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DATE: April 26, 2019

TO: PLANHOLDERS

SUBJECT: Port of Tacoma Bldgs.W. Sitcum Bld 100 & 950 Roof Replacements  
PROJECT NO.  
2201062.02 CONTRACT  
NO. 071093

**ADDENDUM NUMBER ONE (1)**

This addendum is issued to amend the following:

**SPECIFICATIONS**

**A. SECTION 05 50 00 – METAL FABRICATIONS**

1. **DELETE** and **REPLACE** the amended Section 05 50 00 – **METAL FABRICATIONS** with the attached Section 05 50 00 – **METAL FABRICATIONS** (Attachment A)

**B. SECTION 07 54 23 – TPO ROOFING**

1. **DELETE** and **REPLACE** the amended Section 08 62 00– **TPO ROOFING** with the attached Section 07 54 23 – **TPO ROOFING** (Attachment B)

**C. SECTION 08 62 00 – PLASTIC GLAZED SKYLIGHTS**

1. **DELETE** and **REPLACE** the amended Section 07 54 23– **PLASTIC GLAZED SKYLIGHTS** with the attached Section 08 62 00 – **PLASTIC GLAZED SKYLIGHTS** (Attachment C)

**PLANS**

**A. SHEET A1.11-ROOF PLAN-Building 950**

1. **DELETE** and **REPLACE** the amended SHEET A1.11-ROOF PLAN-Building 950 with the attached SHEET A1.11-ROOF PLAN-Building 950 (Attachment D)

**Receipt for this addendum shall be indicated in the space provided in Section 00 41 00, Bid Form.**

**END OF SECTION**

**ATTACHMENT A** – Revision 1 Section 05 50 00 – METAL FABRICATIONS

**ATTACHMENT B** – Revision 1 Section 07 54 23 – TPO ROOFING

**ATTACHMENT C** – Revision 1 Section 08 62 00 – PLASTIC GLAZED SKYLIGHTS

**ATTACHMENT D** – Revision 1 SHEET A1.11-ROOF PLAN-Building 950

## **PART 1 – GENERAL**

### **1.01 REFERENCES**

- A. ANSI A14.3 Ladders, Fixed, Safety Requirements.
- B. OSHA 1926.1053 – Occupational Safety and Health Administration – Stairways and Ladders.
- C. OSHA 1910.27 – Occupational Safety and Health Administration – Fixed Ladders.
- D. ASTM A36 Structural Steel.
- E. ASTM A53 Hot Dipped, Zinc coated Welded and Seamless Steel Pipe.
- F. ASTM A123 Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
- G. ASTM A153 Zinc Coating (Hot Dip) on Iron and Steel Hardware.
- H. ASTM A283 Carbon Steel Plates, Shapes, and Bars.
- I. ASTM A307 Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- J. ASTM A385 - Standard Practice for Providing High Quality Zinc Coatings (Hot Dip)
- K. ASTM A500 Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- L. ASTM A501 Hot Formed Welded and Seamless Carbon Steel Structural Tubing.
- M. AWS A2.0 Standard Welding Symbols.
- N. AWS D1.1 Structural Welding Code.
- O. SSPC (Steel Structures Painting Council) Steel Structures Painting Manual.
- P. PCI – Powder Coating Institute.

### **1.02 SUBMITTALS**

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
  - 1. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.
- B. PCI 3000 Certification: The powder coating applicator shall submit current documentation illustrating PCI 3000 Certification.
- C. Statements: Submit written statements and certification documenting fabricator, erector and welder qualifications.

### **1.03 QUALITY ASSURANCE**

- A. Fabricate steel members in accordance with AISC Code of Standard Practice.
- B. Fabricator: Company specializing in performing the work of this Section with minimum five (5) years documented experience.
- C. Erector: Company specializing in performing the work of this Section with minimum five (5) years documented experience.
- D. Welder(s): Qualified within previous twelve (12) months for type of welding required for this project in accordance with AWS D1.1 and AWS D1.4 and/or WABO (Washington Association of Building Officials) certified as required by local Building Department.
- E. PCI Certified Applicator: The powder coating applicator shall be a Powder Coating Institute, PCI 3000 Certified Company.

### **1.04 DELIVERY, STORAGE AND PROTECTION**

- A. Protect products and fabrications under provisions of Section 01 60 00.

### **1.05 COLORS**

- A. Colors for coated metal shall be similar to color of adjacent surfaces.

