



**PRE-ENGINEERED STRUCTURAL PARKING CANOPIES
For SOLAR PANEL INSTALLATIONS**

Manufactured by ProtekPark Solar

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PART 1 – GENERAL

PART 2 – PRODUCTS

PART 3 – EXECUTION

PART 1 – GENERAL

1.01 SCOPE:

- A. This section covers the furnishing and installation of the structures, foundations and all other items required to furnish and install a complete structural system capable of supporting solar panel installations.

1.02 DESIGN CRITERIA AND PERFORMANCE REQUIREMENTS:

- A. Structural framing for the Solar Parking Canopies shall be designed in accordance with all applicable state and local building codes. Manufacturer shall provide written structural analysis prepared and certified by a Professional Engineer licensed in the applicable State indicating that the structures and the foundations satisfy the required design criteria. At a minimum, the structure shall meet the following design criteria:
 - a. Dead Load: 8psf
 - b. Roof Live Load: 10psf
 - c. Snow, Wind and Seismic Loading: As Required by Code

1.03 QUALITY ASSURANCE:

- A. Installation shall be by experienced crews employed by the Solar Canopy Manufacturer having a minimum of five (5) years experience erecting similar structures. The canopies shall be erected in accordance with manufacturer's instructions and approved drawings.
- B. The structure shall be manufactured in accordance with standard approved practices. Testing shall be performed in accordance with ASTM standards, and test reports shall be certified and submitted by an independent test laboratory.

1.04 SUBMITTALS:

- A. Signed and sealed drawings and calculations shall be submitted by the manufacturer prior to manufacturing. No ordering or fabrication of materials shall commence until submittal drawings are approved by the local building authority and the owner.
- B. Manufacturer shall submit three (3) sets of signed and sealed drawings for approval.
- C. The submittal package shall include drawings and engineering calculations signed and sealed by a Professional Engineer licensed in the applicable State in addition to a full equipment submittal.
- D. At a minimum, submittal drawings shall include the following sheets:
 - a. Title/Cover Sheet
 - b. Column Framing Plans
 - c. Structure Elevations
 - d. Truss Framing Details
 - e. Column Anchoring Details

- f. Gutter Framing Details (if applicable)
- g. Solar Panel and Framing Plans and Details

1.05 MATERIAL DELIVERY, STORAGE AND HANDLING:

- A. Materials shall be delivered to the jobsite in manufacturer's packaging.
- B. Access from unloading area to construction site shall be clear and unrestricted.
- C. Materials shall be stored in a clean, dry and covered area that is secure and protected from weather.
- D. Upon delivery, inspect and report any freight or handling damage to the manufacturer immediately. Manufacturer cannot be held responsible for damages occurring during storage prior to construction.

PART 2 – PRODUCTS, MATERIALS AND COMPONENTS

2.01 MANUFACTURER:

- A. The manufacturer of the Solar Canopies shall have a minimum of 5 years experience in the design and installation of similar systems.

2.02 GENERAL STRUCTURE DESIGN AND COMPONENT DETAILS:

- A. The structure shall be designed and detailed according to good engineering practice. The Solar Canopies shall be a series of connected solar modules which shall be supported by purlins and trusses. Columns shall be located between parking stall spaces with trusses cantilevered to either side of the column for both aisle and perimeter configurations. The total coverage width shall not exceed 33'-0" for aisle canopies or 16'-6" for perimeter canopies unless otherwise specified.
- B. A minimum of clearance of 8'-6" shall be maintained at the lowest point of the canopy truss.
- C. Both aisle and perimeter canopies shall have a nominal roof slope between 5 and 10 degrees unless otherwise specified.
- D. Concrete used for foundations shall have a minimum 28-day compressive strength of 4,000 psi.
- E. Reinforcing steel used in the foundations shall be ASTM A615 Grade 60 deformed billet steel.
- F. HSS column sections shall be ASTM A500 Grade B steel tubing with a minimum yield stress of 46 ksi. Plate material used for connections shall be ASTM A36 material. Formed brackets and plates shall be shop welded to the columns. No field welding should be required. Columns shall be shot blasted, e-coated internally and externally, and powder coated RAL 9018 after fabrication per performance coating specification listed below in Section 2.03.

- G. Truss chords and web struts shall be ASTM A500 steel tubing with a minimum yield stress of 46 ksi. All trusses shall be assembled in the shop. Field assembly of truss components shall not be required. Formed clips for purlin connections shall be welded to the truss top chord. No field welding should be required. Trusses shall be shot blasted, e-coated internally and externally, and powder coated RAL 1019 after fabrication per performance coating specification listed below in Section 2.03.
- H. Purlins shall be ASTM A500 steel tubing with a minimum yield stress of 46 ksi. “C” or “Z” purlins shall not be permitted. Purlins shall be shot blasted, e-coated internally and externally and powder coated RAL 1019 after fabrication per performance coating specification below listed in Section 2.03. Purlins shall be mounted between the truss top chords. Top and bottom of purlins shall be flush with the top and bottom of the truss top chords in order to provide a flat plane for uniform mounting of solar panel racks and to minimize the possibility of birds roosting or nesting. There shall be a maximum clearance of 1/4” between the ends of the purlins and sides of the truss top chords. Purlins shall be bolted to clips on truss top chords with zinc plated Grade 5 bolts and AVK threaded inserts. Purlin spacing shall be determined by panel and rack layout. There shall be a minimum of two purlins per PV panel mounted in portrait orientation with respect to the eaves of the canopy. As required, mounting holes shall be provided in purlins to accommodate AVK threaded inserts for attachment of racking system to purlins. Through bolting shall NOT be permitted.

