. This portion of the specification sets forth the general requirements, including the quality and type of materials required for the installation of all pressure treated and non pressure treated lumber used for wood curbs, nailing strips, miscellaneous blocking material, unexposed fillers, fascia, edging strips, deck replacement, etc

1.3 STORAGE:

A. All material specified herein shall be stored (after delivery to the site) so that it will be fully protected from damage and weather, and shall be stacked to prevent damage. All lumber shall be fully protected to maintain the original required moisture content as specified in item titled "Moisture Content".

1.4 OTHER REQUIREMENTS:

A. Dimensions indicated on the drawings are nominal dimensions (except where details show actual sizes) and shall be subject to the standard reductions required for surfacing or tolerances permitted by the grading rules. Unless otherwise indicated on drawings, all material shall be S4S (surfaced four sides).

1.5 PROTECTION:

A. All finished work shall be adequately protected against damage from any source.

1.6 COORDINATION:

A. Carpenters shall coordinate their work with that of the other trades so that progress continues without interruption.

PART 2 - PRODUCTS

2.1 WOOD - FRAMING AND CURBS:

A. GRADING RULES, GRADES, AND SPECIES

1. Lumber: Southern Pine, yellow pine, Douglas fir, spruce, ponderosa pine, larch or Hemlock and shall meet the following minimum grade requirement of construction standard (75% #1 and 25% #2); free from warping and visible decay. Lumber shall be graded according to the standard grading rules of the Southern Pine Inspection Bureau, the West Coast Lumber Inspection Bureau, or the Western Wood Products Association.

B. MOISTURE CONTENT

1. All lumber shall be air-dried or kiln-dried before treatment, so that the moisture content is not more than 19%. After treatment, it shall be kiln-dried at temperatures not exceeding 160 degrees F. (71 degrees C) so that the moisture content is not more than 19% at time of shipment

C. DECAY-RESISTANT TREATMENT:

1. Lumber in contact with roofing or acting as fascias, and all other exterior lumber, shall be pressure-treated with a waterborne preservative in accordance with AWPA Specification P5. Creosote and oil-borne preservatives are not acceptable.

2. Treating processes, material conditions, plant equipment, and other pertinent requirements shall conform to AWPA Specifications C1 and C2 for specific kind of lumber and type of preservative to be used. Retention shall be as required for intended use.

3. All treated lumber shall bear the mark of a code recognized third party agency such as the AWPA.

D. PLYWOOD:

Grade: CDX or Cyme exterior Grade. Description: 5/8" thick

E. WOOD SIDING:

1. T 111 or approved equal.

2.2 MECHANICAL FASTENERS:

A. WOOD TO STEEL:

1. Acceptable Manufacturers:
   a. Roofgrip screw with Climaseal coating; plastic disc - Buildex Div. of ITW, Itasca, IL.
   b. Dekfast screw with Sentri coating: plastic disc – Construction Fasteners, Inc., Wyomissing, PA.
   c. Fabco Fastening Systems, West Newton, PA: Insul-Fixx screw with Fabcote coating; plastic plate, Plate-Fixx screw with Fabcote coat; plastic disc.
   d. Kwik-Deck screw with Oxyseal coating; plastic disc - Atlas Bolt & Screw Div., Trans Union Fastener Corp., Ashland, OH.

e. Olympic #12-11 Standard Steel Deck Screw or #14-10 Heavy Duty All Purpose Screw with CR-10 coating; three inch diameter plastic - Olympic Manufacturing Group, Inc., Agawam, MA.
f. Glasfast (plastic disc) - Owens-Corning Fiberglas Corp., Toledo, OH.
g. Perma Fastener screw with permaseal coating; plastic plate - International Permalite, Inc., Oak Brook, IL.

2. Screw Length: Sufficient to engage steel, wood deck 1 inch.

B. WOOD TO WOOD:

1. Type: Galvanized, common, annular ring nail. Length: Sufficient to penetrate underlay blocking 1-1/4 inches.

2. Acceptable Manufacturers:

a. Hillwood Manufacturing Co., Cleveland, OH.
b. Independent Nail, Inc., Bridgewater, MA.
c. W.H. Maze Co., Peru, IL.
d. National Nail Corp., Grand Rapids, MI.

C. WOOD TO MASONRY:

1. Acceptable Manufacturers:

a. Tapcon 1/4" diameter, Phillips pan head anchor - Buildex Div. of ITW, Itasca, IL.
b. Confas - Construction Fasteners, Inc., Wyomissing, PA.
c. Con-fixx - Fabco Fastening Systems, West Newton, PA.
d. #14-10 Heavy Duty all Purpose Screw – Olympic Manufacturing Group, Inc., Agawam, MA.
e. Tru-Fast fastener (stainless steel) - The Tru-Fast Corp., Bryan, OH.

2. Length: Sufficient to provide 1-1/2 inch embedment.

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D. WOOD TO HOLLOW MASONRY:

1. Acceptable Manufacturers:

a. Sleeve Anchor by Hilti Fastening Systems, Tulsa, OK.
b. Rawly Hollow Masonry Anchor by the Rawlplug Co., Inc., New Rochelle, NY.

2. Length: As recommended by manufacturer

PART 3 - EXECUTION

3.1 CARPENTRY:

A. At roof edge to receive metal fascia, around all roof top penetration perimeters, and under any flashing component that is to have a roof flange mechanically fastened to roofing substrate; mechanically attach wood blocking. Blocking thickness: Equal to common 1 x 4”, 1 x 6” 2x4”, 2x6”, 2x8”, 2x10”, 2x12”.

B. Fasteners shall be installed in two rows staggered. Spacing in any one row shall not exceed 24 inches. Within eight feet of outside corners, spacing shall not exceed twelve inches in any one row.

C. Where required, offset blocking layers twelve inches, weave corners.

D. When preservative treated wood is cut, the cut end shall be treated in accordance with AWPA Specification M4.

E. Lumber shall be accurately cut to the work requirements and shall be well fastened.

F. Bolted fastenings shall have washers of adequate size under both heads and nuts. Nails shall be of correct size and quantity for proper fastening. Oversized nails that will result in splitting shall not be used. All fasteners shall be galvanized per ASTM A 153.

END OF SECTION

SECTION 07 22 00

ROOF DECK AND INSULATION

PART 1 – GENERAL

1. RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including the Conditions of the Contract and Division 01 Specification Sections apply to this section.

2. SUMMARY

A. Section includes roof insulation over the properly prepared deck substrate.

B. Related Sections:
1. Section 07 05 00 – Common Work Procedures for Thermal and Moisture Protection.
2. Section 07 55 00 – Modified Bitumen Roofing
3. Section 07 62 00 – Sheet Metal Flashing and Trim

3. REFERENCES

A. American Society for Testing and materials (ASTM):
1. ASTM A167 Standard Specification for Stainless and Heat-Resisting Chromium Nickel Steel Plate, Sheet and Strip.
2. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.
3. ASTM B29 Standard Specification for Refined Lead.
4. ASTM B32 Standard Specification for Solder Metal.
5. ASTM C165 Standard Test Method for Measuring Compressive Properties of Thermal Insulation.
6. ASTM C208 Standard Specification for Cellulosic Fiber Insulation Board.
7. ASTM C209 Standard Test Method for Cellulosic Fiber Insulating Board.
8. ASTM C272 Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.
9. ASTM C1396 Standard Specification for Gypsum Wallboard.
10. ASTM C518 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
11. ASTM C578 Standard Specification for Perlite Thermal Insulation Board.
12. ASTM C728 Standard Test Methods for Fire Test of Roof Coverings.
13. ASTM C1289 Standard Specification for Faced Rigid Polyisocyanurate Thermal Insulation.
14. ASTM D5 Standard Test Method for Penetration of Bituminous Materials.
15. ASTM D36 Standard Test Method for Softening Point of Bitumen (Ring and Ball Apparatus).
16. ASTM D312 Standard Specification for Asphalt Used in Roofing.
17. ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
18. ASTM D1621 Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
19. ASTM D1622 Standard Test Method for Apparent Density of Rigid Cellular Plastics.
20. ASTM D1863 Standard Specification for Mineral Aggregate Used on Built-Up Roofs.

21. ASTM D2126 Standard Test Method for Response off Rigid Cellular Plastics to Thermal Humid Aging.
22. ASTM D2178 Standard Specification for Asphalt Glass Felts used in Roofing and Waterproofing.
23. ASTM D4601 Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.
24. ASTM D5147 Standard Sampling and Testing Modified Bituminous Sheet Material.

B. Cast Iron Soil Pipe Institute, Washington, D.C. (CISPI)

C. Factory Mutual Research (FM):
1. Roof Assembly Classifications.

D. National Roofing Contractors Association (NRCA):
1. Roofing and Waterproofing Manual.

E. Underwriters Laboratories, Inc. (UL):
1. Fire Hazard Classifications.

F. Warnock Hersey (WH):
1. Fire Hazard Classifications.

G. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

H. Steel Deck Institute, St. Louis, Missouri (SDI)

I. Southern Pine Inspection Bureau, Pensacola, Florida (SPIB)

J. Insulation Board, Polyisocyanurate (FS HH-I-1972)

K. Insulation Board, Thermal (Fiberboard) (FS LLL-1-535B)

1.4. SUBMITTALS

A. Product Data: Provide manufacturer's specification data sheets for each product in accordance with Division 01 Section Submittal Procedures. 013000.

B. Provide approval letters from insulation manufacturer for use of their insulation within this particular roofing system type.

C. Provide a sample of each insulation type.

D. Shop Drawings
1. Submit manufacturer's shop drawings indicating complete installation details of tapered insulation system, including identification of each insulation block, sequence of installation, layout, drain locations, roof slopes, thicknesses, crickets and saddles.
2. Shop drawing shall include: Outline of roof, location of drains, a complete board layout of tapered insulation components, thickness and the average "R" value for the completed insulation system.

E. Certification
1. Submit roof manufacturer's certification that insulation fasteners furnished are acceptable to roof manufacturer.
2. Submit roof manufacturer's certification that insulation furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.

1.5. QUALITY ASSURANCE

A. Fire Classification, ASTM E-108.

B. Manufacturer's Certificate: Certify that roof system furnished is approved by Factory Mutual, Underwriters Laboratories, Warnock Hersey or approved third party testing facility in accordance with ASTM E108, Class [A or B or C] for external fire and meets local or nationally recognized building codes.

C. Manufacturer's Certificate: Certify that the roof system is adhered properly to meet or exceed the requirements of FM [1-90].

D. Pre-installation meeting: Refer to Division 07 roofing specifications for pre-installation meeting requirements.

1.6. DELIVERY, STORAGE AND HANDLING

A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.

B. Store all insulation materials in a manner to protect them from the wind, sun and moisture damage prior to and during installation. Any insulation that has been exposed to any moisture shall be removed from the project site.

C. Keep materials enclosed in a watertight, ventilated enclosure (i.e. tarpaulins).

D. Store materials off the ground. Any warped, broken or wet insulation boards shall be removed from the site.

PART 2 – PRODUCTS

2.1. PRODUCTS, GENERAL

A. Refer to Division 01 Section "Common Product Requirements."

B. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this Section. Comply with all manufacturer and contractor/fabricator quality and performance criteria specified in Part 1.

C. Substitutions: Products proposed as equal to the products specified in this Section shall be submitted in accordance with Bidding Requirements and Division 01 provisions.
   1. Proposals shall be accompanied by a copy of the manufacturer's standard specification section. That specification section shall be signed and sealed by a professional engineer licensed in the state in which the installation is to take place. Substitution requests containing specifications without licensed engineer certification shall be rejected for non-conformance.
   2. Include a list of three (3) projects of similar type and extent, located within a one hundred mile radius from the location of the project. In addition, the three projects must be at least five (5) years old and be available for inspection by the Architect, Owner or Owner's Representative.
   3. Equivalency of performance criteria, warranty terms, submittal procedures, and contractual terms will constitute the basis of acceptance.
   4. The Owner's decision regarding substitutions will be considered final. Unauthorized substitutions will be rejected.

2.2. INSULATION MATERIALS

A. Thermal Insulation Properties and Approved Insulation Boards.
   1. Rigid Polyisocyanurate Roof Insulation; ASTM C1289:
      a. Qualities: Rigid, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers.
      b. Thickness: N/A
      c. R-Value: N/A
      d. Compliances: UL, WH or FM listed under Roofing Systems Federal Specification HH-I-1972, Class 1.
      e. Acceptable Products:
         1) ENRGY-3; Johns Manville
         2) H-Shield; Hunter
         3) EnergyGuard; GAF
         4) Approved Equivalent
   2. Tapered Polyisocyanurate Roof Insulation; ASTM C1289:
      a. Qualities: Factory Tapered, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers.
      b. Thickness: 1/2” slope to drain at all cricket locations.
      c. Average R-Value: N/A
      d. Tapered Slope: 1/2”
      e. Compliances: UL, WH or FM listed under Roofing Systems Federal Specification HH-I-1972, Class 1
      f. Acceptable Products:
         1) ENRGY 3; Johns Manville
         2) EnergyGuard; GAF
         3) H-Shield; Hunter
         4) Approved Equivalent
   3. High Density Fiberboard Roof insulation; ASTM C208
      a. Qualities: Rigid, composed of interlocking fibers factory blended treated with asphalt on the six sides.
      b. Board Size: Four feet by eight feet (4’ x 8’)
      c. Thickness: Minimum (1/2”)
      d. Compliances: UL, WH, FM listed under Roofing Systems. Federal Specification LLL-I-535-B.
      e. Acceptable Manufacturers:
         1) Blue Ridge; Celotex
         2) Temple Inland
         3) GAF Building Materials Corporation
         4) Georgia-Pacific
         5) Approved Equivalent
   4. Dens-Deck Prime Roof Board
      a. Qualities: Nonstructural glass mat faced, noncombustible, water-resistant treated gypsum core panel.
      b. Board Size: N/A
      c. Thickness: N/A
      d. R-Value: N/A
      e. Compliances: UL, WH or FM listed under Roofing Systems.

2.3. RELATED MATERIALS

A. Fiber Cant and Tapered Edge Strips: Performed rigid insulation units of sizes/shapes indicated, matching insulation board or of perlite or organic fiberboard, as per the approved manufacturer.
   1. Acceptable Manufacturers:
      a. The Garland Company, Inc.
      b. Celotex
      c. Johns Manville
      d. GAF

e. Approved Equivalent

B. Protection Board: Pre-molded semi-rigid asphalt composition board one half (1/2) inch.

C. Roof Board Joint Tape: Six (6) inches wide glass fiber mat with adhesive compatible with insulation board facers.

D. Asphalt: ASTM D312, Type III Steep Asphalt.

E. Roof Deck Insulation Adhesive: Insul-Lock E HR - Dual-component, high rise foam adhesive with 45% rapidly renewable material content as recommended by insulation manufacturer and approved by FM indicated ratings.
1. Tensile Strength (ASTM D412)……250 psi
2. Density (ASTM D1875)……..8.5 lbs./gal.
3. Viscosity (ASTM D2556)……22,000 to 60,000 cP.
4. 2 `Peel Strength (ASTM D903)…..17 lb/in.
5. 3 `Flexibility (ASTM D816)……Pass @ -70°F

F. Fasteners: Corrosion resistant screw fastener as recommended by roof membrane manufacturer.
1. Factory Mutual Tested and Approved with three (3) inches coated disc for I-90 rating, length required to penetrate metal deck one inch.

PART 3 – EXECUTION

1. EXECUTION, GENERAL

A. Comply with requirements of Division 01 Section “Common Execution Requirements.”

2. INSPECTOR OF SURFACES

A. Roofing contractor shall be responsible for preparing an adequate substrate to receive insulation.
1. Verify that work which penetrates roof deck has been completed.
2. Verify that wood nailers are properly and securely installed.
3. Examine surfaces for defects, rough spots, ridges, depressions, foreign material, moisture, and unevenness.
4. Do not proceed until defects are corrected.
5. Do not apply insulation until substrate is sufficiently dry.
6. Broom clean substrate immediately prior to application.
7. Use additional insulation to fill depressions and low spots that would otherwise cause ponding water.
8. Verify that temporary roof has been completed.

3. INSTALLATION

A. Attachment with Mechanical Fasteners
1. Approved insulation board shall be fully attached to the deck with an approved mechanical fastening system. As a minimum, the amount of fasteners shall be in accordance with manufacturer’s recommendation for FM I-90 system. Otherwise, a minimum of one fastener per two square feet shall be installed.
2. Filler pieces of insulation require at least two fasteners per piece if size of insulation is less than four square feet.
3. Spacing pattern of fasteners shall be as per manufacturer’s recommendations to meet the FM requirements. Placement of any fastener from edge of

insulation board shall be a minimum of three inches, and a maximum of six (6) inches.

4. Minimum penetration into deck shall be as recommended by the fastener manufacturer. There is a one (1) inch minimum for metal, wood and structural concrete decks where not specified by the manufacturer. For gypsum and cement-wood fiber decks, penetration shall be determined from pull-out test results with a minimum penetration of one and one-half (1 ½) inches.
5. Gypsum and cementitious wood fiber decks: Where the roof deck is visible from the building interior, the contractor shall ensure no penetration of fasteners through underside of the deck. Any holes or spalling caused by fastener installation shall be repaired by the roofing contractor. Where the new roof system thickness exceeds an amount so that a minimum of 1 ½ of penetration cannot be achieved with an Olympic TB Fastener, or approved equivalent, then (and only then) toggle bolts may be used to secure installation to the deck.
6. Tape joints of insulation as per manufacturer's requirements.

C. Attachment with Insulation Adhesive Approved by Factory Mutual (FM).
1. Ensure all surfaces are clean, dry, free of dirt, debris, oils, loose ore embedded gravel, unadhered coatings, deteriorated membrane and other contaminants that may inhibit adhesion.
2. Apply insulation adhesive directly to the substrate using a ribbon pattern with one quarter to one half (1/4-1/2) inch wide beads 12 inches o.c., using either the manual applicator or an automatic applicator, at a rate of one (1) gallon per one hundred (150) square feet per cartridge.
3. Immediately place insulation boards into wet adhesive. Do not slide boards into place. Do not allow the adhesive to skin over before installing insulation boards.
4. Briefly step each board into place to ensure contact with the adhesive. Substrates with irregular surfaces may prevent the insulation board from making positive contact with the adhesive. Relief cuts or temporary weights may be required to ensure proper contact.
5. All boards shall be cut and fitted where the roof deck intersects a vertical surface. The boards shall be cut to fit a minimum of one quarter (1/4) inch away from the vertical surface.
6. Tape joints of insulation as per manufacturer's requirements.

4. CLEANING

A. Remove debris and cartons from roof deck. Leave insulation clean and dry, ready to receive roofing membrane.

5. CONSTRUCTION WASTE MANAGEMENT

A. Remove and properly dispose of waste products generated during installation. Comply with requirements of authorities having jurisdiction.

END OF SECTION

SECTION 07 31 13
ASPHALT SHINGLES

1.GENERAL

1.1. SECTION INCLUDES

A. Includes all labor, and non owner supplied materials, and equipment to install a composition shingle roofing system over the properly prepared substrate.

B. Includes removal and disposal of existing roofing system(s), insulation boards, gutters, flashings, sheet metal items, copings, etc. for a complete prepared roof surface to receive the new roofing system.

C. See section 01110 Summary of Work for a detailed scope of work.

1.2. RELATED SECTIONS

A. Section 01 - Summary of Work

B. Section 06 - Rough Carpentry

C. Section 07 - Modified Bitumenous Roofing

D. Section 07 - Sheet Metal Flashing & Trim

E. Section 09 - Painting

1.3. REFERENCES

A. ASTM International (ASTM):
1. ASTM C209 - Standard Test Methods for Cellulosic Fiber Insulating Board.
2. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
3. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
4. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
5. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
6. ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
7. ASTM D3018 - Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules.
8. ASTM D3161 - Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method).
9. ASTM D3462 - Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules.
10. ASTM D4586 - Standard Specification for Asphalt Roof Cement, Asbestos- Free.
11. ASTM D4601 - Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.
12. ASTM D4869 - Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing.
13. ASTM D6757 - Standard Specification for Underlayment Felt Containing Inorganic Fibers Used in Steep-Slope Roofing.
14. ASTM D7158 - Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method).
15. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building

Materials.
16. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
17. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings.

B. Florida Building Code (FBC).
1. FL14807 - Underlayments.
2. FL14809 - Asphalt Shingles.
3. FL 23186 - Underlayments.

C. ICC Evaluation Service (ICC-ES).
1. ICC Approval - ESR-1561: Roofing Felt and Underlayment.
2. ICC Approval - ESR-3150: Asphalt Shingles.
3. ICC-ES AC188: Acceptance Criteria for Roof Underlayments.

D. Intertek Testing Services (ITS).
1. Fire Resistance Directory, Current Edition.
2. Code Compliance Research Report - CCRR-1082: Roofing Felt and Underlayment.

E. Underwriters Laboratory (UL):
1. UL 790 - Standard Test Methods for Fire Tests of Roof Coverings.
2. UL 2218 - Impact Resistance of Prepared Roof Covering Materials.

1.4. SUBMITTALS

A. Submit under provisions of Section 01 - Administrative Requirements.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Samples for Selection: For the following products, of sizes indicated: For each product specified, two complete sets of color samples representing manufacturer's full range of available colors and patterns.
1. Asphalt Shingles: Full size.
2. Asphalt Starter Shingles: Full size.
3. Polymer Modified Fiberglass Hip and Ridge Shingles: Full size.
4. Polymer Modified Self-Adhering Fiberglass Reinforced Underlayment: 12 inches (305 mm) square.
5. Nails Used for Fastening Shingles: 5 of each nail type and size.

D. Samples for Verification: For the following products, of sizes indicated: For each product specified, two samples representing actual product, color, and patterns.
1. Asphalt Shingles: Full size.
2. Asphalt Starter Shingles: Full size.
3. Polymer Modified Fiberglass Hip and Ridge Shingles: Full size.
4. Polymer Modified Self-Adhering Fiberglass Reinforced Underlayment: 12 inches (305 mm) square.
5. Nail Used for Fastening Shingles: 5 of each nail type and size.

1.5. QUALITY ASSURANCE

A. Primary Roofing Materials Manufacturer Requirements:
1. Manufacturer specified asphalt shingles for a minimum of ten years.
2. Manufacturer shall be an associate member in good standing of either the National Roofing Contractors Association (NRCA), Western States Roofing Contractors Association (WSRCA), or the Midwest Roofing Contractors Association (MRCA).

B. Installer Qualifications: Approved by the manufacturer to install the specified products and provide the specified warranties.

C. Fire-Resistance Characteristics: Where indicated, provide asphalt shingles and related roofing materials identical to those of assemblies tested for fire resistance per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

D. Exterior Fire-Test Exposure: Class A; ASTM E108 or UL 790, for application and roof slopes indicated.

E. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

1.6. DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7. PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8. PROJECT MEETINGS

A. Pre-Construction Meeting:
   1. Prior to the start of the roofing project, the Owner will hold a job-site meeting and roof tour to review the scope of work.
   2. Authorized representatives of the Owner, the Roofing Contractor (Project Superintendent), the asphalt shingle manufacturer, other Subcontractors whose work complements, penetrates, or is mounted on the roof or will use the roof as a work platform, will be in attendance.
   3. The agenda for the meeting shall include:
      a. A review of the submittals.
      b. Distribution of approved submittals.
      c. A walkover inspection of the roof.
      d. Establishment of a schedule for the work.
      e. Selection of staging and storage locations.

B. Final Inspection: Following the completion of the work, a final inspection shall be scheduled by Owner's Representative. Any uncompleted work shall be noted on a punch list. Final payment shall be made only after punch list is completed.

1.9. WARRANTY

A. Standard Warranty: Shingles subjected to terms and conditions of the standard Manufacturer's Limited Warranty. Wind warranty coverage is subject to the shingles being sealed.
   1. Warranty Length: 50 years.
   2. Limited Term Resistance to Wind: 130 mph (209 kph).

B. Provide a three (3) year workmanship warranty.

C. Upon project completion and acceptance by Owner, the Roofing Contractor shall promptly provide executed copies of the specified warranties.

D. Furnish a list containing the names and contact telephone numbers of the Roofing Contractor's Service Manager, Superintendent, and Project Manager and the Roofing Contractor's current mailing address.

2.PRODUCTS

2.1. MANUFACTURERS

A. Acceptable Manufacturer: Malarkey Roofing Products, which is located at: 3131 N. Columbia Blvd. P. O. Box 17217; Portland, OR 97217; Toll Free Tel: 800-545-1191; Tel: 503-283-1191; Fax: 503-289-7644; Email: request info (jkouba@malarkeyroofing.com); Web: https://malarkeyroofing.com

B. Substitutions: Not permitted.

2.2. SHINGLES

A. High Profile Laminate Shingles:
   1. Legacy (272) as manufactured by Malarkey Roofing Products.
      a. Malarkey Legacy shingles hold a Class A Fire Rating.
      b. As manufactured, Legacy meets the requirements of:
         1. ASTM D7158 Class H, ASTM D3462, ASTM D3161 Class F, ASTM D3018 Type I, ASTM E108 Class A, UL 2218 Class 4 Impact Resistance, ICC-ES AC438, and CSA A123.5.
         2. ICC Approval: ESR-3150.
         3. FBC Approval: No. 14809.
         4. Listed with UL and Intertek/WHI.
      c. Performance:
         1. Limited Material Warranty: 50 years.
         2. Limited Wind Warranty: 15 years. 110 mph (177 kph).
         3. Enhanced Wind Warranty Available: 130 mph (209 kph).
         4. Legacy Silverwood is listed with CRRC and compliant with CEC Title 24, Part 6 Cool Roof Requirements.
         5. NEX polymer mix includes recycled rubber and plastics.
         6. SEBS polymer modified asphalt laminate adhesive.
         7. SEBS asphalt seal-down adhesive.
         8. 3M Smog-Reducing Granules.
         9. Enlarged nailing area of The Zone.

B. Color: Color shall be selected from the manufacturer's standard colors.

2.3. UNDERLAYMENT

A. R-Mer Seal, Self-Adhering Underlayment by The Garland Company:
   1. Product: R-Mer Seal by The Garland Company.
   2. Substitutions not permitted.
   3. As manufactured, meets requirements of ASTM D1970.
   4. Self-adhering sheet shall be nominal 45 mils (1.14 mm) thick.
   5. Self-adhering sheet shall be 36 inches (0.91 meter) in width.
   6. One (1) roll covers two (2) squares of roof.

2.4. RELATED PRODUCTS

A. Endura Vent Eave and Ridge Vents, below deck ventilation system.

B. NEX Polymer Modified 8 inches (203 mm) High-Profile Hip and Ridge: Malarkey No. 222 EZ-Ridge Scotchgard.

C. Full-Width Perforated Starter Shingle: Malarkey Smart Start No. 210.

D. Plastic Roof Cement conforming to ASTM D4586.

E. Fasteners: Hot Dip Galvanized nails with minimum 3/8 inch (9.5 mm) head.

F. Dormer Vents: Construction Metals Inc. low profile stamped dormer, Simpson LPSD20.

2.5. SHEET METAL FLASHING & TRIM

A. Sheet Metal Flashing and Trim: Comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."

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

1. Step Flashings: 24 gauge minimum. Fabricate with a headlap of 2 inches (50 mm) and a minimum extension of 5 inches (125 mm) over the underlying asphalt shingle and up the vertical surface.
2. Cricket Flashings: 24 gauge minimum. Fabricate with concealed flange extending a minimum 24 inches (600 mm) beneath upslope asphalt shingles and 6 inches (150 mm) above the roof plane.
3. Open Valley Flashings: 24 gauge minimum. Fabricate in lengths not exceeding [10 feet (3 m)] with 1-inch- (25-mm-) high inverted-V profile at center of valley and equal flange widths of 10 inches (250 mm).
4. Drip Edges: 24 gauge minimum. Fabricate in lengths not exceeding [10 feet (3 m)] with 2-inch (50-mm) roof deck flange and 1-1/2-inch (38-mm) fascia flange with 3/8-inch (9.6-mm) drip at lower edge.
5. Vent Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch (1.6 mm) thick. Provide 4lb lead sleeve sized to slip over the pipe and install the factory lead counter flashing cap.

3.EXECUTION

3.1. DELIVERY, STORAGE, AND HANDLING

A. New and dry roof materials delivered to the job site in containers unopened and undamaged. Manufacturer's products stamped with labels, names, and run codes of manufacture and testing laboratory.

B. Store underlayment materials on ends only. Discard rolls which may have been flattened, creased, or otherwise damaged. Place materials on pallets or wood sleepers. Do not stack palletized materials.

C. Cover underlayment rolls with weatherproof materials secured to prevent materials from becoming exposed to moisture. Use breathable tarps.

D. Disperse materials stored on the roof surface to avoid concentrated loading. Set larger concentrations over structural members.

3.2. ENVIRONMENTAL REQUIREMENTS

A. Application of roofing materials shall not be performed when weather conditions interfere with good roofing practices.

3.3. UNDERLAYMENT AND EDGING

A. Apply specified underlayment as follows:
1. Apply a single layer of polymer modified underlayment laid parallel to eaves, lapping

to the 4 inch (102 mm) ply line, and 6 inches (152 mm) on ends, end laps staggered 6 feet (1829 mm) from course to course.

B. Valleys: Only those valley installations listed in the manufacturer's installation instructions shall be permitted.
   1. Regardless of valley method used, begin application by centering a full-width valley liner of self-adhering underlayment to the roof deck in all valleys.
   2. The field underlayment is then woven through the valley over the layer of self-adhering underlayment or lapped 6 inches (152 mm) on each side. If fastening the field underlayment, be aware no fasteners are allowed within 6 inches (152 mm) of the valley centerline.

C. Pipe Flashing: Apply ASTM D1970 underlayment around the pipe, sealing it to the field underlayment prior to installing the metal pipe flashing. Install and secure the metal jack so the bottom flange laps over onto the shingles. Side and top flanges shall have shingles lapping onto the flange. Shingles that lap onto flanges shall be sealed to the metal with asphalt roof cement conforming to ASTM D4586.

D. Perimeter Flashing: Use non-corrosive, 24-gauge sheet metal drip edge flashing. Install prior to underlayment on eave edges of roof and then along rake edges over the ends of installed underlayment. Install drip edge with flanges large enough (recommend 4-inch (102 mm) flanges) to completely cover roof edges. Secure with galvanized (or compatible) roofing nails, centered on the top flange at 8 to 10 inches (203 to 254 mm) O.C. or according to local code requirements.