## **1.06 WARRANTY – POWDER COATED HIGH-PERFORMANCE (PVDF) FINISH**

- A. Manufacturer's Warranty: Furnish ten 10 year warranty providing coverage that coatings:
  - 1. Will not chip, crack or peel (lose adhesion)
  - 2. Will not chalk in excess of ASTM D4214 number 8 rating, determined by procedure outlines in ASTM D4214
  - 3. Will not change color more than five Delta-E Hunter units (square root of the sum of square Delta L, Delta a, and Delta b) as determined by ASTM D2244, Method 6.3. Fading or color changes may not be uniform if surfaces are not equally exposed to sun and elements. Mica and metallic coatings are exempt due to inability to accurately measure color, mica and metallic flakes reflect and scatter light in random patterns.
- B. Applicator's Warranty: Furnish five 5 year warranty providing coverage against failure of PVDF based coating over improper pretreatment where coating was not applied in accordance with ASTM D1730, Type B, Method 5 or ASTM B449, Section 5.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS - STEEL**

- A. Steel Sections: ASTM A36.
- B. Steel Tubing: ASTM A500, Grade B.
- C. Steel Plates: ASTM A283.
- D. Steel Pipe: ASTM A53, Grade B, Schedule 40.
- E. Steel Bolts, Nuts, Acorn Nuts, Threaded Rods and Washers: ASTM A307, galvanized to ASTM A153 for galvanized components.
- F. Welding Materials: AWS D1.1; type required for materials being welded.

### **2.02 MATERIALS - ALUMINUM**

- A. Aluminum Round Pipe: Schedule 40, Grade 6061-T6, extruded and seamless.
- B. Aluminum Plates: Grade 6061, ASTM B209.
- C. Aluminum Tube: Grade 6063-T52, extruded and seamless.
- D. Aluminum Angles: Grade 6061-T6, ASTM B308, extruded and seamless. American Standard OR Grade 6063-T52, ASTM B221, extruded and seamless. Sharp Corner.
- E. Aluminum Bars: Rounds, squares and rectangles. Grade 6061, ASTM B211.
- F. Aluminum Channels: Grade 6061-T6, ASTM B308, extruded and seamless. American Standard OR Grade 6063-T52, ASTM B221, extruded and seamless. Sharp Corner.
- G. Aluminum Grating (Bar type): Grade 60-63-T52, ASTM B221.
- H. Aluminum Bolts, Nuts, Acorn Nuts, Threaded Rods and Washers: Grade 2024-T4.

### **2.03 FABRICATION - MISCELLANEOUS ITEMS**

- A. Field verify actual dimensions and conditions at site prior to shop fabrication.
- B. Fit and shop assemble items in largest practical sections for delivery to site.
- C. Fabricate items with joints tightly fitted and secured.
- D. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- E. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- G. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

- H. Eased edges to be smooth, straight and uniform in appearance.
- I. Welding shall conform to AWS D1.1.
- J. Fabricated items include but not limited to the following:
  - 1. Prefabricated Stairs and Landings: Furnish and install fixed aluminum stairs with landing and railings, including all components required for complete installation. One piece assembly meeting or exceeding ~~OSHA standard 1910.25 for fixed industrial~~ IBC requirements for stairs. Provide 316 (marine grade) stainless steel fasteners, bolts, nuts and washers. Refer to roof plan for stair location.
    - a. Manufactured Stairs and Landings: FS Industries, Precision Ladders, Karnel Inc. or approved equal.
      - (1) Manufactured Stairs and Landings: Basis of design, FS Industries, heavy-duty aluminum stair and landing, with railing.
    - b. Minimum Design and Fabrication Requirements:
      - (1) Dimensions: Tread width shall be approximately 46-48 inches. Field verify roof truss spacing for supports to ensure that supports have direct bearing and connection to trusses. Maximum riser height shall be 9-57 inches. Minimum tread depth shall be 9-511 inches.
      - (2) Treads: Heavy duty aluminum bar grating treads with corrugated aluminum nosings.
      - (3) Stair railing: Factory welded aluminum railing of 1 ½ inch diameter x .125 inch thickness square tubing. 2 rail system.
      - (4) Stringers: 10-inch structural aluminum channel stringers.
      - (5) Landings: Landings shall be similar construction to stairs, sized as indicated to allow 22-inch clearance for landing at out-swinging door.
      - (6) Loading: Stairs and landings shall support a concentrated load of 1,000 pounds minimum at any point.
      - (7) Structural connections: Minimum 5/8 inch diameter type 316 (marine grade) stainless steel bolts and 3/8 butt plates.
      - (8) Finish: Mill finish aluminum.
  - 2. Fixed Ladders: Furnish and install fixed aluminum ladders with safety cage including all fasteners for complete installation. One-piece welded assembly meeting or exceeding OSHA 1910.27, OSHA 1926.1053 and ANSI A14.3 standards. Ladders shall comply with IMC 306.5 requirements. Provide 316 (marine grade) stainless steel fasteners, bolts, nuts and washers. Refer to roof plan for ladder locations.
    - a. Manufactured Fixed Ladders: ALACO Ladder Co., Cotterman Co., A-Mezz Industrial Structures Inc. or approved equal.
      - (1) Fixed Roof Access Ladders: Basis of design, ALACO model 564-C, heavy-duty aluminum fixed wall ladder with parapet return, crossover platform and cage.
    - b. Minimum Design and Fabrication Requirements:
      - (1) Loading: At least two loads of 250 pounds each, concentrated between any two consecutive attachments, (the number and position of additional concentrated loads of 250 pounds each, determined from anticipated usage of the ladder, shall be included), plus anticipated loads caused by ice buildup, winds, rigging, and impact loads resulting from the use of ladder safety devices.
      - (2) Ladders shall have rung or step spacing not to exceed 14 inches on center.
      - (3) Ladders shall have a toe spacing not less than 6 inches deep.
      - (4) The minimum perpendicular clearance between fixed ladder rungs or steps and any obstruction behind the ladder shall be 7 inches.
      - (5) There shall be a minimum of 18 inches between rails.

