

CALIFORNIA STATE BOARD OF REGISTRATION
FOR PROFESSIONAL ENGINEERS

LS

1981

LAND SURVEYOR

CC

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 Problems C-1 through C-5. There are no optional questions.
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 of the workbook where space is provided and IDENTIFY THE PROBLEM NUMBER according to the schedule given in (6) below.
5. Read the instructions on the workbook cover page.
6. This portion of the Land Surveyors Examination consists of the following:

Problem C-1	10 Points
Problem C-2	10 Points
Problem C-3	5 Points
Problem C-4	15 Points
Problem C-5	<u>10 Points</u>

TOTAL 50 Points

YOU ARE TO WORK ALL 5 PROBLEMS

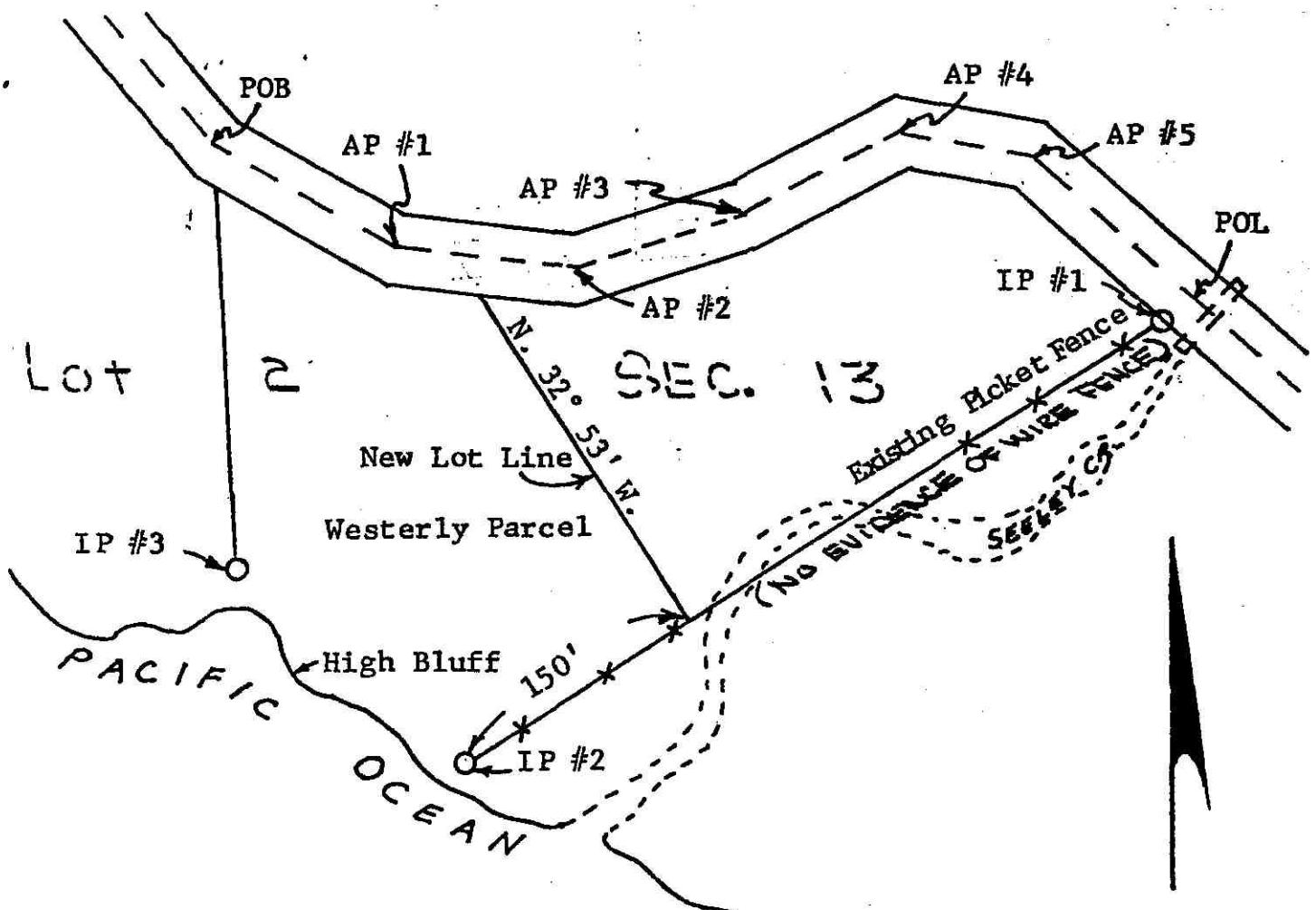
7. After you have completed this portion of the examination, check the problem order, include all pages, and turn it in to the Examination Proctor.
8. You may keep this set of examination questions.

**LS-C
1981
Page 1**

**TURN THE PAGE IMMEDIATELY AND BEGIN YOUR
EXAMINATION**

PROBLEM C-1 (10 POINTS)

REQUIRED



Centerline coordinate values are as follows:

<u>DESCRIPTION</u>	<u>Northing</u>	<u>Easting</u>
P.O.B.	14,320.71	5,357.08
Angle Pt. #1	14,261.63	5,461.50
Angle Pt. #2	14,248.27	5,567.49
Angle Pt. #3	14,281.82	5,654.67
Angle Pt. #4	14,328.00	5,742.01
Angle Pt. #5	14,314.93	5,816.93
P.O.L. (Point on Centerline)	14,235.71	5,910.39

PROBLEM C-1 (10 POINTS)

REQUIRED

Alfred Terry acquired the following described parcel by Grant Deed recorded December 5, 1966, in Book 1000 of Official Records, Page 21:

That certain real property situated in the County of Mendocino, State of California, described as follows:

That portion of Lot 2 of Section 13, Township 11 North, Range 16 West, Mount Diablo Base and Meridian, according to the official plat thereof, described as follows:

BEGINNING at a point in the centerline of the Mendocino Coast Wagon Road, as traveled, said point being distant East, 85.0 feet; South $17^{\circ} 54'$ East 597.5 feet, and South $38^{\circ} 37'$ East 141.7 feet from the Northwest corner of Lot 2, Section 13, Township 11 North, Range 16 West, Mount Diablo Base and Meridian, running thence along the centerline of said Wagon Road South $60^{\circ} 30'$ East 119.97 feet; South $82^{\circ} 49'$ East 106.83 feet; North $68^{\circ} 57'$ East 93.41 feet, North $62^{\circ} 08'$ East 98.80 feet; South $80^{\circ} 06'$ East 76.05 feet; South $49^{\circ} 43'$ East 122.52 feet; thence leaving said Wagon Road centerline South $57^{\circ} 07'$ West 489.05 feet along a wire fence and North-westerly of creek known as Seeley Creek flowing in general direction of said fence to the shoreline of the Pacific Ocean; thence along said shoreline North $49^{\circ} 30'$ West 170.90 feet; thence leaving said shoreline North $2^{\circ} 50'$ West 239.85 feet to the point of beginning.

- A. You have been requested to survey the exterior boundaries, split out the westerly parcel as shown on the attached sketch, and write a metes and bounds description of the westerly parcel.
- B. Is a Record of Survey required? State reasons for your answer.

Field Tied values of monuments located are as follows:

<u>DESCRIPTION</u>	<u>NORTHING</u>	<u>EASTING</u>
Br. Cap on I.P. correctly stamped for NW Corner Lot 2	15,000.00	5,000.00
I.P. #1 - No tag - No reference	14,224.73	5,892.48
I.P. #2 - No tag - No reference	13,970.19	5,499.70
I.P. #3 - No tag - No reference	14,081.18	5,369.74

PROBLEM C-2 (10 POINTS)

