CALIFORNIA STATE BOARD OF REGISTRATION
FOR PROFESSIONAL ENGINEERS

LS

C

LAND SURVEYOR
1977

PRINCIPLES AND PRACTICE

1. This examination is given in two four-hour periods on the same day. The subject matter relates to the principles and practice of Land Surveying. Part C is the first of two parts.

2. In the workbook, you are to work all of the five problems in this booklet.

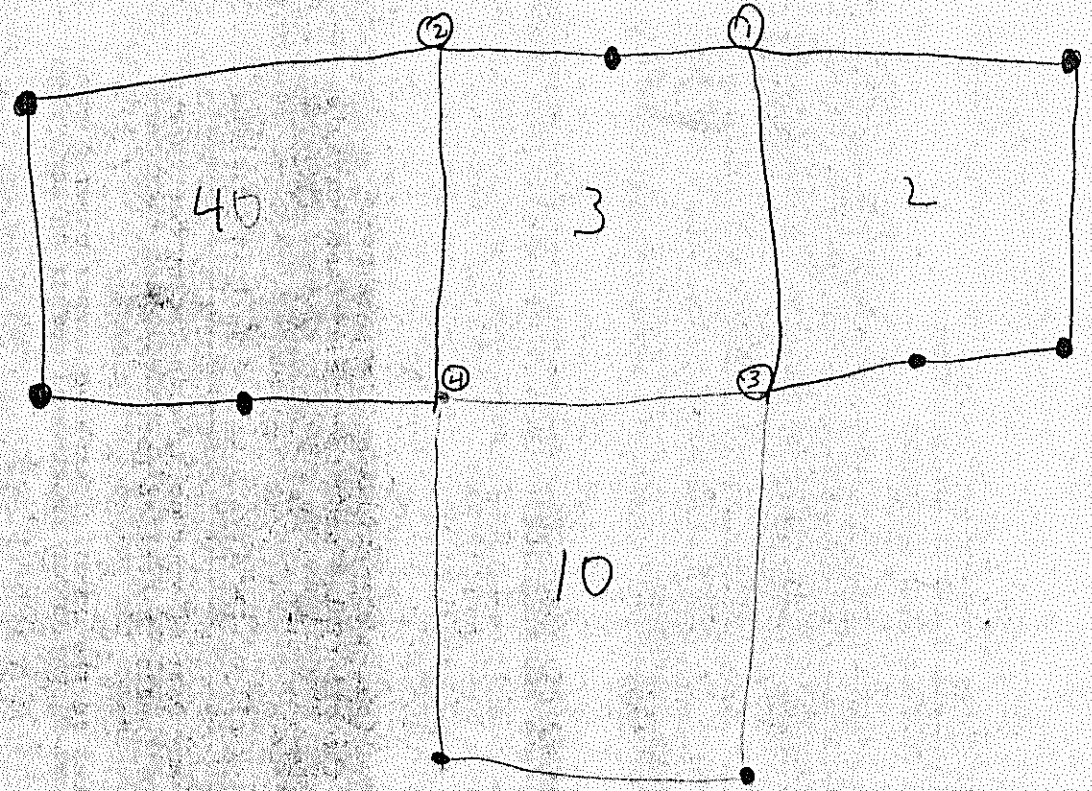
3. You may withdraw from scoring any part of your work by isolating that part and writing VOID across it. Delineate the voided part clearly.

4. Enter your identification number in the upper right-hand corner on each page where space is provided.

5. Read the instructions on the workbook cover page.

6. After you have completed the examination, check the problem order, include all pages, and turn it in to the proctor.

7. You may keep this set of examination questions.


2
1
40
3
2
4
3
10

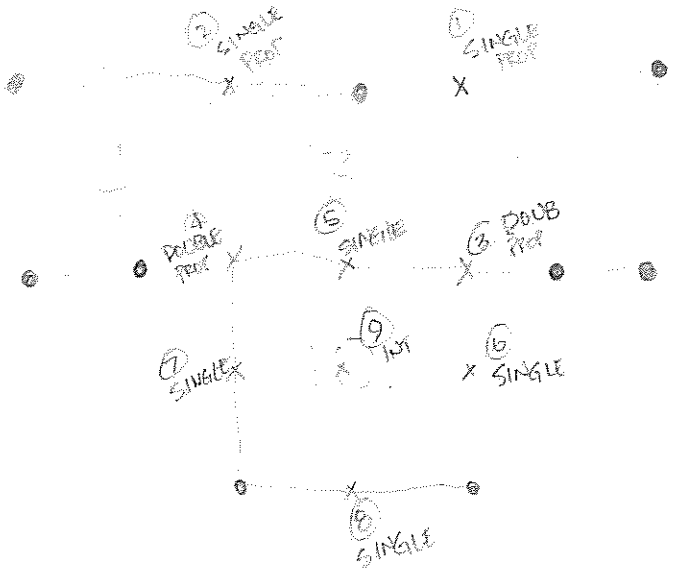
Problem C1 Wt. 5.0 Required

You are to locate the center of Sec. 10, T6S, R4W, SBM by a field survey. The SW corner and the SE corner of Sec. 10 have been recovered. In addition, the following corners in the area have been recovered: (All other corners are considered lost.)

NW Corner Section 4
SW Corner Section 4
S 1/4 Corner Section 4
N 1/4 Corner Section 3
NE Corner Section 2
SE Corner Section 2
S 1/4 Corner Section 2, all of T6S, R4W

Required

Discuss the procedures to be employed in locating the center of Section 10, T6S, R4W.




NORTH CORRECTION LINE

Problem C2 Wt. 10.0 Required

You have been requested to survey the property described as follows:

All that certain real property being a portion of Lot 18 in the Rio Estates Subdivision recorded in Book 1 of Maps, page 183 in Modoc County, California, described as follows:

"Beginning at a 1" iron pipe on the west line of Dusty Road 260.0 feet South of a concrete monument at the northeast corner of said Lot 18; thence West 250.0 feet to a 1" iron pipe; thence S 30° W 201.0 feet to a 1" iron pipe; thence S 60° E 140.0 feet to a 1" iron pipe; thence N 80° E 234.0 feet to a 1" iron pipe on the west line of Dusty Road 200.0 feet South of the point of beginning; thence North along said west line 200.0 feet to the point of beginning."