- (6) Each rung or step shall be capable of withstanding at least a single concentrated 300-pound load applied to the middle of the rung or step.
- (7) Each corrugated rung shall have a minimum 0.75-inch diameter.
- (8) Rungs or steps of fixed metal ladders shall be corrugated, knurled, dimpled, coated with skid-resistant material or otherwise treated to minimize slipping.
- (9) The side rails of through or side-step fixed ladders shall extend 42 inches above the top of the access level or landing platform served by the ladder.

#### **2.04 FINISH - STEEL**

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Clean surfaces prior to finishing.
- C. Do not prime surfaces in direct contact with concrete or where field welding is required.
- D. Protective Coatings:
  - 1. Galvanized Coating: All metal exposed to outdoor atmosphere or shown on drawings shall be hot-dipped galvanized coated to minimum 2.0 oz/sq. ft. zinc coating in accordance with ASTM A385 and ASTM A123.
- E. Shop-Applied Finish: Powder Coated High-Performance (PVDF) Fluoropolymer Resin Finish:
  - 1. Materials shall be in accordance with the (PCI) Powder Coating Institute's published recommendations, specifications and performance standards.
  - 2. The powder coating applicator shall be a Powder Coating Institute, PCI 3000 Certified Company.
  - 3. Shop-Applied Finish: Powder Coated High-Performance (PVDF) Fluoropolymer Resin Finish. Fluoropolymer finish containing minimum 70 percent PVDF resins, four coat system, minimum 1.2 mils dry film thickness, complying with PCI and AAMA 2605 specification and performance standards. Finish material component surfaces after fabrication process.
  - 4. Color: Gray.

#### **2.05 FINISH – ALUMINUM**

- A. Factory Finish: Anodized finish, AAMA 611, Architectural Class I, 0.0007 inch minimum thickness. Color shall be clear anodized.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means erector accepts existing conditions.
- C. Clean and strip primed steel items to bare metal where site welding is required.

#### **3.02 INSTALLATION - MISCELLANEOUS ITEMS**

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components indicated on drawings.
- D. Perform field welding in accordance with AWS D1.1.
- E. No field welding of shop-applied powder coated finished components permitted. Field assembled components with bolted connections in accordance to Contract Documents.
- F. Obtain approval prior to site cutting or making adjustments not scheduled.
- G. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

#### **3.03 ERECTION TOLERANCES**

- A. Maximum Variation From Plumb: 1/4 inch per story, non cumulative.

- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out of Position: 1/4 inch.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.01 REFERENCES**

- A. ANSI/ASTM D412 – Rubber Properties in Tension.
- B. ANSI/ASTM D746 – Brittleness Temperature of Plastics and Elastomers by Impact.
- C. ASTM D624 – Rubber Property – Tear Resistance.
- D. ASTM D822 – Practice for Operating Light and Water-exposure Apparatus (Carbon-Arc Type) for Testing Paint, Varnish, Lacquer, and Related Products.
- E. ASTM D1004 – Initial Tear Resistance of Plastic Film and Sheeting.
- F. ASTM D2240 – Rubber Property – Durometer Hardness.
- G. ASTM E96 – Water Vapor Transmission of Materials.

