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

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

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

Location

Barbur Boulevard

Stage 1

n=0

Stage 2

n=16

Overall

n=16

B-H Highway

Stage 1

n=13

Stage 2

n=20

Overall

n=33

Driver Yielding Rate

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

RRFB Not Activated Crossings
RRFB Activated Crossings

n=240
n=228
n=468
n=135
n=162
n=297
Comparison to Other Studies

This study

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%
Pedestrian Actuation Rates

Barbur Boulevard
- No Cars Present: 75%
- Cars Present: 95%
- Overall: 85%

B-H Highway
- No Cars Present: 70%
- Cars Present: 90%
- Overall: 85%

Overall
- No Cars Present: 80%
- Cars Present: 90%
- Overall: 85%
Diverted Crossings

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

Bus Stops

56%

B-H Highway

44%
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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