You have found and measured only those items shown on the sketch.

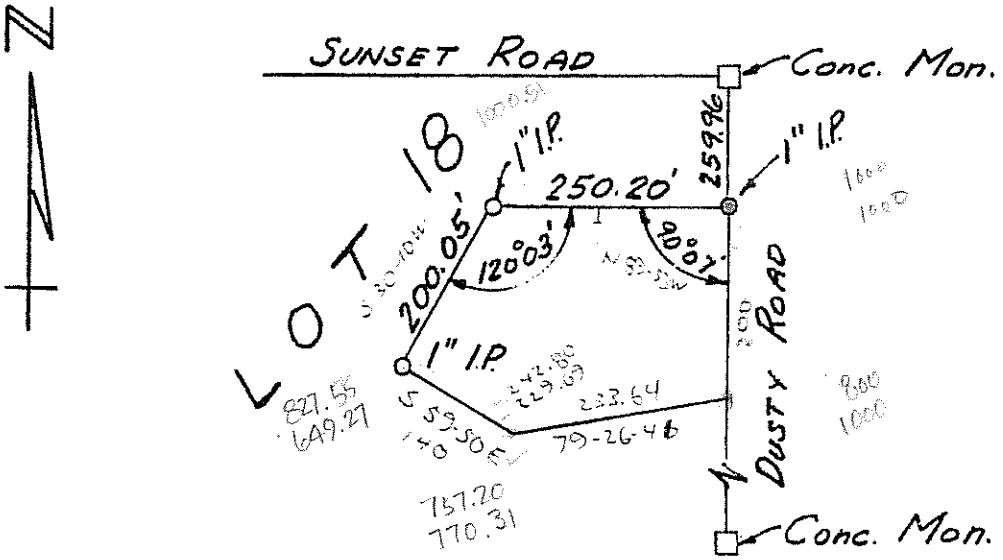



FIG. C2

REQUIRED

From the information given, determine all the bearings and distances on the boundary of the parcel.

Problem C3 Wt. 10.0 Required

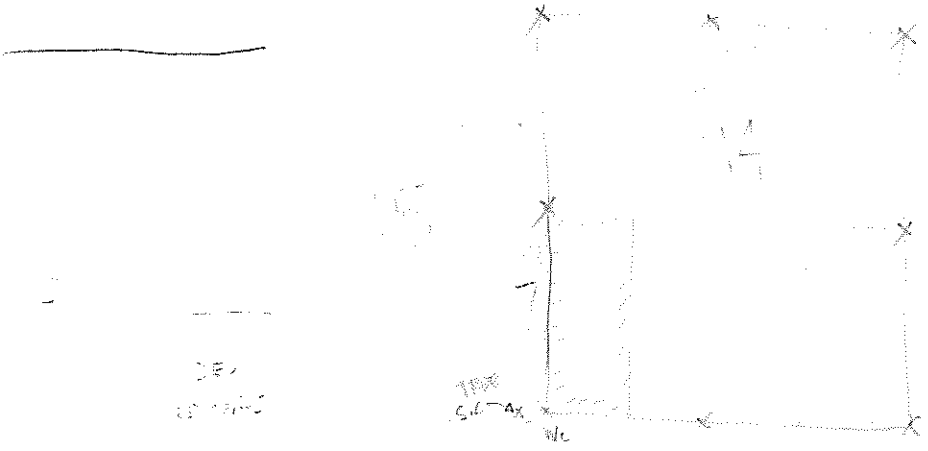
You have been hired to survey and monument the W 1/2 of the SW 1/4 of Section 14. The area is one of increasing growth and rising land values; several housing tracts and a new shopping center have been built near by. During the course of your survey, you discover evidence which proves that the monument which has been used and accepted as the SW corner of Section 14 for over 40 years is, in fact, a perpetuation of a witness corner set by the Deputy Surveyor during his official GLO survey of 1900. This witness corner was set 16 feet east of the true corner. All other monuments which control the breakdown of the section are in place and are known to be reliable. The E 1/2 of the SE 1/4 of Section 15, adjoining the subject property on the west, was developed 25 years ago, with improvements extending to the section line as has been marked at its southerly terminus by the monument which you have now discovered is the witness corner.

Required

In your own words, describe your course of action to complete the survey, including the following:

a. The corners you would set
b. Where and why you would set them
c. What map, if any, you would make
d. The defense you would expect to give if your survey is challenged in court

In your discussion, you may assume that the sections involved have nominal dimensions. The use of sketches is encouraged.



Problem C4 Wt. 10.0 Required

A parcel of land identified as "Tract One of Mann's Subdivision" per Map Book 3, page 17, Records of xxx County, California, is shown below. Bearings and distances not shown are not to be assumed or calculated. Disregard possible requirements for Parcel Map.

Required

a. Write a metes and bounds description sufficient to convey the parcel identified as "A".

b. Write a metes and bounds description sufficient to convey the parcel identified as "B". Disregard references to official records.

c. Write a metes and bounds description sufficient to convey the parcel identified as "C". Disregard references to official records.

