

TRAFFIC AND SAFETY INFORMATIONAL SERIES FREQUENTLY ASKED QUESTION #15

WHAT IS THE HARM IN INSTALLING AN UNWARRANTED TRAFFIC CONTROL DEVICE?

Installing stop signs or traffic signals where they are not needed can cause significant disruption of traffic flow and increase intersection delay for drivers. The induced delay increases travel time and annoys drivers, and the additional starts and stops result in increased fuel consumption and the consequent production of carbon monoxide, nitrous oxide, particulate matter, and other pollutants.

WHAT IS THE HARM IN INSTALLING A STOP SIGN?

Two-way stop signs assign the right-of-way at an intersection. The warrants for the installation two-way stop signs in the *Manual for Uniform Traffic Control Devices* (MUTCD) are listed below. Because a stop sign causes substantial inconvenience to motorists, it should be used only where warranted. It may be warranted where the following conditions exist:

1. the intersection of a less important road with a main road where the applications of the normal right-of-way rule is hazardous;
2. a street entering a through highway or street;
3. an unsignalized intersection in a signalized area;
4. other intersections where a combination of high speed, restricted view, and serious accident record indicates a need for control by the stop sign.

The amount of delay created by the stop sign depends on both major and minor street flows. The gaps in the major flow traffic stream must be adequate to allow the stopped traffic to execute the through, right, or left movement through the intersection. The term “critical gap” is often used to describe the median gap accepted by drivers for specific turning maneuvers and roadway characteristics. According to the 1997 *Highway Capacity Manual*, typical critical gaps are 6.2 to 6.9 seconds for right turns from a minor roadway and 7.1 to 7.5 seconds for left turns from a minor roadway. Left-turning movements take longer, and left-turning drivers must cross more traffic streams. Additional delay for minor street vehicles is also determined by the vehicle arrival rate. The arrival rate of vehicles on the minor street is related to how long drivers will wait in the queue to get to the stop line.

The delay times at stopped approaches can become excessive if either major or minor flow is high. The advantage of a two-way stop is that the major flows do not have to stop and they incur almost no delay at the intersection (i.e., the majority of the traffic does not have to stop).

Four-way stop control is often controversial as it can often confuse motorists and can cause more average delay than other types of control. The multiway stop sign should only be used where the volume on all approaches to the intersection is approximately equal and the traffic volumes are relatively low. However, the four-way stop sign alternative can be quite useful in unusual situations where two-way stop control has not solved the safety problems but where signalization is not yet warranted.

WHAT IS THE HARM IN INSTALLING TRAFFIC SIGNALS?

Justification of signal installation requires considerable data collection and analysis. The following data need to be collected and analyzed:

- traffic volumes by approach and movement for the 16 highest hours in a day,
- pedestrian counts in crosswalks,
- intersection approach speed distributions,
- collision diagrams for recent crashes, and
- condition diagram for the intersection.

The MUTCD lists 11 warrants for the placement of traffic signals. These warrants are summarized below (please refer to the MUTCD for details). If none of these warrants are met, a traffic signal should not be placed. In addition, the fulfillment of a warrant or warrants also does not in itself justify the installation of a signal. Please

1. *Minimum vehicular volume.* The volume of intersecting traffic must be above a certain value.
2. *Interruption of continuous traffic.* The traffic volume on a major street is so significant that the traffic on the minor street cannot safely merge, enter, or cross the major street.
3. *Minimum pedestrian volume.* The volume of pedestrians crossing a major street exceeds a certain value.
4. *School crossing.* At an established school crossing, a signal can be placed if it is shown that there are not enough gaps in the traffic for the children to safely cross.
5. *Progressive movement.* To maintain the proper grouping of vehicles and to effectively regulate the group speed.
6. *Accident experience.* When less restrictive remedies and enforcement has failed to decrease the accident rate below levels expected with signalization.
7. *Systems warrant.* A common intersection that serves a principle network for through traffic flow.
8. *Combination of warrants.* If warrants 1 and 2 are each satisfied by 80 percent of the stated values, a signal placement could be justified.
9. *Four-hour vehicular volume.* The traffic volumes on the major and minor streets exceed a certain value for each of any four hours on an average day.
10. *Peak hour delay.* The minor street traffic suffers major delay in entering or crossing the major street for only one hour of an average weekday.
11. *Peak hour vehicular volume.* The traffic volumes on the major and minor streets exceed a certain value for only one hour of the day.

Installing a traffic signal at a low-volume intersection can significantly increase crashes and delays. Again, the increase in delay and stops then translates into higher fuel consumption, increased travel times, and higher point source pollution. The length of delay is directly related to a number of factors. Cycle length is one factor, for example, that is influenced by traffic volumes and the need to safely accommodate pedestrians. The pedestrian crossing time constraints could significantly increase the necessary cycle lengths. Although traffic signals can reduce the total number of collisions at an intersection, research has shown that certain types of crashes (e.g., rear-end collisions) may actually increase after a signal is installed. For this reason, the type and number of crashes at an intersection should be considered before the installation of a signal.

Traffic signals can represent a positive public investment when justified, but they are costly. A modern signal can cost \$80,000 to \$100,000 to install. In addition, there is the cost of the electrical power consumed in operating a signalized intersection 24 hours a day (which can average about \$1,400 per year).

It is important to carefully consider whether a traffic control device is needed before rushing to an implementation decision. The costs and benefits must be carefully evaluated, and a careful analysis and engineering study must be completed.

For more information

For more information, please contact _____.