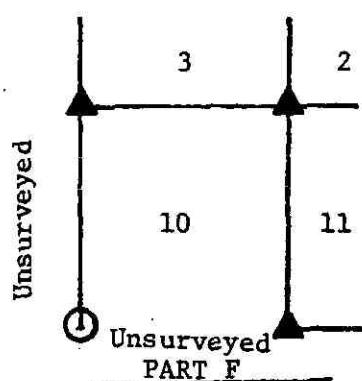
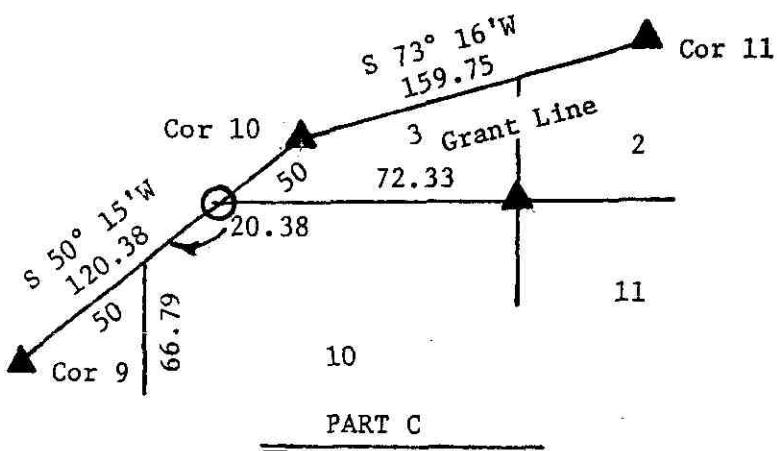
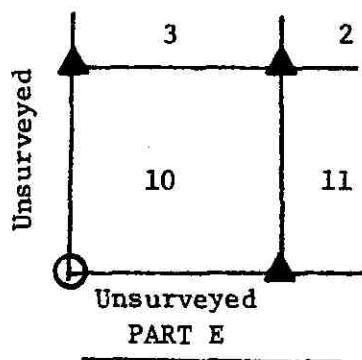
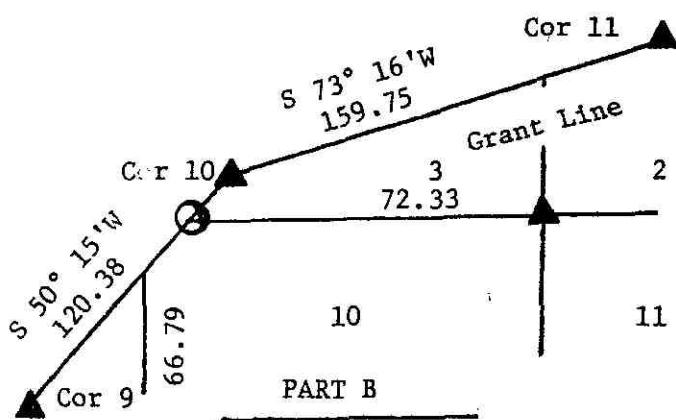
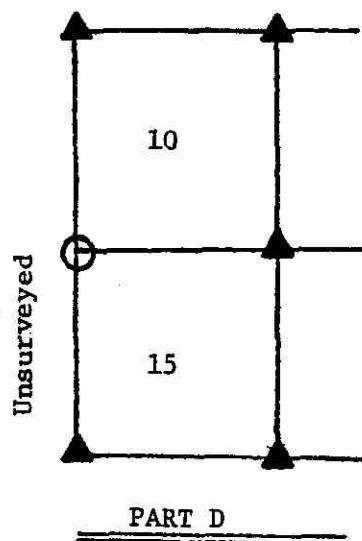
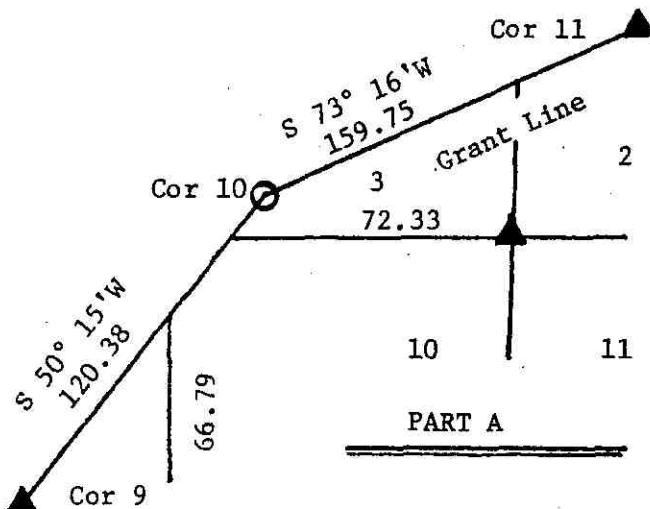
REQUIRED

Single and double proportionate methods of restoring original lost corners are two commonly used principles. Explain in detail what principles you would follow to re-establish lost public land corners in each part of an official plat below.

NOTE: Found corners are indicated by a filled in triangle. ▲

The lost corner is indicated by a ○ .

Assume any undimensioned section line is of standard length and cardinal in direction.



PROBLEM C-3 (5 POINTS)

REQUIRED

Each statement "A" through "O" below is a definition or description of a photogrammetric device, product or procedure. Match the best answer from the list of numbered items with each statement and enter the correct number of your answer on the worksheet in the answer booklet.

- A. A method of expressing the expected vertical map accuracy of a stereoplotter.
- B. Performed using a mono or stereocomparator or stereoplotter.
- C. Usually performed using a stereoplotter equipped with an electronic measurement system.
- D. Part of a camera system referencing the optical center of the lens.
- E. The outward or inward image shift from the photo center due to terrain.
- F. The outward or inward image shift from the photo center due to lens design.
- G. An assemblage of aerial photographs brought to an approximate scale.
- H. A simple Kelsh type mapping instrument.
- I. The distance between photo centers of a stereo pair.
- J. Corrects most images on a photograph to an exact scale.
- K. Clarity of a photographic image.
- L. A representation of cultural and terrain features by line drawing.
- M. Portable device for viewing aerial photos.
- N. Relative displacement of an image in a stereo pair creating stereoscopic height.
- O. Mapping device capable of correcting for earth's curvature and refraction.

-
- 1. Airbase
 - 2. Analytical Photogrammetry
 - 3. Aerotriangulation
 - 4. Analytical Stereoplotter
 - 5. Base/Height Ratio
 - 6. Calibrated Focal Length
 - 7. C Factor
 - 8. Comparator
 - 9. Controlled Mosaic
 - 10. Double Projection Plotter
 - 11. Fiducial
 - 12. Focal Plane
 - 13. Hydrographic Map
 - 14. Hypsographic Map
 - 15. Image Resolution
 - 16. J Factor
 - 17. Orthophoto Mosaic
 - 18. Orthophotography
 - 19. Optical Mechanical Stereoplotter
 - 20. Photo Index
 - 21. Parallax Bar
 - 22. Planimetric Mapping
 - 23. Principal Point
 - 24. PUG
 - 25. Digital Profiling
 - 26. Radial Distortion
 - 27. Relief Displacement
 - 28. Stereoscope
 - 29. Topographic Map
 - 30. Uncontrolled Mosaic
 - 31. X Parallax
 - 32. Y Parallax
 - 33. None of the above.

PROBLEM C-4 (15 POINTS)

REQUIRED

T. 9 S., R. 3 E., Willamette Meridian. Monuments accepted and sketch as shown in Figure 1. Case's of statement and questions as given.

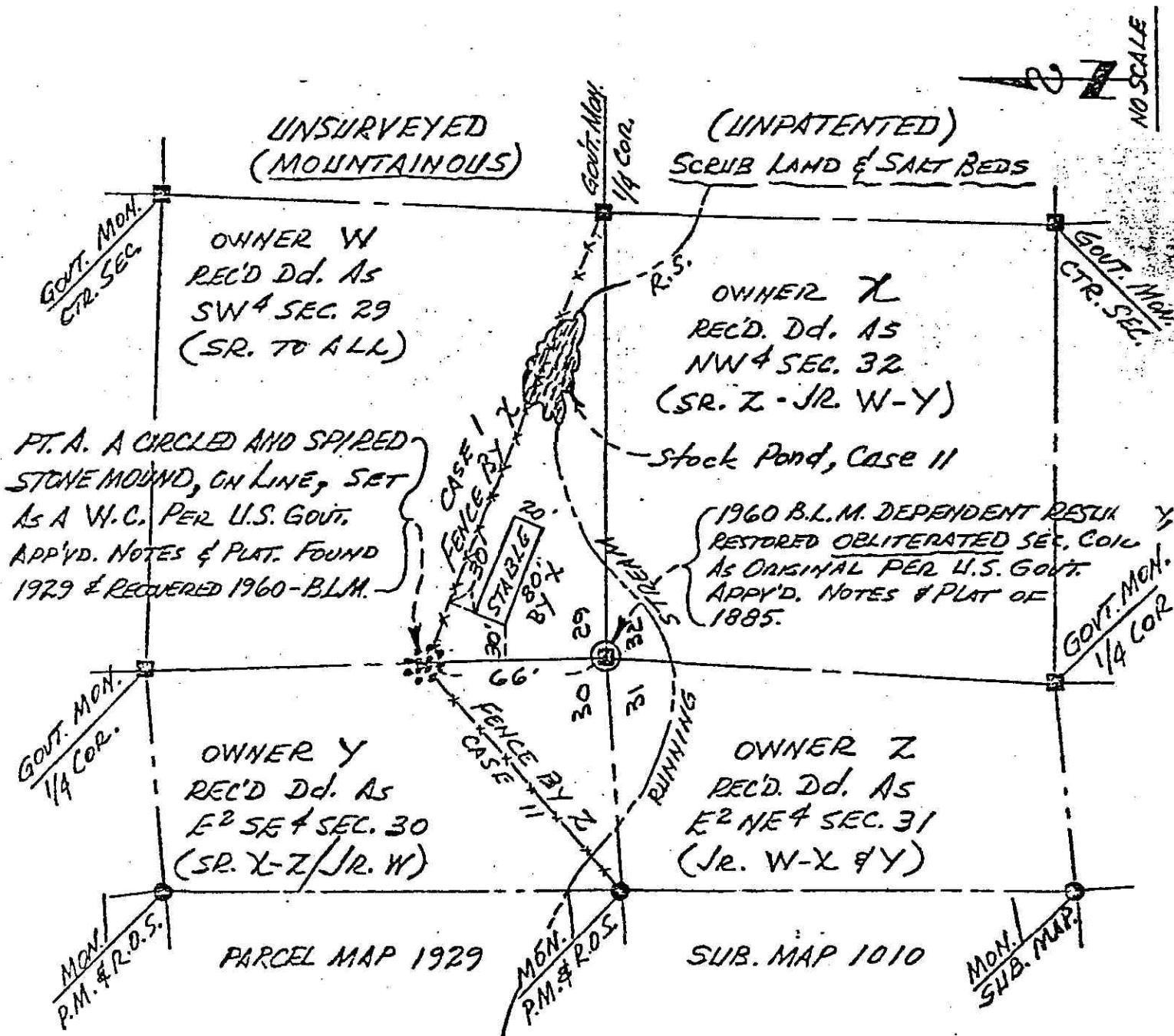


Figure 1

PROBLEM C-4 (15 POINTS)

REQUIRED

CASE 1

STATEMENT

GIVEN CONDITIONS AS SHOWN IN FIGURE 1. "W" and "Y" as past and current owners were both a witness when in 1929, a private survey (1) of property of "Y" was made, finding remains of the original section corner. The corner was further obliterated by 1965. In 1967, "X" received his property by gift (without benefit of survey) from deed. Hence, "X" subsequently asked "W" where the boundary line between them was since he wished to build a boarding stable and fence. Seeing a chance for enlarging his holdings "W" told "X" that Point A was the section corner. In 1968, "X" relying on "W's" information built his improvements as shown. In 1969, "W", being a power in politics and financial circles had the section corner retraced and verified by another private surveyor (2) and thereupon took possession and use of said stable and fence. "X" was naturally upset and filed suit against "W". "Y" was silent and "Z" was unaware!

