



**SPECIAL PROVISIONS
FOR
RECTANGULAR RAPID FLASHING BEACON SYSTEM**

**Dubuque County
STP-U-0252(606)--70-31**

**Effective Date
December 16, 2025**

THE STANDARD SPECIFICATIONS, SERIES 2023, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

236050.01 DESCRIPTION.

A. General.

1. This special provision covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental for the installation of a fully functional pedestrian-activated rectangular rapid flash beacon (RRFB) system, complete with all post- mounted features/attachments specified in the plans.
2. This work shall consist of furnishing and installing the solar-powered beacon assembly complete with RRFBs, solar panel, battery pack with charger, LED driver, pedestrian button/sign units, crosswalk advance warning signage, and wireless communications equipment, attached to a tubular steel post or other approved mounting system as shown in the plans and as specified by the Engineer.

B. Specification References.

The RRFB shall be in conformance with all applicable MUTCD standards and guidelines. It shall consist of two rapidly flashed rectangular yellow indications having LED array-based pulsing light sources, and shall be designed, located, and operated in accordance with the detailed requirements specified in the MUTCD 11th Edition.

C. Functional Requirements.

1. Per FHWA guidelines, RRFB shall be normally dark, shall initiate operation only upon pedestrian actuation, and shall cease operation at a predetermined time after the pedestrian actuation. The flash cycle duration should be based on the MUTCD procedures for timing of pedestrian clearance times for pedestrian signals: refer to the MUTCD, Section 4I.06 and any State-specified regulations.
2. The flash rate, sequence, and pattern shall match the specifications described in the

MUTCD, Section 4L.03 for the flash rate of beacons.

3. The flash rate of each individual yellow indication, as applied over the full flashing sequence, shall not be between 5 and 30 flashes per second, to avoid frequencies that may cause seizures.
4. The light intensity of the vehicle indications shall be certified to meet the minimum specifications for Class 1 yellow peak luminous intensity in the SAE standard J595 (Directional Flashing Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles) dated January 2005. Manufacturer Certification of Compliance shall be provided upon request.
5. The light intensity shall be able to adjust to ambient lighting conditions and automatically dim the brilliance during nighttime operations to minimize excessive glare during nighttime conditions.
6. When activated, all indications associated with a given crosswalk (including those with an advance crossing sign, if used) shall simultaneously commence operation of their rapid flashing cycle within 120 ms. The predetermined flash period shall be initiated each and every time a pedestrian call is made, including calls made while the RRFBs are already flashing or have recently completed a call.
7. The duration of the flash cycle shall be programmable in 1 second increments.

D. Submittals.

Submit PDF shop drawing file for RRFB assembly, pedestrian push button detectors, pedestrian push button pedestals, and other structures to be furnished on the project. Submit a single PDF of catalog cut files and list manufacturer's specifications for all items in the project documents.

236050.02 MATERIALS.

A. Light Bar

1. Each light bar shall contain two rectangular-shaped yellow vehicular-facing indications that meet the specifications provided in the MUTCD, Section 4L.02.
2. An LED indication shall be side mounted on both sides in the light bar housing, as shown in the plans, to be directed at and visible to pedestrians both waiting to cross and within the crosswalk. The pedestrian indications shall flash concurrently with the vehicle indications to give confirmation that the RRFB is in operation.
3. The light bar housing shall be colored black and constructed of durable, corrosion-resistant powder-coated aluminum with stainless steel fasteners.
4. All mounting hardware required for mounting the light bar housing shall be provided.
5. All exposed hardware shall be anti-vandal.
6. Light bars mounted back-to-back on the same posts shall be able to be independently aimed for optimal viewing from an oncoming vehicle.
7. All individual components of the light bar system shall be replaceable to allow for easy field repair and maintenance without removal of the housing from the pole.

B. Controller Circuit

1. The controller circuit shall be mounted in a housing that meets or exceeds NEMA 3R ratings

for protection against corrosion, windblown dust and rain, splashing water, hose-directed water, and damage from ice formation.

