This master should be used by designers working on Port of Portland construction projects and by designers working for PDX tenants (“Tenants”), involving patch and repair of existing roofing. For Port construction projects with larger roofing scope, discuss with the Port engineer about the use of a Port-approved roofing consultant to provide professional services for design of roof repairs, rehabilitation, and/or replacement.

Usage notes highlight a few specific editing choices, however the entire section should be evaluated and edited to fit specific project needs.

SECTION 070152 – MODIFIED BITUMINOUS SHEET ROOFING SYSTEM Modifications

1. GENERAL
	* + 1. DESCRIPTION
				1. This section describes the following:

Modified bituminous sheet with mineral granule surfacing.

Modified bituminous sheet with metal foil surfacing for flashing applications.

Thermal barrier.

Vapor barrier.

Roof insulation and overlay board.

* + - 1. RELATED WORK SPECIFIED ELSEWHERE
				1. Section 061000, Rough Carpentry
				2. Section 076200, Sheet Metal Flashing and Trim
			2. DEFINITIONS
				1. Roofing Terminology: See ASTM D 1079 and glossary of NRCA’s “The NRCA Roofing and Waterproofing Manual” for definitions of terms related to roofing work in this section.
			3. REFERENCES
				1. ARMA: Asphalt Roofing Manufacturers Association
				2. ASTM: American Society for Testing and Materials

ASTM C1396: Gypsum Board

ASTM C728: Perlite Thermal Insulation Board

ASTM D2178: Asphalt Glass Felt Used In Roofing and Waterproofing

ASTM D312: Asphalt Used in Roofing

ASTM D5147: Test Methods for Sampling and Testing Modified Bituminous Sheet Material

ASTM E119: Test Method for Fire Tests of Building Construction and Materials

ASTM E84: Test Method for Surface Burning Characteristics of Building Materials

ASTM C1289: Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

* + - * 1. FM: FM Global

Factory Mutual Approval Guide

FMG Property Loss Prevention Data Sheets 1-28 – Wind Design

FMG Property Loss Prevention Data Sheets 1-29 – Roof Deck Securement and Above Deck Roof Components

FMG Property Loss Prevention Data Sheets 1-49 – Perimeter Flashing

FM Class 1 Insulated Steel Deck Roofs

* + - * 1. NRCA: National Roofing Contractors Association

Quality Control Recommendations for Polymer Modified Bitumen Roofing

NRCA Roofing and Waterproofing Manual

* + - * 1. TIMA: Thermal Insulation Manufacturers Association

RIC/TIMA Bulletin #281-1

* + - * 1. UL: Underwriters Laboratories Inc.

Requirements for Roof Deck Constructions

* + - 1. SUBMITTALS
				1. Product data: For each type of product specified. Include data substantiating that materials comply with requirements.

Tenants: Delete the following.

* + - * 1. Qualification Data: For qualified installer and manufacturer.
			1. QUALITY ASSURANCE

Tenants: Delete the following paragraph.

* + - * 1. Manufacturer Qualifications: A qualified manufacturer that has FM Approvals for membrane roofing system identical to that used for this work.
				2. Obtain primary products (excluding vapor barrier), including each type of roofing sheet, bitumen, and membrane flashings, from a single manufacturer. Provide secondary products as recommended by manufacturer of primary products for use with roofing system specified.
				3. Installer Qualifications: Engage an experienced installer (roofer) who is certified by modified bituminous roofing system manufacturer as qualified to install manufacturer’s roofing materials.

Installer’s Field Supervision: Require installer to maintain a full-time supervisor/foreman on job site during times that modified bituminous sheet roofing work is in progress and who is experienced in installation of roofing systems similar to type and scope required for this work.

* + - * 1. Exterior Fire-Test Exposure: ASTM E 108, Class A for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Identify materials with appropriate markings of applicable testing agency.

