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LOW VOLUME FLASHING

Many agencies like the idea of placing certain traffic signals into flashing operation during low volume periods. These agencies routinely flash signals during late night hours and might also flash the signals on weekends. When volumes are low, flashing operation is a very efficient form of intersection control that minimizes vehicular delay. Flashing operation can be especially beneficial for non-actuated intersections or at intersections where detection is not functioning properly.

Flashing operation during low volume periods also tends to be very popular with the motoring public. Drivers can become very frustrated if they are forced to sit and wait at an intersection when there is no other traffic in sight. Low-volume flashing operation helps avoid such situations.

Unfortunately, there are no hard and fast rules as to when a signal should be placed in flash. There isn't even a good set of usable guidelines pertaining to the use of low-volume flashing operation. For this reason, I developed my own set of guidelines for low-volume flashing operation. They are as follows:

1. Flashing operation should be used when the 15-minute volume in both directions on the main street is less than 100 vehicles and the 15-minute approach volume on the higher volume side street is less than 10 vehicles.
2. In addition, the intersection should not have any of the following:
 - A.) restricted sight distance,
 - B.) complicated or awkward geometrics (such as 5-legs or a complex frontage road situation),
 - C.) a long distance for side street motorists to cross (as is the case at a very wide intersection).
3. Flashing operation should not be used for more than 3 adjacent signals to eliminate high main street speeds associated with the "speedway effect". The "speedway effect" occurs when main street drivers go flying down the corridor late at night because they realize that all of the signals are on flash and there is no chance of being stopped. (For some reason, alcohol consumption seems to intensify this effect, but don't ask me how I know this.)

Sight distance should be evaluated from the edge of the main street extended, not the stop line, since motorists routinely pull past the stop line when evaluating gaps during flashing operation. Many intersections have more than adequate sight distance when the sight distance is evaluated from a reasonable location in front of the stop line, yet have inadequate sight distance when evaluated from the stop line.

Signals that are used in railroad or fire station preemption should not automatically be eliminated from consideration for flashing operation since most controllers allow the signal to be programmed so that it will exit flashing operation to service the preemption routine and then return to flashing operation once the preemption event has ended.

The above guidelines were developed during quite a few years of coordinated signal timing work wherein I implemented low-volume flashing operation at many intersections of all different types. They have proven to be a pretty good set of guidelines that produce reasonable flashing periods that both the public and traffic engineers seem to accept.

Another area where there is no hard and fast rule pertains to the optimum time to drop signals from coordinated operation into free operation. Over the years, I have found that when the 15-minute volume in both directions on the main street is less than 200 vehicles, coordinated operation can give way to free operation. Below this volume, main street platooning tends to be minimal and, consequently, the progression benefits obtained are more than offset by the cost of making side street motorists wait unnecessarily.

To evaluate both the "flashing rule-of-thumb" and the "free rule-of-thumb" you will need to collect a week's worth of machine counts (by 15-minute interval) at some point along the main street (or more than one point if main street traffic volumes change significantly over the corridor) and at all side street approaches where you are considering flashing operation.

Author's Response; Low Volume Flashing Operation

I had three individuals comment on this IMSA Journal article (Jim Otterson of Huntington Beach, California; Joe Paulson of Boulder, Colorado; and Jim Harris of San Bernadino, California) and I appreciate their input. Their main concern was with my desire to increase the use of low-volume flashing indications at signalized intersections. Reference was made to a recent ITE Journal article (April 2000) which indicated that right-angle accidents in Winston-Salem North carolina are significantly higher with the use of low volume flashing operation. I receive the ITE Journal and had read the article as well. However, I found it less than satisfying.

My primary problem with the article is that it makes no attempt to determine which intersection features are causing the late-night accident problems documented in the article. (Are the intersections too wide?; are they too complicated?; are volumes too high late at night?) The article provides no information on the physical characteristics of the intersection or even the relative traffic volumes. If the researcher was dealing with bad candidate intersections for flash, or if good candidate intersections were being flashed for too long of a period time during the day, then there is no wonder accidents are a problem. You just can't tell this from the information provided in the article. It is quite possible that someone in Winston-Salem simply made some bad initial choices as to which signalized intersections to flash and then, when the flashing was removed, the situation got better (as we would expect it to). This article in no way proves that low volume flashing is a bad thing.

In my article I cautioned that low volume flashing operation is not suitable for all intersections. Many intersections are too wide, have complicated geometries, or have sight distance problems that preclude the use of low volume flashing. At other intersections, traffic volumes just don't drop to a low enough level to make late night flashing safe; or some potentially dangerous "surge" of traffic occurs during the wee hours of the morning (such as when a popular nightclub closes for the evening). The author of the ITE article seems to recognize this as the following quote indicates: "... there are places where signals flash and right-angle crashes do not increase. It is a strategy to reduce delay that need not be abandoned..."

One needs to be selective in the use of low volume flashing operation. However, it has been my consistent experience that it is used much less than it should be. And when you stop to think about how signal warrants have been developed, it just makes good common sense that signalized control should be suspended when traffic volumes are such that it is no longer needed. We wouldn't think of signalizing an intersection that had low volumes throughout the day, why do we then insist on maintaining signalization at intersections with low volumes late at night?

My recommendation for any jurisdiction considering the implementation or expansion of low volume flashing operation is to be prudent. That is, implement low-volume flashing at locations that are the best candidates for flashing, monitor the results, and then expand the program (to either more hours of the night or more locations) as engineering judgment would dictate.