3.4. METAL FLASHING INSTALLATION

A. General: Install metal flashings and other sheet metal to comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."

B. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

C. Apron Flashings: Extend lower flange over and beyond each side of downslope asphalt shingles and up the vertical surface.

D. Step Flashings: Install with a head lap of 2 inches and extend over the underlying asphalt shingle and up the vertical surface. Fasten to roof deck only.

E. Cricket Flashings: Install against the roof-penetrating element extending concealed flange beneath upslope asphalt shingles and beyond each side.

F. Open Valley Flashings: Install centrally in valleys, lapping ends at least 8 inches in direction to shed water. Fasten upper end of each length to roof deck beneath overlap.

G. Secure hemmed flange edges into metal cleats spaced 2 inches apart and fastened to roof deck.

H. Rake Drip Edges: Install rake drip edge flashings over underlayment and fasten to roof deck.

I. Eave Drip Edges: Install eave drip edge flashings below underlayment and fasten to roof sheathing.

J. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.5. APPLICATION OF SHINGLES

A. Laminate Shingle Application; 8 inches (203 mm) Offset - Diagonal Pattern:
   1. Starter courses: Use Malarkey starter shingles or 3-tab shingles with the tabs cut off; apply to eave and rake edges of roof.
   2. Cut 6 inches (152 mm) off the length of the starter strip and apply at a lower corner of roof. The starter course shall overhang the edge metal 1/4 to 3/4 inch (6 mm to 19 mm). Fasten with four (4) nails, 1-1/2 inches to 3 inches (38 to 76 mm) up from the eave with one fastener 1 inch (25 mm) from each end and the remaining two evenly spaced on the same line as the end fasteners.
   3. Continue starter course across the roof with a full-length shingles, butting them loosely together to avoid buckling.
   4. First course: Start with a full shingle applied directly over the starter course at the same lower corner of the roof, and secure with fasteners.
   5. Second course: Cut 8 inches (203 mm) off one end of a full shingle and apply the remaining piece over the underlying, first course shingle. Align the bottom edge along a line level with the "sawtooth" overlay in the preceding course, exposing the first course 5-5/8 inches (143 mm). Secure with fasteners.
   6. Succeeding Courses: Courses three through five are begun with partial shingles, each progressively 8 inches (203 mm) shorter, establishing the overall diagonal pattern or stair-step effect. (Pieces cut from shingles along one rake edge can be used to finish off courses on the opposite rake.)
   7. Apply a full shingle adjacent to each of the first five courses to extend the pattern. Butt the shingles loosely together to prevent buckling.
   8. Courses six through ten repeat the process beginning with a full shingle and repeating the 1-to-5 course cycle on up the roof.
   9. Strike a chalk line every six courses or so to ensure straight courses. Shingles may be laid from either lower corner of the roof. Start at the rake edge and follow layout and cutting instructions as required for proper application. Installation of shingles with a 4 inch (102 mm) offset is also acceptable. Offsets must be no less than 4 inches (102 mm).

B. Valley Installation:
   1. Valley Underlayment: Center a full-width strip of self-adhering underlayment (or equivalent conforming to ASTM D1970) in the valley and apply it directly to the roof deck. Ensure this valley liner is tight to the deck without bridging in the center of the valley. Lace the field underlayment into and through the valley from both sides or overlap the valley liner a minimum of 6 inches (152 mm) on each side. When fastening, none should be placed closer than 6 inches (152 mm) from the valley centerline.
   2. Open metal valleys: Install minimum 24 inches (610 mm) wide, 26-gauge, metal valley flashing over the valley liner, and secure with fasteners no more than 1 inch (25 mm) from the outside edges at a spacing of 10 inches (254 mm) to 12 inches (305 mm) on center. For additional sealing, a continuous, 6-inch (152 mm) wide stripping ply of self-adhering Arctic Seal may be applied over the fasteners. Overlaps in the metal should be a minimum of 4 inches (102 mm) and embedded in a continuous bead of sealant. Do not fasten the metal laps. Lay a first course of shingles along the eave of one roof area and over the valley, making sure the end of the last shingle meets or goes beyond the centerline of the metal valley. Complete the installation of shingles on that roof section. After all shingles have been installed in the valley, snap a chalk line 2 inches (51 mm) from the center of the metal valley, and trim shingles to the chalk line, matching the centerline angle. Crop the tops of each shingle course at a 1 inch (25 mm), 45 degree cut. Embed the ends of the cut valley shingles in a continuous 3 inch (76 mm) wide bead of mastic. Install shingles on the adjoining roof as described above.
   3. "Bleeder," "Point," or "California-cut" valleys are not acceptable.

3.6. FASTENERS

A. Laminate Nailing Pattern: Nails must be placed within the nailing zone, 1 inch (25 mm) in from each end of the shingle and the remaining nails evenly spaced on the same line as the

end nails. Fasteners shall be seated flush to the shingle surface and not overdriven to cut into shingles. When fastening, butt shingles loosely together to prevent buckling.

1. Fasteners per shingle: Four (4).
2. Fasteners per shingle/high wind areas: Six (6), including starter shingles.
3. Steep slope fastening (roof decks, greater than 21:12): Six (6), including starter shingles, and hand-sealing underneath.

3.7. OWNER SUPPLIED MATERIALS

A. The Owner will only supply the quantity listed in the owner supplied materials section of this specification below. All additional materials and accessories will be the full responsibility of the contractor to provide and install per the specification and project requirements.

B. Any material or accessories required for the installation of the roof system in excess of the Owner provided material must be supplied by the Contractor and added into the bid cost proposal. It is up to the Contractor to determine the precise amount of material required for the completion of this project; and to provide excess material, as required. The cost to handle and fabricate flashing metal from the Owner provided flat stock is contractor's responsibility and to be added into the bid cost proposal.

C. All required flashings as required per each specification section for plumbing, electrical, gas, etc. will be the Contractors responsibility to provide and install as well as to be included in the bid cost.

D. All materials not specifically included in the owner supplied materials section will be the responsibility of the contractor to provide and install in compliance with section 073113.

E. Freight charges of owner supplied materials will be the responsibility of the Owner.

F. Contractor must coordinate and take delivery of materials, count all materials and ensure it matches the list below, unload and properly locate materials at the job site, and properly protect, cover and store at jobsite.

G. Contractor must be able to provide certification in writing from roof system manufacturer that the contractor is approved to install the specified roof system and provide all warranty requirements of section 073113.

1. Materials specifically provided by the Owner:

    a. See Section 016400 Owner Supplied Materials

END OF SECTION

SECTION 07550
MODIFIED BITUMINOUS MEMBRANE ROOFING

1.GENERAL

1.1. SECTION INCLUDES

A. Includes all labor, non-owner supplied materials, and equipment to install a modified bitumen roof system over the properly prepared substrate.

B. Includes removal and disposal of existing roofing system(s), insulation board, gutters, flashings, sheet metal items, copings, etc. for a complete prepared roof surface to receive the new roofing system.

C. Includes a new cold applied 2-ply asphalt roofing system with all accessories as needed for a complete warrantable roofing system.

D. See section 011100 Summary of Work for a detailed scope of work.

1.2. RELATED SECTIONS

A. Section 01110 – Summary of Work

B. Section 06100 - Rough Carpentry

C. Section 07220 - Insulation Board

D. Section 073113 - Asphalt Shingles

E. Section 07620 - Sheet Metal Flashing and Trim

F. Section 09910 - Painting

1.3. REFERENCES

A. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.

B. ASTM D 312 - Standard Specification for Asphalt used in Roofing.

C. ASTM D 451 - Standard Test Method for Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products.

D. ASTM D 1970 - Specification for Sheet Materials, Self-Adhering Polymer Modified Bituminous, Used as Steep Roofing Underlayment for Ice Dam Protection.

E. ASTM D 1079 Standard Terminology Relating to Roofing, Waterproofing and Bituminous Materials.

F. ASTM D 1227 Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.

G. ASTM D 1863 Standard Specification for Mineral Aggregate Used as a Protective Coating for Roofing.

H. ASTM D 2178 Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.

I. ASTM D 2822 Standard Specification for Asphalt Roof Cement.

J. ASTM D 2824 Standard Specification for Aluminum-Pigmented Asphalt Roof Coating.

K. ASTM D 4601 Standard Specification for Asphalt Coated Glass Fiber Base Sheet Used in Roofing.

L. ASTM D 5147 Standard Test Method for Sampling and Testing Modified Bituminous Sheet Materials.

M. ASTM D 6162 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.

N. ASTM D 6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.

O. ASTM D 6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

P. ASTM E 108 - Standard Test Methods for Fire Test of Roof Coverings

Q. Factory Mutual Research (FM): Roof Assembly Classifications.

R. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.

S. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.

T. Underwriters Laboratories, Inc. (UL): Fire Hazard Classifications.

U. Warnock Hersey (WH): Fire Hazard Classifications.

V. ANSI-SPRI ES-1 Wind Design Standard for Edge Systems used with Low Slope Roofing Systems.

W. ASCE 7, Minimum Design Loads for Buildings and Other Structures

X. UL - Fire Resistance Directory.

Y. FM Approvals - Roof Coverings and/or RoofNav assembly database.

Z. California Title 24 Energy Efficient Standards.

1.4. DESIGN / PERFORMANCE REQUIREMENTS

A. Perform work in accordance with all federal, state and local codes.

B. Exterior Fire Test Exposure: Roof system shall achieve a UL, FM or WH Class rating for roof slopes indicated on the Drawings as follows:
   1. Factory Mutual Class A Rating.
   2. Underwriters Laboratory Class A Rating.
   3. Warnock Hersey Class A Rating.

C. Design Requirements:
   1. Uniform Wind Uplift Load Capacity
      a. Installed roof system shall withstand negative (uplift) design wind loading pressures complying with the following criteria.
         1. Design Code: ASCE 7, Method 2 for Components and Cladding.
         2. Importance Category:
            a. III.
         3. Importance Factor of:

a. 1.0
4. Wind Speed: 115 mph
5. Ultimate Pullout Value: 364 pounds per each of the fastener
6. Exposure Category:
a. B.
7. Design Roof Height: 15 feet.
8. Minimum Building Width: 40 feet.
9. Roof Pitch: 0.5 :12.
10. Roof Area Design Uplift Pressure:
a. Zone 1 - Field of roof 14.3 psf
b. Zone 2 - Eaves, ridges, hips and rakes 24 psf
c. Zone 3 - Corners 36 psf

2. Snow Load: N/A psf.
3. Live Load: 20 psf, or not to exceed original building design.
4. Dead Load:
a. Installation of new roofing materials shall not exceed the dead load capacity of the existing roof structure.

D. Energy Star: Roof System shall comply with the initial and aged reflectivity required by the U.S. Federal Government's Energy Star program.

E. LEED: Roof system shall meet the reflectivity and emissivity criteria to qualify for one point under the LEED credit category, Credit 7.2, Landscape & Exterior Design to Reduce Heat Island - Roof.

F. Roof System membranes containing recycled or bio-based materials shall be third party certified through UL Environment.

G. Roof system shall have been tested in compliance with the following codes and test requirements:
1. Miami-Dade County:
a. Self-Adhered Membrane Systems Over:
1. Wood Decks N.O.A.
b. Torch and Mop Membrane Systems Over
1. Wood Decks N.O.A.
c. Roofing Underlayments
1. Garland Underlayments N.O.A.
d. Roofing Cements and Coatings
1. Garland Coatings and Mastics N.O.A.
2. Cool Roof Rating Council:
a. CRRC Directory CRRC 077-0028
3. International Code Council Evaluation Service (ICC-ES):
a. Membrane Systems
1. ESR-_____
4. Underwriters Laboratories:
a. Certification TGFU.R_____
5. Warnock Hersey
a. ITS Directory of Listed Products
6. FM Approvals:
a. RoofNav Website

1.5. SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation instructions.

C. Shop Drawings: Submit shop drawings including installation details of roofing, flashing, fastening, insulation and vapor barrier, including notation of roof slopes and fastening patterns of insulation and base modified bitumen membrane, prior to job start.

D. Design Pressure Calculations: Submit design pressure calculations for the roof area in accordance with ASCE 7 and local Building Code requirements. Include a roof system attachment analysis report, certifying the system's compliance with applicable wind load requirements before Work begins. Report shall be signed and sealed by a Professional Engineer registered in the State of the Project who has provided roof system attachment analysis for not less than 5 consecutive years.

E. LEED Submittals: Provide documentation of how the requirements of Credit will be met:
   1. List of proposed materials with recycled content. Indicate post-consumer recycled content and pre-consumer recycled content for each product having recycled content.
   2. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.
   3. Product reflectivity and emissivity criteria to qualify for one point under the LEED credit category, Credit 7.2, Landscape & Exterior Design to Reduce Heat Island - Roof.

F. Recycled or Bio-Based Materials: Provide third party certification through UL Environment of roof System membranes containing recycled or bio based materials

G. Verification Samples: For each modified bituminous membrane ply product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

H. Provide written certification from the roofing system manufacturer certifying the applicator is currently authorized to install the specified roof system and ability to provide the specified warranty.

I. Sample Warranty: Provide an unexecuted copy of the warranty specified for this project clearly stating the terms required of the owner, contractor, and manufacturer.

J. Manufacturer's Certificates: Provide to certify products meet or exceed specified requirements.

K. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147.

L. Manufacturer's Fire Compliance Certificate: Certify that the roof 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.

M. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic inspection and maintenance of all completed roofing work. Provide product warranty executed by the manufacturer. Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.6. QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified with documented ISO 9001 certification and minimum of twelve years of documented experience and must not have been in Chapter 11 bankruptcy during the last five years.

C. Installer Qualifications: Company specializing in performing Work of this section with

minimum five years documented experience and a certified Pre-Approved Garland Contractor.

D. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress.

E. Product Certification: Provide manufacturer's certification that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.

F. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.

1.7. PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to commencing Work of this section.

B. Review installation procedures and coordination required with related Work.

C. Inspect and make notes of job conditions prior to installation:
   1. Record minutes of the conference and provide copies to all parties present.
   2. Identify all outstanding issues in writing designating the responsible party for follow-up action and the timetable for completion.
   3. Installation of roofing system shall not begin until all outstanding issues are resolved to the satisfaction of the Owner and Architect.

1.8. DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging with labels intact until ready for installation.

B. Store all roofing materials in a dry place, on pallets or raised platforms, out of direct exposure to the elements until time of application. Store materials at least 4 inches above ground level and covered with "breathable" tarpaulins.

C. Stored in accordance with the instructions of the manufacturer prior to their application or installation. Store roll goods on end on a clean flat surface except store KEE-Stone FB 60 rolls flat on a clean flat surface. No wet or damaged materials will be used in the application.

D. Store at room temperature wherever possible, until immediately prior to installing the roll. During winter, store materials in a heated location with a 50 degree F (10 degree C) minimum temperature, removed only as needed for immediate use. Keep materials away from open flame or welding sparks.

E. Avoid stockpiling of materials on roofs without first obtaining acceptance from the Architect/ Engineer.

F. Adhesive storage shall be between the range of above 50 degree F (10 degree C) and below 80 degree F (27 degree C). Area of storage shall be constructed for flammable storage.

1.9. COORDINATION

A. Coordinate Work with installing associated metal flashings as work of this section proceeds.

1.10. PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.11. WARRANTY

A. Upon completion of the work, provide the Manufacturer's written and signed NDL Warranty, warranting that, if a leak develops in the roof during the term of this warranty, due either to defective material or defective workmanship by the installing contractor, the manufacturer shall provide the Owner, at the Manufacturer's expense, with the labor and material necessary to return the defective area to a watertight condition.
   1. Warranty Period:
      a. 30 years from date of acceptance.

B. Installer is to guarantee all work against defects in materials and workmanship for a period indicated following final acceptance of the Work.
   1. Warranty Period:
      a. 3 years from date of acceptance.

2.PRODUCTS

2.1. MANUFACTURERS

A. Acceptable Manufacturer: The Garland Company, Inc.; 3800 E. 91st St., Cleveland, OH 44105. Local Representative: Richard Jones Phone: (559) 647-1196. rjones@garlandind.com Web Site: www.garlandco.com.

B. Requests for substitutions will not be considered for this project.

C. The Products specified are intended and the Standard of Quality for the products required for this project. If other products are proposed the bidder must disclose in the bid the manufacturer and the products that they intend to use on the Project. If no manufacturer and products are listed, the bid may be accepted only with the use of products specified.
   1. Bidder will not be allowed to change materials after the bid opening date.
   2. If alternate products are included in the bid, the products must be equal to or exceed the products specified. Supporting technical data shall be submitted to the Architect/ Owner for approval prior to acceptance.
   3. In making a request for substitution, the Bidder/Roofing Contractor represents that it has:
      a. Personally investigated the proposed product or method, and determined that it is equal or superior in all respects to that specified.
      b. Will provide the same guarantee for substitution as for the product and method specified.
      c. Will coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.
      d. Will waive all claims for additional cost related to substitution, which consequently become apparent.
      e. Cost data is complete and includes all related cost under his/her contract or other contracts, which may be affected by the substitution.
      f. Will reimburse the Owner for all redesign cost by the Architect for accommodation of the substitution.
   4. Architect/ Owner reserves the right to be the final authority on the acceptance or rejection of any or all bids, proposed alternate roofing systems or materials that has met ALL specified requirement criteria.
   5. Failure to submit substitution package, or any portion thereof requested, will result in immediate disqualification and consideration for that particular contractors request for manufacturer substitution.

2.2. COLD APPLIED 2-PLY ROOF SYSTEM

A. Rosin Sheet: One ply of mechanically attached to the prepared substrate.
   1. Red Rosin Paper:

B. Insulation: As specified in Section 07220 or at minimum;
   1. One layer of six side primed ½" woodfiber insulation board is to be installed with mechanical fasteners per ASCE 7.

C. Base (Ply) Sheet: One ply bonded to the prepared substrate with Interply Adhesive:
   1. StressBase 80:

D. Modified Cap Sheet: One ply bonded to the prepared substrate with Interply Adhesive:
   1. StressPly Plus FR Mineral:

E. Interply Adhesive:
   1. Weatherking Plus WC:

F. Flashing Base (Ply): One ply bonded to the prepared substrate with Interply Adhesive:
   1. StressBase 80:

G. Flashing Cap Sheet: One ply bonded to the prepared substrate with Interply Adhesive:
   1. StressPly Plus FR Mineral:

H. Flashing Ply Adhesive:
   1. Flashing Bond Mastic / Adhesive

I. Surfacing:
   1. Pyramic Acrylic Coating

2.3. ACCESSORIES:

A. Roof Insulation Base Layer(s): Provide roof insulation as specified in accordance with Section 07220.

B. Roof Insulation Top Layer: Provide one layer of ½" six side primed Blue Ridge Structodek High Density Fiberboard Roof Insulation. ASTM C 208, Type II.

C. Vapor Retarder: Red Rosin Paper; Install layer rosin sheet shingled uniformly to achieve one ply over the entire prepared substrate. Shingle in direction of slope of roof to shed water on each area of roof.
   1. Red Rosin Paper by WR Meadows
      a. Weight – 12 lb./roll
      b. Size – 500 square feet p/roll
      c. 36" wide by 167' long

D. Nails and Fasteners: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel, Fasteners shall be self-clinching type of penetrating type as recommended by the deck manufacturer. Fasten nails and fasteners flush-driven through flat metal discs not less than 1 inch (25 mm) diameter. Omit metal discs when one-piece composite nails or fasteners with heads not less than 1 inch (25 mm) diameter are used.

E. Walkway Pads - As recommended and furnished by the membrane manufacturer set in approved adhesive to control foot traffic on roof top surface and provide a durable system compliant non-slip walkway.
   1. WhiteWalk Roof Traffic Pads by WR Meadows
      a. ½" x 3' x 4'
      b. Install walk way pads in a path from all roof access points to and around all

HVAC and serviceable mechanical equipment, to and around roof hatches, and as designated by the owner.

F. Urethane Sealant Hybrid - Tuff-Stuff MS: One part, non-sag sealant as approved and furnished by the membrane manufacturer for moving joints.
   1. Tensile Strength, ASTM D 412: 250 psi
   2. Elongation, ASTM D 412: 450%
   3. Hardness, Shore A ASTM C 920: 35
   4. Adhesion-in-Peel, ASTM C 92: 30 pli

G. Sealant - Green-Lock Structural Adhesive: Single component, 100% solids structural adhesive as furnished and recommended by the membrane manufacturer.
   1. Elongation, ASTM D 412: 300%
   2. Hardness, Shore A, ASTM C 920: 50
   3. Shear Strength, ASTM D 1002: 300 psi

H. Butyl Tape: 100% solids, asbestos free and compressive tape designed to seal as recommended and furnished by the membrane manufacturer.

I. Glass Fiber Cant - Glass Cant: Continuous triangular cross Section made of inorganic fibrous glass used as a cant strip as recommended and furnished by the membrane manufacturer.

2.4. EDGE TREATMENT AND ROOF PENETRATION FLASHINGS

A. Pre-Manufactured Edge Metal Finishes:
   1. Exposed and unexposed surfaces for mill finish flashing, fascia, and coping cap, as shipped from the mill
   2. Exposed surfaces for coated panels:
      a. Steel Finishes: fluorocarbon finish. Epoxy primer baked both sides, .2-.25 mils thickness as approved by finish coat manufacturer.
         Weathering finish as referred by National Coil Coaters Association (NCCA).
         Provided with the following properties.
         1. Pencil Hardness: ASTM D3363, HB-H / NCCA II-2.
         2. Bend: ASTM D-4145, O-T / NCCA II-19
         3. Cross-Hatch Adhesion: ASTM D3359, no loss of adhesion
         4. Gloss (60 deg. angle): ASTM D523, 25+/-5%
         5. Reverse Bend: ASTM D2794, no cracking or loss of adhesion
         6. Nominal Thickness: ASTM D1005
            a. Primer: 0.2 mils
            b. Topcoat, 0.7 mils min
            c. Clear Coat (optional, only used with 22 ga. steel) 0.3 mils
         7. Color: Provide as specified. (Subject to minimum quantities)

B. Flashing Boot - Rubbertite Flashing Boot: Neoprene pipe boot for sealing single or multiple pipe penetrations adhered in approved adhesives as recommended and furnished by the membrane manufacturer.

C. Vents and Breathers: Heavy gauge aluminum and fully insulated vent that allows moisture and air to escape but not enter the roof system as recommended and furnished by the membrane manufacturer.

D. Pitch pans, Rain Collar 24 gauge stainless or 20oz (567gram) copper. All joints should be welded/soldered watertight. See details for design.

E. Drain Flashings should be 4lb (1.8kg) sheet lead formed and rolled.

F. Plumbing stacks should be 4lb (1.8kg) sheet lead. All plumbing stacks are to have the factory lead caps (counter flashing) installed. Caulking and banding will not be acceptable on

open top pipe penetrations. On field fabricated flashings where a lead cap can't be applied a lead umbrella flashing is to be installed, flared out, caulking and banding will be required with the specified sealant.

G. Liquid Flashing - Tuff-Flash: An asphaltic-polyurethane, low odor, liquid flashing material designed for specialized details unable to be waterproofed with typical modified membrane flashings.
   1. Tensile Strength, ASTM D 412: 400 psi
   2. Elongation, ASTM D 412: 300%
   3. Density @77 deg. F 8.5 lb/gal typical

H. Fabricated Flashings: Fabricated flashings and trim are specified in Section 07620.
   1. Fabricated flashings and trim shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the CDA Copper Development Association "Copper in Architecture - Handbook" as applicable.

I. Manufactured Roof Specialties: Shop fabricated copings, fascia, gravel stops, control joints, expansion joints, joint covers and related flashings and trim are specified in Section 07710.
   1. Manufactured roof specialties shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the NRCA "Roofing and Waterproofing Manual" as applicable.

3.EXECUTION

3.1. EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Inspect and approve the deck condition, slopes and fastener backing if applicable, parapet walls, expansion joints, roof drains, stack vents, vent outlets, nailers and surfaces and elements.

C. Verify that work penetrating the roof deck, or which may otherwise affect the roofing, has been properly completed.

D. If substrate preparation and other conditions are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2. PREPARATION

A. General: Clean surfaces thoroughly prior to installation.
   1. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
   2. Fill substrate surface voids that are greater than 1/4 inch wide with an acceptable fill material.
   3. Roof surface to receive roofing system shall be smooth, clean, free from loose gravel, dirt and debris, dry and structurally sound.
   4. Wherever necessary, all surfaces to receive roofing materials shall be power broom and vacuumed to remove debris and loose matter prior to starting work.
   5. Do not apply roofing during inclement weather. Do not apply roofing membrane to damp, frozen, dirty, or dusty surfaces.
   6. Fasteners and plates for fastening components mechanically to the substrate shall provide a minimum pull-out capacity of 300 lbs. (136 k) per fastener. Base or ply sheets attached with cap nails require a minimum pullout capacity of 40 lb. per nail.
   7. Prime decks where required, in accordance with requirements and recommendations of the primer and deck manufacturer.

B. Wood Deck:
   1. Dimensional wood deck shall be minimum 1 inch (25 mm) thick, knotholes and cracks

larger than 1/4 inch shall be covered with sheet metal. All boards shall be appropriately nailed and have adequate end bearing to the centers of beams/rafters. Lumber shall be kiln dried.

2. Plywood shall be a minimum 15/32 inch (11.9 mm) thick and conform to the standards and installation requirements of the American Plywood Association (APA).
3. If no roof insulation is specified, provide a suitable dry sheathing paper, followed by an approved base sheet nailed appropriately for the specified roof system, with 1 inch (25 mm) diameter caps and annular nails unless otherwise required by the applicable Code or Approval agency.
4. Insulation is to be mechanically attached in accordance with the insulation manufacturer's recommendations unless otherwise required by the applicable Code.
5. In all retrofit roof applications, it is required that deck be inspected for defects. Any defects are to be corrected per the deck manufacturer's recommendations and standards of the APA/Engineered Wood Association prior to new roof application.
6. Light metal wall ties or other structural metal exposed on top of the wood deck shall be covered with one ply of a heavy roofing sheet, such as HPR Glasbase Base Sheet, extending 2 inches to 6 inches (51 mm to 152 mm) beyond the metal in all directions. Nail in place before applying the base ply.

3.3. INSTALLATION - GENERAL

A. Install modified bitumen membranes and flashings in accordance with manufacturer's instructions and with the recommendations provided by the National Roofing Contractors Association's Roofing & Waterproofing Manual, the Asphalt Roofing Manufacturers Association, and applicable codes.

B. General: Avoid installation of modified bitumen membranes at temperatures lower than 40-45 degrees F. When work at such temperatures unavoidable use the following precautions:
   1. Take extra care during cold weather installation and when ambient temperatures are affected by wind or humidity, to ensure adequate bonding is achieved between the surfaces to be joined. Use extra care at material seam welds and where adhesion of the applied product to the appropriately prepared substrate as the substrate can be affected by such temperature constraints as well.
   2. Unrolling of cold materials, under low ambient conditions must be avoided to prevent the likelihood of unnecessary stress cracking. Rolls must be at least 40 degrees F at the time of application. If the membrane roll becomes stiff or difficult to install, it must be replaced with roll from a heated storage area.

C. Commence installation of the roofing system at the lowest point of the roof (or roof area), working up the slope toward the highest point. Lap sheets shingle fashion so as to constantly shed water

D. All slopes greater than 2:12 require back-nailing to prevent slippage of the ply sheets. Use ring or spiral-shank 1 inch cap nails, or screws and plates at a rate of 1 fastener per ply (including the membrane) at each insulation stop. Place insulation stops at 16 ft o.c. for slopes less than 3:12 and 4 feet o.c. for slopes greater than 3:12. On non-insulated systems, nail each ply directly into the deck at the rate specified above. When slope exceeds 2:12, install all plies parallel to the slope (strapping) to facilitate backnailing. Install 4 additional fasteners at the upper edge of the membrane when strapping the plies.

3.4. INSTALLATION COLD APPLIED ROOF SYSTEM

A. Base Ply: Cut base ply sheets into 18 foot lengths and allow plies to relax before installing. Install base sheet in Interply Adhesive: applied at the rate required by the manufacturer. Shingle base sheets uniformly to achieve one ply throughout over the prepared substrate. Shingle in proper direction to shed water on each large area of roofing.
   1. Lap ply sheet ends 8 inches. Stagger end laps 12 inches minimum.
   2. Solidly bond to the substrate and adjacent ply with specified cold adhesive at the rate

of 2 to 2-1/2 gallons per 100 square feet.
3. Roll must push a puddle of adhesive in front of it with adhesive slightly visible at all side laps. Use care to eliminate air entrapment under the membrane.
4. Install subsequent rolls of modified across the roof as above with a minimum of 4 inch side laps and 8 inch staggered end laps. Lay modified membrane in the same direction as the underlayers but the laps shall not coincide with the laps of the base layers.
5. Extend plies 2 inches beyond top edges of cants at wall and projection bases.
6. Install base flashing ply to all perimeter and projection details.
7. Allow the one ply of base sheet to cure at least 30 minutes before installing the modified membrane. However, the modified membrane must be installed the same day as the base plies.

B. Modified Cap Ply(s): Cut cap ply sheets into 18 foot lengths and allow plies to relax before installing. Install in interplay adhesive applied at the rate required by the manufacturer. Shingle sheets uniformly over the prepared substrate to achieve the number of plys specified. Shingle in proper direction to shed water on each large area of roofing.
1. Lap ply sheet ends 8 inches. Stagger end laps 12 inches minimum.
2. Solidly bond to the base layers with specified cold adhesive at the rate of 2 to 2-1/2 gallons per 100 square feet.
3. Roll must push a puddle of adhesive in front of it with adhesive slightly visible at all side laps. Care should be taken to eliminate air entrapment under the membrane.
4. Install subsequent rolls of modified across the roof as above with a minimum of 4 inch side laps and 8 inch staggered end laps. Lay modified membrane in the same direction as the underlayers but the laps shall not coincide with the laps of the base layers.
5. Allow cold adhesive to set for 5 to 10 minutes before installing the top layer of modified membrane.
6. Extend membrane 2 inches beyond top edge of all cants in full moppings of the cold adhesive as shown on the Drawings.

C. Fibrous Cant Strips: Provide non-combustible perlite or glass fiber cant strips at all wall/curb detail treatments where angle changes are greater than 45 degrees. Cant may be set in approved cold adhesives, hot asphalt or mechanically attached with approved plates and fasteners.