Retain the following paragraph only if products specified in Part 2 are part of a fire-resistance-rated assembly. Indicate rating, testing agency, and testing agency's design designation on drawings.

* + - * 1. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
				2. Pre-Installation Roofing Meeting: Approximately 2 weeks before scheduled commencement of modifications requiring through-roof penetrations and associated work, meet at the site. Notify participants at least 5 working days before meeting.

Meet with the Port, roof consultant, roofing installer, and other installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.

Review methods and procedures related to roofing installation, including manufacturer’s written instructions.

Review and finalize construction schedule and verify availability of materials, installer’s personnel, equipment, and facilities needed to make progress and avoid delays.

Examine deck substrate conditions and finishes for compliance with requirements, including flatness and attachment to structural members.

Review loading limitations of deck during and after roofing.

Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing.

Review governing regulations and requirements for insurance, certifications, inspection, testing, and hot work, as applicable.

Review temporary protection requirements for roofing system during and after installation.

Review roof observation and repair procedures after roofing installation.

Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.

Review warranty status of roof system and requirements for maintaining it, if applicable.

* + - 1. PERFORMANCE REQUIREMENTS
				1. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
				2. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
				3. Roofing System Design: Provide a roofing system that is nearly identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7-10 and Factory Mutual Global for wind speeds of 130 mph (at 3-second gusts) with Exposure Classification C and Risk Category III.

For projects involving significant areas of system installation or replacement, calculate and edit subparagraphs 1 and 2.

Uplift pressures determined by Modeling Building in “RoofNav.”

Field-of-Roof Uplift Pressure: No less than 57 lbs./sq.ft

Perimeter Uplift Pressure: No less than 96 lbs./sq.ft.

Corner Uplift Pressure: No less than 144 lbs./sq.ft.

Provide roof system matching existing or that is capable of resisting the uplift forces according to recommendations in FM Global Loss Prevention Data Sheet 1-28 and with an FMG approved system per zone:

Zone 1: FM 1-60

Zone 2: FM 1-105

Zone 3: FM 1-150

* + - * 1. FM Approval Listing: Provide modified bituminous sheet roofing system, base flashings, and component materials that have been evaluated by Factory Mutual System for fire spread, wind-uplift, and hail damage, that comply with requirements in FM Approval Standard 4450 and 4470 as part of a roofing system, and that are listed in FM Approvals' “RoofNav” for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals' markings.

Fire/Windstorm Classification: Class 1A-150.

Provide materials bearing FM Approval marking on bundle, package, or container, indicating that materials have been subjected to FM Global examination and follow-up inspection service.

* + - * 1. UL Listing: Provide modified bituminous sheet roofing system and component materials that have been tested for application and slopes indicated and are listed by Underwriters Laboratories, Inc. (UL) for Class A external fire exposure.

Provide roof-covering materials bearing UL classification marking on bundle, package, or container indicating that materials have been produced under UL’s classification and follow-up service.

Provide modified bituminous sheet roofing system that can be installed to comply with UL requirements for Fire Classified and Class 90 wind-uplift requirements.

Insulation Fire-Performance Characteristics: Provide insulation materials that are identical to materials whose fire-performance characteristics have been determined for the assemblies of which the insulation materials are a part, in accordance with test method listed below, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

Surface Burning Characteristics: ASTM E84.

Fire Resistance Ratings: ASTM E119.

