



where science, engineering and software meet . . .

---

The ITE (Institute of Transportation Engineers) [yellow change interval formula](#) calculates the duration of the yellow light. The flaw is not the formula itself. The flaw is how traffic engineers misapply the formula. The misapplications short the yellow light by several seconds. The misapplications adversely affect every intersection. Every driver, good or bad, is susceptible. These misapplications cause crashes, and within a few years the issuance of more red-light tickets than the city's population:

1. Traffic engineers use the formula<sup>1</sup> universally but the formula works only for one special case.
2. Traffic engineers plug the wrong approach speed<sup>2</sup> into the equation.
3. Traffic engineers misapply stochastic methods. Engineers input perception-reaction time and deceleration values for the average passenger car driver. By using *average*, the engineer de facto forsakes half of driving population as well as all commercial vehicle drivers.
4. Traffic engineers misapply an analytic solution to a physical solution. Engineers misapply grade term  $G_g$  to uphill traffic.
5. Traffic engineers omit the calculation of the tolerance of the yellow change interval. Engineers set the red-light camera grace period to 0.3 seconds (less time than the blink of an eye), but the tolerance for a properly-applied formula exceeds 2 seconds. Currently 70% of camera revenue comes from vehicles entering intersections within 1 second of the light turning red.
6. Because traffic engineers misapply the physical and mathematical sciences to yellow change intervals ([TEM § 403-2](#)), the change intervals violate Ohio Revised Code § [4511.09](#). That means that the yellows do not conform to the Ohio Manual of Uniform Traffic Control Devices (OMUTCD). [OMUTCD 4D.26\(3\)](#) requires change intervals to be determined by engineering practices. [ORC 4733.01\(D\)](#) requires engineers to be graduates of ABET-accredited curriculums. ABET requires the engineer to apply, not misapply, the [physical and mathematical sciences](#).

Solution: <http://talussoftware.com/download/yellow-change-intervals> Video: <https://youtu.be/N1Fle9TB8FE>

---

<sup>1</sup>Engineers invoke the name of the "federal guidelines" to justify using the ITE formula. The ITE formula, however, is not a federal standard, guideline or ITE Recommended Practice. The formula is found only in a book referenced by an OMUTCD *option*.

Options and guidelines are used at the engineer's discretion liability. The [TEM](#) explicitly gives an engineer discretion whether to use the formula. <sup>2</sup>Engineers often invoke OMUTCD 4D.26(14) to justify a 3-second yellow. But OMUTCD 4D.26(14) states the 3-

second yellow is a minimum for use only on slower approaches. Slower approaches are 25 mph speed limits or less, that in consonance with the ITE formula. For turning and impeded motions, the ITE formula fails. The formula always shorts a yellow by several seconds, that according to the laws of physics. For turning lanes, the TEM sets the approach speed to the speed limit minus 5 mph. By subtracting 5 mph, the engineer further entraps the driver, who travels legally at the speed limit, by not giving him the distance to stop. [ORC 4511.094 \(D\)](#) requires an additional second of yellow over the minimum but this extra second is arbitrary. The extra second does not compensate for the multi-second failure. Also from a legal POV, determining the yellow change interval from a vote, which is the origin of an ORC, is not an engineering practice.