#### SECTION 07 51 13

**BUILT-UP ASPHALT ROOFING**

#### BASED ON DFD MASTER SPECIFICATION DATED (02/06/17)

***This section has been written to cover most (but not all) situations that you will encounter. Depending on the requirements of your specific project, you may have to add materials, delete items, or modify what is currently written. The Division of Facilities Development expects changes and comments from you.***

***Notes to Specifier: Pay special attention to items in the color red and italic typeface. Roof system options are identified within [brackets]* *by the color blue. This language may be deleted or added to as required by the scope of project. Recent changes in the specification are associated with the date by the title and are identified by the color green. Obtain the most current specification section for each project. Section has language for both new construction and re-roofing.***

***Notes to Specifier: DFD Standard Roofing Details for various roof systems including HVAC and Electrical runs, curbs and support, louver, door and windows and State of Wisconsin Guarantee Forms are located on the DFD Website with the Master Roofing Specifications.***

part 1 - GENERAL

Scope

The work under this section includes all labor, material, equipment and related services necessary to install [Four-ply asphalt/fiberglass built up roof membrane] associated system components including metal flashing, [all roof related construction] [and insulation.]

**Note to Contractor:** See GENERAL REQUIREMENT, Article 28. Construction Waste Management. “In accordance with the Department of Administration’s management practice, all contractors shall reduce, reuse, salvage, and/or recycle construction waste to the extent that is feasible.” Roofing materials removed and disposed of by this project are intended to be recycled. Contractor shall make an effort to locate a recycling site nearest the project for delivery of all materials not intended for reuse by this project. See further instructions at: “TECHNICAL SUBMITTALS AND OTHER DOCUMENTS”.

PART 1 - GENERAL

 Scope

 Related Work

 Reference Standards

 Guarantee

 Quality Assurance

 Product Delivery, Storage and Handling

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 Site Conditions

PART 2 - PRODUCTS

 Bituminous Materials

 Insulation

 Miscellaneous

PART 3 - EXECUTION

 Examination

 Substrate Preparation

 [Installation of Vapor Retarder]

 Installation of New Roof System

 Cleaning

 Construction Verification

RELATED WORK

Applicable provisions of Division 1 shall govern work under this Section. Contractor shall consult these provisions in detail prior to proceeding with work.

07 08 00 – Commissioning of Thermal and Moisture Protection

[06 10 53 – Miscellaneous Rough Carpentry]

[07 63 00 –Sheet Metal Roofing Specialties]

[23 05 29 –Hangers and Supports for HVAC Piping and Equipment]

[26 41 00 – Facility Lightning Protection]

***Note to Specifier:” Lightning Protection Systems” that must be removed, altered, interrupted or disabled to perform the new work must be upgraded at the roof level. The Contractors qualified lightning protection system Installer shall submit a written statement that the roof level portion of the installation would\* qualify for a UL “Master Label”.***

In the event that the Contractor wishes to make improvements in materials and/or techniques, or is required to make improvements by his material manufacturer in order to obtain guarantees, he shall make written request stating in full the nature of the proposed changes and stating that the changes, if approved, will be accomplished at no increase in cost.

**REFERENCE STANDARDS**

[ASTM C208 - Cellulosic Fiber Insulating Board.]

[ASTM C728 - Perlite Thermal Insulation Board.]

[ASTM C1289 – Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.]

ASTM D41 ‑ Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.

ASTM D226 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

ASTM D312 ‑ Asphalt Used in Roofing.

[ASTM D1227 – Emulsified Asphalt Used as a Protective Coating for Roofing.]

[ASTM D1863 - Mineral Aggregate Used on Built-Up Roofs.]

ASTM D2178 ‑ Asphalt Glass Felt Used in Roofing and Waterproofing.

[ASTM D2626 - Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing.]

ASTM D2824 - Aluminum Pigmented Asphalt Roof Coatings.

ASTM D4586 ‑ Asphalt Roof Cement, Asbestos Free.

[ASTM D4601 – Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.]

ASTM D6222 – Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

ASTM D6223 – Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.

FM ‑ Roof Assembly Classifications.

NRCA ‑ Roofing and Waterproofing Manual.

UL ‑ Fire Hazard Classifications.

**GUARANTEE**

State of Wisconsin Roof System Guarantee: Provide written five (5) year guarantee warranting all roofing and flashing required under contract, to be watertight and free from defects in materials or workmanship for period of time, as stipulated in guarantee form.

**Contractor shall perform a minimum of two (2) roof system inspections during the term of this guarantee with final inspection performed within last 6-months of term. Submit written inspection reports to DFD Project Manager and Agency Representative prior to guarantee expiration.**

It is recommended that the Contractor take digital photos of the finished work for their files and future reference.

A copy of the required State of Wisconsin Roof System Guarantee form is appended hereto.

***Note to Specifier: The following shall apply for existing roof systems covered by State guarantee or manufacturer warranties. DFD Re-Roofing Project Manager and the membrane manufacturer must be notified of intent to penetrate the existing guaranteed and/or warranted roof system prior to approval of final bid documents. DFD shall provide information concerning the original approved roof system Contractor(s), existing guarantees & warranties. If required, the manufacture shall provide alternate approved Contractor information when original Contractor is not available. This information shall be included within the bid documents allowing the State to maintain the existing State Guarantee and/or various manufacturer warranties through their expiration dates.***

***Note to Specifier: The following shall apply for existing roof systems no longer covered by State guarantee or manufacturer warranties. At minimum, request and insert a one (1) year or two (2) year State guarantee for all new construction projects and remodel projects including mechanical and electrical new work including penetrations or abandonment of existing roof penetrations that require minor roof system repair, replacement and/or new roofing material installed into a portion of the existing roof system to seam in to the existing roof system membrane to achieve a watertight condition.***

(Contractors Performance-Payment Bond is only required to apply to this trade section during the construction period and the first year of the guarantee period. Said Bond shall not apply to any extended guarantee period beyond the first year. Such extended guarantees are limited to the applicable Contractor and manufacturer as herein specified.)