D. Wood Blocking, Nailers and Cant Strips: Provide wood blocking, nailers and cant strips as specified in Section 06114.
1. Provide nailers at all roof perimeters and penetrations for fastening membrane flashings and sheet metal components.
2. Wood nailers should match the height of any insulation, providing a smooth and even transition between flashing and insulation areas.
3. Nailer lengths should be spaced with a minimum 1/8 inch gap for expansion and contraction between each length or change of direction.
4. Nailers and flashings should be fastened in accordance with Factory Mutual "Loss Prevention Data Sheet 1- 49, Perimeter Flashing" and be designed to be capable of resisting a minimum force of 200 lbs/lineal foot in any direction.

E. Metal Work: Provide metal flashings, counter flashings, parapet coping caps and thru-wall flashings as specified in Section 07620 or Section 07710. Install in accordance with the SMACNA "Architectural Sheet Metal Manual" or the NRCA Roofing Waterproofing manual.

F. 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 (203 mm) o/c to achieve constant compression. Provide suitable, sealant at the top edge if required.

G. Flashing Base Ply: Install flashing sheets by the same application method used for the base ply.
   1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
   2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
   3. Adhere to the underlying base ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
   4. Solidly adhere the entire flashing ply to the substrate. Secure the tops of all flashings that are not run up and over curb through termination bar fastened at 6 inches (152 mm) O.C. and sealed at top.
   5. Seal all vertical laps of flashing ply with a three-course application of trowel-grade mastic and fiberglass mesh and apply white roofing granules.
   6. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.
   7. Coordinate roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices with the roofing system work.
   8. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed, or nailed 4 inches on center and covered with an acceptable counter flashing.

H. Flashing Cap Ply:
   1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
   2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
   3. Adhere to the underlying base flashing ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
   4. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.
   5. Coordinate roof accessories, miscellaneous sheet metal accessory items with the roofing system work.
   6. All stripping shall be installed prior to flashing cap sheet installation.
   7. Heat and scrape granules when welding or adhering at cut areas and seams to granular surfaces at all flashings.
   8. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed, or nailed 4 inches on center and covered with an acceptable counter flashing.

I. Roof Walkways: Provide walkways in areas indicated on the Drawings or at a minimum;
   a. Install walk way pads in a path from all roof access points to and around all HVAC and serviceable mechanical equipment, to and around roof hatches, and as designated by the owner.

3.5. INSTALLATION OF SURFACING

A. Prior to installation of surface coating, obtain approval from manufacturer as to work completed. On average, at least 30 days are required prior to final surfacing.
   1. Reflective Coating:
      a. Allow all cold applied mastics and coating to properly dry and cure before coating application.
      b. Paint all exposed roofing with manufacturer's base coat acrylic coating installed at a rate of one (1.5) gallons per square, back roll entire installation required.

c. Paint all exposed roofing with manufacturer's Energy Star top coat acrylic coating installed at a rate of one (1.5) gallons per square, complete coverage for a clean neat appearance is required. Additional coats may be required to achieve complete coverage and proper mil thickness.

3.6. INSTALLATION EDGE TREATMENT AND ROOF PENETRATION FLASHING

A. Fabricated Flashings: Fabricated flashings and trim are provided as specified in Section 07620.
   1. Fabricated flashings and trim shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the Copper Development Association "Copper in Architecture - Handbook" as applicable.

B. Metal Edge:
   1. Inspect the nailers to assure proper attachment and configuration.
   2. Run one ply over the edge. Assure coverage of all wood nailers. Fasten plies with ring shank nails at 8 inches (203 mm) o.c.
   3. Install continuous cleat and fasten at 6 inches (152 mm) o.c.
   4. Install new metal edge hooked to continuous cleat and set in bed of roof cement. Fasten flange to wood nailers every 3 inches (76 mm) o.c. staggered.
   5. Prime metal edge at a rate of 100 square feet per gallon and allow to dry.
   6. Strip in flange with base flashing ply covering entire flange in bitumen with 6 inches (152 mm) on to the field of roof. Assure ply laps do not coincide with metal laps.
   7. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Seal outside edge with rubberized cement.

C. Roof Edge With Gutter:
   1. Inspect the nailer to assure proper attachment and configuration. Increase slope at metal edge by additional degree of slope in first board.
   2. Run one ply over the edge. Assure coverage of all wood nailers. Fasten plies with ring shank nails at 8 inches (203 mm) o.c.
   3. Install gutter and strapping.
   4. Install continuous cleat and fasten at 6 inches (152 mm) o.c.
   5. Install new metal edge hooked to continuous cleat and set in bed of roof cement. Fasten flange to wood nailer every 3 inches (76 mm) o.c. staggered.
   6. Prime metal edge at a rate of 100 square feet per gallon and allow to dry.
   7. Strip in flange with base flashing ply covering entire flange in bitumen with 6 inches (152 mm) onto the field of the roof. Assure ply laps do not coincide with metal laps.
   8. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof.

D. Scupper Through Wall (Overflow):
   1. Inspect the nailer to assure proper attachment and configuration.
   2. Run one ply over nailer up the overflow, into the scupper hole and up flashing as in typical wall flashing detail. Assure coverage of all wood nailers.
   3. Install scupper box in a 1/4 inch (6 mm) bed of mastic. Assure all box seams are soldered and have a minimum 4 inch (101 mm) flange. Make sure all corners are closed and soldered. Prime scupper at a rate of 100 square feet per gallon and allow to dry.
   4. Fasten flange of scupper box every 3 inches (76 mm) o.c. staggered.
   5. Strip in flange scupper box with base flashing ply covering entire area with 6 inch (152 mm) overlap on to the field of the roof and wall flashing.
   6. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all seams.

E. Coping Cap:
   1. Minimum flashing height is 8 inches (203 mm) above finished roof height. Maximum flashing height is 24 inches (609 mm). Prime vertical wall at a rate of 100 square feet

per gallon and allow to dry.
2. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
3. Attach tapered board to top of wall.
4. Install base flashing ply covering entire wall and wrapped over top of wall and down face with 6 inches (152 mm) on to field of roof and set in cold asphalt. Nail membrane at 8 inches (203 mm) o.c.
5. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all seams and install white roofing granules in fresh mastic.
6. Install continuous cleat and fasten at 6 inches (152 mm) o.c. to outside wall.
7. Install new metal coping cap hooked to continuous cleat.
8. Fasten inside cap 24 inches (609 mm) o.c. with approved fasteners and neoprene washers through slotted holes, which allow for expansion and contraction.

F. Surface Mounted Counterflashing:
1. Minimum flashing height is 8 inches (203 mm) above finished roof height. Maximum flashing height is 24 inches (609 mm). Prime vertical wall at a rate of 100 square feet per gallon and allow to dry.
2. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
3. Install base flashing ply covering wall set in bitumen with 6 inches (152 mm) on to field of the roof.
4. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all vertical seams and install white roofing granules in fresh mastic.
5. Apply butyl tape to wall behind flashing. Secure termination bar through flashing, butyl tape and into wall. Alternatively use caulk to replace the butyl tape.
6. Secure counterflashing set on butyl tape above flashing at 8 inches (203 mm) o.c. and caulk top of counterflashing.

G. Equipment Support:
1. Minimum curb height is 8 inches (203 mm) above finished roof height. Prime vertical at a rate of 100 square feet per gallon and allow to dry.
2. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
3. Install base flashing ply covering curb set in bitumen with 6 inches (152 mm) on to field of the roof.
4. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Attach top of membrane to top of curb and nail at 8 inches (203 mm) o.c. Apply a three-course application of mastic and mesh at all vertical seams and install white roofing granules in fresh roofing mastic.
5. Install pre-manufactured cover. Fasten sides at 24 inches (609 mm) o.c. with fasteners and neoprene washers. Furnish all joint cover laps with butyl tape between metal covers.
6. Set equipment on neoprene pad and fasten as required by equipment manufacturer.

H. Curb Detail/Air Handling Station:
1. Minimum curb height is 8 inches (203 mm) above finished roof height. Prime vertical at a rate of 100 square feet per gallon and allow to dry.
2. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
3. Install base flashing ply covering curb set in bitumen with 6 inches (152 mm) on to field of the roof.
4. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all vertical seams and install white roofing granules into fresh mastic.
5. Install pre-manufactured counterflashing with fasteners and neoprene washers or per manufacturer's recommendations.
6. Set equipment on neoprene pad and fasten as required by equipment manufacturer.

I. Skylight:
1. Minimum curb height is 8 inches (203 mm) above finished roof height. Prime vertical

at a rate of 100 square feet per gallon and allow to dry.
2. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
3. Install base flashing ply covering curb set in bitumen with 6 inches (152 mm) on to field of the roof.
4. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Attach top of membrane to top of wood nailer and apply a three-course application of mastic and mesh. Allow to cure and install white roofing granules in fresh mastic.
5. Install pre-manufactured lens and fasten flashing sides at 8 inches (203 mm) o.c. with fasteners and neoprene washers.

J. Exhaust Fan:
1. Minimum curb height is 8 inches (203 mm) above finished roof height. Prime vertical at a rate of 100 square feet per gallon and allow to dry.
2. Set cant in bitumen. Run all plies over cant a minimum of 2 inches (50 mm).
3. Install base flashing ply covering curb with 6 inches (152 mm) on to field of the roof.
4. Install a second ply of modified flashing ply installed over the base flashing ply, 9 inches (228 mm) on to field of the roof. Attach top of membrane to top of wood curb and nail at 8 inches (203 mm) o.c. Apply a three-course application of mastic and mesh at all vertical seams and install white roofing granules into fresh mastic.
5. Install metal exhaust fan over the wood nailers and flashing to act as counterflashing. Fasten per manufacturer's recommendation.

K. Roof Drain:
1. Plug drain to prevent debris from entering plumbing.
2. Taper insulation to drain minimum of 24 inches (609 mm) from center of drain.
3. Install two base flashing plies (40 inch square minimum) in bitumen.
4. Set lead/copper flashing (30 inch square minimum) in 1/4 inch (6 mm) bed of mastic. Run lead/copper into drain a minimum of 2 inches (50 mm). Prime lead/copper at a rate of 100 square feet per gallon and allow to dry.
5. Run roof system plies over drain. Cut out plies inside drain bowl.
6. Install modified membrane (48 inch square minimum) in bitumen.
7. Install clamping ring and assure that all plies are under the clamping ring.
8. Remove drain plug and install strainer.

L. Plumbing Stack:
1. Minimum stack height is 12 inches (609 mm).
2. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.
3. Set lead/copper flashing in 1/4 inch (6 mm) bed of mastic.
4. Prime flange of new sleeve. Install properly sized sleeves set in 1/4 inch (6 mm) bed of roof cement.
5. Install base flashing ply in bitumen.
6. Install membrane in bitumen.
7. Caulk the intersection of the membrane with elastomeric sealant.
8. Install factory lead cap (counter flashing) proper size and fit must be installed at all pipe penetrations.

M. Heat Stack:
1. Minimum stack height is 12 inches (609 mm).
2. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.
3. Prime flange of new sleeve. Install properly sized sleeves set in 1/4 inch (6 mm) bed of roof cement.
4. Install base flashing ply in bitumen.
5. Install modified membrane in bitumen.
6. Caulk the intersection of the membrane with elastomeric sealant.
7. Install new collar over cape. Weld collar or install stainless steel draw brand.

3.7. CLEANING

A. Clean-up and remove daily from the site all wrappings, empty containers, paper, loose particles and other debris resulting from these operations.

B. Remove asphalt markings from finished surfaces.

C. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.8. PROTECTION

A. Provide traffic ways, erect barriers, fences, guards, rails, enclosures, chutes and the like to protect personnel, roofs and structures, vehicles and utilities.

B. Protect exposed surfaces of finished walls with tarps to prevent damage.

C. Plywood for traffic ways required for material movement over existing roofs shall be not less than 5/8 inch (16 mm) thick.

D. In addition to the plywood listed above, an underlayment of minimum 1/2 inch (13 mm) recover board is required on new roofing.

E. Special permission shall be obtained from the Manufacturer before any traffic shall be permitted over new roofing.

3.9. FIELD QUALITY CONTROL

A. Inspection: Provide manufacturer's field observations at start-up and two (2) days per week through project completion. Provide a final inspection upon completion of the Work.
   1. Warranty shall be issued upon manufacturer's acceptance of the installation.
   2. Field observations shall be performed by a 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 representative indicating procedures followed, weather conditions and any discrepancies found during inspection.
   4. Provide a final report from the representative, certifying that the roofing system has been satisfactorily installed according to the project specifications, approved details and good general roofing practice.

3.10. SCHEDULES

A. Base (Ply) Sheet:
   1. StressBase 80: 80 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing base sheet reinforced with a fiberglass scrim, performance requirements according to ASTM D 5147.
      a. Tensile Strength, ASTM D 5147
         1. 2 in/min. @ 0 +/- 3.6 deg. F MD 100 lbf/in XD 100 lbf/in
         2. 50mm/min. @ -17.78 +/- 2 deg. C MD 17.5 kN/m XD 17.5 kN/m
      b. Tear Strength, ASTM D 5147
         1. 2 in/min. @ 73.4 +/- 3.6 deg. F MD 110 lbf XD 100 lbf
         2. 50mm/min. @ 23 +/- 2 deg. C MD 489 N XD 444 N
      c. Elongation at Maximum Tensile, ASTM D 5147
         1. 2 in/min. @ 0 +/- 3.6 deg. F MD 4 % XD 4 %
         2. 50mm/min@ -17.78 +/- 2 deg. C MD 4 % XD 4 %
      d. Low Temperature Flexibility, ASTM D 5147, Passes -40 deg. F (-40 deg. C)

B. Modified Cap (Ply) Sheet:
   1. StressPly Plus FR Mineral: 155 mil SBS (Styrene-Butadiene-Styrene) mineral surfaced, rubber modified roofing membrane reinforced with a fiberglass and polyester composite scrim. ASTM D 6162, Type III Grade G

a. Tensile Strength, ASTM D 5147
    1. 2 in/min. @ 73.4 +/- 3.6 deg. F MD 310 lbf/in XD 310 lbf/in
    2. 50 mm/min. @ 23 +/- 2 deg. C MD 54.25 kN/m XD 54.25 kN/m
b. Tear Strength, ASTM D 5147
    1. 2 in/min. @ 73.4 +/- 3.6 deg. F MD 500 lbf XD 500 lbf
    2. 50 mm/min. @ 23 +/- 2 deg. C MD 2224 N XD 2224 N
c. Elongation at Maximum Tensile, ASTM D 5147
    1. 2 in/min. @ 73.4 +/- 3.6 deg. F MD 8% XD 8%
    2. 50 mm/min. @ 23 +/- 2 deg. C MD 8% XD 8%
d. Low Temperature Flexibility, ASTM D 5147, Passes -30 deg. F (-34 deg. C)

C. Interply Adhesive:
1. Weatherking Plus WC: Rubberized, polymer modified cold process asphalt roofing bitumen V.O.C. compliant ASTM D 3019. Performance Requirements:
    a. Non-Volatile Content ASTM D 4479 78%
    b. Density ASTM D1475 9.0 lbs./gal.
    c. Viscosity Stormer ASTM D562 900-1100 grams
    d. Flash Point ASTM D 93 100 deg. F min. (37 deg. C)
    e. Slope: up to 2:12
    f. V.O.C. ASTM D 3960 Less than 250 g/l
    g. Flash Point ASTM D 93 105 deg. F
    h. Slope maximum 1:12

D. Flashing Base Ply:
1. StressBase 80: 80 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing base sheet reinforced with a fiberglass scrim, performance requirements according to ASTM D 5147.
    a. Tensile Strength, ASTM D 5147
        1. 2 in/min. @ 0 +/- 3.6 deg. F MD 100 lbf/in XD 100 lbf/in
        2. 50 mm/min. @ -17.78 +/- 2 deg. C MD 17.5 kN/m XD 17.5 kN/m
    b. Tear Strength, ASTM D 5147
        1. 2 in/min. @ 73.4 +/- 3.6 deg. F MD 110 lbf XD 100 lbf
        2. 50 mm/min. @ 23 +/- 2 deg. C MD 489 N XD 444 N
    c. Elongation at Maximum Tensile, ASTM D 5147
        1. 2 in/min. @ 0 +/- 3.6 deg. F MD 4 % XD 4 %
        2. 50 mm/min. @ -17.78 +/- 2 deg. C MD 4 % XD 4 %
    d. Low Temperature Flexibility, ASTM D 5147
        1. Passes -40 deg. F (-40 deg. C)

E. Flashing Ply Adhesive:
1. Flashing Bond: Asphalt roofing mastic V.O.C. compliant, ASTM D 2822, Type II trowel grade flashing adhesive.
    a. Non-Volatile Content ASTM D 4479 70 min.
    b. Density ASTM D 1475 8.3 lbs./gal. (1kg/l)
    c. Flash Point ASTM D 93 103 deg. F (39 deg. C)

F. Surfacing:
1. Flashing Cap (Ply) Sheet:
    a. StressPly Plus FR Mineral: 155 mil SBS (Styrene-Butadiene-Styrene) mineral surfaced, rubber modified roofing membrane reinforced with a fiberglass and polyester composite scrim. ASTM D 6162, Type III Grade G
        1. Tensile Strength, ASTM D 5147
            a. 2 in/min. @ 73.4 +/- 3.6 deg. F MD 310 lbf/in XD 310 lbf/in
            b. 50 mm/min. @ 23 +/- 2 deg. C MD 54.25 kN/m XD 54.25 kN/m
        2. Tear Strength, ASTM D 5147
            a. 2 in/min. @ 73.4 +/- 3.6 deg. F MD 500 lbf XD 500 lbf
            b. 50 mm/min. @ 23 +/- 2 deg. C MD 2224 N XD 2224 N
        3. Elongation at Maximum Tensile, ASTM D 5147
            a. 2 in/min. @ 73.4 +/- 3.6 deg. F MD 8% XD 8%

b. 50 mm/min. @ 23 +/- 2 deg. C MD 8% XD 8%

4. Low Temperature Flexibility, ASTM D 5147, Passes -30 deg. F (-34 deg. C)

G. Coating:
1. White Elastomeric Roof Coating:
a. Pyramic Acrylic Roof Coating: White, Non Toxic, Fire Retardant Roof Coating.
1. Non Volatile 66%
2. Density 12lb. / gal
3. VOC <50 gal./l
4. Reflectance 0.84
5. Emittance 0.91
6. SRI 106

3.11. OWNER SUPPLIED MATERIALS

A. The Owner will only supply the quantity listed in the owner supplied materials section of this specification below. All additional materials and accessories will be the full responsibility of the contractor to provide and install per the specification and project requirements.

B. Any material or accessories required for the installation of the roof system in excess of the Owner provided material must be supplied by the Contractor and added into the bid cost proposal. It is up to the Contractor to determine the precise amount of material required for the completion of this project; and to provide excess material, as required. The cost to handle and fabricate flashing metal from the Owner provided flat stock is contractor's responsibility and to be added into the bid cost proposal.

C. All required flashings as required per each specification section for plumbing, electrical, gas, etc. will be the Contractors responsibility to provide and install as well as to be included in the bid cost.

D. All materials not specifically included in the owner supplied materials section will be the responsibility of the contractor to provide and install in compliance with section 07550.

E. Freight charges of owner supplied materials will be the responsibility of the Owner.

F. Contractor must coordinate and take delivery of materials, count all materials and ensure it matches the list below, unload and properly locate materials at the job site, and properly protect, cover and store at jobsite.

G. Contractor must be able to provide certification in writing from roof system manufacturer that the contractor is approved to install the specified roof system and provide all warranty requirements of section 07550.

1. Materials specifically provided by the Owner:

a. See Section 016400 Owner Supplied Materials

END OF SECTION

SECTION 07563
FLUID APPLIED ROOFING RESTORATION

1.GENERAL

1.1. SECTION INCLUDES

A. Work described in this section includes preparation of the existing roof system and application of a complete roof surface restoration system per manufacturer's recommendations.

B. Includes all items and accessories for a complete warrantied watertight roofing system.

C. Includes installation of owner supplied materials.

D. See section 011100 Summary of work for a detailed scope of work.

1.2. RELATED SECTIONS

A. Section 06100 - Rough Carpentry

B. Section 07550 - Modified Bitumenous Roofing

C. Section 07620 - Sheet Metal Flashing and Trim

D. Section 07710 - Manufactured Roof Specialties

E. Section 15430 - Plumbing Specialties

1.3. REFERENCES

A. ASTM D 5 - Standard Test Method for Penetration of Bituminous Materials.

B. ASTM D 36 - Standard Test Method for Softening Point of Bitumen.

C. ASTM D 43 - Standard Specification for Coal Tar Primer Used in Roofing, Dampproofing, and Waterproofing.

D. ASTM D 71 - Standard Test Method for Relative Density of Solid Pitch and Asphalt.

E. ASTM D 75 - Standard Practice for Sampling Aggregates.

F. ASTM D 92 - Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester.

G. ASTM D 93 - Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester.

H. ASTM D 113 - Standard Test Method for Ductility of Bituminous Materials.

I. ASTM D 1002 - Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal).

J. ASTM D 1370 - Standard Test Method for Contact Compatibility Between Asphaltic Materials (Oliensis Test).

K. ASTM D 1863 - Standard Specification for Mineral Aggregate Used on Built-Up Roofs.

L. ASTM D 3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.

M. SRI - Solar Reflectance Index calculated according to ASTM E 1980.

N. SMACNA Architectural Sheet Metal Manual.

O. ANSI/SPRI ES-1 - Testing and Certification Listing of Shop Fabricated Edge Metal

P. National Roofing Contractors Association (NRCA) - Roofing and Waterproofing Manual.

1.4. SYSTEM DESCRIPTION

A. Built-Up Smooth or Mineral Modified Surface Restoration: Renovation work includes:
1. Surface preparation: Remove loose mineral, dust, dirt, and debris with high pressure water. Clean all debris from jobsite.
2. Fascia Edges: Cut back edges 2”. Prime, coat with mastic, mesh, mastic.
3. Parapets and Vertical Surfaces: Prime, replace flashings, coarse all laps and corners, with mastic, mesh, mastic and granule. Replace all base flashings with new membrane.
4. Metal Flashings: Repair/Replace metal flashings, pitch pockets, etc. Install mastic around all pipes, penetrations, etc.
5. Roof Repairs: Repair blisters, stressed or cracked membrane. Cut back, patch with primer/mastic/membrane.
6. Primer: Prime entire roof surface.
7. Base Coat: Apply base coat over entire roof surface.
8. Reinforcement: Install full fabric reinforcement/ topcoat entire roof surface.
9. Install roofing minerals / granules into the coating while it is wet and let coating cure for 30-45 days and then paint with reflective coating the entire roof area and all base flashings / walls.

1.5. SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Submit shop drawings including installation details of roofing, flashing, fastening, insulation and vapor barrier, including notation of roof slopes and fastening patterns of insulation and base modified bitumen membrane, prior to job start.

D. LEED Submittals: Provide documentation of how the requirements of Credit will be met:
1. List of proposed materials with recycled content. Indicate post-consumer recycled content and pre-consumer recycled content for each product having recycled content.
2. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.
3. Product reflectivity and emissivity criteria to qualify for one point under the LEED credit category, Credit 7.2, Landscape & Exterior Design to Reduce Heat Island - Roof.

E. Verification Samples: For each product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, and color.

F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

G. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic inspection and maintenance of all completed roofing work. Provide product warranty executed by the manufacturer. Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.6. QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.

B. Manufacturer Qualifications: Manufacturer: Company specializing in manufacturing products specified in this section with documented ISO 9001 certification and minimum twelve years and experience.

C. Installer Qualifications: Company specializing in performing Work of this section with minimum five years documented experience and a certified Pre-Approved Garland Contractor.

D. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress.

E. Product Certification: Provide manufacturer's certification that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.

F. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.

1.7. PRE-INSTALLATION CONFERENCE

A. Convene a pre-roofing conference approximately two weeks before scheduled commencement of roofing system installation and associated work.

B. Require attendance of installers of deck or substrate construction to receive roofing, installers of rooftop units and other work in and around roofing which must precede or follow roofing work including mechanical work, Architect, Owner, roofing system manufacturer's representative.

C. Objectives include:
   1. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
   2. Tour representative areas of roofing substrates, inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work.
   3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
   4. Review roofing system requirements, Drawings, Specifications and other Contract Documents.
   5. Review and finalize schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
   6. Review required inspection, testing, certifying procedures.
   7. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing.
   8. Record conference including decisions and agreements reached. Furnish a copy of records to each party attending.

1.8. DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging with labels intact until ready for installation.

B. Store all roofing materials in a dry place, on pallets or raised platforms, out of direct exposure to the elements until time of application. Store materials at least 4 inches above ground level and covered with "breathable" tarpaulins.

C. Stored in accordance with the instructions of the manufacturer prior to their application or installation. Store roll goods on end on a clean flat surface. No wet or damaged materials will be used in the application.

D. Store at room temperature wherever possible, until immediately prior to installing the roll. During winter, store materials in a heated location with a 50 degree F (10 degree C) minimum temperature, removed only as needed for immediate use. Keep materials away from open flame or welding sparks.

E. Avoid stockpiling of materials on roofs without first obtaining acceptance from the Architect/ Engineer.

F. Adhesive storage shall be between the range of above 50 degree F (10 degree C) and below 80 degree F (27 degree C). Area of storage shall be constructed for flammable storage.

1.9. PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Weather Condition Limitations: Do not apply roofing system during inclement weather or when a 40 percent chance of precipitation or greater is expected.

C. Proceed with roofing work only when existing and forecasted weather conditions will permit unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements.

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

E. When applying materials with spray equipment, take precautions to prevent over spray and/ or solvents from damaging or defacing surrounding walls, building surfaces, vehicles or other property. Care should be taken to do the following:
   1. Close air intakes into the building.
   2. Have a dry chemical fire extinguisher available at the jobsite.
   3. Post and enforce "No Smoking" signs.

F. Avoid inhaling spray mist; take precautions to ensure adequate ventilation.

G. Protect completed roof sections from foot traffic for a period of at least 48 hours at 75 degrees F (24 degrees C) and 50 percent relative humidity or until fully cured.

H. Take precautions to ensure that materials do not freeze.

I. Minimum temperature for application is 40 degrees F (4 degrees C) and rising for solvent based materials and 50 degrees F (10 degrees C) and rising for water based.

1.10. WARRANTY

A. Upon completion of the work, provide the Manufacturer's written and signed limited labor and materials Warranty, warranting that, if a leak develops in the roof during the term of this warranty, due either to defective material or defective workmanship by the installing contractor, the manufacturer shall provide the Owner, at the Manufacturer's expense, with the labor and material necessary to return the defective area to a watertight condition.

1. Warranty Period:
    a. 5 years from date of acceptance plus 5 additional years after required inspection by Garland.

B. Installer is to guarantee all work against defects in materials and workmanship for a period indicated following final acceptance of the Work.
    1. Warranty Period:
        a. 2 years from date of acceptance.

2.PRODUCTS

2.1. MANUFACTURERS

A. Acceptable Manufacturer: Garland Company, Inc. (The), 3800 E. 91st St.; Cleveland, OH 44105; Toll Free Tel: 800-321-9336; Tel: 216-641-7500; Fax: 216-641-0633; Web Site:)

B. Local Contact: Rich Jones (559) 647-1196

C. The Products specified are intended and the Standard of Quality for the products required for this project. If other products are proposed the bidder must disclose in the bid the manufacturer and the products that they intend to use on the Project. If no manufacturer and products are listed, the bid may be accepted only with the use of products specified.
    1. Bidder will not be allowed to change materials after the bid opening date.
    2. If alternate products are included in the bid, the products must be equal to or exceed the products specified. Supporting technical data shall be submitted to the Architect/ Owner for approval a minimum of ten (10) days prior to the bid date for review.
    3. In making a request for substitution, the Bidder/Roofing Contractor represents that it has:
    4. Personally investigated the proposed product or method, and determined that it is equal or superior in all respects to that specified.
    5. Will provide the same guarantee for substitution as for the product and method specified.
    6. Will coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.
    7. Will waive all claims for additional cost related to substitution, which consequently become apparent.
    8. Cost data is complete and includes all related cost under his/her contract or other contracts, which may be affected by the substitution.
    9. Will reimburse the Owner for all redesign cost by the Architect for accommodation of the substitution.
    10. Architect/ Owner reserves the right to be the final authority on the acceptance or rejection of any or all bids, proposed alternate roofing systems or materials that has met ALL specified requirement criteria.
    11. Failure to submit substitution package, or any portion thereof requested, will result in immediate disqualification

2.2. ROOF RESTORATION SYSTEM MINERAL SURFACE ROOFS

A. Roof Restoration System:
    1. Primer: Garla-Prime VOC - ½ gallon per 100 square feet.
    2. Coating: Energizer K Plus FR - 6 gallons per 100 square feet.
    3. Flashing: VersiPly Mineral, three course all existing laps and granule
    4. Reinforcement: Grip Polyester Firm - full fabric reinforcement.
    5. Surfacing:
        a. Minerals at 40 lbs per square or partial coverage
        b. Pyramic Acrylic Coating at 1.5 gallons per square base coat, 1.5 gallons per square top coat. To be applied after 30-45 days from completion of restoration work.

2.3. ACCESSORIES:

A. Nails and Fasteners: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel, Fasteners shall be self-clinching type of penetrating type as recommended by the deck manufacturer. Fasten nails and fasteners flush-driven through flat metal discs not less than 1 inch (25 mm) diameter. Omit metal discs when one-piece composite nails or fasteners with heads not less than 1 inch (25 mm) diameter are used.

B. Walkway Pads - As recommended and furnished by the membrane manufacturer set in approved adhesive to control foot traffic on roof top surface and provide a durable system compliant non-slip walkway.

C. Urethane Sealant - Tuff-Stuff: One part, non-sag sealant as approved and furnished by the membrane manufacturer for moving joints.
1. Tensile Strength, ASTM D 412: 250 psi
2. Elongation, ASTM D 412: 950%
3. Hardness, Shore A ASTM C 920: 35
4. Adhesion-in-Peel, ASTM C 92: 30 pli

D. Urethane Adhesive - Green-Lock Structural Adhesive: Single component, 100% solids structural adhesive as furnished and recommended by the membrane manufacturer.
1. Elongation, ASTM D 412: 300%
2. Hardness, Shore A, ASTM C 920: 50
3. Shear Strength, ASTM D 1002: 300 psi

2.4. EDGE TREATMENT AND ROOF PENETRATION FLASHINGS

A. Flashing Boot - Rubbertite Flashing Boot: Neoprene pipe boot for sealing single or multiple pipe penetrations adhered in approved adhesives as recommended and furnished by the membrane manufacturer.