* + - 1. DELIVERY, STORAGE, AND HANDLING
				1. Do not store materials on the roof which have the potential to become foreign object debris.
				2. Obtain approval from the Port prior to storing materials on the roof overnight or storing them within rooftop mechanical penthouses.
				3. Do not leave unused felts and other sheet materials on the roof overnight or when roofing work is not in progress unless protected from weather or other moisture sources. Store rolls of felt and other sheet materials on-end on pallets or other raised surface.
				4. Handle and store materials or equipment in a manner to avoid significant or permanent deflection of deck.
				5. Provide tarps or plastic sheeting, as required, to adequately protect opened roofs and flashings and to prevent entrance of moisture or rain water into the existing structure until new materials have been applied.
				6. Do not open up more roof surface at one time than can be adequately covered and protected in the event of sudden, unexpected rainfall.
				7. Have necessary waterproof canvas or plastic sheeting on hand in case of emergency. The Contractor shall be held liable for any damage to building interior due to negligence.
				8. To the extent possible, deliver roofing materials to the work site in original containers with seals unbroken and labeled with manufacturer’s name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
				9. Store liquid materials within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

Discard and legally dispose of liquid materials that cannot be applied within their stated shelf life.

* + - * 1. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer’s written instructions for handling, storing, and protecting during installation.
			1. PROJECT CONDITIONS
				1. Weather Limitations: Proceed with roofing work only when existing and forecasted weather conditions permit roofing to be installed in accordance with manufacturer’s written recommendations and warranty requirements.

Contact the Port to verify the warranty status of all roof areas where work will take place. Work on warranted roofs must meet the requirements of the warranty provider, be executed by a roofing contractor certified by the membrane manufacturer, and utilize materials manufactured by the warranty issuer, as required to maintain warranty.

* + - 1. WARRANTY
				1. Provide written warranty, signed by Contractor and installer, agreeing to replace/repair defective materials and workmanship (and work not in accordance with the contract documents) as required to maintain roofing system in watertight condition for two years after date of substantial completion.
				2. Special Warranty: Contractor to provide modifications to roof systems under manufacturer No Dollar Limit Warranty which complies with manufacturer’s requirements to ensure any current warranties are not invalidated.

Tenants: In Part 2, delete all references to “pre-bid approved equal.”

1. PRODUCTS

Delete the following article when repair activities are in conjunction with composite or concrete roof decks.

* + - 1. THERMAL BARRIER
				1. Gypsum Roof Board: Gypsum based, non-structural water resistant core material integrally bonded with fiberglass mats on both sides.

Application: Mechanically Fastened.

Board size: Size to fit applications indicated.

Board thickness: 5/8-inch.

Acceptable products:

DensDeck Gypsum Roof Board, by Georgia Pacific Corp.

Securock Gypsum Roof Board, by USG

Or pre-bid approved equal

* + - 1. VAPOR BARRIER
				1. Field Sheet: Two plies of 52 mil thick, plus or minus 10%, chloroprene modified asphalt filmed onto a woven glass fabric, ASTM D1668 and ASTM D6769.

Grade: Spring/fall or winter.

Application: Fully adhered.

Manufacturer: Laurenco Waterproofing, or pre-bid approved equal.

* + - * 1. Flashing Plies: Two plies of 52 mil thick, plus or minus 10%, chloroprene modified asphalt filmed onto a woven glass fabric, ASTM D 1668 and ASTM D6769.

Grade: Spring/fall or winter.

Sheet Width: 9-inch

Application: Fully adhered.

Manufacturer: Laurenco Waterproofing, or pre-bid approved equal.

* + - * 1. Primer: Asphalt complying with ASTM D41, modified with synthetic rubbers in an aliphatic solvent, with no filer.

Grade: Spring/fall or winter.

Manufacturer: Laurenco Waterproofing, or pre-bid approved equal.

* + - * 1. Adhesive (Brush or Roller): Semi-viscous liquid composed of synthetic rubbers to modify the asphalt in cut-back form, ASTM 4479.

Grade: Spring/fall or winter.

Manufacturer: Laurenco Waterproofing, or pre-bid approved equal.

* + - * 1. Adhesive (Trowel): Aliphatic asphalt base mastic with modified synthetic rubbers, combined with Gilsonite, lampblack, and other stabilizers, compatible with asphaltic and coal tar roofing and waterproofing materials.

Manufacturer: Laurenco Waterproofing, or pre-bid approved equal.

