**Purchase Specification**

**for a**

**AC-Powered Cabinet-Based Rectangular Rapid Flashing Beacon (RRFB)**

1. **Overview**

Each Rectangular Rapid Flashing Beacon (RRFB) shall be cabinet-based and use AC power. The industry-standard cabinet will house the AC/DC power supply, circuit breaker, charge controller, flash controller, on-board user interface, and wireless communications. Each RRFB shall include from one to four light bars. The RRFB shall conform to all provisions of the MUTCD, Interim Approval IA-21 including WW+S flash pattern. The RRFB shall be pre-wired to the maximum extent possible. Solar-powered version of the RRFB shall also be available, including a smaller self-contained version that is fully compatible.

1. **Mechanical Specifications**

The RRFB control cabinet shall be constructed from aluminum with a lockable industry standard #2 lock, or optional lockable latch, and tamper-proof hinged door. No other external control cabinet shall be required. The control cabinet shall be vented to provide air circulation and cooling of the electronic system. The vents shall be screened to prevent ingress by insects and debris.

The overall weight of the control cabinet shall not exceed 90lbs (41 kg) and shall have the approximate dimensions: 24” H x 16” W x 8” D (61cm H x 41cm W x 21 cm D).

Fasteners shall be stainless steel.

1. **Fixtures**

**3.1 Light bars**

The light bars shall be current-driven LED strings without active electronics. The LEDs shall be driven by pulse-width modulated fixed current.

The light bar 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 light bar shall conform to all provisions of the MUTCD and FHWA requirements.

Each of the two modules in a light bar shall have 8 LEDs and shall be purpose-built by the manufacturer of the RRFB including the optics. The optics shall be premium, UV-resistant polycarbonate.

Each end of a light bar shall include a side-emitting pedestrian confirmation light composed of a single LED. Users shall have the option of using both confirmation lights for median applications, or covering one confirmation light with an included sticker for side-of-road applications.

The light bar shall be mounted to the post or pole using a separate bracket assembly to facilitate mounting two light bars back-to-back (bi-directional) and to allow the light bar(s) to rotate horizontally for aiming.

The light bar bracket shall be constructed from galvanized or stainless steel and shall have both banding and bolting mounting options and shall be able to be mounted to all specified pole types.

The light bar assembly shall open for access to the wiring connections for the LED modules. LED modules shall be rated to NEMA 3R.

Light bar wiring harnesses shall be included.

Fasteners shall be stainless steel.

**3.2 LED Enhanced Signs**

The RRFB shall be able to optionally operate flashing LEDs in the border of a sign.

1. **Mounting**

Mounting adapter hardware for the RRFB control cabinet shall be available for 4” – 4.5” round poles or square posts. Side-of-Pole mounting shall offer strapping as standard with an option for Z-bar and U-bolts.

Mounting configurations shall not require specialized tools.

1. **Configuration**

The RRFB control cabinet shall house an auto-scrolling LED on-board user interface that provides on-site configuration adjustment, system status and fault notification.

The user interface shall provide a display of four (4) alphanumeric characters and three (3) control buttons to navigate and change settings and activate functions.

When editing the configuration, the user interface will flash the display indicating it is ready to accept editing and will flash the display rapidly 3 times to indicate the setting change has been accepted.

The flash duration for the RRFB fixtures or LED enhanced signs shall be adjustable in-the-field from 5 to 60 seconds in one second increments, 60 to 1,200 seconds in 60-second steps, and 3,600 seconds. Default flash duration shall be 20 seconds.

The flash rate shall be the wig-wag plus simultaneous (WW+S) providing 75 flashing sequences per minute. The flash rate of each individual RRFB indication, as applied over the full flashing sequence, shall not be between 5 and 30 flashes per second to avoid frequencies that might cause seizures.

The system shall provide configurable nighttime intensity settings ranging from 10% to 100% of daytime intensity.

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. If enabled, the ambient brightness auto-adjustment shall adjust output to a range between 50% and 100% of daytime intensity.

