

RURAL EXAMPLE

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

$$\begin{aligned} V_D &= 50 \text{ MPH} & R &= 1000 \text{ FT} \\ W_n &= 10 \text{ FT} & r_g &= 0.50 \\ E &= 7.6 \text{ (7.6\% PER 803.38)} \end{aligned}$$

$$\begin{aligned} U &= u + R - \sqrt{R^2 - L^2} \\ U &= 8.5 + 1000 - \sqrt{(1000)^2 - (43)^2} \\ U &= 9.42492 \end{aligned}$$

$$\begin{aligned} F_A &= \sqrt{R^2 + A(2L + A)} - R \\ F_A &= \sqrt{(1000)^2 + 4[2(19.5) + 4]} - 1000 \\ F_A &= .085996 \end{aligned}$$

$$\begin{aligned} Z &= (V_D / \sqrt{R}) \\ Z &= (50 / \sqrt{1000}) \\ Z &= 1.58 \end{aligned}$$

$$\begin{aligned} W_C &= N(U + C) + F_A + Z \\ W_C &= 2(9.42492 + 2) + 0.085996 + 1.58 \\ W_C &= 24.5158 \end{aligned}$$

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

(w>2 THEREFORE WIDENING IS REQUIRED)

$$\begin{aligned} L_r &= [E n_s (W_n + w/2) / r_g] b_w \\ L_r &= [7.6(1)(10 + 4.5/2) / 0.50] 1 \\ L_r &= 7.6 (12.25) / 0.50 \\ L_r &= 186.20 \end{aligned}$$

RURAL EXAMPLE

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

$$\begin{aligned} V_D &= 40 \text{ MPH} & R &= 500 \text{ FT} \\ W_n &= 12 \text{ FT} & r_g &= 0.58 \\ E &= 8.0 \text{ (8\% PER PAGE 803.36)} \end{aligned}$$

$$\begin{aligned} U &= u + R - \sqrt{R^2 - L^2} \\ U &= 8.5 + 500 - \sqrt{(500)^2 - (43)^2} \\ U &= 10.35243 \end{aligned}$$

$$\begin{aligned} F_A &= \sqrt{R^2 + A(2L + A)} - R \\ F_A &= \sqrt{(500)^2 + 4[2(19.5) + 4]} - 500 \\ F_A &= .1719 \end{aligned}$$

$$\begin{aligned} Z &= (V_D / \sqrt{R}) \\ Z &= (40 / \sqrt{500}) \\ Z &= 1.7885 \end{aligned}$$

$$\begin{aligned} W_C &= 2(U + C) + F_A + Z \\ W_C &= 2(10.35243 + 3) + 0.1719 + 1.7885 \\ W_C &= 28.6652 \end{aligned}$$

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

FOR 72' PAVEMENT WIDTH
w = 3(4.6652) = 13.9956

(w>2 THEREFORE WIDENING IS REQUIRED)

$$\begin{aligned} L_r &= [E n_s (W_n + w/3) / r_g] b_w \\ L_r &= [8 (3) (12 + 13.9956/3) / 0.58] 0.6667 \\ L_r &= (399.9648/0.58) 0.6667 \\ L_r &= 459.7526 \end{aligned}$$

OR

$$\begin{aligned} L_r &= M[E(W_n + w/N) / r_g] \\ L_r &= 2 [8(12 + 13.9956/3) / 0.58] \\ L_r &= 2 (133.3216/0.58) \\ L_r &= 459.7296 \end{aligned}$$

URBAN EXAMPLES

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

$$\begin{aligned} V_D &= 40 \text{ MPH} & R &= 600 \text{ FT} \\ W_n &= 12 \text{ FT} & r_g &= 0.58 \\ E &= 4.0 \text{ (4\% PER PAGE 803.28)} \end{aligned}$$

$$\begin{aligned} L_r &= (W_n n_s E / r_g) b_w \\ L_r &= [12(1)(4) / 0.58] 1.00 \\ L_r &= (48 / 0.58) \\ L_r &= 82.7586 \end{aligned}$$

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

$$\begin{aligned} V_D &= 40 \text{ MPH} & R &= 600 \text{ FT} \\ W_n &= 11 \text{ FT} & r_g &= 0.58 \\ E &= 4.0 \text{ (4\% PER PAGE 803.28)} \end{aligned}$$

$$\begin{aligned} L_r &= b_w (W_n n_s E / r_g) \\ L_r &= 0.6667 [11(3)(4) / 0.58] \\ L_r &= 0.6667 (132 / 0.58) \\ L_r &= 151.7317 \end{aligned}$$

OR

$$\begin{aligned} L_r &= M (E W_n / r_g) \\ L_r &= 2 [4(11) / 0.58] \\ L_r &= 2 (44 / 0.58) \\ L_r &= 151.7241 \end{aligned}$$



ROAD AND BRIDGE STANDARDS

CALCULATED TC-5.11 EXAMPLES

SPECIFICATION
REFERENCE

SHEET 1 OF 1

REVISION DATE

803.22

VIRGINIA DEPARTMENT OF TRANSPORTATION