### **1.02 SYSTEM DESCRIPTION**

- A. 45 mil thick Reinforced Thermoplastic Polyolefin (TPO) membrane roof assembly to conform to UL requirements for a Class A rated assembly and UL requirements for uplift resistance. Manufacturer / installer shall provide all components required to meet UL Class A rated assembly.

### **1.03 QUALITY ASSURANCE**

- A. Membrane Manufacturer: Company specializing in sheet roof membranes with five (5) years experience.
- B. Applicator: Company specializing in installation of sheet roof membranes with three (3) years documented experience approved by membrane manufacturer.
- C. All materials used in or in conjunction with the roofing system shall be manufactured by or approved by one manufacturer.
- D. Each Bidder shall be prepared to provide documentation for Class-A assembly provided by their product;

### **1.04 REGULATORY REQUIREMENTS**

- A. Underwriters Laboratories, Inc. (UL): Class - A Fire Hazard Classification.

### **1.05 SUBMITTALS**

- A. Product Data: Submit specifications, installation instructions, and general recommendations from manufacturers of sheet roofing system materials, for types of roofing required. Include data substantiating that materials comply with requirements.
- B. Shop Drawings: Submit complete shop drawings showing roof configuration and sheet layout, details at perimeter, and special conditions:
  - 1. Indicate layout of tapered insulation materials and thicknesses.
  - 2. Indicate layout of all mechanical fasteners.
  - 3. Submit manufacturer's standard details, modified standard details or special details. Submit letter (prior to roofing installation) from manufacturer stating that all materials and details used by the installer meet the manufacturer's requirements to be warranted by the manufacturer for twenty (20) years.
- C. Samples: Submit samples of all roofing materials and accessories.
- D. Pre-Roofing Conference: Submit copies of pre-roofing conference records.
- E. Statements: Submit written statements documenting qualifications of manufacturer and applicator specified in paragraph "Quality Assurance."

F. [Sample Warranty: Submit manufacturer's sample warranty language.](#)

### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Store materials in weather protected environment clear of ground and moisture. Protect foam insulation from direct sunlight exposure.

### **1.07 ENVIRONMENTAL REQUIREMENTS**

- A. Do not apply membrane during inclement weather or when air temperature is below 40 degrees F.

### **1.08 PRE-INSTALLATION CONFERENCE**

- A. Convene a pre-installation conference one (1) week prior to commencing work of this Section.



- B. Require attendance of parties directly affecting work of this Section. Include Port of Tacoma representative and manufacturer's representative.
- C. Review conditions of installation, installation procedures, and coordination required with related work.

#### 1.09 WARRANTY

- A. Provide minimum twenty (20) year manufacturer's warranty. Warranty shall be provided by the manufacturer of the system, not the marketer.
- B. Warranty: Include coverage of materials (entire system, including fasteners) and installation and resultant damage resulting from failure to resist penetration of moisture; defective materials and workmanship.
  - 1. Warranty Period: Minimum twenty (20) years after date of Final Acceptance. Warranty shall not exclude damage from improper application or environmental contaminants.

#### 1.10 PRECAUTIONS

- A. Adhesives, primer, and caulks as indicated are extremely flammable and/or toxic. Use precautions indicated on can and carton labels.
- B. Surfaces to be bonded shall be dry and clean. Suitable surfaces are usually considered to be smooth, solid masonry, wood, and metal plus well-fastened insulation board that is considered water resistant and accepted for adhered applications by roofing manufacturer.
- C. After exposure to sunlight for 24 hours or longer, membranes may have achieved a "surface curing". Prior to hot air welding an application of primer is required to achieve a proper weld. The need for primer is determined by a test weld.
- D. All fasteners should be installed with a depth-sensing screw gun to prevent overdriving.

### PART 2 - PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS – MEMBRANE

- A. Carlisle SynTec, Sure-Weld, 4560-mil Reinforced Thermoplastic Polyolefin (TPO) membrane, mechanically fastened system.
- B. GAF, Everguard TPO, 4560-mil reinforced membrane, mechanically fastened system.
- C. Firestone, UltraPly TPO, 4560-mil reinforced membrane, mechanically fastened system.
- D. Versico Roofing Systems, VersiWeld TPO, 60-mil reinforced membrane, mechanically fastened system.
- E. Flex Membrane International Corp., TPO Plus, 60-mil reinforced membrane, mechanically fastened system.
- ~~D~~E. Or approved equal
- ~~E~~G. Material specifications and installation details are based upon Sure-Weld TPO by Carlisle SynTec. Mechanically attached.