CASE 11

STATEMENT

AGAIN GIVEN CONDITIONS AS SHOWN IN FIGURE 1. In 1965, while wealthy owner "W" was on vacation in Europe "X" had his property surveyed by contract to licensed surveyor "S", whereupon "S" by physical survey established the section corner at Point A, and filed a Record of Survey of the "W" and "X" properties. "X" and "Z" acting upon said survey constructed their improvements as shown. "W" upon return from vacation and observing his stock pond mostly fenced off filed suit against "X" and "Z". "Y", after conferring with his long time friend "W" removed "Z's" fence and joined in the suit with "W".

CASE 111

STATEMENT

ASSUME THE SECTION CORNER IS LOST. ALSO ASSUME CONDITIONS FROM FIGURE 1 AS REQUIRED PERTINENT TO THIS QUESTION.

No surveys of record have been made by anyone since 1885. In 1930, all the owners of recorded deeds mutually agreed that the circled and spired stone mound is the true section corner - creating their improvement to said corner and resultant lines. In 1965, surveyor "S" after a physical inspection of the property with "Y" and "Y's" realtor, buy "Y's" property. Some nine (9) months

PROBLEM C-4 (15 POINTS)

REQUIRED

CASE 111 - STATEMENT (continued)

later after research of the Government records "S" contests Point A, wanting to move it some 66 feet southerly on line from the north 1/4 corner. "Z" understandably objects while "W" and "X" are too tied up with other business to get involved.

CASE 1

QUESTIONS

1. Considering Senior and Junior rights - between what points is the boundary line of "W" and "Y" and state your reasons.
2. Who would the Court most likely uphold - under what principle of law and where would the Court most likely establish the legal boundary line between "W" and "X"?
3. Do any of the parties (W, X, Y, Z) have recourse against the private surveyor (2)? State your reasons.

CASE 11

QUESTIONS

1. Did "Y" act prudently in removing the fence by "Z" and joining the lawsuit?
2. Does surveyor "S" have a liability? Explain your answer.
3. Who would the Court most likely hold for and against - under what principle of law? Explain your answer.

CASE 111

QUESTIONS

1. Does "Z" have a valid objection and should "W" and "X" get involved? Explain.
2. What data could surveyor "S" have obtained by researching the Government records and of what use to him could that data be?
3. Would the Court most likely uphold "S" or "Z" and under what principle of law?
4. Assuming negative factors - would Case 111 with conditions, variables and due process, under Court decision establish a general precedent of law - and why or why not?

PROBLEM C-5 (10 POINTS)

REQUIRED

You have been commissioned to survey the following legal description:

PART A

Demonstrate what you understand are the primary and secondary calls in the legal description. Identify each primary call and describe why you distinguished such call.

PART B

Describe the procedure that you would follow to complete the task assigned discussing such subjects as research, survey procedure, and boundary analysis.

PART C

Is a Record of Survey required? A correctory description written? Explain your answer.

A parcel of land situated in the County of San Diego, State of California, being a portion of Section 12, Township 12 South, Range 3 West, San Bernardino Base and Meridian, also being a portion of Lot 9 of Rancho Guajome according to map thereof on file in the Superior Court, Case No. 40201, in the Office of the County Clerk of said county, more particularly described as follows:

Commencing at the most westerly corner of the land shown on Record of Survey Map No. 1960, on file in the office of the County Recorder of San Diego County; thence along the Northwesterly line of said land North $33^{\circ}19'30''$ East, 29.37 feet to the most westerly corner of land described in deed to Alexander Dougall and wife, recorded January 7, 1968, as File No. 415137 of Official Records; thence along the Northwest line of said land being the Southeast line of the estate of A. Whirter, as shown on said map in Superior Court, Case No. 40201, North $33^{\circ}19'30''$ East, (record North $33^{\circ}18'00''$ East), 482.88 feet to the TRUE POINT OF BEGINNING; thence continuing North $33^{\circ}19'30''$ East, 129.56 feet; thence South $38^{\circ}15'40''$ East, 217.63 feet to the southeasterly line of said Dougall's land; thence along the southeasterly line of said land, South $54^{\circ}04'00''$ West, (record South $54^{\circ}02'30''$), 130.00 feet to an intersection with a line which bears South $36^{\circ}56'00''$ East, from the True Point of Beginning; thence North $36^{\circ}56'00''$ West, 171.56 feet to the TRUE POINT OF BEGINNING.

CALIFORNIA STATE BOARD OF REGISTRATION
FOR PROFESSIONAL ENGINEERS

LS

1981

ID

LAND SURVEYOR

PRINCIPLES AND PRACTICE

1. This part of the examination - "Part D" - is the second part of the Land Surveyor examination, and is to be completed in 4 hours.
2. Your answers are to be completed in your workbook - use separate answer sheets for each problem, unless otherwise instructed.
3. This portion of the Land Surveyor examination consists of the following:

Problem D-1 <u>OR</u> Problem D-2	CHOOSE ONE	15.0 Points
Problem D-3	REQUIRED	12.5 Points
Problem D-4	REQUIRED	2.5 Points
Problem D-5	REQUIRED	5.0 Points
Problem D-6 <u>OR</u> Problem D-7	CHOOSE ONE	5.0 Points
Problem D-8 <u>OR</u> Problem D-9	CHOOSE ONE	10.0 Points
	TOTAL	50.0 Points

4. Do not work both problems where a choice is offered. Credit will be allowed for one (1) problem only.
5. Problems D-3 and D-8 require that you remove one sheet that is to be attached to your workbook. Be sure that your work on the diagrams is neat, orderly and legible.
6. After you have completed this portion of the examination, check the problem order, include all pages (including diagrams if required) and turn it in to the examination proctor.
7. You may keep this set of examination questions.

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Page 1

IMPORTANT

YOU MUST WORK EITHER D-1 OR D-2, BUT
DO NOT WORK BOTH

PROBLEM D-1 (15 POINTS)

WORK D-1 OR D-2 NOT BOTH

Your client owns Lot 4 of fractional Section 5, T1N, R8W, MDM, situated in an unincorporated area of (blank) County, California, and wishes to subdivide his property for sale. Lot 4, according to the official plat and field notes, is bounded on the West by the Pacific Ocean.

As a condition of the approval of the tentative map, county ordinance requires the dedication of a 100 foot wide strip as measured from the seaward boundary of Lot 4 as a marine preserve.

You find that the seaward portion of Lot 4 consists of a natural sandy beach approximately 300 feet in width as measured from the toe of the bluff.

In addition, it is apparent from your resurvey of Section 5, that the U.S. Deputy Surveyor ran his meanders of the Pacific Ocean through Section 5 at the top of the bluff, and that no patents or other conveyances to other lands exist in this intervening strip. (Area between U.S. Meander line and the Pacific Ocean).

From the above facts and attached data, discuss the following points:

1. Describe how you would advise your client of the true nature and character of the seaward boundary of his property; the nature and character of the area to be dedicated; and what his property rights are to the lands between the U.S. meander line and the shoreline boundary of the Pacific Ocean.
2. From the attached data, what tidal datum would you select to run in the field to locate the true seaward boundary of the property?
3. From the attached data, what elevation would you compute to run in the field?
4. Describe how you would establish the elevation computed in (3) above on the property in question.
5. Describe your survey procedure to locate this datum/line on the ground with respect to subject property.
6. Write an elevation/datum note documenting the above data for inclusion on your tentative and final map.

INDEX MAP NUMBER (See reverse side)	NAME	INDEX MAP NUMBER (See reverse side)	NAME
1	Crescent City	17	Sand Point, Tomales Bay
2	Trinidad Harbor	18	Tomales Point, Tomales Bay
3	North Jetty, Humboldt Bay	19	Humboldt, Tomales Bay
4	Eureka, Humboldt Bay	20	Blake Landing, Tomales Bay
5	Fields Landing, Humboldt Bay	21	Marshall, Tomales Bay
6	South Jetty, Humboldt Bay	22	Inverness, Tomales Bay
7	Shelter Cove	23	Point Reyes, Drakes Bay
8	Rockport	24	Bolinas, Bolinas Bay
9	Fort Bragg	25	Point Bonita, Golden Gate
10	Russian Gulch	26	Ocean Beach, San Francisco
11	Mendocino Bay	27	Princeton, Halibut Bay
12	Elk	28	Año Nuevo Island
13	Arena Cove	29	Santa Cruz, Monterey Bay
14	Fort Ross Cove	30	Monterey Harbor
15	Bodega Head, Bodega Harbor Entrance	31	Carmel City, Carmel Bay
16	Bodega Bay, Bodega Harbor		