***Note to Specifier: No- Dollar-Limit (NDL) and/or Total System Warranties system warranties are preferred. Where those system warranties are required, the manufacturer will require increase performance in the over all applications and at all terminations and provides a site inspection of the finished work prior to issuance of the warranties requested.***

**[\*\*BUR Manufacturer’s Warranty: Provide the BUR manufacturer’s NDL, “total systems warranty” covering defects in material and workmanship of the membrane and other system components supplied by the manufacturer for a period of twenty (20) years from the date of installation.]**

***Note to Specifier: See\*\* areas in the specifications that relate to the 20-yr warranty.***

***Note to Specifier: THIS IS MANDATORY; AE shall send one (1) copy each (In PDF/scan format via e-mail) of all Contractor submitted and “signed” roof system State guarantees, manufacturer warranties, manufacturer metal guarantee and other guarantees associated with the roof system to the DFD Project Manager.***

Include the following information on all guarantee and warranty submittals: State of Wisconsin [Owner], Agency/Location/Address where work is performed obtained from the [Architect/Engineer] [Agency Representative listed on page B-1 of this specification], Building Name, Bldg. State Number, Roof Areas, DFD Project Number and total sq. ft. of all roof areas.

Manufacturer material and installation requirements may vary concerning issuance of the NDL (“No-Dollar-Limit”)/”Total System” warranty\*\*.

Contractor quote shall include and provide all product(s), labor and installation methods necessary and as specified herein, including manufacturer requirements not found specified herein, as required by the approved manufacturer to obtain the specified warranty requested herein.

New membrane, insulation, shop fabricated and/or manufacturer fabricated metal flashing, pre-molded and/or factory supplied associated roof system products, their fasteners and/or all products used for adhesive and/or adherence purposes and sealants shall be covered by the manufacturer NDL (“No-Dollar-Limit”)/”Total System” warranty specified herein and the State Guarantee.

Existing re-installed metal flashing and new wood blocking securement shall be covered in the State guarantee but not the manufacturer NDL (“No-Dollar-Limit”)/”Total System” warranty specified herein.

Shop fabricated metal flashing materials as specified in section 07 63 00 and herein or as required for a complete watertight system may be provided in lieu of manufacturer fabricated metal flashing and shall be covered in the manufacturer total system warranty specified.

**QUALITY ASSURANCE**

***Note to Specifier: Roofing Contractor shall submit manufacturer’s current written documentation stating that they and their roofer employees are ”approved applicators” in good standing able to perform quality work on new construction projects, remodel projects including mechanical and electrical new work penetrations or abandonment of existing roof penetrations that require minor system repair, replacement and/or new material installed into a portion of the existing roof system with intension to seam in to the existing roof system membrane to achieve a watertight condition. This requirement shall apply to all work requiring submittal of a State Guarantees and/or manufacturer warranties.***

***Note to Specifier: Include the following statements in brackets when No-Dollar-Limit (NDL) or System Warranties are required.***

[Roofing Contractor shall be recognized by the manufacturer of the roof membrane system as an “approved” or “authorized” Contractor applicator of their system and all associated products. Within the past five (5) years, the contractor shall be able to document the successful completion of a minimum of three (3) projects of similar size and scope of the work specified in this section.

**Submittal:** One (1) copy of the manufacturer’s current written documentation stating the Roofing Contractor is an ”approved Contractor applicator” in good standing, for the work specified herein shall to be submitted to DFD at the preconstruction meeting. Document shall be up to date, indicate Contractor name, certification status, year of issue and duration of such status.

Roofing Contractor roofers employed on this project shall be recognized by the manufacturer of the roof membrane system as an “approved” or “authorized” applicator. Within the past three (3) years, the worker shall be able to document the successful completion of a minimum of one (1) project of similar size and scope of the work specified in this section.

All roofers by trade, and employed on this project shall have a certificate of successful completion of training for the system to be installed. Undocumented roofers shall not be allowed to perform the work required, installing the roof system specified herein.

**Submittal:** One (1) copy of the manufacturer certificate of successful completion of training for each roofer employed on this project shall be submitted to DFD at the preconstruction meeting. Document shall be up to date, indicate worker name, certification status, year of issue and duration of such status.]

**Submittal:** One (1) copy of a list of all workers to be employed on this project shall be submitted to DFD [AE] at the pre-construction meeting. The list shall indicate each workers name and trade. Project supervisor and main contact person shall be identified.

List shall include after-hour/weekend emergency phone contact personal and their office and cell phone numbers.

**Labors, sheet metal workers or other non-roofer employees shall not be allowed to perform the actual installation of any part of the manufacturer guaranteed/warranted roof system required by this section without manufacturer documentation of training as required herein.**

***Note to Specifier – For Projects with AE, Agency or DFD Field Representative over-site: Roofing Contractor shall submit specified amount of manufacturer’s current paper-print installation and detail manual to be given to the Facility Representative at the preconstruction meeting.***

Submittal: One (1) copy of the manufacturer’s most current installation and detail manual to be given to the Agency Representative at the preconstruction meeting.

