# Install traffic signals logically

## Don't let emotions replace sound engineering judgments when it comes to approving traffic signal installations.

Pressure groups are making all kinds of national headlines these days. There are environmentalists pitting the tiny snail darter against gigantic water projects. There are "Ban the Nukes" groups who oppose nuclear power in any way, shape or form. And there are consumer advocates who will tackle any "public issue" at the drop of a hat.

Similar groups are at work at the local level. Although their "cause" seldom rates more than a headline or two in the local paper, their battle cry of "Save Our Children" is a winner.

These groups usually mount their attack following an accident at an intersection near a school, playground or comparable area where a child has been injured or killed. The campaign is built around the need for a traffic signal "to prevent further loss of life or hardship."

Emotional pleas before the local governing body are hard to counter in a logical manner. The elected officials cave in to the pressure and a signalized intersection is approved. Unfortunately, the results of this decision may be anything but what was anticipated. Too often, the installation contributes to more accidents than was the case before the signals went up.

In a little booklet published several years ago by the New York City Department of Traffic, Commissioner Henry A. Barnes put the problem in perspective:

"One of the greatest obstacles a professional traffic engineer faces in applying sound theories of traffic engineering is being forced to cope with thousands of non-professional engineers — the general public," Barnes said. "Everyone is a traffic expert! The result is that this attitude of expertise in itself creates accident hazards for, through pressure and the compliance of misguided civic officials, the false theories of vociferous local groups are put into effect with dire results. Whenever unnecessary or excessive traffic controls are in use, dangerous traffic conditions may result."

By Gary Chamberlain
Executive Editor

The booklet went on to show how, contrary to popular belief, a signal light may not provide the best means of protection. It referred to an analysis of accidents at school crossings made by a highway department in the midwest. The three-year study included children in the five- to 14-year age group and involved 40 intersections all located in the same large city.

The intersections were divided into four groups of 10 each. The selections were made so that traffic conditions were comparable. The only significant differences were that during school crossing hours:

- Group 1 was supervised by school patrol boys.
- Group 2 was supervised by patrol boys plus a school janitor.
- Group 3 was supervised by patrol boys and a police officer.
- Group 4 was supervised by patrol boys plus traffic signals.

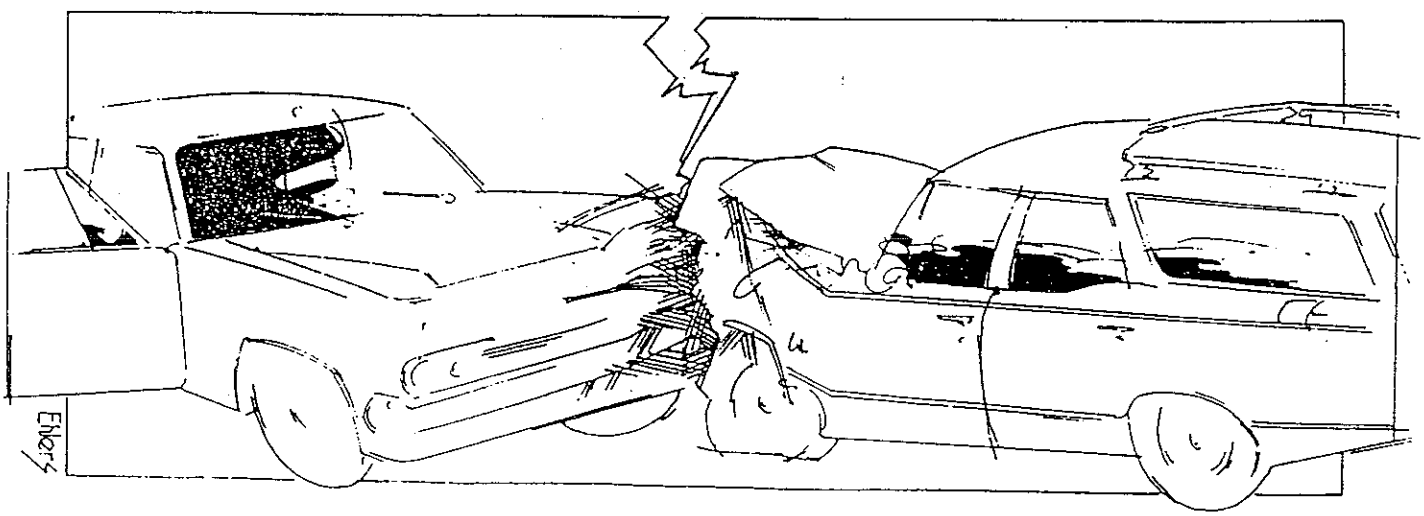
The analysis showed that Group 1 recorded the fewest accidents and Group 2 the next fewest, followed closely by Group 3. Differences among the groups were quite small and within the laws of chance.

