Principles and Practice of Surveying

Sample Examination

Second Edition

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Morning Session
Sample Examination

SITUATION FOR PROBLEMS 1–4

A retracement survey of Section 6 in a public land survey township has resulted in the coordinates tabulated as follows. The section line lengths from the original government survey plat and field notes for the township are also tabulated. All other corners in Sections 5, 6, and 7 have been deemed to be lost.

retracement survey coordinates		
corner	N (ft)	E (ft)
NW corner, Section 6	15,300	10,000
SW corner, Section 6	10,000	10,000
E 1/4 corner, Section 6	12,642	15,346
SE corner, Section 7	4667	15,334
NE corner, Section 5	15,207	20,706
S 1/4 corner, Section 5	9965	18,033

GLO plat and field note distances	
section line	length
N line, Section 6	80 ch 60 lks
E line, Section 6 from SE to E 1/4	40 ch
E line Section 6 from E 1/4 to NE	39 ch 40 lks
S line, Section 6	80 ch 50 lks
W line, Section 6	79 ch 50 lks
N line, Section 5	80 ch
S line, Section 5	80 ch
E line, Section 7	80 ch

1. What are the northing and easting coordinates for the southeast corner of Section 6?

(A) 9977 ft, 15,342 ft
(B) 9984 ft, 15,366 ft
(C) 9993 ft, 15,355 ft
(D) 10,000 ft, 15,280 ft

2. What are the coordinates of the northeast corner of Section 6?

(A) 15,253 ft, 15,373 ft
(B) 15,253 ft, 15,353 ft
(C) 15,275 ft, 15,303 ft
(D) 15,300 ft, 15,280 ft

3. What is the approximate area of the north 1/2 of the southeast 1/4 of the northwest 1/4 of the southeast 1/4 of Section 6?

(A) 5 ac
(B) 10 ac
(C) 20 ac
(D) 40 ac

4. The only evidence found at the southeast corner of Section 8 was a concrete monument set by a private surveyor in 1950. During research, a recorded plat was found with a notation that the concrete monument was set immediately adjacent to a scribed light-wood post determined to be the original corner monument. Which of the following designations currently applies to the southeast corner?

(A) existent corner
(B) obliterated corner
(C) lost corner
(D) original corner

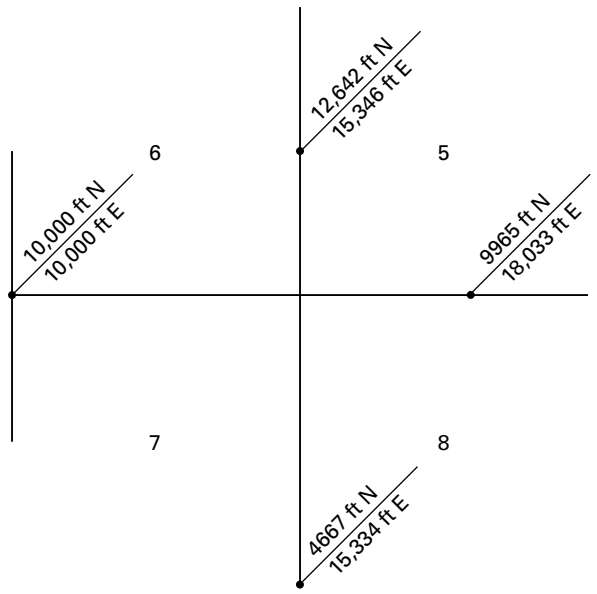
5. A task analysis has indicated that a project will require 80 hr of three-person survey crew time, 40 hr of office technician time, and 40 hr of professional surveyor supervision time. A recent audit has revealed that the firm has a fringe benefit factor of 30% and a general and administrative overhead factor of 120%, for a total overhead of 150% on a direct labor basis. Assuming that a 12% operating margin is desired and that wage rates are as given in the following table, approximately what fee should be quoted for the project?

job class	hourly wage rate ($)
professional surveyor	30
office technician	15
crew chief	15
instrument technician	12
rod technician	9

(A) $5280
(B) $13,100
(C) $13,800
(D) $14,800

Solutions
Morning Session

1.



Since the southeast corner of Section 6 is an interior section corner, double proportional measurement should be used to reestablish it. First, determine the measured distance between found corners.

$$\begin{aligned}\text{measured N-S distance} &= \sqrt{\Delta N^2 + \Delta E^2} \\ &= \sqrt{\begin{array}{l}(12{,}642\text{ ft} - 4667\text{ ft})^2 \\ \quad +(15{,}346\text{ ft} - 15{,}334\text{ ft})^2\end{array}} \\ &= 7975.01\text{ ft}\end{aligned}$$

$$\begin{aligned}\text{measured E-W distance} &= \sqrt{\Delta N^2 + \Delta E^2} \\ &= \sqrt{\begin{array}{l}(9965\text{ ft} - 10{,}000\text{ ft})^2 \\ \quad +(18{,}033\text{ ft} - 10{,}000\text{ ft})^2\end{array}} \\ &= 8033.08\text{ ft}\end{aligned}$$

To determine the northing coordinate, N, apply the measured north-south distance, proportioned by the ratio of record distance from the lost corner to the found corner to the south to the total record distance between the found corners to the north and south, to the northing coordinate of the found monument to the south.

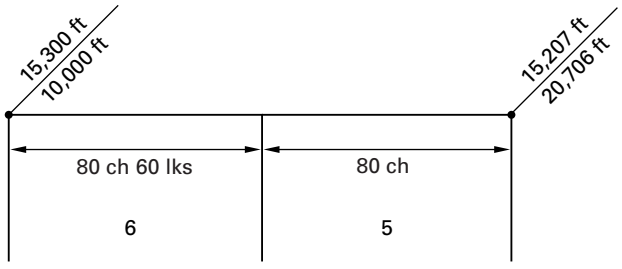
$$\begin{aligned}N &= N_{\text{S}} + \left(\frac{\text{record distance to S}}{\text{record N-S distance}}\right) \\ &\quad \times (\text{measured N-S distance}) \\ &= 4667\text{ ft} + \left(\frac{80\text{ ch}}{80\text{ ch} + 40\text{ ch}}\right)(7975\text{ ft}) \\ &= 9984\text{ ft}\end{aligned}$$

To determine the easting coordinate, E, apply the measured east-west distance, proportioned by the ratio of record distance from the lost corner to the found corner to the west to the total record distance between the found corners to the west and east, to the easting coordinate of the found monument to the west.

$$\begin{aligned}E &= E_{\text{W}} + \left(\frac{\text{record distance to W}}{\text{record E-W distance}}\right) \\ &\quad \times (\text{measured E-W distance}) \\ &= 10{,}000\text{ ft} + \left(\frac{80\text{ ch }50\text{ lks}}{120\text{ ch }50\text{ lks}}\right)(8033\text{ ft}) \\ &= 15{,}366\text{ ft}\end{aligned}$$

The answer is B.

2.



Since the northeast corner of Section 6 is on the township exterior, single proportional measurement should be used to reestablish it. To determine the northing coordinate for the lost corner, apply the differences in northing coordinates for the found corners to the west and east, proportioned by the ratio of the record distance for the north line of Section 6 to the total record