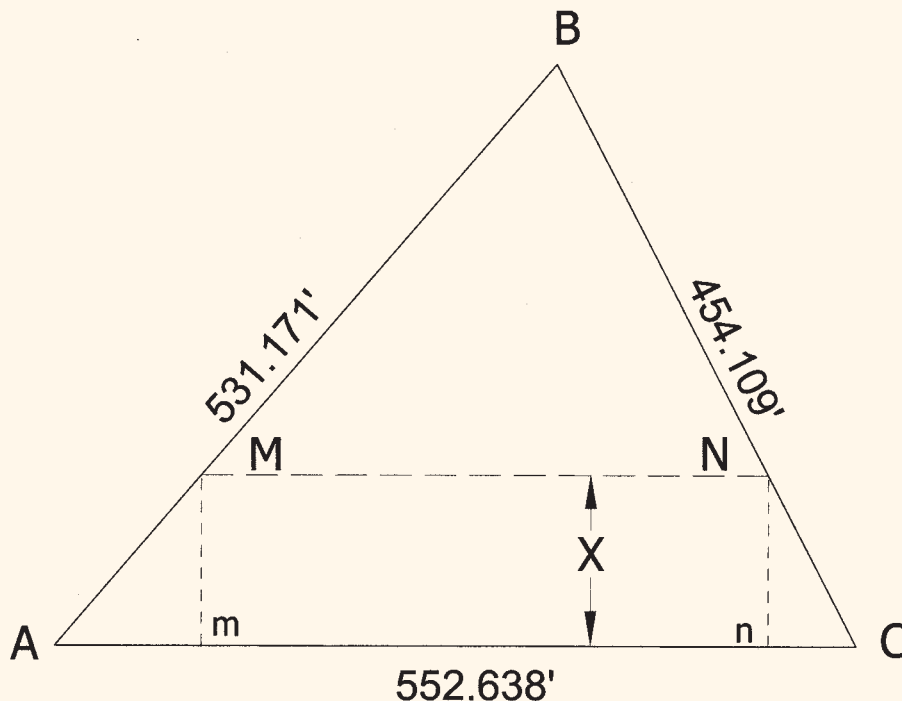




Solution to Problem 125



Solving for the angles of triangle A-B-C by the Law of Cosines:
 angle A = 49°29'36", angle B = 67°42'50", angle C = 62°47'34"

Using Heron's formula for the area of triangle A-B-C:
 $\text{Area}^2 = (s)(s-a)(s-b)(s-c)$, where $s = (a + b + c)/2$
 $= (768.959)(314.85)(216.321)(237.788)$
 Area = 111,595.774 sq. ft.

$$\begin{aligned} MN &= 552.638 - Am - nC \\ &= 552.638 - X \tan 40^\circ 30' 24'' - X \tan 27^\circ 12' 26'' \\ &= 552.638 - 1.368371483 X \end{aligned}$$

$$\text{Area A-M-N-C} = \frac{111595.774}{2} = \frac{552.638 + 552.638 - 1.368371483 X}{2} X$$

Expanding and rearranging: $1.368371483 X^2 - 1105.276 X + 111595.774 = 0$
 From which $X = 118.2896$ by the Quadratic Equation.

$$MN \text{ then is } 552.638 - Am - nC = 552.638 - 101.0527 - 60.8114 = 390.774$$

$$AM \text{ is then } 155.5766, MB \text{ is } 375.5944, CN \text{ is } 133.0054 \text{ and } NB \text{ is } 321.1036$$

$$\text{The desired ratios are: } AC / MN = 552.638 / 390.774 = \sqrt{2}$$

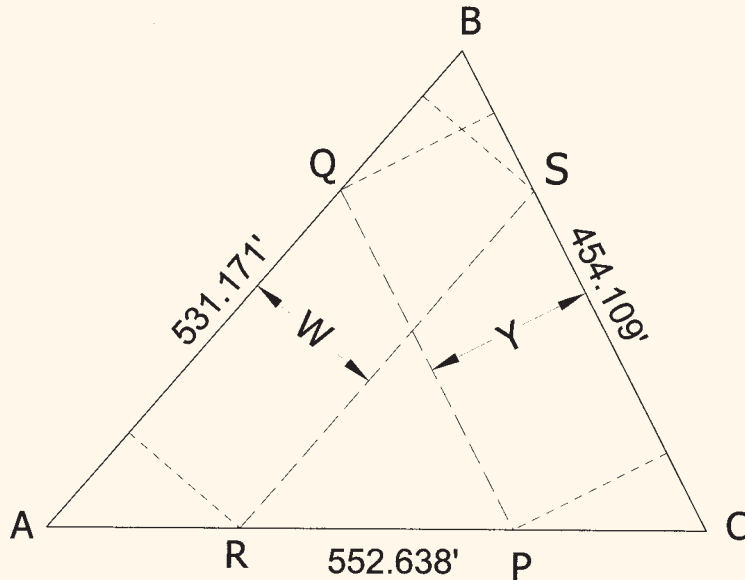
$$MB / MA = 375.5944 / 155.5766 = \sqrt{2} + 1$$

$$NB / NC = 321.1036 / 133.0054 = \sqrt{2} + 1$$





Solution to Problem 126



With all of the angles and the area known from Problem No. 125,
 $PQ = 454.109 - Y \tan 22^\circ 17' 10'' - Y \tan 27^\circ 12' 26''$
 $= 454.109 - 0.923936283 Y$

$$\text{Area C-P-Q-B} = \frac{111595.774}{2} = \frac{454.109 + 454.109 - 0.923936283 Y}{2} Y$$

Expanding, rearranging and solving for Y by the Quadratic Equation, $Y = 143.9550$

PQ is 321.1038, BQ is 155.5763, QA is 375.5974, PC is 161.8638 and PA is 390.7742

The ratios are $BC/PQ = 454.109/321.1038 = \sqrt{2}$

$$AP/PC = 390.7742/161.8638 = \sqrt{2} + 1$$

$$AQ/QB = 375.5974/155.5763 = \sqrt{2} + 1$$

$RS = 531.171 - W \tan 22^\circ 17' 10'' - W \tan 40^\circ 30' 24'' = 531.171 - 1.264128673 W$

$$\text{Area A-R-S-B} = \frac{111595.774}{2} = \frac{531.171 + 531.171 - 1.264128673 W}{2} W$$

Expanding, rearranging and solving for W, $W = 123.0702$

RS is 375.5945, AR is 161.8641, RC is 390.7739, BS is 133.0055 and SC is 321.1035

The ratios are $AB/RS = 531.171/375.5945 = \sqrt{2}$

$$RC/AR = 390.7739/161.8641 = \sqrt{2} + 1$$

$$SC/BS = 321.1035/133.0055 = \sqrt{2} + 1$$