#### 2.02 MEMBRANE MATERIALS

- A. Membrane: White, 45 mils thick, Sure-Weld Reinforced Thermoplastic Polyolefin (TPO) membrane and scrim reinforcement, minimum 8 feet wide roll conforming to the following criteria.

PROPERTIES	TEST	RESULTS
Breaking strength, minimum (Grab method)	ASTM D751	225 lbf
Tear strength, minimum (Tongue tear)	ASTM D751	55 lbf
Brittleness	ASTM D2137	-40 deg C Pass
Heat aging, 32 days at 240 degrees F, (reinforced)	ASTM D573	90% breaking strength, 90% elongation
Water absorption psi minimum (Method A) 158 degrees F, 7 days	ASTM D471	Plus 3% weight change
Ozone resistance 100 deg F – 70 hours	ASTM D1149	Pass

Dimensional stability 24 hours at 54 deg C	ASTM D1204	+/- 0.3%
Puncture resistance, minimum	FTM 101C Method 2031	250 lbf

- B. Seaming and Adhesive Materials: As recommended by membrane manufacturer.
- C. Flexible Flashing: 60 mil thick unreinforced TPO membrane; white color; manufactured by membrane manufacturer.
- E. Prefabricated Perimeter Flashing: TPO coated metal flashing flanges.

### 2.03 INSULATION MATERIALS

- A. Rigid Insulation: Confirm that rigid insulation is compatible with single-ply membrane and shall be approved by membrane manufacturer. Polyisocyanurate insulation, ASTM C1289 Type II, Class I, Grade 2.
- B. Rigid Insulation: Approved by membrane manufacturer for mechanically fastened application in a Class-A assembly.
- C. Tapered Rigid Insulation: Factory tapered polyisocyanurate insulation with a minimum slope of 1/4 in./ft. unless otherwise noted.
- D. Fasteners: Metal plates and screws as recommended by insulation manufacturer for deck type and complying with fire rating assembly requirements. Fasteners approved by primary sheet roofing manufacturers.

### 2.04 TAPERED INSULATION CRICKETS

- A. Tapered Insulation System: Factory tapered perlite with a minimum slope of 1/4 in./ft per NRCA requirements at all locations including crickets and valleys, unless otherwise noted; ASTM C728; approved for use with single-ply mechanically attached membrane roofing. Compression resistance: 35 psi, water absorption 1.2%; ASTM C209; weight: 0.9lbs/SF.
  - 1. Provide tapered cricket insulation.
  - 2. Provide roofing membrane manufacturer's written approval of system layout and fastening.

### 2.05 ACCESSORIES

- A. Sealants: As recommended by membrane manufacturer.
- B. Cover Board: Georgia-Pacific, DensDeck cover board, minimum 1/4 inch thickness, ASTM C1177 as recommended and provided by membrane manufacturer. 4 ft x 8 ft boards, or approved equal.
- C. Reglet and Counter Flashing: As specified in Section 07 62 00.
- D. Roof Drains:
  - 1. Jay R. Smith, Model No. 1010 with clamping ring, JOSAM Model No. 21500, or approved equal.
  - 2. Provide expansion joint if drain is connected directly to vertical rainleader or with less than 2 feet offset.
  - 3. Field verify size of existing drain leaders. Modify roof deck to install drain and provide drain receiver and all accessories required for a complete installation.
- D. Coping Flashing: As specified in Section 07 62 00.
- E. Exposed Scuppers: As specified in Section 07 62 00.
- F. Insulation Joint Tape: Manufacturer's standard glass fiber reinforced; 4 to 6 inch wide; self-adhering.
- G. Traffic Surfacing Walkway: Sure-weld heat weldable walkway rolls heat welded to the membrane surface provided by membrane manufacturer, or approved equal.
- H. Mechanical Fasteners for Insulation: Appropriate to purpose intended and approved by UL; length required for thickness of material; with metal washers; manufactured by membrane manufacturer.
- I. Disc Washers and Screws: Membrane manufacturer's standard.
- J. Flashing Materials: Manufacturer's standard system compatible with sheet membrane. Including premolded inside and outside corners, pipe flashing and square tube wraps.

