Pedestrian Safety Solutions:
Selecting Locations for Rectangular Rapid Flashing Beacons (RRFB's)

Presented to: Capital District Transportation Committee
New Visions Virtual Learning Series

Presenters: Chris Cornwell, PE, LEED-AP
Ryan Walsh, EIT

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Engineering | Design | Planning | Construction Management

Overview of RRFB's

- RRFB's serve to enhance marked crosswalks which conform with current MUTCD signage and pavement markings
- RRFB's add flashing beacons which consist of two rectangular shaped LED lights (5"x2")
- RRFB Flashing Pattern consists of a 50 millisecond pulse
- RRFB' s are normally dark, only initiated upon user activation

Design Considerations

- **RRFB's have seen a recent surge in installations**
- **GPI has specified over 60 installations in the last 5 years**
  - NYSDOT Regions 1, 2, 3, and 8
- **Design Considerations**
  - Client
  - Public
  - Engineering Judgment

TABLE X-X: EST Crossing Treatment Selection

Street Posted Speed Range	15-25 mph		25-30 mph			30-45 mph							
FACILITY TYPE	2 lane	3 lane	2 lane	2 lane with median refuge	3 lane	2 lane	2 lane with median refuge	3 lane	4 lane	4 lane with median refuge	5 lane	6 lane	6 lane with median refuge
Marked and Signed Crosswalk*	✓	✓	EJ	EJ	X	EJ	EJ	X	X	X	X	X	X
Crosswalk with Yield Lines	EJ	✓	✓	✓	✓	EJ	EJ	EJ	X	X	X	X	X
Raised Crosswalk	✓	✓	EJ	EJ	EJ	EJ	EJ	EJ	X	X	X	X	X
Rectangular Rapid Flashing Beacon Crossing	X	EJ	✓	✓	✓	✓	✓	✓	X	✓	X	X	X
Pedestrian Hybrid Beacon Crossing	X	X	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓	✓	✓
Full Traffic Signal Crossing	X	X	EJ	EJ	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓
Grade Separated Crossing	X	X	EJ	EJ	EJ	X	EJ	EJ	✓	✓	✓	✓	✓

LEGEND

Desirable	✓
Engineering Judgement	EJ
Not Recommended	X

*NOTE: All treatments shall include a marked crosswalk. The "Marked and Signed Crosswalk" line item indicates contexts where ONLY a marked and signed crosswalk is an appropriate treatment.

Design Considerations

- **Approved NYSDOT Item 680.8225XY10**

https://www.dot.ny.gov/spec-repository-us/680.82252110.pdf

  - with ‘X’ Two Forward Beacons or Four Beacons
  - with ‘Y’ AC Power (overhead or underground) or Solar Powered
- **Additional Guidance**
  - TSMI 18-02 https://www.dot.ny.gov/divisions/operating/oom/transportation-systems/repository/TSMI-18-02%20RRFBs_041018.pdf
- **Client specifications**
  - AC or Solar powered
- **Communications**
  - Wireless or Hardwired
- **Approved List**
  - Carmanah, TAPCO, Trafficalm (page 11)
  - https://www.dot.ny.gov/divisions/operating/oom/transportation-systems/repository/APL.pdf

Design Considerations

RRFB (RECTANGULAR RAPID FLASH BEACON)

Carmanah Technologies Corp.

Model #	Description
R920E	Solar (DC Power)
SC315G	Base
87668	Light Bar
XAV2E - LED	AP Button

TAPCO – Traffic & Parking Control Company, Inc.
Parent Item # 600705 (Bi-Directional RRFB)

Item #	Description	
500360	EX12V RRFB	(REQ 2)
2180-BRKT-R	Cabinet Bracket Fits Round Poles 2-3/8 & Up	(REQ 2)
SLR-55-B	55W/12V Solar Panel Package	(REQ 2)
101494	Battery, Universal 12V 50Ah AGM	(REQ 2)
101620	Push Button Bulldog Add-On Option Kit	(REQ 2)
138089	RRFB, Dimmable Light Bar Assembly	(REQ 4)
145332	Grommet Kit	(REQ 2)
IGK0008	Install Guide Kit	(REQ 1)

TAPCO – Traffic & Parking Control Company, Inc.
Parent Item # 600706 (Uni-Directional RRFB)

Item #	Description	
500360	EX12V RRFB	(REQ 2)
2180-BRKT-R	Cabinet Bracket Fits Round Poles 2-3/8 & Up	(REQ 2)
SLR-55-B	55W/12V Solar Panel Package	(REQ 2)
101494	Battery, Universal 12V 50Ah AGM	(REQ 2)
101620	Push Button Bulldog Add-On Option Kit	(REQ 2)
138089	RRFB, Dimmable Light Bar Assembly with Universal	(REQ 2)
145332	Grommet Kit	(REQ 2)
IGK0008	Install Guide Kit	(REQ 1)

TAPCO – Traffic & Parking Control Company, Inc.

