The Institute of Transportation Engineers (ITE) Yellow Change Interval Formula is a math equation which engineers use to calculate the duration of the yellow light. There are problems with how traffic engineers use it.   The flaw is not the formula itself but rather that 1) engineers apply the formula to traffic movements the formula does not fit and 2) engineers plug the wrong numbers into the formula.   The problem creates yellows too short by several seconds. That creates a systematic defect called dilemma zones. Dilemma zones subject innocent drivers to inadvertently run red lights. The problem is so pervasive that a handful of red light cameras in just a few years will issue more tickets than a city's population.   The problem causes crashes as well.   Here are some facts:

1. Traffic engineers use the formula[1] universally but the formula works only for one special case.
2. Traffic engineers plug the wrong approach speed 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, the change intervals violate Arizona Revised Statute § 28-643[2].   That means that the yellows are not established in accordance to the Manual of Uniform Traffic Control Devices (MUTCD). MUTCD 4D.26(3) requires change intervals to be determined by engineering practices.   Arizona Engineering Practice Act § 32-101 (11) defines engineering practice as the application (not the misapplication) of the physical and mathematical sciences.

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

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[1]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 appears in a book referenced by a MUTCD *option*. Options and guidelines are used at the engineer's discretion.   [2]Engineers often invoke ARS § 28-643 or MUTCD 4D.26(13) to arbitrarily justify a 3-second yellow. But ARS § 28-643 and MUTCD 4D.26(13) state the 3-second yellow is a minimum to be used only for slower approaches. Slower approaches are 25 mph speed limit or less according to the ITE formula. 3-second yellows appear often for turning lanes regardless of speed limit thus never giving the driver the distance to stop.   For turning and impeded motions, the ITE formula always fails. The formula always shorts a yellow by several seconds, that according to the laws of physics.