However, at the 10 intersections in Group 4 "protected" by traffic signals, more than twice as many accidents were recorded "than at all 30 of the other crossings combined." In other words, the chance of accidents with signals was about seven times greater than without signals.

The American Automobile Association (AAA) in its *Manual on Pedestrian Safety* also makes a good case against irrational signal installations. For example, the manual reports on the unhappy results that followed the replacement of stop signs with traffic signals at the intersection of a major rural highway and a city route.

"During the next 15 months, accidents were three times what they had been during the 17 months prior to the change," the manual reported, "and property damage from accidents at the intersection totaled $11,105, compared with only $1670 for the 17 months preceding the installation. Furthermore, the signal installation was much more costly than stop signs, and the likelihood is also that traffic delays were increased."

Both the AAA manual and the New York City booklet caution readers about falling prey to "well-meaning but uninformed" persons who consider the traffic control signal to be the remedy for any intersection problem. And the booklet discusses another "false theory"



in which the public confused *ease* in crossing with *safety*.

Over the protests of the traffic engineer, the administration of a large city ordered the signal operation along a major artery changed to a block system. This required all vehicles to stop on red at the nearest intersection. The idea was to make it easier for pedestrians to cross at points other than signalized intersections. It was also "theoretically" supposed to reduce accidents.

A check of accidents over comparable periods before and after the change proved most revealing. As the number of stops increased to 880,000 from 400,000, the number of stopping actions required of drivers increased in the ratio of 2.2 to 1. Applying this ratio to the 53 accidents which occurred before the change resulted in a figure of 116.6. The actual number of accidents recorded during the period totaled 117.

"The changes made did not bring about safer, more convenient or more economical transportation," the booklet stated. "Instead, accidents increased sharply, over 20% of the drivers were so inconvenienced by delays that they sought alternate routes, and the economic loss measured by the amount of gasoline needlessly burned per year in unnecessary stopping and starting amounted to hundreds of thousands of dollars."

What then is the solution for local officials harassed by citizens demanding that a traffic signal be installed? This three-step process should take the heat off the governing body and, if properly conducted, should result in a logical "go" or "no-go" decision.

First, anticipate that citizen action will be forthcoming on the need for a signal following an accident or series of accidents at an intersection. More than likely this action will surface very soon if the accident involves a fatality.

Be ready to cite cases such as those referred to in the New York City booklet and the AAA manual where unprofessional decisions on signal installations or timing patterns created even more hazardous situations. Try to use a close-to-home example or one that resembles the intersection in question whenever possible.

Whatever you do, don't neglect to show your concern for those making the request. Tell them their proposal will be reviewed *immediately* by a professional staff person. Then set a *reasonable* date for making a decision for or against the signal. Remind those demanding a signal that any decision rendered will be based on professional design standards as applied to the local scene.

Next, turn the problem over to a pro. This may be the traffic engineer, city engineer or a consultant who specializes in traffic engineering. Insist that the party responsible for making the report do so well in advance of the date promised. This will give the elected officials plenty of time to review the report and to prepare a proper response.

How can the elected officials make certain that the traffic engineer has acted responsibly on the part of both the city and its citizens? For one thing, the engineer knows that his or her job and professional reputation are involved in the decision. There are also some guidelines that elected officials can use. These are contained in the 1978 edition of the *Manual on Uniform Traffic Control Devices* published by the Federal Highway Administration.

