

## Section 3.6

# STANDARDIZATION OF YELLOW AND ALL- RED INTERVALS FOR SIGNALIZED INTERSECTIONS

### 3.6.1 PURPOSE

The purpose of the yellow change and all-red clearance intervals is to provide a safe transition between two conflicting traffic signal phases. The function of yellow change interval is to warn traffic of an impending change in the right-of-way assignment and the function of the all-red clearance interval is to provide additional time following the yellow change interval to clear the intersection before conflicting traffic is released. The [MUTCD](#) states that a yellow change interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds and a red clearance interval should have a duration not exceeding 6 seconds. The intent of this section is to provide a State standard for uniform application of the minimum yellow and all-red intervals.

All new signals installations, intersections with Traffic Infracation Devices, signal phasing changes, geometric changes affecting the timing or phasing, or corridor re-timing projects must comply with these guidelines immediately upon implementing timing changes. All other existing signalized intersections on the state highway system must be in compliance with guidelines of this Section by January 1, 2015.

### 3.6.2 STANDARD

- (1) [Section 316.075\(3\)\(a\), F.S.](#) states that no traffic control signal device shall be used which does not exhibit a yellow or "caution" light between the green or "go" signal and the red or "stop" signal. The Statute is silent on the yellow clearance interval duration and does not mention nor mandates the use of an all red clearance interval.
- (2) [Section 316.075\(1\)\(c\)\(1\), F.S.](#) requires "Vehicular traffic facing a steady red signal shall stop before entering the crosswalk on the near side of the intersection or, if none, then before entering the intersection and shall remain standing until a green indication is shown."
- (3) [Section 316.075\(1\)\(a\), F.S.](#) requires "Vehicular traffic facing a circular green signal may proceed cautiously straight through or turn right or left unless a sign at such place prohibits either such turn. But vehicular traffic, including vehicles turning right or left, shall yield the right-of-way to other vehicles and to pedestrians lawfully within the intersection or an adjacent crosswalk at the time such signal is exhibited."

- (4) Approach speed used in this section is the posted speed or the 85<sup>th</sup> percentile approach speed for the lanes being analyzed. Through lane and turn lane approach speeds on an approach may be different. According to [Section 5.3 of the Federal Highway Administration's Signal Timing Manual](#), "When applying Equation 5-2 to left-turn movement phases, the speed used should reflect that of the drivers that intend to turn. This speed can equal that of the adjacent through movement but it can also be slower as left-turn drivers inherently slow to a comfortable turning speed."
- (5) Yellow change and all-red clearance intervals specified herein are minimums, and should be increased as necessary, based on professional engineering judgment, to fit site conditions at any particular intersection.

### 3.6.2.1 Yellow Change Interval

The Florida yellow change intervals shown in **Table 3.6-1**, are computed using the ITE formula (**Formula 3.6-1**, found in *ITE's Traffic Engineering Handbook*). These intervals are the required minimums. If necessary and due to equipment limitations, round computed values up to the next 0.5 second.

**Table 3.6-1. Florida Yellow Change Interval (0.0 % Grade)\***

APPROACH SPEED (MPH)	YELLOW INTERVAL (SECONDS)
25	3.0
30	3.2
35	3.6
40	4.0
45	4.3
50	4.7
55	5.0
60	5.4
65	5.8
* For approach grades other than 0%, Use ITE Formula.	

### Formula 3.6-1

$$Y = t + \frac{1.47v}{2(a + Gg)}$$

Where:

Y= length of yellow interval, sec.

t = perception-reaction time, (Use 1 sec.).

v= speed of approaching vehicles, in mph.

a= deceleration rate in response to the onset of a yellow indication. (Use 1ft/sec<sup>2</sup>)

g = acceleration due to gravity. (Use 32.2 ft/sec<sup>2</sup>)

G= grade, with uphill positive and downhill negative. (percent grade /100)

### 3.6.2.2 All-Red Clearance Interval

An all-red clearance interval must be used. Providing adequate all-red clearance intervals can significantly impact intersection safety by reducing the probability of occurrence of right angle crashes, even if drivers run the red signal indication. The all-red clearance interval values are computed using **Formula 3.6-2**, found in **ITE's Traffic Engineering Handbook**.

### Formula 3.6-2

$$R = \frac{W + L}{1.47v}$$

Where:

R = length of all-red interval, sec.

W = total traversed width, from the approach stop bar to the far side of no-conflict point.

L = Length of vehicle (Use 20 ft.)

v = speed of approaching vehicles, in mph.

### 3.6.2.3 Turn Phases

- (1) **Protected Turns.** For protected left or right turns the yellow and all-red intervals shall be computed using **Formulas 3.6-1** and **3.6-2** where the speed is based on the turning movement's lane speed.
- (2) **Protected/Permissive Turns.** For protected left or right turns, the yellow and all-red intervals shall be computed based on the lane speed. For permissive left or right turns, the yellow and all-red intervals are determined by the concurrent through phase.