**SP-150579**
**(New)**

**SPECIAL PROVISIONS**
**FOR**
**ITE COMPLIANT CONTINUOUS FLASHING SINGLE HEAD LED SOLAR BEACON**
**WITH PEDESTAL POLE AND CONCRETE FOUNDATION**

**Mills County**
**DHS-706-0(17)--7H-65**

**Effective Date**
**November 19, 2019**

**THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.**

## 150579.01 DESCRIPTION.

**A. Summary.**
This work includes the supply and installation of ITE compliant, continuous operating single head solar powered flashing beacon on a sign post. Each unit shall consist of a self-contained solar engine, LED signal module and signal housing, solar panels, batteries, mounting hardware pedestal poles, concrete foundation and retroreflective sign sheeting such that the entire assembly mounts to the sign post. The general locations for installation are indicated the contract documents Contractor to identify field locations per the special detail for Engineer approval before installation. The system shall conform to all provisions of the following:

- MUTCD, Chapter 4L, Flashing Beacons
- Vehicle Traffic Control Signal Heads – LED Circular Signal Supplement by ITE dated 6/27/2005

**B. Operations.**
All beacons shall operate in flashing mode 24/7/365. Electrical and battery storage systems shall be sized appropriately for year round use. For equal evaluation of all photovoltaic systems, manufactures shall size their system using the latitude and longitude of Glenwood, Iowa to determine the amount of sun-hours available year round. A 12 month solar sizing report showing of loss of load probability (LOLP) of less than 1.000% and/or an Array to Load ratio not being under 1.2 during all months will be required by the vendor before final acceptance.

## 150579.02 MATERIALS.

**A. Mechanical Specifications.**

1. **Cabinet/Housing.**
   - **a.** Manufactured of 0.125 inch sheet aluminum. It shall have a rated of NEMA 3R, or better, for protection from weather.
   - **b.** Each cabinet shall be equipped with mounting brackets for any of the mounting configurations listed in the plans. All necessary hardware for proper mounting shall be included and incidental to the beacon bid item.

2. **Solar Charge Controller.**
   - **a.** Fully automatic charger using three stages of charging for rapid, efficient and safe battery charging.
     - Stage 1: Full Charge, with 100% of available solar energy.
     - Stage 2: Either Pulse-Width Modulation (PWM) or Maximum Power Point Tracker (MPPT) is allowed for constant voltage regulation to prevent heating and excessive battery gassing.
     - Stage 3: Float Charge, after battery is fully recharged, reduces to a float or trickle charge with transition dependent on battery history.
   - **b.** Have a low voltage disconnect (LVD) of 11.4 VDC and shall automatically reconnect after LVD when the voltage reaches 12.6 VDC. The charge controller shall have a high voltage disconnect (HVD) of 15.3VDC.
   - **c.** Colored indication LED's (or similar display methods) shall show various states of system operation. For example, a green LED or LCD display may show the system is charging and off when not charging. Battery status LED's indicate battery state, showing a blinking green LED during PWM/MPPT charging, a solid green LED when battery is near full charge, a solid amber LED indicating battery at middle capacity, blinking red LED indicating low charge, or a solid red LED indicating load disconnected (LVD).
   - **d.** Capable of operating in a temperature range of -40°F and +140°F.
   - **e.** Approved to Underwriters Laboratories, Inc. (UL) standards.

3. **Solid State DC Flasher.**
   - **a.** Solid state, two circuit device which controls the flashing sequence of the beacon. The flasher will have a flash rate of 60 flashes (+/- 5%) per minute and will flash a duty cycle of 50% on and 50% off.
   - **b.** Allow an input voltage range of 11.4 to 30VDC.

4. **Solar Panel.**
   - **a.** Size appropriately for the type of photovoltaic system proposed and required in this specification. The appropriate wattage of the solar panel shall be verified with a "Solar Sizing Report" based upon location (Glenwood, Iowa) and specific system configuration and operating parameters.
   - **b.** The maximum size (length by width dimension) of the solar panel must not exceed 576 square inches.
   - **c.** Rated for highway use and have a 20 year life.

5. **Battery.**
   - **a.** Absorbed glass mat (AGM) 12 volt DC battery. The battery self-discharge rate shall be 1% per month or less (at 68°F). The appropriate battery size (AmpHr) shall be verified with a 12 month system sizing report based upon location and specific configuration and operating parameters.
   - **b.** Sized to provide a minimum of 7 days of autonomy.

6. **Signal Beacon.**
   - **a.** Consists of the head, amber or red lens, visor, signal closure cap, and mounting hardware for the type of structure in the contract documents. The lens will be a 12VDC 12 inch amber LED beacon. The head shall be a one-piece polycarbonate shell with the polycarbonate door using stainless steel hinge pins. Thumbscrews shall hold the door against the body. The visor shall be a one-piece polycarbonate tunnel unit which shall be

connected at four points to the head door.

**b.** The daytime brightness (light output) of the signal beacon shall meet the provisions of the ITE publications entitled “Vehicle Traffic Control Signal Heads” and “Traffic Signal Lamps”. (910 candles for amber and 365 candles for red during daytime operations). There shall be no daytime dimming per the FHWA interpretation dated October 09, 2013 for any reason including lack of battery storage or lack of solar charging. For more information on this, refer to Federal Highway Administration’s official ruling number and title: “4(09)-28 (I) – Diming of Flashing Beacons during Daytime Conditions.”

**c.** Automatic night dimming may be enabled on the Solid State DC flasher. The dimming function shall employ an external photocell to detect ambient light. The flasher shall initiate the night dimming function when detected light conditions reach the ambient light level as defined by the Federal Aviation Administration (FAA).

**7. Poles.**

Pole requirements as outlined in Section 2525 and Article 4189.05 of the Standard Specifications shall be followed.

**8. Foundations.**

**a.** Use Class C Structural concrete complying with Section 2403 of the Standard Specifications.

**b.** Use uncoated reinforcing steel complying with Article 4151.03 of the Standard Specifications

**c.** All reinforcing steel shall be Grade 60.

**d.** For drilled-shaft foundations, comply with Articles 2433.01, 2433.03, A and 2433.03, C through I of the Standard Specifications.

**9. Signs and Sign Panels.**

Sign and Sign Panel requirements as outlined in Article 4186 of the Standard Specifications shall be followed.

**B. Material Approvals.**

Prior to the installation of any beacons, contractor will submit to the Engineer the following for approval:

- Vendor cut sheets of beacons proposed with solar panel and battery size clearly identified.
- Solar sizing report of the proposed beacon system (LED module, solar array and battery).
- UL certification of solar charge controller.
- ITE compliance certification statement or 3rd party conformance report.
- Required materials per all standard specifications listed above.

**150579.03 METHOD OF MEASUREMENT.**

Each. The Engineer will count each flashing beacon, pedestal pole, concrete foundation with all signs and mounting hardware installed as one unit.

**150579.04 BASIS OF PAYMENT.**

The Contractor will be paid the contract unit price for each flashing beacon, pedestal pole, concrete foundation with all signs and mounting hardware installed complete.