TRANSPORTATION AND TRAFFIC ENGINEERING HANDBOOK

INSTITUTE OF TRANSPORTATION ENGINEERS

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Yellow clearance interval. The purpose of a yellow clearance interval is twofold: (1) to advise the motorists that the red interval is about to commence[21] and to permit the motorists to come to a safe stop and (2) to allow vehicles that have entered the intersection legally sufficient time to clear the point of conflict prior to the release of opposing pedestrians or vehicles. Thus, the duration of the clearance period is a func-

[20] "Traffic Control Signal Timing," *Manual on Uniform Traffic Control Devices for Canada*, 2nd ed. (Reinge Press Limited, Ottawa, Canada, 1966).

[21] In Great Britain it is the practice to use the yellow clearance interval before the beginning of green as well as before the beginning of red. This is not permitted in the *Uniform Manual on Traffic Control Devices*.

tion of approaching speed. To satisfy the first purpose, the minimum duration of the yellow period is:

$$y_1 = t + \frac{1}{2}\frac{v}{a}$$

where y_1 = yellow interval in sec,
t = perception-reaction time of driver in sec (the value for t can be taken as 1 sec),
v = approach speed in ft per sec (or m per sec)
a = deceleration rate in ft per sec per sec (or m per sec per sec).

An incorrect choice for the length of yellow period, however, can lead to the creation of a *dilemma zone*. This is an area close to an intersection in which a vehicle can neither stop safely nor clear the intersection before the beginning of the red interval without speeding. Olson and Rothery[22] have suggested that the yellow period should be such that a driver could just stop his vehicle on seeing the yellow light before entering the intersection or he could continue at uniform speed and cross the intersection before the beginning of the red interval. The nondilemma yellow period to satisfy both conditions is:

$$y_2 = t + \frac{1}{2}\frac{v}{a} + \frac{w + l}{v}$$

where y_2 = nondilemma yellow interval in sec,
w = width of intersection,
l = length of vehicle.

When reasonable limiting values of $t = 1$ sec, $a = 15$ ft per sec per sec (4.6 m per sec per sec), and $l = 20$ ft (6.1 m) are used, the values of y_1 and y_2 for various approach speeds may be calculated as shown in Table 17.6.

The yellow clearance interval should equal or exceed the values of y_1 for the approach speed selected. On the general assumption that excessively short or long yellow intervals encourage driver disrespect, common practice sets yellow periods between 3

TABLE 17.6
Theoretical Minimum Clearance Intervals* for Different Approach Speeds and Crossing Street Widths

Approach Speed mph	Minimum Time to Stop (y_1) (sec)	Street Width† $w = 30$	$w = 50$	$w = 70$	$w = 90$	$w = 110$
20	2.0	3.8	4.4	5.6	5.7	6.4
30	2.5	3.6	4.1	4.5	5.0	5.5
40	3.0	3.9	4.2	4.5	4.9	5.2
50	3.4	4.1	4.4	4.7	5.0	5.2
60	3.9	4.5	4.7	4.9	5.1	5.4

*Obtained from the formulas:

$y_1 = t + \frac{v}{2a}$ and $y_2 = t + \frac{1}{2}\frac{v}{a} + \frac{(w + l)}{v}$, when $t = 1$ sec, $a = 15$ ft per sec per sec, and $l = 20$ ft.

†Crossing street width in ft.

[22] P. L. Olson and R. W. Rothery, "Driver Response to the Amber Phase of Traffic Signals," *Traffic Engineering*, XXXII, No. 5 (1962) pp. 17–20, 29.

and 5 sec. When y_2 exceeds the value selected for the yellow interval and when hazardous conflict is likely, an all-red clearance interval could be used for 2 to 3 sec between the yellow interval and the start of green for opposing traffic. The total time of the yellow and all-red intervals should be held to the minimum necessary to clear the intersection.

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