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Final Report

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Introduction

This project consisted of two studies of pedestrian safety and operations at signalized intersections, each described in the following sections. Two published documents were generated; these are listed in the last section. Once we began work on the project we chose to focus on evaluating the effect of an operational characteristic – pedestrian signal phasing design. We evaluated the safety effects of two different types of pedestrian signal phasing in the context of several roadway and roadside characteristics.

Study 1: Safety Effects of Exclusive and Concurrent Signal Phasing for Pedestrian Crossing

This paper describes the estimation of pedestrian crash count and vehicle interaction severity prediction models for a sample of signalized intersections in Connecticut with either concurrent or exclusive pedestrian phasing. With concurrent phasing, pedestrians cross at the same time as motor vehicle traffic in the same direction receives a green phase, while with exclusive phasing, pedestrians cross during their own phase when all motor vehicle traffic on all approaches is stopped. Pedestrians crossing at each intersection were observed and classified according to the severity of interactions with motor vehicles. Observation intersections were selected to represent both types of signal phasing while controlling for other physical characteristics. In the nonlinear mixed models for interaction severity, pedestrians crossing on the walk signal at an exclusive signal experienced lower interaction severity compared to those crossing on the green light with concurrent phasing; however, pedestrians crossing on a green light where an exclusive phase was available experienced higher interaction severity. Intersections with concurrent phasing have fewer total pedestrian crashes than those with exclusive phasing but more crashes at higher severity levels. It is recommended that exclusive pedestrian phasing only be used at locations where pedestrians are more likely to comply.

More details are provided in Publication 1 listed below.

Study 2: A Study of Pedestrian Compliance with Traffic Signals for Exclusive and Concurrent Phasing

This paper describes a comparison of pedestrian compliance at traffic signals with two types of pedestrian phasing: concurrent, where both pedestrians and vehicular traffic are directed to move in the same directions at the same time, and exclusive, where pedestrians are directed to move during their own dedicated phase while all vehicular traffic is stopped. Exclusive phasing is usually perceived to be safer, especially by senior and disabled advocacy groups, although these safety benefits depend upon pedestrians waiting for the walk signal. This paper investigates whether or not there are differences between pedestrian compliance at signals with exclusive pedestrian phasing and those with concurrent phasing and whether these differences continue to exist when compliance at exclusive phasing signals is evaluated as if they had concurrent phasing. Pedestrian behavior was observed at 42 signalized intersections in central Connecticut with both concurrent and exclusive pedestrian phasing. Binary regression models were estimated to predict pedestrian compliance as a function of the pedestrian phasing type and other intersection characteristics, such as vehicular and pedestrian volume, crossing distance and speed

limit. We found that pedestrian compliance is significantly higher at intersections with concurrent pedestrian phasing than at those with exclusive pedestrian phasing, but this difference is not significant when compliance at exclusive phase intersections is evaluated as if it had concurrent phasing. This suggests that pedestrians treat exclusive phase intersections as though they have concurrent phasing, rendering the safety benefits of exclusive pedestrian phasing elusive. No differences were observed for senior or non-senior pedestrians.

More details are provided in Publication 2 listed below.

Publications

1. Yaohua Zhang, Sha A. Mamun, John N. Ivan, Nalini Ravishanker, Khademul Haque, “Safety Effects of Exclusive and Concurrent Signal Phasing for Pedestrian Crossing”, *Accident Analysis & Prevention*, in press.
2. John N. Ivan, Kevin McKernan, Yaohua Zhang, Nalini Ravishanker, Sha A. Mamun, “A Study of Pedestrian Compliance with Traffic Signals for Exclusive and Concurrent Phasing”, submitted for presentation at the Transportation Research Board Annual Meeting, January 2016, and for publication in *Transportation Research Record*, in review.