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**SPECIFICATIONS - DETAILED PROVISIONS**  
**Section 13123 – Electrical Panel Sunshade Structure**

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**SECTION 13123**  
**ELECTRICAL PANEL SUNSHADE STRUCTURE**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. General. Design and provide pre-engineered, prefabricated electrical panel sunshade structure (sunshade), including primary and secondary structural steel system, metal roof system, and sunshade accessories as specified herein.

Design and construct an open sided, single span, steel framed sunshade. The sunshade shall completely shade and protect from rain the electrical panel line-up, including motor control center and RTU. The sunshade shall be designed and constructed to provide the inside clearances (top of concrete slab to bottom of roof framing) and roof area shown on the Drawings. The sunshade shall fully comply with the primary framing, secondary structural members, roof system, welding, and painting requirements specified herein.

- B. Manufacturer. The sunshade manufacturer shall be Butler Manufacturing Company, Varco-Pruden, or equal.

**1.02 REGULATIONS, CODES, STANDARDS, AND REFERENCE SPECIFICATIONS**

The design, materials, and installation thereof shall conform to the latest editions (unless indicated otherwise) of all applicable local, state, and federal regulations, codes, standards, and specifications, including, but not limited to the following:

- A. "California Building Code", published by the International Code Council.
- B. "Manual of Steel Construction", published by the American Institute of Steel Construction, Inc. (AISC).
- C. "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings", published by the AISC.
- D. "Serviceability Design Considerations for Low-Rise Buildings", published by the AISC.
- E. "Specifications for the Design of Cold-Formed Steel Structural Members", published by the American Iron and Steel Institute (AISI).

- F. "Specifications for the Design of Light-Gage, Cold-Formed Steel Structural Members", published by the AISI.
- G. "Structural Welding Code, Steel", published by the American Welding Society (AWS).
- H. Underwriters Laboratories (U.L.) and Factory Mutual (FM) requirements for wind rated and fire rated assemblies.
- I. ASCE Standard 7-16 Minimum Design Loads and Associated Criteria for Buildings and other Structures, published by the American Society of Civil Engineers (ASCE).

### 1.03 QUALITY ASSURANCE

- A. IAS Accreditation. Sunshade system manufacturer shall be accredited by the International Accreditation Service, Inc. (IAS) in accordance with AC472, Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems. Manufacturer's fabrication facilities shall be accredited under Parts A, B, and C of AC472 to design and fabricate the metal building system components specified herein.
- B. Letter of Certification. Contractor shall submit written certification prepared and signed by a civil or structural engineer, registered in the State of California verifying that the sunshade design, metal roof system design (including panels, clips, and support system components) and foundation system design meet indicated loading and code requirements specified herein and by authorities having jurisdiction. The certification must reference specific dead loads, live loads, wind loads/speeds, tributary area load reductions (if applicable), concentrated loads, collateral loads, seismic loads, end use categories, governing code bodies including year, and load applications.

### 1.04 DESIGN LOAD CRITERIA

Contractor shall design and construct the sunshade in accordance with the following minimum design loads:

- A. Roof Live Load. Roof live loads shall be 20 psf.
- B. Wind Pressure. A minimum wind pressure of 20 psf shall be applied to primary framing.
  - 1. Project Location Risk Category - IV Wind Speed

2. Exposure Category – C

Wind pressure coefficients and design wind pressures shall be applied to primary framing, and roof components in accordance with applicable code requirements.

- C. Seismic Load. Seismic loading shall be determined and applied in accordance with the provisions of the latest version of the California Building Code, essential facilities. See Seismic Design Parameters Table on Drawing G-1 for site specific design parameters.
- D. Dead Load. The weight of building system construction, including roof mounted lights, framing, and covering members.
- E. Collateral Load. Additional imposed loads required by the Contract Documents other than the weight of the building system. These added loads may include such items as rain gutters and electrical systems. A minimum collateral load of 5 psf shall be applied to primary and secondary structural framing systems.
- F. Design Load Combinations. Load combinations used to design primary and secondary structural members shall be according to the governing code.
- G. Geologic Design Parameters See Geologic Design Parameters Table on Drawing G-1 for site specific design parameters.

**1.05 WARRANTIES**

- A. In addition to the one (1) year guarantee required by the General Conditions, the prefabricated metal roofing system erection contractor shall provide a written one (1) year extended warranty (for a total of two years) against leaks in roof panels arising out of or caused by ordinary wear and tear under normal weather and atmospheric conditions. Said warranty shall be signed by an officer of the metal roofing system erection contractor.
- B. Provide manufacturer's standard written warranty for twenty (20) years against perforation of metal roof panels due to corrosion under normal weather and atmospheric conditions. Warranty shall be signed by metal roofing system manufacturer.