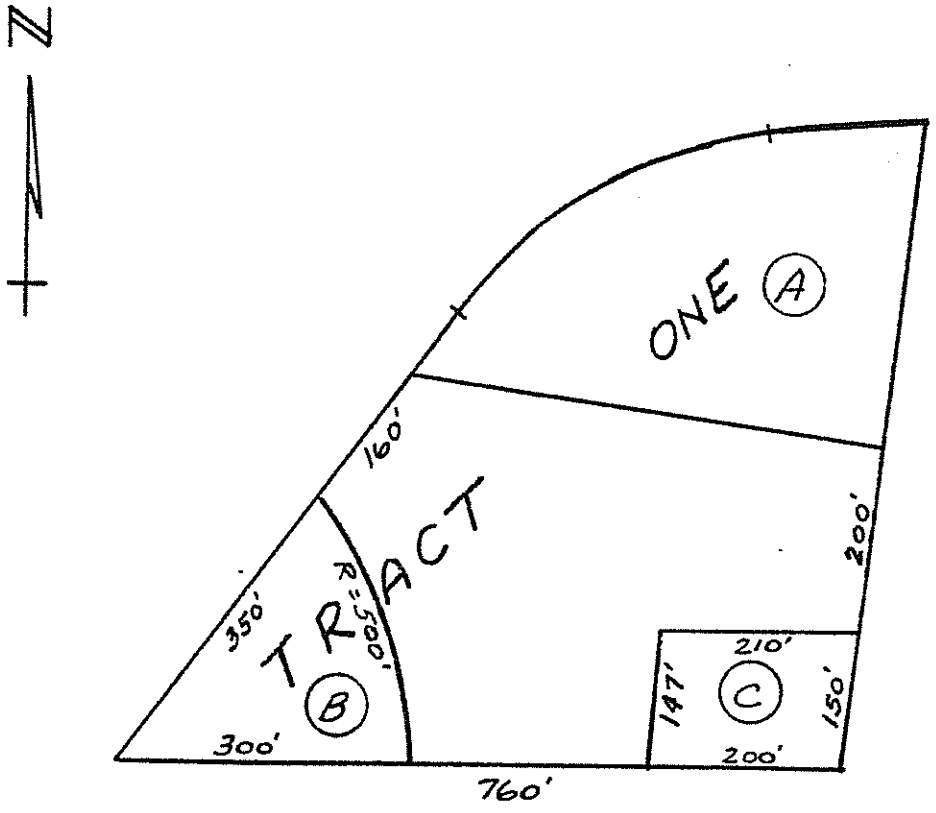



FIG. C4

Problem C5 Wt. 15.0 Required Answer all parts

Instruction

This problem contains 30 parts. In your workbook, list each part by number, (1, 2, 3 etc.) and identify your answer choice for each part with the letter which identifies your answer choice (A, B, C, etc.).

1. An easement in gross is:

   A. A personal right of the grantee.
   B. An encumbrance to the servient tenement.
   C. Appurtenant to the dominant tenement.
   D. All of the above.
   E. A and B only.

2. The State Board of Registration for Professional Engineers administers:

   A. The Subdivision Map Act.
   B. The Land Surveyors Act.
   C. Discipline of unlicensed persons practicing Land Surveying.
   D. All of the above.
   E. A and B only.

3. An easement that has been granted can be extinguished by:

   A. A quiet title action by the grantor.
   B. Nonuse for a period of five years by the grantee.
   C. Abandonment by the grantee.
   D. All of the above.
   E. A and C only.

4. Recording of a deed:

   A. Is required by law.
   B. Imparts constructive notice.
   C. Validates the deed.
   D. All of the above.
   E. A and B only.

5. To effectively acquire real property by adverse possession, these elements must be present:

   A. Payment of property taxes for five continuous years.
   B. Hostile and exclusive use for five continuous years.
   C. Claim of right or color of title.
   D. All of the above.
   E. A and B only.

6. Which is not considered an encumbrance?

   A. Property taxes
   B. Liens
   C. Easements
   D. Encroachments
   E. All of the above are considered encumbrances.

7. Without specific reference, a conveyance of real property, nevertheless, includes:

   A. Improvements situate on the land.
   B. Easements appurtenant to the land.
   C. Mineral substances below the surface.
   D. All of the above.
   E. A and C only.

8. Valid conveyances of real property cannot be made by:

   A. A minor under 18 years of age.
   B. A deed which has not been notarized.
   C. A person adjudicated incompetent.
   D. All of the above.
   E. A and C only.

9. Real property cannot be acquired.by:

   A. Wills and succession.
   B. Quitclaim deed.
   C. Accession (accretion or reliction).
   D. Adverse possession.
   E. Real property can be acquired by all the above.

10. For a deed to be valid, it is not essential that:

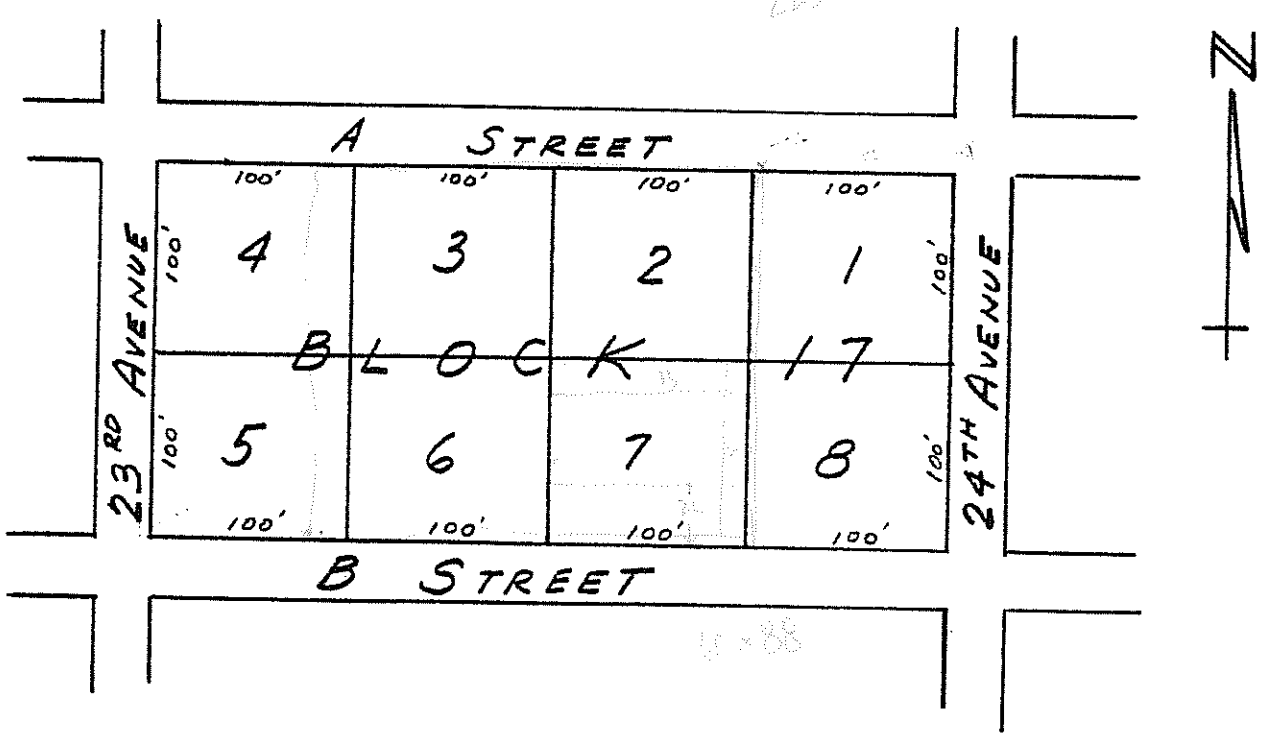
   A. The deed be dated.
   B. The grantee accept the conveyance.
   C. The grantor deliver the deed to grantee.
   D. The grantor be competent and over 18 years of age.
   E. All of the above are essential.

