

VIRGINIA DEPARTMENT OF TRANSPORTATION

*TRAFFIC ENGINEERING DIVISION*

MEMORANDUM

<b>GENERAL SUBJECT:</b>		<b>NUMBER:</b>
Traffic Signals		306
<b>SPECIFIC SUBJECT:</b>		<b>DATE:</b>
Calculation of Clearance Intervals		August 16, 2001
		<b>SUPERSEDES:</b>
<b>DIRECTED TO:</b>		<b>SIGNATURE:</b>
District Administrators		Ilona O. Kastenhofer

In an effort to establish consistency throughout the Commonwealth, this memorandum will govern the method in which the timing of the yellow change intervals and all red intervals is established.

The formula recommended by the Institute of Transportation Engineers will be employed in the following manner:

$$\text{yellow change interval} = t + V/(2a \pm 64.4g)$$

where:

- **yellow change interval** = the length of the yellow phase and is expressed in seconds.
- **t** = the perception reaction time expressed in seconds. This is 1 second unless the engineer responsible determines that the situation warrants increasing it to 1.5 seconds.
- **V** = the posted speed expressed in feet/second.
- **a** = the deceleration rate expressed in feet/second<sup>2</sup>. This should be 10 ft/sec<sup>2</sup> under typical conditions. Engineers may decrease this to 8 or 9 feet/second<sup>2</sup> if conditions warrant such as heavy truck traffic or increase to 11 or 12 feet/second<sup>2</sup> if warranted.
- **g** = the grade of approach (percent/100); use + for a positive grade and – for a negative grade
- minimum yellow time should be 3 seconds and the maximum should be 6 seconds.

$$\text{all red interval} = (w+l)/V$$

where:

- **all red interval** = the length of the all red phase expressed in seconds, and follows the yellow change interval.
- **w** = width of intersection, curb to curb expressed in feet.
- **l** = vehicle length, taken as 20 feet.
- **V** = posted speed in feet/second.
- minimum all red interval should be 1 second and the maximum should be 3 seconds. Longer all reds can be used at the engineer's discretion where extreme conditions warrant.

### General

- all timings will be calculated to the nearest tenth of a second
- if rounding to the nearest half second is desired, it should be done in the following manner:

.0 to .1 – rounded down to whole number  
.2, .3, .4 – rounded up to next half second  
.6 – rounded down to half second  
.7, .8, .9 rounded up to next whole number

**In all cases of developing signal timings, engineering judgment governs final decisions.**

cc: Mr. Charles D. Nottingham  
Mr. A. V. Bailey, II  
Mr. T. F. Boyd  
Mr. Claude D. Garver, Jr.  
Ms. C. S. Sorrell  
Mr. J. C. Southard  
Mr. C. F. Gee  
Mr. Roberto Fonseca  
Division Administrators  
Resident Engineers  
District Traffic Engineers  
Ms. Kathe Jefferson  
Mr. Dan Dennis