2.03 DESIGN PERFORMANCE COATING:

- A. The following specification/process for outdoor, exposed parking structures represents the minimum coating standards required to provide an industrial/marine grade finish that is both attractive and durable. As measured by ASTM - B117, the performance coating is designed to provide corrosion resistance that is approximately five to seven times that provided by hot dipped galvanize or conventional coating processes.
- B. The multi-step cleaning/coating procedure is further described below in terms of Metal Preparation, Zn-Phosphate, E-Coat and Powder Coat processes.

C. Metal Preparation Process

- a. All structural components; columns, base plates, trusses and purlins shall be abrasively cleaned after fabrication to a near white metal surface which meets SSPC- SP10 Near-White Blast Cleaning.
- b. The surface profile of the abrasively cleaned shall have a minimum 1.5 mil to 2.5 mil surface profile.
- c. The following testing shall be performed on the product after abrasive cleaning - backside Contamination Tape Test (TM-1); Detection of Chlorides – Paper Test (TM-3A); and Copper Sulfate Test (TM-4).

D. Layer 1 – Zinc Phosphate Coating

- a. All structural components; columns, base plates, trusses and purlins shall have 150 to 500 milligrams per square foot weight coating of Zinc Phosphate on all internal and exterior surfaces. Upon submersion into the

Zinc Phosphate solution, all interior and exterior surfaces including small crevices are coated.

E. Layer 2 – Electro-Deposition Coating

- a. All structural components; columns, base plates, trusses and purlins shall have 0.6 mils to 1.2 mils electro-deposition epoxy coating. Electro-deposition of epoxy shall be performed in a tank with the component completely submersed providing protection to both the internal and external surfaces. Layers one and two shall be accomplished using a twelve stage electro-deposition process.

F. Layers 3 and 4 – Double Coat of TGIC Superdurable Polyester Powder Coating

- a. All structural components; columns, base plates, trusses and purlins shall receive a double coat of TGIC Superdurable Polyester Powder Coating. The poles shall have 6 mils to 10 mils of Powder Coating dry film thickness followed by oven cure.

G. Physical/Corrosion Properties and Film Physical Properties:

Property	Test Method	Performance
Electro-Deposition Color	-----	Green
Film Thickness	Digital Gage	0.6 - 1.0 mils
Pencil Hardness	ASTM D3363	2H+
Direct impact	ASTM D2794	Pass 120 in/lbs
Reverse Impact	ASTM D2794	Pass 100 in/lbs
Cross-Hatch Adhesion	ASTM D3359	4B - 5B
Humidity	ASTM D1735	1000 Hrs +
Water Immersion	ASTM D870	240 Hrs +

2.04 GENERAL NOTES:

- A. All steel products shall be from a domestic (US) source accompanied by mill certifications.
- B. Certified welding inspection reports shall be submitted for all welded structural components.
- C. All canopy bolts, nuts and washers, unless otherwise noted, shall have a hot dip galvanized finish.
- D. All special inspectors shall be retained by the owner/customer. The extent of inspection shall comply with the contract documents, applicable code requirements and the local jurisdiction.
- E. All materials shall be new, of good quality and without defects which would lessen quality of work.

- F. All materials shall conform to the requirements, tolerances, etc. of the latest editions of the AISC Manual of Steel Construction, AISI Specifications for the Design of Cold Formed Steel Members, ASTM Standard Specifications for General Requirements for rolled steel plates, shapes, sheets and bars for structural use.
- G. All welding shall be done in accordance with the latest version of the American Weld Society's Specification – AWS D1.1. Electrodes shall be E70 series unless otherwise noted.
- H. Canopy erection drawings shall be furnished at time of material shipment.
- I. Templates for placement of anchor bolts shall be provided.

PART 3 – EXECUTION

3.01 SITE PREPARATION AND INSPECTION:

- A. General Contractor shall direct, oversee and inspect all site work related to the Solar Canopy Installation. Site preparation shall be in accordance with final drawings and specifications provided by manufacturer.
- B. Canopy contractor shall inspect site and notify general contractor in writing of any condition(s) that may inhibit the proper and timely construction of the canopies. Canopy contractor shall be under no obligation to proceed until conditions have been sufficiently corrected.

3.02 INSTALLATION:

- A. Canopy contractor shall be responsible for installation of foundations and placement of anchor bolts and for removal of any spoil due to foundation drilling from the site daily.
- B. Installation of the entire system and all components shall be in strict accordance with manufacturer's recommendations.

3.03 CLEANING AND GROUTING:

- A. After the system has been fully erected, the canopy contractor shall provide the materials and labor to grout the base of the column to produce a finished joint.
- B. Canopy contractor shall place all trash and debris into appropriate receptacles provided by the general contractor.

3.04 WARRANTY:

- A. Canopy manufacturer shall provide a one (1) year warranty on materials and workmanship from the date of substantial completion.
- B. Canopy manufacturer shall provide complete warranty information on all manufacturers providing accessories within the system.