* + - 1. ROOF INSULATION
				1. General:

Provide insulating materials to comply with requirements indicated for materials and referenced standards; in sizes to fit applications indicated, selected from manufacturer’s standard thicknesses, widths and lengths.

Minimum Thermal Resistance: Match existing.

Pitch top surface of insulation to drain, where tapered insulation is indicated.

* + - * 1. Polyisocyanurate Board Roof Insulation: Rigid, cellular thermal insulation with polyisocyanurate closed-cell foam core and manufacturer’s standard facing laminated to both sides; complying with ASTM C1289, Class 1, aged R-values as designated at mean temperatures indicated after conditioning in accordance with RIC/TIMA Bulletin #281-1.

Application: Fully adhered using cold-applied insulation adhesive approved for application by the membrane manufacturer.

Board Size: 4-foot x 4-foot maximum.

Board Thickness: 2-inch maximum per panel.

Products:

Paratherm by Siplast.

ENRGY 3 by Johns Manville.

Or pre-bid approved equal.

* + - * 1. Tapered Polyisocyanurate Board Roof Insulation: Rigid, cellular thermal insulation with polyisocyanurate closed-cell foam core and manufacturer’s standard facing laminated to both sides; complying with ASTM C1289, Class 1, aged R-values as designated at mean temperatures indicated after conditioning in accordance with RIC/TIMA Bulletin #281-1.

Application: Fully adhered using cold-applied insulation adhesive approved for application by the membrane manufacturer.

Board size: 4-foot x 4-foot maximum.

Products:

Tapered Paratherm, by Siplast

Tapered ENRGY 3, by Johns Manville

Or pre-bid approved equal.

* + - * 1. Overlay Board: Perlite board; ASTM C728.

Application: Fully adhered using cold-applied membrane adhesive approved for application by the membrane manufacturer.

Board thickness: 3/4-inch.

* + - 1. MODIFIED BITUMINOUS SHEET ROOFING SYSTEM
				1. SBS Roof Membrane: Two ply, cold adhered assembly.

Base Ply Sheet: ASTM D 6163, Grade S, Type 1, glass-fiber-reinforced, smooth surfaced SBS-modified asphalt sheet.

Top Ply Sheet: ASTM D 6163, Grade G, Type 1, glass-fiber-reinforced, granular surfaced SBS-modified asphalt sheet.

Products:

Paradiene 20/30 FR, by Siplast.

Slopes over 1/2 inch 12 inches: Provide Siplast “HT” System, with mechanical fasteners.

DynaBase/DynaGlas FR by Johns Manville.

Or pre-bid approved equal.

* + - * 1. Reinforcing Sheet: ASTM D 6163, Grade S, Type 1, glass-fiber-reinforced, smooth surfaced SBS-modified asphalt sheet.

Application: Cold adhered.

Products:

Paradiene 20 by Siplast.

DynaBase by Johns Manville.

Or pre-bid approved equal.

* + - * 1. Flashing Sheet: ASTMD 6298, embossed aluminum foil surfaced, glass-fiber-reinforced, SBS-modified asphalt sheet.

Application: Torch, hot air, or adhesive applied.

Products:

Veral by Siplast.

DynaClad by Johns Manville.

Or pre-bid approved equal.

* + - 1. MISCELLANEOUS MATERIALS
				1. Roofing Adhesive: Roofing system manufacturer’s asphalt-based, asbestos-free, cold-applied adhesive designed for use with SBS roof membrane applications.

Products:

PA-311 Adhesive by Siplast.

MBR Cold Application Adhesive by Johns Manville.

Or pre-bid approved equal.

* + - * 1. Insulation Adhesive: Insulation system manufacturer’s cold application or polyurethane foam adhesive used to adhere insulation panels to the substrate, as well as to other insulation panels.

Products:

Parafast Insulation Adhesive by Siplast.

MBR Bonding Adhesive by Johns Manville.