The user interface shall provide viewing and/or programming access for the following:

* Activation duration (5 to 60, 60 to 1200, or 3600 seconds)
* Digital output that is active during the flashing cycle that allows the control of external devices such as crosswalk illumination. Digital output shall be configurable for night operation only or operation day or night.
* Radio channel (choice of 1 to 14)
* Radio power on/off status
* Radio equipped status
* Daytime intensity
* Flash pattern
* Night intensity setting
* Adjustment for ambient daytime brightness
* Self-Test / BIST (Built-In Self-Test) including the detection of shorts or open circuits in the fixture outputs
* Battery status – general description and actual battery voltage (not applicable for AC model)
* Day or night status, as determined by dedicated photosensor not solar panel output
* Solar panel voltage (not applicable for AC model)
* Automatic Light Control (ALC). If this safety feature is enabled, it allows the RRFB to temporarily reduce the intensity of the light bars to maintain energy equilibrium. The user interface shall report the amount of dimming being applied in the range of 10% to 100%.
* Daily activations averaged over 90 days
* Pushbutton detection
* Firmware version number

Activation duration, night intensity setting and adjustment for ambient daytime brightness shall be automatically broadcast to all RRFBs in the system when changed in one RRFB.

1. **AC/DC Power Supply**

The RRFB shall include a universal AC/DC power supply that accepts conventional AC power input and outputs 15 volts DC. It shall be rated for at least 50 watts. AC wiring input shall terminate on a DIN-rail circuit breaker rated for 4 amps.

1. **Operational Specifications**

The RRFB shall meet the minimum photometric specifications of the Society of Automotive Engineers (SAE) standard J595 Class I dated January 2005. A photometric report by a certified third-party testing laboratory shall be provided to demonstrate compliance with J595.

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

The controller shall be able to support up to 1.4 amps combined current through the RRFB fixtures simultaneously.

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

The system shall operate normally within the temperature range of -40 to +165°F (-40 to +74°C).

1. **Radio System**

The radio system shall operate at 2.4GHz.

Upon detection of a pushbutton press, an RRFB will broadcast an activation to all other nearby RRFBs sharing the same channel.

The RRFB shall have the capability to activate other RRFBs by wireless communications within 1,000 feet (304 meters).

The RRFB shall have a minimum of 14 unique channels that can be configured on-site to avoid inadvertent activation of nearby systems.

The antenna shall be a low-profile “button” shape that cannot be bent or broken by vandals.

1. **Activations**

The system shall be capable of activation by pedestrian pushbutton with voice message.

The pedestrian pushbutton shall be ADA compliant and have these accessibility features:

* Activation area of 2” minimum across in at least one direction
* Shall be operable with a closed fist
* Shall be operated with a maximum of 3.5lbs (15.5N)
* Shall have a visual contrast with the body background of at least 70 percent
* Voice message with the MUTCD IA-21 approved message “Yellow lights are flashing”, spoken twice by default
* Visible indicator for button press confirmation
* Audible locator tone
* Tactile directional arrow

The pushbutton shall be self-contained with no external controller. The pushbutton shall have wireless Bluetooth communication for changing volume and other settings via companion smartphone application.

All RRFBs in the system shall initiate activation simultaneously within 150ms of activation.

If an additional activation occurs while the system is activated, the flash duration shall reset. For

example, with the flash duration set to 20 seconds, if an additional activation occurs after the RRFB has been activated for 15 seconds the RRFB will continue for an additional 20 seconds, or 35 seconds in total.

If the RRFB has ceased its flashing cycle, any subsequent activation shall activate the RRFB immediately regardless of how recently the RRFB ceased operation.

Pushbutton wiring harnesses shall be included.

1. **Environmental Testing**

The RRFB cabinet and light bars shall be rated to a minimum of NEMA 3R.

1. **Packaging**

Packaging shall consist of only recyclable corrugated cardboard and soft plastic bags.

1. **Qualifications**

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

The RRFB shall be manufactured in the USA and shall be Buy American compliant.

Manufacturer shall provide a 5-year Limited Warranty.

The Manufacturer shall be ISO 9001 certified.

Manufacturer: Carmanah Technologies Inc.

Model: SC315-G AC RRFB

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