

APPENDIX K

Pedestrian Crossover Infrastructure Requirements

1.0 General

1.1 Scope

- a) This general specification identifies additional construction requirements specific to PXO facilities, including but not limited to, traffic infrastructure, street lighting, traffic signs, and pavement markings.

2.0 Reference Standards

- a) These are the primary references for the design and construction of a pedestrian crossover per Schedule 15-2, Part 2, Clause 6.1(a). DB Co shall reference, but not be limited to, the following reference material for the design and construction of a pedestrian crossover:
 - RRFB Specification (Appendix K1 - below)
 - City of Ottawa Pedestrian Crossover (PXO) Program (Appendix K2 – separate document)
 - City of Ottawa Right-of-Way Lighting Policy
 - Ministry of Transportation of Ontario (MTO) Ontario Traffic Manual (OTM) Book 15
 - Ontario Regulation 402/15

3.0 Approval of Source

- a) DB Co shall coordinate and request approval from the City of Ottawa for their pedestrian crossover designs according to the requirements of Schedule 15-2, Part 2, Table 6-1 before proceeding to order, supply and install the pedestrian crossovers. For the permanent installation of pedestrian crossovers, DB Co shall only supply and install materials provided by manufacturers approved by the City of Ottawa or its agent. Only materials evaluated and approved will be accepted. Once the materials are approved, DB Co and the manufacturer shall not change the material type or component parts without prior approval, by the City of Ottawa or its agent, for subsequent orders.

4.0 Characteristics (Physical, Electrical, Environmental, Operational)

4.1 Physical Characteristics

4.1.1 Traffic Poles and Foundations

- a) DB Co shall supply and install the traffic infrastructure referenced from Table 1 below, based on the PXO Type and presence of street lighting, per the City of Ottawa Standard Detail Drawings.

Table 1: Pole Type and Foundation Detail for each PXO Type

PXO Type		City of Ottawa Standard Detail Drawing		
		Pole Type		Foundation Details
Type B	w/ street lighting	Joint Use (32')	J-6-16	As per T23
	w/o street	Mast Pole	J-6-51	As per T22

	lighting			
Type C	w/ street lighting	Joint Use (32')	J-6-16 (w/o arm)	As per T23
	w/o street lighting	Tubular Pole	J-6-49 (w/o arm)	As per T21 (or LID 002D)

- a) DB Co shall refer to the attached design references for the placement and spacing of signs, push buttons, RRFB, etc. on the appropriate poles.

4.1.2 RRFB

- a) DB Co shall reference the City of Ottawa RRFB specification included with this Appendix. The City has pre-approved the following RRFB models:
- JSF RRFB Model AB 9207 (Single-sided)
 - JSF RRFB Model AB 9407 (Double-sided)
 - Carmanah SC 315 (Single-sided or double-sided)

4.2 Electrical Characteristics

- a) DB Co is to coordinate and provide sufficient notice to the City of Ottawa prior to making any electrical connections per Schedule 15-2, Part 2, Table 6-1. An authorized City of Ottawa electrical maintenance provider shall complete all final electrical connections.
- b) For the installation of the RRFBs, DB Co shall comply with the requirements of the RRFB specifications.

4.3 Environmental Characteristics

- a) For the installation of the RRFBs, DB Co shall comply with the requirements of the RRFB specifications.

4.4 Operational Characteristics

4.4.1 Illumination

- a) DB Co shall coordinate with the City of Ottawa Street Lighting Group to confirm if the proposed location of the PXO meets the required City of Ottawa lighting level criteria as per City of Ottawa ROW Lighting Policy. If the location does not meet the required lighting level criteria, DB Co shall design, obtain approvals, supply materials and labour, equipment, construct, provide inspection and testing associated with the City’s requirements for street lighting standards and best practices, or upgrade the existing fixtures to meet the appropriate lighting levels.
- b) For the installation of new street lights, DB Co shall supply and install all luminaires and the associated traffic fixtures, or an equivalent approved material. The type/model of street light varies for each specific site. As such, DB Co shall confirm

with City of Ottawa Street Lighting Group for the appropriate type/model of each material required for new street lights.

- c) An authorized City of Ottawa Street Light maintenance provider shall complete all final electrical connections.

