Improving Walkability Through Control Strategies at Signalized Intersections

Edward J. Smaglik, Ph.D., P.E.
Associate Professor, Northern Arizona University
Senior Engineer, Kittelson & Associates

2014 Joint Regional Traffic Signal Forum & ITS Maryland Annual Meeting

November 6th, 2014
Presentation Agenda

- Project Details
- Background
- Motivation
- Research Questions
- Proposed Methodology
- Final Steps
Project Details

- Lead: Portland State University (PSU)  
  Sirisha Kothuri & Chris Monsere, Co-Pis  
- Subaward Recipient: Northern Arizona University (NAU)  
  Edward J. Smaglik, NAU Investigator  
- Overall Budget: $109,075  
  NAU: $25,643  
- Project Schedule  
  September 2014 – January 2016
Project Details

- Funding Agency:
  - Transportation Research and Education Center (TREC), through their National Institute for Transportation and Communities (NITC) program
  - University Transportation Center (UTC) based out of Portland State University

- Project Partners:
  - Portland, OR
  - Flagstaff, AZ
  - Mesa, AZ
Background

- Emphasis on active transportation
- Walking promotes healthy, livable communities
- Increase in walking trips

National Walking Trends

Source: Data from Pucher et al., (2011)

Local Commute Shares - Walk 4%

Source: City of Portland, Climate Action Plan
Background

- Pedestrian fatality trends
  - 6% increase in 2012
  - 73% in urban areas
  - 20% at intersections

- Poor crossings
  - Deter people from walking
  - Unsafe crossing behavior

“On average, a pedestrian was killed every 2 hours and injured every 7 minutes in traffic crashes”

Source: NHTSA, Traffic Safety Facts 2012
Motivation

- At some point in every trip, “Everyone is a pedestrian”
- Operational information lacking for Pedestrian First policies
- Less delay => Improved Compliance
  - Enhanced Safety?
- Delays at signalized intersections may affect pedestrians disproportionately
  - Equalize delay?

Source: City of Portland, TSP
Research Questions

- Current use of novel treatments, and knowledge base behind them?
  - Leading Pedestrian Interval
  - Cycle Length Manipulation
  - Permissive Window Variation
  - Pedestrian Priority (new)
- Impact of the above on MOEs for all users at the intersection
- How do we implement ped priority with an off the shelf controller?
- Guidance for determination of operational and geometric characteristics that lend well to implementation of these strategies
Methodology

1. Comprehensive review of recent pedestrian control strategies
2. Pedestrian priority algorithm development
3. Simulation of alternative pedestrian treatments
4. Field implementation of pedestrian priority treatment
5. Guidance document for alternative pedestrian treatments
Strategy review

- Literature review of pedestrian control strategies
  - Identify agencies that have deployment experience
  - Queried for thoughts and feedback
  - Focus on impact of all users
Algorithm development

- Develop and test an algorithm to implement pedestrian priority
  - Off the shelf controllers
    - 2070
    - NEMA
  - Ensure algorithm is reliable and robust enough for deployment
Software in the Loop Simulation

- Using VISSIM and Econolite’s ASC/3 software controller,
  - Identify differing impacts of various strategies on user groups
  - Investigate feasibility of control strategies with respect to operational and functional characteristics
- Solicit input from partner agencies regarding characteristics of simulated intersection
Field deployment

- Work with partner agencies to identify locations for field deployment
  - Informed through simulation outcomes

- 2070 Standard
  - City of Portland, Voyage

- NEMA Standard
  - Cities of Flagstaff and Mesa, likely Econolite’s ASC/3

- Data collected will vary by site characteristics
  - Collect and compare pedestrian and vehicle delay
Close the loop

- Analyze field deployment collection data
  - Identify any additional impacts not seen in simulation

- Compare to simulation data to validate simulation results

- Develop a guidance document
  - Practitioner based, focused on implementation, performance, and management of strategies at intersections

- Write final report

- Tech transfer
Questions? Thoughts Suggestions?
edward.smaglik@nau.edu
esmaglik@kittelson.com
Edward J. Smaglik, Ph.D., P.E.
Associate Professor and Director
AZ Trans: The Arizona Laboratory for Applied Transportation Research
Senior Intern Kittelson & Associates