

SIGNALIZED INTERSECTION SAFETY STRATEGIES



Employ Signal Coordination

WHERE TO USE

Signalized intersections with a high frequency of crashes involving major street left-turning and minor street right-turning vehicles where adequate safe gaps in opposing traffic are not available. Major road rear-end crashes associated with speed changes can also be reduced by retiming signals to promote platooning.



Photo by: Texas Transportation Institute

This photo shows two closely-spaced intersections that are not coordinated. Poor coordination results in unnecessary stops, more delay, and possibly higher crash rates.

DETAILS

Signal coordination has long been recognized as having beneficial effects on the quality of traffic flow along a street or arterial. Good signal coordination can also generate measurable safety benefits, primarily in two ways.

Coordinated signals produce platoons of vehicles that can proceed without stopping at multiple intersections. Reducing the number and frequency of required stops and maintaining constant speeds for all vehicles reduce rear-end conflicts. In addition, signal coordination can improve the operation of turning movements. Drivers may have difficulty making permitted turning maneuvers because of a lack of gaps in through traffic. Crashes may occur when drivers become impatient and accept a gap that is smaller than needed. Such crashes could be reduced if longer gaps were made available.

Corridors with coordinated signals that experience a higher level of rear-end and angle crashes should be reviewed to determine if the timing should be revised or if the signals should be optimized again.

KEY TO SUCCESS

Signals up to a mile of each other should be coordinated. The grouping of the signals to be coordinated is a very important aspect of design of a progressive system. Factors that should be considered include geographic boundaries, volume/capacity ratios, and characteristics of traffic flow. Coordination across jurisdictional boundaries is strongly encouraged.



ISSUES

Signals too close together can present problems related to drivers focusing on a downstream signal and not noticing the signal they are approaching, or proceeding through a green signal and not being able to stop for a queue at an immediate downstream signal. Dispersion of platoons can occur if signals are spaced too far apart, resulting in inefficient use of the signal coordination.

Achieving a coordinated system along a corridor may be complicated by signal requirements associated with crossing facilities, any of which may also require signal coordination. The need for long signal cycles associated with multiphase operation and long clearance intervals will dictate the cycle length on which progression will be based. Such a cycle length may produce additional delays on crossing facilities.

Coordinating signals for an extended length of highway can involve multiple governmental jurisdictions. Agreement among the many governmental stakeholders must be achieved in such cases.

Along corridors heavily used by emergency services, implementation of signal preemption may be considered (see Signalized Fact Sheet A5). On some corridors heavily served by bus transit, transit priority systems may be considered. Other corridors may include at-grade rail crossings. In all three situations, preemption may break up a platoon or cause the system to get out of coordination for several cycles and negate the effectiveness of a coordination scheme.

TIME FRAME ●●○

Implementation time for signal coordination is short to moderate. Installation of signals that may otherwise be unwarranted will increase implementation time, due to additional approvals required. The type of signal system to be installed or upgraded will also affect implementation time.

COSTS ●●○○

Costs involved will be low to medium. If a new system is required to control the coordination, costs will be higher and will include design of the system and purchase and installation of new equipment.

EFFECTIVENESS

PROVEN: Studies have proven the effectiveness of signal coordination in improving safety. The Institute of Transportation Engineer's Traffic Safety Toolbox cites two studies of coordinated signals with intersection crash frequencies that dropped an average of 32%. One of the studies showed an improvement in crash rates for mid-block sections as well. Signal coordination can also contribute to a decrease in red-light running. An Arizona study on the effectiveness of traffic signal coordination concluded that crash rates on intersection approaches decreased 6.7% after signal coordination.

COMPATIBILITY

Traffic signal coordination is compatible with most other strategies to improve signalized intersection safety. Signalized Fact Sheet A7 discusses removing a signal that is no longer warranted. Consideration may be given to retaining an unwarranted signal to use in a coordinated system.

For more details on this and other countermeasures: <http://safety.transportation.org>

For more information contact:

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