11. Which of the following has jurisdiction to carry out the provisions of the Subdivision Map Act:

A. Real Estate Commissioner
B. State Board of Registration for Professional Engineers
C. Local Governing Body
D. State Lands Commission
E. State Planning Agency

NOTE: Questions 12 thru 16 refer to a parcel of land which can be outlined on the map below from the land description which follows:

LAND DESCRIPTION: Commencing at the southwest corner of "A" Street and 24th Avenue; thence west along the south line of "A" Street 95.0 feet to the point of beginning; thence south, parallel to the west line of 24th Avenue 200 feet to the north line of "B" Street; thence west along the north line of "B" Street 225.0 feet to a point 80.0 feet east of the northeast corner of 23rd Avenue and "B" Street; thence north parallel with the east line of 23rd Avenue 200.0 feet to the south line of "A" Street; thence east along the south line of "A" Street 225.0 feet to the point of beginning.



12. Which of the following most correctly describes the same parcel as identified in the LAND DESCRIPTION:

    A. Lots 2, 3, 6 and 7 together with the west 5.0 feet of Lots 1 and 8 and the east 20 feet of Lots 4 and 5, all of Block 17.

    B. All that portion of Block 17 lying east of a line 20.0 feet west of and parallel with the west line of Lots 3 and 6 and west of a line 5.0 feet east of and parallel with the east line of Lots 2 and 7.

    C. All of Block 17 except the east 95.0 feet and except the west 80.0 feet thereof.

    D. All of the above are equally correct.

    E. None of the above are correct.

13. The total record area contained in the land described is:

    A. 35,000 sq. ft.
    B. 4,500 sq. ft.
    C. 1.033 acres
    D. 45,000 sq. ft.
    E. C and D

14. What type of description was used to describe the land parcel:

    A. Lot-Book Description
    B. Metes and Bounds
    C. Government Survey
    D. All of the above
    E. None of the above

15. The lots contiguous to Lot 7 are:

    A. 2, 6 and 8
    B. 1, 2, 3, 6 and 8
    C. 6 and 8
    D. All lots in Block 17
    E. None of the above

16. With a 25-foot building set-back from the street, a 6-foot set-back from the sideline and 15 feet from the rear line, what is the buildable area of Lot 7?

    A. 5640 sq. ft.
    B. 5280 sq. ft.
    C. 7050 sq. ft.
    D. 6600 sq. ft.
    E. 4800 sq. ft.

17. The Subdivision Map Act provides for:

A. Release clauses in all blanket mortgages of subdivided property

B. Delivery of the Real Estate Commissioner's report

C. Approval of proposed sales contracts for the subdivision lots by the local governing body

D. Execution of an improvement contract between the subdivider and local governing body

E. All of the above.

18. Which of the following is <u>not</u> a subdivision:

A. Neighbors adjusting their common boundary
B. A condominium project
C. A conveyance of land to a public agency or public utility
D. A 5-year lease of 5 acres of a 30-acre industrial parcel
E. A and C only

19. Which of the following represents the best method for the reestablishment of a lost GLO corner common to four patented interior sections?

A. Set the corner in the place indicated by a person who vividly remembers seeing the corner before it was lost.

B. Set the corner at the intersection of the lines joining the quarter-section corners adjacent to the lost corner.

C. Set the corner at distances each proportinate to the GLO plat distances from the four nearest section or quarter-section corners adjacent to the lost corner.

D. Set the corner from terrain calls in the GLO field notes and/or from established lines of occupation.

E. Refer the matter to the BLM and request that they reestablish the corner.

20. Which of the following correctly describes an obliterated corner?

A. A point where there are no remaining traces of the monument and whose location can be restored only by reference to other interdependent corners.

B. A point where there are no remaining traces of the monument and whose location can be restored only by court decision.

C. A point where there are no remaining traces of the monument, but whose location has been perpetuated by acceptable evidence.

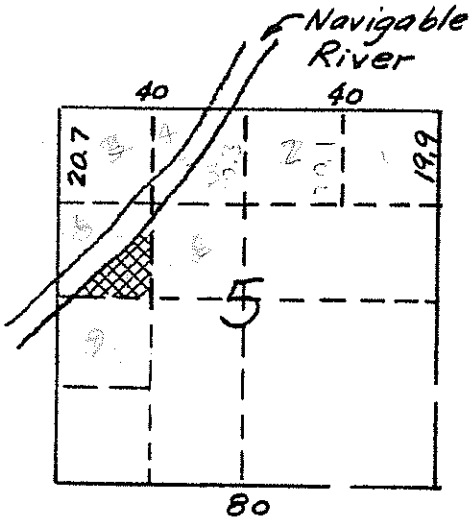
D. A point which has been destroyed by vandalism, construction, earthquake, etc.

E. A point where there are no remaining traces of the monument and whose location can be restored only by double-proportionate measurement from nearby undisturbed points.

21. The first Public Land Surveys were made under authority of which of the following?

A. The General Land Office
B. The Surveyor General of the United States
C. The Bureau of Land Management
D. The Geographer of the United States
E. The Secretary of the Interior

22. The dimensions shown on the sketch of Section 5 are in chains and are from the official township plat.




The area returned for Government Lot 2, in acres, is .

A. 40.00
B. 39.60
C. 40.80
D. 80.00
E. 40.40

23. Refer to the sketch in Question 22. The correct number of Government Lots is:

A. 6
B. 9
C. 10
D. 12
E. 13

24. Refer to the sketch in Question 22. The cross-hatched area represents Government Lot number:

A. 3
B. 4
C. 5
D. 6
E. 7

25. Ownership of the cross-hatched area in the sketch for Question 22, above, when patented, extends to which of the following lines?

