

**TRAFFIC MONITORING SITE SOLAR POWER UNIT.**  
**(REV 6-16-99) (FA 7-20-99) (7-02)**

PAGE 755. 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 Unit(s) at the location(s) and as shown in the plans and the Design Standards.

**744-2 Materials.**

**744-2.1 General:** Use Solar Power Unit components currently listed on the Department's Approved Products List (APL) as 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 material(s) used at a Traffic Monitoring Site is covered in Section 748.

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

- (a) Peak power range of 46 to 53 watts,
- (b) Voltage at maximum power greater than 16.5v at 77° F [25° C],
- (c) Current at maximum power greater than 2.85 A at 77° F [25° C],
- (d) Cells are laminated between ethylene vinyl acetate and tempered glass,
- (e) Approximate panel size of 18 by 38 inches,
- (f) Capable of multiple arrays and series or parallel wiring configurations,
- (g) Extruded aluminum frame, and
- (i) Mounting hardware.

When additional solar panel(s) are required at a location, the number will be specified in the plans.

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

- (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, and
- (e) Approximate overall dimensions of 12 by 7 by 9 inches (H).

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

- (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 -68 to 122° F, and
- (f) Approximate overall dimensions of 2 by 5 by 1 inch (H).

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

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

(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 Unit:** The Solar Power Unit may consist of any or all of the following components:

- (a) Solar panel(s) and mounting hardware,
- (b) Solar power pole,
- (c) Battery (12 volt, six cell recombinant photovoltaic),
- (d) Voltage regulator,
- (e) Lightning rod (air terminal) with mounting hardware and associated wiring,

and

- (f) Weatherhead 2 inches.

**744-2.7 Solar Power Pole:** Meet the requirements of Section 641 for Type N-III concrete strain pole, except as follows:

Ensure that the overall pole length is 30 feet ( $\pm 1$  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. 4 stranded bare copper ground wire within the pole during fabrication. Attach the ground wire to the tenon by either exothermic weld, 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.

The grounding electrode and exothermic welding of the ground wire to the grounding electrode will be paid for under Section 620.

### **744-3 Installation Requirements.**

**744-3.1 General:** Install the Solar Power Unit(s) 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 panel(s) to the south. Ensure that the angle of the solar panel(s) 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 panel(s) junction box to the weatherhead through a liquid tight flexible conduit and through the pole to the cabinet.

### **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.

**744-5.5 Grounding Electrode:** Separate measurement for payment will be made for the grounding electrode. The quantity of grounding electrode will be determined as provided in 620-4.

#### **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. 620- 1- Grounding Electrode - per foot.
- Item No. 744- 70- TMS Solar Power Unit - each.