Model #	Description
139649	RRFB, Non Dimmable Light Bar

Trafficalm Systems

Model #	Description
SA328	Solar (DC Power)
M75-SA300-CT13	Base Unit – 30W Intelligent Controller
M75-SA300-CLB3	Collaborator – 30W Remote Unit
M75-BDL34-0000	BDL3-Y Bulldog Pedestrian Station

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ITEM 680.8225XY10 - RECTANGULAR RAPID FLASHING BEACON (RRFB) ASSEMBLY

1.0 DESCRIPTION

This work shall consist of furnishing and installing a Rectangular Rapid Flashing Beacon (RRFB) assembly in accordance with the contract documents or as directed by the Engineer. All materials and labor required to provide a complete functioning system are to be included.

1.1 General Requirements

1.1.1 RRFB unit shall consist of two rapidly flashed, rectangular-shaped yellow indications with an LED-array-based light source. It shall be designed, located, and operated in accordance with the detailed requirements of the contract and as specified below.

1.1.2 Each RRFB shall conform to all provisions of the MUTCD.

1.1.3 Each RRFB shall be a complete assembly consisting of supporting structure (pole, breakaway transformer base, sign, cabinet, and solar panel supports), indications, signage, cabinet, solar panel, and electrical components (wiring, solid-state circuit boards, etc.).

1.1.4 Each RRFB shall be supplied with all required hardware to install assembly.

1.1.5 Each RRFB shall be ADA compliant.

1.1.6 Each RRFB shall be rated for 90 mph wind conditions.

1.1.7 All components shall be designed to operate under ambient temperature conditions from -30 to 165 °F.

1.2 Functional Requirements

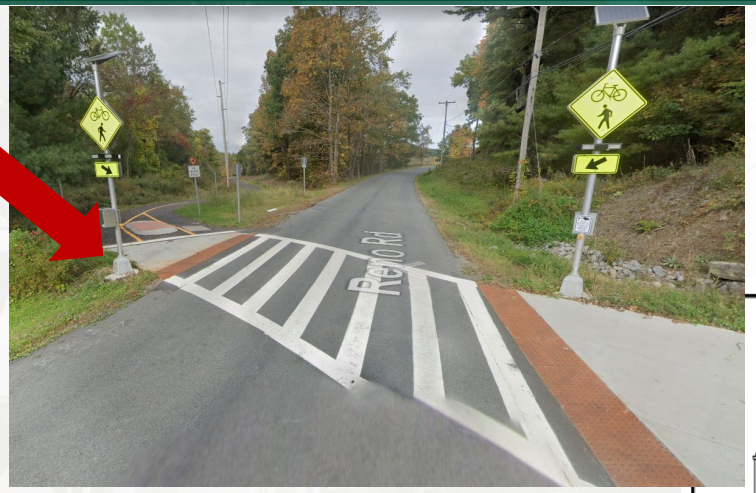
1.2.1 The RRFB shall be normally dark, shall initiate operation only upon pedestrian actuation, and shall cease operation after a predetermined period of operation. The predetermined period of operation shall be based on the procedures provided in Section 4E.06 of the current MUTCD for the timing of pedestrian clearance times for pedestrian signals.

