Florida Department of Transportation Research

Dynamic Flashing Yellow Arrow (FYA) — A Study on Variable Left Turn Model Operational and Safety Impacts
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Traffic engineers use various left-turn signalization methods to find an optimal balance of safety and efficiency. While protected/permitted left-turn configurations allow most left-turning traffic to turn during the protected phase, the permitted phase exploits the efficiency of using available gaps in oncoming traffic to facilitate additional left turns. In many cases, concerns arise with left turning traffic patterns during certain times of day, such as school arrival and dismissal. When such concerns arise, engineers have changed from protected/permitted phasing to protected-only by changing the signal displays. Historically, this change required physical replacement of overhead signal displays and was essentially a permanent change, even though it may only be needed a few hours per day. The four-section display with a flashing yellow arrow overcomes this limitation.

Combining protected and permitted turn lights in one traffic signal creates an opportunity to vary the time, or phasing, devoted to protected and permitted control in response to the traffic volume at the intersection. Varying these times can help address capacity and delay issues. However, though numerous studies have developed guidelines for selecting left-turn control types, there are no clear or uniform standards for implementation of a variable left-turn mode, changing by time of day.

In this project, University of Central Florida researchers developed a decision support system (DSS) for the evaluation of left-turn phasing based on intersection conditions. First an interactive evaluation framework was developed and tested; second, based on this framework a simplified and systematic DSS was designed to flag intersections requiring traffic engineers' attention.

In their literature review, researchers found that common guidelines for left-turn phasing did not apply to all intersections; a comprehensive approach was needed to cover all cases and to develop a deeper understanding of the range of

All through traffic waits as drivers complete protected left turns.

parameters that affect left-turn phasing. They listed parameters of interest for their potential impact on operational and safety effectiveness. The DSS framework would be based on these parameters, such as time of day, peak hour, intersection geometry, land use, and others. Each parameter was investigated using data drawn from databases or from video collection units placed in the field at over a dozen intersections that met researcher criteria; over 200 hours of video data were processed. Collected data were further analyzed using Synchro Studio (8.0) to calculate the level of service and a permitted left-turn adjustment factor. The researchers used a novel experimental design to examine the effects of the parameters, ultimately creating a model with correspondence to the real-world data of 84%. Based on this model, the researchers created a DSS in Visual Basic.

Through this project, researchers expanded the understanding of traffic flows involving left-turn lanes and put this new knowledge to practical use in the development of a software tool that traffic engineers can use to fine-tune time-of-day phasing at heavily traveled intersections. The result will be greater safety, higher throughput, and fewer delays at these intersections, producing greater convenience and efficiency for Florida drivers.

Project Manager: Rick Morrow, FDOT District Five Traffic Operations
Principal Investigator: Essam Radwan, University of Central Florida
For more information, visit http://www.dot.state.fl.us/research-center