B. Vents and Breathers: Heavy gauge aluminum and fully insulated vent that allows moisture and air to escape but not enter the roof system as recommended and furnished by the membrane manufacturer.

C. Pitch pans, Rain Collar 24 gauge stainless or 20oz (567gram) copper. All joints should be welded/soldered watertight.

D. Drain Flashings should be 4lb (1.8kg) sheet lead formed and rolled.

E. Plumbing stacks should be 4lb (1.8kg) sheet lead formed and rolled.

F. Liquid Flashing - Tuff-Flash: An asphaltic-polyurethane, low odor, liquid flashing material designed for specialized details unable to be waterproofed with typical modified membrane flashings.
1. Tensile Strength, ASTM D 412: 400 psi
2. Elongation, ASTM D 412: 300%
3. Density @77 degrees F 8.5 lb/gal typical

G. Fabricated Flashings:
1. Fabricated flashings and trim shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the CDA Copper Development Association "Copper in Architecture - Handbook" as applicable.

H. Manufactured Roof Specialties: Manufactured copings, fascia, gravel stops, control joints, expansion joints, etc. as needed for a complete new roofing system.

1. Manufactured roof specialties shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the NRCA "Roofing and Waterproofing Manual" as applicable.

3.EXECUTION

3.1. EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify that work penetrating the roof deck, or which may otherwise affect the roofing, has been properly completed.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2. ROOF PREPARATION AND REPAIR

A. General:
1. Remove existing roof flashings from curbs and parapet walls down to the surface of the roof. Remove existing flashings at roof drains and roof penetrations as noted at the pre bid meeting or marked for correction.
2. Remove all wet, deteriorated, blistered or delaminated roofing membrane or insulation and fill in any low spots occurring as a result of removal work to create a smooth, even surface for application of new roof membranes.
3. Install new wood nailers as necessary to accommodate insulation/recovery board or new nailing patterns.
4. When mechanically attached, the fastening pattern for the insulation/recovery board shall be as recommended by the specific product manufacturer.
5. Existing roof surfaces shall be primed as necessary and allowed to dry prior to installing the roofing system.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Repair all defects such as deteriorated roof decks; replace saturated insulation board, replace loose or brittle membrane or membrane flashings. Verify that exiting conditions meet the following requirements:
1. Existing membrane is either fully adhered or that the membranes mechanical fasteners are secured and functional.
2. Application of roofing materials over a brittle roof membrane is not recommended.

D. Remove all loose dirt and foreign debris from the roof surface. Do not damage roof membrane in cleaning process.

E. Clean and seal all parapet walls, gutters and coping caps, and repair any damaged metal where necessary. Seal watertight all fasteners, pipes, drains, vents, joints and penetrations where water could enter the building envelope.

F. Clean the entire roof surface by removing all dirt, algae, paint, oil, talc, rust or foreign substance. Use a 10 percent solution of TSP (tri-sodium phosphate), Simple Green and warm water. Scrub heavily soiled areas with a brush. Rinse with fresh water to remove all TSP solution. Allow roof to dry thoroughly before continuing.

G. Repair existing roof membrane as necessary to provide a sound substrate for the liquid membrane. All surface defects (cracks, blisters, tears) must be repaired with similar materials.

H. Pre-Treatment of Known Growth - General Surfaces: Once areas of moss, mold, algae and other fungal growths or vegetation have been removed and surfaces have also been

thoroughly cleaned, apply a biocide wash at a maximum spread rate of 0.2 gallons/square (0.08 liters/m), to guard against subsequent infection. Allow to dry onto absorbent surfaces before continuing with the application. On non-absorbent surfaces, allow to react before thoroughly rinsing to remove all traces of the solution.

3.3. INSTALLATION

A. General Installation Requirements:
   1. Install in accordance with manufacturer's instructions. Apply to minimum coating thickness required by the manufacturer.
   2. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing the roof system.
   3. Insurance/Code Compliance: Where required by code, install and test the roofing system to comply with governing regulation and specified insurance requirements.
   4. Protect work from spillage of roofing materials and prevent materials from entering or clogging drains and conductors. Replace or restore work damaged by installation of the roofing system.
   5. All primers must be top coated within 24 hours of application. Re-prime If more time passes after priming.
   6. Keep roofing materials dry during application.
   7. Phased construction will not be allowed, base coat, reinforcement, top coat, and granules will be completed in one pass then allowed to cure 30-45 days prior to the white reflective coating.
   8. Coordinate counter flashing, cap flashings, expansion joints and similar work with work specified in other Sections under Related Work.
   9. Coordinate roof accessories and miscellaneous sheet metal accessory items, including piping vents and other devices with work specified in other Sections under Related Work.

B. Renovation work includes:
   1. Surface preparation: Remove all loose roofing granules, dirt and foreign debris from the roof surface.
   2. Flashing:
      a. Fascia Edges: Cut back edges 2”. Prime, coat with mastic, mesh, and mastic.
      b. Parapets and Vertical Surfaces: Prepare parapet walls and vertical surfaces where indicated, with asphalt primer. Allow primer to dry tack free. Apply flashing plies as follows:
         1. With brush grade flashing adhesive.
         2. Solidly adhere flashing membrane to substrate and nail using termination bar.
         3. Seal all vertical laps of flashing membrane with a three-course application of Flashing Bond and fiberglass mesh.
      c. Metal Flashings: Repair/Replace metal flashings, pitch pockets, etc.
   3. Primer: Prime entire roof surface at 1/2 gallon per 100 SF.
   4. Reinforcement: Install full fabric reinforcement/ topcoat entire roof surface.
      a. Run fabric parallel to the low edge using a shingling method up the slope with minimum 3 inch fabric laps.
      b. After positioning reinforcement to roll out, apply Coating about 40 inches wide to surface where reinforcement ply is to be applied at 3.0-3.5 gallons per 100 SF.
      c. Do not apply too far ahead of fabric so coating does not dry before fabric can be embedded.
      d. Immediately roll a 36 inch width of reinforcement into wet coating.
      e. Use care to lay the fabric tight to the roof surface without air pockets, wrinkles, fishmouths, etc.
      f. After embedding reinforcement into the Coating, apply additional coating to completely saturate the fabric at 3.0-3.5 gallons per 100 SF.
   5. Coating: Apply top coat as soon as possible after embedding reinforcement.
      a. Apply Energizer K Plus FR Coating to entire roof surface at 3.0-3.5 gallons per

100 SF.

6. Surfacing: Install roofing minerals into the coating while it is wet at 40 lbs per square. Let coating cure for 30-45 days and then paint with reflective coating all roof and wall/ base flashings.

3.4. INSTALLATION EDGE TREATMENT AND ROOF PENETRATION FLASHING

A. Fabricated Flashings:
   1. Fabricated flashings and trim shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the Copper Development Association "Copper in Architecture - Handbook" as applicable.

B. Manufactured Roof Specialties: Manufactured copings, fascia, gravel stops, control joints, expansion joints, joint covers and related flashings and trim are provided as specified.
   1. Manufactured roof specialties shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the National Roofing Contractor's Association "Roofing and Waterproofing Manual" as applicable.

C. Metal Edge:
   1. Inspect the nailers to assure proper attachment and configuration.
   2. Run one ply over the edge. Assure coverage of all wood nailers. Fasten plies with ring shank nails at 8 inches (203 mm) o.c.
   3. Install continuous cleat and fasten at 6 inches (152 mm) o.c.
   4. Install new metal edge hooked to continuous cleat and set in bed of roof cement. Fasten flange to wood nailers every 3 inches (76 mm) o.c. staggered.
   5. Prime metal edge at a rate of 100 square feet per gallon and allow to dry.
   6. Strip in flange with base flashing ply covering entire flange in bitumen with 6 inches (152 mm) on to the field of roof. Assure ply laps do not coincide with metal laps.
   7. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Seal outside edge with rubberized cement.

D. Raised Metal Edge:
   1. Inspect the nailer to assure proper attachment and configuration.
   2. Run one ply over the edge. Assure coverage of all wood nailers. Fasten plies with ring shank nails at 8 inches (203 mm) o.c.
   3. Install continuous cleat and fasten at 6 inches (152 mm) o.c.
   4. Install new metal edge hooked to continuous cleat and set in bed of roof cement. Fasten flange to wood nailer every 3 inches (76 mm) o.c. staggered.
   5. Prime metal edge at a rate of 100 square feet per gallon and allow to dry.
   6. Strip in flange with base flashing ply covering entire flange in bitumen with 6 inches (152 mm) on to the field of roof. Assure ply laps do not coincide with metal laps.
   7. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof.

E. Coping Cap:
   1. Minimum flashing height is 8 inches (203 mm) above finished roof height. Maximum flashing height is 24 inches (609 mm). Prime vertical wall at a rate of 100 square feet per gallon and allow to dry.
   2. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
   3. Install base flashing ply covering entire wall and wrapped over top of wall and down face with 6 inches (152 mm) on to field of the roof and set in cold asphalt. Nail membrane at 8 inches (203 mm) o.c.
   4. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all seams and install granules.
   5. Install coping cap per manufacturer's recommendations.

F. Surface Mounted Counterflashing:
   1. Minimum flashing height is 8 inches (203 mm) above finished roof height. Maximum

flashing height is 24 inches (609 mm). Prime vertical wall at a rate of 100 square feet per gallon and allow to dry.
2. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
3. Install base flashing ply covering wall set in bitumen with 6 inches (152 mm) on to field of the roof.
4. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all vertical seams and install granules.
5. Apply butyl tape to wall behind flashing. Secure termination bar through flashing, butyl tape and into wall. Alternatively use caulk to replace the butyl tape.
6. Secure counterflashing set on butyl tape above flashing at 8 inches (203 mm) o.c. and caulk top of counterflashing.

G. Curb Detail/Air Handling Station:
1. Minimum curb height is 8 inches (203 mm) above finished roof height. Prime vertical at a rate of 100 square feet per gallon and allow to dry.
2. Set cant in bitumen. Run all field plies over cant a minimum of 2 inches (50 mm).
3. Install base flashing ply covering curb set in bitumen with 6 inches (152 mm) on to field of the roof.
4. Install a second ply of modified flashing ply in bitumen over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all vertical seams and install granules.
5. Install pre-manufactured counterflashing with fasteners and neoprene washers or per manufacturer's recommendations.
6. Set equipment on neoprene pad and fasten as required by equipment manufacturer.

H. Exhaust Fan:
1. Minimum curb height is 8 inches (203 mm) above finished roof height. Prime vertical at a rate of 100 square feet per gallon and allow to dry.
2. Set cant in bitumen. Run all plies over cant a minimum of 2 inches (50 mm).
3. Install base flashing ply covering curb with 6 inches (152 mm) on to field of the roof.
4. Install a second ply of modified flashing ply installed over the base flashing ply, 9 inches (228 mm) on to field of the roof. Attach top of membrane to top of wood curb and nail at 8 inches (203 mm) o.c. Apply a three-course application of mastic and mesh at all vertical seams and install granules.
5. Install metal exhaust fan over the wood nailers and flashing to act as counterflashing. Fasten per manufacturer's recommendation.

I. Roof Drain:
1. Plug drain to prevent debris from entering plumbing.
2. Taper insulation to drain minimum of 24 inches (609 mm) from center of drain.
3. Run roof system plies over drain. Cut out plies inside drain bowl.
4. Set lead/copper flashing (30 inch square minimum) in 1/4 inch bed of mastic. Run lead/copper into drain a minimum of 2 inches (50 mm). Prime lead/copper at a rate of 100 square feet per gallon and allow to dry.
5. Install base flashing ply (40 inch square minimum) in bitumen.
6. Install modified membrane (48 inch square minimum) in bitumen.
7. Install clamping ring and assure that all plies are under the clamping ring.
8. Remove drain plug and install strainer.

J. Plumbing Stack:
1. Minimum stack height is 12 inches (609 mm).
2. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.
3. Prime flange of new sleeve. Install properly sized sleeves set in 1/4 inch (6 mm) bed of roof cement.
4. Install base flashing ply in bitumen.
5. Install membrane in bitumen.
6. Caulk the intersection of the membrane with elastomeric sealant.

7. Turn sleeve a minimum of 1 inch (25 mm) down inside of stack.

3.5. APPLICATION OF SURFACING

A. Prior to installation of surface, obtain approval from manufacturer as to work completed. On average, at least 30-45 days are required prior to final surfacing.

B. Allow all cold applied mastics and coating to properly dry and cure before coating application.

C. Paint all exposed roofing with manufacturer's base coat acrylic coating installed at a rate of one and a half (1.5) gallons per square, back roll entire installation required.

D. Paint all exposed roofing with manufacturer's Energy Star top coat acrylic coating installed at a rate of one and a half (1.5) gallons per square, back roll entire installation required. Complete coverage is required with a clean finished appearance. Additional coats may be required.

3.6. CLEANING

A. Clean-up and remove daily from the site all wrappings, empty containers, paper, loose particles and other debris resulting from these operations.

B. Remove asphalt markings from finished surfaces.

C. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.7. PROTECTION

A. Provide traffic ways, erect barriers, fences, guards, rails, enclosures, chutes and the like to protect personnel, roofs and structures, vehicles and utilities.

B. Protect exposed surfaces of finished walls with tarps to prevent damage.

C. Plywood for traffic ways required for material movement over existing roofs shall be not less than 5/8 inch (16 mm) thick.

D. In addition to the plywood listed above, an underlayment of minimum 1/2 inch (13 mm) recover board is required on new roofing.

E. Special permission shall be obtained from the Manufacturer before any traffic shall be permitted over new roofing.

3.8. FIELD QUALITY CONTROL

A. Require attendance of roofing materials manufacturers' representatives at site during installation of the roofing system.

B. Perform field inspection and testing as required under provisions of Section 01410.

C. Correct defects or irregularities discovered during field inspection.

D. Inspection: Provide manufacturer's field observations at the project start-up and a minimum of two days per week throughout the course of construction. Provide a punch walk inspection and report as well as a final inspection upon completion of the work.

E. Warranty shall be issued upon manufacturer's acceptance of the installation.

F. Field observations shall be performed by a representative employed full-time by the manufacturer and whose primary job description is to assist, inspect and approve membrane

installations for the manufacturer.

G. Provide observation reports from the representative indicating procedures followed, weather conditions and any discrepancies found during inspection.

H. Provide a final report from the representative, certifying that the roofing system has been satisfactorily installed according to the project specifications, approved details and good general roofing practice.

3.9. FINAL INSPECTION

A. At completion of roofing installation and associated work, meet with Contractor, Architect, installer, installer of associated work, roofing system manufacturer's representative and others directly concerned with performance of roofing system.

B. Walk roof surface areas, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. Identify all items requiring correction or completion and furnish copy of list to each party in attendance.

C. If core cuts verify the presence of damp or wet materials, the installer shall be required to replace the damaged areas at his own expense.

D. Repair or replace deteriorated or defective work found at time above inspection as required to a produce an installation that is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

E. Architect upon completion of corrections.

F. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.

3.10. PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.11. SCHEDULES

A. Coatings:
   1. Coating: Energizer K Plus FR: Multi-purpose: rubberized, liquid waterproofing membrane designed to restore and upgrade fire ratings on existing smooth surfaced SBS, aged APP, and built-up roof surfaces.
      a. Non-Volatile, ASTM C 1250: Typical 80%
      b. Density, ASTM D 1475: 10 lbs./gal (1.21 g/cm3)
      c. Viscosity @ 77 degrees F (25 degrees C), Brookfield RVT, Spindle #5, 50 rpm: Typical 15,000/25,000 cP
      d. Flash Point, ASTM D 93: Minimum 100 degrees F (37.7 degrees C)
      e. Elongation @ 77 degrees F (25 degrees C), ASTM D 412: Typical 275%
      f. Water Absorption: Less than 0.7%
      g. Compound Stability: Passes 200 degrees F (93.3 degrees C)
      h. Accelerated Weathering Test (Q-UV; UVB-313 bulbs): Passes 2,000 hrs. exposure.
      i. Wet Film Thickness @ 6 gal. (22.7 l), 96 mils (2,438 microns)
      j. VOC: 250 g/l

B. Reinforcement/Base Coat
   1. Grip Polyester Firm: Strong, rigid polyester reinforcing fabric.
      a. Tensile 75.3 lbs (ASTM D 1682)
      b. Tear Strength 17.4 lbs

c. Elongation 44.25% (ASTM D 1682)
d. Nominal Thickness 15 mils

3.12. OWNER SUPPLIED MATERIALS

A. The Owner will only supply the quantity listed in the owner supplied materials section of this specification below. All additional materials and accessories will be the full responsibility of the contractor to provide and install per the specification and project requirements.

B. Any material or accessories required for the installation of the roof system in excess of the Owner provided material must be supplied by the Contractor and added into the bid cost proposal. It is up to the Contractor to determine the precise amount of material required for the completion of this project; and to provide excess material, as required. The cost to handle and fabricate flashing metal from the Owner provided flat stock is contractor's responsibility and to be added into the bid cost proposal.

C. All required flashings as required per each specification section for plumbing, electrical, gas, etc. will be the Contractors responsibility to provide and install as well as to be included in the bid cost.

D. All materials not specifically included in the owner supplied materials section will be the responsibility of the contractor to provide and install in compliance with section 07563.

E. Freight charges of owner supplied materials will be the responsibility of the Owner.

F. Contractor must coordinate and take delivery of materials, count all materials and ensure it matches the list below, unload and properly locate materials at the job site, and properly protect, cover and store at job site.

G. Contractor must be able to provide certification in writing from roof system manufacturer that the contractor is approved to install the specified roof system and provide all warranty requirements of section 07563.

1. Materials specifically provided by the Owner:

a. See Section 016400 Owner Supplied Materials

END OF SECTION

SECTION 076200

SHEET METAL FLASHING AND TRIM

1.GENERAL

1. RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

2. SUMMARY

A. Section Includes:

1. Manufactured through-wall flashing with counterflashing
2. Formed low-slope roof sheet metal fabrications.
3. Formed wall, coping, and soffit sheet metal fabrications.
4. Formed equipment support flashing
5. Surface mounted counter flashing
6. Manufactured reglets and counter flashing
7. Edge metal / gravel stop and cleat flashing
8. Gutters & Downspouts

B. Related Requirements:
1. Division 06 "Rough Carpentry" for wood nailers, curbs, and blocking.
2. Division 07 “Membrane Roofing” for materials and installation of sheet metal flashing and trim integral with roofing.
3. Division 07 “Metal Roofing” for materials and installation of sheet metal flashing and trim integral with roofing.
4. Division 07 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

3. COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leak proof, secure, and noncorrosive installation.

4. PREINSTALLATION MEETINGS

A. Pre Installation Conference: Conduct conference at Project site.

1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
3. Review requirements for insurance and certificates if applicable.
4. Review sheet metal flashing observation and repair procedures after flashing installation.

5. SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counter flashings as applicable.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches

C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

D. Samples for Verification: For each type of exposed finish.

1. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.

6. INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For each type of coping and roof edge flashing that is SPRI ES-1 tested.

C. Product Test Reports: For each product, for tests performed by a qualified testing agency.

D. Sample Warranty: For special warranty.

7. CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

8. QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1. For copings and roof edge flashings that are SPRI ES-1 tested**,** shop shall be listed as able to fabricate required details as tested and approved.

9. DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

10. WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: **20** years from date of Substantial Completion.

2.PRODUCTS

1. PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

D. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:

1. Design Pressure: As indicated on Drawings**.**

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F (67 deg C)**,** ambient; 180 deg F (100 deg C)**,** material surfaces**.**

2. SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 (Z275) coating designation; prepainted by coil-coating process to comply with ASTM A 755/A 755M.

1. Surface: Smooth, flat and with manufacturer's standard clear acrylic coating on both sides**.**
2. Exposed Coil-Coated Finish:
   a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

3. Color: Match Architect's sample
4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

3. UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 45 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.

1. The Garland Company Inc., 3800 E. 91st Street Cleveland OH 44105; R-Mer Seal self-adhering underlayment. Local Representative: Richard Jones (559) 647-1196 rjones@garlandind.com
2. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F or higher.
3. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F or lower.

B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

4. MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

   a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
   b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
   c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Zinc-Tin Alloy-Coated Stainless-Steel Sheet: Series 300 stainless steel.

C. Solder:

1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead with maximum lead content of 0.2 percent**.**

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

5. FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Sealant Joints: Where movable, non expansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

G. Do not use graphite pencils to mark metal surfaces.

6. ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- long sections. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than dimension indicated on Drawings. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.

1. Gutter Profile: Style B according to cited sheet metal standard.
2. Expansion Joints: Butt type with cover plate**.**
3. Accessories: Continuous, removable leaf screen with sheet metal frame and hardware cloth screen**.**
4. Gutters with Girth up to 15 Inches: Fabricate from the following materials:
   a. Galvanized Steel: 22 gauge thickness.

B. Downspouts: Fabricate downspouts per plans and details or per size per CA plumbing code. Fabricate from the following materials unless otherwise shown on drawings.
1. Galvanized Steel: 22 gauge thickness.

C. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape required, complete with outlet tubes, exterior flange trim, and built-in overflows. Fabricate from the following materials:

1. Galvanized Steel: 22 gauge thickness.

7. WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12-foot long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of

wall openings; and form with 2-inch high, end dams. Fabricate from the following materials:

1. Galvanized Steel: 22 gauge thickness.

B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend **4 inches** beyond wall openings. Form head and sill flashing with 2-inch high, end dams. Fabricate from the following materials:

1. Galvanized Steel: 22 gauge thickness.

C. Wall Expansion-Joint Cover: Fabricate from the following materials:

1. Galvanized Steel: 22 gauge thickness.

8. MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:

1. Galvanized Steel: 22 gauge thickness.

B. Overhead-Piping Safety Pans: Fabricate from the following materials:

1. Galvanized Steel: 22 gauge thickness.

3.EXECUTION

1. EXAMINATION

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

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

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

2. UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller. Cover underlayment within 14 days.

B. Apply slip sheet, wrinkle free, directly on substrate before installing sheet metal flashing and trim.

3. INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
5. Torch cutting of sheet metal flashing and trim is not permitted.
6. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of **10 feet** with no joints within 24 inches of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not solder metallic-coated steel sheet.
2. Do not pre-tin zinc-tin alloy-coated stainless steel**.**
3. Do not use torches for soldering.
4. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
5. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
6. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.
7. Copper-Clad Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for copper-clad stainless steel.

H. Rivets: Rivet joints in zinc where necessary for strength.

4. ROOF-DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutters: Join sections with riveted and soldered joints or joints sealed with sealant as shown and specified on drawings or summary/scope of work. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.

1. Fasten gutter spacers to front and back of gutter.
2. Anchor and loosely lock back edge of gutter to continuous cleat**,** eave or apron flashing**.**
3. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches apart.
4. Anchor gutter with gutter brackets and straps spaced not more than 24 inches apart to roof deck, unless otherwise indicated, and loosely lock to front gutter bead.
5. Anchor gutter with spikes and ferrules spaced not more than 24 inches apart.
6. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.
7. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.

C. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch below gutter discharge.

D. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints minimum of 4 inches in direction of water flow.

5. ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements**,** sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification. All roof edge flashings are to incorporate a minimum 22 gauge continuous cleat.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.

1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch centers.
2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch centers.

D. Copings: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.

E. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

F. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches. Secure in waterproof manner by means of interlocking folded seam or blind rivets and sealant, anchor and washer at 36-inch centers unless otherwise indicated.

G. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

6. WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 042000 "Unit Masonry."Section092400 "Cement Plastering."

C. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

7. MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

B. Overhead-Piping Safety Pans: Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.

8. ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

9. CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 62 00

SECTION 099100
PAINTING

1. **GENERAL**

A. **SECTION INCLUDES**

B. Surface preparation and field painting of fascia board, sheet metal items, edge metal, sheet metal counterfashing, and surfaces as specified including mechanical and electrical equipment that do not have a factory-applied finish.

C. Surface preparation and field painting of exposed exterior items and surfaces.

2. **RELATED SECTIONS**

A. Section 01 Summary of Work

B. Section 06 Rough Carpentry

C. Section 07 Modified Bitumen Roofing

D. Section 07 Modified Roofing Restoration

E. Section 07 Asphalt Shingle Roofing

F. Section 07 Sheet Metal Flashing and Trim

3. **REFERENCES**

A. American Society for Testing and Materials (ASTM) D 16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.

B. Steel Structures Painting Council (SSPC) SP6 - Commercial Blast Cleaning Procedures.

C. Steel Structures Painting Council (SSPC) SP10 - Near White Blast Cleaning Procedure.

4. **SUBMITTALS**

A. Submit under provisions of General Conditions.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
   2. Preparation instructions and recommendations.
   3. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

5. **QUALITY ASSURANCE**

A. Installer Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

C. Paint exposed surfaces. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.

D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

E. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   1. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   2. Refinish mock-up area as required to produce acceptable work.

6. **DELIVERY, STORAGE, AND HANDLING**

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 degree F (7 degree C). Maintain storage containers in a clean condition, free of foreign materials and residue.

C. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

D. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 degree F (10 and 32 degree C), unless manufacturer's instructions specifically states.

E. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 degree F (7 and 35 degree C).

F. Do not apply paint in or when snow, rain, fog, or mist; or when relative humidity exceeds 85 percent or is imminent; or at temperatures less than 5 degree F (3 degree C) above the dew point; or to damp or wet surfaces.
   1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

G. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

7. **PROJECT CONDITIONS**

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

8. **EXTRA MATERIALS**

A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

B. Quantity: Furnish Owner with an additional three percent, but not less than 1 gal (3.8 l) or 1 case, as appropriate, of each material and color applied.

9. **MANUFACTURERS**

A. Acceptable Manufacturer: BEHR Process Corporation, which is located at: 3400 W. Segerstrom Ave.; Santa Ana, CA 92704; Tel: 714-545-7101; Fax: 714-241-1002

B. Or owner and architect approved equal.

10. **PAINT MATERIAL - GENERAL**

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. VOC Classification: Provide materials, including primers, undercoats, and finish-coat materials, that meet local air quality management district regulations.

C. Color: Refer to Finish Schedule and Paint Legend for paint colors.

D. Application Rate: Coating thickness for primer, intermediate, barrier and finish coats shall be measured as Dry Film Thickness (DFT) and comply with manufacturer's published recommendations.

E. EXTERIOR PAINT SYSTEMS

A. Ferrous Metal - Steel / Iron:
   1. One Prime Coat:
      a. BEHR PREMIUM PLUS Interior/Exterior Oil-Based Primer & Sealer No. 434.
   2. Two finish coats:
      a. BEHR PREMIUM PLUS ULTRA Exterior Paint.

B. Non-Ferrous Metal - Galvanized / Aluminum:
   1. One Prime Coat: (If primer is required per product instruction)
      a. BEHR PREMIUM PLUS Exterior Water-Based Primer & Sealer No. 436.
   2. Two finish coats:
      a. BEHR PREMIUM PLUS ULTRA Exterior Paint.

C. Wood - Stain-Blocking / Tannin Bleed (i.e. Cedar and Redwood) - Solid Color Staining (If primer is required per product instruction)
   1. One Prime Coat:
      a. BEHR PREMIUM PLUS Exterior Water-Based Primer & Sealer No. 436.

D. Wood - Floors, Decks and Steps:
   1. One Prime Coat: (If primer is required per product instruction)
      a. BEHR PREMIUM PLUS Exterior Water-Based Primer & Sealer No. 436.
   2. Two finish coats:
      a. BEHR PREMIUM SOLID COLOR DECK, FENCE & SIDING

A. **EXECUTION**

11. **EXAMINATION**

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
   1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.
   2. If a potential incompatibility of primers applied by others exists, obtain the following from the primer Applicator before proceeding:
      a. Confirmation of primer's suitability for expected service conditions.
      b. Confirmation of primer's ability to be top coated with materials specified.

12. **PREPARATION**

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
   1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
   1. Provide barrier coats over incompatible primers or remove and reprime.
   2. Provide barrier coats over incompatible primers or remove primers and re-prime substrate.
   3. Cementitious Substrates: Prepare concrete, brick, concrete masonry block, and cement plaster surfaces to be coated. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods to prepare surfaces.
      a. Use abrasive blast-cleaning methods if recommended by coating manufacturer.
      b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not coat surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
   4. Wood Substrates: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Smoothly sand surfaces exposed to view and dust off.
      a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer, before applying primer.
      b. Immediately on delivery, prime edges, ends, faces, undersides, and backsides of wood to be coated.
      c. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
      d. Determine moisture content of surfaces by performing a moisture test. Do not coat if moisture content exceeds 15 percent.

5. Ferrous-Metal Substrates: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC recommendations.
    a. Blast-clean steel surfaces as recommended by coating manufacturer and according to SSPC-SP 10.
    b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
    c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire brush, solvent clean, and touch up with same primer as the shop coat.
6. Nonferrous-Metal Substrates: Clean nonferrous and galvanized surfaces according to manufacturer's written instructions for the type of service, metal substrate, and application required.
    a. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Material Preparation: Carefully mix and prepare coating materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.
3. Use only the type of thinners approved by manufacturer and only within recommended limits.
4. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

4. APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

B. General: Apply high-performance coatings according to manufacturer's written instructions.
1. Use applicators and techniques best suited for the material being applied.
2. Do not apply high-performance coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film.
3. Coating surface treatments, and finishes are indicated in the coating system descriptions.
4. Provide finish coats compatible with primers used.
5. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, grilles, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.

C. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. The number of coats and film thickness required is the same regardless of application method.
2. Completed Work: Match approved Samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.