The manual was developed with the cooperation of a National Advisory Committee which included representatives from 10 professional and engineering organizations. Among these were the Institute of Transportation Engineers and the National League of Cities. Since its first printing in 1935, the manual has served as the "bible" on the design of and warrants for traffic

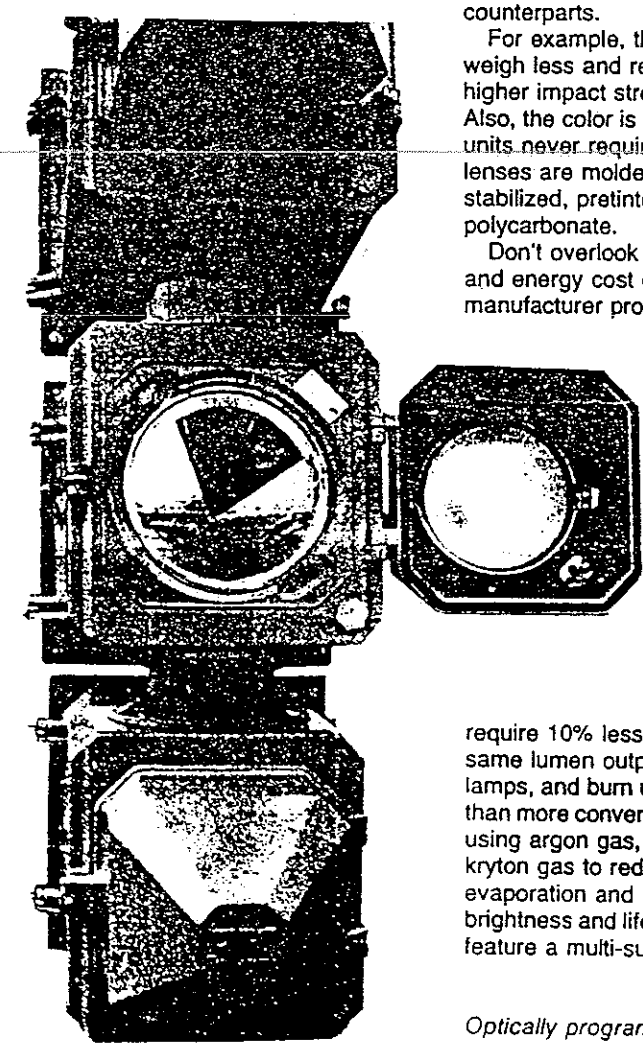
## What's new in traffic and pedestrian signals

Design and mechanical features of the signal light have progressed markedly since it was first developed as an outgrowth of the old railroad lantern. For those specifying new or replacement units, here are some innovative features to look for that can cut installation and maintenance costs and conserve energy. The major point to keep in mind is that equipment designed to provide a long, effective life will almost always prove more economical, even if the first cost is moderately higher than that of inferior equipment.

The trend today appears to be toward die cast aluminum or polycarbonate signal heads. Both types remain relatively maintenance-free throughout their lifetime. The polycarbonate signals, however, offer some important advantages over their aluminum counterparts.

For example, the polycarbonate units weigh less and reportedly have a much higher impact strength than aluminum. Also, the color is "molded-in" so that the units never require painting. Even the lenses are molded of an ultraviolet stabilized, pretinted transparent polycarbonate.

Don't overlook traffic lamps as labor and energy cost cutters. One manufacturer produces lamps that require 10% less energy, deliver the same lumen output as higher wattage lamps, and burn up to 5000 hours longer than more conventional lamps. Instead of using argon gas, these lamps employ kryton gas to reduce filament evaporation and increase both brightness and life. In addition, the lamps feature a multi-supported tungsten



*Optically programmed signal.*

systems and operations.

The manual devotes 50 pages to traffic signals. However, from an elected official's viewpoint, the section on traffic signal warrants should prove the most valuable as a check on the thoroughness of the engineer's report. There are eight of them:

- Minimum Vehicular Volume. This warrant applies where the volume of intersection traffic is the principal reason for considering a signal installation.
- Interruption of Continuous Traffic. This warrant applies whenever long delays are experienced by a relatively few motorists because of the absence of acceptable gaps in the flow of traffic at reasonable frequency.
- Minimum Pedestrian Volume. This warrant reflects the adequacy of crossing gaps and the frequency of such gaps in relation to the number of pedestrians who may desire to cross at the intersection in question.
- School Crossings. This warrant recognizes the "unique" problems related to children crossing a major artery on the way to and from school, and may be considered as a special case.
- Progressive Movement. This warrant relates to the desirability of holding traffic in compact platoons that will arrive at each successive signalized intersection at the beginning of the green interval.
- Accident Experience. This warrant "must be used with caution," not because of a lack of concern for traffic accidents, but because experience has shown that the signal does not always succeed as a safety device.
- Systems. This warrant applies when the common intersection of two or more major routes has a total existing or immediately projected volume of 800 vehicles during the peak hour of a typical weekday, or each of any five hours of a Saturday or Sunday.
- Combination of Warrants. This warrant applies to exceptional cases whereby signals may occasionally be justified when no single warrant is satisfied.

