EQUATIONS TEST 1

$d_P = v_0 t = (1.47) V_0 t$

U.S. Customary

$$d_B = 1.075 \frac{V_0^2 - V_F^2}{a} \quad (3\text{-}1)$$

$$d_B = \frac{v_0^2 - v_F^2}{2a}$$

where:

d_B = braking distance, ft
V = design speed, mph
a = deceleration rate, ft/s^2

$$d_B = \frac{v_0^2 - v_F^2}{2g f_f}$$

U.S. Customary

$$SSD = 1.47Vt + 1.075 \frac{V_0^2 - V_F^2}{a} \quad (3\text{-}2)$$

$$SSD = v_0 t + \frac{v_0^2 - v_F^2}{2a}$$

$SSD = d_P + d_B$

where:

SSD = stopping sight distance, ft
V = design speed, mph
t = brake reaction time, 2.5 s
a = deceleration rate, ft/s^2

$$SSD = v_0 t + \frac{v_0^2 - v_F^2}{2g f_F}$$

U.S. Customary

$$d_B = \frac{V^2 - V_f^2}{30\left[\left(\frac{a}{32.2}\right) \pm G\right]} \quad (3\text{-}3)$$

$$d_B = \frac{v_0^2 - v_f^2}{2(a \pm gG)}$$

$$d_B = \frac{v_0^2 - v_f^2}{2g(f_f \pm G)}$$

where:

d_B = braking distance on grade, ft
V = design speed, mph
a = deceleration, ft/s^2
G = grade, rise/run, ft/ft

U.S. Customary

$$\frac{0.01e + f_S}{1 - 0.01ef_S} = \frac{v^2}{gR} = \frac{0.067V^2}{R} = \frac{V^2}{15R} \quad (3\text{-}6)$$

where:

e = rate of roadway superelevation, percent

f_S = side friction (demand) factor

v = vehicle speed, ft/s

g = gravitational constant, 32.2 ft/s^2

V = vehicle speed, mph

R = radius of curve measured to a vehicle's center of gravity, ft

U.S. Customary

$$f_S = \frac{V^2}{15R} - 0.01e \quad (3\text{-}7)$$

U.S. Customary

$$R_{min} = \frac{V^2}{15(0.01e_{max} + f_{Smax})} \quad (3\text{-}8)$$

$$\frac{100}{2\pi R} = \frac{D}{360} \quad (2.4.2)$$

or

$$D = \left(\frac{5729.58}{R}\right)^\circ$$