5. FIELD QUALITY CONTROL

A. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:

1. Owner will engage a qualified independent testing agency to sample paint material being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in the presence of Contractor.
2. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove non-complying paint from Project site, pay for testing, and repaint surfaces previously coated with the non-complying paint. If necessary, Contractor may be required to remove non-complying paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

6. **CLEANING**

A. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

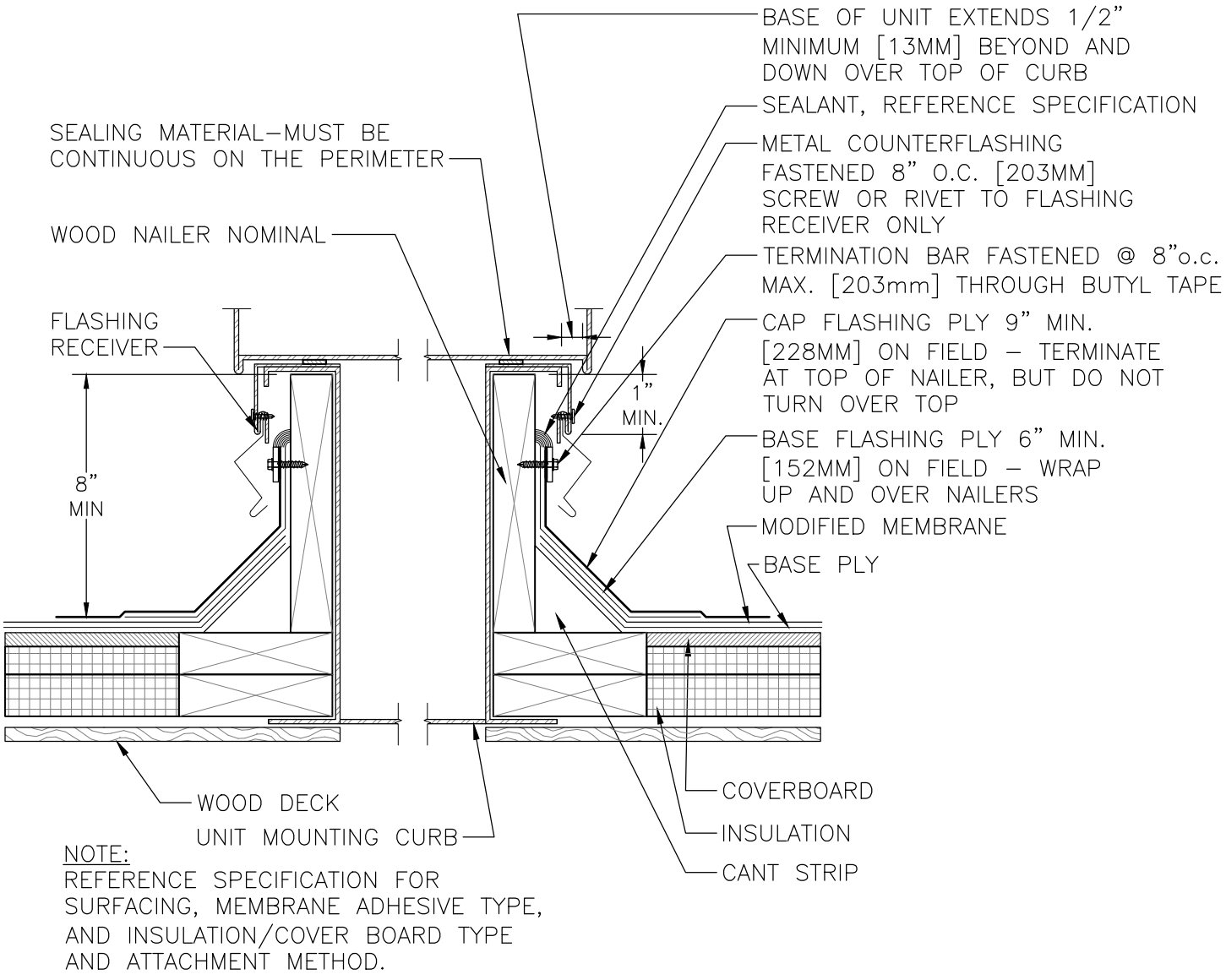
7. **PROTECTION**

A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

C. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces.

END OF SECTION



NOTE:
REFERENCE SPECIFICATION FOR SURFACING, MEMBRANE ADHESIVE TYPE, AND INSULATION/COVER BOARD TYPE AND ATTACHMENT METHOD.

DRAWINGS ON 8½"x11 TITLE BLOCKS ARE NOT TO SCALE.

CURB DETAIL / AIR HANDLING STATION

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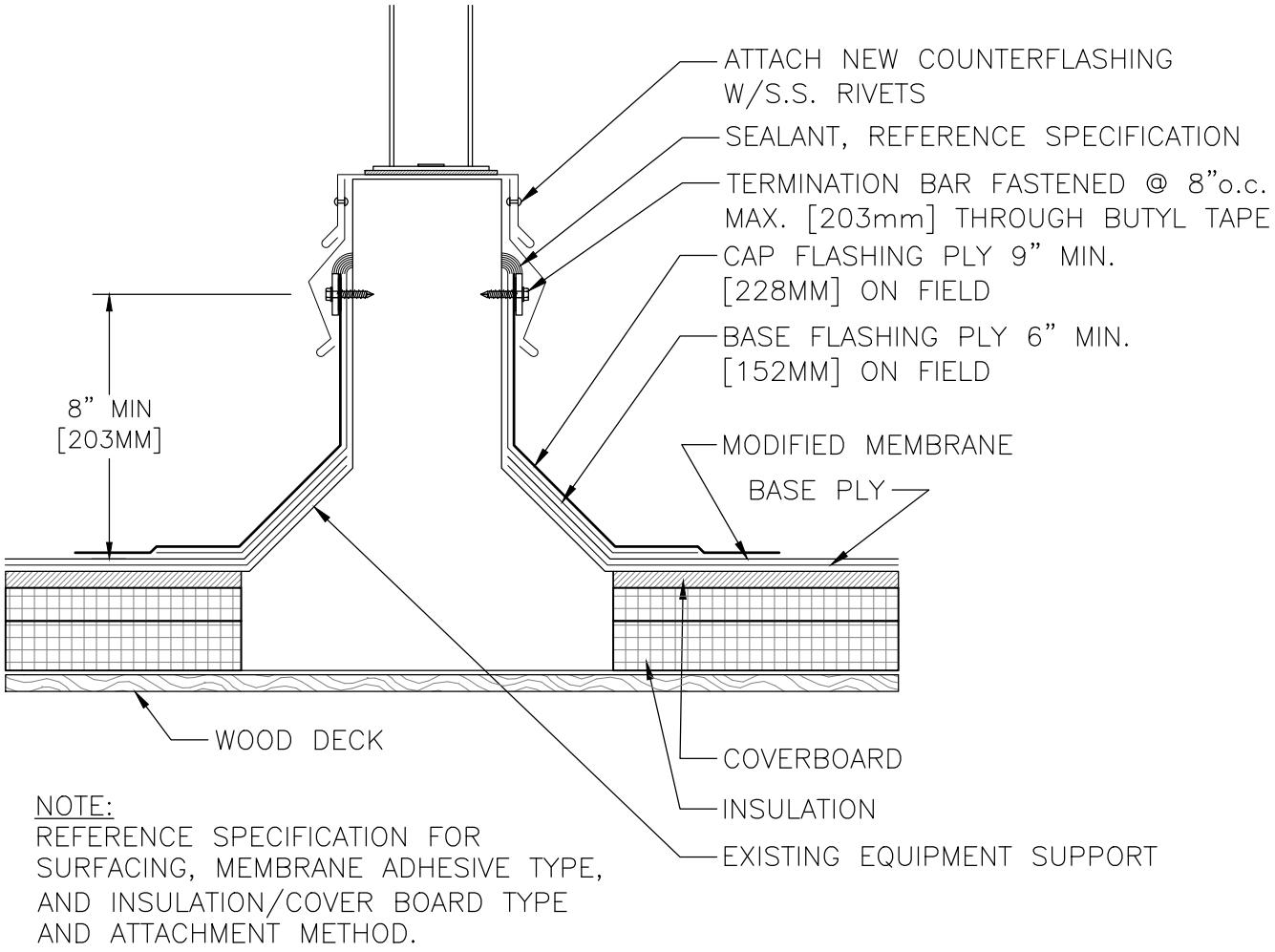

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EQUIPMENT SUPPORT - PREMANUFACTURED - EXISTING

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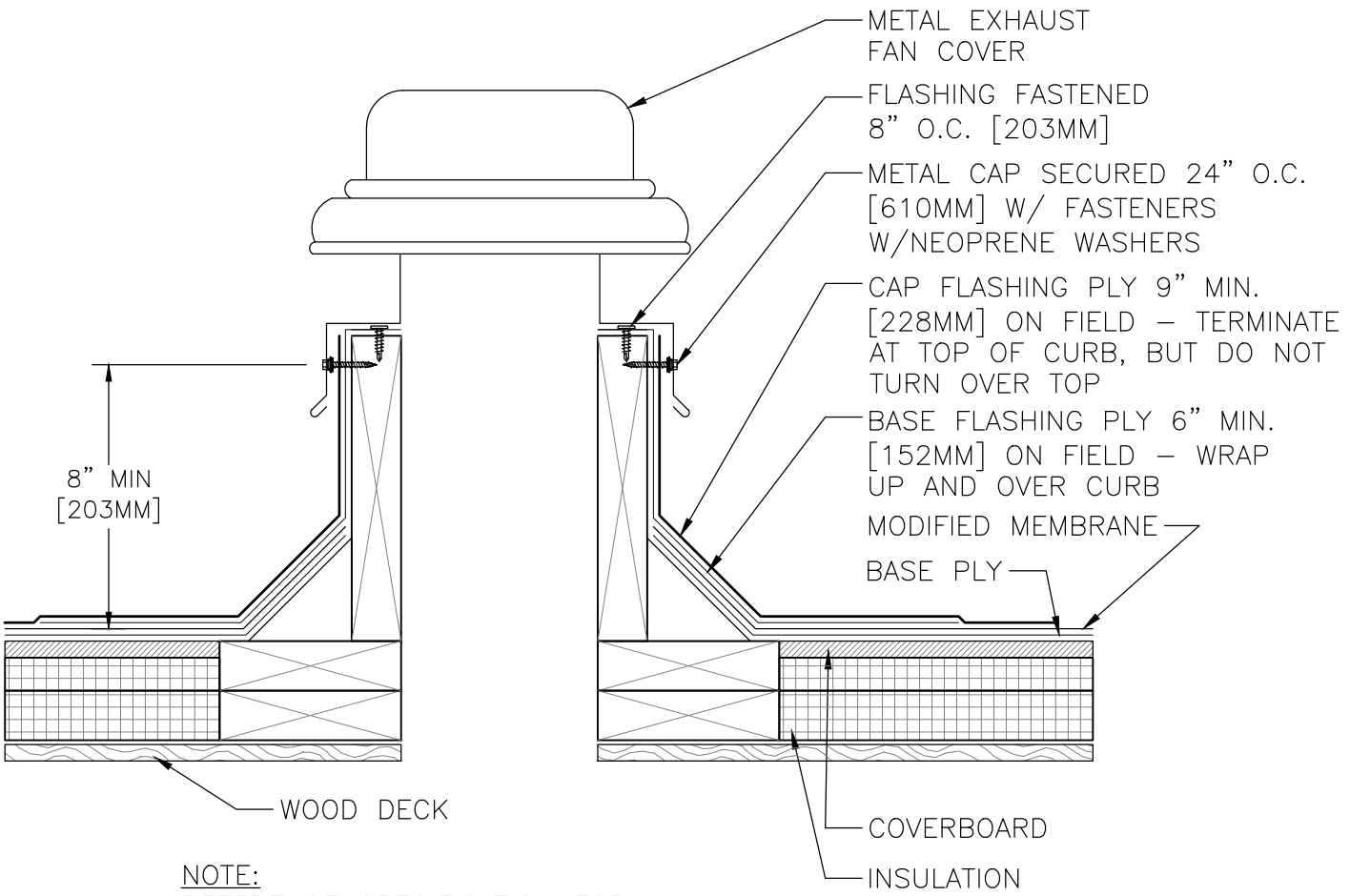

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EXHAUST FAN

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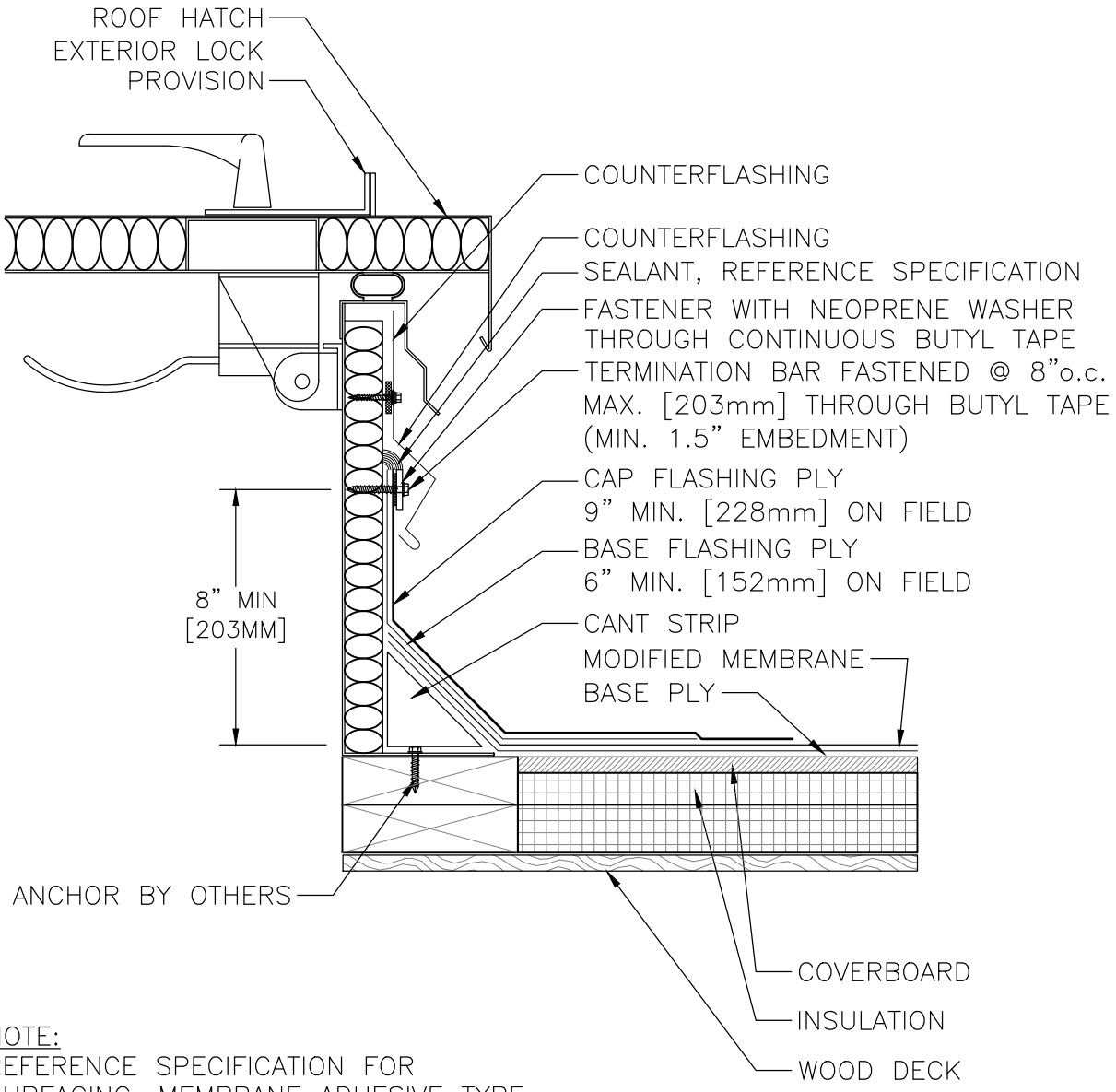

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HATCH DETAIL

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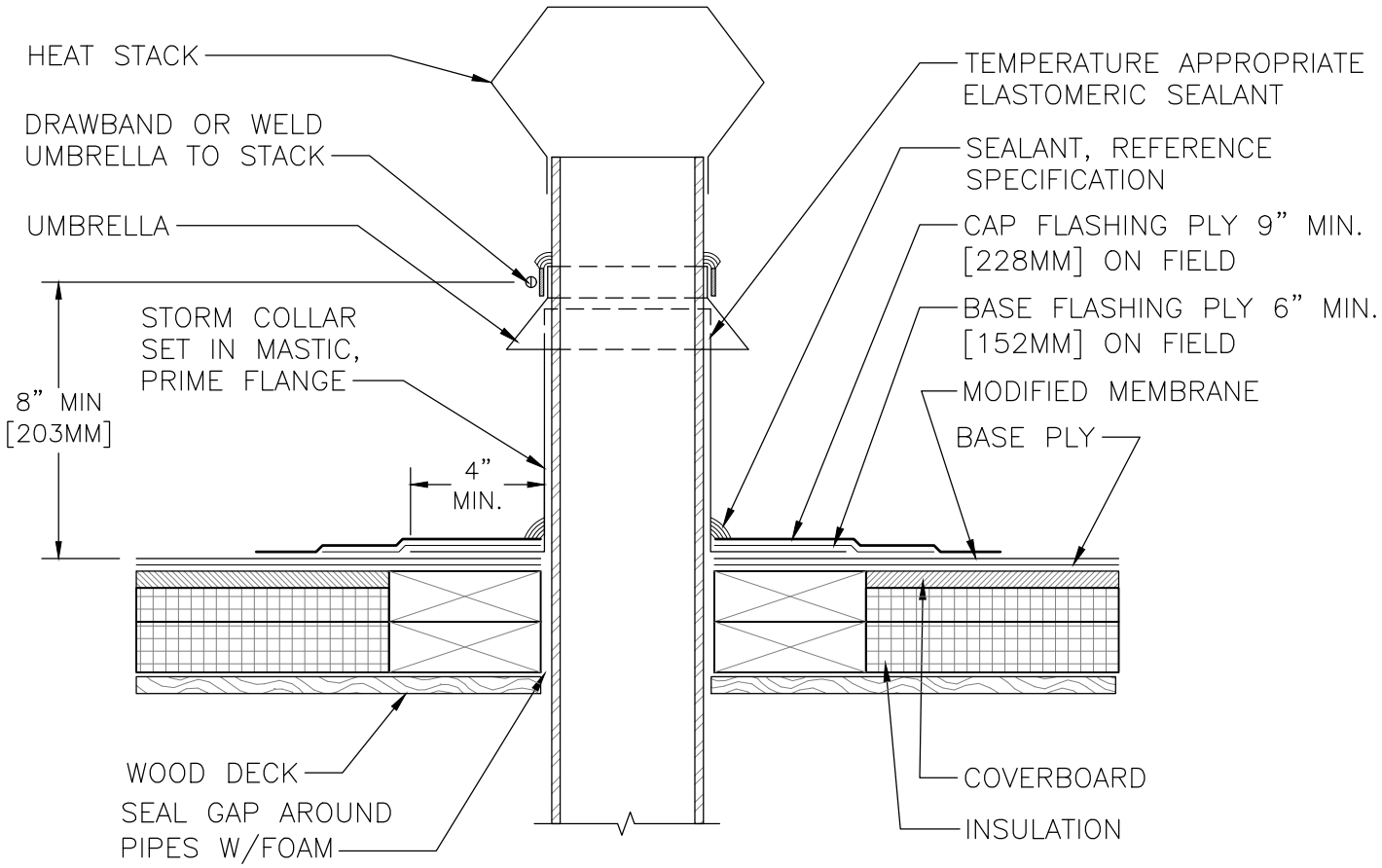

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HEAT STACK

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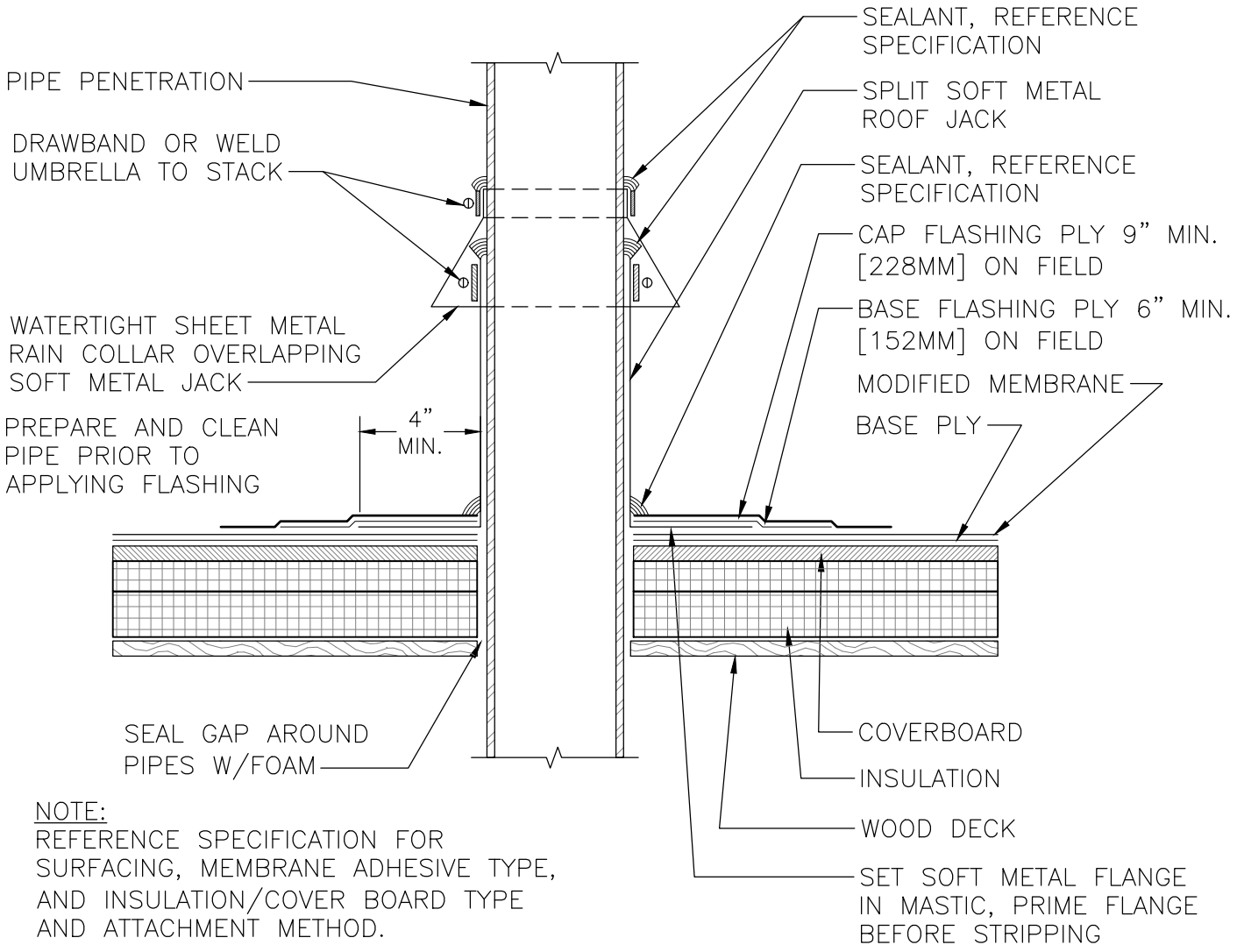

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PIPE/TUBE PENETRATION - SPLIT JACK w/COLLAR

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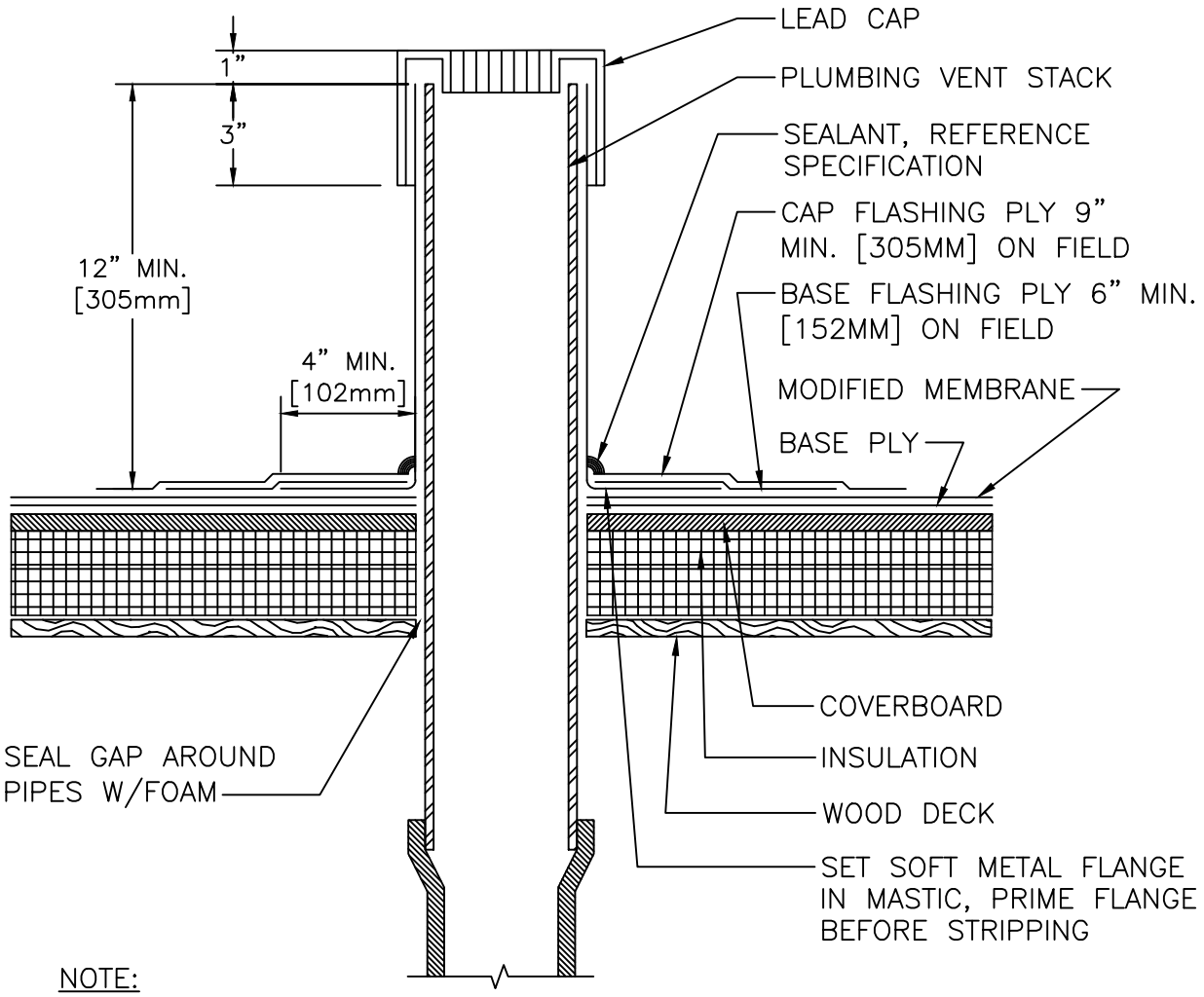

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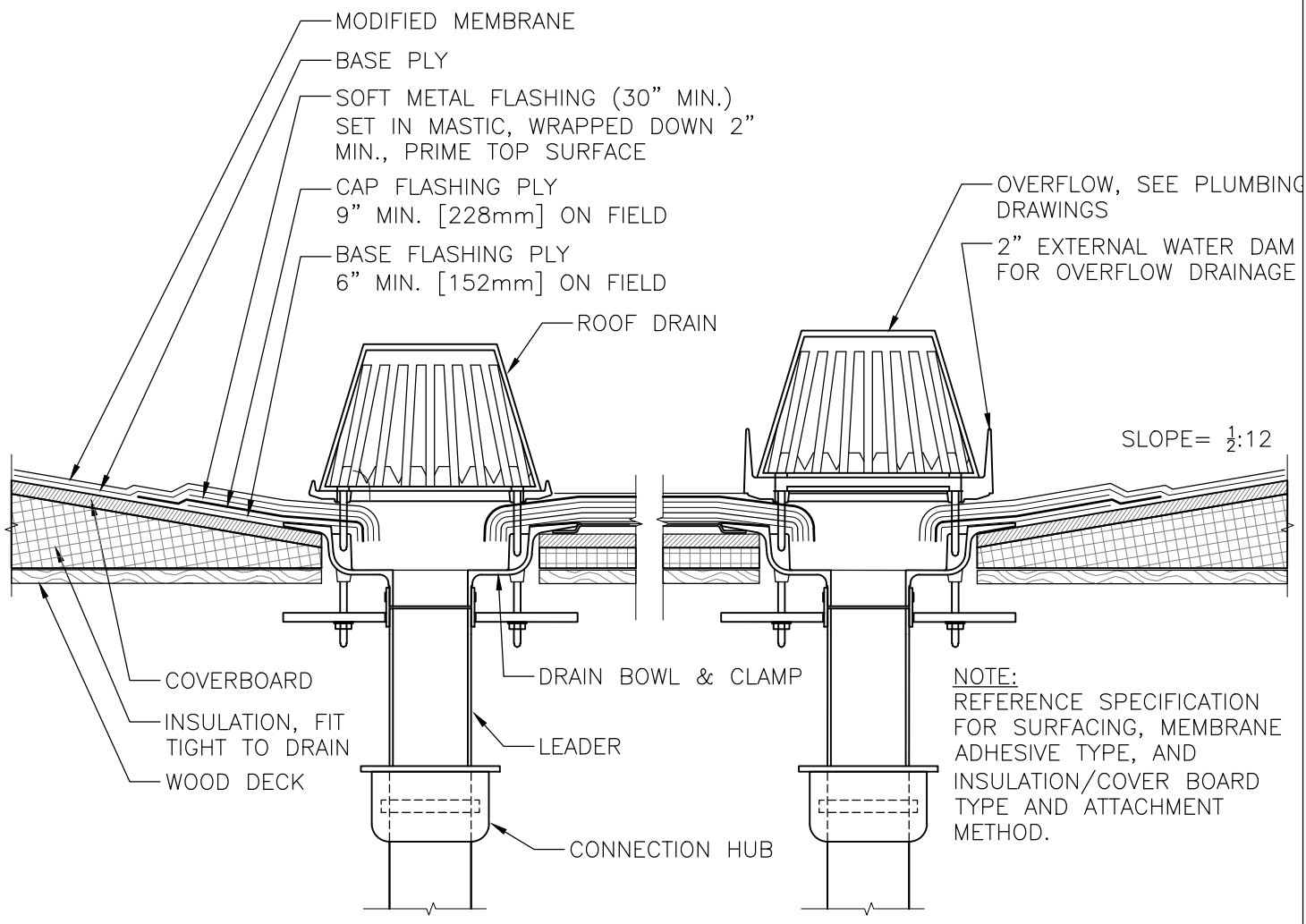

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ROOF DRAIN AND OVERFLOW SUMPED (ALTERNATE)