Or pre-bid approved equal.

* + - * 1. Primer: Asphalt, solvent blend conforming to ASTM D 41.

Products:

PA-1125 Asphalt Primer by Siplast.

Asphalt Primer by Johns Manville.

Or pre-bid approved equal.

* + - * 1. Wood Members: Comply with rough carpentry requirements specified elsewhere, for wood members indicated as roofing system work.
				2. Cants: Perlite Board ASTM C728.
				3. Reinforced Fluid Applied Flashing: Polymethyl methacrylate (PMMA) elastomeric liquid applied flashing membrane.

Products:

Parapro by Siplast.

PermaFlash by Johns Manville.

Or pre-bid approved equal.

* + - * 1. Walkway Protection Boards: Mineral-surfaced bituminous composition boards, approximately 1/2-inch thick, manufactured specifically for hot bituminous application on modified bitumen sheet roofing as a protection course for foot traffic. Provide 36-inch minimum width.
				2. Substrate Joint Tape: 6-inch or 8-inch wide, coated, glass-fiber joint tape.
				3. Preformed Pipe Flashing: Two piece, four pound lead pipe jack with integral flashing flange and flashing cap.
				4. Mastic Sealant: Polyisobutylene (plain or bituminous modified), nonhardening, nonmigrating, nonskinning, and nondrying.
				5. Fasteners: Galvanized steel, fluoropolymer-coated steel, or nonferrous metal screws. Size, length, and type recommended by manufacturer as suitable for material to be fastened, substrate, and that will comply with requirements of governing authorities and listing agencies and approved by Factory Mutual Research Corporation.
				6. Ceramic Granules: By membrane manufacturer.

Color: Match membrane.

* + - * 1. Radiant Barrier Coating: As recommended by the manufacturer for use in covering asphaltic bleedout on the flashing sheet application.

Color: Match flashing sheet.

1. EXECUTION
	* + 1. NOTIFICATION
				1. Notify the Port three days prior to installation of roofing repairs. Allow exposed membrane to be observed by the Port prior to application of materials. Materials applied without such prior observation shall be subject to removal at the Contractor’s expense if so requested by the Port.
				2. Notify the Port when work will disrupt normal business activities.
				3. Obtain Port approval prior to the start of any flame welding, cutting, or burning work.
			2. QUALITY OF WORK
				1. Experienced personnel in the type of roofing work specified shall perform the work.
				2. Supervision shall be maintained by the same person throughout the entire course of the installation of new materials.
				3. Finished work shall be free from wrinkles, creases, bubbles, fish mouths, and similar defects. Laps shall be fully sealed per manufacturer’s installation instructions, and entire surface shall be watertight.
				4. Use proper installation practices. An aesthetically pleasing overall appearance of the finished roof application is a standard requirement for this work, and shall be subject to approval by the Port.
				5. Make necessary preparations, utilize recommended application techniques, apply specified materials, and exercise care in ensuring that the finished application is acceptable to the Port.
				6. Cooperate with inspection and test agencies engaged or required to perform services in connection with installing modified bitumen sheet roofing system.
			3. EXAMINATION
				1. Examine substrate surfaces to receive modified bitumen sheet roofing system and associated work. Do not proceed with roofing until unsatisfactory conditions have been corrected.
				2. Verify existing roof membrane and deck surfaces are dry and free of snow or ice.

Tenants: Delete the following paragraph

* + - * 1. Verify that existing roof openings and penetrations are secure in place, curbs are set and braced, and that roof drain bodies are securely clamped in place.
				2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations.
				3. Steel Roof Deck: Verify that surface plane flatness and fastening of steel roof deck is acceptable to receive roof membrane.