2. All control circuit connectors shall meet or exceed IP67 ratings, dust proof, and protected from temporary immersion in water up to 3 feet deep for 30 minutes.
3. The LED light output and flash pattern shall be completely programmable, with the capability to actuate and shall be reconfigurable if future MUTCD or State guidelines specify a different flash pattern.
4. The controller circuit shall be capable of storing input activation count data in preset intervals, with downloadable capabilities using at least one of the following:
 - i. Web-enabled, to allow for remote programming and system diagnostics, including flash time, flash pattern, and report system information such as battery voltage and temperature.
 - ii. On-board interface that provides system programming and diagnostics.
 - iii. Approved equal system.
5. All individual components of the controller circuit system shall be replaceable to allow for easy field repair and maintenance.

C. Wireless Radio

1. Wireless radio control shall operate on 900 MHz frequency hopping spread spectrum network, 2.4 GHz mesh network radio, 27.255 MHz FSK Modulated, or approved equal.
2. Wireless radio shall integrate with communication of the controller circuit to activate the light indications from pedestrian activation device. The Wireless radio shall operate with sufficient range capacity to communicate with all RRFB units associated with the crossing it is installed with.
3. The wireless radio shall synchronize all the RRFB system light indications to turn on within a maximum of 150 ms of each other and remain synchronized for the duration of the flashing cycle.
4. Wireless radio systems shall operate from 3.6 V DC to 15 V DC.
5. The wireless radio unit shall have an LCD display to program flash time and system information, including but not limited to battery voltage, battery temperature, solar charge, and onboard diagnostics.
6. All components of the wireless radio system shall be replaceable to allow for easy field repair and maintenance.

D. Battery

1. The battery shall be a replaceable 12 V DC sealed lead-acid, Absorbed Glass Mat (AGM), maintenance-free battery, or approved equal.
2. The battery shall conform to Battery Council International (BCI) specifications and shall be rated at 45 Ah minimum, or an approved alternative which meets power consumption, activation, and autonomy requirements for the RRFB system. Calculations shall be provided.
3. The battery shall be sealed within a plastic film to resist damage from moisture and corrosion.
4. The battery shall be mounted inside the controller circuit housing or in an approved alternate location.

5. The battery shall be capable of continuous operation within a minimum temperature range of -40° to 140° F.
6. All battery connectors shall conform to Ingress Protection IP67 rating, dust-proof, and protected from temporary immersion in water up to 3 feet deep for 30 minutes.
7. The battery shall be replaceable independent of all other components.
8. Autonomy with a fully charged battery shall be a minimum of 14 days without sunlight, dependent upon ambient temperature and number of activations. The battery shall have a capacity capable of providing up to 30 days of autonomy. Solar calculations shall be provided.

E. Solar Array

1. The solar array shall provide 10 watts minimum and 85 watts maximum peak total output or approved system that will provide enough power for the system for the specified amount of time and activation cycles. Solar calculations shall be provided for the specified wattage at each location prior to installation.
2. The solar array shall be affixed to an aluminum plate and bracket and shall securely mount to the provided posts, per manufacturer's recommendations and supplied anti-vandal hardware.
3. The solar array shall be adjustable to an angle 45 degrees to 60 degrees from vertical to facilitate adjustment for maximum solar collection.
4. The solar array assembly (solar array and mounting plate and bracket), shall be mounted to the posts utilizing hardware capable of 360 degrees of rotation about the posts to facilitate adjustment for maximum solar collection.
5. The solar array shall have a minimum operating temperature range of -40° to 185° F.