A. Meander line
B. High-water line
C. Low-water line
D. Centerline of the river
E. Average of high and low-water lines

26. Fee title to submerged lands in California ordinarily vests in which of the following entities?

A. United States
B. State of California
C. The owner of the adjacent uplands
D. State Lands Commission
E. Coastal Waterways Commission

27. Fee title to the bed of a non-tidal, navigable river ordinarily vests in which of the following entities?

A. United States
B. The state(s) bordering upon or containing the river, to the thread thereof
C. The individuals whose lands border upon the river, to the thread thereof
D. A or B only
E. B or C only

28. Which of the following elements are <u>not</u> necessary in California for the acquisition of an easement by prescription?

A. Continuous use for 5 years
B. Payment of taxes on the subject land
C. Use of land hostile to the true owner
D. Claim of right
E. Open and notorious use of the land

29. In order for a monument to control the position of a point in a deed description, which of the following conditions must be met?

A. The monument must fit the bearings and distances given in the deed.
B. The monument must have been set pursuant to the deed description.
C. The monument must be called for in the deed.
D. The monument must bear an LS or RCE tag.
E. The monument must appear on a record map.

30. Which of the following statements is <u>not</u> true?

A. Wording in a deed reading "...to the East line of Ash Street, thence along Ash Street..." will carry title to the centerline of Ash Street.

B. "Land described in deed recorded in Book xx, pg xx..." is equivalent to saying "Land conveyed by deed recorded in Book xx, pg xx..."

C. When "tide water" is the boundary in a deed, the title to ordinary high water mark is conveyed.

D. A grant of land "to be used for a road" ordinarily conveys the fee to the road.

E. The line dividing "the East one-half" from "the West one-half" of a lot may be irregular -- even going around trees, etc. as long as the two "halves" are of equal area.

CALIFORNIA STATE BOARD OF REGISTRATION
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LS D

LAND SURVEYOR
1977

PRINCIPLES AND PRACTICE

1. This examination is given in two four-hour periods on the same day. The subject matter relates to the principles and practice of Land Surveying. Part D is the second of two parts.

2. In the workbook, you are to work any five of the six problems in this booklet.

3. You may withdraw from scoring any part of your work by isolating that part and writing VOID across it. Delineate the voided part clearly.

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Problem D1 Wt. 10.0

Using the configuration below and the current NOAA/NOS* standards and specifications for vertical control, determine the following:

A. The applicable limits of closure for each class of leveling. (Omit third-order leveling).

B. The greatest predicatable reliability of an elevation determined at the new bench mark, expressed as +/- x.xxx ft., for each class of leveling.

C. The route and class of leveling to most economically establish an elevation at the new bench mark which would be good to +/- 0.080 ft. Support your answer with appropriate economic considerations.

*National Oceanic and Atmospheric Administration/National Ocean Survey formerly USC & GS

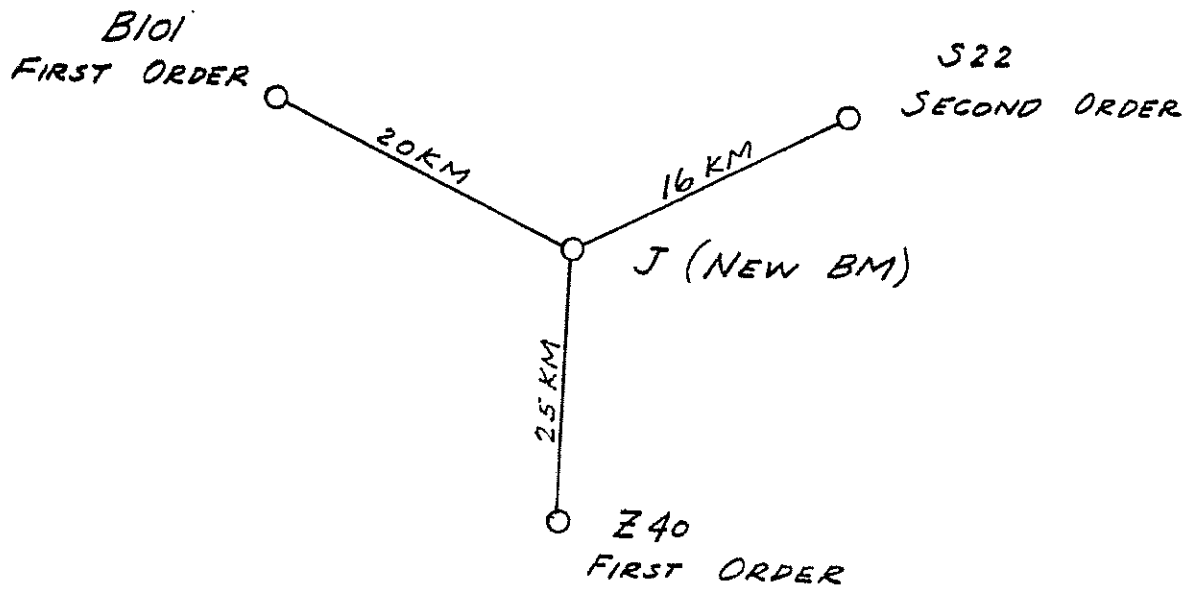



FIG. D1

Problem D2 Wt. 10.0

You have slope-staked "Burns Street" every 50 feet from Station 25+50 to Station 27+50 as follows:

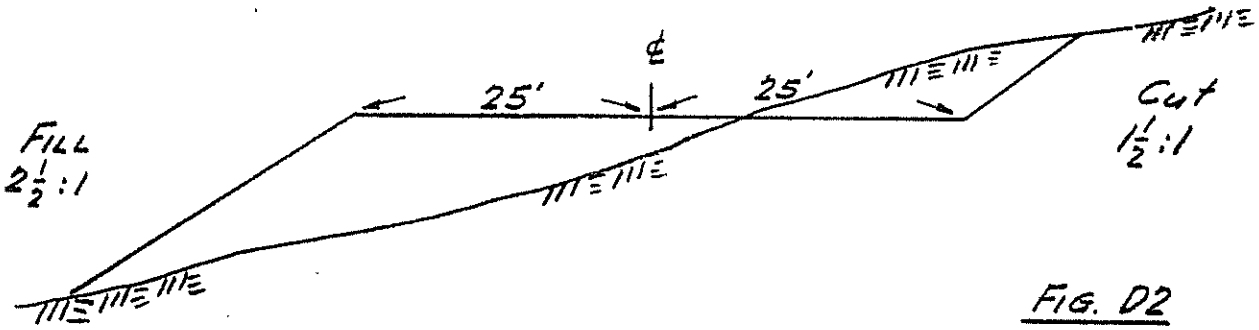



FIG. D2

The cuts or fills at the toe of slope or at the top of cut as determined by you were as follows:

