Pedestrian and Bicycle Safety at Alternative Intersections and Interchanges

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Western ITE Annual Meeting
June 25, 2018
NCHRP7-25 Overview

Guide for Pedestrian and Bicycle Safety at Alternative Intersections and Interchanges
Today’s Discussion

• **Background / Benefits and Challenges of A.I.I.s**
• **Project Objectives and Approach**
• **Evaluation Criteria**
• **Data Collection – Where we are now**
• **What’s next**
• **Questions and Discussion**
Standard Accommodations
Inventory Summary

- A total of 1,686 A.I.I.s reviewed
  - 48 signalized RCUTs
  - 95 unsignalized RCUTS
  - 1,378 MUTs
  - 12 QRs
  - 57 CFIs
  - 96 DDIs
- Across 33 states
- Includes 17 international A.I.I.s
- http://go.ncsu.edu/aii
Multimodal Benefits of A.I.I.s

• Potentially reduced pedestrian-vehicle conflict points
• Often feature two-phase traffic signal control with reduced pedestrian wait time
• Minimized crossing distances
• Simplification of conflicts to one-directional vehicular traffic
• May feature reduced turn lanes and permissive turns
Potential Challenges for Multimodal Users at A.I.I.s

- Potential for altered travel paths and pedestrian travel in unexpected locations
- Traffic approaching from unexpected directions
- Unfamiliar signal phases
- Uncontrolled crossing of turn lanes
Consider pedestrians and bicyclists in initial design and throughout design process!

Avoid need to retrofit by better initial placement of pole and/or walkway.

Available right-of-way in island would have allowed for “straightline” crosswalk and walkway directing peds towards crossing.

Source: ITRE
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Research Objective

The objective of this research is to develop a guide for transportation practitioners to improve and integrate pedestrian and bicycle safety considerations at A.I.I.s through planning, design, and operational treatments.
Performance-Based Design Process

- Identify intended outcomes (criteria)
- Establish geometric design decisions
- Evaluate performance outcomes
- Refine decisions based on performance
- Assess financial feasibility
- Select project or alternatives

NCHRP Report 785 – Performance-Based Design Process
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Performance-Based Criteria

• 1. Traversing: traveling through the A.I.I. (does not include street crossings)
Performance-Based Criteria

• 2. Wayfinding: orienting to the A.I.I. geometry and understanding how to navigate
Performance-Based Criteria

• 3. Crossing: traveling across a street where conflicts with automobiles are possible

Source: ITRE

Source: Bastian Schroeder
Performance Criteria Overview

• **TRAVERSING**
  - Minimize Speed Differential / Control Speeds
  - Manage Line of Sight and Visibility
  - Minimize Travel Time

• **WAYFINDING**
  - Provide and Convey a Reasonable Path

• **CROSSING**
  - Minimize/Manage Conflict Points
  - Manage speeds at conflict points
  - Provide Lines of Sight and Visibility
  - Minimize Travel Time
  - Provide Accessible Features

• **ALL THREE**
  - Comfort and Quality of Service (level of stress)
Minimize Speed Differential/Control Speeds

All Data - Speed v.s. Percent Yield

- Entry
- Exit

Linear (Entry):
\[ y = -0.0295x + 0.9062 \]
\[ R^2 = 0.8292 \]

Linear (Exit):
\[ y = -0.0261x + 0.4717 \]
\[ R^2 = 0.7965 \]
Manage Line of Sight and Visibility

Limited visibility: driver → pedestrian & pedestrian → driver

Source: Google
Minimize Travel Time
Provide and Convey a Reasonable Path
Minimize/Manage Conflict Points

- 8 Conflict Points
  - 2 free/flow or accelerating
  - 6 stopped or decelerating

- 8 Conflict Points
  - 4 free/flow or accelerating
  - 4 stopped or decelerating
Provide Accessible Features

Source: Google

Source: Google
Comfort and Quality of Service
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Data Collection Ongoing

• Visualizations of unbuilt A.I.I.s covering broad range of design features/options
• Conduct four focus groups and online survey
  • Non-engineer pedestrian/bicyclists
  • RCUT – Holly Springs, NC
  • DDI – Kansas City, MO
  • MUT – Detroit, MI
  • DLT – Salt Lake City, Utah
• Web-survey with focus group materials to allow a broad audience to comment on the proposed solutions
Sample Draft Visualization

- Conventional intersection form (Control site)
Sample Draft Visualization

- Comparison RCUT site
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Questions and Discussion

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