**1.06 SUBMITTALS**

The Contractor shall prepare and submit complete and organized shop drawings as specified herein. Contractor shall submit complete information, drawings, and technical

data for all sunshade components, and accessories, including, but not limited to, the following:

- A. Manufacturer's IAS accreditation per AC472 (Parts A, B, and C) for the design and fabrication facilities that will provide the building components specified herein.
- B. Manufacturer's product information, specifications, and installation instructions for sunshade components and accessories.
- C. Engineering design calculations and details, prepared and signed by a civil or structural engineer registered in the State of California for the sunshade frame system, roof system, and foundation system.
- D. Civil or structural engineer shall verify the foundation system for bearing, overturning, and sliding. Calculation shall include the proposed sunshade structure and MCC in the engineering design calculations.
- E. Complete erection drawings showing roof framing, transverse cross sections, covering and trim details, and accessory details to clearly indicate proper assembly of sunshade components.
- F. Reinforced concrete foundation drawings including foundation plan, sections, and details for foundation construction. Sunshade anchor bolt layout drawing including anchor bolt, size, location, and embedment.
- G. Color selection charts showing manufacturer's full line of standard colors.

## **PART 2 - PRODUCTS**

### **2.01 SUNSHADE STRUCTURAL SYSTEM**

- A. General
  - 1. The design of the sunshade structural system shall be single span, moment-resisting frame with tapered or straight columns and roof beams; and with a A-frame pitched roof. Vertical bracing between column members (i.e. rod bracing) will not be permitted.
  - 2. Reinforced concrete foundations, including anchor bolt sizing and embedment length, shall be adequately designed in accordance with applicable code requirements and the specific soil conditions of the building site. Anchor bolt diameter, embedment, and location shall be as specified by sunshade manufacturer's anchor bolt layout drawings.

Minimum foundation size, depth, and reinforcement shall be as shown on the Drawings. If sunshade manufacturer's foundation design calculations require any increase to foundation size, depth, or reinforcing, Contractor shall construct same at no additional cost to Owner.

B. Structural Steel Design

1. All structural mill sections or welded-up plate sections shall be designed in accordance with the AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings," and all cold-formed steel structural members shall be designed in accordance with the AISI "Specifications for the Design of Cold-Formed Steel Structural Members."
2. The structural system shall be designed in accordance with the applicable building code(s) and the design load criteria specified herein.

C. Primary Framing

1. Rigid Frames
  - a) Frames shall consist of standard structural shape columns or welded-up plate section columns and roof beams complete with necessary splice plates for bolted field assembly.
    - 1) All base plates, cap plates, compression splice plates and stiffener plates shall be factory welded into place and have the connection holes shop fabricated.
    - 2) Columns and roof beams shall be fabricated complete with holes in webs and flanges for the attachment of secondary structural members except for field work as noted on manufacturer's erection drawings.
  - b) All bolts for field assembly of frame members shall be high strength bolts as indicated on erection drawings.
2. Endwall Structural
  - a) The endwall structural shall be cold-formed channel members designed in accordance with the AISI Specification or welded-up plate sections designed in accordance with the AISC Specification.

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- b) Endwall frames shall consist of endwall corner posts, endwall roof beams and endwall posts as required by design criteria.
  - 1) All splice plates and base clips shall be shop fabricated complete with bolt connection holes. All base plates, cap plates, compression splice plates and stiffener plates shall be factory welded into place and have the connection holes shop fabricated.
  - 2) Beams and posts shall be shop fabricated complete with holes for the attachment of secondary structural members except for field work as noted on manufacturer's erection drawings.
- c) Intermediate frames shall be substituted for end-wall roof beams when specified. Necessary endwall posts and holes for connection to the intermediate frame used in the endwall shall be shop fabricated.

#### D. Secondary Structural Members

##### 1. Purlins

- a. Purlins shall be "Z" shaped, precision roll formed.
- b. Purlins shall be "Z" sections, 8 inches or 9-1/2 inches deep.
- c. Outer flange of purlins shall contain factory-punched holes for panel connections.

##### 2. Eave Struts

- a. Eave struts shall be factory prepunched "C" sections, 8 inches, 9-1/2 inches, or 11 inches deep.

##### 3. Bracing

- a. Bracing (where permitted) shall be located as indicated on manufacturer's drawings.
- b. Diagonal bracing shall be hot-rolled rod of size indicated on manufacturer's drawings, and attached to columns and roof beams as shown on the manufacturer's drawings.



- c. Fixed base columns or pinned base portal frames shall be provided where vertical rod bracing is not permitted.
  - d. Flange braces, purlin braces, etc., when required, shall be cold-formed and installed as indicated on manufacturer's drawings.
- E. Welding. Welding procedure and operator qualifications and welding quality standards shall be in accordance with the American Welding Society structural welding code. Inspection other than visual inspection as defined by AWS paragraph 8.15.1, shall be identified and negotiated prior to bidding. Certification of welder qualification shall be supplied when requested.
- F. Structural Painting and Protective Coatings. All structural steel shall be coated per Service Condition A, as specified in Detailed Provision Section 11200.