4.4.2 Traffic Signs

- a) DB Co shall design, supply and install all temporary and permanent traffic signs for a pedestrian crossover per the requirements of OTM Book 5 and Book 15.

4.4.3 Pavement Markings

- a) DB Co shall design, supply and install all temporary and permanent pavement markings for a pedestrian crossover per the requirements of OTM Book 11 and Book 15.
- b) The dimensions of the “shark tooth” pavement markings in the general traffic lanes shall be:
 - Height = 90 cm
 - Width = 60 cm
 - Spacing = 30 cm

Appendix K1 - RRFB Specification

1.0 General Requirements

- a) RRFB's are pedestrian-activated, high-intensity flashing beacons that warn drivers of the presence of a pedestrian in the crosswalk. RRFB's consist of two rectangular yellow indications with two tell-tale end indicators to let pedestrians know that the beacon is flashing. RRFB's must be activated manually by pushbuttons and are to flash in a rapid pattern for a pre-set time.
- b) The Ontario Traffic Manual (OTM) Book 15, outlines the components and installation layouts of RRFB's at pedestrian crossovers. All RRFB's supplied must be compliant with Book 15 applications and requirements and also be compliant with all certifications, as may be required by law.
- c) The RRFB must be widely distributed and have been on the market for more than two (2) years.

2.0 General Design

- a) The unit shall be available in two configurations, double-sided and single-sided. A RRFB unit shall consist of the RRFBs, associated enclosure, and a power supply consisting of a solar panel with rechargeable battery(s) and a push button for activation. The unit may have a separate controller and/or battery cabinet if so required.
- b) The RRFB's must be capable of being mounted on these poles above the Pedestrian Crossing sign and at a height between 3.0m and 4.0m from the base of the pole.

3.0 RRFB Specifications

- a) The enclosure in which the RRFBs are mounted must be yellow. The yellow colour must be similar to that used on warning signs in the Province of Ontario. Refer to the OTM Book 1B. Where a separate controller/battery cabinet is provided, the cabinet shall be grey.
- b) All RRFB enclosures (and controller/battery cabinet if applicable) shall be powder coated aluminum and shall be weather tight, secure and vandal resistant. All enclosures/cabinets shall have a minimum 5 year corrosion damage warranty.
- c) Each single-sided RRFB unit shall provide two (2) LED rectangular-shaped amber indications facing outward toward on-coming traffic. A double-sided unit shall provide an additional two (2) LED indications facing the opposite direction.
- d) Each LED indication shall be a minimum of 125mm wide by 50mm high. The two (2) RRFB indications shall be aligned horizontally, with the longer dimension horizontal and with a minimum space between the two indications of 175 mm, measured from inside edge of one indication to the inside edge of the other indication.

- e) The RRFBs shall provide a minimum of 20 degrees horizontal pivot. When set, the RRFB angle shall remain securely in place.
- f) Each RRFB unit shall provide two (2) yellow LED tell-tale end indicators, one facing inward toward the crossover the other facing outward. Each tell-tale indicator shall be a minimum of 5 sq. cm.

4.0 Power Specifications

- a) Each unit shall be powered by a rechargeable battery(s). The battery(s) shall be recharged by solar panels.
- b) Each unit must be capable of being connected directly to 120 volt AC power or to be capable of being modified to provide a direct AC connection. In the case where the supplied unit does not provide a direct AC connection, an “AC modification package” must be available from the manufacturer that would enable the unit to accept a direct AC connection. The “AC modification package” must be easily field installable. The cost of the “AC modification package” must be available at a cost of [REDACTED].
- c) The power supply must be capable of operating the RRFB unit (from full charge) for a minimum of 20 days without re-charging at an average usage rate of 200 cycles per day at 25 seconds of activation/per cycle.
- d) The solar panel and battery(s) must be of sufficient size and capacity to provide the necessary power as recommended by the manufacturer to achieve the rated usage, where installed in Ottawa, Ontario, Canada.
- e) The battery(s) shall be UL certified and field replaceable.
- f) The solar panel must be capable of being securely installed on the top and on the side of the J-6-49, J-6-51 or J-6-16 (side only) pole that the RRFB is mounted.
- g) All brackets and hardware required to mount the solar panels must be supplied with the unit. All brackets and mounting hardware are to be corrosion resistant. Brackets and mounting hardware must be supplied to enable 12 side-of-pole installations and 20 top-of-pole installations.
- h) All wiring connections for the RRFB unit components must be capable of being easily installed within the poles specified (J-6-49, J-6-51, J-6-16). All wiring and connections shall be weather tight, secure and vandal resistant.
- i) The unit is to be supplied with an accessible push button for pedestrians to activate the RRFB’s. The push button is to be yellow and must be capable of being mounted on the same pole that the RRFB is mounted. Brackets and mounting hardware to attach the push button to the poles specified must be supplied.

