

SIGNALIZED INTERSECTION SAFETY STRATEGIES



Employ Emergency Vehicle Preemption

WHERE TO USE

Signalized intersections where normal traffic operations impede emergency vehicles and where traffic conditions create a potential for conflicts between emergency and non-emergency vehicles.



Photo by: Texas Transportation Institute

DETAILS

Signal preemption allows emergency vehicles to disrupt a normal signal cycle in order to proceed through the intersection more quickly and under safer conditions. The preemption systems can extend the green on an emergency vehicle's approach or replace the phases and timing for the whole cycle. The *Manual on Uniform Traffic Control Devices* discusses signal preemption, standards for the phases during preemption, and priorities for different vehicle types that might have preemption capabilities.

A signal preemption system can decrease emergency vehicle response times. Preemption is especially useful where emergency vehicles are likely to have to travel some distance along a corridor. Also, preemption can provide both a safety and operational benefit on high-speed roadways where emergency vehicles need to enter the intersection from the minor road.

Many systems have applications in transit-vehicle priority as well as signal preemption for emergency vehicles. Some jurisdictions use confirmation lights to inform drivers that emergency vehicles are preempting the signal or signs that inform drivers that a police pursuit is in progress.

KEY TO SUCCESS

One key to success is ensuring that the preemption system works when needed by providing clear sight lines between emergency vehicles and detectors. Also, it is important to ensure that vehicles from a variety of jurisdictions will be able to participate in the signal preemption program. The focus of the treatment should be on fire and emergency medical services because they often follow standard routes. Another key to success is the coordination of implementation across jurisdictions, including compatibility of equipment and technology, as well as operational policies.



ISSUES

Preempted signals that stop vehicles for too long may encourage disrespect in drivers for the red signal, and they may decide to proceed even though the signal is red.

Preemption of signals by emergency vehicles will temporarily disrupt traffic flow. Congestion may occur, or worsen, before traffic returns to normal operation. One study of signal preemption systems in the Washington, D.C., area demonstrated that once a signal was preempted, coordinated systems took anywhere from half a minute to seven minutes to recover to normal operation. During these peak periods in more congested areas, vehicles experienced significant delays.

Light-based detectors need a clear line of sight to the emitter on the vehicles. This line could become blocked by roadway geometry, vehicles, foliage, or precipitation.

TIME FRAME ●●○

Implementation time will vary from short to medium, based upon the number of intersections and number of agencies involved in the preemption system.

COSTS ●●○○

Costs for installation of a signal preemption system will vary from medium to high, based upon the number of signalized intersections at which preemption will be installed and the number of emergency vehicles to be outfitted with the technology. The number of detectors and the intricacy of the preemption system could increase costs.

EFFECTIVENESS

PROVEN: Installation of signal preemption systems for emergency vehicles has been shown to decrease response times. A review of signal preemption system deployments in the United States shows decreases in response times between 14 and 50% for systems in several cities. In addition, the study reports a 70% decrease in crashes with emergency vehicles in St. Paul, Minnesota, after the system was deployed (though the extent to which emergency vehicle priority was implemented in the city is unclear).

COMPATIBILITY

Signal preemption is compatible with most other strategies to improve signalized intersection safety.

SUPPLEMENTAL INFORMATION

Highway and other agencies should ensure that their policies for traffic signals include use of signal preemption systems. A successful program requires the coordinated and cooperative involvement of agencies from engineering, enforcement, emergency medical services, etc., throughout the area. Implementation of a preemption system should be considered as part of programs to upgrade corridor or jurisdictional traffic signal and control systems.

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

For more information contact:

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