

TC-5.11

RURAL EXAMPLE

20 FT PAVEMENT WIDTH
(DESIGN SOFTWARE - 1 LANE AT 10 FT)

$V_D = 50$ MPH $R = 1000$ FT
 $W_n = 10$ FT $rg = 0.50$
 $E = 7.6$ (7.6% PER 803.38)

$$U = u + R - \sqrt{R^2 - L^2}$$

$$U = 8.5 + 1000 - \sqrt{(1000)^2 - (43)^2}$$

$$U = 9.42492$$

$$F_A = \sqrt{R^2 + A(2L + A)} - R$$

$$F_A = \sqrt{(1000)^2 + 4[2(19.5) + 4]} - 1000$$

$$F_A = .085996$$

$$Z = (V_D / \sqrt{R})$$

$$Z = (50 / \sqrt{1000})$$

$$Z = 1.58$$

$$W_C = N(U + C) + F_A + Z$$

$$W_C = 2(9.42492 + 2) + 0.085996 + 1.58$$

$$W_C = 24.5158$$

$$w = W_C - 2W_n = 24.5158 - 2(10) = 4.5158 \text{ or } 4.5$$

(w>2 THEREFORE WIDENING IS REQUIRED)

$$L_r = [E n_s (W_n + w/2) / rg] b_w$$

$$L_r = [7.6(1)(10 + 4.5/2) / 0.50] 1$$

$$L_r = 7.6 (12.25) / 0.50$$

$$L_r = 186.20$$

RURAL EXAMPLE

72 FT PAVEMENT WIDTH
(DESIGN SOFTWARE - 3 LANES AT 12 FT)

$V_D = 40$ MPH $R = 500$ FT
 $W_n = 12$ FT $rg = 0.58$
 $E = 8.0$ (8% PER PAGE 803.36)

$$U = u + R - \sqrt{R^2 - L^2}$$

$$U = 8.5 + 500 - \sqrt{(500)^2 - (43)^2}$$

$$U = 10.35243$$

$$F_A = \sqrt{R^2 + A(2L + A)} - R$$

$$F_A = \sqrt{(500)^2 + 4[2(19.5) + 4]} - 500$$

$$F_A = .1719$$

$$Z = (V_D / \sqrt{R})$$

$$Z = (40 / \sqrt{500})$$

$$Z = 1.7885$$

$$W_C = 2(U + C) + F_A + Z$$

$$W_C = 2(10.35243 + 3) + 0.1719 + 1.7885$$

$$W_C = 28.6652$$

$$w = W_C - 2W_n = 28.6652 - 2(12) = 4.6652$$

FOR 72' PAVEMENT WIDTH

$$w = 3(4.6652) = 13.9956$$

(w>2 THEREFORE WIDENING IS REQUIRED)

$$L_r = [E n_s (W_n + w/6) / rg] b_w$$

$$L_r = [8 (3) (12 + 13.9956/6) / 0.58] 0.6667$$

$$L_r = (343.9824/0.58) 0.6667$$

$$L_r = 395.4018$$

OR

$$L_r = M[E(W_n + w/N)/rg]$$

$$L_r = 2 [8(12 + 13.9956/6) / 0.58]$$

$$L_r = 2 (114.6608/0.58)$$

$$L_r = 395.3820$$

URBAN EXAMPLES

24 FT PAVEMENT WIDTH
(DESIGN SOFTWARE - 1 LANE AT 12 FT)

$V_D = 40$ MPH $R = 600$ FT
 $W_n = 12$ FT $rg = 0.58$
 $E = 4.0$ (4% PER PAGE 803.28)

$$L_r = (W_n n_s E / rg) b_w$$

$$L_r = [12(1)(4) / 0.58] 1.00$$

$$L_r = (48 / 0.58)$$

$$L_r = 82.7586$$

66 FT PAVEMENT WIDTH
(DESIGN SOFTWARE - 3 LANES AT 11 FT)

$V_D = 40$ MPH $R = 600$ FT
 $W_n = 11$ FT $rg = 0.58$
 $E = 4.0$ (4% PER PAGE 803.28)

$$L_r = b_w (W_n n_s E / rg)$$

$$L_r = 0.6667 [11(3)(4) / 0.58]$$

$$L_r = 0.6667 (132 / 0.58)$$

$$L_r = 151.7317$$

OR

$$L_r = M (E W_n / rg)$$

$$L_r = 2 [4(11) / 0.58]$$

$$L_r = 2 (44 / 0.58)$$

$$L_r = 151.7241$$

VDOT	
ROAD AND BRIDGE STANDARDS	
SHEET 1 OF 1	REVISION DATE
803.22	01/13

CALCULATED TC-5.11 EXAMPLES

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE