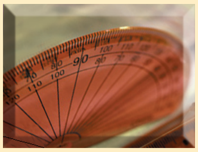
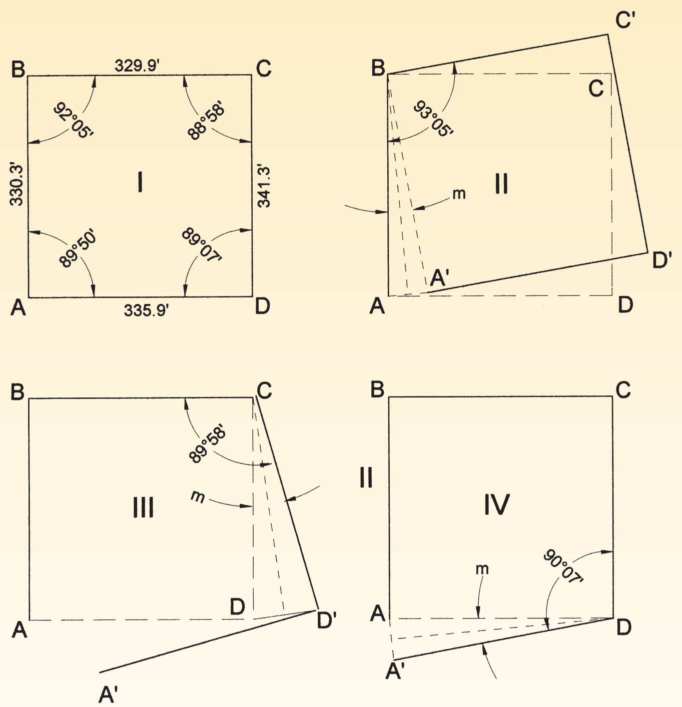


Solution to Problem 41



(This problem is based on an article by Roger Swink, LS, in the Summer 1972 issue of *The California Surveyor*)

Traverse I started at A with A-D assumed East. It closes within 0.1′, or 1:16,300. Traverse II uses the same distances and angles except the angle at B has a blunder of 1°. The closure is S88°56½′ W 5.80′. It can be seen that the error of closure is line A-A′ and the distance from the starting point A to the point of the blunder is approximately equal to the line from B to the midpoint of A-A′, or

$$\text{distance} = \frac{A\text{-}A'}{2}\left(\frac{1}{\sin m/2}\right),$$ where m is the angular blunder.

Since this is equal to 332.3′, the blunder could be at B or D, but not C.

If the traverse is rerun with the starting point at D, the closure is S43°56′W 8.29′ and the calculated distance to the blunder point is 475.0′. This indicates B, but not A or D, and the error is isolated. Do this for Traverses III and IV with the angular blunder at C and D, respectively, and you will see how it works.

Using this technique for the problem given, starting at F and proceeding clockwise yields a closure of N72°14′42″E 1.966′. The calculated distance to the point of blunder is 675.9′, close to the inverse distance to D.

But, the traverse could have an error of closure within, say, 1:10,000 and still be considered valid. The distance closure could be ±0.24′ and still be valid, so the calculated distance could be

$$\frac{1.966' \pm 0.24'}{2 \sin 0°05'} = 594.7' \text{ to } 759.7'$$ which indicates A, B, C or D and excludes E

If the starting point is moved to A, the closure is S56°00′39″E 2.255′ and the distance is

$$\frac{2.255 \pm 0.24'}{2 \sin 0°05'} = 694.4' \text{ to } 859.4'$$ which indicates D and excludes B, C, E and F

and the blunder is isolated.

Solution to Problem 42

TO RISE 500 FEET AT A UNIFORM RATE OF GRADE OF 3% REQUIRES

$$\frac{500'}{0.03\ \%} = 16{,}666.67$$ LINEAL FEET OF ROAD.