

1063 - RECTANGULAR RAPID FLASHING BEACON (RRFB) INSTALLATION

1063.1 DESCRIPTION

a. Work

This work shall consist of furnishing all labor, materials and equipment to complete in place the Rectangular Rapid Flashing Beacon (RRFB) work, of the type specified, as shown on the plans (including standard details), as specified in the following specifications as directed by the Engineer, and in those sections of the standard specifications of the City of Overland Park, Kansas and the Kansas Department of Transportation, that are either directly or by reference included herewith.

Whenever these specifications conflict with the plans, the General Specifications or the Kansas Department of Transportation Standard Specifications for State Road and Bridge Construction, current edition (hereinafter referred to as "Standard Specification"), these RRFB specifications shall govern.

b. Replacing Damaged Improvements

Improvements such as sidewalks, curbs, driveways, roadway pavements and any other improvements removed, broken or damaged by the Contractor shall be replaced or reconstructed with the same kind of materials found on the work or with materials of equal quality. The new work shall be left in a serviceable condition satisfactory to the Engineer. Whenever a part of a square or slab of existing concrete sidewalk, driveway or pavement is broken or damaged, the entire square or slab shall be removed and the concrete reconstructed.

1063.2 MATERIALS

All materials used in the fabrication or assembly of the items listed below shall comply with the applicable parts of Section 1703, "Electric Lighting and Traffic Signal Equipment" of the "standard Specifications" with the additions as stated herein. Unless specifically noted otherwise, all RRFB equipment shall be new and similar to the best grade of this type of equipment, and shall be approved by the Traffic Engineer.

a. Approved Materials List

All material for RRFB's used by the Contractor shall be from the City's Approved Materials List. It is important that users be completely knowledgeable of all application requirements and procedures prior to product application. It is the responsibility of the installer to contact the supplier of all materials if questions regarding applications procedures or conditions arise.

b. RRFB for Audible Pedestrian Pushbuttons

RRFB for audible pedestrian pushbuttons shall consist of the following to be installed on an aluminum pedestal pole mount.

(1) RRFB Equipment shall be as follows:

(a) On-Board User Interface

Adjustable, auto-scrolling LED display

Field-configurable flash duration to one second increment

Ambient auto-adjust configuration

Night dimming configuration

Wireless update of configurable settings from any unit to all systems

Channel selection

System test, status and fault detection

Activation data reporting

(b) Light Bar

MUTCD IA-11 compliant flash pattern

3" x 7" amber LED indications

Side emitting pedestrian confirmation lights

Exceeds SAE J595 class 1 Intensity

Meets SAE J578 chromaticity

High-power LEDs meets 90% lumen maintenance (L90) based on IES LM-80

- Premium, UV-resistant polycarbonate lens
- Waterproof LED Indications (NEMA 3R)
- Two-piece mounting bracket to facilitate mounting back-to-back light bars (bi-directional)
- Horizontal rotation adjustment for in-the-field aiming of light bar
- Dimensions: 24" L x 1.5" W x 4.5" H (61.0 cm L x 3.8 cm W x 11.4 cm H)
- (c) Energy
 - 45 watt high-efficiency photovoltaic cell with blocking diodes
 - Maximum power point tracking with temperature compensation (MPPT-TC) for optimal energy collection in all solar conditions
- (d) Energy Storage
 - Replaceable, recyclable best in-class 12V dual battery system (sealed, maintenance-free)
 - Designed for minimum 5 year battery life
- (e) Enclosure Construction
 - Aluminum housing with lockable tamper-proof hinged door
 - Integrated mounting for optional voice message push button controller
 - Side of pole mounting to 4" diameter or larger pole
- (f) Operating Performance
 - Rated for 660, 20 second activations per day, year-round operation with a minimum of 0.94 sun hours
 - Wireless activation within 150 mS
 - Wireless range of 500 ft (152 m)
- (g) Pedestrian Activation
 - ADA compliant, Piezo-driven push button with two-tone audible and visual LED confirmation
 - Audible pushbutton with voice message & visual LED confirmation
- (h) Pole Panel Mounting Bracket
 - Top of pole mounting configuration for 4"-4 1/2" diameter round post
- (i) Warranty
 - 3-year limited warranty
- (2) Aluminum Pedestal Base and Shaft
 - Aluminum pedestal bases shall consist of aluminum, die cast or sand cast base and a shaft for mounting vertical signal or standard controller cabinet capable of withstanding wind loadings of 100 mph.
 - The cast aluminum bases should meet the requirements of Section 1626.2(b) ASTM B26, S.G.70A-T6, S5A.F. or ASTM B108, S.G.70A-T6 of the "Standard Specifications." The base and post shall be joined by a threaded connection. Welded connections will not be accepted. The threaded post shall be easily and fully screwed into the threaded pedestal base without lubricant and be secured to the base by means of a threaded set screw. A pedestal base collar is required.
 - The shaft shall be spun from one piece of seamless tubing, meeting the requirements of Section 1626.2(b) ASTM B210, having a minimum nominal 0.125" wall thickness and shall be 14 feet in length. The shaft shall have no longitudinal welds, nor circumferential welds. The shaft shall have a uniform polished finish. Each shaft shall be tire-wrapped with a heavy water-resistant paper for protection during shipment and installation.
- (3) Audible Pedestrian Push Button
 - An ADA compliant audible pedestrian push button shall be mounted on the pole to activate the flashing beacons.
 - (a) Push Button Station
 - The push button station shall be designed for use at a pedestrian crosswalk with overhead flashing yellow lights. The push button station shall contain an ADA compliant push button with a directional arrow, visual LED confirmation lights, a weather resistant speaker and audio amplifier.