25+50: Rt. 5.5' cut, Lt. 3.2' fill
26+00: Rt. 0.5' fill, Lt. 1.0' fill
26+50: Rt. 2.2' cut, Lt. 1.0' fill
27+00: Rt. 1.3' cut, Lt. 5.3' fill
27+50: Rt. 12.3' fill, Lt. 1.0' cut

The design centerline elevation at Sta. 25+50 is 101.75' with a +2.00% grade to Sta. 27+50. The existing centerline ground elevations were found to be as follows:

25+50: 102.3
26+00: 103.8
26+50: 102.1
27+00: 103.1
27+50: 101.0

Required

Turn your test sheet sideways and draw a vertical line through the center. Let the sheet represent the left and right sides of your field notebook.

A. Prepare a complete set of field notes showing how the above data would have been recorded. Any data that cannot be derived from the information given may be assumed.

B. Draw a picture of the slope stakes at Station 25+50 and show how they would be marked in the field.

Problem D3 Wt. 10.0

In the figure shown below, the lines ABLE - BAKER and KING - LAD are fixed in length and azimuth and the stations ABLE, BAKER, KING and LAD are fixed in position (latitude and longitude). All stations are occupied; all lines are observed in both directions.

Required

A. State the names of the various types of equations required for a complete adjustment of the figure.

B. Determine the quantity of each of the equations named in (A).

C. State the purpose for each type of equation and the criteria for its development (i.e., what is the guiding principle to follow in writing the equation).

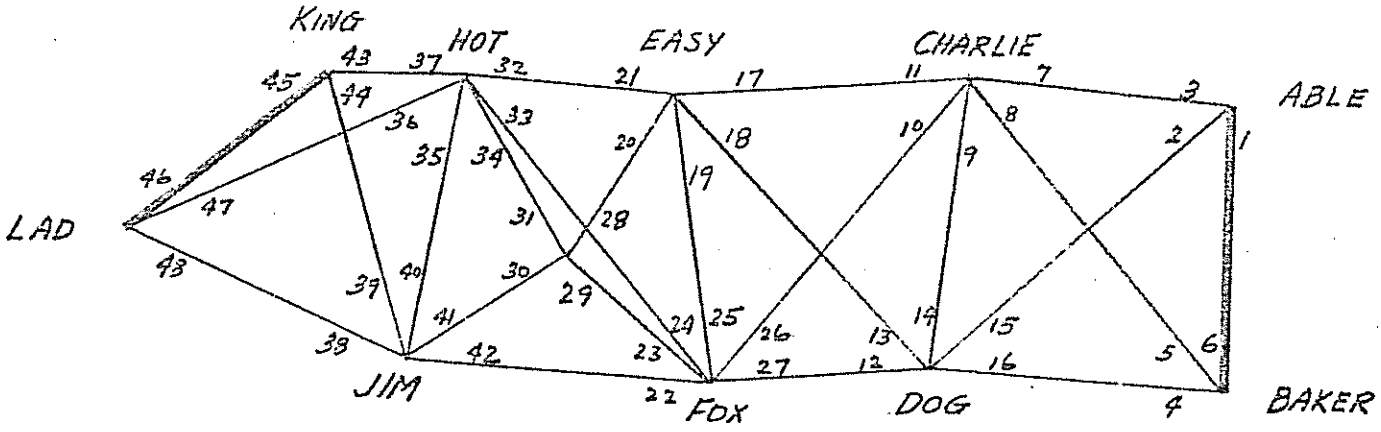



FIG. D3

Problem D4 Wt. 10.0

Cameras for aerial photography are classed as normal angle (f=8.25"), wide angle (f=6") and superwide angle (f=3.5").

Required Answer all parts

8.25 A. What focal length camera would you specify when mapping forested terrain?

3.5 B. If a minimum number of photographs are required to cover an area at a certain altitude, which focal length would be selected?

3.5 C. Which focal length would be preferred for mapping flat terrain?

6" D. Which of these lens systems would, with 60% overlap, give the best stereoscopic imagery?

2400 E. If a Kelsh plotter is used for map compilation and the "C" factor is 1200, at what height should the plane fly above mean terrain in order to plot two-foot contours?

F. If the side lap is 30% and the forward overlap is 60%, what is the effective steroscopic area covered by a single model on a 9"x9" format photograph?

Problem D4 Wt. 10.0 Continued

G. What photo scale would be obtained with a camera with a focal length of 120mm at a flying height of 3000 feet?

H. Expressed as a fraction of the contour interval, what accuracy is required for vertical field control?

I. If f=6" and the flying height is 2400 feet, how many photographs are required to map a strip of land 8,000 feet in length using 60% forward overlap?

J. With a 30% sidelap and a 60% forward overlap using a 6" focal length camera, how many acres are covered by a single stereoscopic model at a flight height of 7200 feet?

Problem D5 Wt. 10.0

You have been approached by Mr. Rich, and have been asked to submit a proposal to survey, stake and describe by metes and bounds the four parcels as shown on the sketch provided by him. He has indicated that he and his wife wish to avoid the provisions of the Subdivision Map Act by deeding the alternate parcels to their son in joint tenancy with each of them so that any of the resultant parcels might be sold.

Required

a. Prepare a letter responding to Mr. Rich regarding his request for a proposal.

b. Fully explain the reasons you responded as you did, backing up these reasons with fact or law.

