CITY OF FAIRFIELD CALIFORNIA

What is Traffic Signal Coordination?

Traffic Signal Coordination occurs when a group of two or more traffic signals are working together so that cars moving through the group will make the **least** number of stops possible. In order for this to happen, each traffic signal in the group must allow a green light for all directions of travel during a fixed time period. This occurs when traffic counts are collected at each intersection, entered into a traffic operational model, then optimized for maximum throughput using an iterative and fine tuning process. Once optimized, the timings are inserted into the controller located at each cabinet then tested in the field with additional fine tuning based on field conditions

In addition, that fixed time period must be the same for each traffic signal in the group. Since each traffic signal in a group runs through all its directions in the same time period, it then becomes possible to "line up" the green lights for one direction. The way the green lights "line up" depends on the distance between traffic signals and the speed of the traffic.

Does this mean I never have to stop at a red light?

Unfortunately, the answer to this question is "No". There are many reasons why, even when traffic signals are coordinated, you will still have to stop at red lights. Each of the reasons has to do with the amount of time available for the green light in your direction.

In order to operate traffic signals safely, several things must be considered. Because of the fixed amount of time for the "coordinated" traffic signal to provide a green light for all of the traffic movements, each of the following has a direct relationship to the amount of time available for the green light at each traffic signal within a coordinated group along a roadway.

Pedestrian Crossing: For safety, enough time must be allowed for a pedestrian to cross the street from curb-to-curb walking at a pace of four (4) feet per second*. This is called the pedestrian clearance interval and is represented by the flashing "DON'T WALK" or upraised hand symbol. The wider the street, the more time needed to cross and the less time available for the green light in the opposite direction. (*It should be noted that four (4) feet per second is a "rule of thumb". Other variable such as railroad preemption and/or a higher population of elderly pedestrians may impact the values used in this calculation.)

Cross Traffic: Like pedestrian crossing, enough time should be allocated to clear the waiting traffic on the cross street. The heavier the cross traffic, such as experienced near schools, businesses, and other heavy traffic generators, the more time needed to clear them through the intersection and the less time available for the green light in the “coordinated” direction.

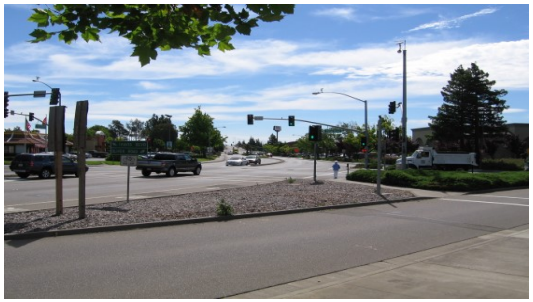
Left-Turn Signals: Where left-turning traffic is especially heavy and/or the amount of opposing traffic is so heavy that there are not enough gaps in the traffic to safely complete a left-turn, left-turn signals are usually installed. The amount of time for left-turning traffic also limits the time permitted for the "through" traffic flow in the opposite direction.

Each of the above factors limit the amount of time for the green light in the "coordinated" direction.

Two-Way Traffic Flow: Another thing that limits the amount of time for the green light in one direction is the need for "coordination" in the other direction as well. The distance between traffic signals and the speed of the traffic determine the way in which the green lights at the next traffic signal "line up". If the spacing is not equal between traffic signals, the green lights may only "line up" well in one direction. When this happens, the green lights will normally "line up" better in the direction with the most traffic. The traffic in the other direction may have to stop.

Off-Peak Traffic Periods: Another reason that you may have to stop is that the traffic signals are not coordinated. During times when traffic is light, traffic signals often are allowed to run independently. Traffic signals are most often coordinated during the "peak" travel times when traffic is heaviest. These times are usually between 7:00-9:00 in the morning and 4:00-6:00 in the evening.

Fire Emergency Pre-Emption: Most of the traffic signals are equipped with emergency vehicle pre-emption. Most fire trucks are equipped with emitters in the light bar when operating code red. The activation of these emitters pre-empts many of the equipped intersections to allow for uninhibited flow of emergency vehicles. This can often times lead to additional delays at intersections.



Why do I have to wait so long at a side street or left turn lane?

In order to have "coordinated" traffic signals, each traffic signal in the group or segment must be able to allow the green light for all movements during a common fixed time period. The time period chosen is usually determined by the largest intersection with the most different movements. This will most often be an intersection that has left-turn arrows for all directions and wide cross streets. For that reason, the time period that is fixed for each traffic signal may be rather long. So, if you are waiting for a green light to cross the "coordinated" street where there are no left -turns arrows and very light traffic on the side street, chances are very good that you will feel like you are waiting for a very long time.

Is Artificial Intelligence used on traffic signals? Are traffic signals smart?

Several of the intersections and corridors have been identified in needing smart signals. Because of the high demand and the effort it requires to retime intersections, several key corridors have been identified for use of smart signals. After an engineer determines the over arching thresholds needed to operate within the corridor, the traffic signal determines the amount of entering and dispersing traffic with predictions to optimize corridors in real-time. In some cases left turns are reserviced out of sequence to optimize flow, where key directions are held back to allow for platooning of vehicles. The algorithms developed in these systems reduces air pollution and green house gasses.

For more information on various programs, visit the City of Fairfield's web page.

www.fairfield.ca.gov

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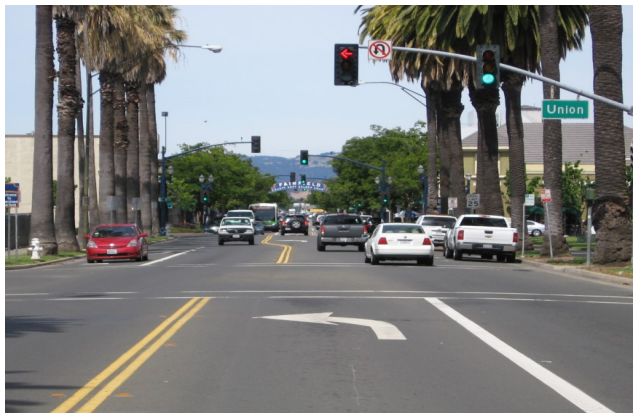

Traffic/Transportation Engineering

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Updated 12/2/2021

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