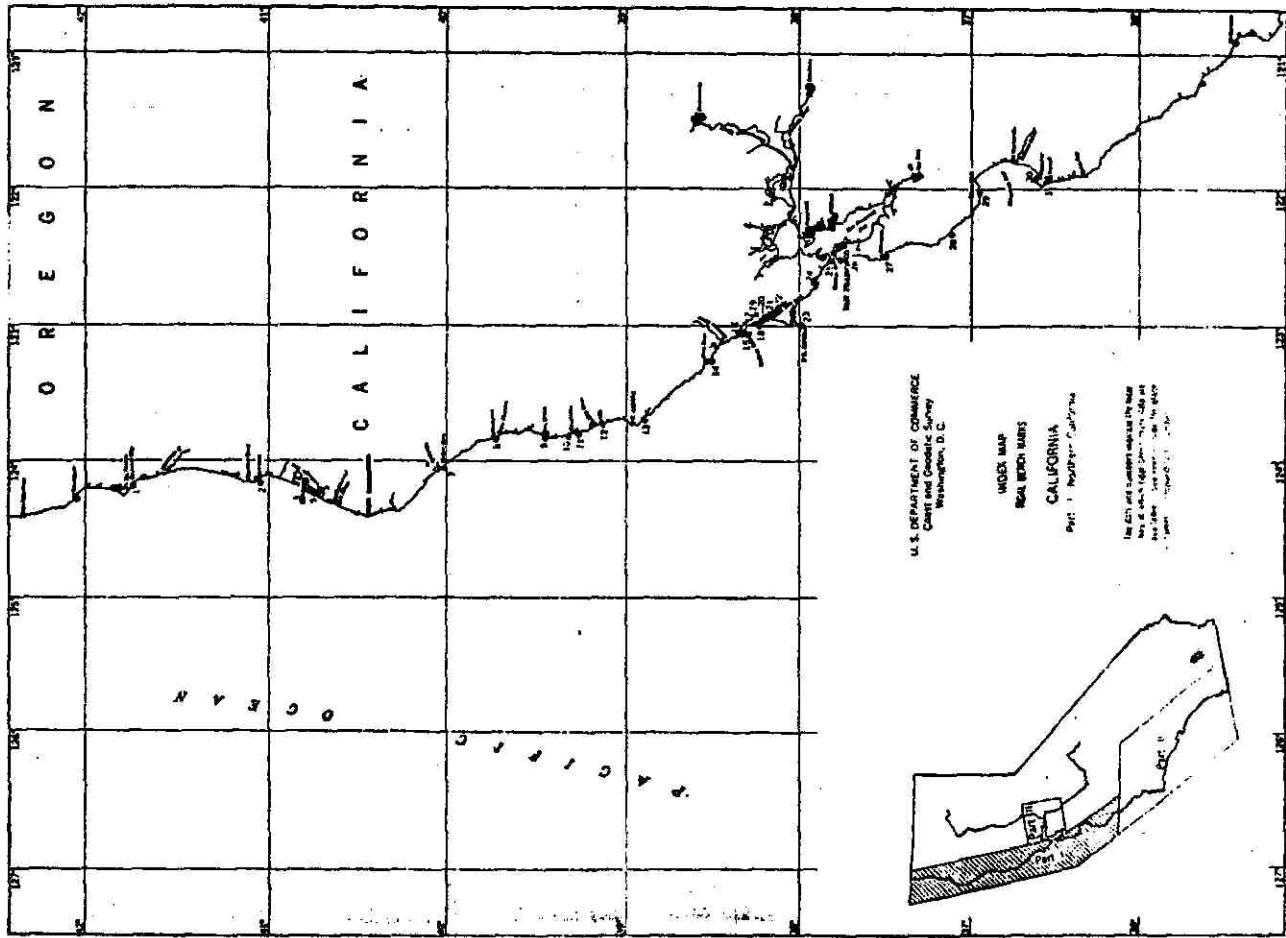
NOTE: Unnumbered dots on the index map on the reverse side indicate nearest tidal bench mark locations in the states of Oregon and California.

Parts II and III.

Tidal bench mark locations in the State of California are shown on three index maps, as follows:

- Part I. - Northern California
- Part II. - Southern California
- Part III. - San Francisco Bay and San Joaquin - Sacramento Delta Region.

Tidal bench mark data are available for the above locations and may be obtained by writing to the Director, U. S. Coast and Geodetic Survey, Washington 25, D. C. In requesting these data, please refer to both the index map numbers and the names of the particular localities in which you are interested.



Received 2/28/67

TIDE INFORMATION									
Name	Altitude	Mean High	Mean Low	Low	Mean	High	Mean	High	Low
Point Reyes	100	100	90	70	80	90	100	100	90
Point San Pedro	100	100	90	70	80	90	100	100	90
Point Conception	100	100	90	70	80	90	100	100	90
Point Mugu	100	100	90	70	80	90	100	100	90
Point Arguello	100	100	90	70	80	90	100	100	90
Point Gorda	100	100	90	70	80	90	100	100	90
Point San Simeon	100	100	90	70	80	90	100	100	90
Point Conception	100	100	90	70	80	90	100	100	90

UNITED STATES - WEST COAST
CALIFORNIA

GULF OF THE FARALLONES

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Page 3



MARINER PROTECTION
15 MILES off Lat. 37°45'
North American Net Datum
BOUNDRYS IN FARALLONES
STATION AND POINT TO LOWER PATRONS
AT MEAN LOWER LOW WATER

For stations and descriptions see Chart No.
13000. For points see Chart No. 13001.

Topographic and bathymetric data are from the National Ocean Survey Survey and Control
Division and the California State Water Resources Control Board.

Information and interpretations are from the California State Water Resources Control Board.

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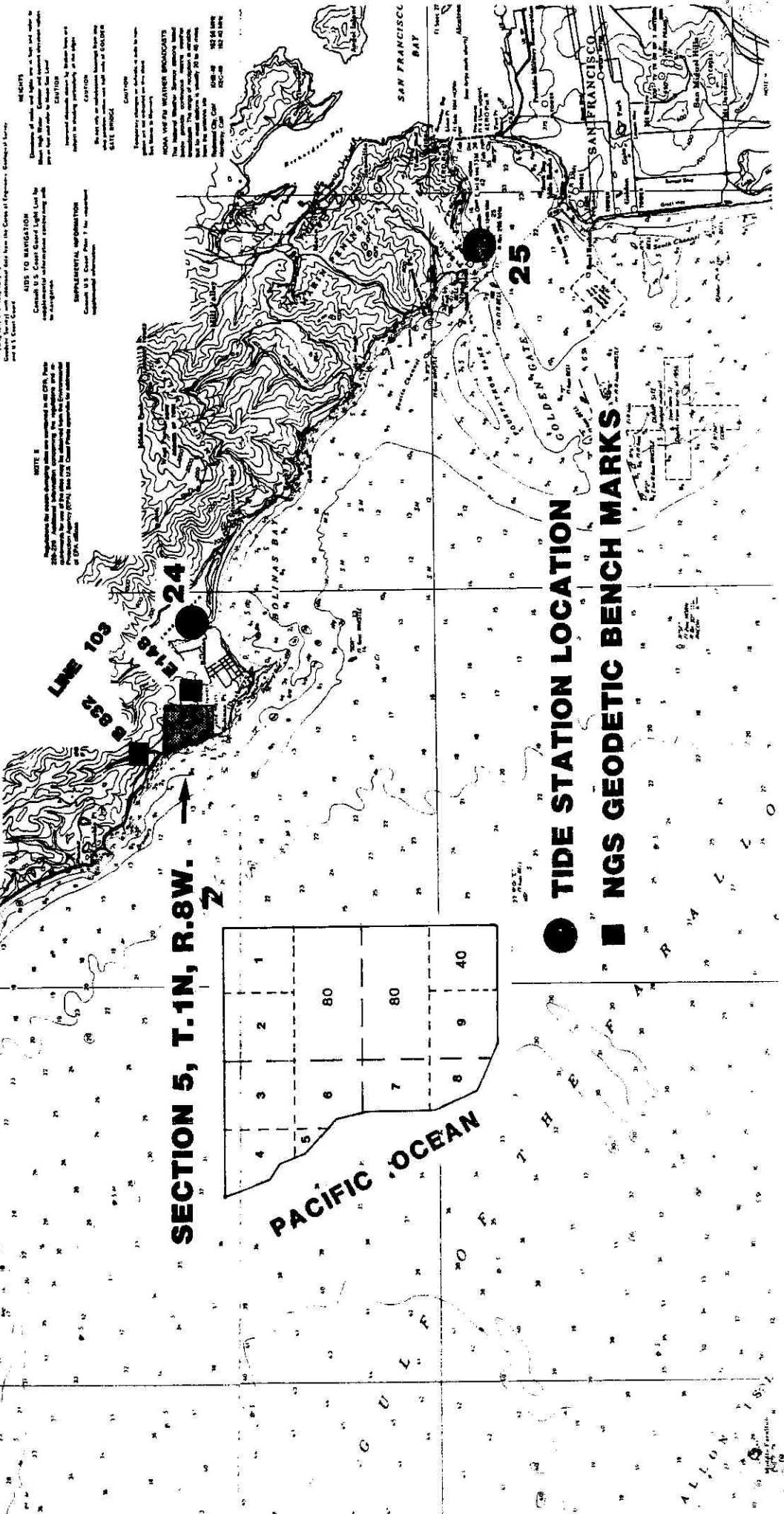
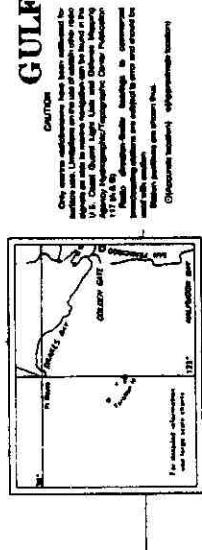
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TIDE STATION LOCATION
■ NGS GEODETIC BENCH MARKS

5/4/65

CALIFORNIA I-23

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

TIDAL BENCH MARKS

Point Reyes, Drakes Bay
Lat. 37° 59'.5; Long. 122° 58'.5

BENCH MARK 2 (1929) is a standard disk, stamped "BM TWO 1929," set in top of west edge of cement walk which extends north towards Coast Guard Station building. It is 2 $\frac{1}{2}$ feet south of southwest corner of Coast Guard Station building, 10 feet northwest of southwest corner of Coast Guard boiler room building, and $\frac{1}{2}$ foot east of west edge of sidewalk. Elevation: 15.97 feet above mean lower low water.