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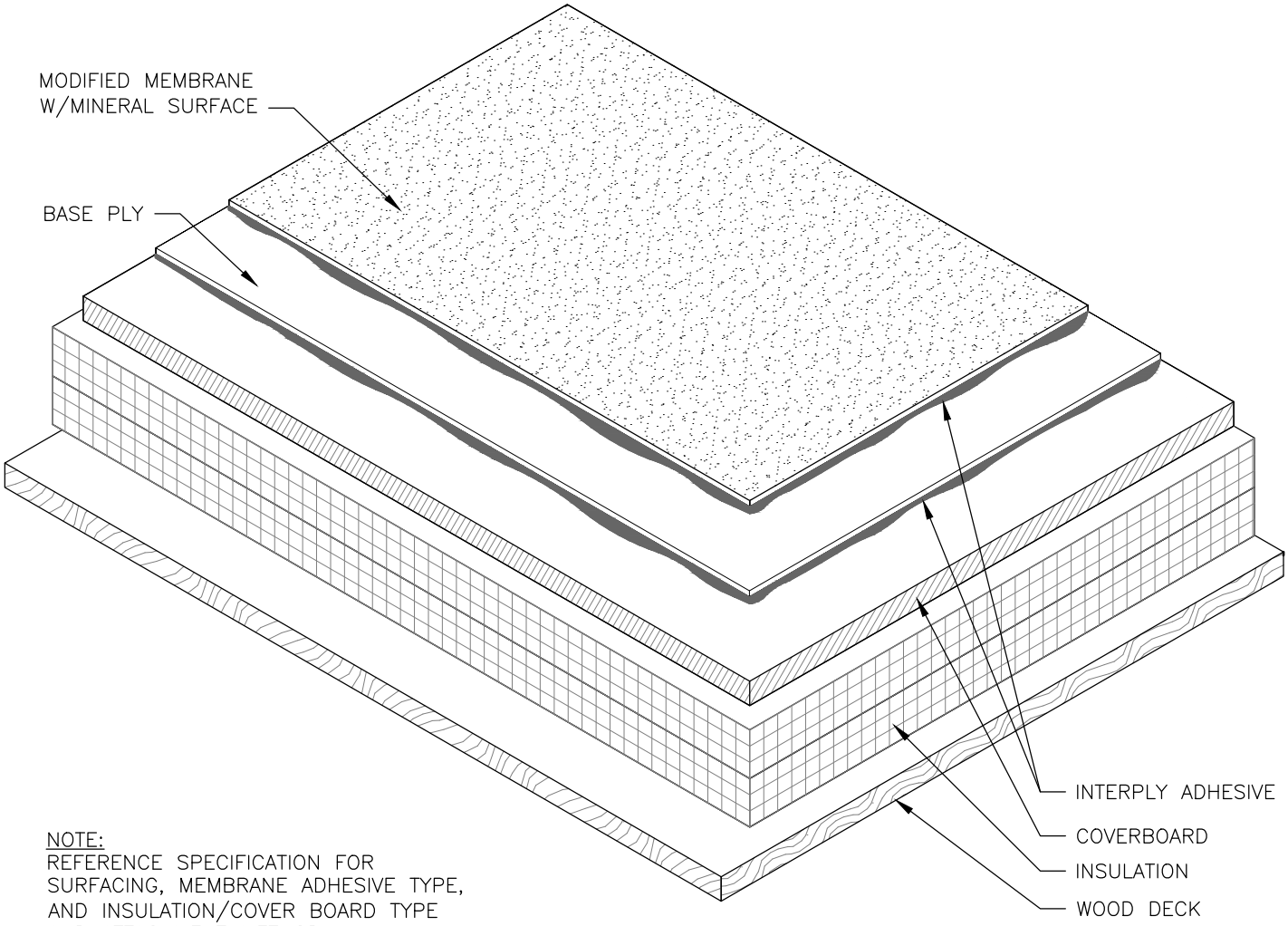

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TYPICAL ROOF SYSTEM - MINERAL SURFACE

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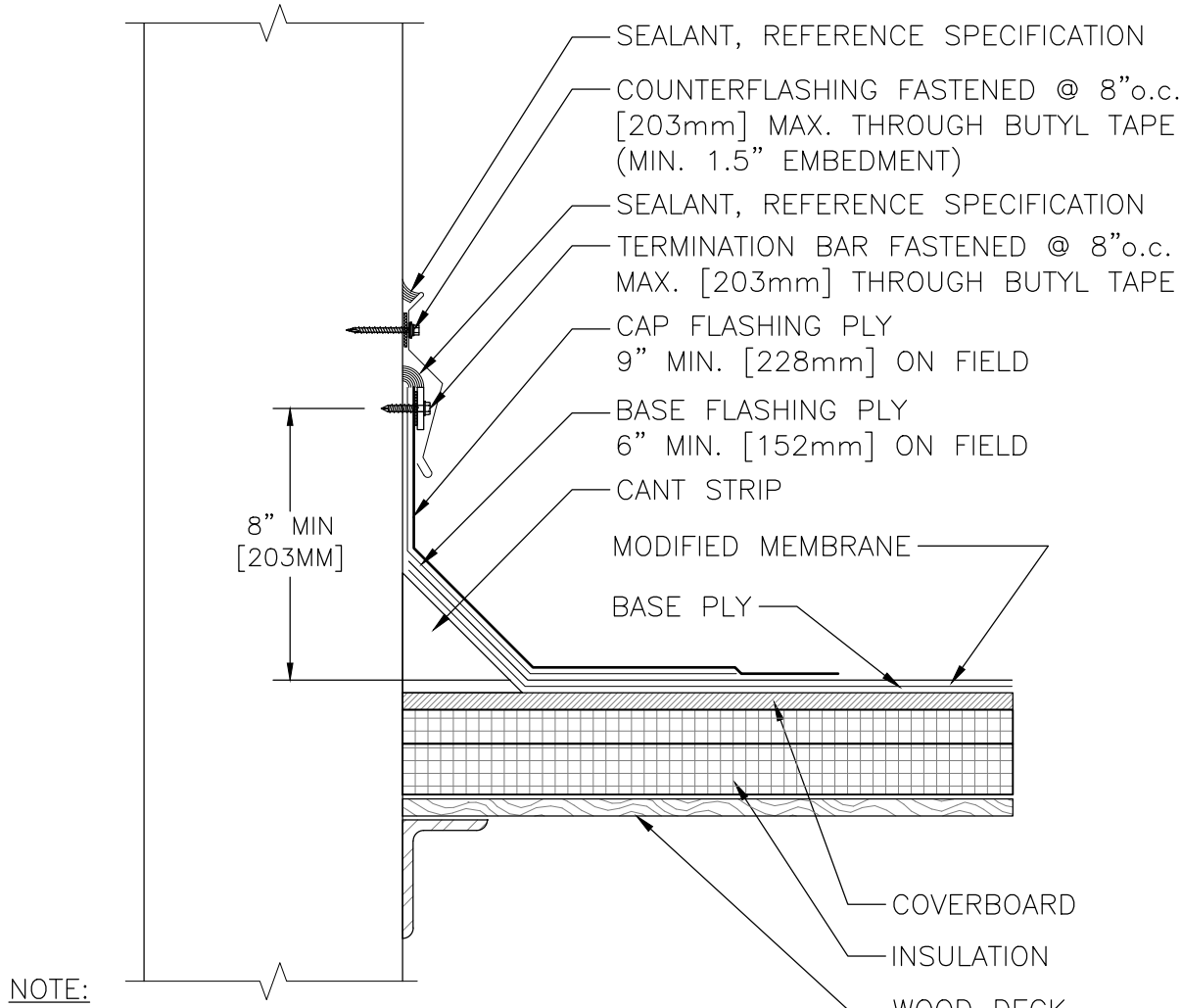

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WALL FLASHING - SURFACE MOUNTED COUNTERFLASHING

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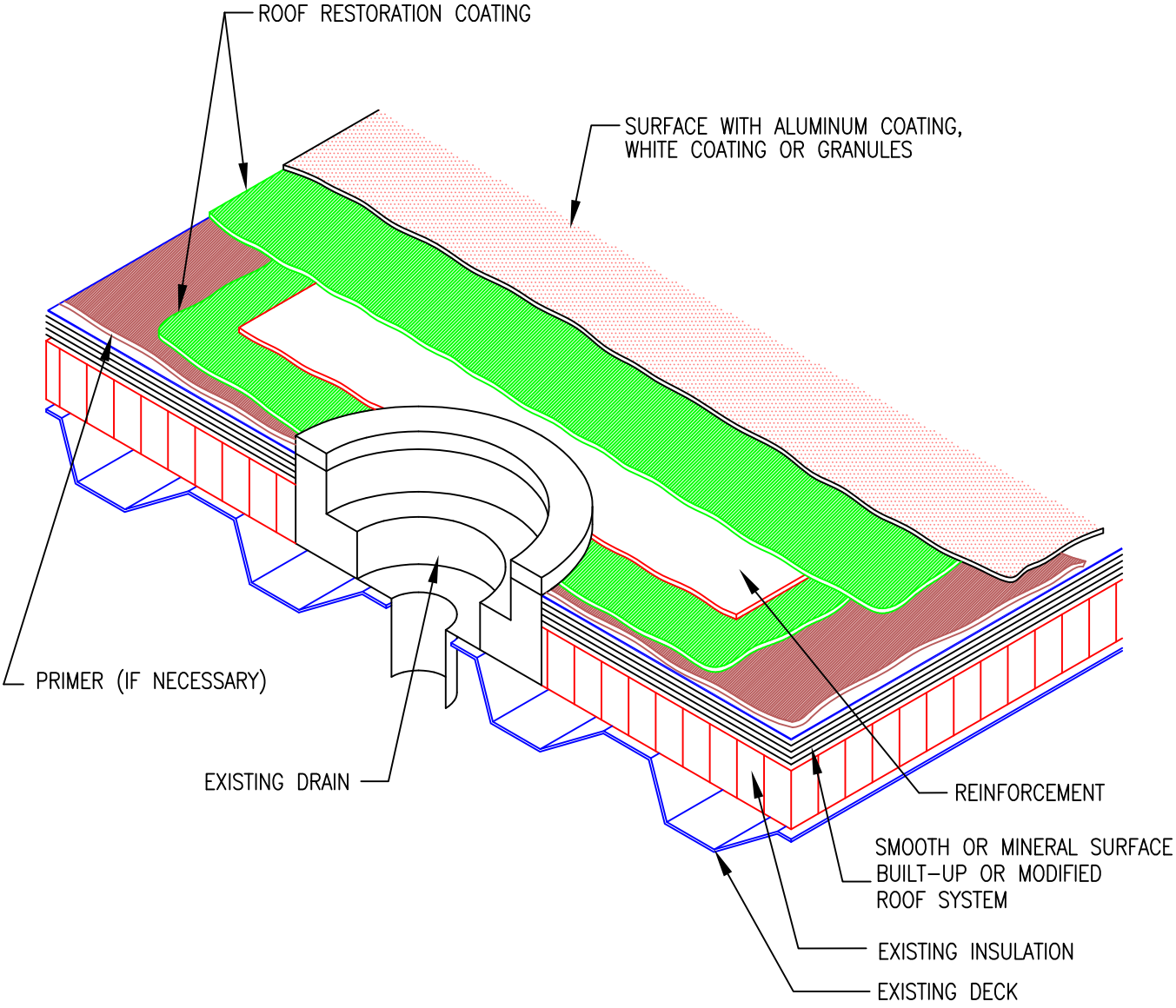


THE GARLAND COMPANY, INC.

GARLAND CANADA, INC.

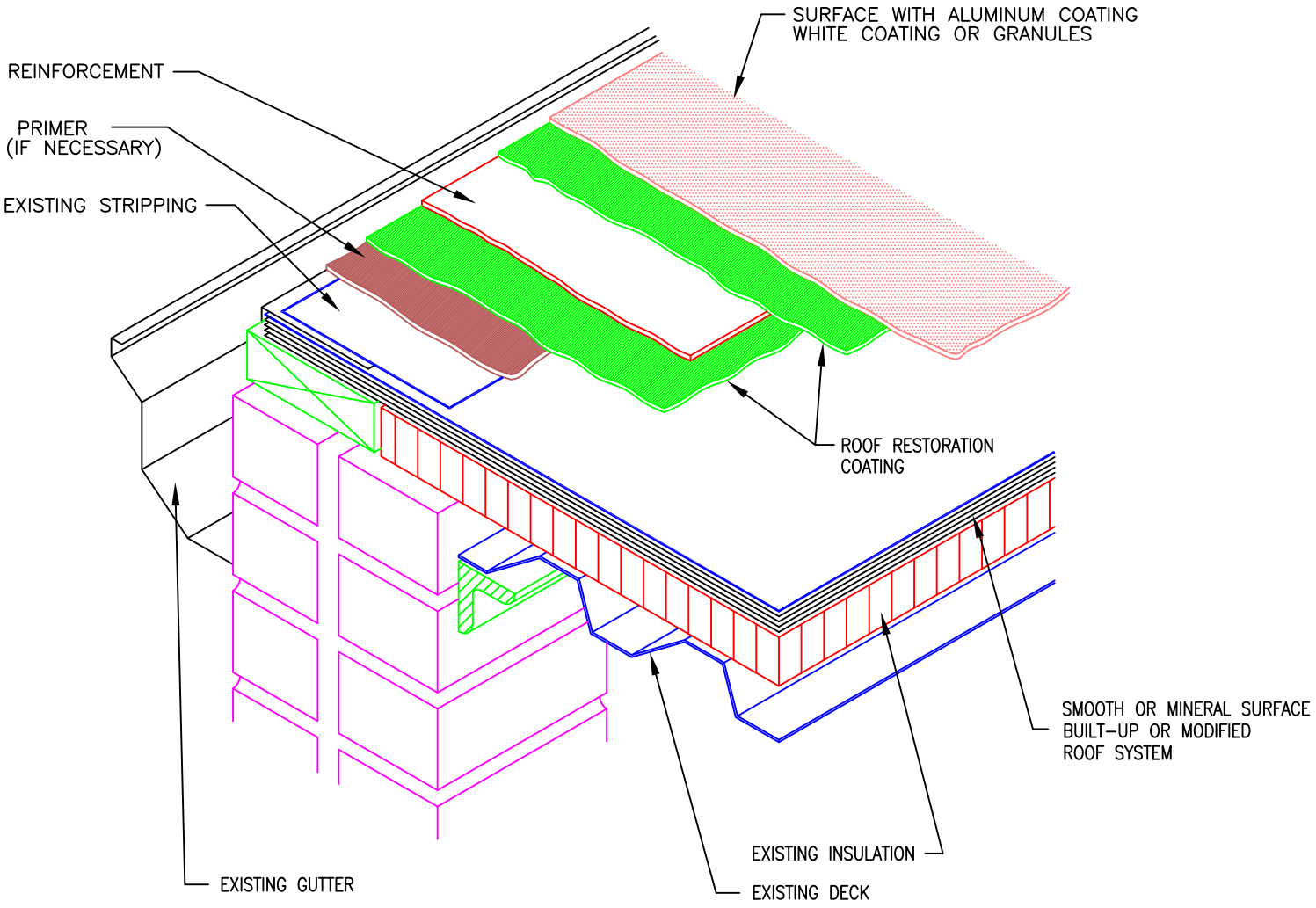
THE GARLAND COMPANY UK, LTD

since 1895

DETAIL:

DRAIN DETAIL

SMOOTH/MINERAL MODIFIED RESTORATION



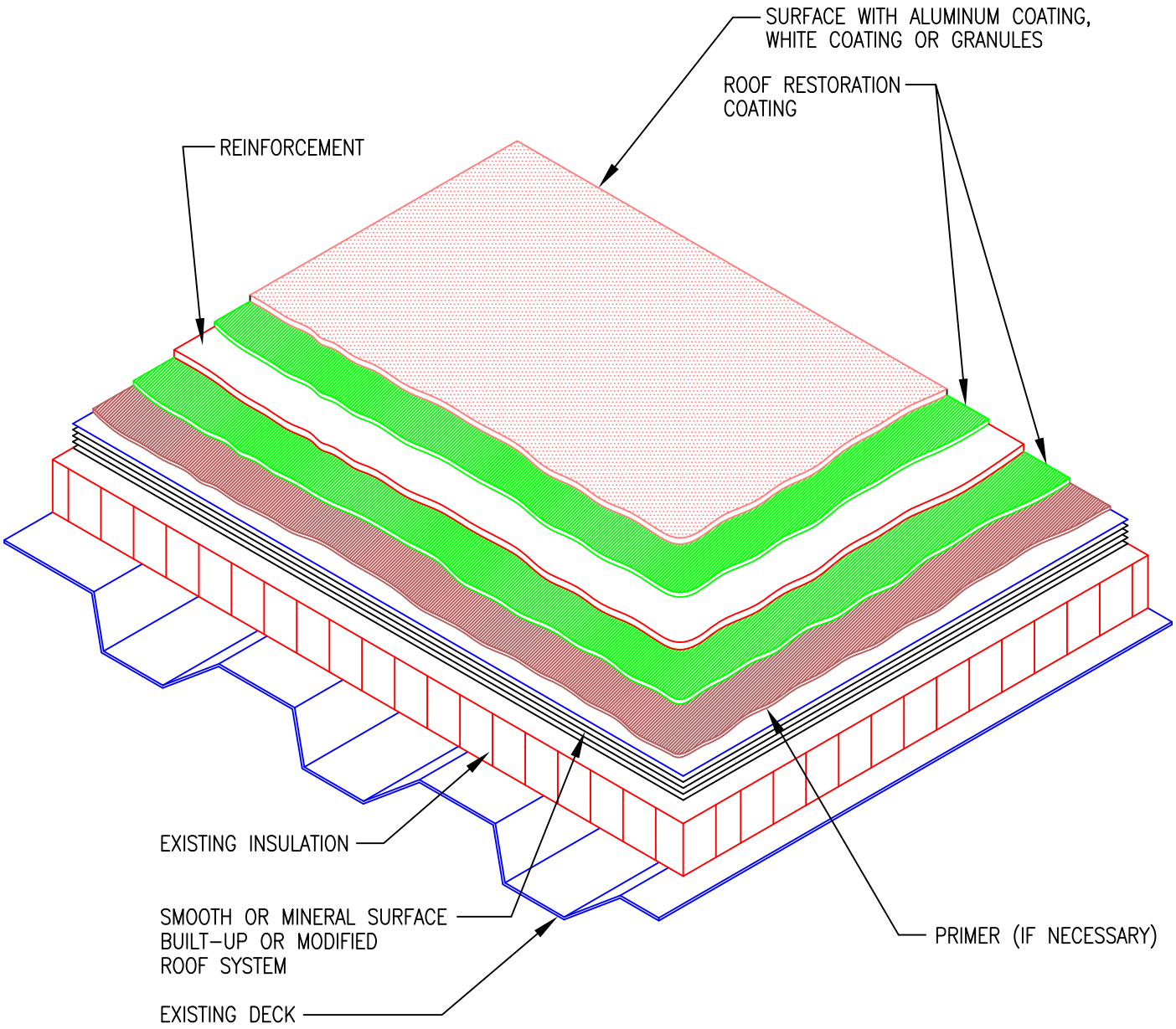
GARLAND
since 1895

THE GARLAND COMPANY, INC.
GARLAND CANADA, INC.
THE GARLAND COMPANY UK, LTD

DETAIL:

EDGE DETAIL

SMOOTH/MINERAL MODIFIED RESTORATION



THE GARLAND COMPANY, INC.

GARLAND CANADA, INC.

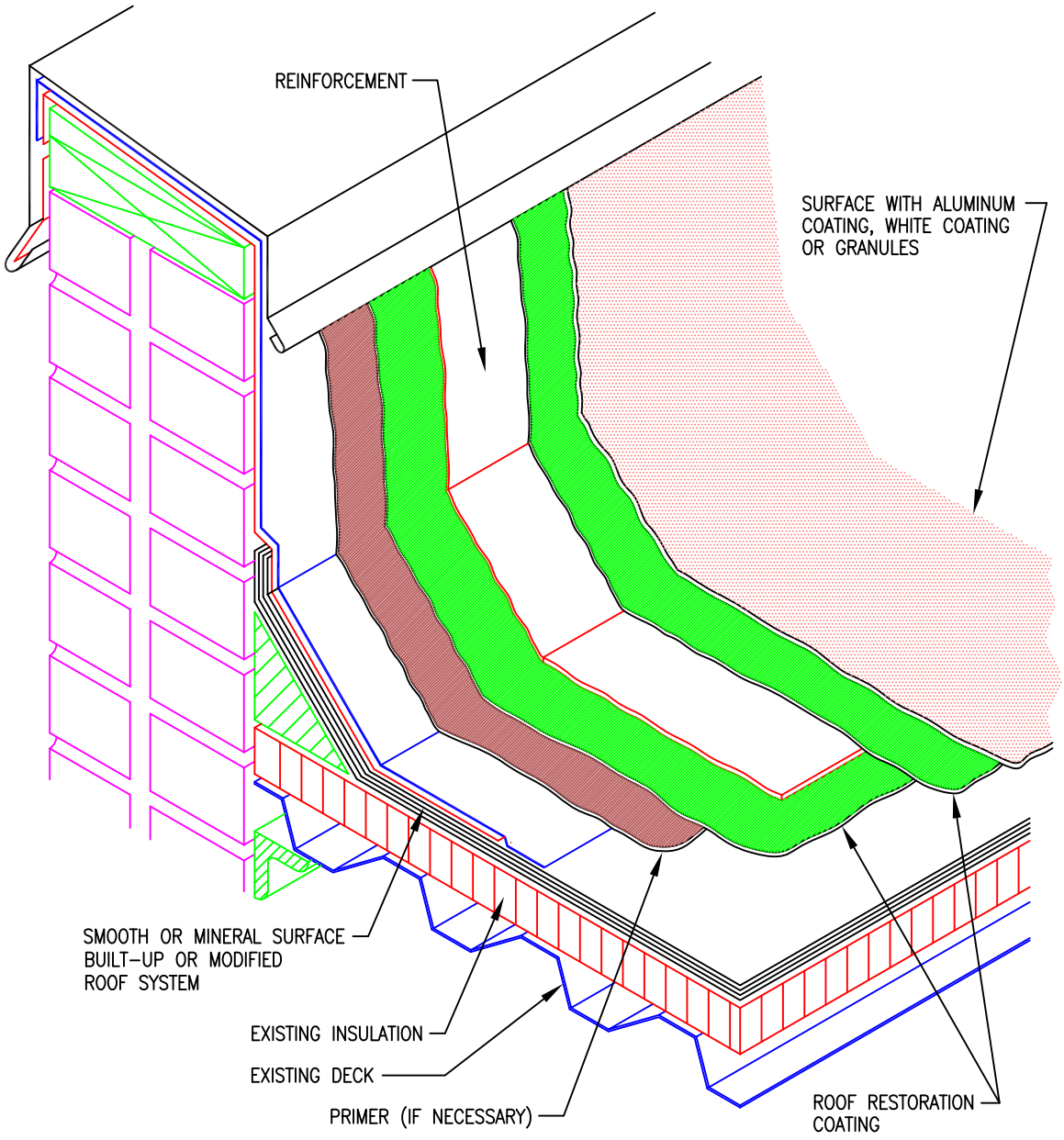
THE GARLAND COMPANY UK, LTD

since 1895

DETAIL:

FIELD DETAIL

SMOOTH/MINERAL MODIFIED RESTORATION



GARLAND since 1895

THE GARLAND COMPANY, INC.

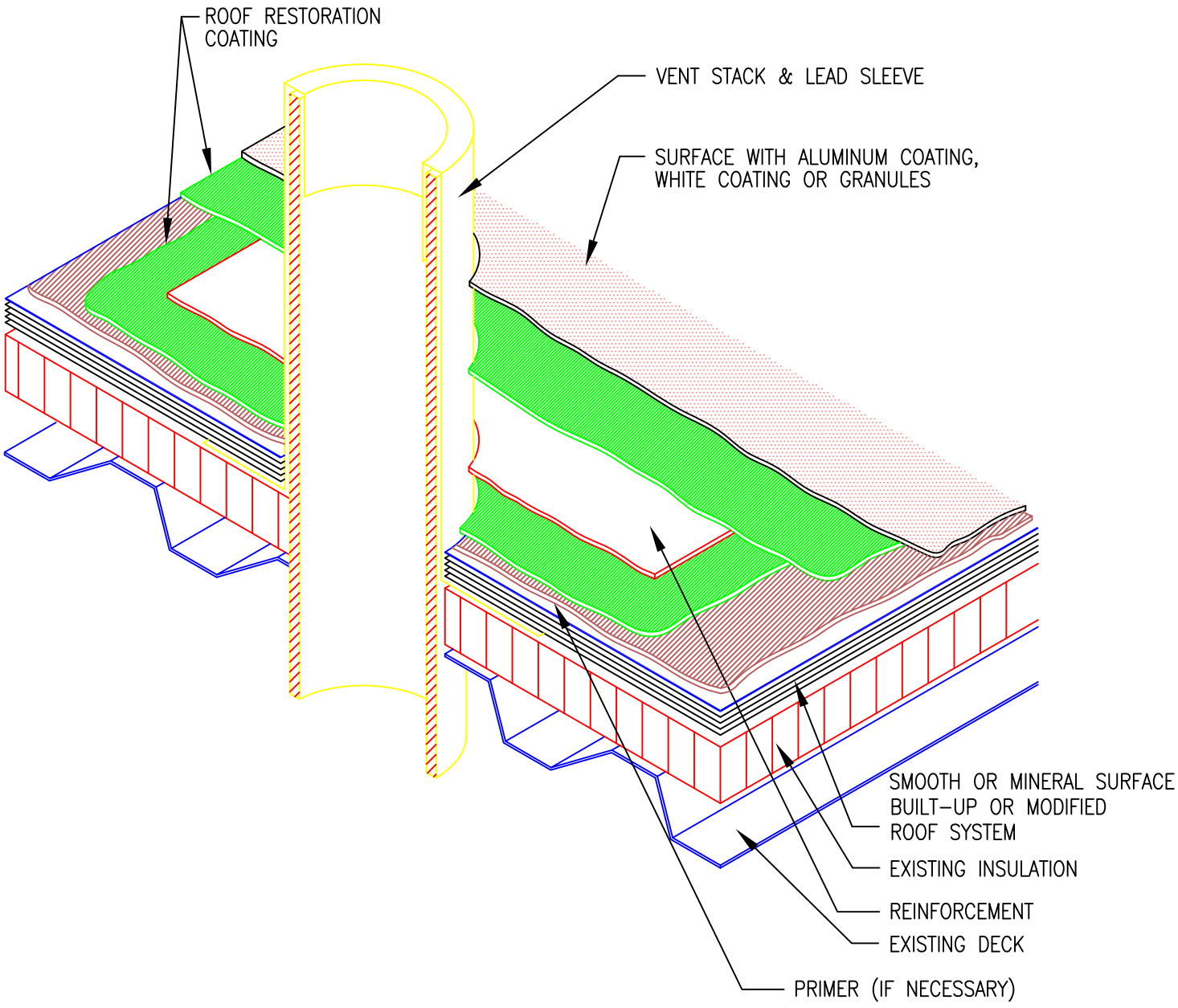
GARLAND CANADA, INC.

THE GARLAND COMPANY UK, LTD

DETAIL:

FLASHING DETAIL

SMOOTH/MINERAL MODIFIED RESTORATION



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GARLAND CANADA, INC.
THE GARLAND COMPANY UK, LTD
since 1895

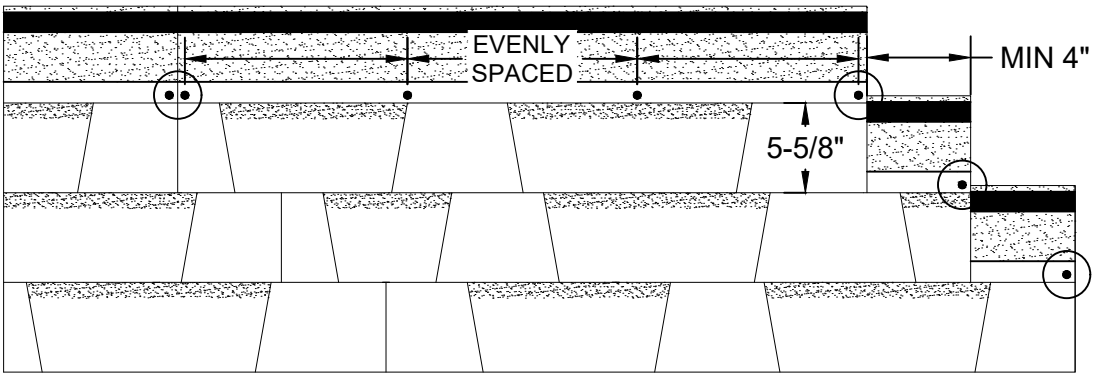
DETAIL:

PIPE DETAIL

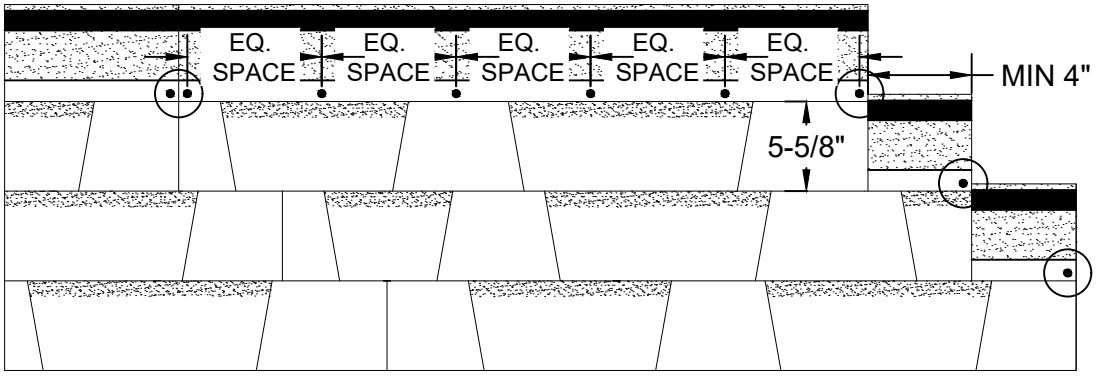
SMOOTH/MINERAL MODIFIED RESTORATION

LAMINATE NAILING PATTERNS

4 NAIL

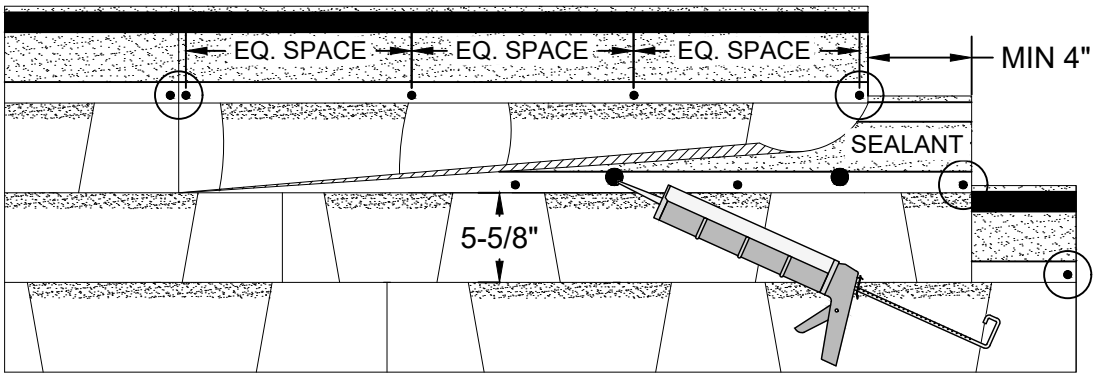


6 NAIL



-IN BOTH PATTERNS, FASTENERS SHOULD BE PLACED IN THE NAILING AREA AND END FASTENERS SET APPROX. 1" FROM EACH EDGE OF THE SHINGLE. THE REMAINING FASTENERS SHOULD BE EVENLY SPACED ON THE SAME LINE AS THE END FASTENERS.