Submittal: Web-site information to allow access to manufacturer’s most current installation and detail manual.

Roofing Contractor shall perform work required using details provided within the specifications, on the drawings or as required by the manufacturer for a proper watertight installation and to allow issuance of warranties required herein.

All components included in the roof system installed by the work required shall be included in the manufacturer watertight warranty for the duration of such warranty required herein. System components required by the work but otherwise not warranted by the manufacturer shall be upgraded to be manufacturer specific products at the time of bid such that they are covered by the warranty required herein.

Provide all equipment recommended by the manufacturer for proper installation of the materials specified.

Roofing installations shall comply with fire resistive rating as defined in the Wisconsin Administrative Code. Required rating on these roofs: U.L. Class A.

**Prior to the start of construction, it is required that the Contractor’s superintendent or foreman shall be in attendance at preconstruction/pre-installation meeting(s).**

It is the responsibility of the Roofing Contractor to obtain the services of a competent:

Electrician: For removal and reinstallation of roof curb-mounted exhaust fans and associated covers, ventilators, other electrical equipment and their associated wiring connections at the unit(s), relative to work on this project.

Agency is responsible for disconnect where wiring must be pulled or cut and conduits relocated to allow installation of the new roof system.

Plumber: To re-lead, repair and/or reset the roof drain bowls, relative to work on this project.

[Remove, relocate and support gas or pressurized air piping as directed.]

[Mechanical Contractor] [State Agency]: For removal of belt, chain driven and/or electrical exhaust fans and associated flex connection duct runs/piping and its associated roof curb penetration.]

The Contractor shall raise all existing mechanical and electrical trades’ roof system penetrations to a minimum height above the roof system of 8”.

Contractor shall notify the Agency Representative 24 hours in advance of all Electrical, Plumbing and Mechanical disconnections.

[Lightning Protection Contractor: For removal, re-installation, replacement of broken components and written verification as stated in specification section 26 41 00 of existing cabling, lightning rods, associated products and proper anchoring, fastening and/or adherence of all of cabling and rods and/or rod base plates. Verify that this installation does not interfere with the proper installation of the roofing metal flashing and its clip/cleat fastening point.]

It is the responsibility of the Agency to perform inspection of the roof areas to be replaced by this project and to provide the following services:

State Agency: Existing Electrical, Plumbing and Mechanical installations and associated equipment pipe and duct runs shall be identified/verified by the State Agency as in use or be spray painted in ORANGE by the Agency if they are abandoned or shall be abandoned and shall be removed by this roofing Contractor, and verify that the electrical run is terminated, prior to start of work by Contractor. Electrical conduct runs lying directly on the existing roof membrane shall be relocated by the Agency prior to start of work.

**PRODUCT DELIVERY, STORAGE AND HANDLING**

Make no deliveries to the project site until ready to install or approved storage is provided. The State will not accept delivery nor will the State be responsible for any materials or equipment stored on the premises.

Deliver materials in the manufacturer's original, unopened containers and rolls with labels intact and legible.

Deliver materials in sufficient quantity to allow continuity of work.

Materials used on the job must be stored in such a manner as not to create a nuisance or hazard.

Store materials on clean, raised platforms, with breathable, weather protective covering when stored outdoors. Provide continuous protection from materials against weathering and moisture absorption.

Factory applied "shrink-wrapping" is not considered to be an acceptable weather protective covering. Store rolled goods on end; do not double stack rolls. Improper storage practices will be grounds for rejection of questionable materials.

Store primers, coatings, sealants and similar materials between 60 degrees and 80 degrees Fahrenheit.

DO NOT store materials in a manner which will overload any portion of the building.

Handle all materials in a manner which will not damage the material. All damaged materials shall be removed from project site.

Select and operate material handling equipment and store materials as not to damage existing construction or applied roofing, and without overloading the building structural system.

**TECHNICAL SUBMITTALS AND OTHER DOCUMENTS**

**At [or before] the preconstruction meeting and prior to start of work,** **submit the following for approval to DFD Project Manager [Architect/Engineer]:**

The following information shall be included on all submitted documents:

Agency/Location/Address where work is performed obtained from the [Architect/Engineer] [Agency Representative listed on page B-1 of this specification], Building Name, Bldg. State Number, Roof Areas, DFD Project Number and total sq. ft. of all roof areas.

**INSTALLATION INSTRUCTIONS:** Provide one (1) copy of the manufacturer’s most current installation/instruction and detail manual concerning the installation of the roof system and all associated products that will be used in this project to be turned over to the Agency Representative at the preconstruction meeting.

**RECYCLED MATERIALS:**  Three (3) copies of a Waste Management Plan to DFD for review. Include recycle business name, address, contact, and phone number where all recycled roofing material removed by this project will be delivered.

**SEE QUALITY ASSURANCE:** Three (3) copies of manufacturer’s current written documentation stating the Roofing Contractor is an ”approved applicator” in good standing, for the work specified herein.

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**MATERIAL LIST:** Three (3) copies of a list of all materials used on the project identified by manufacturer's name, size, thickness, type or grade. List shall be submitted on Contractor's letterhead stationery.

Contractor shall state the following on the material list submittal:

**“New products installed on this project do not contain asbestos”.**

***Note to Specifier: When removing an existing roof where existing materials might contain asbestos, insert the following paragraph(s):***

 **[ASBESTOS TESTING:** Three (3) copies required. Contractor replacing the roof system is required to take a minimum of two (2) samples of existing roof system(s) encountered to be sent to a testing lab. Each test result shall properly identify the DFD Project No., project location, bldg. name, bldg. number & roof area/location where the test sample was taken. Test lab charges shall be the responsibility of the Contractor at no additional cost to the project.