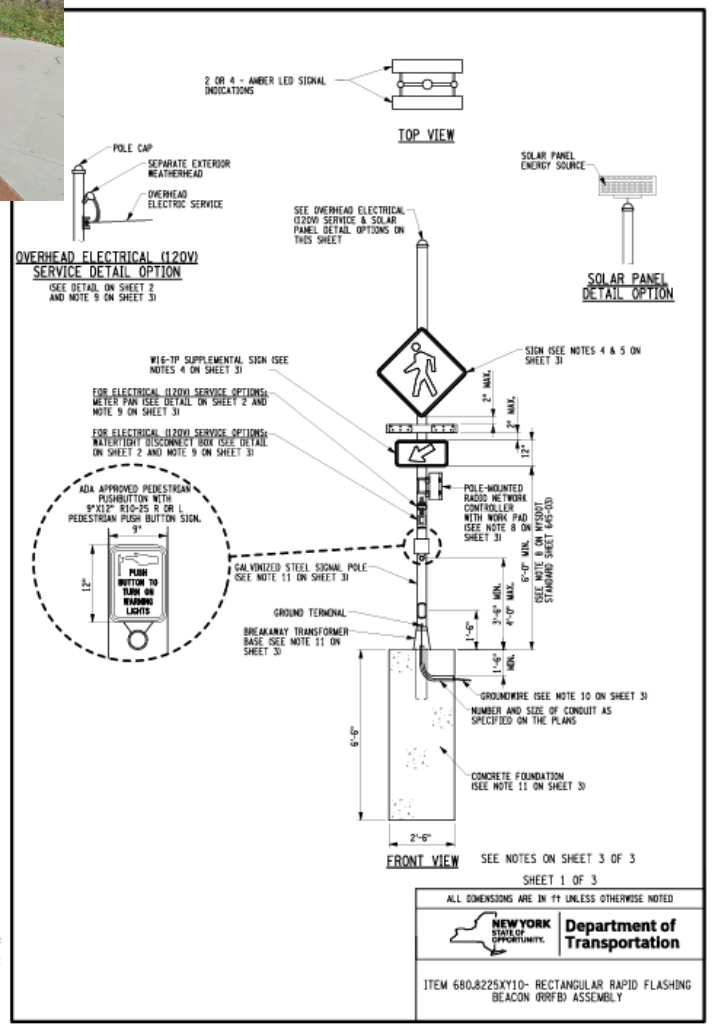
1.2.2 When actuated, all RRFB units associated with a given crosswalk shall simultaneously commence operation of their rapid-flashing indications within 120 milliseconds. All RRFB units associated with a given crosswalk shall simultaneously cease operation of their rapid-flashing indications within 120 milliseconds.

1.2.3 During activation, a small light, directed at and visible to pedestrians in the crosswalk, shall be installed integral to the RRFB to give confirmation that the RRFB is in

Design Details

- **All Details provided in the Specifications by NYSDOT**
  - Solar or AC Powered
- **Which Side to place the RRFB?**
  - Consideration for trails on the '*right*' side
  - Or 'far' side of crosswalk for better compliance with button activation

