Glossary

Term	Definition
AASHTO	American Association of State Highway Traffic Officials. The NCDOT gets its perception time and deceleration constants from AASHTO.
All-Red Clearance Interval	Is the amount of time that all drivers on all approaches see red before cross traffic gets a green light. $$R = \frac{W + L}{v_i}$$ R is the time it takes for the slowest vehicle to traverse the intersection—from intersection entry point to intersection exit point. R is the all-red clearance interval, W is the length of the vehicle's path through the intersection, L is the length of the vehicle, and v_i is the velocity of the slowest vehicle inside the intersection. The slowest driver is usually a turning driver. When the traffic signal hardware is not able to indicate red to all inbound traffic, traffic engineers extend the yellow duration by adding R time to it. Such intersections are usually enforced by the Restrictive Yellow Law. An intersection that has an all-red clearance interval (not just an extended yellow phase) must be enforced by the Permissive Yellow Law.
Approach Segment	The region of road from the Critical Distance up to the intersection entry point.
Approach Speed	The 85th percentile velocity of freely-flowing traffic used for setting v in the Formula. The approach speed of vehicles is measured at the Critical Distance from the intersection. Generally speaking engineers set the approach speed to the speed limit but that is incorrect. The speed limit is usually less than the approach speed. By setting v in the Formula to the speed limit, engineers create a Dilemma Zone Type 1.
Braking Distance	The distance, *b*, a vehicle travels from the moment the driver hits the brake to when the vehicle stops. The vehicle starts from the

	Approach Speed. $$b = \frac{v^2}{2a + 2Gg}$$
Critical Distance, Stopping Distance	The distance, c, required for a driver to stop. This is the distance the driver travels at the Approach Speed while perceiving the light turning yellow, plus the distance the driver travels while decelerating to a stop. $$c = vt_p + \frac{v^2}{2a + 2Gg}$$
Critical Distance Line	A line on the road which the NCDOT fails to paint at a distance of the Critical Distance from the intersection. If the driver crosses the line and then the light turns yellow, the Formula requires the driver to proceed to the intersection at no less than the approach speed. If the light turns yellow before the driver crosses the light, the Formula requires the driver to stop.
Design Speed	The Design Speed is the speed which engineers designed the road. For example a narrow curvy road on a cliff side only handles traffic going 25 mph. Any faster and a vehicle may not be able to negotiate a curve and drive off the cliff.
Denos Gazis	The inventor of the Yellow Light Interval Formula. He invented the Formula in 1959 while he worked for GM Research Labs. Dr. Gazis died in 2004.
Dilemma Zone Type 1	A region on the road where the engineer confronts the driver with a no-win scenario. When the driver is within this region at the onset of yellow, the driver neither has the distance to stop nor the time to proceed into the intersection. No matter the driver's decision, he will run a red light. Setting the yellow time to < Yellow Change Interval Formula always produces a Dilemma Zone Type 1. Setting a turn lane yellow change interval to the Formula always creates a Dilemma Zone Type 1. Turning drivers need more time than straight-thru drivers. Setting the yellow time $Y < t_p + v/(a + Gg)$ always produces a type I dilemma zone for drivers who need to slow down before entering the intersection. This includes U, left and right turning drivers.

	This includes drivers who have to slow down for obstacles in or at the far side of the intersection—including the next intersection, cars waiting at the next intersection, business entrances, or opposing left turning cars who want to play chicken.
Dilemma Zone Type 2	A region on the road when upon seeing the light turn yellow, drivers are not sure whether to stop or go. A solution is possible but it is still not clear to the reasonably perceptive driver what the solution is. If the driver guesses wrong by 1/10th of a second, the driver will run a red light.
Engineering	From Merriam-Webster: **en·gi·neer·ing** *noun* 1 **:** the activities or function of an engineer 2 *a*: the application of science and mathematics by which the properties of matter and the sources of energy in nature are made useful to people *b*: the design and manufacture of complex products <software *engineering*>
Formula Yellow Light Change Interval Formula Kinematic Formula for Yellow Change Interval	Computes the time it takes a vehicle to traverse the Critical Distance at the Approach Speed. This in essence, defines a yellow light. **Definition by Words** $$Yellow\ Interval = Perception\ Time +$$ $$\frac{[Safe\ Braking\ Distance]}{Speed\ Limit}$$ **Definition by Math** $$Y = t_p + \frac{\left[\dfrac{v^2}{2a + 2Gg}\right]}{v}$$
G	Acceleration due to Earth's gravity: 32.2 ft/s^2
Grade, g	The incline of a road. The slope. Rise over run. Positive values represent uphill. Negative values represent downhill.
ITE	Institute of Transportation Engineers Institute of Traffic Engineers (before 1972)

MUTCD	Manual for Uniform Traffic Control Devices. This federal manual contains thousands of standards and guidelines for the uniform design and implementation of signs, signals and other traffic control devices. The manual is not a body of law. It is a just a set of standards. The MUTCD says very little about the length of yellow lights. It only says that the "minimum length is 3 seconds and the maximum length is 6 seconds, with longer durations reserved for higher speed limits."
NCDOT	North Carolina Department of Transportation
Perception Time	The amount of time drivers perceive and react to a signal that just turned to a steady yellow.
Permissive Yellow Law	It is illegal for a driver to enter the intersection on a red light, but it is legal for to be in the intersection while the light turns red.
Restrictive Yellow Law	It is illegal for a driver to enter the intersection on a red light and it is illegal to be in the intersection while the light turns red. It is not wise to have both restrictive and permissive laws active in the same State. That is confusing to both drivers and enforcement.
TEH	Traffic Engineering Handbook, published by ITE.
Turn Execution Speed	The speed at which a driver enters the intersection. For a U turn, this number could be as little as 1 mph.