**A Contractor owner or employee shall have taken the exterior asbestos supervisor course and possess current documentation that they are an ‘Exterior Asbestos Supervisor’ able to take existing roof system samples as required to be tested for possible asbestos contamination.**

Minimum of two test samples on each roof area of existing roof systems, one to be taken in the field of the roof and one at the base flashing.

Pre-bid tour Contractors are advised to obtain a small sample of the existing roof system while on site.

**ASBESTOS:** Three (3) copies of the necessary regulatory notifications for asbestos removal or three (3) copies of core sample test results indicating the roofing materials slated for removal do not contain asbestos. (Refer to General Requirements Article “HAZARDOUS SUBSTANCES – ASBESTOS, LEAD AND POLYCHLORINATED BIPHENYLS (PCB’S)” for additional information.)

**Test lab results must be submitted prior to start of work]**

**SAFETY REPORT:** One (1) copy of a written report to be given to the Facility Representative at the preconstruction meeting, describing in detail the Contractors implementation of specific OSHA regulations, Contractor’s worker safety program methods/means, roof perimeter safety and identification of the “watch person” required at all roof levels. Identify fire extinguisher and their locations, all equipment/operators on roof/ground in setup/storage area and travel routes used while performing the work.

**[TAPERED INSULATION DRAWING:** Three (3) copies in addition to the number of copies the Contractor needs returned, of insulation supplier's shop drawings showing the layout of the tapered insulation. Shop drawings shall show actual locations and sizes of all roof drains and other pertinent rooftop equipment.]

**MSDS DATA:** One (1) copy of all MSDS paperwork for each products used on this project to be given to the Agency Representative at the preconstruction meeting.

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**EMERGENCY AND OFFICE CONTACT PHONE LIST:** One (1) copy of the Contractor’s office superintendent and job foreman daytime, after hours and weekend phone contact numbers to be given to the Agency Representative at the preconstruction meeting.

**Contractor shall maintain at least one (1) copy of the following at the project site throughout construction:**

Specifications, drawings, addenda, value enhancement, change order and all approved submittals.

Latest version of the manufacturer’s handbook including details and technical information concerning application techniques for all primary roofing system materials required by the work.

Material Safety Data Sheets (MSDS) manual for all materials used on this project.

**After the completion of the project, and prior to final payment, submit the following to DFD Project Manager as one (1) package including a cover page listing all documents sent:**

**RECYCLED MATERIALS:**  Three (3) copies of a completed Waste Management Plan to DFD for review. Include recycle business name, address, contact, and phone number where all recycled roofing material removed by this project will be delivered.

Contractor shall submit a final summary of the progress reports, including the percentage of recycled waste (weight or volume) to the quantity of waste that would have been otherwise land filled.

Submit recycler receipt for all deliveries showing all received product their weight and % calculation as described in GENERAL REQUIREMENTS, Article 28.

Material kept for reuse and delivered to the Contractors property or given away at the site by the Contractor shall be identified as well. The total sq. ft/bulk sum of all material shall be recorded and submitted.

[Contractor shall contact the following or another recycling company to arrange for pick up of EPDM and/or whole-piece insulation intended for disposal by the Contractor.

“Nationwide Foam, Inc.”: Recycles insulation and will arrange for flatbed drop off and removal at a cost less than landfill fees. Contact: Ken Wardrop at (888) 820-2760 Ext. 29 or e-mail at ken@nationwidefoam.com.]

[Contractor shall contact local concrete companies or earth fill providers concerning disposal of existing concrete and/or stone ballast.]

[Contractor shall deliver sheet-rock and shingle roof debris to the following recycling company, or another recycle service if closer to the work, to include all associated paper, wood, metal, fasteners, plastics, felt/membranes that are mixed in with the shingles and intended for disposal by the Contractor.

“2ndSeason”: Recycles debris from shingle tear-off and will accept your loads between the hours of 7:00 AM – 4:30 PM Monday through Friday. Cedar shingle drop off cost will be slightly higher. They are located at 2159 Range Trail, Verona, Wisconsin 53593. Contractor may find location and drive-maps at “map quest”, “live search” or other such services. The site phone number is (608) 848-4400. ]

[Contractor shall contact a metal recycle company for metal debris containers, pickup or delivery of metal debris intended for disposal.]

**[WASTE MANIFEST:** Two (2) copies of the Waste Manifest Records to DFD Project Manager if required in accordance with General Requirements Article “HAZARDOUS SUBSTANCES – ASBESTOS, LEAD AND POLYCHLORINATED BIPHENYLS (PCB’S)”.]

**[AS-BUILT DRAWING:** One (1) copy of a fully dimensioned as-built roof plan showing all seam and patch locations, actual locations and sizes of roof drains, vents, fans, etc.]

**STATE OF WISCONSIN ROOF GUARANTEE:** One (1) original copy of guarantee as required herein. (Refer to GUARANTEE article in Part 1 of this Section).

**MANUFACTURER ROOF WARRANTY:** One (1) original copy of all membrane warranties as required herein. (Refer to GUARANTEE article in Part 1 of this Section).

**[MISCELLANEOUS METAL WARRANTY:**  One (1) original copy of manufacturer warranty as required by Specification Section 07 63 00).]