Tenants: Delete the following paragraph

* + - * 1. Verify that roof drain lines are functioning correctly before starting work of this section. Report such blockages in writing to the Port.
			1. GENERAL INSTALLATION REQUIREMENTS
				1. Provide 18 inches minimum clear distance between new roof penetrations and any new/existing adjacent penetrations or walls.
				2. Protect other work from spillage of modified bitumen roofing materials, and prevent liquid materials from entering or clogging drains and conductors. Replace or restore other work damaged by installation of modified bituminous sheet roofing systems work.
				3. Where the existing roof is cut open, install and maintain suitable temporary felt and fabric flashing as required to keep water out from under the existing roofing during the construction period, as well as to prevent any water leaking into existing occupied spaces within.
				4. Coordinate installing roofing system components so that insulation and roofing plies are not exposed to precipitation or left exposed overnight. Provide cut offs at end of each day’s work to cover exposed ply sheets and insulation with a course of coated felt with joints and edges sealed with roofing cement. Remove cut-offs immediately before resuming work.
				5. Level Joints to Existing Roofing:

Remove all dry and alligatored bitumen surfacing from the existing roof at least 24  inches back from edges of new work.

Prime surfaces with materials recommended by roofing materials manufacturer.

Install base ply as specified, extending 15 inches out onto existing roof.

Install sheet membrane as specified, extending 18 inches out onto existing roof.

Flash exposed edge of roofing with torch-applied “torch grade - fire retardant” modified bitumen roofing sheet 12 inches wide, centered on edge of new roof.

Delete when repair activities are in conjunction with composite or concrete roof decks.

* + - 1. THERMAL BARRIER INSTALLATION
				1. Thermal Barrier on Steel Decks:

Thermal Barrier on Steel Decks:

Comply with manufacturer’s recommendations, UL requirements for “Roof Deck Constructions” which are fire-rated “Fire Acceptable” or with FM requirements for “Class I” metal deck construction, whichever is the most stringent.

Mechanically fasten one course of thermal barrier material to steel roof deck using fasteners of length to penetrate top of roof deck flutes only. Comply with requirements of Factory Mutual Data Sheet 1-28 and with Part 1 of this specification section.

Thermal barrier joints shall be staggered between alternate courses and closely butted with board edges supported.

* + - * 1. Thermal Barrier Joint Penetrations: Prevent bitumen from penetrating thermal barrier joints, entering building, or damaging roofing system components or adjacent building construction. Tape thermal barrier joints.
			1. VAPOR BARRIER INSTALLATION
				1. Surface Preparation:

Over Concrete Deck:

Remove projections, such as fins, higher than 1/16-inch.

Remove deleterious materials such as laitance, spatters, dirt, and debris.

Remove any existing membrane materials and adhesive.

Scrape off knife-like edges of external corners.

Patch or otherwise repair all cracks in the concrete over 1/16-inch wide.

Patch all chips and voids in surfaces to be covered to provide a concrete surface profile of 4 or less according to the International Concrete Repair Institute.

Over Thermal Barrier:

Remove projections, such as fins, higher than 1/16 inch.

Remove deleterious materials such as dirt and debris.

Scrape off knife-like edges of external corners.

Tape joints between thermal barrier boards.

Over Existing Vapor Barrier:

Remove all loose and adhered debris and wipe surface clean.

* + - * 1. Vapor Barrier Installation:

Install the vapor barrier in the following sequence:

Flashing plies.

Base ply field sheet.

Top ply field sheet.

Flashing Plies:

Using a brush or squeegee, apply 1 1/4 to 1 1/2 gallons per 100 sq. ft. of adhesive 6 inches up vertical surfaces and 5 inches onto horizontal surfaces.

Embed 9-inch-wide pre-cut and pre-folded vapor barrier sheet 5 inches up the vertical surface and 4 inches onto horizontal surfaces.

Coat first ply with adhesive at the rate of 3/4 gallon per 100 sq. ft. 7 inches up vertical surfaces and 6 inches onto horizontal surfaces.

Embed 9-inch-wide pre-cut vapor barrier sheet 4 inches up vertical surfaces and 5 inches onto horizontal surfaces.

