Research Summary

Using Traffic Signals to Reduce Speeding and Speeding Opportunities on Arterial Roads

Research Need

Preventing speeding on multilane arterials is critical to safety. Earlier research found that timing traffic signals with a "Safe Waves" approach – one that removes opportunities for drivers to progress through multiple intersections at dangerously fast speed while supporting traffic flow at a safe speed – can reduce speeding opportunities by up to 50% with little or no change in average traffic delay.

Goals/Objectives

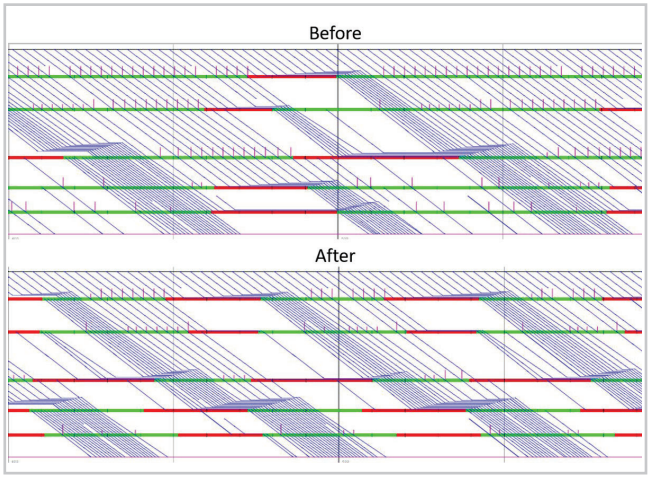
Objectives were:

1) Do a field test to determine whether Safe Waves signal timing results in a substantial reduction in speeding while still providing good progression.

2) Where a field test is not possible, do a simulation-based case study to determine whether Safe Waves signal timing results in a substantial reduction in speeding opportunities while still providing good progression.

3) Develop a software tool with which traffic engineers can evaluate the number of speeding opportunities produced by a arterial traffic signal timing plan. With a tool like this, engineers will be able to use Speeding Opportunities as a performance measure when developing signal timing plans.

4) Write a guidebook for timing traffic signals using the Safe Waves approach.



Methodology

Safe Waves timing plans were developed for two corridors: Route 114 in Danvers (2+2 lanes, 40 mph speed limit, 6 intersections) and Rt 16 in Everett and Chelsea (3+3 lanes, 35 mph, 9 intersections). Innovative techniques included undersized phases for infrequently called pedestrian movement and 30-minute peak hour factors to reduce needed cycle length. On Rt 114, the new signal timing was implemented in the field, and speeds measured with radar. On Rt 16, traffic with old and new timings was simulated.

A guide for Safe Waves signal timing draws on experience with both urban and suburban corridors.

A new web app, the Safe Waves Analysis Tool (SWAT) was developed. It creates vehicle trajectories using a deterministic simulation with platoon dispersion, from which speeding opportunities can be measured.

Key Findings

On Rt 114, with Safe Waves timing, 78% fewer vehicles exceeded the speed limit. Arterial travel time increased by 1.8 seconds per intersection, and pedestrian delay fell by 19%.

On Rt 16 (simulated), speeding opportunities fell by 57%. Vehicle delay increased by 2.7 seconds per intersection, but pedestrian delay for crossing the arterial fell by 35 seconds, due mainly to shorter cycles.

Use of Findings

This research has proven that signal timing using the Safe Waves approach can provide effective speed management on arterials with traffic signals spaced up to 1800 ft apart and perhaps more. A guidebook offers tips and techniques for following that approach.

Practitioners can use the new web-app Safe Waves Analysis Tool, free of charge, to evaluate arterial signal timing plans in terms of speeding opportunities. Government agencies, in turn, can request that Speeding Opportunities be used as a performance measure for traffic signal timing.

Project Information

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