**[LIGHTNING PROTECTION CERTIFICATION:** One (1) original copy of all testing required by Specification Section 26 41 00.1).]

**SETTLEMENT CERTIFICATE [AND WAGE RATE AFFIDAVIT]:** One (1) copy of each document.

The following information shall be included on all submittal documents.

Agency/Location/Address where work is performed obtained from the [Architect/Engineer] [Agency Representative listed on page B-1 of this specification], Building Name, Bldg. State Number, Roof Areas, DFD Project Number and total sq. ft. of all roof areas.

**SITE CONDITIONS**

Apply roofing in dry weather. All roofing materials installed during rain shall be removed and replaced with dry materials at Contractor's expense.

DO NOT apply roofing unless authorized by the [DFD Project Manager] [Architect/Engineer] [DFD Project Representative] when the working hours ambient temperature is below 32 degrees Fahrenheit. Under no circumstances will any seaming, flashing or adhesive activities be allowed when the ambient temperature is below 20 degrees Fahrenheit, or the wind chill factor is below 0 degrees Fahrenheit.

Existing materials designated to remain, which are damaged or defaced as a result of the work shall be replaced at Contractor's expense to like new condition.

[Reinstall] [Install] all rooftop mounted equipment in a watertight manner and repair any damage to sheet metal or other components related to connection and protection of the roof system.

Prevent materials from entering and clogging roof drains and conductors. Remove roof drain plugs when no work is taking place or when rain is forecast.

Protection of surfaces:

Take every precaution to prevent water leakage, bitumen drippage, debris falling into the building interior, or other such occurrences. Contractor is responsible for any damage to the building interior, or contents, during [reroofing] [construction].

Provide special protection or avoid heavy traffic on completed work. Temporary walkways and work platforms shall be provided as necessary.

Wall surfaces shall be protected with tarpaulins or other suitable cover to prevent damage, staining or discoloration that might result from operations such as removal, disposal, replacement or removing of equipment or materials to the roof surface. Windows, doorways, docks, walkways, etc. may require special protection measures.

Disposal of materials:

All materials to be disposed of shall be loaded directly into trucks by means that will prevent damage to existing or new surfaces and to control pollution. Free-fall of debris from heights over 15’ will not be allowed.

Contractor is responsible for any charges, such as landfill fees, incurred for disposal of materials.

PART 2 - PRODUCTS

**BITUMINOUS MATERIALS**

All products used in this installation shall be compatible with one another and the membrane intended for use.

Where specific manufacturers are named, products by other manufacturers may be considered equal in accordance with the provisions of Article 17 of the General Conditions.

Use new materials only; salvaged or used materials are unacceptable.

Organic Felt: ASTM D226, Type I; No. 15 asphalt saturated organic felt, perforated for vapor retarder installation, non-perforated for flashing installation.

[Base Sheet: ASTM D2626; asphalt saturated and coated organic base sheet.]

Fiberglass Felt: ASTM D2178, [\*\*Type VI] [IV]**;** asphalt-coated fiberglass felt.

[Fiberglass Base Sheet: ASTM D4601, Type II; non-perforated, asphalt-coated fiberglass base sheet.]

Base Flashing: ASTM D6222 or ASTM D6223, Type II, Grade G; [\*\*Mop applied, SBS or APP] [torch applied APP] modified bituminous sheet material with granule or mineral surfacing as recommended and supplied by the manufacturer of the fiberglass felts. Flashing sheet shall have minimum 250 gram/sq. meter polyester or dual polyester/fiberglass reinforcing.

Asphalt:

For membrane construction and flood coat for aggregate application: ASTM D312, Type II.

For [application of vapor retarder,] adhesion of insulation and base flashings and flood coat of drain sumps: ASTM D312, Type III.

Asphalt Primer: ASTM D41.

Flashing and Plastic Cement: ASTM D4586, Type I for horizontal application. ASTM D4586, Type II for vertical application. Products shall be asbestos free.

[Fibrated Asphalt Emulsion: ASTM D1227, Type IV. Asbestos free.]

Asphalt Aluminum Roof Coating: ASTM D2824, [Type I; non–fibrated for roof coating,] [Type III; fibrated for coating base flashing,] minimum 3 pounds per gallon aluminum paste. Fibrated product shall be asbestos free.

Note to Specifier: It is required to design roofs in accordance with the provisions of the State Energy Code relative to system “U” value. When specifying tapered insulation, use average thickness for basis of calculations.

**Insulation**

[Tapered Insulation: ASTM C1289, Type II, Class 1, Grade 2; rigid board polyisocyanurate insulation with felt or fibrous mat facing on both sides, factory tapered to [1/8”] [1/4”] [1/2”] per foot slope. Tapered insulation board shall have a start thickness at the perimeter of the roof drain sump of 1/2”. Maximum board size = 48” x 48”; maximum board thickness (including fill boards) = 2-1/2”.]

[Polyisocyanurate: ASTM C1289, Type II, Class 1, Grade 2; rigid board insulation with felt or fibrous mat facing on both sides. For mechanically attached boards, maximum size = 48" x 96"; for adhered boards, maximum size = 48” x 48”. Thickness = [1-1/2”] [2.0”].]

[Perlite: ASTM C728; rigid board insulation. Thickness as follows:]

[3/4"] [1”] for overlay of other insulation.

[Factory tapered to [1/4”] [1/2”] per foot net positive slope for saddles and crickets.]

As required to match existing drain bowl elevation and to fill blocking to thickness of insulation.

Cants and Tapered Edge Strips: ASTM C208, Type II, Grade 1; rigid board wood fiber insulation, or, ASTM C728; rigid board perlite insulation.

