Title: Implementation Guidelines for Alternative Traffic Signal Phasing

Problem:
Most current traffic signal control systems do not dynamically change the phase sequence. There are opportunities to reduce stops and delays, as well as reduce blocking problems by changing the sequence of traffic signal phases. Some practitioners are hesitant to allow dynamically changing phase sequences because they are concerned that this operation may violate driver expectancy and confuse pedestrians.

Possible changes to phase sequence may include changing a left turn phase between leading and lagging, skipping phases, or servicing a phase twice per cycle. Alternate phase orders are particularly helpful at closely spaced intersections such as freeway interchanges in order to reduce blocking problems.

There is little research into these safety issues making discussion and debate difficult. The most common concern is that drivers and pedestrians may expect phases to appear in a pre-defined order and will start out upon seeing a yellow on the cross street without waiting for a green and walk signal.

It should be noted that dynamic phase sequences may also have positive impacts including safety impacts such as reducing blocking and spill-back between intersections and removing vehicles from the yellow dilemma zone.

Objective:
The objective of this research would be to investigate the issues involved with dynamically changing signal sequences. Typical tasks that might be undertaken include:

- Compiling existing research and literature on this practice, particularly deployment case studies.
- Investigating the driver and pedestrian expectancy under dynamic phasing. This research may involve human factor studies using laboratory driver simulators as well as field studies.
- Investigate safety issues including accident histories from existing locations where phase orders have changed by time of day. Investigator looking at these sites should look for variation in different types of vehicle and pedestrian accidents.

The fundamental objective is to determine the benefits and impacts of dynamic phasing.

Ultimately, if there are situations where changing phase sequences can be shown to be safe and effective, warrants or guidelines must be developed and recommended for inclusion in the Manual on Uniform Traffic Control Devices. Inclusion in the manual would give practitioners legal justification for implementing such operations.

Key Words: Traffic Signals, Optimization, Actuated Control, Arterial, Human Factors, Safety, Dynamic Phase Sequence

Related Work:
Research into leading versus lagging left turn operation. Evaluation of Dallas style permitted plus protected signal heads.

Urgency/Priority:
This is an urgent project since in many cases traffic operations can be significantly improved by the use of dynamic phase sequencing. Practitioners are hesitant to request this type of operation due to safety and liability concerns. Vendors to date have not implemented dynamic phase sequencing in part because of these same concerns. Consequently, new traffic signal control systems are not operating as efficiently or safely, causing millions of dollars in lost time and accidents every day.

Cost: $300,000

User: State and local traffic engineers.

Implementation:
The published report from this study will provide guidance on what safety issues, if any are involved with dynamic phase sequencing. The submitters hope that this operation will show no significant safety issues and lead to widespread adoption of this practice.
Submitted By

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