

TRAFFIC AND SAFETY INFORMATIONAL SERIES

FREQUENTLY ASKED QUESTION #16

WOULDN'T INSTALLING A TRAFFIC SIGNAL REDUCE THE NUMBER OF CRASHES AT AN INTERSECTION?

A traffic signal is not always the best option for reducing crashes at an intersection. In fact, the incorrect installation or placement of a traffic signal can actually result in additional crashes at the intersection.

Crash analysis is very complicated and usually identifies multiple causes for the crash history at a given intersection. For this reason, the solution to a safety problem at a particular intersection is not always obvious, and the placement of any type of traffic control device to address the identified causes must be considered carefully.

WHAT ARE THE WARRANTS FOR A TRAFFIC SIGNAL?

A traffic control signal should not be installed unless one or more of the nine traffic signal warrants presented in the *Manual on Uniform Traffic Control Devices* (MUTCD) is met. A complete listing of these warrants is included in the answer to Traffic and Safety Informational Series Frequently Asked Question #15, What Is the Harm in Installing an Unwarranted Traffic Control Device? Among other things, these warrants are related to vehicular and pedestrian volumes at the intersection, the intersection's crash history, and the presence of a school or railroad crossing.

However, fulfillment of one or more of these warrants does not in itself justify the installation of a traffic signal. A comprehensive engineering study should also be performed to determine whether a traffic signal would improve the overall safety and/or operation of the intersection. If the study indicates otherwise, a traffic signal should not be installed, even if one or more of the warrants is met.

WHAT CONTRIBUTES TO INTERSECTION CRASHES?

According to the U.S. Department of Transportation's 1994 *Technical Report on Intersection Crossing Path Crashes*, approximately one-third of all intersection crossing path crashes occur at intersections controlled with traffic signals. However, most of the crashes related to traffic signals are rear-end collisions.

The National Highway Traffic Safety Administration and Insurance Institute for Highway Safety have published several fact sheets about crashes in general that contain information relevant to understanding intersection crashes. The major contributors to crashes are summarized below:

- *Young drivers* are major contributors to fatal crashes in Iowa. In 2019, although 16- and 17-year-old drivers only represented 2.8 percent of Iowa's licensed drivers, they were involved in 11 percent of all fatalities resulting from crashes.
- *Alcohol* is a major contributing factor to traffic fatalities. In 2019, alcohol-related crashes were responsible for 103 fatalities, roughly one-quarter of all fatalities resulting from crashes.
- *Speeding* is another major contributing factor to fatal crashes in Iowa. When a vehicle is traveling at a faster speed, a much greater distance is required to make the same driving decisions than when a vehicle is traveling at a slower speed. Speeding was a factor in 21 percent of fatal crashes in Iowa in 2019.

- *Red light running* results in a large number of crashes at signalized intersections. For example, red light running crashes were responsible for 143,000 injuries and 846 deaths in the United States in 2019.

WHAT CAN BE DONE TO REDUCE INTERSECTION CRASHES?

An intersection crash analysis can be undertaken with the goal of developing countermeasures to reduce crashes. However, it is important to keep in mind that each intersection has its own unique characteristics that must be studied and analyzed in detail. The traffic engineer conducting the analysis should observe the site and use proper analysis techniques and his or her background and experience to identify solutions.

Signalization may not eliminate the crash concerns at an intersection; it may simply change the type of crashes that occur or shift them to another location. A traffic signal (especially an unwarranted signal) can cause excessive delay, and violation of the signal by frustrated drivers can contribute to additional crashes or result in a diversion of traffic to parallel residential streets.

The evaluation of an intersection and its characteristics may indicate that measures other than a traffic signal could improve safety adequately and less intrusively. Some countermeasures that might be considered for crash reduction have been identified by the Institute of Transportation Studies in the 16th edition of the *Fundamentals of Traffic Engineering*:

- Prohibit a turning movement
- Provide dedicated/channelized turn lanes
- Install or improve warning signs
- Improve roadway lighting
- Provide a stop sign
- Install or improve pedestrian crosswalks
- Improve skid resistance for wet-weather crashes
- Correct the roadway alignment

WHAT ABOUT INSTALLING A TRAFFIC SIGNAL?

Traffic signals, when warranted, can produce a more orderly movement of traffic, increased intersection capacity, a reduction in certain types of crashes (especially right-angle crashes), nearly continuous movement along a route (via signal coordination), and interruptions in traffic to permit other traffic or pedestrians to cross. However, improperly installed or unwarranted traffic signals can produce excessive delay, disobedience of the signal indications, increased use of minor roadways to avoid signals, and an increase in certain types of crashes (especially rear-end collisions).

Installation of a traffic signal (or multiway stop control) must be preceded by a thorough engineering study to determine whether the location meets minimum signalization warrants. A traffic signal should only be installed if the intersection meets one or more of the nine warrants in the MUTCD for signal installation (for these warrants, see the answer to Traffic and Safety Informational Series Frequently Asked Question #15, What Is the Harm in Installing an Unwarranted Traffic Control Device?).

Only one traffic signal warrant is related to an intersection's crash history. This warrant requires that remedies less restrictive than a traffic signal be considered first, that there be at least five reportable crashes in a year that could be corrected by a traffic signal, and that certain minimum volume levels be met.