**Miscellaneous**

[Rosin Paper: Unsaturated rosin sized building paper, minimum 4 lbs. per square.]

Fasteners:

[Base Sheet or Vapor Retarder Felts to Cement-Bonded Wood Fiber Deck: ES Products "ES/Nail" or "Nail-Tite", E.G. Building Fasteners Corp. "Insuldeck Loc-Nail" with cap washers, or Simplex Nail and Mfg. Co. "Tube-Loc".]

Base Flashings to Wood Blocking, Base Sheet to Wood Deck: 1-1/4" hot-dipped galvanized roofing nails driven through 1" diameter metal discs (or with 1" diameter capped heads).

Base Flashings to Masonry: Zinc coated, high carbon steel masonry nails with 1" diameter round or 1" square steel capped heads.

[Insulation to Steel Deck: Polymer coated metal screw and plate fastening devices approved by the manufacturer of the insulation and of appropriate length to penetrate the top flange of the deck a minimum of 3/4", but not long enough to extend past the bottom of the deck rib.]

Lead Flashing:

Plumbing Vents (soil stacks): Four (4) pound lead boot flashing fabricated such that top will turn back into stack a minimum of 1". Flange shall be 12" x 12" plus O.D. of stack in both directions.

Roof Drains: Four (4) pound lead, 30" x 30".

[Aggregate: ASTM D1863, No. 7; clean, dry, well rounded, light colored gravel or slag.]

Pourable Sealer: 2-part polyurethane or other sealer intended for use by the manufacturer to seal manufacturer approved and supplied pitch pans and other penetrations. Sealer and pitch pan provided shall be included in the manufacture warranty as specified herein or upgrade to be included in such warranty.

Other products, not specifically described, but required for a complete and proper installation of the work in this section shall be selected by the Contractor subject to the approval of the [Project Manager] [Architect/Engineer] [Project Representative].

PART 3 - EXECUTION

**EXAMINATION**

Examine the areas and conditions under which work in this section will be installed. Bring to the [DFD Project Manager’s] [Architect/Engineer] [DFD Project Representative's] attention any conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

Proceeding with the work shall signify the Contractor’s acceptance of the substrate being covered by the new installation.

***Note to Specifier:*** *Architect/Engineer shall include a note on new construction roof drawing and plumber drawing bid documents requiring the General Contractor to call a meeting between the roofing contractor and plumbing contractor to coordinate the final drain location. AE shall inspect installation at the start of this work to assure proper installation of .tapered insulation drawing shall be re-submitted to the AE after drain locations are approved by all, in writing. Tapered insulation installed contrary to the low point of the drain, over flow or scupper locations shall be cause for rejection of the work and therefore;*

Approved tapered insulation drawing layouts shall be reviewed by the Contractor installing the work in this section prior to start of such work, and before ordering the materials, to assure that the tapered insulation layout will correspond with the exact location of new and/or existing roof drains and primary through-wall and/or roof edge drain scupper locations.

Tapered insulation systems that are not installed such that they drain directly and positively to the roof drain shall be removed and installed correctly by the roofing Contractor at no additional cost to the project.

***Note to Specifier: Designer must calculate insulation depth to be achieved by the new tapered roof system design at all roof edge, outer wall and roof-to-wall intersection and properly identify structural wall/wood blocking height requirements in relation to metal flashing coverage and counterflashing receiver height.***

**SUBSTRATE PREPARATION**

Plan work and take whatever action is necessary to prevent dirt and debris from entering the building during [construction] [removal of existing roofing materials].

***Note to Specifier: If required, insert language relative to removal and disposal of existing roofing system. Include archival information on existing materials, if available.***

[*Mechanical Fastening To Metal Deck*: Provide fully adhered 60-mil EPDM over [2”] Polyisocyanurate insulation adhered in asphalt or manufactures recommended adhesives, over [1-1/2”] mechanically fastened Polyisocyanurate insulation over existing metal deck to achieve an R-value of [R-24]. Mechanical fasteners shall be sized to be long enough to fasten into the upper flute of the metal deck only. NO Fasteners shall be installed that could be long enough to penetrate the lower flute of the metal deck.]

***Note to Specifier: For concrete decked areas only insert the following sentence:***

[An existing bituminous vapor retarder, if found to be present, may remain if well adhered.]

All vertical surfaces to receive new flashing materials shall be thoroughly cleaned of existing adhesives, sealants, bituminous materials, etc.

Verify that wood blocking, curbs and nailers are securely anchored and that roof openings and penetrations are in place and set and braced. Verify that roof drains are properly clamped into position.

Verify that the substrate is clean, dry and free from sharp projections and depressions and that all surfaces and site conditions are ready to receive new materials. [Bottom flanges (ribs) of steel deck shall be void of moisture and other debris.]

Pressure Treated Plywood and Lumber: These products shall not be specified or provided for use in roofing projects as a substrate material intended to receive mechanical fasteners used to secure metal roof panels, panel clips, metal coping, roof penetration curbs cap and Counterflashing, all other metal flashing, roofing insulation and membrane installations that are a part of the roof system.

The manufacture shall approve of all mechanical fasteners used to secure all roof system components.

[Contractor shall take multiple digital photos to be submitted electronically to the [Project Manager] [Architect Engineer] [DFD Project Representative] showing the various locations and types of mechanical fastening that will be hidden from view or otherwise concealed beneath the completed roof system.]

**[installation of VAPOR RETARDER]**

[None required.]