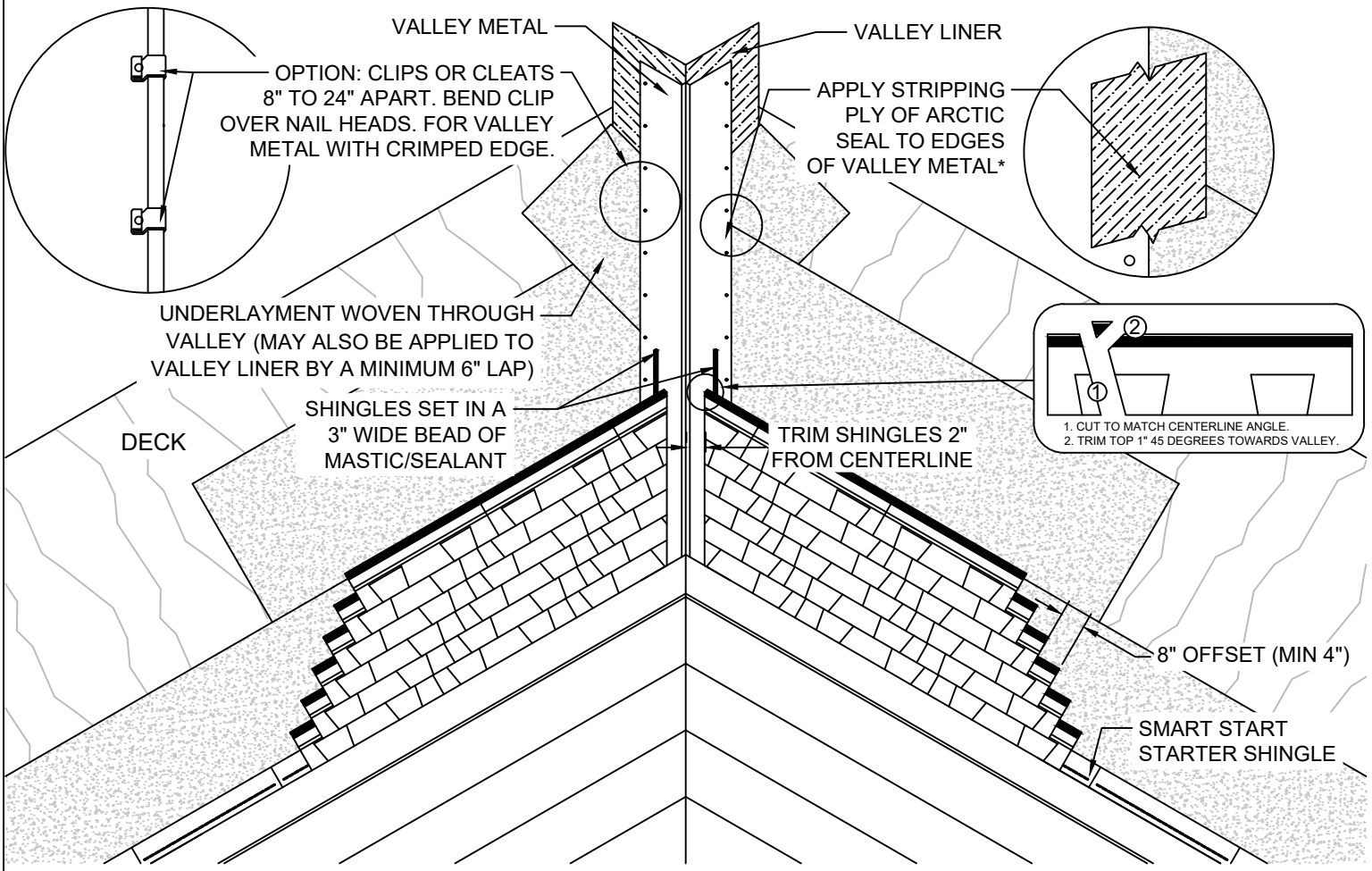
HAND-SEALING LAMINATE SHINGLES



STEEP SLOPE 6

Malarkey Roofing Products® Defining Excellence.™	PROJECT NAME:	DATE:
		SCALE: NOT TO SCALE
		PROJECT NO:
	ADDRESS:	DRAWING NO. :
Rev. 12/18	OWNER:	SUBMITTAL NO. :

LAMINATE METAL "W" VALLEY



NOTES:

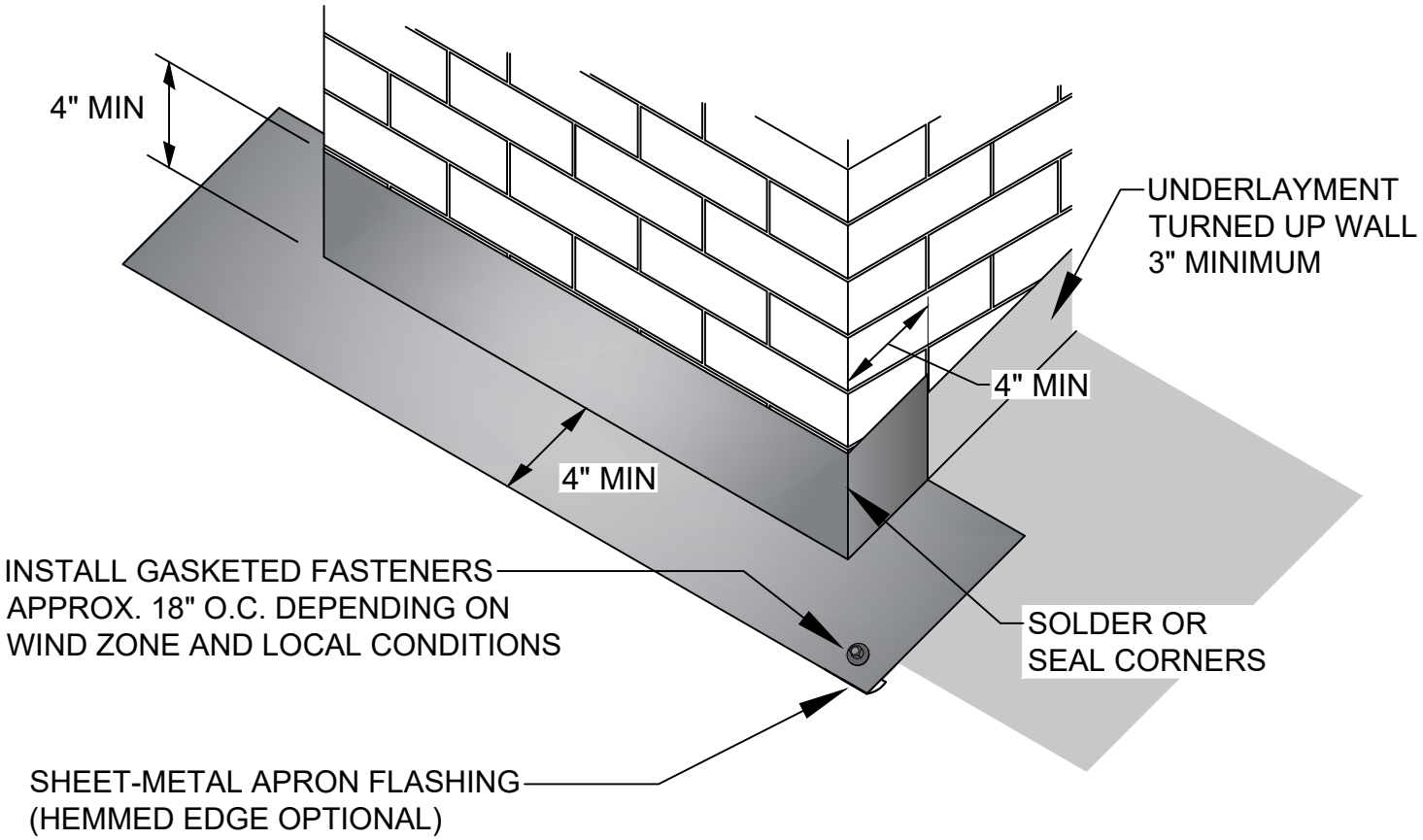
- VALLEY METAL FLASHING USED WITH MALARKEY SHINGLES MUST BE MINIMUM 24" WIDE AND 26 GAUGE.
- SECURE VALLEY METAL WITH FASTENERS NO MORE THAN 1" FROM THE OUTSIDE EDGES AND SPACED 10"-12" ON CENTER.
- SET OVERLAPPING ENDS OF VALLEY METAL IN A UNIFORM LAYER OF SEALANT WITH A MINIMUM 4" LAP. DO NOT FASTEN THE LAP.
- NAIL SHINGLES NO CLOSER THAN 6" FROM VALLEY CENTERLINE.

*A CONTINUOUS, MINIMUM 6"-WIDE STRIP OF ARCTIC SEAL SHALL BE APPLIED TO BOTH EDGES OF THE VALLEY METAL FOR ADDITIONAL SEALING ON PROJECTS WITH MALARKEY NDL AND EMERALD PREMIUM WARRANTIES.

STEEP SLOPE 15

Malarkey Roofing Products® Defining Excellence.™	PROJECT NAME:	DATE:
		SCALE: NOT TO SCALE
		PROJECT NO:
	ADDRESS:	DRAWING NO. :
Rev. 1/19	OWNER:	SUBMITTAL NO. :

CHIMNEY APRON FLASHING



NOTES:
-ALL FLASHING TO BE MINIMUM 26 GAUGE.
-APRON WILL LATER HAVE SHEET-METAL COUNTER FLASHING INSTALLED TO PREVENT MOISTURE INTRUSION.

STEEP SLOPE 19

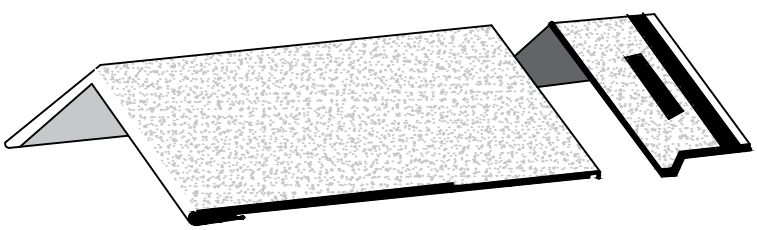
Malarkey Roofing Products® Defining Excellence.™	PROJECT NAME:	DATE:
		SCALE: NOT TO SCALE
		PROJECT NO:
	ADDRESS:	DRAWING NO. :
Rev. 2/19	OWNER:	SUBMITTAL NO. :

EZ-RIDGE HIP AND RIDGE SHINGLES
LAMINATE SHINGLE ROOF

EZ-RIDGE INSTALLATION - REMOVE RIDGE SHINGLES FROM CARTON AND PLACE ON ROOF RIDGE IN POSITION OVER INSTALLED FIELD SHINGLES. OVERLAP ALL RIDGES TO THE CUTOUT (ALWAYS MAINTAINING EXPOSURE OF HIP OR RIDGE AT 8 1/4"). PUSH DOWN ON CENTER OF SHINGLE AND NAIL TO FIT EXACT PITCH OF ROOF. THE ENTIRE SHINGLE SHOULD BE ALIGNED WITH THE UNDERLYING CUTOUT. BEGIN AT THE BOTTOM OF THE HIP OR AT THE RIDGE OPPOSITE THE DIRECTION OF PREVAILING WINDS. COMPLETE HIPS BEFORE RIDGES.

-TO ENSURE IMMEDIATE SEALING, MALARKEY RECOMMENDS EACH RIDGE SHINGLE BE SEALED DOWN UNDERNEATH WITH A QUARTER-SIZED SPOT OF SHINGLE TAB ADHESIVE ON EACH SIDE.

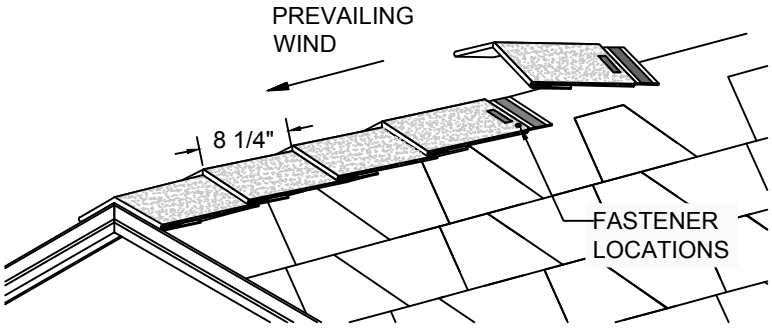
NOTE: AVOID EXCESSIVE USE OF ADHESIVE AS IT MAY CAUSE BLISTERING.



TO CREATE AN EZ-RIDGE STARTER, CUT OFF THE 8 ¼" EXPOSURE PORTION* OF AN EZ-RIDGE SHINGLE, AND USE THE 3 ¼" REMAINDER (WITH SEAL-DOWN STRIP) AS THE STARTER.

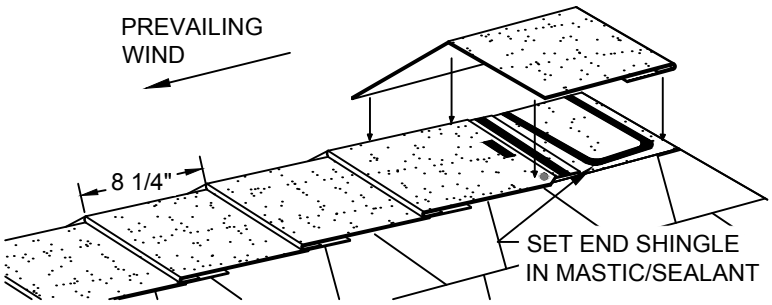
PLACE THE STARTER FLUSH TO THE RAKE AT THE PEAK, AND POSITION SO SEAL-DOWN STRIP IS NEAREST THE ROOF EDGE. FASTEN WITH TWO NAILS, ONE ON EACH SIDE, ¾" BEHIND THE CUTOUT AND ½" UP FROM THE EDGE.

*SAVE THE EXPOSURE PORTION FOR USE AS THE LAST SHINGLE ON THE OPPOSITE END OF THE RIDGE.



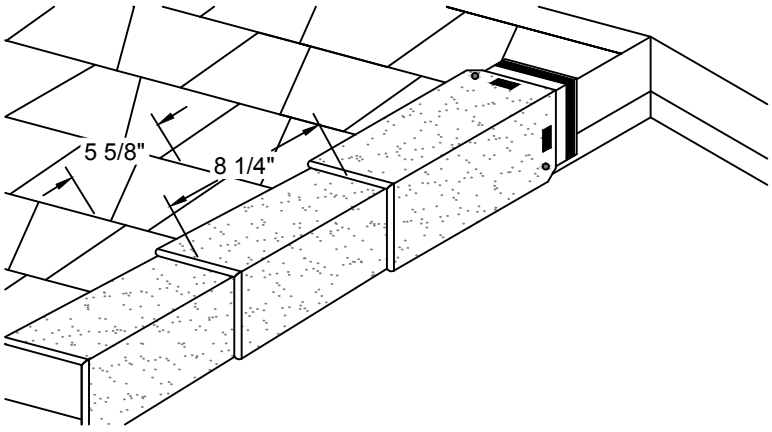
FIRST EZ-RIDGE SHINGLE COMPLETELY OVERLAPS STARTER. POSITION EACH EZ-RIDGE SHINGLE TO FOLLOW WITH AN 8 ¼" EXPOSURE BEFORE FASTENING.

SHINGLE FASTENING: INSTALL ONE NAIL ON EACH SIDE OF THE EZ-RIDGE SHINGLES, ¾" BEHIND THE CUTOUT, AND ½" UP FROM THE EDGE. USE ⅜" HEADED, NON CORROSIVE ROOFING NAILS, LONG ENOUGH TO PENETRATE ALL LAYERS AND FASTEN THE SHINGLE SECURELY TO THE ROOF DECK.



FOR THE LAST SHINGLE OF THE RUN, REMOVE THE CUTOUT END OF THE RIDGE SHINGLE AND TRIM TO FIT, MAINTAINING THE 8 ¼" EXPOSURE. SET THE SHINGLE IN MASTIC.

THE LAST SHINGLE OF THE RUN CAN ALSO BE FLIPPED AROUND TO PRESERVE THE HIGH-PROFILE APPEARANCE AT THE RAKE EDGE OF THE ROOF (PICTURED AT LEFT).



RAKE EDGE INSTALLATION: EZ-RIDGE SHINGLES CAN ALSO BE INSTALLED ON RAKE EDGES. INSTALL RAKE EDGE SHINGLES BEFORE RIDGE SHINGLES.

FOLLOW EZ-RIDGE INSTALLATION INSTRUCTIONS WITH THESE EXCEPTIONS: ALWAYS START AT THE LOW END OF THE ROOF, AND POSITION THE HIGH PROFILE, FINISHED END OF THE SHINGLES IN THE LOWEST POSITION.

INSTALLATION WITH EXPOSED NAILS MAY AFFECT THE AESTHETIC APPEAL OF EZ-RIDGE SHINGLES.

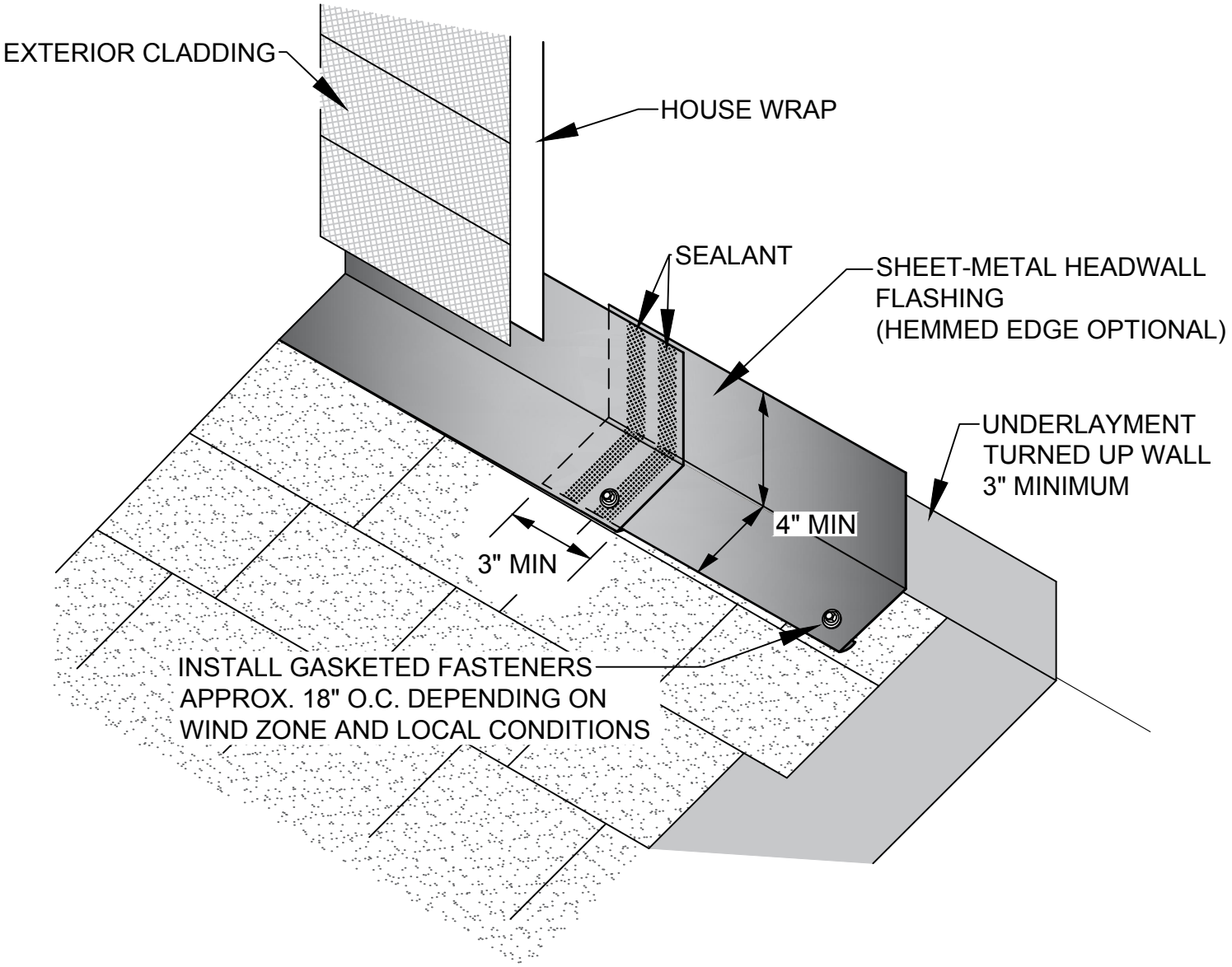
STEEP SLOPE 22B

Malarkey Roofing Products®
Defining Excellence.™

Rev. 1/17

PROJECT NAME:	DATE:
	SCALE: NOT TO SCALE
	PROJECT NO:
ADDRESS:	DRAWING NO. :
OWNER:	SUBMITTAL NO. :

HEADWALL FLASHING



NOTES:

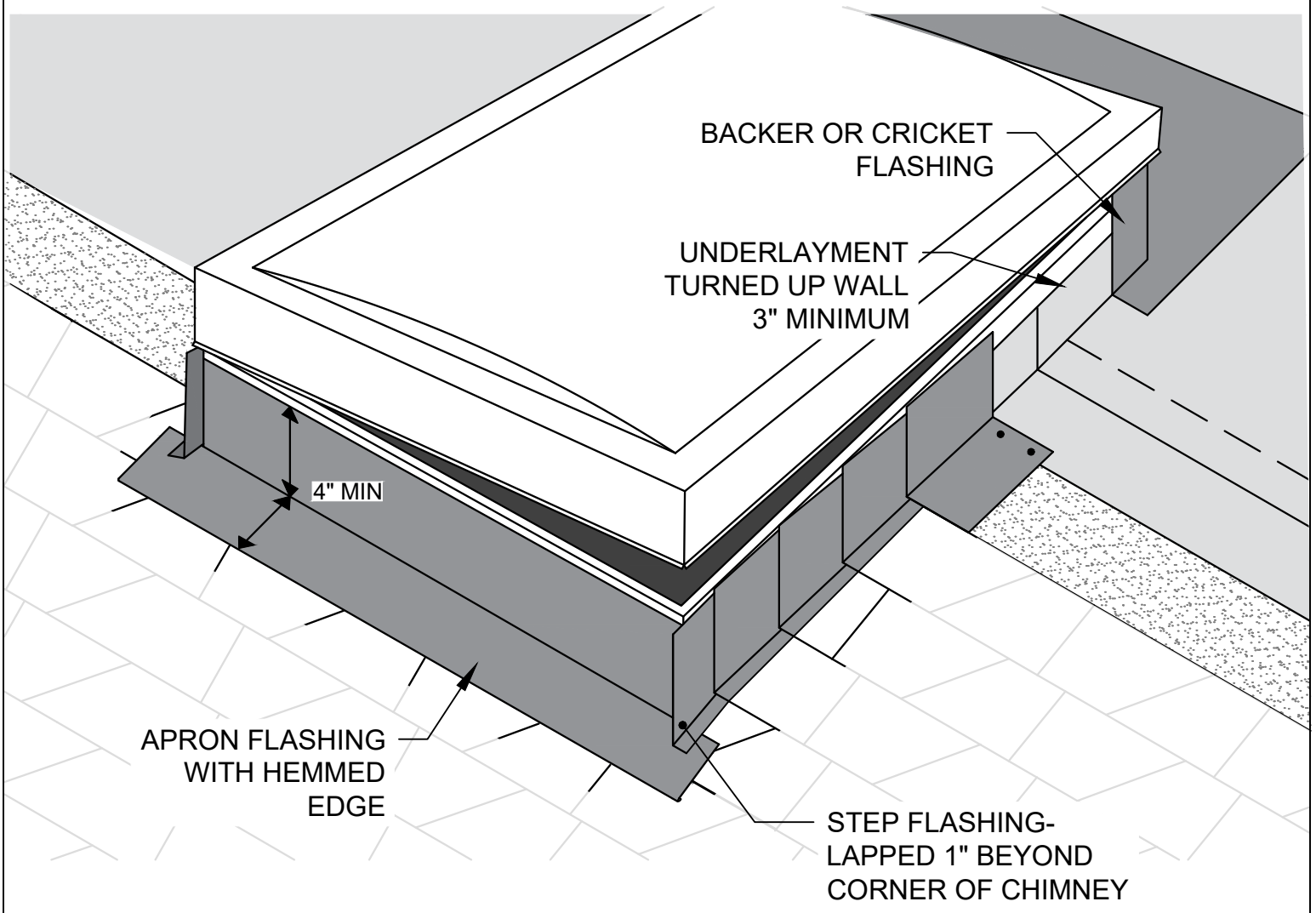
-FLASHING AGAINST THE HEADWALL SHOULD BE COUNTER-FLASHED A MINIMUM OF 2" WITH HOUSE WRAP OR OTHER FLASHING AND THEN COVERED WITH THE FINISH WALL CLADDING.

-LAPS IN THE HEADWALL FLASHING SHOULD BE 3" MINIMUM AND THE OVERLAPPING END SET IN A DOUBLE BEAD OF SEALANT.

STEEP SLOPE 26

Malarkey Roofing Products® Defining Excellence.™	PROJECT NAME:	DATE:
		SCALE: NOT TO SCALE
		PROJECT NO:
	ADDRESS:	DRAWING NO. :
Rev. 11/19	OWNER:	SUBMITTAL NO. :

SKYLIGHT FLASHING

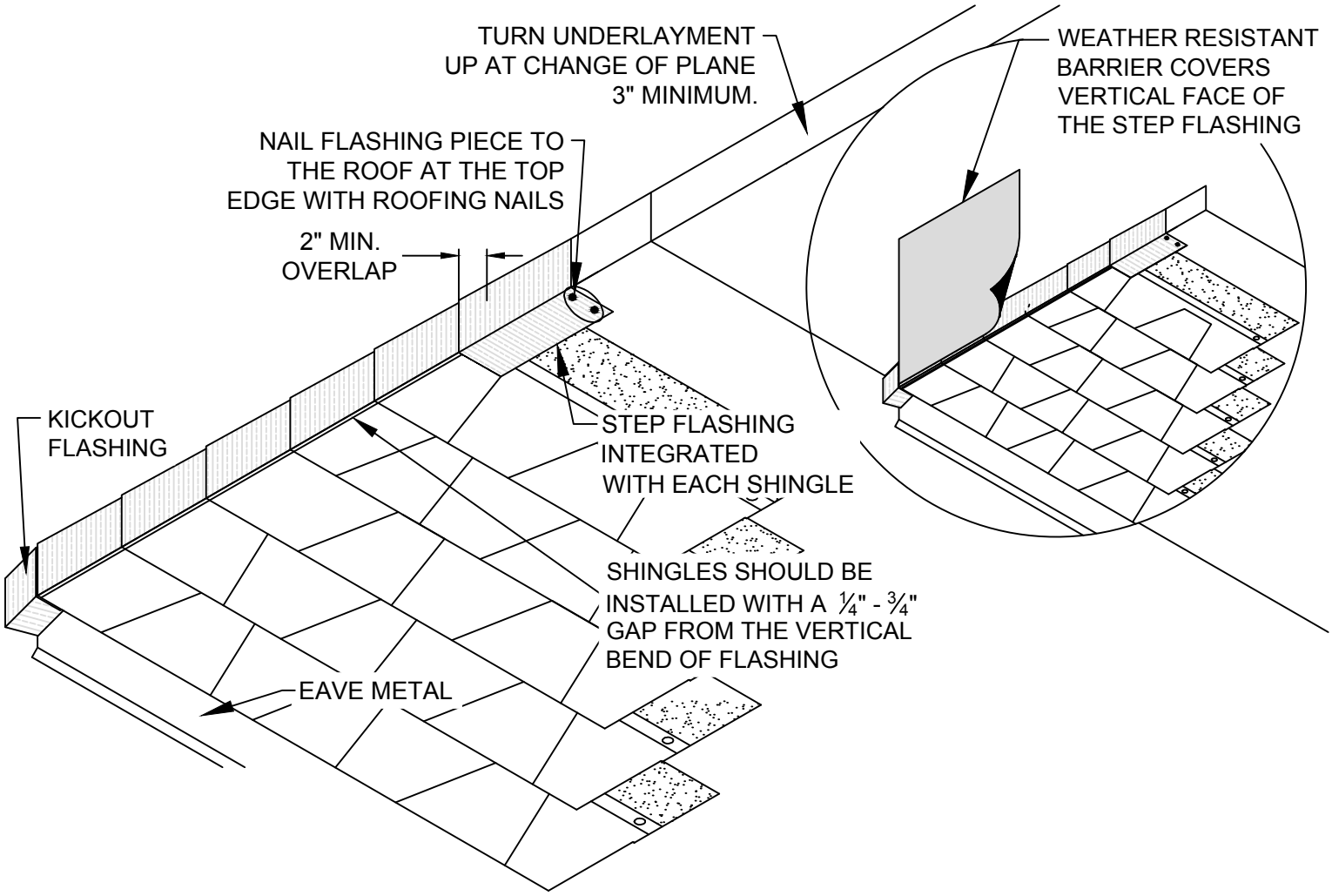


NOTES:
-ALL FLASHING TO BE MINIMUM 26 GAUGE.
-STEP FLASHING TO BE INTEGRATED WITH EACH COURSE OF SHINGLES.
-MAINTAIN A 1/4" - 3/4" GAP BETWEEN THE SHINGLES AND VERTICAL BEND OF METAL STEP FLASHINGS.
-WHEN CLOSED, THE SKYLIGHT SASH SHOULD COUNTER-FLASH THE APRON AND STEP FLASHINGS.