BENCH MARK 3 (1929) is a standard disk, stamped "3 1929," set in top of southeast side of concrete sidewalk between Coast Guard Station building and boiler room building. It is 4 $\frac{1}{2}$ feet north of northeast corner of boiler room building, 2 $\frac{1}{2}$ feet south of southeast corner of Coast Guard Station building, and about $\frac{1}{2}$ foot west of east edge of sidewalk. Elevation: 15.75 feet above mean lower low water.

Mean lower low water at Point Reyes, Drakes Bay is based on 7 months of records, June 1 - December 26, 1929, reduced to mean values. Elevations of other tide planes referred to this datum are as follows:

	Feet
Mean higher high water	5.50
Mean high water	4.90
Mean tide level	3.05
Mean low water	1.20
Mean lower low water	0.00

The estimated highest water level to the nearest half foot is 8 $\frac{1}{2}$ feet above mean lower low water. The estimated lowest water level to the nearest half foot is 2 $\frac{1}{2}$ feet below mean lower low water.

5/9/64

CALIFORNIA I-24

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

TIDAL BENCH MARKS

Bolinas, Bolinas Lagoon
Lat. 37° 54'.6; Long. 122° 40'.9

BENCH MARK "TIDAL 1" (1947) is a standard disk, stamped "BOLINAS TIDAL 1," set flush in top of concrete wing wall at north end of wooden bulkhead at base of bluff on west side of entrance to Bolinas Lagoon. It is 103 feet south of south end of heavy riprap at end of street leading from village of Bolinas, 0.3 mile east along street from post office 52 yards south of end of street, 5 $\frac{1}{2}$ feet higher than beach, and $\frac{1}{2}$ foot west of east end of concrete wall. Elevation: 10.38 feet above mean lower low water.

BENCH MARK "TIDAL 2" (1947) is a standard disk, stamped "BOLINAS TIDAL 2," set flush in top of east concrete curb at entrance to U. S. Coast Guard Station. It is 11 feet from inner line of walk along village street and 1 $\frac{1}{2}$ feet east of station flagpole, $\frac{1}{2}$ foot east of center line of concrete sidewalk, 1 $\frac{1}{2}$ feet north of east end of bottom concrete step, and 1 foot above sidewalk. Elevation: 10.23 feet above mean lower low water.

BENCH MARK PARADISE VALLEY (1947) is a 2 $\frac{1}{2}$ -inch brass cap, stamped "PARADISE VALLEY 1947," set in top of concrete post, flush with ground, on grassy delta at mouth of Paradise Valley on west side of Bolinas Lagoon and 15 feet northeast of ruins or old fence. It is about $\frac{1}{2}$ mile north of Bolinas Union School, 170 yards northeast of road, 52 yards northwest of northwest bank of Pine Gulch Creek, and 415 feet northeast of telegraph pole No. 396. Elevation: 6.54 feet above mean lower low water.

Mean lower low water at Bolinas, Bolinas Lagoon is based on 71 high waters and 72 low waters, April 16 - May 23, 1947, reduced to mean values. Elevations of other tide planes referred to this datum are as follows:

	Feet
Mean higher high water	4.40
Mean high water	3.80
Mean tide level	2.30
Mean low water	0.80
Mean lower low water	0.00

The estimated highest water level to the nearest half foot is 7 $\frac{1}{2}$ feet above mean lower low water. The estimated lowest water level to the nearest half foot is 2 $\frac{1}{2}$ feet below mean lower low water.

1947

5/9/64

CALIFORNIA I-25

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

TIDAL BENCH MARKS

Point Bonita, Bonita Cove, Golden Gate
Lat. 37° 49' 1"; Long. 122° 31' 7"

BENCH MARK 2 (1917) is a standard disk, stamped "BONITA". BM 2 1917", set in top of very large black mass of bedrock on rock shore, near high water line and 41 feet south of south edge of wharf directly in front of Coast Guard boathouse. It is 88 $\frac{1}{2}$ feet south of corner of boathouse, and 2 $\frac{1}{2}$ feet northwest of southeast edge of rock. Elevation: 11.05 feet above mean lower low water.

BENCH MARK 2A (1925) is a standard disk, unstamped, set in top of large red and green rock on beach 13 feet east of base of high bluff and 171 feet south of south side of wharf. It is 130 $\frac{1}{2}$ feet south of Bench Mark 2, and about 8 feet higher than beach. Elevation: 15.57 feet above mean lower low water.

BENCH MARK 3 (1917) is a standard disk, stamped "BONITA". BM 3 1917", set in top of mass of concrete poured on top of large flat black bedrock on rock shore near high water line, 53 feet northeast of northeast edge of wharf. It is 49 $\frac{1}{2}$ feet east of east corner of boathouse, and about 3 feet higher than high water line. Elevation: 9.49 feet above mean lower low water.

Mean lower low water at Point Bonita, Bonita Cove, Golden Gate is based on 4 months of records, February - May 1935, reduced to mean values. Elevations of other tide planes referred to this datum are as follows:

<u>Feet</u>
Mean higher high water
Mean high water
Mean tide level
Mean low water
Mean lower low water

The highest estimated water level to the nearest half foot is 8 $\frac{1}{2}$ feet above mean lower low water. The estimated lowest water level to the nearest half foot is 2 $\frac{1}{2}$ feet below mean lower low water.

CALIFORNIA PART I
Northern CaliforniaU. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY

The difference between National Geodetic Vertical Datum (formerly Sea Level Datum of 1929) (SLD) and mean lower low water (MLLW) for each location where the tidal bench marks and the geodetic bench marks of the National Geodetic Network have been connected by differential levels is given below.

Bench mark elevations above National Geodetic Vertical Datum may be obtained by subtracting the tabular difference from the published elevations above mean lower low water.

<u>Index Map Number</u>	<u>Locality</u>	<u>NGVD-MLLW</u> <u>Feet</u>
1	Crescent City	3.72
4	Eureka	3.34
7	Shelter Cove	3.35
17	Sand Point, Tomales Bay	2.35
18	Tomales, Tomales Bay	2.38
19	Hamlet, Tomales Bay	2.42
20	Blake Landing, Tomales Bay	2.37
21	Marshall, Tomales Bay	2.24
22	Inverness, Tomales Bay	2.38
23	Point Reyes, Drakes Bay	2.92
24	Bolinas, Bolinas Lagoon	1.86
25	Point Bonita, Golden Gate	1.95
26	Ocean Beach	2.96
27	Princeton, Halfmoon Bay	3.09
29	Santa Cruz, Monterey Bay	2.95
30	Monterey Harbor	2.80
31	Carmel Cove, Carmel Bay	2.93

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**U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY**

VERTICAL CONTROL DATA By the
Editorial Committee

SPECIAL CONTROL DIVISION

1000

QUAD 371214 PAGE NO. 4
CALIFORNIA LATITUDE 37° 30' TO 38° 00'
LONGITUDE 121° 30' TO 122° 00'
DIAGRAM SIX TOTAL

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PROBLEM D-2 (15 POINTS)

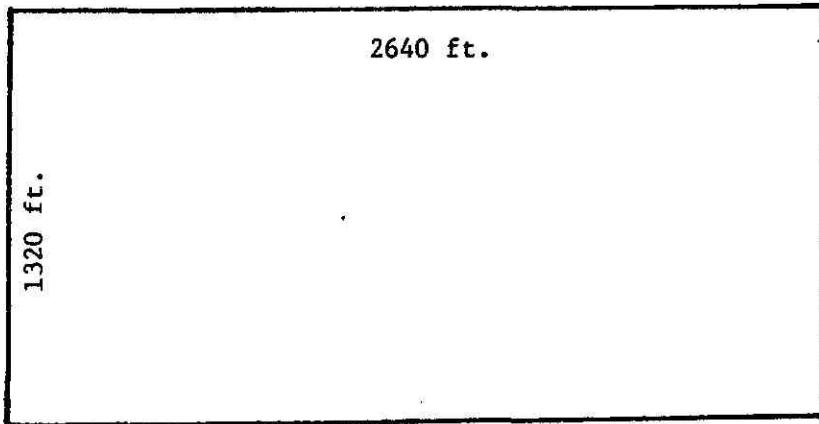
WORK D-1 OR D-2 NOT BOTH

Your client is a civil engineer who asks you to obtain an aerial topographic map for use in the design of an 80 acre subdivision. (See figure)

The vertical accuracy required for the map is +0.25 foot on 90% of all spot elevations checked.

- A. Describe in detail the economic considerations which you would make in selection of an aerial sub-contractor.
- B. Show the locations on a similar sketch as shown below on your answer sheet of the horizontal and vertical premarks which you would set. You must assume a commonly used photogrammetric mapping and control procedure and clearly list your assumptions.
- C. What survey methods and accuracies would you utilize for the control work to meet the required accuracy? What size panel would be required?
- D. What basic contour interval would be required on the map? Should the mapping contours have the same vertical accuracy as the spot elevations?
- E. Explain how you would check the vertical accuracy of the map after delivery to you by the aerial sub-contractor.

NOTE: The below sketch is to be duplicated on your answer sheet showing such horizontal and vertical control required as a result of your analysis of this problem.



- Horizontal & Vertical Control
 Vertical Control Only

NOTE: Symbols added by examinee.

