

CITY OF CONCORD
SPECIFICATIONS FOR
RECTANGULAR RAPID FLASHING BEACON (RRFB)
AUGUST, 2017

Specifications for Solar Powered Rapid Rectangular Flashing Beacon (RRFB)

Overview

This specification is for the Solar Powered Rapid Rectangular Flashing Beacon which shall be Carmanah SC315 Gen III Solar Rectangular Rapid Flashing Beacon (RRFB) or approved equal.

Each unit shall consist of a solar panel with mount, controller enclosure that houses the energy management system, on-board user interface, wireless communications and push button with voice message controller. Each unit shall include minimum two (2) RRFB lightbars with side-emitting pedestrian confirmation light (both ends). The system shall include the roadside signage at the crosswalk and as shown on the plans. Type 1-A pole and foundations shall also be included as part of the system and as shown on the plans. The contractor shall furnish and install all equipment and devices as described in this specification and as shown on the plans for a complete functional RRFB system. The system shall conform to all provisions of the MUTCD, Interim Approval IA-11.

1.0 Mechanical Specifications

The controller enclosure shall be constructed from aluminum with a lockable or tamper-proof hinged door. All electronics shall be mounted in the controller enclosure. A separate cabinet to house the controller for the optional push button with voice message shall not be required.

The overall weight of the controller enclosure shall not exceed 42 lbs (19 kg) and shall not exceed the approximate dimensions: 19.75" H x 11.1" W x 6" D.

The lightbar housing shall be constructed from aluminum and shall have the approximate dimensions: 24" L x 1.5" D x 4.5" H.

Each lightbar shall have two light modules of approximately 7" wide by approximately 3" high. Each lightbar shall include a side-emitting pedestrian confirmation light on each end.

At each location, dual lightbar (bi-directional configuration/double sided) shall be installed per plans.

The lightbar shall be mounted to the pole using a separate bracket assembly to facilitate mounting two lightbars back to back (bi-directional) but still allow the lightbars to be pivoted independently of each other. The lightbar shall be able to pivot by approximately 40 degrees in order to aim the lightbar independent of the wire hole location on the pole.

The lightbar bracket shall be constructed from 3/16" galvanized steel and shall have both banding and bolting mounting options and shall be able to be mounted to all specified pole types.

The lightbar assembly shall open for access to the wiring connections for the LED modules. LED modules shall be rated to MIL-STD-810F, Method 506.4 for ingress protection.

2.0 Mounting

The controller enclosure shall be furnished with two (2) mounting brackets for banding to 4" diameter or larger round poles.

3.0 Configuration

The controller enclosure shall house an on-board user interface that provides on-site configuration adjustment, system status and fault notification, and system activation information.

The flash duration shall be adjustable in-the-field from 10 to 60 seconds in one second increments.

The system shall provide configurable nighttime intensity settings.

The system shall be capable of enabling or disabling ambient brightness auto-adjustment. This feature allows the system to provide optimal output brightness in relation to ambient light levels while always maintaining adherence to SAE J595 Class I specifications.

Flash duration and other in-the-field adjustable settings shall be automatically broadcast to all units in the system, except channel selection which shall be configured on each unit.

4.0 Solar / Battery System

The system shall include one 45-watt high-efficiency photovoltaic cell solar panel supplied with mounting hardware. The controller enclosure shall house one 35 Ah sealed valve-regulated lead-acid battery. The battery shall be readily available from multiple suppliers and non-proprietary. Solar panel and battery system shall be 12 Volt dual battery systems (sealed, maintenance-free) and shall be designed for minimum 5-year battery life.

5.0 Operational Specifications

The intensity of the yellow indications directly perpendicular to the lens shall be a minimum of 1,800 Candela at full sun daylight conditions. The intensity shall be able to adjust to ambient light conditions, however during daylight operation the intensity shall meet the minimum specifications of the Society of Automotive Engineers (SAE) standard J595 Class I dated January 2005.

The color of the yellow indications shall meet the specifications of SAE standard J578 (Color Specification) chromaticity dated December 2006.

The system, including the push button with voice message, shall have the capacity to operate 660 20-second activations per day year-round using the applicable peak sun hours insolation available at the installation location. The source of the insolation data shall be the NASA Atmospheric Data Center.

The controller enclosure shall have the capability to activate other solar engines by wireless communications within 500 feet (152 meters). The solar engine shall have unique channels that can be configured on-site to avoid activation of nearby systems.

The system shall use a dedicated light sensor to detect night and day states and apply any optionally-enabled intensity adjustments.

6.0 Model XAV2E-LED

The XAV2E-LED system shall be Polara model with powder coated black color or approved equal and shall consist of:

1. Push Button Station (PBS). The PBS shall include the following:
 - An instructional sign.
 - A push button with a directional tactile arrow for activating the flashing lights.
 - A voice message saying "Yellow Lights are Flashing, Vehicles May Not Stop".
 - A constant audible "Locate Tone."

- All RRFBs in the system shall initiate activation simultaneously within 120mS of actuation
- A group of Yellow LEDs above the push button which flash in sync with the flashing beacon.
- A speaker, 10 watt RMS audio amplifier.
- A noise monitoring microphone for auto volume control and LEDs.
- An 8 position terminal block ready for connection to control unit.
- Mounting hardware.

2. Design Compliance

- The system shall meet the functionality requirements of MUTCD 2009-4E.
- The system shall meet NEMA TS2 Section 2.1 Temperature and Humidity requirements.
- The PBS Enclosure shall meet NEMA 250 – Type 4X Enclosure requirements.

7.0 Energy Balance, Array-to-Load Ratio (ALR) and Autonomy Calculations

The manufacturer shall provide an energy balance worksheet consisting of (Energy In)/ (Energy Out), ALR and System Autonomy calculations.

