Timing the Change and Clearance Intervals

- Change Interval - (Y) – alerts drivers that green interval is about to end
- Clearance Interval (AR or Y) – allows vehicles that entered the intersection at the end of Y to clear before conflicting traffic is given green
- Dilemma zone - drivers can neither safely stop nor safely clear (while driving at a constant V) the intersection

Timing the Change and Clearance Intervals

- Approach speed = V (ft/sec)
- PIEV time = PIEV (sec)
- Deceleration rate = a (ft/sec²)
- Intersection width = w (ft)
- Average vehicle length = l (ft)

Total Stopping Distance = PIEV x V + V² / 2a

D = X - (w + l)
Timing the Change and Clearance Intervals

Design Values:

- PIEV = 1.0 sec
- \( a \) = 10 ft/sec\(^2\)
- \( l \) = 20 ft.

Gazis' relationship:

\[
\frac{1}{v} = \frac{v}{(v + w + l)} + \frac{1}{2a}
\]

From Traffic Engineering Handbook:

- Change Interval:
  \[
  Y = t_r + \frac{V}{2a + 2g}\sin G
  \]
  where:
  - \( t_r \) = reaction time, sec
  - \( V \) = approach speed, ft/sec
  - \( a \) = deceleration rate, ft/sec\(^2\)
  - \( g \) = deceleration due to gravity, ft/sec\(^2\)
  - \( G \) = percent grade divided by 100.

- Clearance Interval:
  \[
  AR = \frac{w + l}{\beta}
  \]
  where:
  - \( w \) = width of cross street, ft
  - \( \beta \) = length of vehicle, ft
  - \( \beta \) is an empirical factor.
Example

Given:
- Approach speed = 35 mph
- 5-lane cross street
- $Y + AR = 4$ sec

a. Is the existing clearance interval timing satisfactory?

b. If not, determine a suitable clearance interval, and show the location of the dilemma zone for the existing timing on a sketch.