PROBLEM D-3

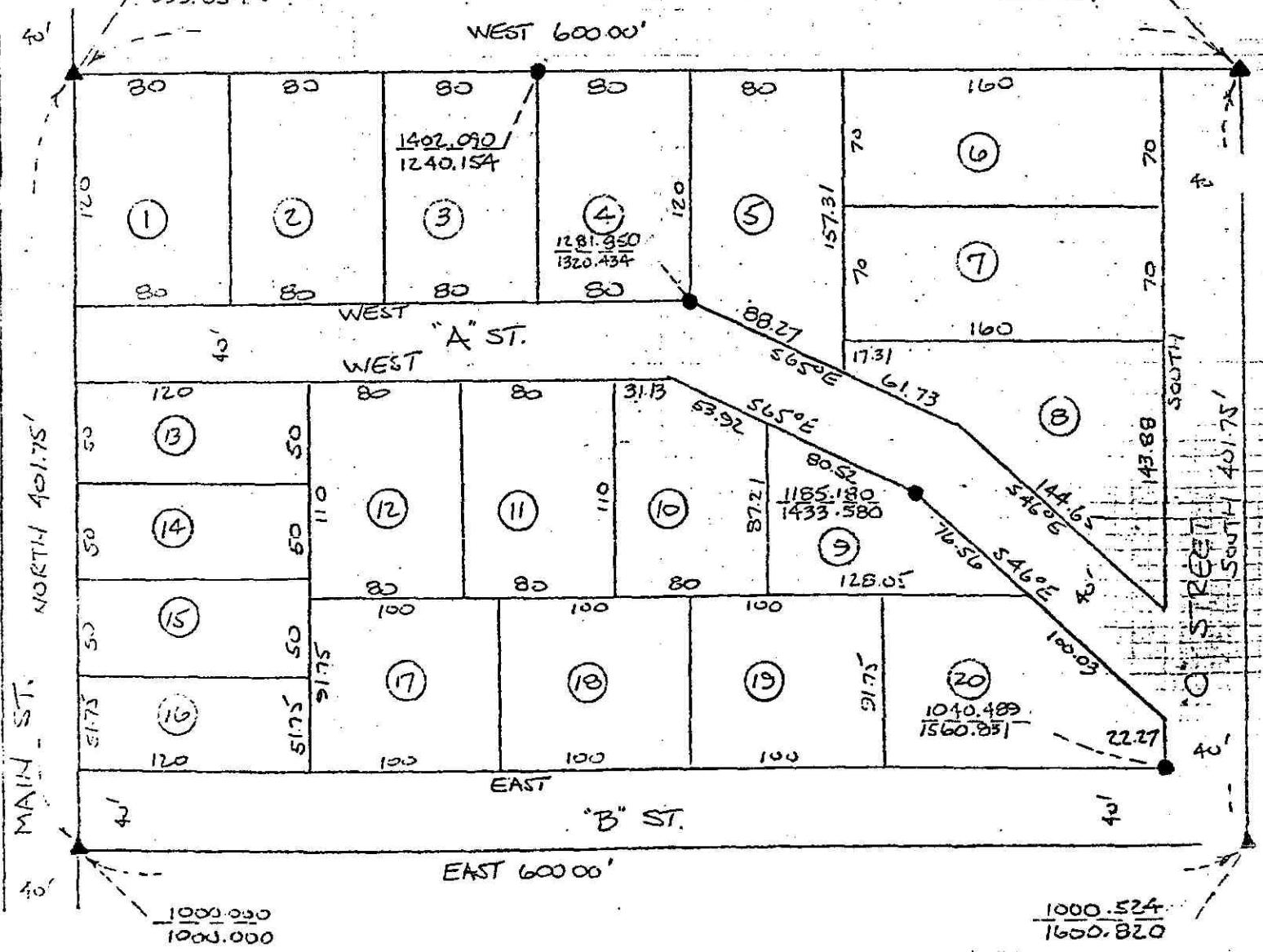
PLEASE NOTE

DIAGRAM IS TO BE REMOVED AND
SUBMITTED WITH YOUR ANSWER SHEETS.

PROBLEM D-3 (12.5 POINTS)

REQUIRED

REMOVE AND SUBMIT WITH YOUR ANSWER SHEETS



PROBLEM D-3 (12.5 POINTS)

REQUIRED

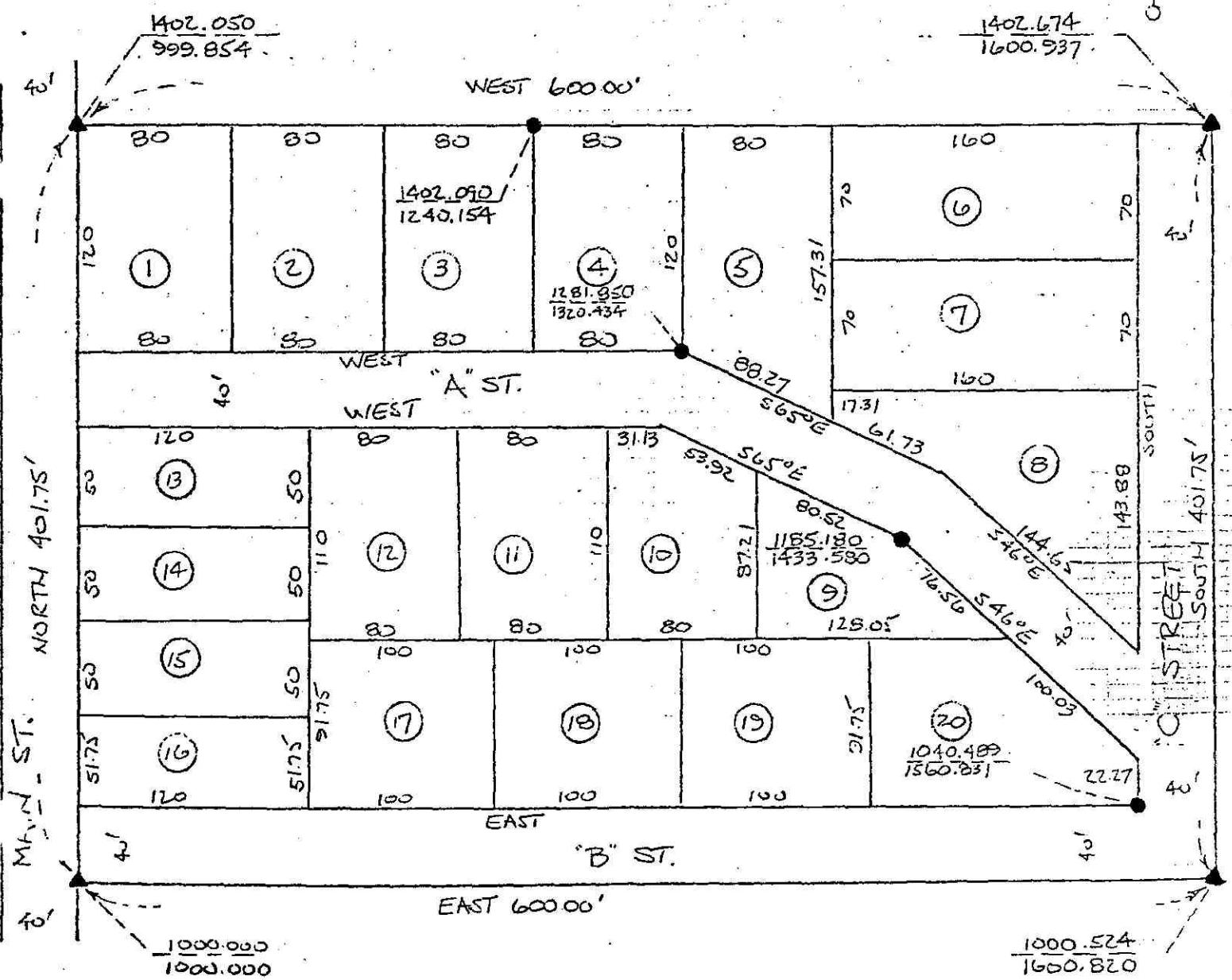
- A. Shown hereon is the original map of "Heart Acres". You have been asked to survey and monument Lots 3, 16 and 20. Calculate from coordinates given, the bearings and distances for these lots. ON THE ATTACHED SHEET, (WHICH IS TO BE REMOVED AND SUBMITTED WITH YOUR ANSWER SHEET) show the bearings and distances for all lines required to survey the lots in question.

B. Is a Record of Survey or a Corner Record required? State the reasons for your answer.

Dimensions shown are record per "Heart Acres" and are complete.
Coordinates shown are "your" measured values.

- ▲ indicates a found original boundary monument.
- indicates a found original lot corner.

No other monuments have been found.



PROBLEM D-4 (2.5 POINTS)

REQUIRED

A licensed Land Surveyor is empowered by statute to administer oaths to witnesses and to consider the parole evidence of a sworn witness in restoring a missing corner.

Discuss fully the weight which you would give as a licensed Land Surveyor to the sworn testimony of a witness who had seen and described accurately a land survey corner destroyed by road construction. The witness, now some 20 years later, is unsure of the exact original location within 50 feet also testified that the proportioned location established by you was definitely not the original location.

- A. What location and method of restoring the missing corner would you follow?
- B. What steps would you take upon completion of your field work?

CLEARLY STATE ANY ASSUMPTIONS THAT YOU MAKE.

PROBLEM D-5 (5 POINTS)

REQUIRED

In the following legal description, number the courses and for each course, explain what you would hold and why in resolving the boundary.

All that certain real property situate in the Southeast one-quarter of Section 36, Township 10 North, Range 10 East, Mount Diablo Meridan, County of Sacramento, California, described as follows:

Beginning at a 16" pine scribed NWJ marking the Northwest corner of the Lands of Jones as described by deed recorded in the office of the recorder of said county in Book 4444 of Deeds at page 1111; thence,

1. North $89^{\circ}59'59''$ East 165.29 feet to a 4" x 4" Granite post marking the Northwest corner of the Lands of Smith as described by deed recorded in the office of the recorder of said county in Book 1 of Deeds at page 1; thence,
2. Along the Westerly line thereof, South $01^{\circ}01'01''$ West 100.00 feet; thence,
3. Northwesterly 200.65 feet to a stone 18" high and 4" x 4" wide; thence,
4. West to a natural lake named Wild Man Lake, thence,
5. Northerly along said lake, 200 feet to a point 10 feet South of Mr. Boats Pier; thence,
6. North $89^{\circ}01'01''$ East 50.00 feet to the point of beginning.