Seal all terminations and laps with waterproofing adhesive.

Field Sheet Plies – For large areas not effectively sealed with flashing plies:

Flash corners, edges, and joints prior to application of field sheet plies on horizontal areas.

Using a brush or squeegee, uniformly coat the horizontal surfaces with waterproofing adhesive at a rate of 1 1/4 to 1 1/2 gallons per 100 sq. ft. and allow tack to almost dry.

Smoothly embed base ply field sheet and seal all laps with adhesive. Continue all sheets to the vertical surface, or 6 inches onto adjacent existing vapor barrier, and terminate. Maintain total contact with the substrate. At turn-down conditions, extend base ply field sheet 6 inches onto the vertical wall.

Allow base ply field sheet to cure for 1 hour prior to application of top ply field sheet.

Coat base ply field sheet with waterproofing adhesive at the rate of 3/4 gallon per 100 sq. ft. and allow “tack” to almost dry.

Smoothly embed top ply field sheet; center laps over base ply field sheet; seal all laps uniformly with waterproofing adhesive. Continue all sheets to the vertical surface, or 2 inches beyond the edge of the base ply field sheet onto adjacent existing vapor barrier, and terminate. Maintain total contact with the substrate. At turn-down conditions, extend top ply field sheet 8 inches onto the vertical wall.

Top coat all seams with 4-inch-wide application of adhesive, centered on each seam.

* + - 1. INSULATION AND OVERLAY BOARD INSTALLATION
				1. Manufacturer’s Recommendations: Except as otherwise shown or specified, comply with recommendations and instructions of manufacturer, and FM requirements.
				2. General: Install insulation in courses utilizing a maximum board thickness of 2 inches over the entire surface to be insulated. Cut and fit tightly around obstructions.

Form cant strips, crickets, saddles, and tapered areas with additional material as shown and as required for proper drainage of membrane.

Stagger all joints in one direction for each course.

Fill all gaps between insulation boards larger than 1/4 inch with strips of polyisocyanurate insulation.

* + - * 1. Do not install more insulation each day than can be covered with membrane before end of day and before start of inclement weather.
				2. Fully adhere each layer of insulation using insulation adhesive approved for application by the membrane manufacturer. Stagger end joints between panels a minimum of 6 inches.
				3. Trim surface of insulation where necessary at drain sumps so completed surface is flush with ring of drain.
				4. The insulation shall present a smooth surface to accept the roof membrane.
				5. Fully adhere overlay board using insulation adhesive approved for application by the membrane manufacturer. Stagger end joints between panels a minimum of 6 inches. Provide 1/16-inch gap between all board edges.
			1. ROOF MEMBRANE INSTALLATION
				1. Install modified bituminous membrane roofing system according to roofing system manufacturer’s written instructions, applicable recommendations of NRCA/ARMA’s “Quality Control Recommendations for Polymer Modified Bitumen Roofing,” and applicable specification plates of NRCA’s “The NRCA Roofing and Waterproofing Manual.”
				2. Shingling Plies: Install modified bituminous membrane roofing system with ply sheets shingled uniformly to achieve required number of membrane plies throughout. Shingle in direction to shed water.

Where roof slope exceeds 1 inch per 12 inches, run sheets of modified bituminous membrane roofing parallel with slope. Mechanically attach top ends of sheets to nailer strips.

* + - * 1. Cant Strips: Install and secure preformed 45-degree cant strips at junctures of modified bituminous membrane roofing system with vertical surfaces or angle changes greater than 45 degrees.
				2. Roofing Application: Apply all layers of roofing free of wrinkles, creases, or fishmouths. Exert sufficient pressure on the roll during application to ensure prevention of air pockets.

Apply all layers of roofing perpendicular to the slope of the deck.

Base Ply Sheet: Fully bond to the prepared substrate, utilizing minimum 3-inch side and end laps.