- K. All roof accessories to be installed per sheet roofing membrane manufacturer's approved details.
- L. Provide factory molded, heat-weldable boots with draw-band clamps at all roof pipe and conduit penetrations. Provide sheet metal "hat" collar above draw-band.

## **2.06 ROOF PROTECTION PADS**

- A. Provide where ballasted antenna equipment frames will be placed on the roof.
- B. Protection pads shall be minimum ½-inch thick, non-porous recycled rubber material, sized as required to extend beyond support frames. Similar to Roof-Gard product manufactured by Humane Manufacturing Co., LLC, or equal.

## **2.07 WOOD TREATMENT**

- A. Preservative treatments are not acceptable for use with membrane.

# **PART 3 - EXECUTION**

## **3.01 INSPECTION**

- A. Membrane manufacturer's technical advisor shall field inspect prepared roof surface prior to membrane application and compile a written report to the Engineer prior to roofing membrane application.
- B. Contractor shall verify that insulation and other systems have been installed complying with membrane manufacturer's recommended practices.
- C. Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains.
- D. Verify roof openings and penetrating elements through roof are solidly set, wood cant strips, wood nailing strips, and reglets are in place. Verify deck is supported and secured.
- E. Do not apply roofing materials to damp, frozen, dirty, dusty, or deck surfaces unacceptable to manufacturer.
- F. Verify deck surfaces are dry and free of snow or ice. Confirm dry deck by moisture meter with 12 percent moisture maximum.
- G. Ensure flatness and verify tight joints of wood deck.
- H. Beginning installation means acceptance of substrate.

## **3.02 PREPARATION**

- A. Seal joints of plywood deck with tape. Fill knotholes with latex filler.
- B. Install metal reglets flashing and mechanically fasten rigid. Apply sealant to top edge continuous.
- C.

## **3.03 INSULATION APPLICATION**

- A. Place layers of insulation and cover board in accordance with insulation manufacturer's instructions. Insulation shall be placed in a minimum of two layers, with joints staggered (offset) between layers.
- B. Insulation shall be installed in compliance with the flamespread and smoke density requirements of Section 2603 of the IBC.
- C. Lay insulation boards to moderate contact without forcing joints. Cut insulation to fit neatly to perimeter blocking and around protrusions through roof.
- D. Lay tapered boards to establish pitch to scuppers. Provide positive slope (minimum 1/4 in./ft; unless otherwise noted; from horizontal).
- E. Mechanically or adhesively fasten insulation boards per roofing manufacturer's recommendations.
- F. Tape joints of insulation in accordance with insulation manufacturer's instructions.

## **3.04 MEMBRANE INSTALLATION**

- A. Install membrane roofing in accordance with membrane manufacturer's instructions.
- B. Roll out membrane. Minimize wrinkles and bubbles.
- C. Overlap edges and ends minimum 4-1/2 inch and heat seal. Apply uniform bead of sealant to cut edges.
- D. Install mechanical fasteners in accordance with manufacturer's recommendations.
- E. Shingle joints on sloped substrate in direction of drainage.
- F. Seal adjoining surfaces.
- G. Continue membrane up vertical surfaces minimum 8 in. unless otherwise noted.
- H. Seal items penetrating membrane with factory-molded counterflashing membrane boots.
- I. Install flashings. Seal watertight to membrane.

- J. Reinforce membrane with multiple thickness of membrane material over joints, whether joints are static or moving
- K. Place traffic surfacing (walkway roll) at locations noted on roof plan. As a minimum, install continuous walkway extending from roof ladder to each HVAC mechanical unit. Install walkway along all sides of HVAC mechanical units.
- L. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.
- M. Coordinate sleeve assemblies for through wall routing of electrical and mechanical power, control and coolant lines with membrane flashing and metal flashing installation.

**3.05 PROTECTION**

- A. After installation, close off area to prevent unauthorized traffic.

**3.06 FIELD QUALITY CONTROL**

- A. Manufacturer's technical representative shall provide final inspection report to the Engineer. This inspection will verify acceptance of installation by manufacturer for issuance of manufacturer's warranty. If any deficiencies are found to effect final acceptance by manufacturer, then the Contractor shall make any repairs; changes required for final acceptance by manufacturer; at his own expense with no cost to Owner.

**3.07 CLEANING**

- A. Remove trash, debris, equipment, and parts from job site.
- B. Repair damage and remove stains caused by work of this Section.