IMPORTANT

YOU MUST WORK EITHER D-6 OR D-7, BUT
DO NOT WORK BOTH

PROBLEM D-6 (5 POINTS)

WORK D-6 OR D-7 NOT BOTH

Calls to topographic features returned by the original U.S. Government Surveyor in his field notes are often persuasive evidence which can be used in the re-establishment of obliterated public land corners.

Discuss in detail what weight you would give to topographic calls from the original notes in considering a missing corner as lost. Use an example of your own choosing to illustrate your reasoning.

PROBLEM D-7- (5 POINTS)

WORK D-6 OR D-7 NOT BOTH

The professionally licensed Land Surveyor is involved in diversified work throughout the surveying, mapping, and engineering field. However, the license allows the Professional to become involved with the division of land in the State of California that means working within the provisions of the Subdivision Map Act and local agency ordinances. Answer the ten questions with short precise sentences. List Chapter, Article, and Section numbers from either the 1980 or 1981 Subdivision Map Act to substantiate your answers.

Be sure to write your answer on the separate answer sheet provided.

1. In April, 1975, the Act was recodified from the Business and Profession Code to the _____ Code, Division 2.
2. "Local Agency" means _____.
3. "Subdivision" includes a condominium project as described in Section _____ of the Civil Code.
4. The Conditions under which contiguous parcels or units of land merge is covered by what Chapter, Article and Section of the Act? _____
5. In the event that an owner's development lien has been created pursuant to Chapter 3 of Part 23 of the Education Code what must be done?
6. A Parcel Map shall show the location of each parcel created and its relation to _____.
7. An approved or conditionally approved tentative map shall expire _____ months after approval, or after such additional time as may be prescribed by local ordinance, not to exceed an additional _____ months.
8. There may be imposed by local ordinance, a requirement of dedication or irrevocable offer of dedication of land within a subdivision for different purposes. Irrevocable offers may be terminated as provided in subdivisions _____.
9. The surveyor shall set sufficient monuments to conform with Section 8771 of the Business and Professions Code and any requirements of local ordinance. If the original surveyor is replaced by another, how may the former release his obligation to set the final monuments? _____
10. Subdivided lands may be merged and resubdivided without reverting to acreage under what conditions?

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V

IMPORTANT

YOU MUST WORK EITHER D-8 OR D-9, BUT
DO NOT WORK BOTH

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IMPORTANT

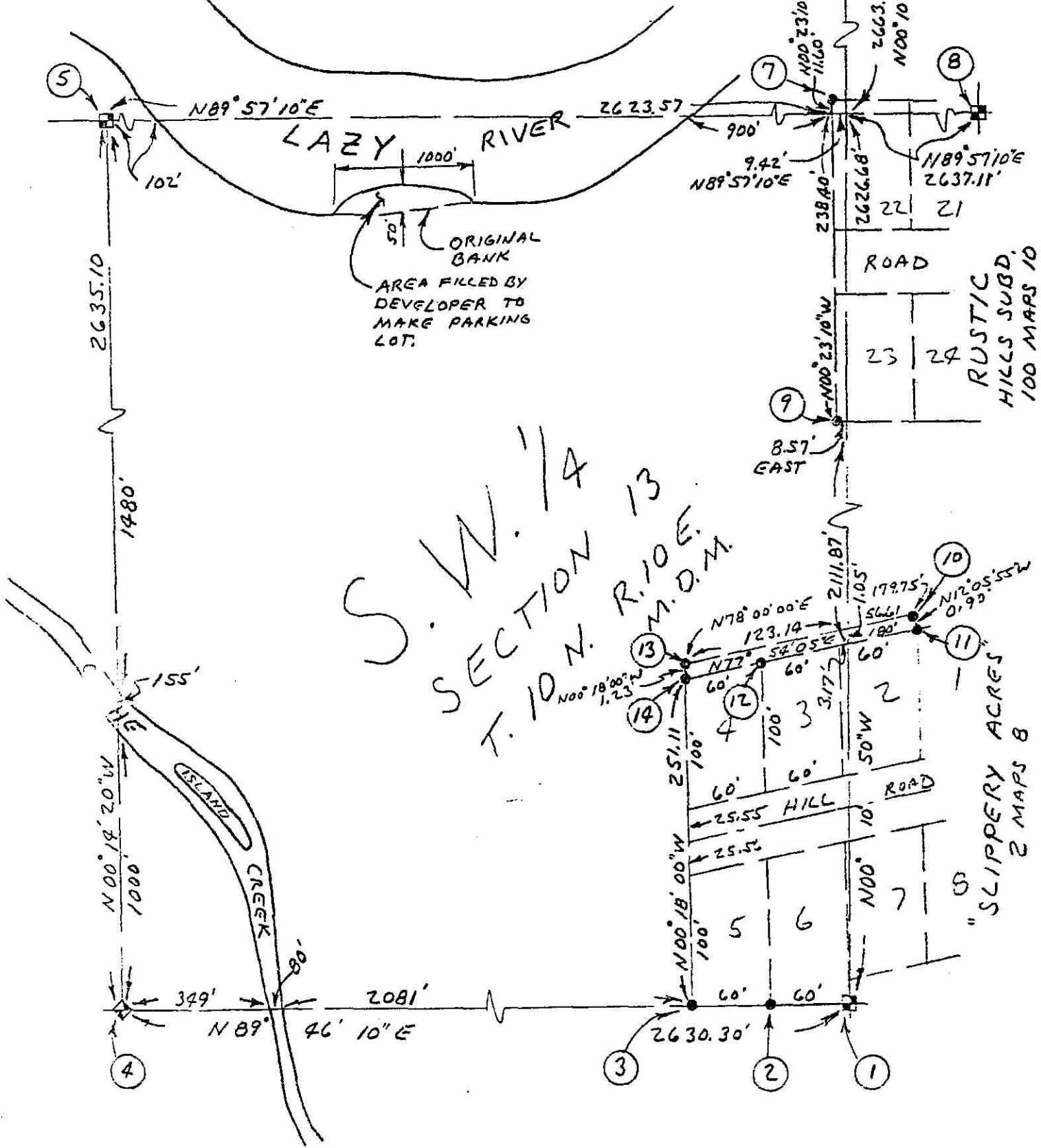
PROBLEM D-8

DIAGRAM IS TO BE REMOVED AND
SUBMITTED WITH YOUR ANSWER SHEETS

PROBLEM D-8 (10 POINTS)

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REMOVE DIAGRAM AND SUBMIT WITH ANSWER SHEETS



PROBLEM D-8 . (10 POINTS)

WORK D-8 OR D-9 NOT BOTH

The monuments reflected in sketch are described as follows:

1. Found old rock mound accepted as south 1/4 corner of Section 13 and southeast corner Lot 6 per plat of "Slippery Acres".
2. Found 1/2" rebar tagged LS 3000.
3. Found 1/2" rebar tagged LS 3000.
4. Found old rock mound. Accepted as southwest corner Section 13.
5. Found USGLO Brass Cap in 2" IP and stamped for West 1/4 corner Section 13.
6. Found USGLO Brass Cap in 2" IP and stamped for North 1/4 corner Section 13.
7. Found 1-1/2" IP tagged LS 4000 at northwest corner of "Rustic Hills Subdivision" which is a subdivision of the North 250' of West 1/2 of Southeast 1/4, Section 13, Township 10 North, Range 10 East, M.D.M.
8. Found USGLO Brass Cap in 2" IP and stamped for East 1/4 corner Section 13.
9. Found 1-1/2" IP tagged LS 4000 at southwest corner of "Rustic Hills Subd."
10. Found 1" pipe tagged LS 100.
11. Found 1/2" rebar tagged LS 3000.
12. Found 1/2" rebar tagged LS 3000.
13. Found 1" pipe tagged LS 100.
14. Found 1/2" rebar tagged LS 3000.

The following information is also known:

1. Cache Creek is a non-navigable creek.
2. Lazy River is a navigable, non-tidal river.
3. "Rustic Hills Subdivision" was originally surveyed by LS 4000.
4. "Slippery Acres" was originally surveyed by LS 100 and resurveyed by LS 3000.
5. Hill Road of "Slippery Acres" was vacated by the County of Extra 5 years prior to your survey.
6. The Grant Deed granting your client his property reads as follows:

Parcel 1: All that portion of the southwest one-quarter of Section 13, T.10N., R.10E., M.D.M. lying south of Lazy River and east of Cache Creek. Excepting therefrom any portion of "Slippery Acres" subdivision recorded in the office of the Recorder of Extra County in Book 2 of Maps at Page 8 lying within the southwest one-quarter of Section 13, T.10N., R.10E., M.D.M.