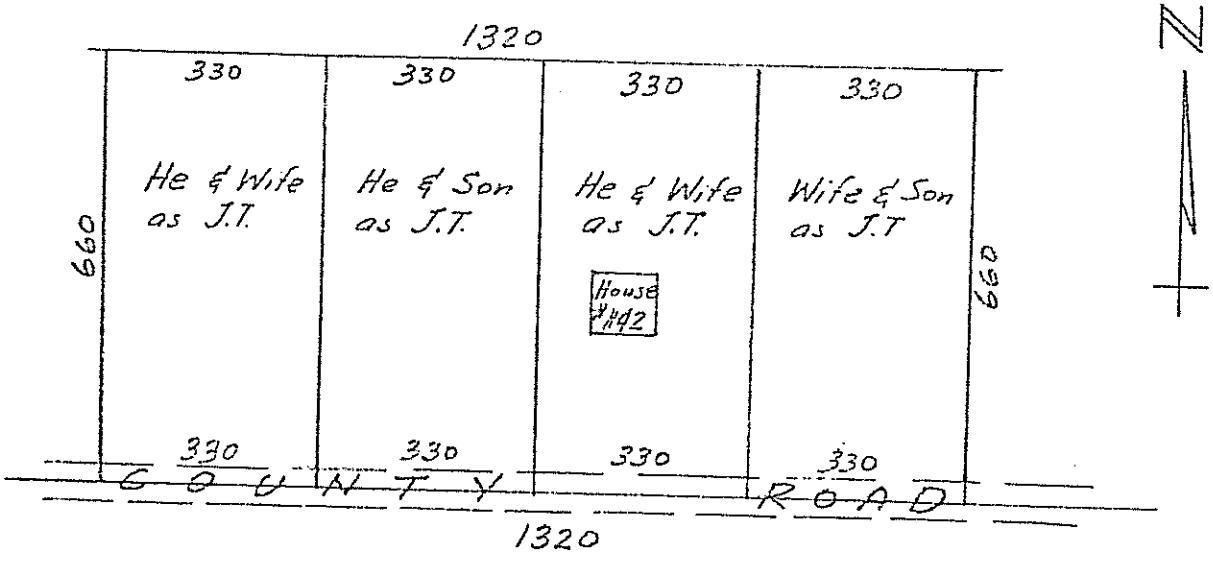



FIG. D5

Problem D6 Wt. 10.0

You have been engaged to establish a control traverse between two existing National Geodetic Survey monuments. These monuments, which are also bench marks, were set by triangulation prior to the advent of modern long range distance meters and were not directly connected at the time of the original survey. In order to maintain accuracy, you have re-measured this line with a recently calibrated EDM using an offset bar. Your measured slope distances, corrected for atmospherics are:

1. 50777.452 meters
2. 50777.430 meters
3. 50777.442 meters
4. 50777.424 meters

You have occupied "BRUNO" with the EDM and your HI is 5.60 feet. The retroprisms were set at "DIABLO" on a tower. The height of the retroprisms is 94.25 feet. Record data is as shown below. Coordinates shown are based upon the California Coordinate System, Zone 3. Elevations are based upon the National Geodetic Vertical Datum of 1929. Assume the mean radius of the earth to be 20,906,000 feet.

Required

a. What is the grid azimuth from "BRUNO" to "DIABLO" (South=0°00'00")?

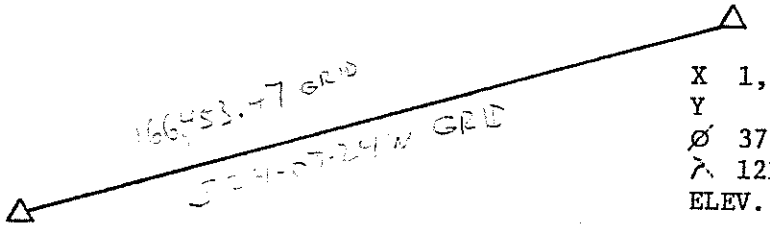
b. What is the record inverse grid distance in feet?

c. What is the record inverse geodetic distance in feet?

d. What is the standard error of the mean of your measured data, in feet?

e. What is your measured geodetic length, in feet?

f. What is the geodetic azimuth from "BRUNO" to "DIABLO"?



NGS - DIABLO
X 1,592,180.48
Y 506,186.77
ø 37°52'54".387 N
λ 121°54'47".107 W
ELEV. 5847.10 feet

NGS - BRUNO
X 1,440,263.78
Y 438,156.83
ø 37°41'15".017 N
λ 122°26'04".097 W
ELEV. 100.75 feet

Lambert Projection for California III

Table II (Cont'd)

1" of Long. = 0".61223204 of θ

| Long. | θ | Long. | θ | Long. | θ |
|---|---|---|---|---|---|
| 121° 11' | -0° 25' 06".0908 | 121° 46' | -0° 46' 31".7761 | 122° 21' | -1° 07' 57".4654 |
| 12 | -0 25 42.8247 | 47 | -0 47 08.5120 | 22 | -1 08 34.1993 |
| 13 | -0 26 19.5587 | 48 | -0 47 45.2460 | 23 | -1 09 10.9332 |
| 14 | -0 26 56.2926 | 49 | -0 48 21.9799 | 24 | -1 09 47.6672 |
| 15 | -0 27 33.0265 | 50 | -0 48 58.7138 | 25 | -1 10 24.4011 |
| 121° 16' | -0 28 09.7604 | 121° 51' | -0 49 35.4477 | 122° 26' | -1 11 01.1350 |
| 17 | -0 28 46.4944 | 52 | -0 50 12.1816 | 27 | -1 11 37.8689 |
| 18 | -0 29 23.2283 | 53 | -0 50 48.9156 | 28 | -1 12 14.6029 |
| 19 | -0 29 59.9622 | 54 | -0 51 25.6495 | 29 | -1 12 51.3368 |
| 20 | -0 30 36.6961 | 55 | -0 52 02.3834 | 30 | -1 13 28.0707 |
| 121° 21' | -0 31 13.4301 | 121° 56' | -0 52 39.1173 | 122° 31' | -1 14 04.8046 |
| 22 | -0 31 50.1640 | 57 | -0 53 15.8513 | 32 | -1 14 41.5386 |
| 23 | -0 32 26.8979 | 58 | -0 53 52.5852 | 33 | -1 15 18.2725 |
| 24 | -0 33 03.6318 | 59 | -0 54 29.3191 | 34 | -1 15 55.0064 |
| 25 | -0 33 40.3657 | 122° 00' | -0 55 06.0530 | 35 | -1 16 31.7403 |
| 121° 26' | -0 34 17.0997 | 122° 01' | -0 55 42.7870 | 122° 36' | -1 17 08.4742 |
| 27 | -0 34 53.8336 | 02 | -0 56 19.5209 | 37 | -1 17 45.2082 |
| 28 | -0 35 30.5675 | 03 | -0 56 56.2548 | 38 | -1 18 21.9421 |
| 29 | -0 36 07.3014 | 04 | -0 57 32.9887 | 39 | -1 18 58.6760 |
| 30 | -0 36 44.0354 | 05 | -0 58 09.7226 | 40 | -1 19 35.4099 |
| 121° 31' | -0 37 20.7693 | 122° 06' | -0 58 46.4566 | 122° 41' | -1 20 12.1439 |
| 32 | -0 37 57.5032 | 07 | -0 59 23.1905 | 42 | -1 20 48.8778 |
| 33 | -0 38 34.2371 | 08 | -0 59 59.9244 | 43 | -1 21 25.6117 |
| 34 | -0 39 10.9710 | 09 | -1 00 36.6583 | 44 | -1 22 02.3456 |
| 35 | -0 39 47.7050 | 10 | -1 01 13.3923 | 45 | -1 22 39.0795 |
| 121° 36' | -0 40 24.4389 | 122° 11' | -1 01 50.1262 | 122° 46' | -1 23 15.8135 |
| 37 | -0 41 01.1728 | 12 | -1 02 26.8601 | 47 | -1 23 52.5474 |
| 38 | -0 41 37.9067 | 13 | -1 03 03.5940 | 48 | -1 24 29.2813 |
| 39 | -0 42 14.6407 | 14 | -1 03 40.3279 | 49 | -1 25 06.0152 |
| 40 | -0 42 51.3746 | 15 | -1 04 17.0619 | 50 | -1 25 42.7492 |
| 121° 41' | -0 43 28.1085 | 122° 16' | -1 04 53.7958 | 122° 51' | -1 26 19.4831 |
| 42 | -0 44 04.8424 | 17 | -1 05 30.5297 | 52 | -1 26 56.2170 |
| 43 | -0 44 41.5763 | 18 | -1 06 07.2636 | 53 | -1 27 32.9509 |
| 44 | -0 45 18.3103 | 19 | -1 06 43.9976 | 54 | -1 28 09.6848 |
| 45 | -0 45 55.0442 | 20 | -1 07 20.7315 | 55 | -1 28 46.4188 |

