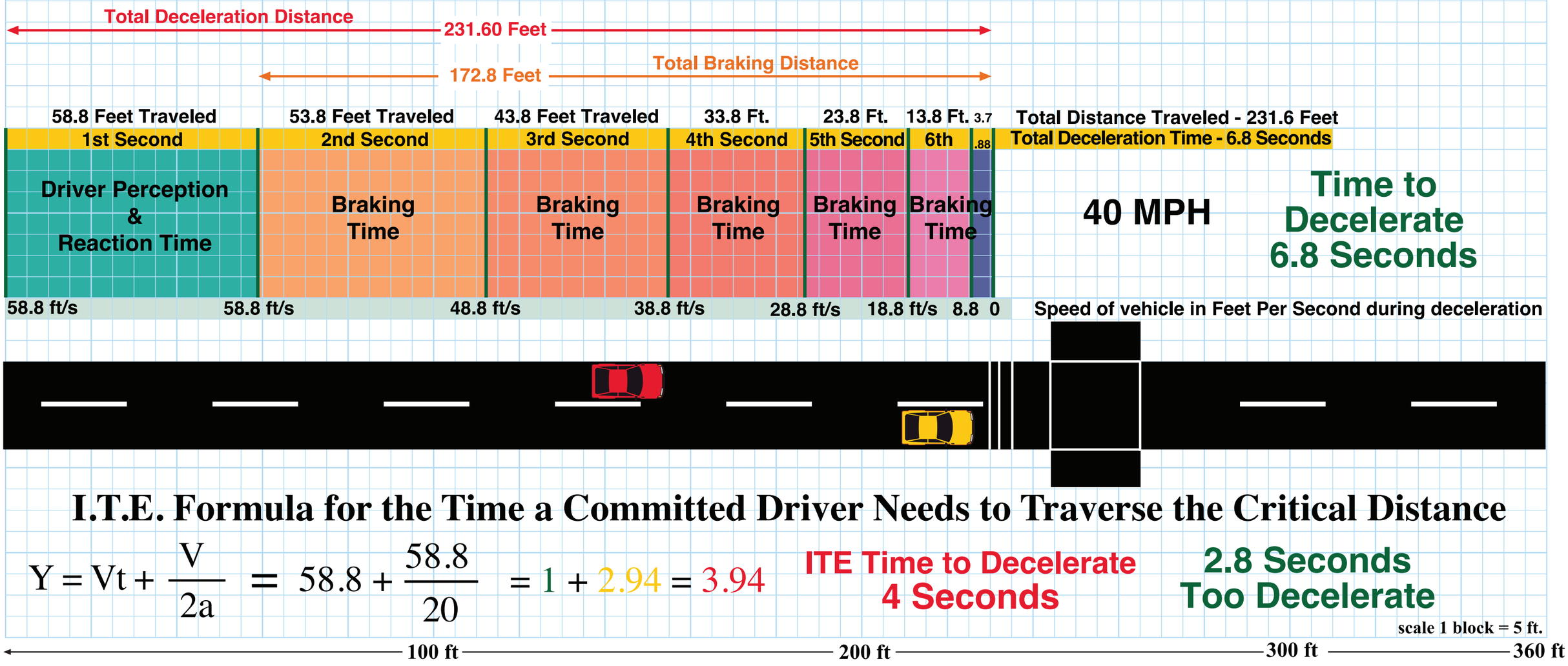
ENGINEERING VS. REALITY

Institute of Transportation Engineers Formula for Calculating Vehicle Stopping (aka, Critical) Distance

$$S = Vt + \frac{V^2}{2a} = 58.8 + \frac{58.8 \text{ X } 58.8}{2 \text{ X } 10 \text{ Ft/S}} = 58.8 + \frac{3457.44}{20} = 58.8 + 172.8 = 231.6$$

S = Stopping Distance in Feet
V = Vehicle Speed, Feet Per Second, 40mph = 58.8 feet per second
t = Perception-Reaction Time
a = Deceleration Rate, 10 feet per second per second