**3.08 MAINTENANCE**

- A. Instruct Engineer in periodic maintenance of roof membrane. Provide maintenance manuals, warranties and information required for future maintenance.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.01 PERFORMANCE REQUIREMENTS**

- A. General: Provide unit skylights capable of withstanding loads as prescribed by the prevailing code for the project location.
- B. Unit skylights must be tested in accordance with AAMA\WDMA\CSA\101\I.S.2\A440 as required by Section 2405.5 of the International Building Code.
- C. Unit skylights must be tested and certified by NFRC for thermal performance. Products must be listed on the NFRC Certified Products directory.
- D. System Performance Requirements:
  - 1. Double dome models:
    - a. Maximum U-factor shall be 0.50 BTU/HR-ft<sup>2</sup>-F maximum per NFRC 100
    - b. Maximum SHGC shall be 0.35 maximum per NFRC 200
    - c. Minimum Visible Light Transmission not less than 40%

### **1.02 SUBMITTALS**

- A. Product Data Sheet: For each type of skylight specified, include details of construction and installation, relative to applicable roofing materials.
- B. Samples for Selection: Manufacturer's color charts showing a full range of colors available for each type of skylight glazing and aluminum finish.

### **1.03 QUALITY ASSURANCE**

- A. Fire-Test-Response Characteristics: Provide Thermoformed domes fabricated from sheets identical to those tested for the following fire-test-response characteristics, per ASTM test method indicated below, by UL or other testing and inspecting agencies acceptable to authorities having jurisdiction. Identify plastic sheets with appropriate markings of applicable testing and inspecting organization.
  - 1. Self-Ignition Temperature: 651 deg F (343 deg C) or greater when tested per ASTM D 1929 on plastic sheets in the thickness intended for use.
  - 2. Smoke density of 75 or less when tested per ASTM D 2843 on plastic sheets in the thickness intended for use.
  - 3. Relative- Burning Characteristics: As follows, when tested per ASTM D 635:
    - a. Acrylic: Burning extent of 2.5 inches (64mm) per minute or less when tested on plastic glazing indicated below with a nominal thickness of 0.060 inch (1.5 mm) or the thickness intended for use.

### **1.04 WARRANTY**

- A. General: Warranties specified in this section shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.
- B. Skylight Warranty: Provide written warranty signed by manufacturer, agreeing to repair or replace work that exhibits defects in materials or workmanship and guaranteeing weather-tight and leak-free performance. "Defects" is defined as uncontrolled leakage of water and abnormal aging or deterioration.
  - 1. Warranty Period: 2 years from date of Substantial Completion.
- C. Plastic Warranty: Provide written warranty signed by manufacturer agreeing to repair or replace work that has or develops defects in the plastic. "Defects" is defined as abnormal aging or deterioration.
  - 1. Warranty Period: 2 years from date of Substantial Completion against yellowing or breakage.
- D. Finish Warranty: Provide written warranty signed by manufacturer agreeing to repair or replace work with finish defects. "Defects" is defined as peeling, chipping, chalking, fading, abnormal aging or

deterioration, and failure to perform as required.

1. Warranty Period for Kynar 500 Finish: 10 years from date of Substantial Completion.

## **PART 2 - PRODUCTS - NOT USED**

### **2.01 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by Wasco Skylights part of the Velux Group, Wells, ME (800-388-0293), or approved equal.
- B. Substitutions: Substitute manufacturers must submit the following:
  1. Complete details of proposed skylight.
  2. Complete specifications for review.
  3. Test reports showing units have been tested with NFRC
  4. NFRC Certified Products Directory (CPD#) number.

### **2.02 MATERIALS**

- A. Curb Frame: High performance PVC with minimum effective thickness of 0.060 inch (1.5mm). Provide integral condensation gutter system with corners fully welded for waterproof quality.
- B. Retainer Frame: Extruded aluminum alloy 6063-T5 (min). ASTM B 221 (ASTM B 221 M) with minimum effective thickness of 0.60 inch (1.5 mm).
- C. Plastic Sheets: Monolithic, formable, transparent (colorless) or translucent (white) sheets with good weather and impact resistant.
- D. Interior Laylite: 10mm multi-wall flat cellular polycarbonate panel filled with Lumira™ aerogel insulating material.
- E. Thermal Break: Fabricate skylight units with thermal chambered PVC.
- F. Gaskets: Structural glazing tape to form adhesive bond between PVC curb and inner dome and between inner and outer dome. Butyl tape between outer dome and extruded aluminum retainer. Gaskets form an air and water impenetrable barrier between adjacent surfaces.
- G. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other non-corrosive metal as recommended by manufacturer.

