

UTC Project Information	
Project Title	MPC-495 – Safety Effects of Protected and Protected/Permitted Left-Turn Phases
University	University of Utah
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Funding Agencies	USDOT, Research and Innovation Technology Administration
Agency ID or Contract Number	DTRT13-G-UTC38
Project Cost	\$95,000
Start and End Dates	September 30, 2013 to December 31, 2018
Project Duration	September 30, 2013 to December 31, 2018
Brief Description of Research Project	<p>Protected left-turn phases at signalized intersections are intended to reduce the frequency of angle collisions that result from conflicts between left-turning vehicles and opposing through vehicles. AASHTO's "NCHRP 500 series" also notes that the frequency of rear-end and sideswipe crashes between left-turning vehicles and following through vehicles can also be reduced with properly timed, protected left-turns. Various studies have demonstrated the overall safety effectiveness of protected left-turn phases (e.g., Harkey et al., 2008; Davis and Aul, 2007). A consensus on the extent of this safety effectiveness under different intersection conditions does not exist. While separate left-turn phasing may reduce delay for left-turning vehicles, it may increase the overall intersection delay and disrupt traffic progression. It is therefore important to understand the safety effects of protected left-turn phases under a variety of intersection conditions so that appropriate operational and safety trade-offs can be quantified and considered by agency decision makers. Protected/permitted left-turn phasing is sometimes used as a compromise between fully-protected and permitted only phasing. Information on the safety effects of protected/permitted under a variety of intersection conditions is needed as well. This project will estimate the safety effects of protected and protected/permitted left-turn phases for different intersection conditions. Intersection conditions of interest may include factors such as turning volumes, opposing through volumes, pedestrian crossing volumes, approach speeds, sight distance, number of lanes, and type of channelization.</p> <p>The primary objective of this research project is to estimate the safety effects of left-turn phases for different conditions and provide operational recommendations. The operational recommendations will be in the form of</p>

	<p>a framework that demonstrates how the results of this research can be incorporated into a performance-based analysis of operational and safety trade-offs associated with different left-turn phasing alternatives.</p>
<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	<p>Outcomes presented to UDOT Research and Innovation Library Session. Results are expected to serve as building blocks for estimation of the safety performance of different left-turn phases at the level of an individual approach. Modeling of disaggregated data (5-minute volume counts) shows new opportunities for more detailed analysis and illustrated the interactions between left-turning demands and opposing through traffic. A follow-up project is expected to expand such analysis using even higher-resolution data to develop real-time measures of safety.</p>
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>Results obtained in this study will help improve understanding of the safety performance of different left-turn phase indications. Transportation engineers are expected to use such results to model future crash frequencies and help guiding selection of left-turn phase indications by site, and strategies by time of day. Analyses of such detailed and carefully-harvested datasets are rare in the literature and will complement current body of literature to support decision making. Exploration of high-resolution data opened new opportunities to obtain real-time metrics to monitor left-turn crash risk.</p>
<p>Web Links</p> <ul style="list-style-type: none"> • Reports • Project Website 	<ul style="list-style-type: none"> • https://rosap.ntl.bts.gov/view/dot/42387 • https://www.ugpti.org/resources/reports/details.php?id=972