I.T.E. Formula for the Time a Committed Driver Needs to Traverse the Critical Distance

$$Y = Vt + \frac{V}{2a} = 58.8 + \frac{58.8}{20} = 1 + 2.94 = 3.94$$

ITE Time to Decelerate 4 Seconds

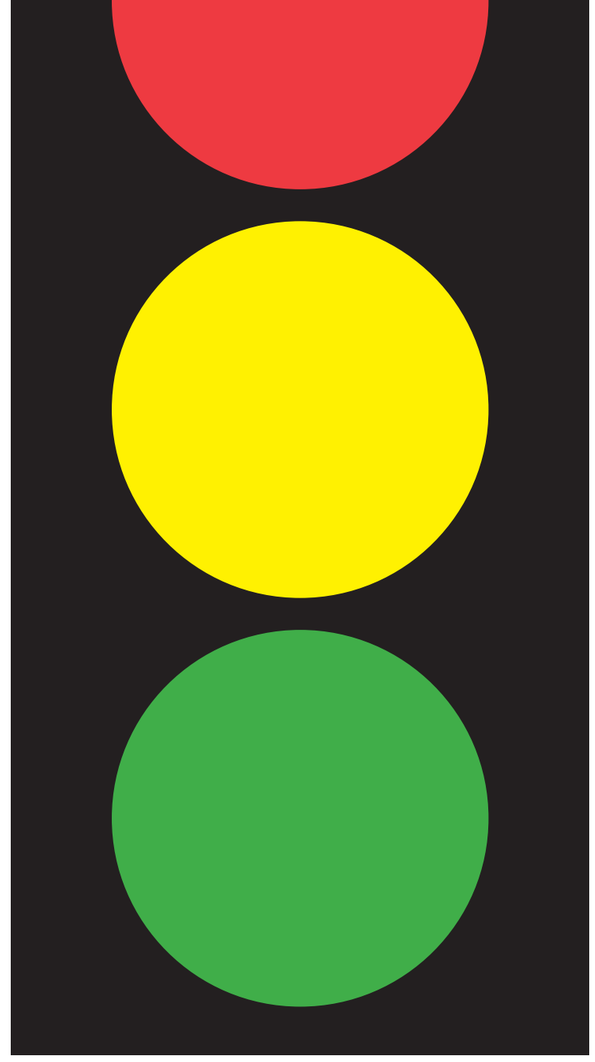
2.8 Seconds Too Decelerate

scale 1 block = 5 ft.

100 ft — 200 ft — 300 ft — 360 ft

POINTS TO PONDER:

1. Normal range of yellow light timing is 3 to 6 seconds.
2. At speeds above 30 MPH, even 6 seconds total clearance time **may not be enough to decelerate**.
3. Most violations of the yellow change interval DO NOT result in crashes, due to “lost time” of 3 seconds per phase.
4. **Longer** change intervals are called for with **higher** approach speeds, **regardless of the posted speed limit**, therefore there is **no such thing** as merely **“meeting standards”** with yellow light timing.
5. Yellow intervals over 6 seconds may lead to increases in rear end crashes in some situations.
6. Photo enforcement can lead to **increases in crashes due** to inordinate **driver focus** on what the signal is doing, at the **expense of everything else**!

