Improving Pedestrian Safety at Unsignalized Crossings

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Overview of Presentation

• What are the issues/problems?

• Framework for crossing treatments
  – Marked crosswalk
  – Enhanced crosswalk
  – Active treatment
  – “Red” treatment
  – Full traffic signal
Unsignalized Pedestrian Crossing

- No motor vehicle traffic signal control on main street
- Pedestrian crossing may be at intersecting street or mid-block
- Typically a marked crosswalk, but not necessarily
- More common with larger block size (suburbs)
Problems at Unsignalized Crossings
Problems at Unsignalized Crossings

• Confusion about right-of-way
  – Who yields / stops ?
  – Pedestrian must be in crosswalk
• Difficulty judging acceptable gaps
• Excessive delay to pedestrians
Problems × 3

- High-speed arterial streets
- 2 or more lanes in both directions
- Mid-block transit stops
- Limited access control
  - Commercial driveways
  - Center two-way left turn lane
- Low pedestrian volumes (does not satisfy traffic signal warrant)
• Recommend treatments for high-speed, high-volume roadways
• Recommend modifications to MUTCD pedestrian traffic signal warrant
FHWA Study on Marked vs. Unmarked Crosswalks

- Depends on:
  - Traffic volume
  - Traffic speed
  - Road width/median

1. Marked Crosswalk
2. Consider Enhancement to Marking
3. Must Add Enhancement to Marking
Safety Benefits of Other Treatments

• Difficult to quantify for each treatment
• Insufficient crash data for experimental treatments

• Lead to use of safety surrogates
  – % motorists yielding to pedestrians
  – Motorist behavior (speed reduction)
  – Pedestrian behavior
What are “treatments”? 

• Geometric design
• Traffic calming
• Static warning signs
• Continuous flashing beacons
• Activated beacons
Median Crossing Island
Median Crossing Island
Curb Extension (Mid-Block, Transit Stop)
Curb Extension (Intersection)
Roadway / Lane Narrowing
Crossing Sign + Markings
In-Street Crossing Signs

STATE LAW
YIELD TO
WITHIN CROSSWALK

STATE LAW
STOP FOR
WITHIN CROSSWALK
High-Visibility Signs / Markings
High-Visibility Signs / Markings
Advance Yield / Stop Line
Overhead Flashing Amber Beacons
Overhead Flashing Amber Beacons
Half Signal
Pedestrian Hybrid Beacon ("HAWK")
Pedestrian Hybrid Beacon ("HAWK")
Research Question

• What treatment is most (cost)-effective in different street contexts?
Research Approach

• Evaluate motorist yielding for different treatments in different street contexts
• Higher yielding = less delay, more safe
• Lower yielding = more delay, less safe
• Using Highway Capacity Manual pedestrian delay thresholds, develop algorithm to determine treatment type
Presto!! Shazam!!
Increasing traffic volume

Traffic Volume

Pedestrian Volume/Demand

No crosswalk marking

Basic or enhanced marking/signing

“Yellow” treatment

“Red” treatment

Traffic signal per MUTCD

Increasing Visibility and/or Traffic Control

Increasing pedestrian volume/demand
2 Lanes, <55 km/h
6 Lanes, >55 km/h

Traffic Signal
(Proposed MUTCD Warrant)

NO Marked Crosswalk Only

Major Road Volume - Total of Both Approaches (veh/h)
Questions or Comments?

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Resources / Additional Reading

• *NCHRP Report 562 / TCRP Report 112:*

• *Alternative Treatments for At-Grade Pedestrian Crossings, ITE 2001* ($37.50 US)

• City of Boulder (CO) *Pedestrian Crossing Treatment Installation Guidelines,*

• *Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations,*
  FHWA 2005,

• Pedestrian Crossing Control Guide, TAC 2012 ($155 CN)