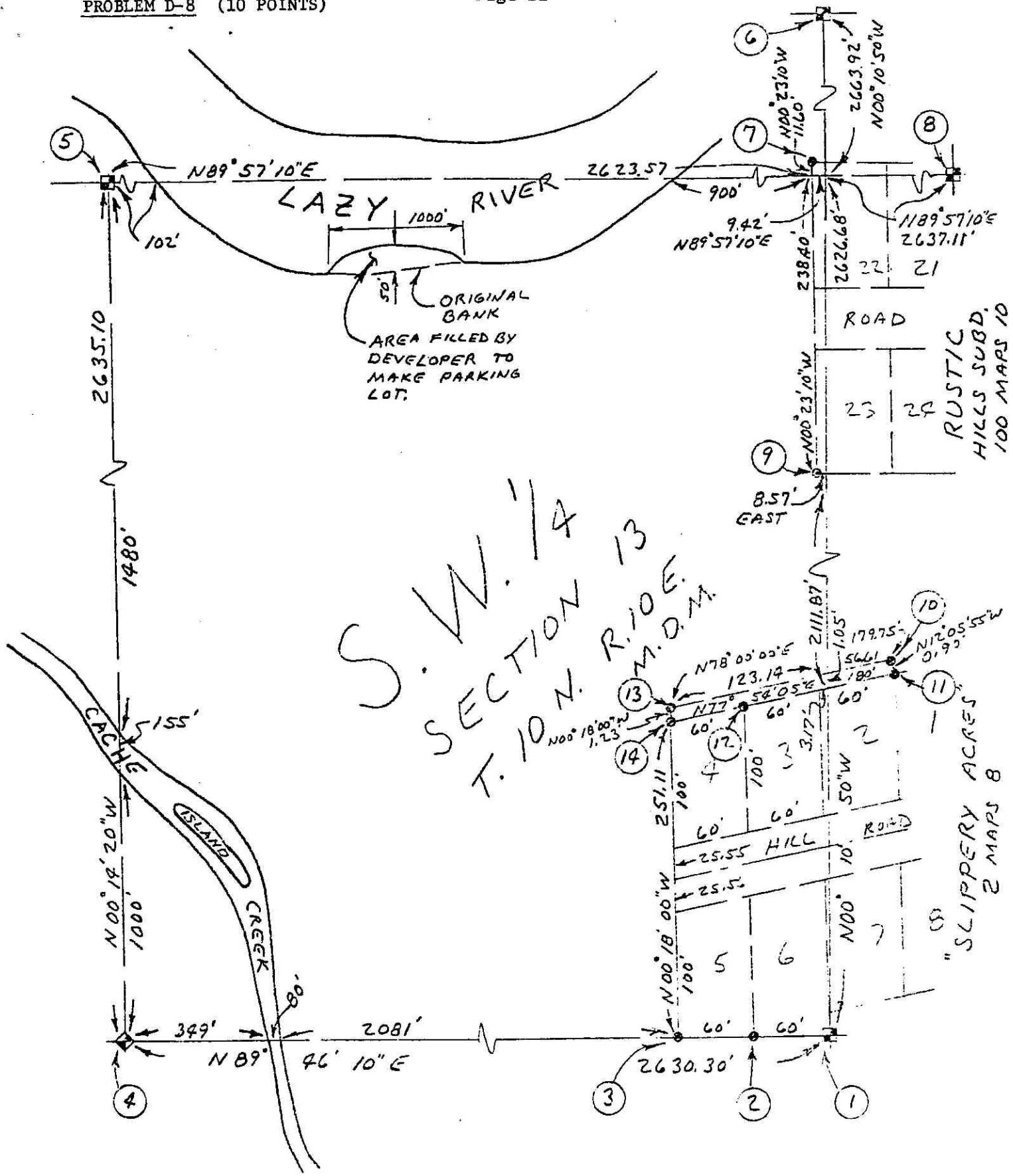
Parcel 2: Lot 4 of "Slippery Acres" Subdivision, recorded in the office of the Recorder of Extra County in Book 2 of Maps, at Page 8.

PROBLEM D-8 (10 POINTS)

WORK D-8 OR D-9 NOT BOTH

QUESTIONS:

- A. Outline the boundary of your clients property ON THE ATTACHED SKETCH (WHICH IS TO BE REMOVED AND SUBMITTED WITH YOUR ANSWER SHEET) and state the reasons for your determination for each boundary segment. Begin your explanation on the south boundary and continue your discussion around the boundary in a clockwise direction.
- B. Based on the facts stated on the preceding page, what is the status and possible claim of title to the island in Cache Creek? State your reasons.
- C. Based on the facts stated on the preceding page, what is the status of and possible claim of title to the filled land in Lazy River? State your reasons.



IMPORTANT

YOU MUST WORK EITHER D-8 OR D-9, BUT

DO NOT WORK BOTH

The attached sketch shows record data as per GLO notes. The area has not been resurveyed since the original GLO surveys.

Your clients deed reads as follows:

That portion of Section 33, T.7N., R12E., M.D.M. described as follows:

The fractional S 1/2 of the SW 1/4 of said Section 33 that lies north-easterly of the northeasterly line of Spanish Rancho.

AND

That portion of Spanish Rancho as per Patent Book 6, Page 1 of Patents, in the County of Wherever, State of California, described as follows:

Beginning at the intersection of the south line of Section 33 with the north-easterly line of Spanish Rancho; thence along the westerly prolongation of the south line of said Section 33, westerly to the intersection with the southerly prolongation of the westerly line of said Section 33; thence northerly along the southerly prolongation of the west line of said Section 33 to an intersection with the said northeasterly line of said Spanish Rancho, thence southeasterly along said northeasterly line to the Point of Beginning.

Excepting therefrom (1) that portion of said land lying southwesterly of the thread of Hill Creek.

Also excepting therefrom (2) that portion of said land that lies northerly of the westerly projection of the S 1/2 of the S 1/2 of said Section 33.

Research and field evidence reveals the following facts:

Hill Creek is non-navigable.

Hill Creek has been realigned and channelized as a flood control channel, however, the old channel of Hill Creek is still evident.

Monuments for Ro. Cors. Nos. 1 and 4 exist.

There is no evidence of Ro. Cors. 2 and 3.

Section Corners A, B, and C are found.

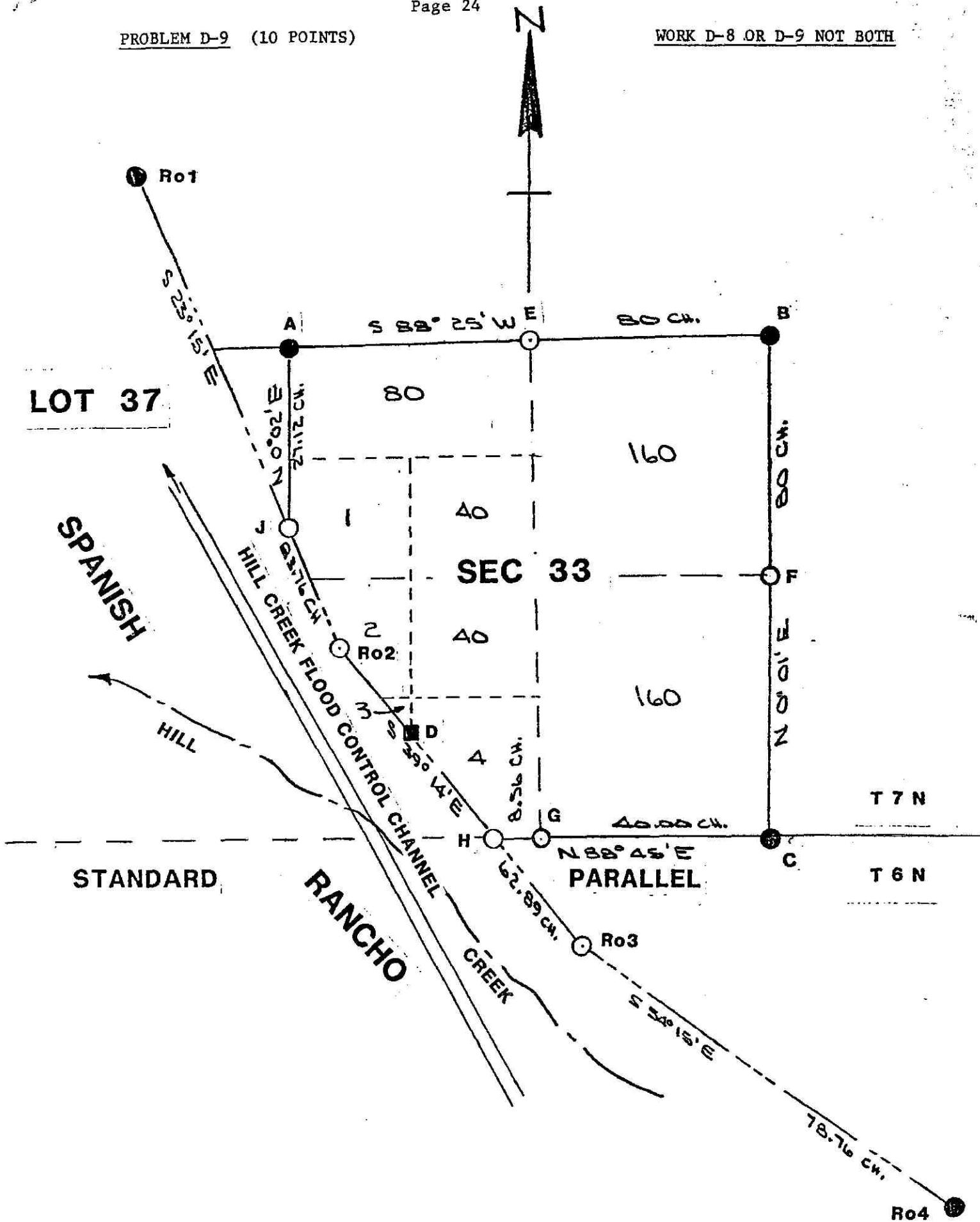
Quarter Section and Closing corners E, F, G, H, and J are lost.

There is no evidence of the projected S.W. Corner of Section 33.

A concrete monument marked "D" is found. Its location appears to be near the intersection of the West line of Lot 4 of Section 33 with the northeasterly line of Spanish Rancho. There is no record of this monument.

PROBLEM D-9 (10 POINTS)

WORK D-8 OR D-9 NOT BOTH



PROBLEM D-9 (10 POINTS)

WORK D-8 OR D-9 NOT BOTH

QUESTIONS

1. Explain how you would survey and identify the land as described.
2. What corners require monumentation?
3. Is a Record of Survey required? Explain your answer.
4. Would a Corner Record be sufficient? Explain your answer.