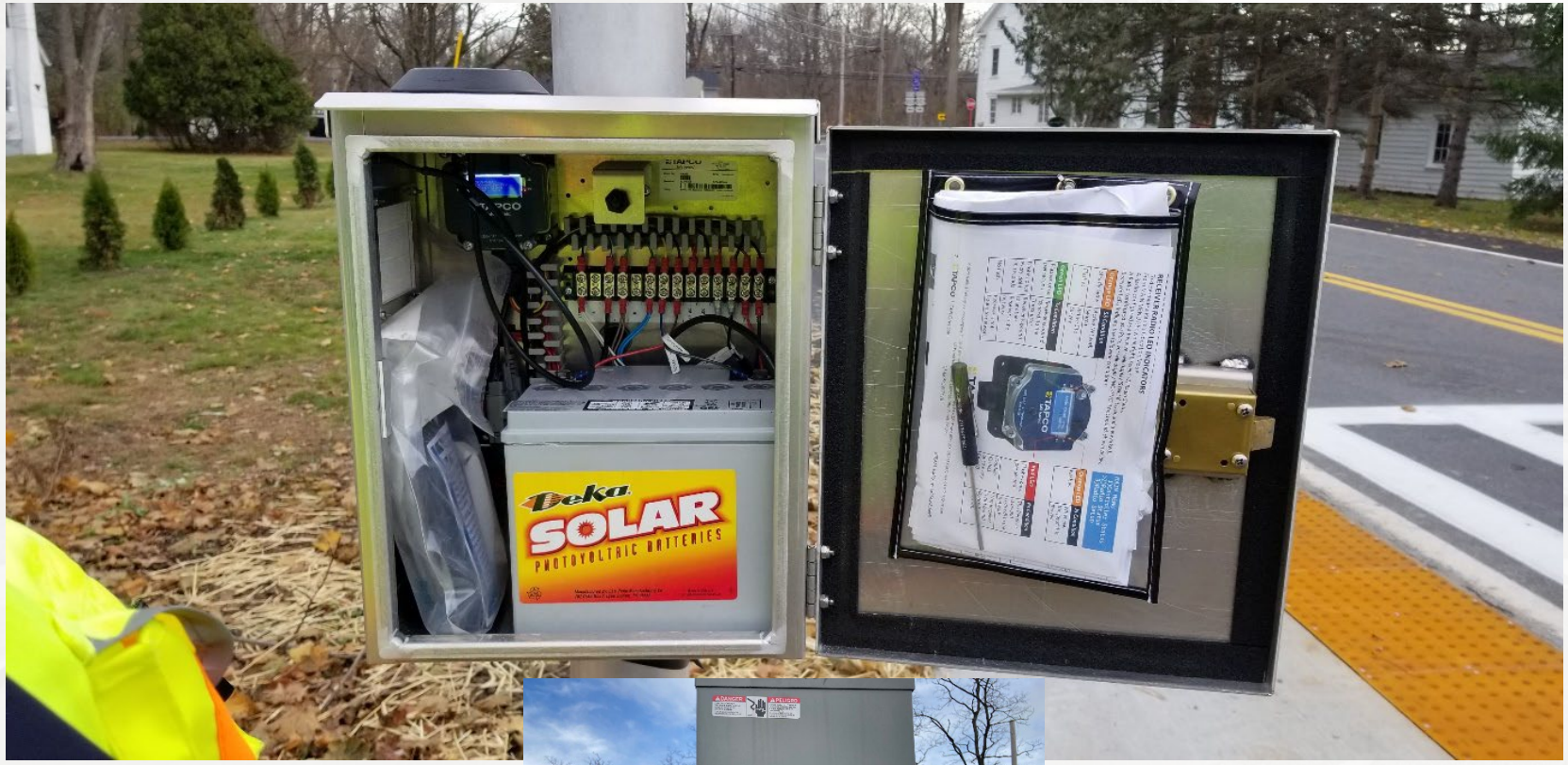




Construction Photos of RRFB's

Snow In July?

Construction Photos of RRFB's



Maintenance Considerations

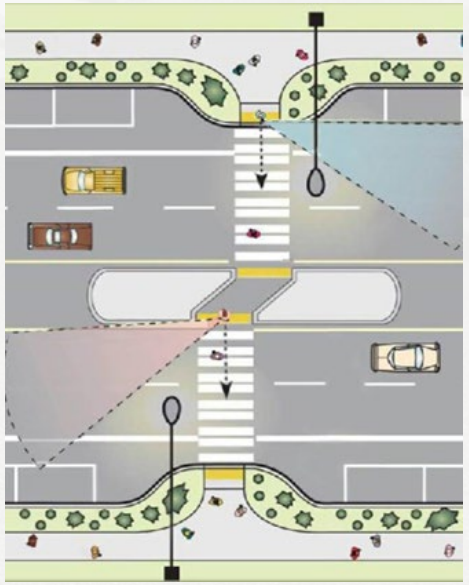
- Vehicle Collisions
- Vandalism
- Wireless Communications
- Battery life
- Solar Panel life
- Electric Service

Cost Considerations (Upstate NY)

- **Recent Average Weighted Bids from Contractors:**
  - Solar Powered
    - *$8,000 Each….$20,000 average crossing*
  - AC Powered (overhead supply)
    - *$7,200 Each….$25,000 average crossing*
  - AC Power (underground supply)
    - *$10,000 Each….$28,000 average crossing*
  - Other Considerations
    - *ADA Ramps, Crosswalk, enhanced countermeasures*

Refuge Islands

- Located at the mid-point of the marked crossing
- Improves safety by allowing a pedestrian/bicycle user to cross traffic one direction at a time, shortening the crossing distance
- Min. depth must be considered to accommodate bikes (8’ min)
- Introduction of the ‘offset’ to encourage users to look toward traffic before crossing



Refuge Islands

- **Considerations**
  - Sight distance
  - Landscaping
  - Accessibility
  - Drainage
  - Offset