[Base Sheet *(Vapor Retarder)* over Wood or Cement-Bonded Wood Fiber Deck: Over wood deck apply one layer of rosin paper. Mechanically attach a single ply of base sheet over the deck beginning along the drain line (low point) and working up slope. Lap each course 3" over the preceding course, and fasten to the deck through the lap at 9" O.C. In addition, two rows of fasteners spaced at 12” O.C. from the lap and at 18" O.C., staggered, shall extend down the field of the sheet. *Apply one ply of No. 15 organic felt in full mopping (minimum twenty five (25) pounds per square) of hot asphalt over the base sheet to act as a vapor retarder. Lap each course a minimum of 2" over the proceeding course. Apply a glaze coat of hot asphalt (minimum 25 pounds per square).]*

[Vapor Retarder over Concrete Deck:

Prime any exposed deck at a rate of 1 gallon per square and allow to dry. Hold primer back 2" to 3" from any cracks or deck joints to prevent drippage.

Apply a vapor retarder consisting of two (2) plies No. 15 organic felt set into full moppings of (minimum twenty five (25) pounds per square) of hot asphalt. Avoid mopping over cracks or open joints in the deck to minimize the potential for drippage. Lay felts smooth without wrinkles. Seal membrane to projections and walls as detailed.]

[Vapor Retarder over Cement-Bonded Wood Fiber Deck:

Beginning along the drain line (low point), lay one course of felt over the deck, dry. Mechanically fasten along both outside edges and with one row of fasteners down the center at 9" O.C.

Working up slope, apply felt in full moppings of (minimum twenty five (25) pounds per square) of hot asphalt. Asphalt shall be applied in such a way that in no place will dry felt touch dry felt, nor will any asphalt be applied to the deck.

Lap plies 19" over preceding courses, leaving an exposure of 17". Mechanically fasten the edge of this exposed felt to the deck at 9" O.C.]

[Vapor Retarder over Steel Deck:

Mechanically fasten one layer of perlite insulation directly to the deck using a fastener pattern recommended by the insulation manufacturer to meet FM I-90. Fasteners shall penetrate top flange of deck only. Insulation shall bear a minimum of 1-1/2” on all top flanges.

Apply a vapor retarder consisting of two (2) plies No. 15 organic felt set into full moppings of (minimum twenty five (25) pounds per square) of hot asphalt. Lay felts smooth without wrinkles. Seal membrane to projections and walls as detailed.]

[Apply a glaze coat of hot asphalt (minimum 25 pounds per square).]

[Contractor, at his option, may use the vapor retarder as a temporary roof for up to fourteen (14) calendar days only, provided the following:

Each temporary roof area shall be drained by at least one roof drain.

Vapor retarder must be glaze coated (minimum 25 pounds per square) to be used as a temporary roof.

All damaged areas must be repaired or replaced prior to application of insulation.]

**INSTALLATION OF NEW ROOF SYSTEM**

***Note to Specifier: A vapor retarder shall be specified over metal roof decks for all New Roofs and Roof Replacement projects where the interior of the building will be open to outside elements during construction that requires protection to the interior work by the new roof system. The vapor retarder will help prevent moisture transfer into the new roof system insulation during interior construction.***

Install all nailers and wood blocking in accordance with Section 06 10 53.

Install insulation as follows:

***Over Steel Deck:*** [Mechanically fasten one layer of [1-1/2”] [2.0”] polyisocyanurate directly to the deck using a fastener pattern recommended by the insulation manufacturer to meet FM I-90. Fasteners shall penetrate top flange of deck only. Insulation shall bear a minimum of 1-1/2” on all top flanges.]

***Over Other Substrates:*** [Prime exposed concrete at a rate of one (1) gallon per square and allow to dry. Hold primer back 2" to 3" from any cracks or deck joints to prevent drippage. Apply one layer of [1-1/2”] [2.0”] polyisocyanurate in full moppings of hot asphalt.]

[Apply tapered insulation in full moppings of hot asphalt in accordance with the approved shop drawings.]

[Apply overlay of [3/4”] [1”] perlite in full moppings of hot asphalt.]

“Full mopping of hot asphalt” for purposes of insulation adhesion shall be defined as minimum thirty (30) pounds per square over 95% of the board’s surface area. Less than 95% coverage at the minimum weight will be grounds for rejection of the work.

Stagger insulation joints in all layers to include flat stock and tapered insulation, a minimum of 6" in both directions.

Install field fabricated crickets to displace water wherever areas of ponding are anticipated. Crickets shall be constructed from perlite board insulation and tapered edge strips set into moppings of hot asphalt. For the purpose of these specifications, ponding will be defined as standing water on the surface of the roof after 72 hours of reasonable drying weather, after a rain.

Provide sumps around all roof drains using perlite and tapered edge strips as detailed. Unless otherwise indicated, sump shall be 48" x 48". Insulation shall have a constant, gradual slope from the perimeter of the sump to the drain bowl. Severely sloped sumps will be rejected.

[Additional Counterflashing:

Provide new like metal counterflashing per DFD detail at all existing roof top units and roof hatches where none exist.]

Complete installation of roof drain assembly on a daily basis (all felts and lead shall extend under the clamping ring). Provide new clamping ring-to-bowl hardware (bolts, clamps, etc.). Replace broken or otherwise unusable clamping rings. Replace broken or missing strainers with new cast iron strainers.

Temporary installation at drain bowl assemble shall not be allowed. Clamping rings and sealant shall be applied to assure a water tight installation.