(b) Control Unit

The control unit shall provide a system for playing a voice message through the push button station and have the capability of being remotely located from the push button station. The control unit shall include the following options:

- Selectable number of message repetitions
- Capable of setting the minimum and maximum limits for the sound volume
- Automatic volume adjustment to compensate for change in ambient noise levels
- Inputs for external light signal to trigger the voice message

(4) Concrete Foundation

The RRFB pole shall be mounted on a concrete foundation as indicated in the standard details.

c. RRFB for Standard Pedestrian Pushbuttons

RRFB for standard pedestrian pushbuttons shall consist of the following to be installed on a standard 1 3/4" x 1 3/4" steel sign post.

(1) RRFB equipment shall be as follows:

(a) On-Board User Interface

Same as above for use with audible pedestrian push buttons.

(b) Light Bar

Same as above for use with audible pedestrian push buttons.

(c) Energy

10 watt high-efficiency photovoltaic cell with blocking diodes

Maximum power point tracking with temperature compensation (MPPT-TC) for optimal energy collection in all solar conditions

(d) Energy Storage

Replaceable, recyclable best in-class 12V dual battery system (sealed, maintenance-free)

Designed for minimum 5 year battery life

Lightweight for ease of handling

Quick connect terminals and strapping for efficient installation

(e) Operating Performance

Rated for 300, 20 second activations per day, year-round operation with a minimum of 0.94 sun hours

Operating Autonomy of 13 days at rated operation

Wireless activation within 120 mS

Wireless range of 500 ft (152 m)

(f) Pedestrian Activation

Standard ADA compliant, Piezo-driven push button with two-tone audible confirmation

(g) Post Mounting Bracket

Top of pole mounting configuration for 1 3/4" x 1 3/4" square, steel sign post

(h) Warranty

3-year limited warranty

(2) Steel Sign Posts

This specification covers steel sign posts, post anchors, and breakaway anchor sleeves in accordance with the standard details.

(a) Material

Steel posts shall conform to the standard specification for hot rolled carbon sheet steel, structural quality, ASTM designation A570, Grade 50. Yield strength after cold-forming is 60,000 psi minimum.

(b) Shape

The cross section of the sign post shall be square tube formed of 12 gauge (0.105 U.S.S. gauge) steel. The cross section of the post anchor and anchor sleeve shall be square tube formed of 12 gauge (0.105 U.S.S. gauge) steel. All posts, post anchors and anchor sleeves shall be carefully rolled to size and

shall be welded directly in the corner by high frequency resistance welding and externally scarfed to agree with corner radii. All ends shall be cut square.

(c) Finish

Sign posts, post anchors and anchor sleeves shall be manufactured from hot-dipped galvanized steel conforming to ASTM A653, G90, Structural Quality, Grade 50, Class 1. The corner weld is zinc coated after scarfing operation. The steel is also coated with a chromate conversion coating and a clear organic polymer topcoat. Both the interior and the exterior of the post shall be galvanized.

(d) Cross Section

Perforated sign posts, post anchors and anchor sleeves shall be of the following sizes:

Description	Size	U.S.S. Gauge	Weight (lbs./foot)
Sign Post	1 3/4" x 1 3/4"	12	2.06
Post Anchor	2" x 2"	12	2.42
Anchor Sleeve	2 1/4" x 2 1/4"	12	2.77

(e) Telescoping Properties

The finished posts, post anchor and anchor sleeve shall be straight and have a smooth, uniform finish. It shall be possible to telescope all consecutive sizes of square tubes freely and for not less than ten feet of their length without the necessity of matching any particular face to any other face.