Trail Splitter Islands

- **Design intent as an alternative to Bollards which are a hazard**
- **Used to discourage vehicular access and to slow/separate approaching trail users**
- **Originally designed with mountable curbing and yellow striping only**
- **Bikers have had a hard time seeing**
  - Despite the contrasting color and stripes
- **Solution = flexible delineators**

General Installation Photos

General Installation Photo

General Before/After Photos

General Before/After Photos

General Before/After Photos

Enhanced Countermeasures

- **NYSDOT TSMI 16-03**
  - https://www.dot.ny.gov/divisions/operating/oom/transportation-systems/repository/TSMI-16-03.pdf
  - Retroreflective Sign Post Strips
    - *NYSDOT Item 645.81090003 $70/Each*
- **NYSDOT TSMI 17-07**
  - https://www.dot.ny.gov/divisions/operating/oom/transportation-systems/repository/TSMI_17-07_PSAP_Details_102417.pdf
  - Back to back and double Type A posts
    - *NYSDOT Item 645.81 $150/Each*

Passive Activation Study

- **RRFB's are only effective if activated by the user**
- **Many users, especially bikers do not activate**
- **Working with HRVG as part of the EST proposed study with NYSDOT Traffic Safety on Passive Activation**
- **Study on the possible specific passive detection units to be installed**
  - Thermal, Infrared, Cameras, etc
- **Will collect data on the effectiveness of different technologies**
  - efficiency of detecting trail users and avoidance of false activations
- **Existing RRFB buttons would remain in place, providing back-up to the remote detection technology with signage**

Enhanced Crossing Treatments

- **Raised Crosswalk or Raised Intersection**
  - NYSDOT Standard Sheets
    - *https://www.dot.ny.gov/main/business-center/engineering/cadd-info/drawings/standard-sheets-us-repository/608-07_050116.pdf*
  - Raises 4” to decrease vehicular speed by adding vertical deflection
  - Curb Extensions (bump outs)
  - Considerations
    - *Drainage*
    - *Snowplowing*
    - *Noise*

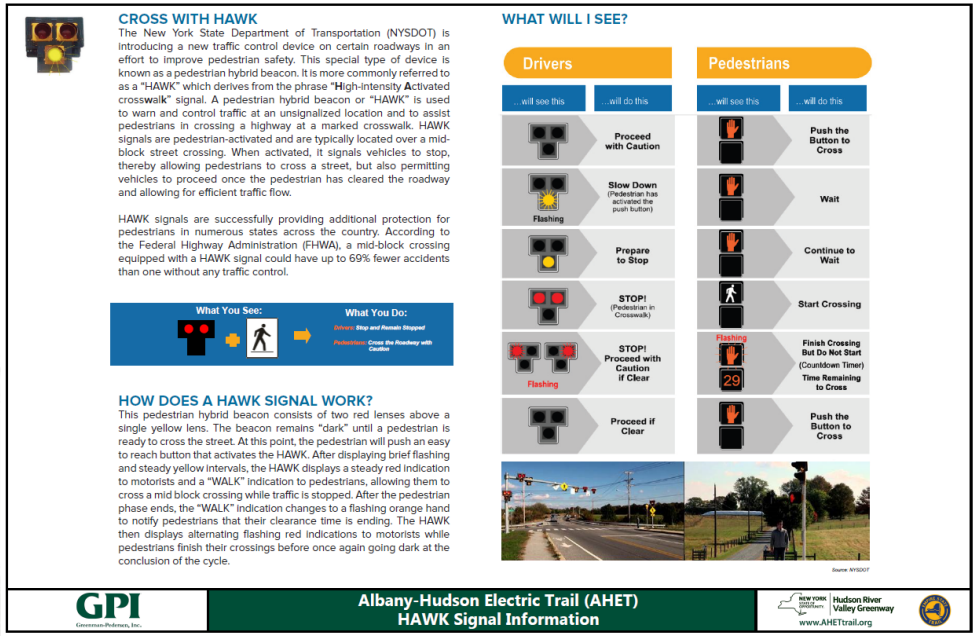
Enhanced Crossing Treatments

- **HAWK – High-Intensity Activated Crosswalk or Pedestrian Hybrid Beacon**

Vs

- **Pedestrian Actuated Signal**

- **HAWK's are used were Signals are not justified or meets Warrants**



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