Energy-In is based on Electric charge, in Ah, entering the battery from the charger, accounting for:

- The energy from the solar panel based on applicable peak sun hours insolation available at the installation location for the panel's inclination angle. The insolation figure used shall be the worst-case month of the calendar year. The source of the insolation data shall be the NASA Atmospheric Data Center.
- Shading from nearby trees, buildings or other structures unique to a particular location are to be factored in and the calculations shall clearly show and justify the de-rating of the solar panel energy input.
- Efficiency losses from the charger, including conversion efficiency of a Maximum Power Point Tracking (MPPT) Charger, where applicable.
- MPPT Charger current boost, if applicable.
- Battery charger efficiency losses

Energy-Out is based on the sum of quiescent and operating load in all circuitry over 24 hours with an operating capacity of 300 20-second activations, including:

- Baseline wireless over 24 hours
- Operating load of push button with voice message if applicable at rated operating capacity per activation
- Additional operating load of the wireless system per activation
- Operating load of lightbars including pedestrian indicators at rated intensity per activation. The number of lightbars and their electrical load details (volts, current and watts) shall be clearly indicated.

ALR

System Array-to-Load (ALR) ratio shall be calculated as: Energy-In divided by Energy-Out as defined above.

Systems shall be designed to a minimum Array-to-Load (ALR) ratio of 1.2.

Autonomy

System autonomy shall be a minimum of 10 days or as recommended by the NASA Atmospheric Data Center for the location and shall be calculated by the following method:

(Temperature-derated battery capacity minus battery capacity unavailable due to Low Voltage Disconnect) divided by Daily total energy consumption with an operating capacity of 300 20-second activations (as calculated above).

8.0 Qualifications

The product shall be FCC certified to comply with all 47 CFR FCC Part 15 Subpart B Emission requirements.

The product shall be Buy American compliant.

Manufacturer shall provide a 3 Year Limited Warranty.

Manufacturer must be ISO 9001 certified.

Specifications for AC Powered Rectangular Rapid Flashing Beacon (RRFB)

Overview:

This specification is for the AC Powered Rapid Rectangular Flashing Beacon which shall be Carmanah SC315 Gen III Rectangular Rapid Flashing Beacon (RRFB) or approved equal.

Each unit shall consist of a controller enclosure that houses the energy management system, on-board user interface, wireless communications, power supply, and push button with voice message controller. Each unit shall include minimum two (2) RRFB lightbars with side emitting pedestrian confirmation light (both ends). The system shall include roadside signage at the crosswalk and as shown on the plans. Type 1-A pole and foundations shall also be included as part of the system at the locations and as shown on the plans. The contractor shall furnish and install all equipment and devices as described in this specification and as shown on the plans for a complete functional RRFB system. The system shall conform to all provisions of the MUTCD, Interim Approval IA-11.

1.0 Mechanical Specifications

The controller enclosure shall be constructed from aluminum with a lockable or tamper-proof hinged door. All electronics shall be mounted in the controller enclosure.

The overall weight of the controller enclosure shall not exceed 50 lbs (22.7 kg) and shall have the approximate dimensions: 19" H x 10" W x 6" D (48.2cm H x 25.4cm W x 15.3cm D).

The lightbar housing shall be constructed from aluminum and shall have the approximate dimensions: 24" L x 1.5" D x 4.5" H (61.0 cm L x 3.8 cm D x 11.4 cm H).

Each lightbar shall have two light modules of approximately 7" wide by approximately 3" high. Each lightbar shall include a side-emitting pedestrian confirmation light on each end.

At each location, dual lightbar (bi-directional configuration/double sided) shall be installed per plans.

The lightbar shall be mounted to the pole using a separate bracket assembly to facilitate mounting two lightbars back to back (bi-directional) and to allow the lightbar to pivot. The lightbar shall be able to pivot by approximately 40 degrees in order to aim the lightbar independent of the wire hole location on the pole.

The lightbar bracket shall be constructed from 3/16" galvanized steel and shall have both banding and bolting mounting options and shall be able to be mounted to all specified pole types.

The lightbar assembly shall open for access to and wiring connections to the LED modules. LED modules shall be rated to MIL-STD-810F, Method 506.4 for ingress protection.

2.0 Mounting

The controller enclosure shall be furnished with mounting brackets for banding to 4" diameter or larger round poles.

3.0 Configuration

The controller enclosure shall house an on-board user interface that provides on-site configuration adjustment, system status and fault notification, and system activation information.

The flash duration shall be adjustable in-the-field from 10 to 60 seconds in one second increments.

The system shall provide configurable night time intensity settings.

The system shall be capable of enabling or disabling ambient brightness auto-adjustment. This feature allows the system to provide optimal output brightness in relation to ambient light levels while always maintaining adherence to SAE J595 Class I specifications.

Flash duration and other in-the-field adjustable settings shall be automatically broadcast to all units in the system, except channel selection which shall be configured on each unit.

4.0 AC Power Interface

- The system shall include an on-board AC-DC power supply with 120-220 VAC input.

5.0 Operational Specifications

The intensity of the yellow indications directly perpendicular to the lens shall be a minimum of 1,800 Candela at full sun daylight conditions and in all daylight conditions shall meet the minimum specifications of the Society of Automotive Engineers (SAE) standard J595 Class I dated January 2005.

The color of the yellow indications shall meet the specifications of SAE standard J578 (Color Specification) dated December 2006.

The controller enclosure shall have the capability to activate other AC powdered RRFB systems by wireless communications within 500 feet (152 meters).

The system shall use a dedicated light sensor to detect night and day states and apply any optionally-enabled intensity adjustments.

6.0 Model XAV2E-LED

The XAV2E-LED system shall be Polara model with powder coated black color or approved equal and shall consist of:

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