Apply each sheet directly behind the cold adhesive applicator.

Cut a dog ear angle at the end laps on overlapping selvage edges.

Using a clean trowel, apply top pressure to top seal T-laps immediately following sheet application.

Stagger end laps a minimum of 3 feet.

Top Ply Sheet: Fully bond to the base play sheet, utilizing minimum 3-inch side and end laps.

Apply each sheet directly behind the cold adhesive applicator.

Stagger end laps of the finish ply a minimum 3 feet.

Cut a dog ear angle at the end laps on overlapping selvage edges.

Stagger side laps of the finish ply a minimum 12 inches from side laps in the underlying base ply sheet.

Stagger end laps of finish ply a minimum 3 feet from end laps in underlying base ply sheet.

Heat weld all side and end laps of the modified bitumen plies during each day’s application in areas where standing water accumulates.

Flashing/Reinforcing Sheets:

Flash walls and curbs using the reinforcing sheet and metal foil flashing membrane.

After the base ply sheet has been applied to the top of the cant, prime the base ply surfaces to receive the reinforcing sheet.

Fully adhere the reinforcing sheet, utilizing minimum 3-inch side laps onto the primed base ply surface and up the primed wall or curb 3 inches above the top of the cant strip and terminate.

After the top ply sheet has been applied to the top of the cant, prepare the surface area that is to receive flashing coverage by torch heating granular surfaces or by application of asphalt primer; allowing primer to dry thoroughly.

Torch apply the metal foil-faced flashing into place using three foot widths (cut off the end of roll) always lapping the factory selvage edge.

Where torch application is not permitted, use alternative application methods as recommended by the manufacturer.

Stagger the laps of the metal foil flashing layer from lap seams in the reinforcing layer.

Extend the flashing sheet beyond the toe of the cant onto the prepared surface of the finished roof and up the wall or curb to the desired flashing height as indicated on the drawings.

Exert pressure on the flashing sheet during application to ensure complete contact with the vertical/horizontal surfaces, preventing air pockets.

Check and seal all loose laps and edges.

Mechanically attach the top edge of the flashing sheet at 9 inches on center.

Membrane Stripping:

Install membrane strips as reinforcement where metal flanges are set on roofing. Extend stripping onto the roof membrane as indicated on the drawings.

Allow expansion of running metal flashing and edge trim that adjoins roofing. Do not seal or bond membrane or modified bituminous flashing or stripping to metal flanges over 3 feet in length.

Granule Embedment (Top Ply Sheet): Broadcast mineral granules over all bitumen overruns on the top ply sheet while the adhesive is soft, to ensure a monolithic surface color.

Radiant Barrier Coating (Flashing Sheet): Allow torch applied flashing sheet to cool, then spray or hand apply radiant barrier coating over all visible bitumen overruns in the flashing sheet application.

* + - * 1. Counter-Flashings: Counter-flashings, cap flashings, expansion joints, and similar work to be coordinated with modified bituminous roofing work are specified in other sections.
				2. Roof Accessories: Miscellaneous sheet metal accessory items, including piping vents, and other devices to be coordinated with modified bituminous roofing system work, are specified in other sections.
			1. ROOF WALKWAYS
				1. Composition Board Walkways: Provide walkway protection boards at locations shown, using units of manufacturer’s standard size, 1/2-inch thick.
				2. Fully adhere units using cold-applied membrane adhesive approved for application by the membrane manufacturer.
			2. PROTECTING ROOFING
				1. Protect roofing during remainder of construction period. At substantial completion of construction, or at a time when remaining construction will in no way affect or endanger roofing, inspect roofing and submit a written report, with copies to the Port, describing nature and extent of deterioration or damage found.
				2. Repair or replace (as required) deteriorated or defective work found at time of above inspection to a condition free of damage and deterioration at time of substantial completion and according to warranty requirements.

END OF SECTION 070152