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Evaluating Driver and Pedestrian Behaviors at Enhanced Multilane Midblock Pedestrian Crossings

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Evaluating Driver and Pedestrian Behaviors at Enhanced Multi-lane Midblock Pedestrian Crossings

A Case Study in Portland, OR

Nick Foster, AICP
Introduction

• Problem
  – Over 4,000 pedestrian deaths in 2010

• Potential solution
  – Enhanced crossings
    • Effectiveness?
    • Use?
Project Overview

• Two marked midblock crossings
  – Rectangular rapid flash beacons (RRFB)
  – Raised median refuge islands
  – Z-crossing (Danish offset)
• One site only
Background

- RRFB research focused on drivers
  - Driver yielding rates: 54%-88%
- Crossing decisions based on distance to crosswalk
  - Limited research on attraction
- No literature on Z crossing use
Site 1 – Barbur Boulevard

- 30,700 ADT
- 35 MPH
Site 2 – B-H Highway

- 26,400 ADT
- 40 MPH
Methodology

• 62 hours of video
  – Weekdays in February 2013
• Driver and pedestrian behavior MOEs
RESULTS
Driver Yielding Rates

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**Location**
- Barbur Boulevard
- B-H Highway

**Stage 1**
- RRFB Not Activated Crossings: n=0
- RRFB Activated Crossings: n=240

**Stage 2**
- RRFB Not Activated Crossings: n=13
- RRFB Activated Crossings: n=16

**Overall**
- RRFB Not Activated Crossings: n=0
- RRFB Activated Crossings: n=468

**Location**
- Barbur Boulevard
- B-H Highway

**Stage 1**
- RRFB Not Activated Crossings: n=13
- RRFB Activated Crossings: n=135

**Stage 2**
- RRFB Not Activated Crossings: n=20
- RRFB Activated Crossings: n=162

**Overall**
- RRFB Not Activated Crossings: n=33
- RRFB Activated Crossings: n=297
Comparison to Other Studies

This study

Shurbutt, et al. (4 Beacons)

Shurbutt, et al. (2 Beacons)

Western Michigan

ODOT (Bend)

ODOT

Hunter, et al.

Average Driver Yielding Rate

0% 20% 40% 60% 80% 100%

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Pedestrian Actuation Rates

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Barbur Boulevard
- No Cars Present
- Cars Present
- Overall

B-H Highway
- No Cars Present
- Cars Present
- Overall

RRFB Actuation Rate

0%  20%  40%  60%  80%  100%
Crossing Locations

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Diverted Crossings

- 52% of crossings at crosswalk are out-of-direction
Diverted Crossings – SB Only

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Z-Crossing Use

• Path use = 52%
  – High yielding rates
Other Findings

• Avoidance maneuvers
  – Hard braking (2)

• Stranded pedestrians
  – RRFB activated (1 – 0.3%)
  – RRFB not-activated (6 – 15%)

• Minimal pedestrian delay
  – 20 sec max (RRFB not activated)
  – All but one <15 sec (RRFB activated)
Conclusions

• 91-92% overall driver yielding rate
• Marked midblock crossing with RRFB may encourage diversion
• Z-crossing effectiveness limited
  – Adequate sight distance
  – No physical barrier
Future Research

• Pedestrian diversion
  – More sites
  – Before/after
  – Wider field of view
  – Automated analysis
  – Survey

• Z-crossing
  – More sites

• Driver understanding
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