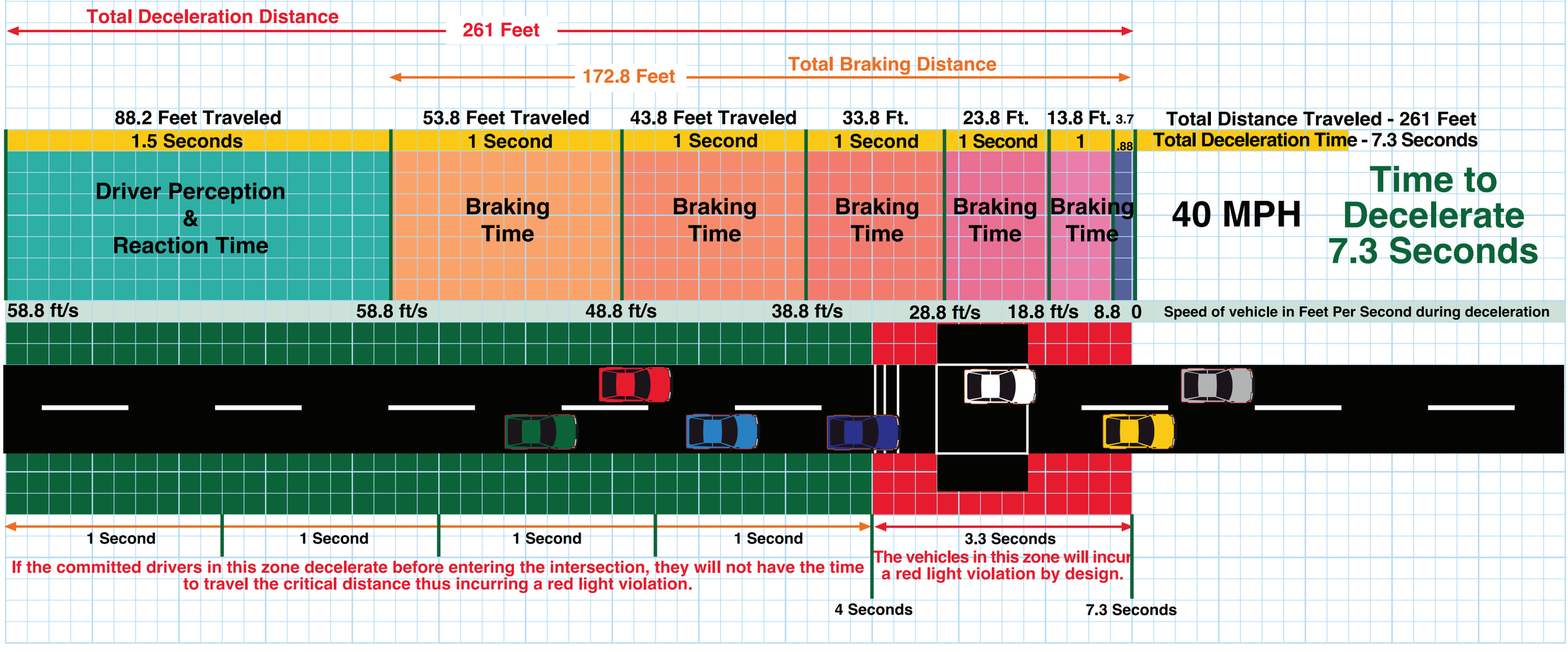


- Are We Fooling Ourselves?

This chart represents the true reality on the street. Traffic engineers know that 1.5 seconds is the absolute minimum perception and reaction time drivers need to be safe. The National Safety Council recommends 2.5 seconds (.75 reaction & 1.5 perception) ITE recommended deceleration rate of 10 feet per second requires 172.8 feet of stopping distance on dry pavement at 40 mph which takes 5.8 seconds to complete. Therefore the correct formula for determining yellow light duration is:

$$y = VT + \frac{V}{A} = 1.5 + \frac{58.8}{10} = 1.5 + 5.8 = 7.3 \text{ seconds}$$

y = Yellow Time in Seconds
V = Vehicle Speed, Feet Per Second, 40mph = 58.8 feet per second
t = 1.5 Seconds Perception-Reaction Time
a = Deceleration Rate, 10 feet per second per second



GETTING BACK TO REALITY

1. **Credibility with the public** is the key to effective traffic control.
2. ITE and the engineering community should consider current driver population, vehicle mix, and distractions when **setting standards** for **yellow light timing**.
3. **Longer yellows** can be an **effective countermeasure** to red light crashes, particularly right angle crashes.
4. Combination of Yellow plus All Red interval can keep **yellows from becoming too long**.
5. Photo enforcement should **not be considered a substitute** for good traffic engineering practice.
6. **Other countermeasures** such as better signal visibility using back plates, better intersection definition with striping, and fewer distractions such as unnecessary signing, could **reduce crashes without the need for photo enforcement**.

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