SPR RESEARCH PROGRAM
SECOND-STAGE PROBLEM STATEMENT
FY 2017

ODOT Research Unit
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I. PROBLEM NUMBER AND TITLE

17-038_AST Compliance and Surrogate Safety Measures for Uncontrolled Crosswalk Crossings in Oregon

II. RESEARCH PROBLEM STATEMENT

In 2013 and 2014 there were 52 and 55 pedestrian fatalities in Oregon respectively. A high proportion of the crashes took place at crosswalks and/or nearby intersections. The trend in 2015 was unfortunately upwards with 77 pedestrian fatalities.

Traffic laws and regulations provide a legal framework that protects pedestrians when they are most vulnerable, i.e. at crosswalks. Unlike most states, Oregon is more sympathetic towards pedestrians regarding driver obligations and how pedestrians demonstrate their intention to utilize a crosswalk. The majority of states require drivers to yield to pedestrians but in Oregon drivers must stop for pedestrians as soon as they move onto the roadway in a crosswalk with the intent to proceed (*1*). Furthermore, the Oregon Revised Statutes require that a driver, before crossing a crosswalk, stops and remain stopped for pedestrians until pedestrians have cleared the lane in which the vehicle is traveling as well as the adjacent lane. Dissimilar compliance laws, users and roadway characteristics preclude a direct transfer of crosswalk surrogate safety research results that have been (or will be) developed in other states.

Designing a crosswalk for a desired level of safety is problematic because prediction models for crosswalk safety are still unreliable and very difficult to calibrate to local conditions. Even if prediction models for crosswalk safety improve significantly, it would likely take several years of service before safety levels could be reliably measured. Relying solely on archived crash data has several problems; this approach is: (i) *reactive*, fatalities and crashes must take place before any action is taken; (ii) *sluggish*, data access lead time is substantial, over a year or more until official crash statistics are published; and (iii) *incomplete*, even if crash datasets are available, some high-risk road safety issues (near-misses) cannot be rapidly identified utilizing crash data due to their low exposure and/or low-crash frequency.

Crosswalk stopping compliance, stopping distance, and approach speeds can be readily observed from video footage or sending staff out to the field. If some of these field measurements are good surrogates for safety levels, then it will be possible to modify crosswalk design features or nearby roadway characteristics and readily observe whether surrogate safety measures have changed significantly. Surrogate safety measures can be utilized to provide more timely feedback regarding safety levels and help rank short-term project priorities. Many questions remain related to the link between surrogate measures and crosswalk safety performance and the transferability of out of state results. As states crosswalk laws, driver behavior and culture vary significantly, surrogate safety measure studies are more accurate and relevant when developed from a robust, local data set.

III. RESEARCH OBJECTIVES

The objective of this research is to analyze, as robustly as possible, the effectiveness of field measurements and surrogate safety measures to develop a *proactive* approach to evaluate crosswalk safety performance. The proposed research aims to answer these questions: (i) Can surrogate safety measures be used as a reliable predictor of a crosswalk expected safety performance? (ii) Is it possible to utilize field-based surrogate safety measures as a tool to examine the need of crosswalk improvements?

IV. WORK TASKS, COST ESTIMATE AND DURATION

The specific tasks to complete the study are described below.

Task 1: Literature and Data Collection Technologies Review (*3 months*)

The review will focus on two aspects critical to this research: 1) studies related to surrogate safety measures, with a focus on vehicle-pedestrian interactions and 2) innovative field vehicle speed and trajectory data collection technologies to simultaneously record video and vehicle speeds.

Task 2: Analysis of Crosswalk Pedestrian Crash Data in Oregon (*2 months*)

The research team will analyze pedestrian-vehicle crashes in the last decade and try to identify trends or patterns in the recent increase of crosswalk pedestrian crashes. It is expected that the relevant data can be gathered from existing databases, past projects, GIS files, and/or videolog or Streetviewer.

Task 3: Selection of key surrogate safety measures (*2 months*)

The research team (in consultation with the TAC) will finalize a list of surrogate safety measures based on the key findings of Tasks 1 and 2. The research team will analyze pros and cons of surrogate measures that take exposure and crash likelihood into account as well as measures that focus on driver and pedestrian behavior, vehicle trajectory, traffic conditions, type of conflicts, and delays at uncontrolled crosswalks (*2*).

Task 4: Identification of Study Locations and Pilot Data Collection (*3 months*)

The research team will propose a list of data collection locations. Location characteristics and history of crashes will be part of the selection criteria. A pilot study will be conducted to refine and revise data collection procedures and the final list of data collection sites and surrogate measures.

Task 5: Data Collection (*4 months*)

Site-specific data collection will be necessary to obtain detailed vehicle-pedestrian interaction data. Detailed data regarding vehicle trajectories, speeds, traffic conditions, and pedestrian behavior will be collected to estimate surrogate measures selected in Task 3.

Task 6: Surrogate Data Effectiveness Evaluation (*4 months*)

The research team will use the data from Task 5 to analyze whether surrogate safety measures can be used as a reliable predictor of crosswalk safety performance and if field-based surrogate safety measures can be used to analyze and/or prioritize crosswalk improvement needs.

Task 7: Final Report (*2 months*)

Prepare and submit a final report which describes the research study, conclusions, and recommendations for future crosswalk surrogate safety data collection efforts and safety evaluations.

The project is estimated to cost $176,000 with an 18-month schedule (*note: some task durations overlap*).

V. IMPLEMENTATION

This research idea will be implemented by the Traffic Unit. This project will prioritize the analysis of crosswalk locations that are considered "Safety Transportation Hotspot and Systemic Locations".

VI. POTENTIAL BENEFITS

This project is timely due to the recent increase in pedestrian fatalities. Research results can be used to inform and prioritize ODOT HSIP funding. The FAST Act will provide funding for the purpose of decreasing pedestrian fatalities and injuries. The results of this study can also be useful to design future law enforcement training and/or pedestrian safety public education campaigns.

VII. SUBMITTED BY

Stage 1 Submitter	*Stage 2 Submitter*	*Person Responsible For Implementation*
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REFERENCES

1. Pedestrian Crossing: 50 State Summary, National Conference of State Legislatures, published April 20, 2015, http://www.ncsl.org/research/transportation/pedestrian-crossing-50-state-summary.aspx
2. NCHRP Report 562, 2006, Improving Pedestrian Safety at Unsignalized Crossings. http://www.trb.org/Main/Blurbs/157723.aspx