DRIVER BEHAVIOR BY INTERVAL AT PEDESTRIAN HYBRID BEACONS

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Background
What is a Pedestrian Hybrid Beacon (PHB)?
Research Objectives

- Identify the number and locations of PHB installations in Massachusetts
- Evaluate driver familiarity and understanding of PHBs, including concerns and misconceptions
- Evaluate driver behavior for each PHB interval
Survey of PHB Comprehension

PEDESTRIAN HYBRID BEACON GUIDE

SD            SLOW DOWN
PD            PREPARE TO STOP
PE            PEDESTRIAN ACTIVATED BEACON WITH CROSSWALK PUSH BUTTON
TE            PEDESTRIAN WAITING FOR WALK SIGNAL
SC            PEDESTRIAN IS CROSSING
ST            STOP
FR            FLASHING RED
AR            AFTER STOPPING
RE            PROCEED WITH CAUTION
DB            DARK
BS            BEACON STAYS DARK UNTIL ACTIVATED BY ANOTHER PEDESTRIAN

If you encountered the PHB during the solid red phase below, what would you do?

- Slow down.
- Prepare to stop.
- Stop and then proceed with caution.
- Stop and stay stopped.

How confident were you answering the previous question?

Not Confident 1
Somewhat Not Confident 2
Somewhat Confident 3
Confident 4

Please slide the marker.

Have you encountered a device like the one in the image before?

- Yes
- No
- Unsure

How confident were you answering the previous question?

Not Confident 1
Somewhat Not Confident 2
Somewhat Confident 3
Confident 4

Please slide the marker.
71% of drivers have never heard of a PHB by name.

50% of drivers have not or were unsure if they have seen a PHB.
The other confusing thing about PHBs: The law in MA states that if a traffic signal is dark (for example due to a power outage), it should be treated like an all-way stop. But PHBs are dark whenever a pedestrian has not activated it. Very confusing!
"I think the 2 phases/types of yellow and red would be confusing to most drivers. I would treat each as a regular red or yellow not knowing the difference, but others could make different choices."
Solid Yellow Scenario

Responses

Percentage of Responses | Mean of Confidence

Drive as normal with caution. | 8.51 [2.814]
Slow down. | 32.81 [3.00]
Prepare to stop. | 52.36 [3.192]
Stop option not presented | 0
Stop and then proceed with caution. | 6.99 [2.894]
Solid Red Scenario

“The PHB looks like a great idea! I hope the pedestrian is given enough time to cross.”
**Flashing Red Scenario**

<table>
<thead>
<tr>
<th>Percentage of Responses [Mean of Confidence]</th>
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<tbody>
<tr>
<td>Drive as normal with caution.</td>
</tr>
<tr>
<td>Slow down.</td>
</tr>
<tr>
<td>Prepare to stop.</td>
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<tr>
<td>Stop and stay stopped.</td>
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<tr>
<td>Stop and then proceed with caution.</td>
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</table>

- 0.63 [2] option not presented
- 9.779 [3.054]
- 23.34 [3.054]
- 65.93 [3.153]
Field Study of Driver Behavior

<table>
<thead>
<tr>
<th>Data</th>
<th>Vehicle Arrival &amp; Departure</th>
<th>Driver Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 10 Locations</td>
<td>• Dark</td>
<td>• Drive Through</td>
</tr>
<tr>
<td>• 50 Actuated crossings OR 3 hours of video (whichever occurs first)</td>
<td>• Flashing Yellow</td>
<td>• Partial Stop</td>
</tr>
<tr>
<td></td>
<td>• Solid Yellow</td>
<td>• Full Stop</td>
</tr>
<tr>
<td></td>
<td>• Solid Red</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Flashing Red</td>
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</tbody>
</table>
Rail Trail Crossings

345 Damon Road Hadley

615 Old Connecticut Path Framingham
345 Damon Rd Northampton, MA
Crossings = 48
Vehicles = 329

Percent Driver Action

Vehicle Arrival Interval

- Dark
- Flashing Yellow
- Solid Yellow
- Solid Red
- Flashing Red

- Full Stop
- Partial Stop
- Drive Through
Rail Trail Crossings

Approximately 25% of drivers drove through on Solid Red

*Inconsistent with survey results*

Between 10-50% of drivers Fully Stopped “early”
Urban 2-Lane

282 Beacon St Sommerville

63 Beacon St Sommerville
Solid Red compliance ranges 84-90%

Dark interval results differ despite similarity in location and characteristics
Urban 4-Lane

116 MA-9 Hadley
53 Mystic Ave Sommerville
858 State St Springfield
Low value for “early stopping” could be due to a majority of pedestrian crossings during the Solid Red Interval.
Conclusions & Next Steps
Flashing Red & Flashing Yellow are the least understood by drivers.

“Early Stopping” (stopping prior to Solid Red) is common when pedestrian presence is expected (i.e., rail trails).

Flashing Red has the lowest compliance which could put secondary pedestrians at risk.

Pedestrian behavior is expected to have a significant effect on driver behavior (i.e., crossing interval).

Next Steps:

• Finalize video analysis (across all variables)
• Analyze pedestrian/bicyclist behavior
• Analyze impact of PHB operations (i.e., interval duration, lockout, etc.)
• Evaluate “trailing” vehicle behavior
• Complete driving simulator study

And…. Graduate (for now)!
Thank you!

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