

TRAFFIC SIGNALS

Each year the City of Vista receives numerous inquiries regarding the operation of the traffic signals within the city. The public's understanding of the function of traffic signals can improve driving habits by reducing speeding and associated traffic accidents. The more drivers know about the operation of traffic signals, the less they will be frustrated when waiting for a signal to change.

WHY ARE TRAFFIC SIGNALS NEEDED?

As traffic volumes increase beyond the capability of lesser controls such as all-way stops, it may be necessary to install a traffic signal. Prior to installation, established minimum traffic signal criteria must be satisfied. The criteria include an evaluation of vehicular and pedestrian volumes, accident experience and vehicular volume delays.

ARE TRAFFIC SIGNALS THE ANSWER TO SOLVING TRAFFIC PROBLEMS?

ADVANTAGES OF TRAFFIC SIGNALS

Signals offer maximum control at intersections. They relay messages of what to do and what not to do. The primary function of any traffic signal is to assign right-of-way to conflicting movements of traffic at an intersection.

By alternating assignment of right-of-way to various movements, traffic signals provide for the orderly movement of conflicting traffic flows. In order to permit the crossing of minor movements that could not otherwise move safely through an intersection, traffic signals might interrupt extremely heavy flows. When properly timed, a traffic signal increases the traffic handling capacity of an intersection. When installed under conditions that justify its use, a traffic signal is a valuable device for improving the safety and efficiency of both pedestrian and vehicular traffic. Under appropriate conditions, traffic signals are likely to reduce certain types of accident such as right-angle (broadside) collisions.

DISADVANTAGES OF TRAFFIC SIGNALS

While many people realize that traffic signals can reduce the number of right-angle collisions at an intersection, few realize that traffic signals can also cause a significant increase in rear-end collisions. Normally traffic engineers are willing to accept an increase in rear-end accidents for a decrease in the more severe right-angle accidents. However, when there is no right-angle accident problem at an intersection and a traffic signal may not be needed for traffic control, the installation of traffic signals can actually cause deterioration in the overall safety at an intersection.

Traffic signals are not a "cure all" for traffic problems. The primary goal of the traffic engineer is to attain the safest and most efficient overall traffic flow possible. In addition to an increase in accident frequency, unjustified traffic signals can cause excessive delays, disobedience of traffic signals and diversion traffic to adjacent streets.



HOW MUCH DOES A TRAFFIC SIGNAL COST?

Traffic signals are more costly than is commonly realized, even though they represent a sound public investment. A traffic signal can cost between \$100,000 and \$200,000. This money pays for the following equipment:

- Traffic Signal Controller
- Signal Heads
- Vehicle Detectors

➤ Signal Poles

The traffic signal controller is the brain of the traffic signal. It consists of computer controls that operate the selection and timing of the traffic movements according to various demands of traffic as registered by vehicle detectors.

The signal head provides for controlling traffic in a single direction and consist of one or more signal sections. These usually include solid red, yellow and green lights and sometimes red, yellow and green turn arrows. A signal head may contain one or more signal faces.

Vehicle detectors are devices used for indicating the passage or presence of vehicles. Vehicle detectors consist of wire loops placed in the pavement at intersection, which are activated by a change inductance caused by a vehicle passing or standing over the wire loop.

WHAT ARE THE DIFFERENT TYPES OF SPECIAL FUNCTIONS PROVIDED BY A TRAFFIC SIGNAL?

TRAFFIC SIGNAL PREEMPTION

The transfer of signal control to a special signal operation is known as preemption. There are three common types of preemption: Railroad, Emergency Vehicle and Transit Vehicle. In the City of Vista, preemption of traffic signal operations is limited to railroad and emergency vehicle preemption. Any authorized emergency vehicle can use emergency vehicle preemption; however, in Vista this use is limited to the fire department.

The purpose of preemption is to obtain or hold a green light for railroad and emergency vehicles as soon as possible. To accomplish this, existing green intervals, including pedestrian intervals, are usually shortened. After the yellow change interval, a green light is usually displayed on the approach being used by the emergency vehicle. In the City of Vista, emergency vehicles are equipped with a strobe light

emitter that transmits a signal to a detector located on a traffic signal pole.

OTHER FUNCTIONS

FLASHING RED: According to the California Vehicle Code (CVC), when the red indication is illuminated with rapid intermittent red flashes, a driver shall stop before entering the intersection. The driver may proceed subject to the rules applicable to making a stop at a multi-way stop controlled intersection.

FLASHING YELLOW: When the yellow indication is illuminated with rapid intermittent yellow flashes, a driver may proceed through the intersection with caution.

DARK SIGNAL: When a traffic signal has gone dark due to a power failure, it is considered to function in the same manner as a multi-way stop controlled intersection and a driver must stop before entering the intersection.

SIGNAL TIMING: traffic signals assign right-of-way to various movements for different time intervals depending on traffic flows. In a coordinated mode, signals have pre-set time intervals for the different times of the day including morning, mid-day and evening peak travel periods.

During non-coordinated operation, the traffic signals function in an actuated mode utilizing detectors in the pavement on the intersection approaches to monitor and assign right-of-way on the basis of changing traffic demand. These signals attempt to assign most of the available “green time” to the heaviest traffic movement demand.

WHAT IS TRAFFIC SIGNAL COORDINATION AND HOW DOES IT WORK?

The greatest cost benefit to the public on traffic operation improvements comes from the coordination of adjacent traffic signals to provide for smooth movement of traffic through groups of signals on an arterial street. This coordination of

adjacent traffic signals along the street is basically a function of the spacing of the signals, the prevailing speed of traffic and the traffic signal cycle length. Also important are the traffic volume and proportion of green time given to the progression movement.

Many drivers ask why they have to wait so long for a signal to change while waiting to enter a major intersection from a side street when no traffic can be seen on the arterial. To allow coordination of the arterial, the side street must wait until the main traffic movement on the arterial has gone through the intersection.

The goal of coordination is to get the greatest number of vehicles through the system with the fewest number of stops. Since it is not possible even in well-spaced, well-designed systems for every vehicle to proceed through the system without stopping, the principle of “majority rules” applies. The busiest traffic movements are given priority.

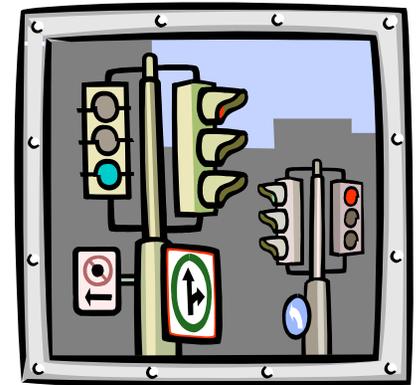
FUTURE TRAFFIC SIGNAL COORDINATION GOALS

The City of Vista’s traffic signal system is routinely improved by monitoring traffic volumes on streets and turning movements at busy intersections. This allows implementation of the most efficient signal coordination timing available.

The City is in the process of implementing additional traffic surveillance cameras at locations that allow staff to monitor real-time traffic conditions at the most critical intersections. Also, more traffic signals are being linked via fiber optic cable to a software program that enables traffic engineers to monitor signal timing and phasing in real time. Both of these innovations permit increasingly fine-tuned adjustments to traffic signal timing to minimize traffic delays.



TRAFFIC SIGNAL SYSTEMS



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