

**TRAFFIC MONITORING SITE SOLAR POWER UNIT.**  
**(REV 10-22-10) (FA 11-22-10) (1-15)**

The following new Section is added after Section 715:

**SECTION 744**  
**TRAFFIC MONITORING SITE SOLAR POWER UNIT**

**744-1 Description.**

Install traffic monitoring site (TMS) solar power units at the locations and as shown in the Plans and the Design Standards. Solar power units are used to power traffic monitoring sites that collect vehicular data on a continuous basis. The solar Power unit consists of the following components: solar panel(s) and mounting hardware; 12-V storage battery; voltage regulator; lightning rod (air terminal) with wiring and associated mounting hardware; and Type P-III power pole.

**744-2 Materials.**

**744-2.1 General:** Use solar power unit components currently listed on the Department's Approved Product List (APL) that are compatible with the other components installed at the location. Ensure that the solar power unit is marked in accordance with Section 748 and the markings are visible after installation.

The approval process for equipment and/or materials used at a traffic monitoring site is covered in Section 748.

**744-2.2 Solar Panel configured for nominal 12v DC:** Meet the following requirements:

(a) Peak power range of 80 watts to 130 watts, as specified in the Contract Documents;

- (b) Voltage at maximum power greater than 16.5v at 77°F
- (c) Current at maximum power greater than 2.85A at 77°F
- (d) Photovoltaic modules constructed of mono or poly-crystalline cells
- (e) Capable of multiple arrays and series or parallel wiring configurations
- (f) Anodized aluminum frame
- (g) Mounting hardware

Ensure that solar panels do not have internal voltage regulators. When multiple panels are required, use panels of the same model and manufacture.

**744-2.3 Battery 12 Volt:** Meet the following requirements:

- (a) Rechargeable for photovoltaic application
- (b) Valve regulated lead-calcium gelled electrolyte
- (c) Polypropylene case
- (d) Minimum current discharge rate of 100 hours at 0.9 amperes
- (e) Approximate overall dimensions of 12 inches by 7 inches by 9 inches (H)

**744-2.4 Voltage Regulator configured for nominal 12v DC:** Meet the following requirements:

- (a) Minimum of 15v for battery charging
- (b) Begin charging when battery voltage is 13.3v or less
- (c) Discontinue charging when battery voltage is 14.5v
- (d) Quiescent current of 15mA or less

(e) Operating temperature range of minus 68°F to 122°F

(f) Approximate overall dimensions of 2 inches by 5 inches by 1 inch (H)

**744-2.5 Lightning Rod:** Meet the following requirements:

(a) Diameter of 1/2 inch and length of 3 feet

(b) Constructed of either solid copper or copper with nickel plating

Ensure that a base adapter and bronze pipe clamp with stainless steel u-bolt to fit a 2-7/8 inch outside diameter pipe are included with each lightning rod.

**744-2.6 Solar Power Pole:** Meet the requirements of Section 641 for concrete strain pole, except as follows:

Ensure that the overall pole length is 30 feet (plus or minus 1 foot),

Omit the hole for the 3/4 inch bolt,

Cast a 2-7/8 inch galvanized steel pipe tendon in the top of the pole with the threaded end extending 12 inches above the top of the pole,

Embed a No. 6 stranded bare copper ground wire within the pole during fabrication. Attach the ground wire to the tenon either by exothermic weld, or a threaded or compression connector.

Ensure that the ground wire exits the pole 5 feet from the bottom of the pole and extends a minimum of 4 feet outside the pole.

Ground the pole in accordance with Section 620.

**744-3 Installation Requirements.**

**744-3.1 General:** Install the solar power units in accordance with the manufacturer's recommended installation procedure and the Contract Documents.

**744-3.2 Pole Placement:** Install the pole in accordance with Section 641. Ensure that the pole is placed to allow for the proper placement of the solar panels.

**744-3.3 Solar panel(s) Orientation:** Mount and orient the solar panels to the south. Ensure that the angle of the solar panels from horizontal is equal to the latitude of the pole location plus 10 degrees.

Install a 2-1/2 inch weatherhead on the tenon and route the wires from the solar panels junction box to the weatherhead through a liquid tight flexible conduit and through the pole to the cabinet. Use #10 AWG stranded copper wire with type THHN, THW or THWN insulation to connect the solar panel to the voltage regulator.

**744-4 Guaranty Provisions.**

**744-4.1 Contractor's Responsibility:** Secure all guaranties that are customarily issued by the equipment manufacturers for the specific equipment included in the Contract. Ensure that the form in which such guaranties are delivered includes the provision that they are subject to transfer to the Department, and is accompanied by proper validation of such fact. Transfer guaranties at final acceptance of the work (or equipment) by the Department.

**744-4.2 Terms:** Ensure that the manufacturers of the equipment stipulate the terms of guaranties when submitting a request to the Department for certification and for equipment submittal for construction projects. Include terms for a specified service performance with provisions for repair parts and labor, or for replacement. Provisions shall define the equipment "installation date" as the date for such guaranty to be in effect. For construction projects, the "installation date" is the first day of equipment "burn-in". For warehouse purchases, the "installation date" is the date of visual inspection approval, not to exceed ten days after delivery date.

**744-4.3 Conditions:** When guaranty is available, ensure that a written and signed guaranty accompanies the manufacturer's billing invoice. The Engineer will sign and retain the original and provide a copy to the manufacturer. If the Contractor does not comply with the terms of the guaranty, the Department may suspend the certification. Comply with additional terms and conditions as stated in purchasing agreements.

**744-5 Method of Measurement.**

**744-5.1 General:** Measurement for payment will be in accordance with the following tasks.

**744-5.2 Furnish and Install:** The Contract unit price each for solar power unit, furnished and installed, includes the solar power unit as specified in the Contract Documents, all equipment, materials, and labor necessary for a complete and accepted installation.

**744-5.3 Furnish:** The Contract unit price each for solar power unit, furnished, includes the solar power unit and materials as specified in the Contract Documents, plus all shipping and handling costs involved in the delivery as specified in the Contract Documents.

**744-5.4 Install:** The Contract unit price each for solar power unit, installed, includes all miscellaneous materials and labor necessary for a complete and accepted installation as specified in the Contract Documents. The Engineer will supply the solar power unit as specified in the Contract Documents.

**744-6 Basis of Payment.**

Price and payment will be full compensation for all work specified in this Section.

Payment will be made under:

Item No. 744- 70- TMS Solar Power Unit - each.