



TRAFFIC TIPS

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COMPREHENSIVE SERVICES

Hubbell, Roth &

Clark, Inc. is a

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services. Our Transportation and Traffic Engineering expertise allow us to address problems of urban traffic congestion, traffic safety, and highway design. We provide assistance in transportation planning, design and operation. Other services of the firm include:

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TRAFFIC SIGNAL PROGRESSION

The most noticeable feature of traffic signal operation is proper signal timing. The second most noticeable feature is the progression (coordination) of adjacent traffic signals. If the timings are set so that traffic makes it through an intersection, then it is desirable for the same traffic to make it through the next intersection without having to stop. If traffic can make it through 2 or more traffic signals in a row without having to stop, then there is progression between the intersections. Ideally, it would be possible for traffic to travel through every intersection on a road without having to stop regardless of which way traffic is going or what the time of day is.

While this is desirable, it is not always possible.

Traffic signal progression, or coordination, is affected by many factors.

Some of them are:

- ◆ Distance between adjacent intersections (signal spacing)
- ◆ Speed of traffic
- ◆ Cycle length
- ◆ Roadway congestion

Let's look at each of these factors individually and then see how they interact with each other.

Signal spacing

Signal progression is a time-distance relationship. As a result, the distance between signals is very important. Normally, traffic engineers try to maintain mile or 1/2 mile signal spacing wherever possible. This spacing works well with many cycle length and speed combinations. However, it is not always possible to maintain this kind of relationship. There may be no 1/2 mile road. The spacing between major intersections may be more or less than a mile. There may be intersections that warrant traffic signals that are at locations other than mile or 1/2 mile locations. If the spacing between a series of signalized intersections is irregular, it is not possible to maintain good progression in both directions

Speed of traffic

Speed of the vehicle is the second factor in the time-distance relationship. Normally, the progression speed will be approximately equal to the posted speed limit. However, the cycle length that is in use may cause a different progressive speed to be used. For example, a car traveling 45 MPH (66 feet per second) can travel 1 mile in 80 seconds (5280/66). If the signal spacing is mile or 1/2 mile, then very good progression can be attained at 45 MPH by using an 80-second cycle and setting the offsets properly. If the

speed limit is less than 45 MPH, an 80-second cycle will give adequate progression, but another cycle length might work better.

An offset is the length of time before a green comes on after a reference time. All the signals in a progressive system are set to the same reference time. Therefore, the signals can be set to turn green at times that would allow traffic to arrive at a signal when the green is on and not have to stop.

Cycle length

The previous section discussed cycle length as it relates to speed of the vehicle. During the off-peak hours, shorter cycle lengths are desirable to reduce intersection delay. Also, during the off-peak periods, traffic is lighter and operating speeds will almost

always be at or near the posted speed. Therefore, engineers can take advantage of cycle lengths that give good progression at posted speeds.

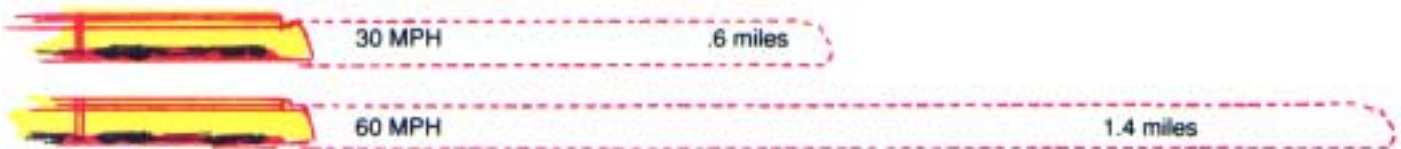
Peak hours are a different story. Generally, traffic is so heavy during peak hours that the shorter cycle lengths cause too much congestion because traffic starts and stops too often. As a result, the traffic engineer quite often is forced to use longer cycle lengths that do not give good progression at the posted speed limit in both directions. Many times, traffic is much heavier in one direction than the other during peak periods. This permits the traffic engineer to set signals to give good progression in the direction of heaviest traffic flow. For those roads that have heavy traffic in both directions, the traffic engineer may have to use lower pro-

gressive speeds when he develops his progression patterns.

Roadway congestion

There are many things that happen that can disrupt progression. The most common is traffic congestion. Many roads operate over capacity during the rush hours. The result is congestion. In rush hour conditions, all of the traffic cannot make it through the intersection during the green. Traffic may have to wait for two or more greens in order to clear an intersection. Obviously, when this happens there can be no progression. If the congestion is caused by a poorly timed traffic signal, it may be possible to restore or improve progression by a simple signal timing change. All too often, however, this is not the case and progression is lost until the congestion clears.

Safety at Highway-Rail Grade Crossings - Trains Can't Stop Quickly... You Can



Stopping Distances for the Average Freight Train

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