A signalized intersection in itself does not provoke any thoughts by the motorist or pedestrian. It is taken for granted as long as the intersection is functioning properly. Yet those of us in this field must spend countless hours in thinking out the problems of each installation, using known means at our disposal to satisfy the various complex vehicle and pedestrian demands.

The allocation of the cycle, split into intervals of sufficient length, must be so timed to accommodate the demand requirements. This is especially true of closely tied groups of intersection in an irregular street pattern, but still requiring an orderly and efficient movement through each of these intersections in a progressive manner. These types of systems can be further complicated by the presence of railroad grade crossings. Often in functional design, channelization, medians, street markings, and other regulatory measures are required in order to supplement the movements. The designer must be thoroughly familiar with these tools.

Our contemporary way of life takes the convenience of properly timed traffic control equipment for granted. However, it is only necessary to take the usual route home during the similar rush hour when some traffic control equipment is grossly malfunctioning to appreciate the present high standards of the traffic control signals.

In the final appraisal of our art it is necessary to have the expeditious transportation of persons and goods to maintain and extend our high standards of life. This high speed movement will of necessity exact a toll of life and limb, however small it can be made. Slowing down traffic, whether by congestion or legislation, has the effect of lowering the desirability of suburbanland for residential use.

Traffic signals, while suited to allocate the general vehicular right of way are not well suited to control left turn conflicts at an ordinary intersection when used alone. Traffic signals sometimes outlive their usefulness because of emotional reasons. Such cases encourage disrespect for other signals that are warranted, and so all unnecessary unwarranted signals should be removed.

To the general public, the installation of a traffic signal often implies that accidents will be substantially reduced. Studies have frequently shown, however, that this is not always true. Our society is already so dependent on high speed movement of emergency and ordinary vehicles, that if we attempted to stop all traffic accidents by stopping all vehicular movement, that the end result might be more fatalities than the approximate one hundred per day because the injured from other causes and the critically ill could not be efficiently moved to medical aid or medical aid could not be brought to them.

A study of traffic signal installations in Michigan from 1946 to 1957 covering various types of installations from the simple three-leg to five and six-legs and other complex intersections, showed the following.

At intersections where stop-and-go signals were installed, the number of accidents increased nearly one-fourth. It was found that the simpler the intersections, the greater the increase in accidents. In the case of flashing beacon installations, the number of accidents decreased regardless of the type of intersection, the average being 26 percent.

The number of persons injured decreased by 20 percent at intersections where stop and go signals were installed and by 50 percent where flashing
beacons were installed. The number of fatalities also decreased after either of the two types of signals were installed.

After installation of stop-and-go signals, rear-end collisions increased 200 percent, head-on collisions increased 157 percent, and side-swipe collisions increased 74 percent. Only angle and miscellaneous types of collisions decreased. The installation of flashing beacons resulted in a nearly uniform reduction of about 25 percent for each type of collision. It was found that the greatest reduction in accident rates occurred at the higher volume intersections for stop-and-go signals and at the lower volume intersections for flashing beacons.

At 39 intersections where stop-and-go signals were installed, the number of accidents increased 23 percent, on the other hand at 50 intersections where flashing beacons were installed, there was a 26 percent reduction in accidents. The greatest increase in number of accidents after stop-and-go signals were installed was observed at 3 and 4-leg undivided intersections.

After stop-and-go signals were installed the number of persons injured remained fairly constant at 3-leg intersections; increased slightly at 4-leg "undivided" intersections; decreased at 4-leg "divided", 5-leg, 6-leg, and other complex type of intersections. At flashing beacon installations there was a general decrease in the number of persons injured at all types of intersections.

The study indicates that stop-and-go signals are less effective from the safety standpoint at simple types of intersections, but for the more complex types they may be desirable. It appears that greater use should be made of flashing beacons at 3-leg and 4-leg intersections where some type of signal is required.

Traffic signals affect the various types of collisions. The installation of stop-and-go signals caused an increase of 200 percent in rear-end collisions; an increase of 157 percent in head-on collisions; and an increase of 74 percent in side-swipes. Only angle collisions and other miscellaneous types were decreased. At intersections with flashing beacons all types of collisions declined, ranging from 18 percent for rear-end collisions, 29 percent for angle collisions and 32 percent for head-on collisions.

