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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

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Methodology

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

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**Comparison of Driver Yielding Rates by Location**

- **B-H Highway**
  - Stage 1: RRFB Not Activated Crossings: 13, RRFB Activated Crossings: 135
  - Stage 2: RRFB Not Activated Crossings: 20, RRFB Activated Crossings: 162
  - Overall: RRFB Not Activated Crossings: 33, RRFB Activated Crossings: 297

- **Barbur Boulevard**
  - Stage 1: RRFB Not Activated Crossings: 0, RRFB Activated Crossings: 16
  - Stage 2: RRFB Not Activated Crossings: 16, RRFB Activated Crossings: 228
  - Overall: RRFB Not Activated Crossings: 16, RRFB Activated Crossings: 468

**Summary**

- Overall, RRFB activated crossings show higher yielding rates compared to RRFB not activated crossings.
- The highest yielding rate was observed on B-H Highway, Stage 2, with RRFB activated crossings.
- The lowest yielding rate was observed on Barbur Boulevard, Stage 1, with RRFB not activated crossings.
Comparison to Other Studies

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- Hunter, et al.
- Western Michigan
- ODOT
- ODOT (Bend)
- Shurbutt, et al. (2 Beacons)
- Shurbutt, et al. (4 Beacons)
- This study

Average Driver Yielding Rate

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

Shurbutt, et al. (4 Beacons) has the highest average driver yielding rate, followed by ODOT (Bend) and Shurbutt, et al. (2 Beacons).
Pedestrian Actuation Rates

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Barbur Boulevard

- No Cars Present
- Cars Present
- Overall

B-H Highway

- No Cars Present
- Cars Present
- Overall

Location

Overall

RRFB Actuation Rate
Crossing Locations

Bus Stops

15%
15%
70%

SW 62nd Ave

B-H Highway
Diverted Crossings

- 52% of crossings at crosswalk are out-of-direction
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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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