Evaluation of an RRFB System at the Belmont Ridge Road and W&OD Trail Mid-Block Crosswalk

VDOT BPAC Summer Meeting
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STUDY LOCATION

Intersection of Belmont Ridge Road and W&OD Trail – southeast of Leesburg
RRFBs at Belmont Ridge Rd
Trail View of RRFBs

(a) (b)

Eastbound  Westbound
BACKGROUND

- 2008 – FHWA interim approval
- 2009 – zig-zag pavement markings
- 2011 – VDOT RRFB RFE
- 2011 – NVRPA commissioned study
- 2012 – NVRPA Recommendations Report
- 2013 – VDOT installed RRFB at BRR
- 2014 – VCTIR evaluation of RRFB
- 2015 – VCTIR report published
**RRFB; cleared vegetation for improved sight distance**
Study Purpose/Scope

• Evaluate the utility, effectiveness, and safety of the RRFB system
  – RRFB activation rate
  – Motorists behavior (with and without activation)
  – Trail user impressions of the system
• Scope: after installation - 1 year study period with a follow up 3 year crash analysis
Data Collection

1) Trail user and motorist interactions
Data Collection

Trail user and motorist interactions (Video)

- 3 video data collection periods: 3 weeks, 5 months, 1 year after RRFB installation (Wed, Thur, Sat, Sun); 168 hours of video review

1. Number of trail person crossings by mode
2. Number of crossing instances defined as “potential RRFB activations”
3. RRFB activation rate
4. Traffic characteristics during potential RRFB activation events
5. Effect of RRFB activation/non-activation on motorist yield rate
6. Effect of activation/non-activation on immediate yields
Data Collection

2) Vehicle speeds obtained with LIDAR gun

3) On-Site/On-line surveys
Results

1) Number of trail person crossings by mode

![Bar chart showing number of trail person crossings by mode on weekdays and weekends. The chart indicates a higher number of crossings on weekends for both pedestrians and bicyclists.]
Results

2) Potential RRFB activations

![Bar chart showing total counts and potential activations. The bar for total counts is much higher than the bar for potential activations.]

2/11/2016
Results

3) Activation Rate – all modes combined

2/11/2016
Results

3) Activation Rate – by mode

![Activation Rate Chart]

- Ped
- Bicycle
- Ped+Bike

- 3 Weeks After
- 5 Months After
- 1 Year After
Results

4) Activation Rate with Traffic Present

![Bar chart showing activation rate with traffic present over different time periods.](attachment:bar_chart.png)
Results

5) Effect of RRFB activation/non-activation on motorist yield rate
Results

6) Effect of activation/non-activation on immediate yields
Vehicle speeds obtained with LIDAR Gun

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<th>Before Zig-Zags</th>
<th>Northbound</th>
<th>Southbound</th>
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Results - Survey

Have you ever activated the flashers?

When do you activate flashers?
Results - Survey

When the flashers are activated, do you feel your waiting times to cross have decreased?

![Pie chart showing responses to the question:]

- Yes, this is often the case: 44.8%
- Sometimes: 47.7%
- No, this is rarely the case: 7.5%

Do you expect motorists to yield when the flashers are activated?

- **Always (N = 61)**
  - No: 24.6%
  - Yes: 75.4%

- **Sometimes (N = 113)**
  - No: 36.3%
  - Yes: 63.7%

- **Never (N = 39)**
  - No: 35.9%
  - Yes: 64.1%
Results - Survey

Do you feel the flashing beacon system increases, decreases, or has no impact on safety?

- Always (N = 61): 88.5%, 3.3%, 8.2%
- Sometimes (N = 113): 85.0%, 15.0%
- Never (N = 39): 76.9%, 12.8%, 10.3%
Results - Survey

Right of way?

- Motor vehicle drivers only, 35.7%
- Bicyclists only, 0.9%
- Walkers only, 6.6%
- Don't know, 9.4%
- Both Bicyclists and walkers, 47.4%

Overall Opinion?

- 1 Highly Unfavorable
- 2 Unfavorable
- 3 Neither Favorable Nor Unfavorable
- 4 Favorable
- 5 Highly Favorable

43.3%
Conclusions

• RRFB systems have a positive effect on motorist yield rates.
• The RRFB system installed at Belmont Ridge Road had a positive effect on motorist awareness.
• The RRFB system is perceived by trail users as an enhancement to safety at the BRR crossing.
• Trail user perception of RRFB system benefits grew over time.
• There is a correlation between trail user activation of the RRFB system and the presence of traffic.
• Trail users are confused as to who has the right of way at the crossing location.
Recommendations

1. With the support of VCTIR, VDOT’s TED should develop more specific guidance for RRFB installations.

2. VDOT’s TED should update its guidelines for the installation of marked crosswalks to include RRFBs as a Level 4 device.

3. VDOT’s Operations Regions should continue to pursue opportunities to install and evaluate RRFB systems.

4. VCTIR should conduct a crash analysis at BRR 3 years after RRFB installation.