## 2.02 ROOF SYSTEM

- A. General. The roof shall be covered with factory roll-formed roof system panels, Butlerib II (by Butler Manufacturing Company), Panel Rib (by Varco-Pruden), or equal. Construction details and panel installation shall be in accordance with the manufacturer's drawings and printed instructions.
- B. Panel Description
- 1. Panels shall be 3 feet wide with four (4) major corrugations, 1-1/2 inch high and 12 inches on center with two (2) minor corrugations between each of the major corrugations the entire length of the panel.
  - 2. The panel sidelaps shall overlap one (1) major corrugation.
  - 3. Panels shall be of maximum length, so as to minimize the number of panel endlaps. Panel endlaps shall be 6 inches. Panel endlaps shall be factory prepunched (top panel with a round hole and bottom panel with a slotted hole) to provide for expansion and contraction and panel alignment.
  - 4. The upper end of all panels shall be marked for the proper location of endlap sealant.
  - 5. Ridge panels when required shall be one (1) piece, factory curved to match the roof slope. Cross section of the ridge panel shall match the roof panel. Ridge panel splices shall occur over the first purlin on either side of the building center.
  - 6. Eave panels shall extend beyond the building structural line.

7. Roof panels shall be factory prepunched at panel ends to match prepunched holes in structural members to assure proper alignment. Upper end of eave and splice panels will have 3/4 inch long slots to provide for expansion and contraction of the panels.

C. Panel Design

1. Panels shall be designed in accordance with AISI "Specifications for the Design of Light-Gage, Cold-Formed Steel Structural Members".
2. Panels shall be designed to support a two hundred (200) pound load distributed evenly over a 2 foot square area centered between purlins without exceeding a panel deflection-to-span ratio of 1/180 in a two-span condition.

- D. Panel Material and Finish. Panel material as specified shall be 26 or 24 gage galvanized steel (ASTM A525) painted with Butler-Cote 500 FP finish system (or equivalent), a full strength, 70% Kynar 500/Hylar 5000 fluoropolymer coating. Manufacturer shall warrant that coating shall not blister, peel, crack, chip, or experience material rust through for twenty (20) years. Color of finish system shall be as selected by Owner.

E. Fasteners

1. Provide self-drilling galvanized screws with metal backed neoprene washers.
2. Fastener size, quantity, and location shall be as shown on manufacturer's erection drawings.

F. Panel Installation

1. All panels shall be factory cut-to-length according to the manufacturer's erection drawings.
2. All panels shall be positioned and aligned to hold the 3 foot module throughout the building length. Prepunched panels shall be positioned and aligned by matching the prepunched holes in the panel with the prepunched roof structurals.
3. All sidelaps will be at least one (1) full corrugation.

4. All sidelaps will be at least 6 inches and fastened together over and to structural members.
5. All panel side and endlaps shall be sealed with weather sealing compound (Panlastic sealant, or equal) to prevent the entry of capillary moisture.
6. Fasteners shall be installed with proper tools, in a workmanlike manner according to the recommendations of the manufacturer.
7. Panel ends shall be cut straight and square.

### **2.03 SUNSHADE ACCESSORIES**

Unless otherwise specified, sunshade accessories shall be items standard with the sunshade manufacturer.

As a minimum, the sunshade structure shall be provided with the following accessories:

Eave and gable trim, fascias, flashing, and closures. Trim, fascias, flashing, and closures shall be roll-formed from 24 gage (minimum) aluminized steel with the same finish as specified for roof panels.

### **2.04 PAINTING AND PROTECTIVE COATING**

Unless otherwise specified, all ferrous metal surfaces not receiving factory finishes shall be field prepared and coated per Detailed Provision Section 11200.

## **PART 3 - EXECUTION**

### **3.01 DELIVERY, STORAGE, AND HANDLING**

Contractor shall ensure that prefabricated components, sheets, panels, and other manufactured items and accessories are delivered, stored, handled, and erected in a manner that they will not be damaged or deformed. Materials stored on site prior to erection shall be stacked on platforms or pallets and protected with suitable weathertight covering. Contractor shall inspect all materials upon arrival at jobsite for damage.

### **3.02 INSTALLATION**

- A. Sunshade frames, roof members, panels, and accessories shall be installed plumb, square, and level, and be securely and rigidly anchored to the adjoining constructions. Sunshade assemblies and accessories shall be installed in

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accordance with approved shop drawings and printed recommendations and instructions of the manufacturer.

- B. All work shall be coordinated with the work of related subcontractors and suppliers to assure a proper installation.
- C. Contractor shall exercise care in handling factory-finished panels, sheets, and accessories. Scratches and small blemishes shall be touched-up with coating system provided by manufacturer. Dented, creased, bent or rusted items shall be replaced by new unblemished items.
- D. Provide non-metallic, non-shrink dry pack grout for setting base plates, sills, or other framing members required to bear on concrete.

**END OF SECTION**