In the before period, angle collisions were dominant, but after installation of stop-and-go signals, rear-end collisions ranked highest. However, after flashing beacons were installed, angle collisions still predominated, but there was a 29 percent decline in the number.

Since stop-and-go signals tend to reduce angle collisions, it follows that where this type of accident is a substantial percentage of the total, stop-and-go signals are more likely to be effective.

After stop-and-go signals were installed, the number of accidents increased regardless of light or weather conditions, with the greatest increase occurring during periods of inclement weather.

With flashing beacons the number of accidents decreased under all-weather conditions, both day and night.

These comparisons point to the accident reduction benefit that can result from converting stop-and-go signals to flashing signals especially during inclement weather. More consideration should be given to this type of operation where signal controls are flexible enough to permit conversion.

Highway Lighting

In the beginning on this earth, the Lord created light, and ever since it has been a magnet for mankind, because he also divided it into periods of daylight and darkness.

 Probably the greatest need for roadway lighting is "Traffic Safety". To support this statement we need but glance at the highway accident statistics and we are immediately impressed by the fact that the nighttime fatal accidents are about three times the daytime rate despite the fact that the traffic volume at night is less.
The main difference between daytime and nighttime driving is visibility—The relative capability of being seen under given conditions of distance, light, atmosphere, etc. Although we realize that there are other factors, the main ingredient that is lacking is light. We can build the best highway in the world, but unless we can see where we are going, the highway will not be safe at night.

We all know from personal experience the limitations when driving at night with car lights as the only source of roadway illumination, particularly on low beam.

We know the hazards of driving on an unlighted highway with little traffic, where our tendency is to increase our speed and overdrive the headlights, and we are fully aware of the reduced visibility when driving against oncoming car headlights.

Many people do not recognize the need for highway lighting and are prone to criticize on the basis of initial cost without evaluating the return in lives saved through increased traffic safety, and the economic dividend realized through increased business, increased roadway capacity and night driving comfort—and the latter point may well be much more important than we assess it to be. Fortunately, the publicity being given to the shocking traffic toll in human lives is making people aware of the fact that steps must be taken to reduce this death rate, and roadway lighting will be increasingly recognized for the contribution it makes toward this end.

The mechanization of men's activities and the development of the internal combustion engine and its use in vehicles for commercial and private use was certainly the main reason for an increase in day and night traffic. Overnight a farm spot became a dangerous intersection. Safety devices and traffic signals were designed and more and more it became clear that good street lighting, with the safety and comfort of the road user in mind, became a necessity of vital importance. What is good street lighting? What should it prevent and what should it guarantee?

The main reason for street lighting is to illuminate at certain levels and as uniformly as possible the surface of the roads. The desirable level depends upon the density of traffic, and the nature of the roadway for which the lighting system is to be designed.

By facilitating the use at night of the streets and roads, street lighting may be very helpful in switching a part of day traffic to night traffic such as heavy interurban transports.

Although independent of traffic signs and traffic lights, good street lighting may help to guide the night traffic into, through, and out of inhabited areas, with greater traffic safety.

As annual state reports on motor vehicle accidents are completed, it becomes increasingly apparent that darkness, especially on the nations' rural highways, is an invitation to death.

Although the figures vary from state to state, the results and effects of darkness on rural roads is basically the same. The facts are: only one-third of all accidents on rural roads occur during dark hours, yet the death toll at night is virtually the same as during daylight hours. Statistics show that there is one fatality for every 83 accidents during daylight hours, and one fatality for every 44 accidents during hours of darkness. Of the pedestrians killed, 70 percent are killed at night. Per accident at night the bodily injuries are more serious and the property damage is 50 percent higher than in daytime.

The thousands of lives lost each year because of poor light conditions for night driving are being decreased by more efficient headlights and more adequate illumination on streets and highways.

When we consider the financial status of street lighting, the average layman is somewhat amazed at the cost. The least expensive installation, a luminaire mounted on wood poles with overhead wiring, runs approximately $200 per luminaire. The better installations, a luminaire mounted on steel poles both under-
ground wiring, runs about $750.00 per luminaire. Either type of these installations are very inexpensive when you consider the property damage, injuries and loss of life each year.

Traffic signals, flashing beacons and street lighting are but three tools which the Traffic Engineers use to help in making our highways safer for their users. These tools along with the other tools discussed during this program can make a great improvement in traffic safety.