ROADWAY SAFETY INSTITUTE

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UTC Project Information	
Project Title	Development of Guidelines for Permitted Left-Turn Phasing Using Flashing Yellow Arrows
University	University of Minnesota
Principal Investigator	Gary Davis
PI Contact Information	drtrips@umn.edu 612-625-2598
Funding Source(s) and Amounts Provided (by each agency or organization)	Minnesota Department of Transportation: $51,000 Local Road Research Board: $51,000
Total Project Cost	$102,000
Agency ID or Contract Number	UTC Grant Number: DTRT13-G-UTC35 MnDOT contract 99008 work order 63 CTS# 2013025
Start and End Dates	08/09/2012 – 08/31/2015
Brief Description of Research Project	*Final report abstract:* The objective of this project was to develop guidelines for time-of-day use of permitted left-turn phasing, which can then be implemented using flashing yellow arrows (FYA). This required determining how the risk for left-turn crashes varied as traffic-flow conditions varied during the course of a representative day. This was accomplished by developing statistical models, which expressed the risk of occurrence of a left-turn crash during a given hour as a function of the left-turn demand, the opposing traffic volume, and a classification of the approach with respect to the opposing traffic speed limit, the type of left-turn protection, and whether or not opposing left-turn traffic could obstruct sight distance. The models were embedded in a spreadsheet tool which will allow operations personnel to enter, for a candidate intersection approach, existing turning movement counts, and a classification of the approach with respect to speed limit, turn protection, and sight distance issues and receive a prediction of how the risk of left-turn crash occurrence varies throughout the day, relative to a user-specified reference condition.
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	The spreadsheet tool developed during this project has recently been made available to the public. The Minnesota Local Road Research Board has produced a video to guide practitioners through the use of the tool, which can help determine when it's safe to use flashing yellow arrows.

Impacts/Benefits of Implementation (actual, not anticipated)	Traffic engineers can have access to the spreadsheet tool , which can be used to determine at which times of day crash risk is sufficiently low for flashing yellow arrows to be implemented safely for permitted left turns at a specific intersection.
Web Links • Reports • Project website	http://www.cts.umn.edu/Research/ProjectDetail.html?id=2013025 http://www.cts.umn.edu/Publications/ResearchReports/reportdetail.html?id=2446