## Lambert Projection for California III

### Table I (Cont'd)

| Lat. | R feet | Y' y value on central meridian feet | Tabular difference for 1 sec. of lat. | Scale in units of 7th place of logs | Scale expressed as a ratio |
|---|---|---|---|---|---|
| 37° 41' | 27,082,139.33 | 430,852.71 | 101.14117 | -304.6 | 0.9999299 |
| 42 | 27,076,070.86 | 436,921.18 | 101.14133 | -305.9 | 0.9999296 |
| 43 | 27,070,002.38 | 442,989.66 | 101.14167 | -306.8 | 0.9999294 |
| 44 | 27,063,933.88 | 449,058.16 | 101.14200 | -307.4 | 0.9999292 |
| 45 | 27,057,865.36 | 455,126.68 | 101.14233 | -307.6 | 0.9999292 |
| 37° 46' | 27,051,796.82 | 461,195.22 | 101.14250 | -307.4 | 0.9999292 |
| 47 | 27,045,728.27 | 467,263.77 | 101.14283 | -306.9 | 0.9999293 |
| 48 | 27,039,659.70 | 473,332.34 | 101.14317 | -306.0 | 0.9999295 |
| 49 | 27,033,591.11 | 479,400.93 | 101.14367 | -304.8 | 0.9999298 |
| 50 | 27,027,522.49 | 485,469.55 | 101.14383 | -303.1 | 0.9999302 |
| 37° 51' | 27,021,453.86 | 491,538.18 | 101.14417 | -301.1 | 0.9999307 |
| 52 | 27,015,385.21 | 497,606.83 | 101.14450 | -298.8 | 0.9999312 |
| 53 | 27,009,316.54 | 503,675.50 | 101.14483 | -296.0 | 0.9999318 |
| 54 | 27,003,247.85 | 509,744.19 | 101.14533 | -292.9 | 0.9999326 |
| 55 | 26,997,179.13 | 515,812.91 | 101.14567 | -289.5 | 0.9999333 |
| 37° 56' | 26,991,110.39 | 521,881.65 | 101.14600 | -285.7 | 0.9999342 |
| 57 | 26,985,041.63 | 527,950.41 | 101.14633 | -281.5 | 0.9999352 |
| 58 | 26,978,972.85 | 534,019.19 | 101.14683 | -276.9 | 0.9999362 |
| 59 | 26,972,904.04 | 540,088.00 | 101.14717 | -272.0 | 0.9999374 |
| 38° 00' | 26,966,835.21 | 546,156.83 | 101.14767 | -266.7 | 0.9999386 |
| 38° 01' | 26,960,766.35 | 552,225.69 | 101.14800 | -261.0 | 0.9999399 |
| 02 | 26,954,697.47 | 558,294.57 | 101.14850 | -255.0 | 0.9999413 |
| 03 | 26,948,628.56 | 564,363.48 | 101.14900 | -248.6 | 0.9999428 |
| 04 | 26,942,559.62 | 570,432.42 | 101.14933 | -241.9 | 0.9999443 |
| 05 | 26,936,490.66 | 576,501.38 | 101.14983 | -234.8 | 0.9999459 |
| 38° 06' | 26,930,421.67 | 582,570.37 | 101.15033 | -227.3 | 0.9999477 |
| 07 | 26,924,352.65 | 588,639.39 | 101.15083 | -219.4 | 0.9999495 |
| 08 | 26,918,283.60 | 594,708.44 | 101.15133 | -211.2 | 0.9999514 |
| 09 | 26,912,214.52 | 600,777.52 | 101.15183 | -202.6 | 0.9999533 |
| 10 | 26,906,145.41 | 606,846.63 | 101.15233 | -193.6 | 0.9999554 |
| 38° 11' | 26,900,076.27 | 612,915.77 | 101.15267 | -184.3 | 0.9999576 |
| 12 | 26,894,007.11 | 618,984.93 | 101.15333 | -174.5 | 0.9999598 |
| 13 | 26,887,937.91 | 625,054.13 | 101.15383 | -164.5 | 0.9999621 |
| 14 | 26,881,868.68 | 631,123.36 | 101.15450 | -154.0 | 0.9999645 |
| 15 | 26,875,799.41 | 637,192.63 | 101.15483 | -143.2 | 0.9999670 |