

## Gazing at Yellow Rapid-Flashing Beacons: FHWA Studies

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## FHWA Interim Approval

- Optional use of rectangular rapid flashing beacons (RRFB)
- Pedestrian and school crosswalks across uncontrolled approaches
- July 16, 2008



## Research – RRFB Driver Yielding

Study	# Sites	Driver Yielding	Unique
2010 FHWA	22 (most in St. Pete)	72 to 96% activated	Original study, multiyear (2 yrs+ data)
2009 FHWA	2 (Miami)	55 to 60% day 66 to 70% night	Day and night
2009 Florida	1 (St. Pete)	35% overall 54% activated	Trail crossing
2011 Texas	1 (Garland)	80% activated	School, overhead
2011 Oregon	2 (Bend)	83% activated	45 mph
2014 Texas	22 (most in Garland)	34 to 92% activated	Sig: city, PSL, crossing distance, one/two way



## Next Step – Manual?

- How to include new device in MUTCD?
  - Takes several steps
- National Committee on Uniform Traffic Control Devices (NCUTCD)
  - <http://www.ncutcd.org/>
  - Makes recommendations to FHWA regarding proposed revisions / interpretations
  - Several technical committees



## NCUTCD

- RRFB → Signals Technical Committee (STC)
- STC would like answers to several questions before developing draft language
  - Why rectangular? Would circular be OK? Size?
  - Could the beacons be mounted above?
  - What is optimal flash rate? Flash pattern?
  - What is the proper intensity?
  - What about potential for seizures?
  - Others



## Other FHWA Studies

- Task Order #4: 2011-2015
  - 2012 Closed Course
  - 2013-2014 Open Road
- Task Order #8: 2013-2016
  - 2013/4 Closed Course
  - 2014-2015 Open Road
  - And other tasks

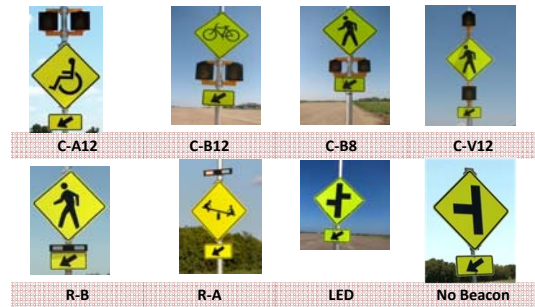


## 2012 - Closed-Course Objective

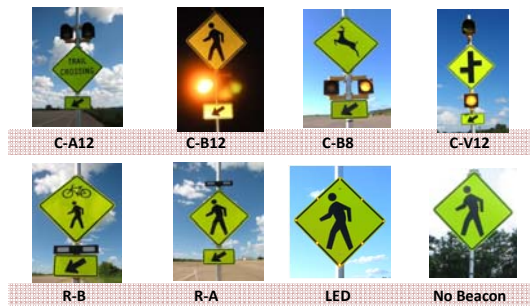
- Determine influence of flashing beacons/LEDs on object detection and legend recognition
  - Beacon shape (circular, rectangular, embedded)
  - Beacon size (circular 12-inch, circular 8-inch)
  - Placement (above, below, embedded)
- Identify up to two assemblies for testing on open road



## 2012 - Study Assemblies, Lap B



## 2012 - Study Assemblies, Lap A



## 2012 - Distractor Signs



## 2012 - Three Objects



## 2012 - Tasks

- Participants to say when they could first see
  - Warning lights ("lights")
  - Road sign ("sign")
  - Read the words or identify the symbol on the road sign ("word")
  - Object: pedestrian, trash can, or small box ("Ped", "can", or "box")
- Slide show used prior to driving to train participants



### 2012 - Object Detection Observations

- Time (day / night) significant, example average detection distance to pedestrian:
  - Daytime: 911 +/- 539 feet
  - Nighttime: 116 +/- 93 feet
- Age (young = <55 / old = 55+)
  - Significant daytime only
  - Nighttime conditions impeded detection to point that effects of several variables too small to detect

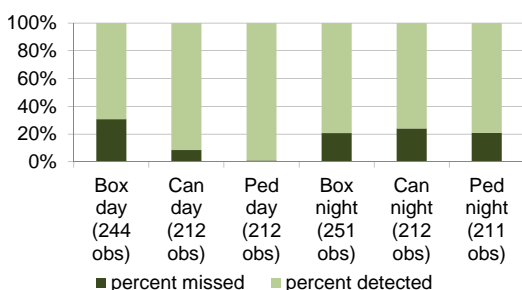


### 2102 - Object Detection Observations

- Certain assemblies are associated with shorter object detection distance (i.e., drivers had to be closer to detect object, which is not desirable)
  - Daytime: shorter for R-B compared to C-B12, C-B8, R-A, 155 to 167 ft differences (significant)
  - Nighttime: shorter for R-B compared to C-B12, 37 ft difference (significant)



### 2012 – Detection Observations



### 2012 Recommendation for Open-Road Study

- Devices selected:

- R-B
- C-B12



### 2013/4 - Closed-Course Objective

- Determine influence of yellow flashing beacons/LEDs on identifying direction pedestrian is walking
  - Beacon brightness (0, 600, 1400, 2200 candelas)
  - Beacon placement (above, below, embedded)
  - Flash pattern (several)
- Identify assemblies for testing on open road



### 2013/4 – Assemblies



### 2013/4 – Occlusion Glasses



### 2013/4 – Setup



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### 2013/4 - Tasks

- After vision restored, indicate via button push whether ped is walking to left or right
- Next, state whether the intensity is:
  - Comfortable
  - Irritating
  - Unbearable
- Respond to survey questions after conclusion of in-field data collection

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### 2013/4 – Closed Course Study Results

- Data being analyzed
- Will select assemblies for testing on the open road – **any city willing to host a test site?**
- Results should be available soon

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**QUESTIONS?**

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