- j) The pushbutton shall have a two-tone audible confirmation.
- k) The power supply, including battery and solar panel and all other components must be capable of operating at temperatures between -40°C and +40°C. Any upgrades to the power supply or other components recommended by the manufacturer required to ensure the unit operates at its rated usage, within this temperature range are to be included.

5.0 Operational Requirements

- a) The operation of the RRFB shall be as outlined in OTM Book 15.
- b) When activated by push button, the two (2) yellow indications in each RRFB unit (two in each direction for double sided units) shall flash in a rapidly alternating “wig-wag” flashing sequence (left light on, then right light on) with a duty cycle of 800 milliseconds (ms). The left LED flashes two times in a slow volley each time it is energized (125 ms on and 75 ms off per flash). This is followed by the right LED, which flashes four times in a rapid volley when energized (25 ms on and 25 ms off per flash) and then has a longer flash for 200 ms. The effect is known as a “stutter flash effect” and is compliant with the Manual on Uniform Traffic Control Devices (MUTCD) RRFB flash pattern 2/4-1 (2012).
- c) The RRFBs must also be capable of flashing in compliance with MUTCD RRFB flash pattern WW+S (2014) (Wig-Wag plus Simultaneous).
- d) The unit’s flash pattern shall be capable of being easily set in the field through manual means (switch, dial, etc.).
- e) When the RRFB is flashing, the two tell-tale end indicators on the unit shall be on. Otherwise, they are to be off.
- f) The time lapse between the push button activation and start of the RRFB flashing should be less than 1 second and in no case more than 3 seconds.
- g) If a pedestrian pushes the button midway through a flashing cycle, the unit is to reset the RRFB flash duration for another full cycle.
- h) The flash rate of each individual yellow indication, as applied over the full on-off sequence of a flashing period of the indication, shall not be between 5 and 30 flashes per second.
- i) The flash duration cycle of the RRFB must be variable. The flash duration cycle must be capable of being set (in 5 seconds increments) for a minimum of 5 seconds up to 60 seconds.
- j) Generally more than one (1) RRFB unit is installed at a PXO. The operation of these units must be synchronized to enable the activation of one RRFB unit to automatically activate up to four (4) additional RRFBs.

- k) The communication “channel” for the RRFB to synchronize with other RRFB units shall be capable of being easily set in the field through manual means (switch, dial, etc.).
- l) Communication enabling the synchronization of the RRFB units shall be wireless and must operate within a minimum line-of-sight distance of 350m.
- m) Communication between RRFB units to enable synchronized activation must be secure and designed to avoid interference between multiple locations or other electrical devices.
- n) The RRFB units must provide a night time auto brightness feature. This feature must be capable of being turned off.
- o) The RRFB unit shall provide a visual indicator of substandard operating condition.

6.0 Operational Requirements

- a) A five (5) year warranty is to be provided for workmanship and materials.
- b) The RRFB enclosure and controller cabinet (if applicable) shall have a five (5) year corrosion damage warranty.
- c) One (1) written copy of the installation and operating manual must be supplied for each unit supplied. The manual is to contain the information necessary to install, operate, and maintain the RRFB unit and all associated components.
- d) Keys and/or special tools that may be required to access and maintain the unit shall be supplied.
- e) Parts covered by warranty must be available within twenty (20) calendar days. The supplier shall be responsible for all delivery costs, including those for the return of defective components as may be required.

APPENDIX K2

City of Ottawa Pedestrian Crossover (PXO) Program