It may be helpful for the person making the report to supply the elected officials with a copy of the full text of the warrants. Each is quite brief and written so that the layman can understand most of the terminology.

The manual goes on to state that "traffic control signals should not be installed unless one or more of the signal warrants . . . are met. Information should be obtained by means of engineering studies and compared with the requirements set forth in the warrants. If these requirements are not met, a traffic signal should neither be put into operation nor continued in operation (if already installed)."

The final step involves a review of the report by the elected officials and the notification of interested parties to attend the meeting where the report will be presented. The officials should go over all the details of the report with the person who prepared it. Any questions or problems should be ironed out prior to the meeting. It's important that the officials present a united front, especially if the report indicates a signal is not warranted. It's also a good idea to have the engineer on hand at the meeting to answer any technical questions that may arise.

By following this three-step process, elected officials should find the trauma of facing irrational citizens minimized. If the decision is a "no-go" one, the officials have the professionally-prepared report to back them up. It's doubtful that this will please all of the citizens. Still, the city and its citizens will be better protected in the long run. Safety will be the winner. ■■

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filament which can withstand jolts and jars while retarding blub blackening.

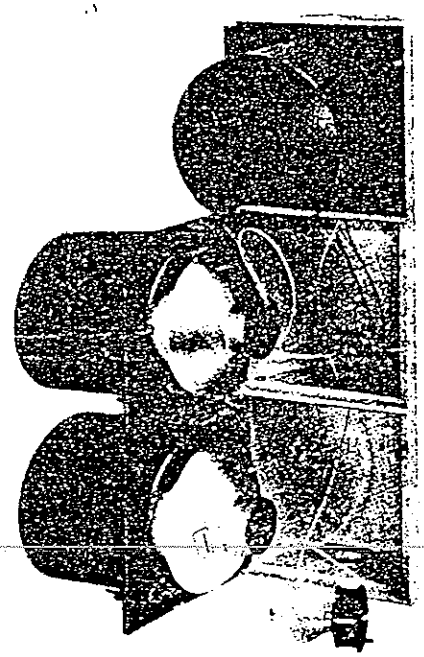
There is another energy-saving item that is available for signals, particularly the pedestrian, turn and lane control and variable message variety. This is fiberoptics.

A fiberoptic signal consists of four basic elements — a low-voltage transformer, low-wattage/high-intensity lamp with integral reflector, color filter and a fiberoptic module comprised of up to 160,000 glass fibers that carry light from the lamps to the signal face. Using a dot matrix format, individual fibers are grouped together in bundles to form the appropriate message. The controlled divergence of light projected from the ends of the individual light guides assures bright, legible messages. No light is wasted on opaque areas.

One manufacturer reports that fiberoptics requires less than 40% of the power used by conventional 150-watt incandescent signals. The modules are also available as retrofit kits.

Normally, signals and other traffic devices can guide drivers safely through difficult traffic situations. But, at some intersections, conflicting input tends to confuse motorists and prompt them to make dangerous decisions. There is an optically programmed signal available to help solve this problem.

Traffic engineers can internally mask the focal plane of this signal, "aiming" the light it transmits to drivers. They can also control the distance at which the signal first becomes visible. Situations where these signals are finding increased popularity include closely spaced intersections where drivers could be misled by "downstream" signals not intended for them, skewed intersections where drivers could be confused by signals intended for other approaches, intersections with signals directing separately phased turn movements that might confuse drivers in through traffic lanes, and intersections where pedestrians could view both pedestrian and vehicle signals with conflicting indications.



*Polycarbonate traffic signal.*

A 3½-year nationwide study of 100 problem approaches showed that use of the optically programmed signals at 36 intersections reduced accidents by 22.4%.


*Fiberoptic pedestrian signal.*