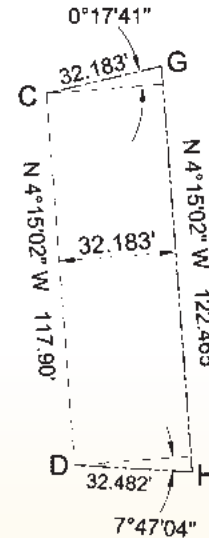
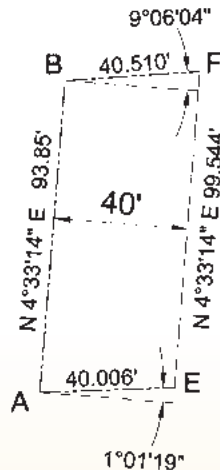
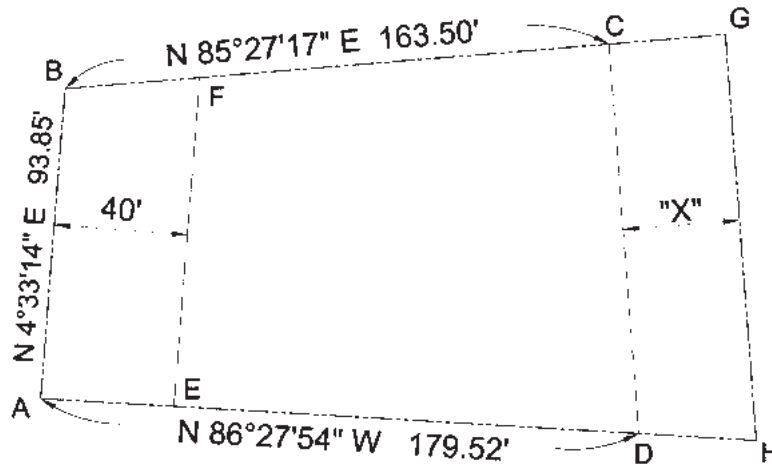


Solution to Problem 111



SIDE E-F OF THE TRAPEZOID A-B-F-E IS EQUAL TO

$$93.85 + (40) \tan 1^{\circ}01'19'' + (40) \tan 9^{\circ}06'04'' = 93.85 + 0.714 + 6.408 = 99.544$$

THE AREA OF TRAPEZOID A-B-F-E IS THEREFORE

$$(40) \left[\frac{93.85 + 99.544}{2} \right] = 3867.88 \text{ sq. ft.}$$

THE AREA OF TRAPEZOID C-G-H-D MUST ALSO BE EQUAL TO 3867.88 sq. ft.

THAT AREA IS EQUAL TO (X) [(SIDE C-D + SIDE G-H) / 2]

SIDE C-D IS GIVEN AS 117.90

SIDE G-H IS EQUAL TO $117.90 + (X) \tan 0^{\circ}17'41'' + (X) \tan 7^{\circ}47'04''$

SO THE AREA, 3867.88 sq. ft., IS EQUAL TO

$$3867.88 = (X) \left[\left(117.90 + 117.90 + 0.005143919(X) + 0.136706381(X) \right) / 2 \right]$$

EXPANDING AND REARRANGING,

$$0.1418503 X^2 + 235.80 X - 7735.76 = 0$$

FROM WHICH $X = 32.183$ (BY THE QUADRATIC FORMULA)

