

Research Need for Operations and Maintenance Technical Advisory Group

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1. Issue Identified:

Left-turn Phase Sequence Alternatives

2. Summary of Problem:

The research should compare three types of left-turn phase sequence alternatives in terms of safety and operations. According to the Federal Highway Administration, these types include:

- Lead-lead: The most commonly used left-turn phase sequence, in which both opposing left-turn phases start at the same time.
- Lag-lag: Commonly used in coordinated signal systems with closely spaced intersections, with both left-turn phases ending at the same time.
- Lead-lag: Generally used to accommodate through-movement progression in a coordinated signal system.

According to a Texas Department of Transportation study, as left-turn traffic volumes increase, average traffic delay and accident potential increase for both through and left-turning vehicles. Time allocated to left-turn phases must be reallocated from time that could be allocated to through phases. Traffic engineers must determine the appropriate left-turn phase sequence to meet left-turn demand while also accommodating through-movement progression. In Illinois, this challenge is particularly relevant in urban and suburban areas with networks of arterial roadways and numerous interconnected traffic signal systems. This is especially true in the northeastern Illinois region, which includes the City of Chicago and surrounding suburban communities. In addition, traffic engineers must select the left-turn phase sequence that minimizes crash frequency and severity.

3. Desired Results/Outcome:

The researchers should conduct before-and-after studies of various traffic safety and operational conditions broken down by lead-lead, lag-lag, and lead-lag left-turn phase sequences. Measures should include the number of overall crashes, fatal and serious-injury crashes, overall delay, left-turn movement delay and through-movement delay.