STEEP SLOPE 29

Malarkey Roofing Products® Defining Excellence.™	PROJECT NAME:	DATE:
		SCALE: NOT TO SCALE
		PROJECT NO:
	ADDRESS:	DRAWING NO. :
Rev. 8/19	OWNER:	SUBMITTAL NO. :

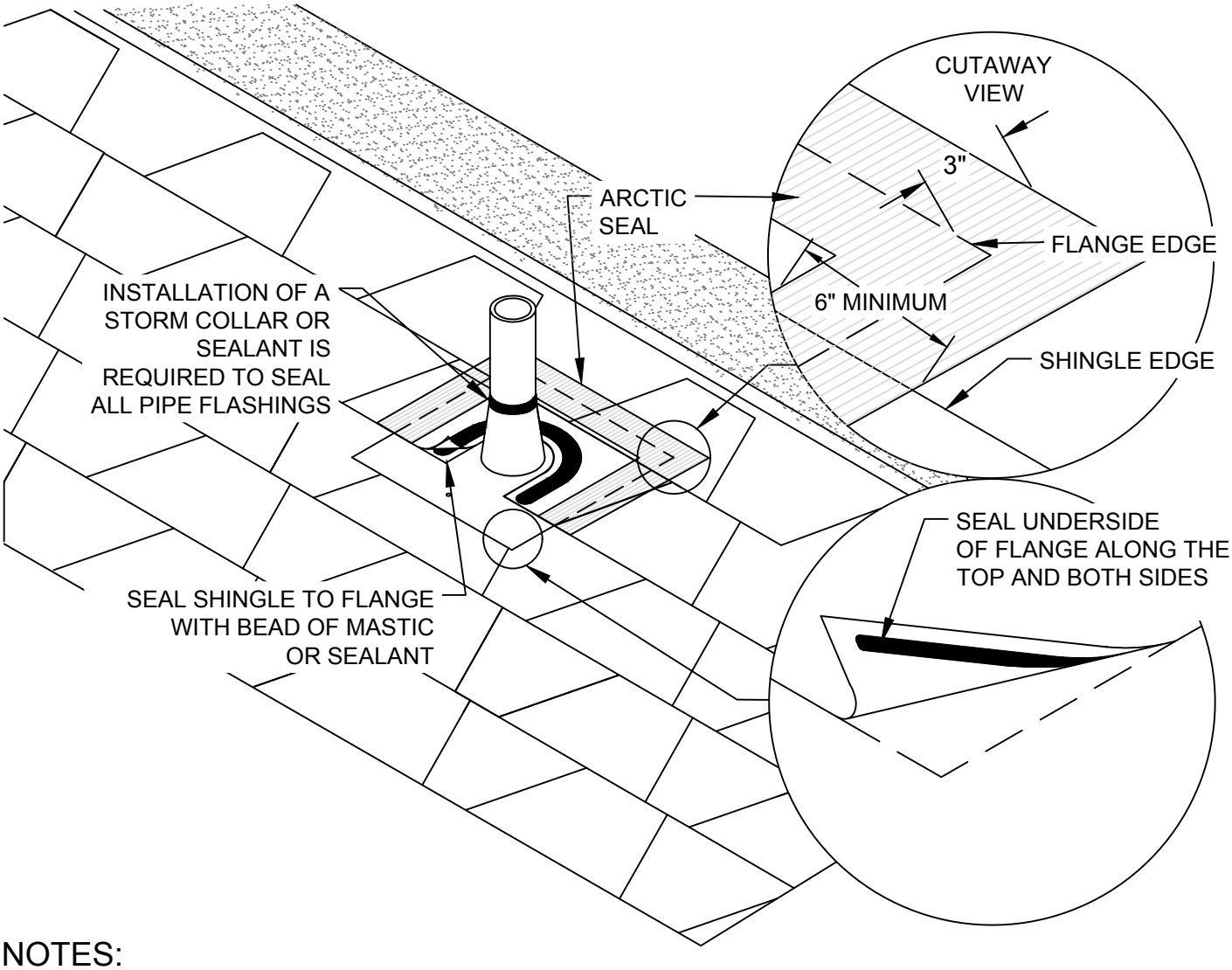
KICKOUT AND STEP FLASHING
LAMINATE SHINGLE ROOF



STEEP SLOPE 17B

Malarkey Roofing Products® Defining Excellence.™	PROJECT NAME:	DATE:
		SCALE: NOT TO SCALE
		PROJECT NO:
	ADDRESS:	DRAWING NO. :
Rev. 1/17	OWNER:	SUBMITTAL NO. :

PIPE FLASHING
LAMINATE SHINGLE ROOF



NOTES:

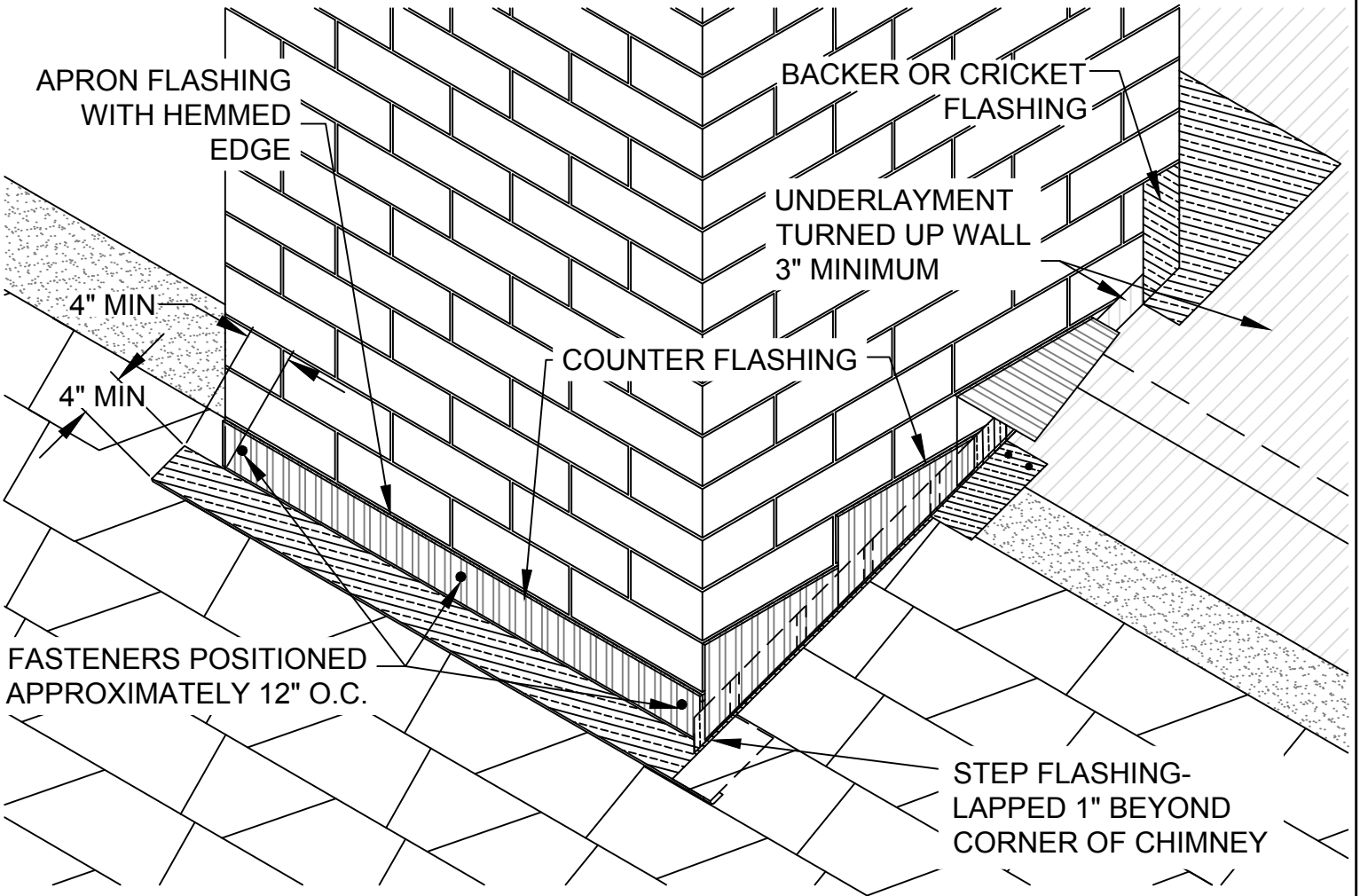
-FOR ADDITIONAL PROTECTION ON SLOPES 2" - 4" MALARKEY RECOMMENDS THE UNEXPOSED FLANGES OF ALL VENT AND PIPE FLASHINGS BE STRIPPED-OFF (MINIMUM 6" WIDE) WITH ARCTIC SEAL SELF-ADHERING UNDERLAYMENT COVERING ALL FASTENERS USED TO SECURE THE FLASHINGS AND TYING ONTO THE FIELD UNDERLAYMENT A MINIMUM OF 3".

-SHINGLES ON TOP OF THE STRIPPING OF ARCTIC SEAL SHOULD BE SEALED DOWN WITH A BEAD OF MASTIC/SEALANT (UNEXPOSED/UNDER THE SHINGLES).

STEEP SLOPE 18B

Malarkey Roofing Products® Defining Excellence.™	PROJECT NAME:	DATE:
		SCALE: NOT TO SCALE
		PROJECT NO:
	ADDRESS:	DRAWING NO. :
Rev. 1/17	OWNER:	SUBMITTAL NO. :

CHIMNEY STEP AND APRON FLASHING
LAMINATE SHINGLE ROOF



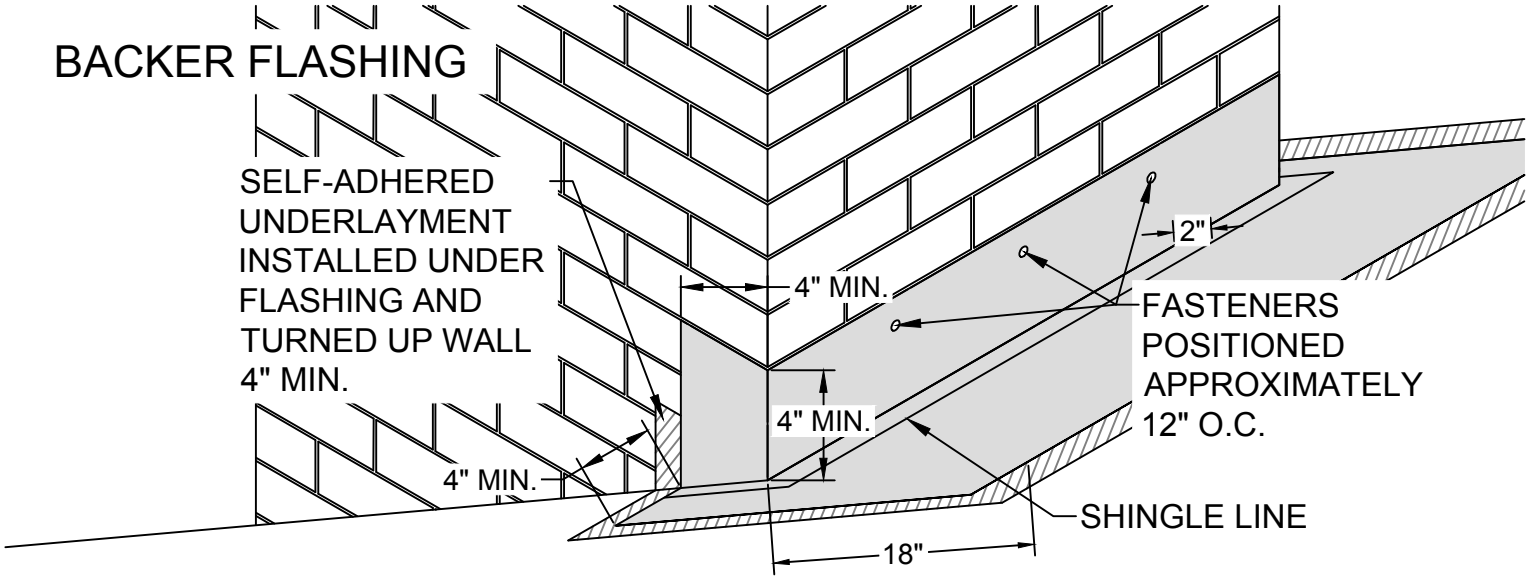
NOTES:
-ALL FLASHING TO BE MINIMUM 26 GAUGE.
-STEP FLASHING IS TO BE INTEGRATED WITH EACH COURSE OF SHINGLES.
-MAINTAIN A 1/4" - 3/4" GAP BETWEEN THE SHINGLES AND THE VERTICAL BEND OF ALL METAL STEP FLASHINGS.
-EACH PIECE OF COUNTER FLASHING LAPS OVER THE PREVIOUS AND BENDS OVER STEP FLASHING.
-APPROXIMATELY 1/2" GAP LEFT BETWEEN ROOF SURFACE AND BOTTOM OF COUNTER FLASHING.
-ANY LAPPED CHIMNEY APRON/HEADWALL FLASHING MUST BE LAPPED A MINIMUM OF 3".

STEEP SLOPE 19B

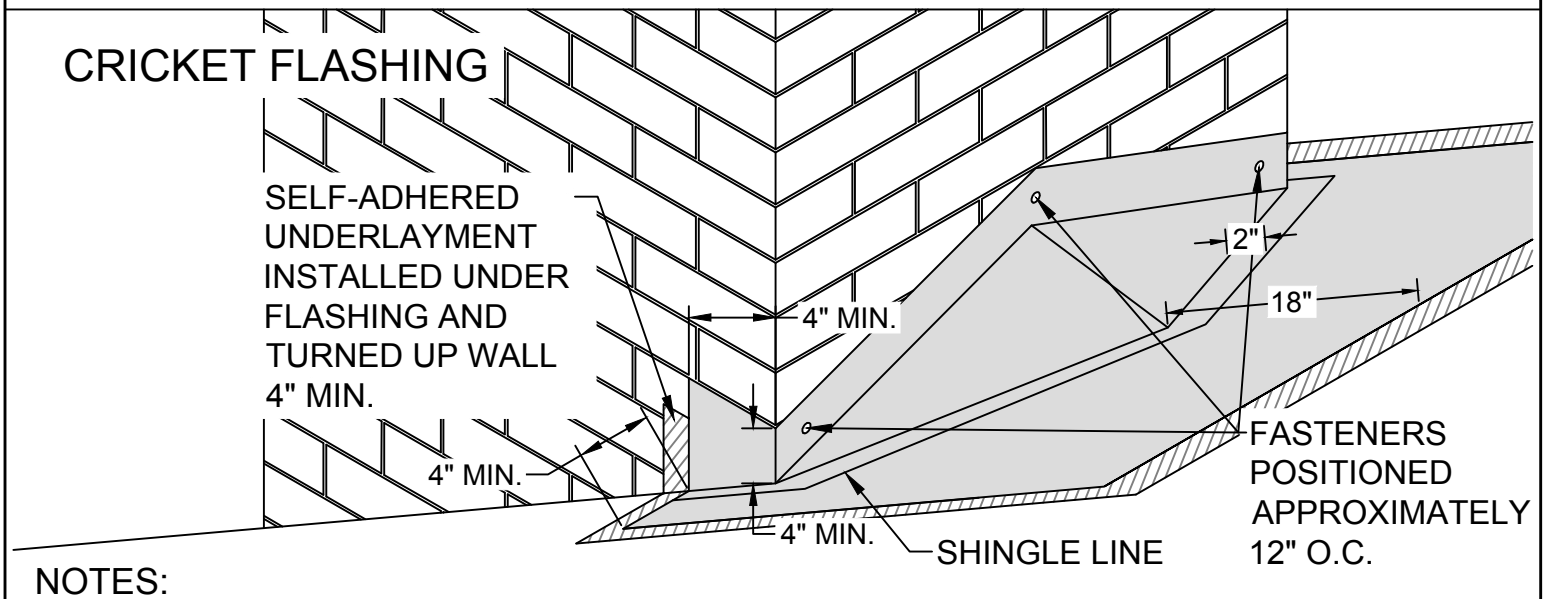
Malarkey Roofing Products® Defining Excellence.™	PROJECT NAME:	DATE:
		SCALE: NOT TO SCALE
		PROJECT NO:
	ADDRESS:	DRAWING NO. :
Rev. 1/17	OWNER:	SUBMITTAL NO. :

CHIMNEY BACKER AND CRICKET FLASHINGS

BACKER FLASHING



CRICKET FLASHING



NOTES:

-ALL FLASHING METAL TO BE A MINIMUM 26 GAUGE.

-A ¼" - ¾" GAP BETWEEN THE SHINGLE AND VERTICAL BEND OF ALL FLASHINGS IS REQUIRED.

-SHINGLES HELD BACK 2" FROM BACKER OR CRICKET, BEAD OF MASTIC APPLIED TO UNDERSIDE OF SHINGLES 1"- 2" UP FROM SHINGLE LINE.

-SEAL ALL RELIEF CUTS AND CORNERS.

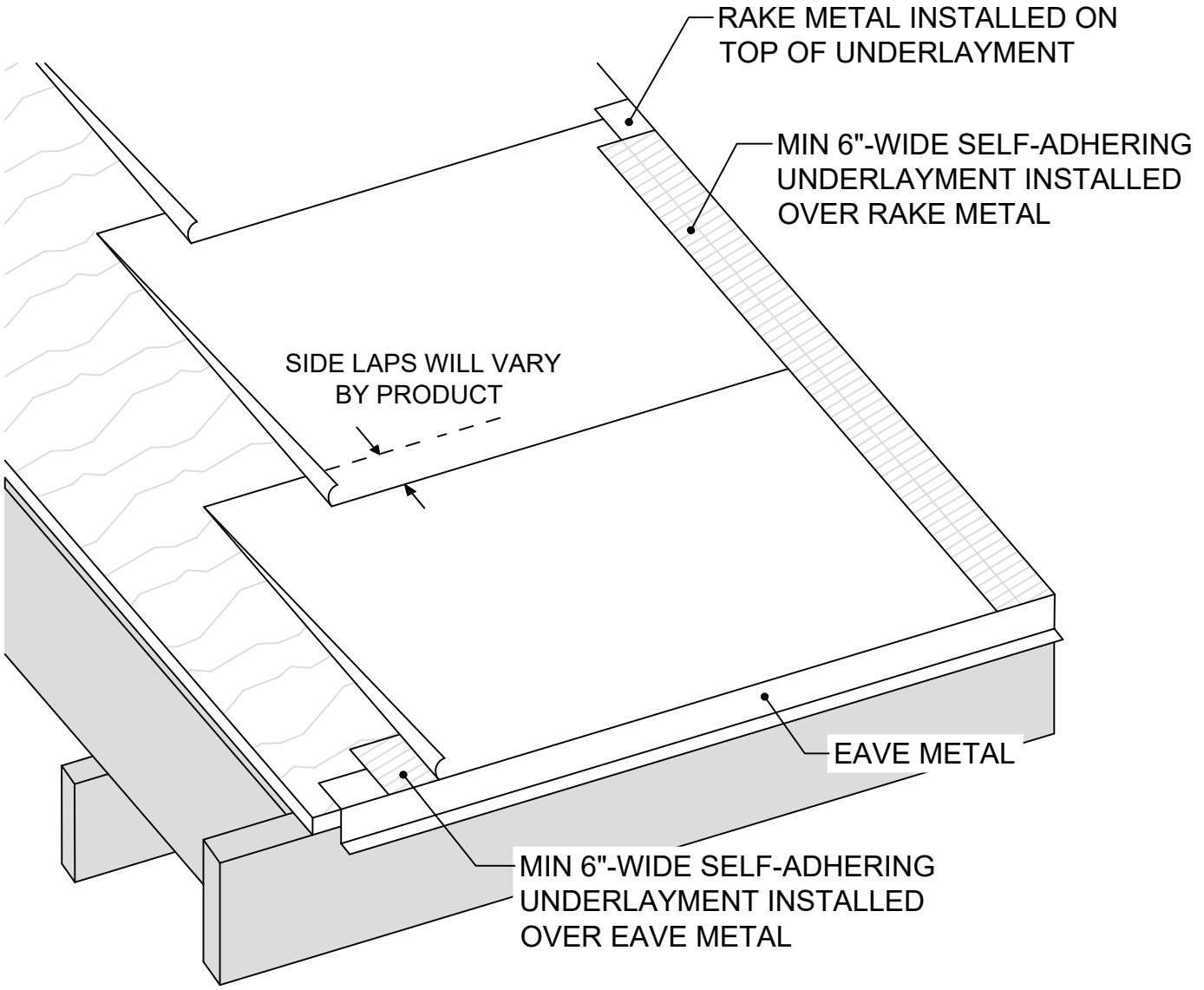
-FOR WIDTHS MORE THAN 30", CRICKET FLASHING IS REQUIRED.

-ROOF COVERING, STEP AND COUNTER FLASHING OMITTED FOR CLARITY.

STEEP SLOPE 20

Malarkey Roofing Products® Defining Excellence.™	PROJECT NAME:	DATE:
		SCALE: NOT TO SCALE
		PROJECT NO:
	ADDRESS:	DRAWING NO. :
Rev. 1/17	OWNER:	SUBMITTAL NO. :

SINGLE LAYER OF UNDERLAYMENT WITH STRIPPED-OFF PERIMETER METAL

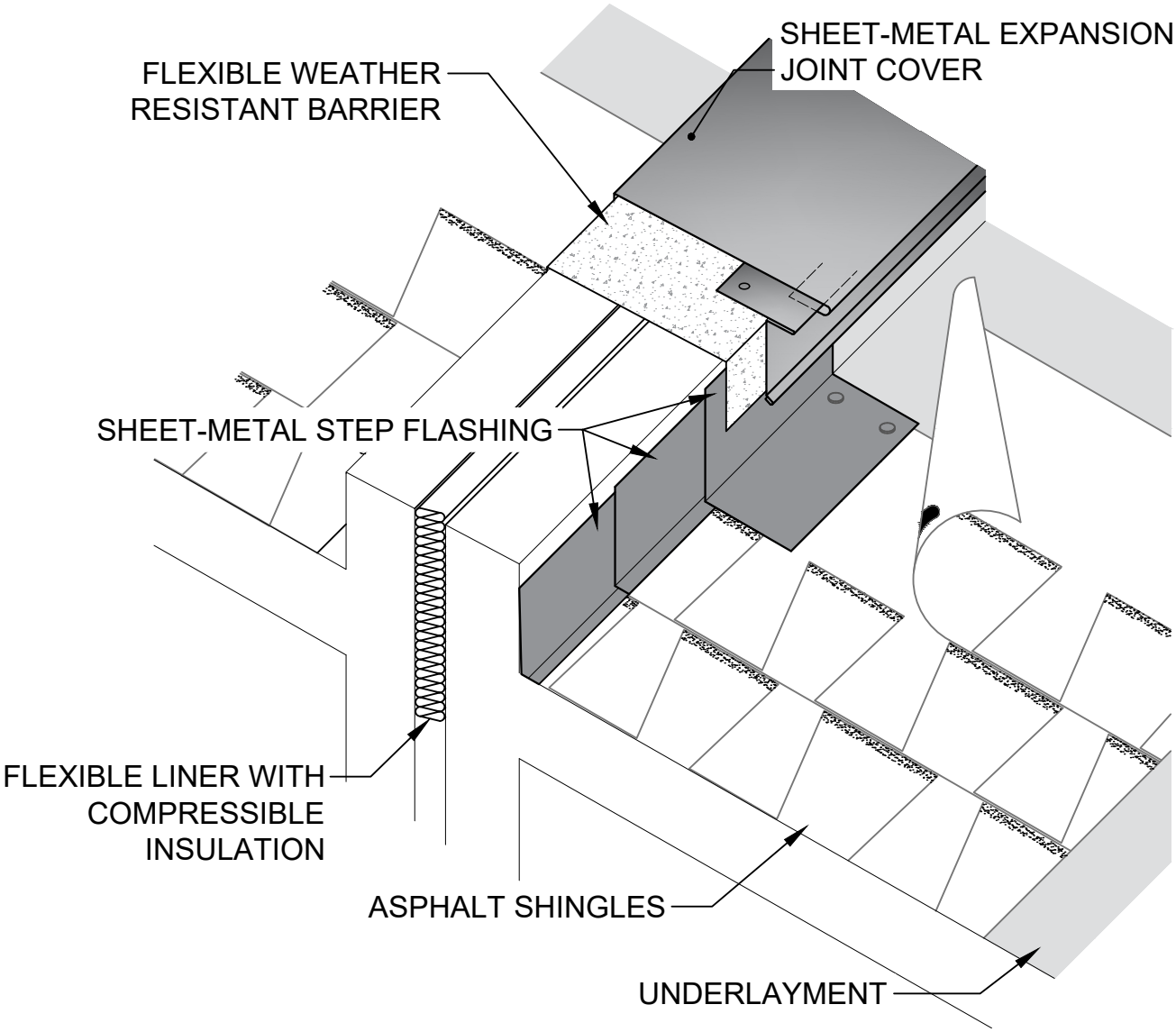


NOTES:
-WHEN REQUIRED BY SPECIFICATIONS, WEATHER, OR WARRANTY REQUIREMENTS, STRIP-OFF PERIMETER METAL WITH MIN 6"-WIDE ARCTIC SEAL SELF-ADHERING UNDERLAYMENT; 3" ON THE FLANGE, 3" ON THE FIELD

STEEP SLOPE 25

Malarkey Roofing Products® Defining Excellence.™	PROJECT NAME:	DATE:
		SCALE: NOT TO SCALE
		PROJECT NO:
	ADDRESS:	DRAWING NO. :
Rev. 5/19	OWNER:	SUBMITTAL NO. :

STEEP SLOPE EXPANSION JOINT: CURB TO CURB

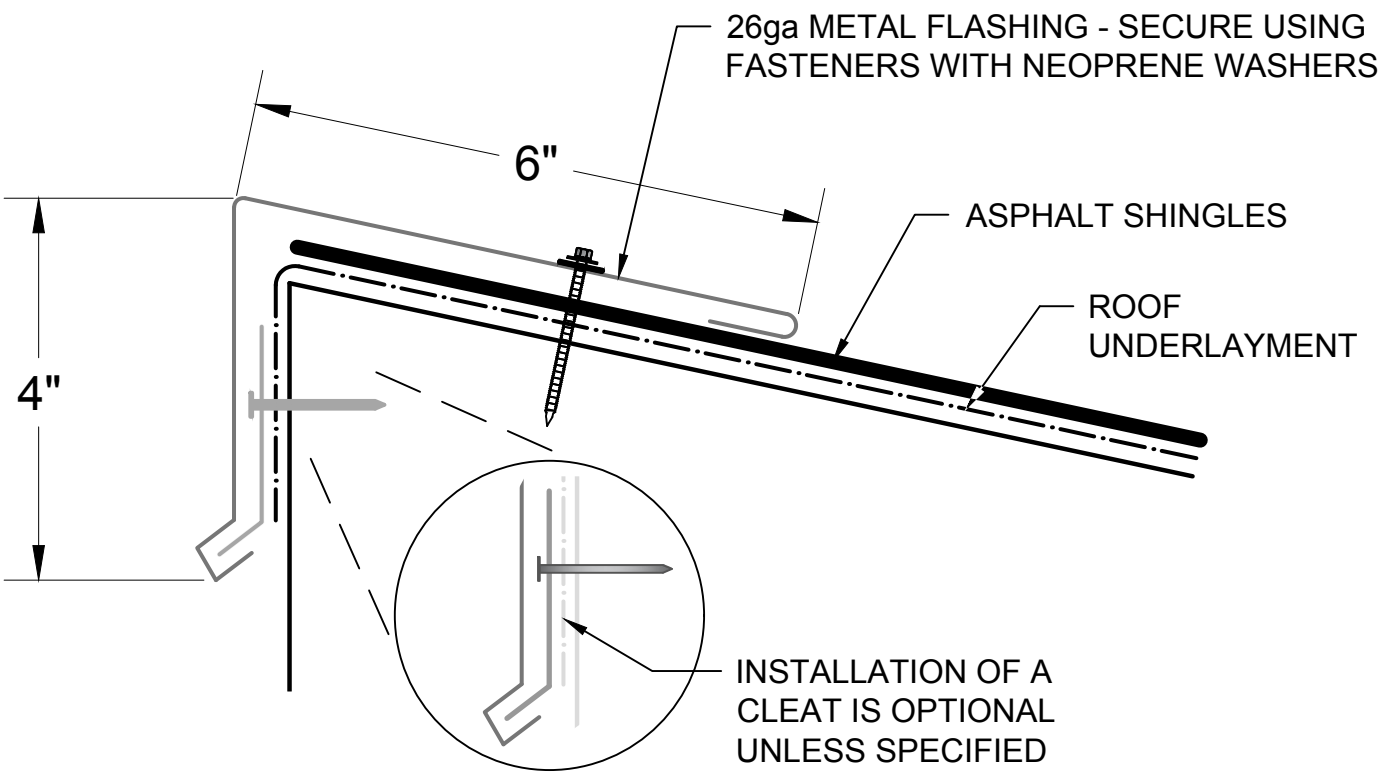


NOTES:
-FLASHING REQUIREMENTS ARE TYPICAL FOR BOTH SIDES OF EXPANSION JOINT.

STEEP SLOPE 28

Malarkey Roofing Products® Defining Excellence.™	PROJECT NAME:	DATE:
		SCALE: NOT TO SCALE
		PROJECT NO:
	ADDRESS:	DRAWING NO. :
Rev. 7/19	OWNER:	SUBMITTAL NO. :

SHED ROOF FLASHING AT THE PEAK



NOTES:
-INSTALL HORIZONTAL FLANGE OF METAL FLASHING ON TOP OF SHINGLES; SECURE IN PLACE BUT DO NOT OVERDRIVE THE FASTENERS AND CREATE AN INDENTATION IN THE METAL.
-LAPS IN THE FLASHING, 2" MINIMUM; APPLY SEALANT BETWEEN THE OVERLAPPING ENDS AND FASTEN TOGETHER.

STEEP SLOPE 30

Malarkey Roofing Products® Defining Excellence.™	PROJECT NAME:	DATE:
		SCALE: NOT TO SCALE
		PROJECT NO:
	ADDRESS:	DRAWING NO. :
Rev. 11/19	OWNER:	SUBMITTAL NO. :