$$C-G \text{ EQUALS } 32.183 / \cos 0^{\circ}17'41'' = 32.183$$

$$D-H \text{ EQUALS } 32.183 / \cos 7^{\circ}47'04'' = 32.482$$

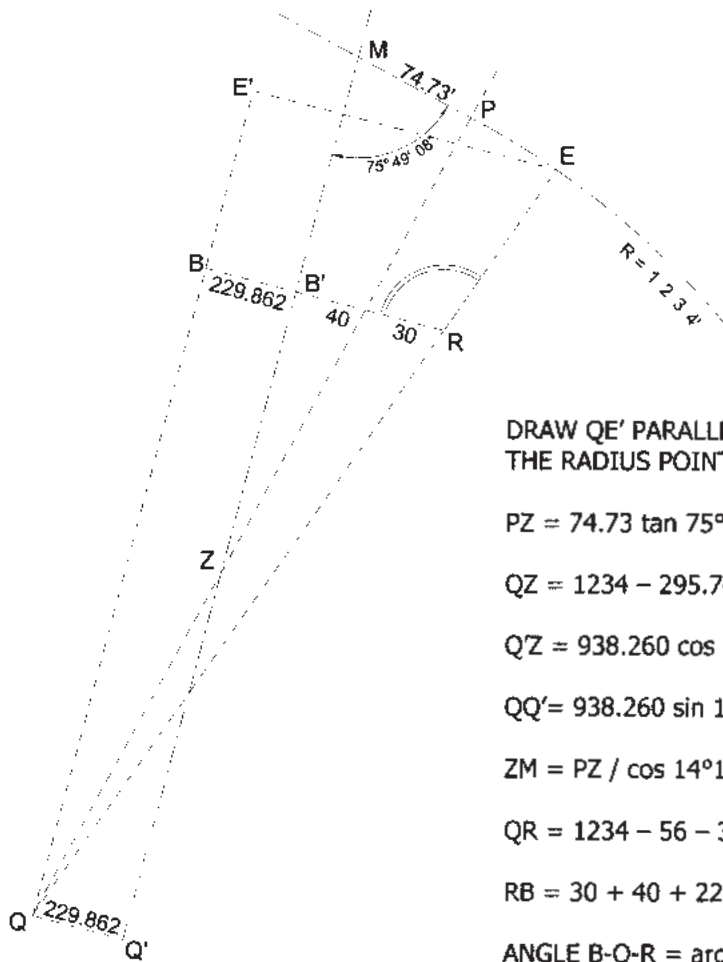
$$G-H \text{ EQUALS } 117.90 + 32.183 \tan 0^{\circ}17'41'' + 32.183 \tan 7^{\circ}47'04'' = 122.465$$

THE AREA OF C-G-H-D IS $(32.183) \left[\frac{117.90 + 122.465}{2} \right] = 3867.83 \text{ sq. ft.}$

(THE TOTAL AREA OF A-B-C-D, 18060.84 sq. ft., WAS NOT NECESSARY TO SOLVE THIS PROBLEM)



Solution to Problem 112



DRAW QE' PARALLEL WITH THE CENTERLINE OF LEFT LANE AND THROUGH THE RADIUS POINT OF THE ARC $R=1234'$

$$PZ = 74.73 \tan 75^\circ 49' 08'' = 295.740$$

$$QZ = 1234 - 295.740 = 938.260$$

$$Q'Z = 938.260 \cos 14^\circ 10' 52'' = 909.668$$

$$QQ' = 938.260 \sin 14^\circ 10' 52'' = 229.862$$

$$ZM = PZ / \cos 14^\circ 10' 52'' = 305.036$$

$$QR = 1234 - 56 - 30 = 1148$$

$$RB = 30 + 40 + 229.862 = 299.862$$

$$\text{ANGLE } B-Q-R = \arcsin 299.862 / 1148 = 15^\circ 08' 29''$$

$$BQ = 1148 \cos 15^\circ 08' 29'' = 1108.146$$

$$B'M = 909.668 + 305.036 - 1108.146 = 106.558$$

$$\text{MAKING THE BC STATION } 14+22.41 - 106.56 = 13+15.85$$

$$\text{ANGLE } P-Q-R = 15^\circ 08' 29'' - 14^\circ 10' 52'' = 0^\circ 57' 37''$$

$$\text{ARC } PE = 1234 (0^\circ 57' 37'') \pi / 180 = 20.68'$$

$$\text{MAKING THE EC STATION } 27+62.16 - 74.73 - 20.68 = 26+66.75$$

$$\text{ANGLE } B-R-E = 180^\circ - (90^\circ - 15^\circ 08' 29'') = 105^\circ 08' 29'',$$

THE CURB RETURN CENTRAL ANGLE

$$\text{CURB RETURN } L = 30 (105^\circ 08' 29'') \pi / 180 = 55.05'$$

$$\text{CURB RETURN SEMI-TANGENT} = 30 \tan (105^\circ 08' 29'' / 2) = 39.20'$$