When complete and roof is free of debris, Contractor shall rod and clean all drain bodies and piping to the first elbow to be clean and free of previous asphalt and coal tar system seepage, re-roofing debris and all other debris that may impede proper drainage.

All drains shall be made to be fully operable and free flowing and maintained in such condition throughout construction and after final drain bowl strainer re-installation.

Existing strainers are to receive two coats of alumacoating or equal after final installation of roof system.

Install fiber cants and tapered edge strips in full moppings of hot asphalt where detailed, manufacturer requirement, or for positive slope.

STEP - DO NOT SLIDE - each unit of insulation into place.

Lay insulation boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeters of roof areas and around penetrations and projections.

Apply a membrane consisting of four (4) plies of fiberglass felt in hot asphalt in accordance with manufacturer's recommendations and the following:

All four plies shall be installed at one time; phased construction is unacceptable.

Equiviscous temperature at point of application shall be no more than 25 degrees F (14 degrees C) from bitumen rating indicated on bitumen container label.

Interply moppings shall be minimum twenty-five (25) pounds per square, 100% coverage.

Plies shall be lightly "broomed" into place. A moderately soft commercial broom or squeegee should be used for this purpose. Do not stand or walk on hot felt behind roll; set and walk beside roll at all times from the insulation side. “Kicking In” of felts will be cause for rejection of the work.

Side laps shall be minimum two (2) inches; end laps shall be minimum six (6) inches.

Apply felts smooth, free from air pockets, wrinkles, fishmouths, or tears. Repair defects immediately, while the asphalt is still molten. Do not “step down”.

Extend all membrane felts to the top of cant strips as detailed.

Mop and seal two additional plies of felt around all roof penetrations.

Install two ply membrane and bitumen glaze coat for cut‑off at end of day's operation. Remove cut-off before resuming roofing.

Glaze coat of exposed felts at end of working day is not required.

Apply bituminous flashings to seal membrane to vertical elements and roof edges in accordance with the manufacturer's recommendations and the following:

Prime masonry and exposed metal surfaces to receive flashing at a rate of one (1) gallon per square.

Install two (2) plies of fiberglass felt in hot asphalt, extending a minimum of 6" horizontally from the toe of the cant onto, and 8" vertically above, the membrane surface. [At roof edges, the first ply of felt shall extend completely to the bottom of, and be secured over, the outside edge of the blocking (Contractor may use organic felt in place fiberglass felt for first ply at edges only).]

[Torch] [\*\*Mop-apply] base flashing extending a minimum of 3" horizontally beyond, and to the same height vertically as, the flashing felt. [\*\*Hot air-weld lap seams and] maintain a minimum of 1/4” bleed-out at all laps. [At roof edges the base flashing shall be trimmed off flush with the outside edge of the blocking.] Consult manufacturer of flashing for specific application methods.

On vertical surfaces, flashing shall not be applied in segments greater than [3] [\*\*6] feet in length.

All flashing components (felts and modified) shall be fully adhered (95% bonded) to the substrate and each other. Areas with more than 5% voids will be rejected.

Mechanically fasten the top edge of base flashing to vertical surfaces @ 8" O.C. and embed 4" wide jute tape in flashing cement (“three-course”) along edge to cover fasteners. Provide three-course vertical laps where no bitumen bleed-out is visible.

Prior to counterflashing installation, apply fibrated aluminum roof coating over base flashings at a rate of two (2) gallons per square.

[Aluminum coated base flashing defaced by asphalt flood coating during gravel installation shall have another coating of fibrated aluminum applied over the asphalt.]

Install all accessories, leads, flanges, etc., during the membrane construction process. Prime all metal surfaces in contact with asphalt; use primer, not plastic cement. Extend standard plumbing vent stacks as necessary to provide heights of 8" to 12" above the finished roof surface. No extensions shall be shorter than 4” (consult Project Representative for approved methods).

***Gravel Covered Roof****:* [Apply a flood coat of minimum sixty (60) pounds per square of hot asphalt, and embed, while molten, not less than 500 pounds per square of gravel or slag. Gravel or slag must be dry at the time of application. A minimum of 50% of the gravel must be adhered.]

***Smooth Surface Roof:*** [Apply fibrated asphalt emulsion to the entire roof surface in accordance with the emulsion manufacturer's detailed instructions, but at a rate not less than three (3) gallons per square. Allow the emulsion to weather a minimum of thirty (30) days and apply non-fibrated asphalt aluminum roof coating over the emulsion in accordance with the coating manufacturer's detailed instructions, but at a rate not less than one-half (1/2) gallon per square.]

Refasten all mechanical equipment and remount other rooftop equipment as necessary.

Standing water shall be diverted by use of saddles or cricket. Ponding water is defined as standing water on the surface of the roof membrane after 72 hours of reasonable drying weather, after a rain.

[Refill pitch pockets with pourable sealer. Fill in minimum of two (2) lifts. Shape final lift to shed water.]

**CLEANING**

Inspect adjacent roof systems, their drain strainers and the grounds below the work area and remove debris associated with this project.

Repair or replace defaced or disfigured finishes caused by work of this Section. In areas where finished surfaces are soiled by asphalt or any other source of soiling caused by work of this Section, consult manufacturer of surfaces for cleaning advice and conform to their instructions.

**CONSTRUCTION VERIFICATION**

Contractor is responsible for utilizing the construction verification checklists supplied under specification Section 07 08 00 in accordance with the procedures defined for construction verification in Section 01 91 01 or 01 91 02.

\*\*\* END OF SECTION \*\*\*