(f) Tolerances

Tolerance Description	1 3/4" x 1 3/4"	2" x 2"	2 1/4" x 2 1/4"
Outside Tolerances at Sides at Corners ¹	± 0.008"	± 0.008"	± 0.010"
Wall Thickness Tolerances	+ 0.0011", -0.005	+ 0.011", -0.005	+ 0.011", -0.005
Convexity and Concavity Tolerances ²	± 0.010"	± 0.010"	± 0.010"
Squareness of Sides Tolerances ³	± 0.010"	± 0.012"	± 0.014"
Permissible Twist in 3' Length	0.062"	0.062"	0.062"
Straightness Tolerances in 3' Length	1/16"	1/16"	1/16"
Corner Radii	5/32" ± 1/64"	5/32" ± 1/64"	5/32" ± 1/64"

Notes:

¹Measurements from outside dimensions shall be made at least 2 inches from the end of tube.

²Measured in the center of the flat sides determined at the corner.

³A sample shall be considered to fail if its sides are not 90 degrees to each other within the squareness tolerance listed above

(g) Holes

Holes shall be 7/16" ± 1/64" in diameter on one inch centers on all four sides down the entire length of the post, post anchor and anchor sleeve. Holes shall be on centerline of each side in true alignment and opposite each other directly and diagonally. All holes shall be drilled or punched and all welds, cuts, burrs, and sharp edges are to be smoothed off before application of finish.

(h) Post Length

Posts shall be ordered in 2' increments and cut to length. One single sign post long enough to support all signs shall be installed. Two separate lengths of post joined with a sleeve to achieve the necessary post length shall not be allowed.

(i) Breakaway Performance

The breakaway base design shall meet the requirements of the National Cooperative Highway Research Program Report (NCHRP) No. 350 or Manual for Assessing Safety Hardware (MASH).

(3) Standard Pedestrian Push Button

An ADA compliant audible pedestrian push button shall be mounted on the pole to activate the flashing beacons.

(a) Push Button

The ADA compliant, highly vandal resistant button shall have essentially no moving parts and be pressure activated to withstand an impact from a baseball bat or hammer. The body shall be fabricated of aluminum and coated with a powder coat paint process in either yellow or black according to the plans. The button shall be made of 316 stainless steel material. Visual LED confirmation lights, a weather resistant speaker and audio amplifier.

(b) Solid State Switch

Operating Force:	3.0 lbs maximum
Operating Temperature:	-30 degrees to +165 degrees F
Operating Voltage:	12-36 VDC, 9-25 VAC RMS
Mean Time Before Failure:	8,800,000 hours (typical)
Switch Operating Life:	Greater than 300 million operations
“Off” Current:	15µA Typical
“On” Resistance:	40Ω
Maximum “On” Current:	30 mA (over-current protected)
Maximum “On” Time:	11 seconds
Debounce Time:	85 ms

(c) Beeper

Volume:	68 dB @ 1 meter
Beep on Press:	2.6 kHz
Beep on Release:	2.3 kHz
Beep Length:	50 ms

1063.3 CONSTRUCTION REQUIREMENTS

The Contractor shall install all of the equipment and wiring necessary for function as indicated on the plan and in accordance with this specification. The RRFB system shall be complete, and the Contractor shall furnish and install all equipment necessary for the satisfactory operation of electrical apparatus and for the complete operation of the system whether specifically mentioned or not.

The contractor shall only use qualified laborers who are well trained to perform functions related to RRFB’s, including familiarity with applicable sections of the National Electric Code.

1063.4 MEASUREMENT AND PAYMENT

The Engineer will measure the Rectangular Rapid Flashing Beacon installation according to the type of pedestrian pushbutton and directionality of the light bar as directed on the plans, per each complete-in-place and accepted for all work necessary as follows:

Measurement and payment for any warning signs and plaques shown to be installed on the post, except as indicated, shall be included in the bid for “Permanent Traffic Control Signing” as shown in the plans and not be subsidiary to the Rectangular Rapid Flashing Beacon Installation.

Payment for “RRFB (Standard Pushbuttons) (Bi-Directional)” or “RRFB (Standard Pushbuttons) (Uni-directional)” including the control unit with built-in solar panel with wiring harness, the appropriate number of LED light bars, miscellaneous mounting brackets and hardware, and appropriate number of standard pedestrian pushbutton units with the R10-25 sign, complete and in place, at the contract unit price bid shall be considered full compensation for the specified work.

Payment for “RRFB (Audible Pushbuttons) (Bi-Directional)” or “RRFB (Audible Pushbuttons) (Uni-Directional)” including the control unit, controller cabinet with batteries, wiring harness, solar panel, solar light engine, the appropriate number of LED light bars, miscellaneous mounting brackets and hardware, and the appropriate number of audible pedestrian pushbutton units with the R10-25 sign, push button extension brackets, concrete foundation, pedestal pole and base, complete and in place at the contract unit price bid shall be considered full compensation for the specified work.