### **2.03 PLASTIC SKYLIGHT UNITS**

- A. General: Factory-assembled, curb-mounted unit consisting of plastic glazing, gasketing, inner frame designed to mount on separate curb, and self-contained flashing.
  1. Products: Provide EcoSky model E3SS2 or approved equal, meeting the requirements of this section.
- B. Curb: Mount on existing curbs. Modify curbs as necessary to accommodate skylight installation.
- C. Condensation Control: Fabricate skylight units with integral internal gutters and weeps to collect and dispose of condensation.
- D. Thermal Break: Fabricate skylight units with thermal chambered PVC.
- E. Shape and Size: As indicated by model number.
- F. Outer Glazing: Dome thermoformed:
  1. Impact Modified Translucent IR reflecting Acrylite® Satin Sky 2.~~Continuous Cast Acrylic; translucent.~~
- G. Inner Glazing: Thermoformed Dome:
  1. Impact Modified Acrylic Clear.
- H. Inner Laylite: 10mm Multi-wall flat cellular polycarbonate panel filled with Lumira™ aerogel insulation material.

## **2.04 FABRICATION**

- A. Framing Components: As follows:
  - 1. Factory fit and assemble components.
    - a. Fabricate components to drain condensation and moisture occurring or migrating within skylight system to the exterior.
    - b. Fabricate components to accommodate expansion, contraction, and field adjustment, and to provide for minimum clearance and shimming at skylight perimeter.
    - c. Fabricate components to ensure that glazing is thermally and physically isolated from framing members.
    - d. Fit and secure joints in aluminum by heliarc welding.

## **2.05 ALUMINUM FINISHES FOR GLAZING RETAINER**

- A. General: Comply with NAAMM "Metal Finishes Manual" recommendations for application and designations of finishes.
- B. Finish designations prefixed by AA conform to the system for designations of aluminum finishes established by the Aluminum Association.
  - 1. Kynar Fluoropolymer Two-Coat System: (70% PVDF) complying with AAMA 2605. Color: Bone White.

## **2.06 SKYLIGHT PROTECTION SCREEN**

- A. Screen: Welded steel wire mesh, 4" x 4" spacing, wire diameter - .188" min. unfinished stainless steel.
- B. Frame: Extruded aluminum alloy 6063-T5 (min). ASTM B 221 (ASTM B 221 M) with minimum effective thickness of 0.090 inch (2.2 mm).
  - 1. Frame includes a pocket for the edges of the screen material, and a downward leg for attachment to any vertical surface of a skylight retainer or frame.
- C. Adjustment Bar: Extruded aluminum bar stock, ¼" x 1", alloy 6063-T5 (min). ASTM B 221 (ASTM B 221 M).
  - 1. Adjustment bar is slotted for width adjustment in the field.
- D. Fasteners: Nonmagnetic stainless steel or other non-corrosive metal as recommended by manufacturer.
- E. Performance Requirements: Screen is tested to meet the requirements of OSHA 29 CFR 1910.23
- F. Warranty: Provide written warranty signed by manufacturer, agreeing to repair or replace work that exhibits defects in materials or workmanship as defined by the manufacturer.
  - 1. Warranty Period: 2 years from date of Substantial Completion.
- G. Fabrication: Fabricate frame components to factory specifications. Assemble frame legs (2 sides) and adjustment bar (2 sides) into a frame using ¼-14 x 1" hex head stainless steel fasteners. Install screen in frame and fix into frame with 1/4-14 x 1" hex head stainless steel fasteners.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates and conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting skylight performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 INSTALLATION**

- A. General: Comply with manufacturer's written instructions for protecting, handling, and installing skylight components.
- B. Coordinate with installation of roof deck and other substrates to receive skylight units.
- C. Coordinate with installation of vapor barriers, roof insulation, roofing, and flashing as required to assure that each element of the work performs properly and that combined elements are waterproof

and weather tight. Anchor units securely to supporting structural substrates, adequate to withstand lateral and thermal stresses as well as inward and outward loading pressures.

- D. Counter Flashing: Where counter flashing is required as a component of the skylight, install to provide an adequate waterproof overlap with roofing or roof flashing (as counter flashing). Seal with thick bead of mastic sealant, except where overlap is indicated to be left open for ventilation.

### **3.03 CLEANING AND PROTECTION**

- A. Clean exposed metal and plastic surfaces according to manufacturer's instructions. Touch up damaged metal coatings.
- B. Clean plastic skylight units, inside and out, not more than 5 days prior to date of substantial completion.

**END OF SECTION**



