



Given: Square abutment

Profile-grade El. at front face abutment: 275.335

Lane width: 3.6 m

Lane cross slope: 2%

Paved-shoulder width: 3.3 m

Usable-shoulder width: 3.9 m

Shoulder cross slope: 4%

Toe-of-slope El. at end of wing: 272.287

Determine the following.

Break-point El.

$$275.335 [3.6(0.02) + (3.3 + 0.6)(0.04)] = 275.335 - (0.072 + 0.156) = 275.107$$

Horizontal distance from break point to toe of slope, S

$$3(275.107 - 272.287) = 8.460 \text{ m}$$

Wing length, L

$$X_2 = W_f \tan\left(\frac{\alpha}{2}\right) = 0.3 \tan 15^\circ = 0.080 \text{ m}$$

$$S - X_2 - W_f = 8.460 - 0.080 - 0.300 = 8.080 \text{ m}$$

$$L = \frac{(S - X_2 - W_f) \sin 45^\circ}{\sin(90^\circ - \alpha + 45^\circ)} = \frac{(8.08) \sin 45^\circ}{\sin 105^\circ} = 5.915 \text{ m}$$

Horizontal distance from end of wing to toe of slope, Y

$$X_2 = L \cos \alpha = 5.915 \cos 30^\circ = 5.123 \text{ m}$$

$$Y \equiv (S - X_2 - W_f) - X_3 = 8.080 - 5.123 = 2.957 \text{ m}$$

End-wing El. at toe of slope

$$\text{El.} = \left(\frac{Y}{3}\right) + (\text{toe-of-slope El.}) = \left(\frac{2.957}{3}\right) + 272.287 = 0.986 + 272.287 = 273.273$$

End-wing El. required

$$\text{El.} = (\text{End-wing El. at toe of slope}) + 0.150 = 273.273 + 0.150 = 273.423$$

FLARED-WING LENGTHS AND ELEVATIONS EXAMPLE

Figure 67-2B