F. Accessible Push Button Station

1. The accessible push button station (APBS) shall be vandal resistant.
2. The APBS shall be ADA-compliant.
3. The APBS shall be capable of continuous operation over a temperature range of -29° to 165° F.
4. The APBS shall provide an audible tone when pressed and shall activate the RRFB.
5. Each APBS shall include an instructional sign per plan details, mounted adjacent to or integral with the APBS.
6. APBS shall comply with:
 - i. US Access Board's "Draft Guidelines for Accessible Public Rights of Way" (PROWAG) Section R306.
 - ii. Section 4K of the MUTCD.
 - iii. NEMA TS 2 Section 2.1 Temperature & Humidity requirements.
 - iv. NEMA TS 2 Section 2.1 Transient Voltage Protection requirements.
 - v. NEMA TS 2 Section 2.1 Mechanical Shock and Vibration requirements.
 - vi. IEC 61000-4-4, IEC 61000-4-5 Transient Suppression requirements.
 - vii. FCC Title 47, Part 15, Class A Electronic Noise requirements.
 - viii. NEMA 250 – Type 4X Enclosure requirements.
 - ix. NEMA TS 4 – Electrical Reliability requirements (applicable portions of Section 8).

7. All sounds shall emanate from the APBS.
8. All sounds shall be synchronized with all RRFB assemblies associated with the pedestrian crossing.
9. The APBS shall have the field-selectable "Locator Tone" function. This means that during the period when the RRFB is not activated (dark), the system shall provide a locating tone that emanates from the APBS. The system shall provide at least three different sounds to choose from.
10. The APBS shall not use vibrotactile or percussive indications. All messages and tones shall be compliant with PROWAG.
11. The APBS shall have the field selectable "Informational Message" function. This message shall say "Warning lights are flashing" and shall be spoken twice. This message shall only be active once the pedestrian pushbutton has been depressed.
12. The locator tone and informational message audible features shall have independent settable minimum and maximum volume limits.
13. The system shall have an ambient sensing microphone located in the pedestrian station in a non-visible, environmentally protected housing. Automatic volume adjustment in response to ambient traffic sound level shall be provided up to a maximum volume of 100 dBA.
14. The APBS shall have a tactile arrow with high visual contrast, located on the actual push button, and shall be able to be oriented to one of four directions:
 - i. Left
 - ii. Right
 - iii. Up
 - iv. Down

G. Posts

1. Appropriate hardware shall be provided to mount all RRFB components to the posts, which allow the devices to be aimed appropriately based on vehicle orientation and manufacturer's specifications.
2. The length of the posts will be dependent on the mounting location of control and battery cabinet. Locating the control box and battery cabinet above the W11-2 signs will require a longer post. Control cabinets which combine the controller circuit, wireless radio, battery, and solar array in one post-top mounted unit is an acceptable alternative.
3. Post is incidental to the RRFB.

H. Signs

1. All signs shall conform to MUTCD standards and Iowa DOT Standards.
2. All signs shall use provided anti-vandal fasteners and tools to mount components to sign, and sign to fixture.
3. All signs shall be supplied and mounted as shown in the permanent signing plan sheets. Arrow plaque signs shall point down and toward the painted crosswalk.
4. Signs are incidental to the RRFB.

236050.03 CONSTRUCTION.

A. General.

Assemble and mount the RRFB System per the plans and details and the manufacturer's recommendations.

B. Inspection.

Inspect all the electrical equipment and notify the Engineer in writing before the equipment is installed if the equipment appears to be deficient in fit, form or function.

C. Coordination.

It shall be the sole responsibility of the Contractor to coordinate among suppliers and contractors providing equipment for the project.

236050.04 METHOD OF MEASUREMENT AND PAYMENT

Each Rectangular Rapid Flashing Beacon completed in accordance with the contract and accepted, as a single complete unit of work for each location, will be counted.

236050.04 BASIS OF PAYMENT.

A. This item will be paid at the established contract unit price for Rectangular Rapid Flashing Beacon.

B. All labor, materials, and equipment necessary for installation of a fully functional RRFB system specified herein is included in this item. This work includes, but is not limited to the following:

- Programming software kit,
- Wireless communication hardware system,
- RRFB LED light bars,
- Pole mounted APS stations with button unit and MUTCD signs (R10-25),
- Tubular steel post,
- 30 inch pedestrian crossing signs (MUTCD W11-2),
- 21 inch by 15 inch down arrow right/left signs (MUTCD W16-7P)
- Sign mounting brackets, and
- Internal wiring, conduit, and other miscellaneous equipment.