Rectangular Rapid Flashing Beacons (RRFB) for Pedestrian Crossings

Kay Fitzpatrick
Texas A&M Transportation Institute
TexITE August 31, 2012
History

- Idea: use beacon from emergency flashers on police vehicles
- Eye catching
- First installed in Florida in early 2000s
- FHWA Interim Approval – July 16, 2008
Flash Pattern

- “Stutter flash” effect
- Wig-wag sequence (was)
  - Left / “slow”: 2 X [124 ms on / 76 ms off]
  - Right / “rapid”: 4 X [25 ms on / 25 ms off]
- June 13, 2012 FHWA interpretation clarifies flash pattern
  - 70 to 80 flashing periods per minute
  - Left / “slow”: 2 X [124 ms on / 76 ms off]
  - Right / “rapid” + “long”: 4 X [25 ms on / 25 ms off] + 200 ms
Results from FHWA Study

Ron Van Houten & Jim Shurbutt
Western Michigan University
Motorist Yielding
Study Locations

- Collected data at 22 sites:
  - 19 St. Petersburg, Florida
  - 2 Mundelein, Illinois (school crossings)
  - 1 Washington, DC
- For 18 of the 22 sites:
  - 2-year after data
**RRFB Site Characteristics**

**Number of Lanes**
- 4 lanes: 68%
- 3 lanes: 14%
- 2 lanes: 9%
- 5 lanes: 9%

**Posted Speed Limit**
- 35 mph: 86%
- 40 mph: 5%
- 30 mph: 9%

**Median RRFB**
- Yes: 32%
- No: 68%

**Percent of Sites ADT (1000s)**

- 100%
- 75%
- 50%
- 25%
- 0%

**ADT (1000s)**

- 0
- 10
- 20
- 30
Study Method

- Staged pedestrian
- Recorded data for 20 to 40 crossings
- Count of drivers who:
  - Stopped or slowed and allowed pedestrian to cross
  - Did not yield = passed in front of pedestrian but would have been able to stop
## Motorist Yielding Results

<table>
<thead>
<tr>
<th>Time</th>
<th>Range</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>0 to 26%</td>
<td>4%</td>
</tr>
<tr>
<td>One week</td>
<td>64 to 97%</td>
<td>79%</td>
</tr>
<tr>
<td>One month</td>
<td>62 to 96%</td>
<td>84%</td>
</tr>
<tr>
<td>Two years</td>
<td>72 to 96%</td>
<td>84%</td>
</tr>
</tbody>
</table>
Results from Garland Study

Marcus Brewer & Kay Fitzpatrick
Texas A&M Transportation Institute
Motorist Yielding
Study Site

- Walnut at Bullock, Garland, TX
- Crossing 4 lanes with TWLTL, 35 mph
- 20 mph school zone w/ crossing guard
Treatment

- RRFB activated May 27, 2011
- Bi-directional assembly on each curb and on mast arm above TWLTL
## Motorist Yielding Findings

<table>
<thead>
<tr>
<th>Time</th>
<th>Before</th>
<th>After Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Date</td>
<td>#</td>
</tr>
<tr>
<td><strong>w/ Crossing Guard</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM School Zone</td>
<td>5/17/11</td>
<td>15</td>
</tr>
<tr>
<td>AM School Zone</td>
<td>5/18/11</td>
<td>6</td>
</tr>
<tr>
<td>PM School Zone</td>
<td>5/18/11</td>
<td>12</td>
</tr>
<tr>
<td><strong>Staged</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM Peak</td>
<td>5/17/11</td>
<td>40</td>
</tr>
<tr>
<td>Mid-afternoon</td>
<td>5/18/11</td>
<td>40</td>
</tr>
</tbody>
</table>
FHWA Study (Current)
Questions Being Asked

- Several devices w/lights
  - Overhead beacons (yellow or red), roadside beacons, LED embedded signs, etc.

- Several combinations
  - Flash rate, flash pattern, brightness, shape and size of beacons/LEDs, placement (within, top, bottom, etc.)

- What is optimal?

- What about glare?
FHWA Study Design

- Focus on:
  - Beacon shape and size (circular 12 inch, circular 8 inch, rectangular)
  - Placement (above, below, both)
- Driver detection of:
  - (1) Light, (2) sign, (3) read symbol, (4) object
- Select devices for on-road study
- **Looking for agencies willing to test devices**
Closed-Course Study @ TAMU Riverside Campus

C-A12  C-B12  C-B8  C-V12

R-B  R-A  LED  No Beacon
Closed-Course Study @ TAMU Riverside Campus

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
<tr>
<td>C-A12</td>
<td>C-B12</td>
<td>C-B8</td>
<td>C-V12</td>
</tr>
<tr>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
</tr>
<tr>
<td>R-B</td>
<td>R-A</td>
<td>LED</td>
<td>No Beacon</td>
</tr>
</tbody>
</table>

- C-A12
- C-B12
- C-B8
- C-V12
- R-B
- R-A
- LED
- No Beacon
TxDOT Study (current)
TxDOT Study

- Looking for sites!
- Want to examine yielding for a range of:
  - Posted speed limits
  - Crossing distance
- Please let us know where you are considering RRFB, Pedestrian Hybrid Beacons, or other pedestrian treatments
Wrap Up
Status for RRFB

- Interim approval (national)
- Desired = crash reduction factor
- Desired = guidance on speed limits, crossing distance, ADTs appropriate for device
- Desired = better understanding of what affects effectiveness
References on RRFB

- Effects of Yellow Rectangular Rapid-Flashing Beacons on Yielding at Multilane Uncontrolled Crosswalks
  - TechBrief, FHWA-HRT-10-046
  - Research Report, FHWA-HRT-10-043

- Tech Memo on Garland Study (request via email to Kay, Marcus, or Robert)