Candidate ID Number_____

1989 California Professional Land Surveyor Examination

Section A

Problem 1

Grader Use Only — Do Not Write Below This Line

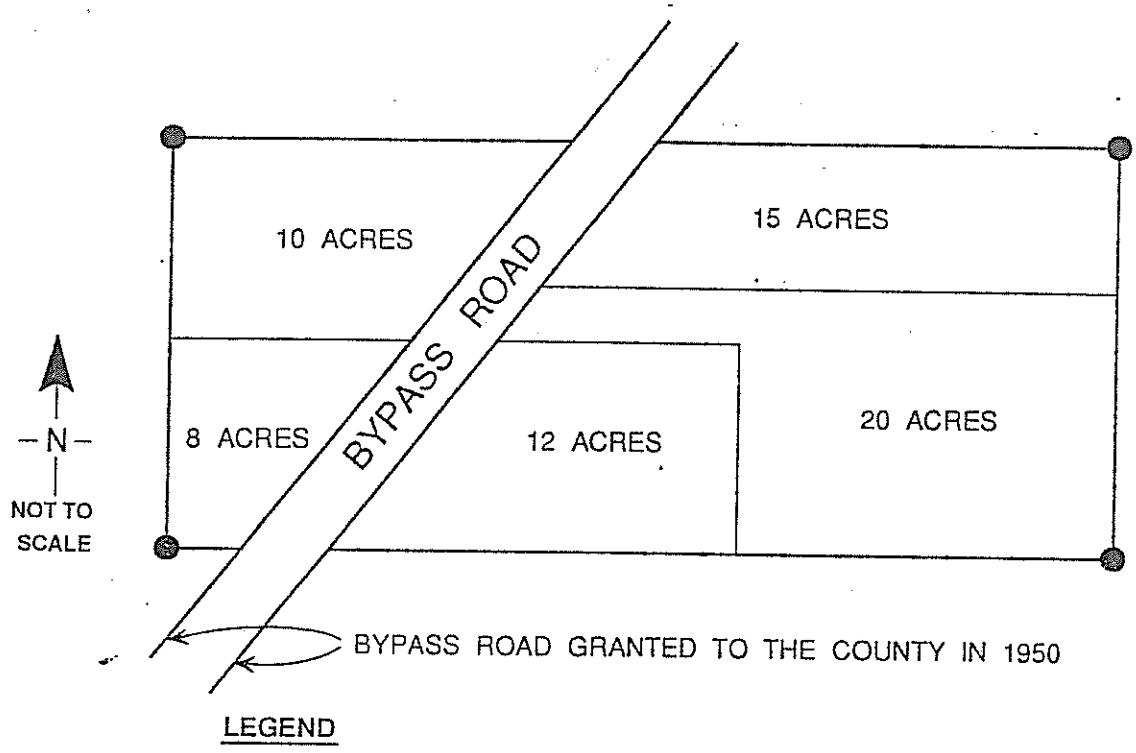
Grader ID Number:_____

PROBLEM A1

10 Points

PROBLEM STATEMENT

Given the information denoted in the diagram below, the client has asked you to provide surveying and mapping services necessary to create the parcels as shown.



PROBLEM REQUIREMENTS

The answers to the following questions are based upon current California law. You are to answer each of the questions briefly in your own words, or indicate the appropriate citations.

1. What type of map or maps, if any, are required for this land division? 1 Point

2. If a map is required, who shall prepare it? 1 Point

3. Explain whether or not the new parcels are required to be monumented. 1 Point

4. If monuments are required or requested, when must they be set? 1 Point

PROBLEM REQUIREMENTS (continued)

5. If a map or maps are required, under what conditions would holders of beneficial interests not be required to sign? 1 Point

6. Excluding lawsuits and moratoriums, and if a final map or parcel map is required, what is the maximum time allowed to record the map? 1 Point

7. Under what conditions may the monuments called for on a parcel map or final map be set by another licensed land surveyor? 1 Point

8. After the completion of your work on the client's property, a tractor removed the monument that you found at the exterior southeast corner. The contractor asks you to replace the corner. What document, if any, would you prepare? 1 Point

9. Assuming it is necessary to gain access to the neighboring property to conduct your field survey and the neighbors question your right to be on their property, how would you respond? 1 Point

10. How can non-title information (i.e., building setback lines, etc.) be filed or recorded with a subdivision map? 1 Point

Grading Plan - Problem A1

Grader ID No. _____
Candidate ID No. _____

1. A tentative, final, or parcel map (SMA 66426, 66424).	1 Point	_____
2. A licensed land surveyor or civil engineer authorized to practice land surveying (SMA 66434, LSA 8731).	1 Point	_____
3. SMA 66495 requires sufficient durable monuments; also see LSA 8771. The surveyor must also set additional monuments as required by local ordinance (SMA 66495). (SMA 66495 does not require parcels to be monumented.)	1 Point	_____
4. At least one exterior line shall be monumented prior to the map recording (SMA 66495). The interior monuments may be delayed to no later than a specific date noted in the surveyor's statement (SMA 66496 and 66441).	1 Point	_____
5. Beneficial interest holders or their trustees are not required to sign parcel maps (SMA 66436.3, 66445.3E).	1 Point	_____
6. Two years with a maximum one-year time extension if allowed by local ordinance (SMA 66452.6). (Five years acceptable per 66452.6E).	1 Point	_____
7. Death, disability, or retirement of original surveyor, refusal, also. (SMA 66498).	1 Point	_____
8. Corner record (LSA 8773 through 8773.4, board rule 464).	1 Point	_____
9. Right of Entry (LSA 8774).	1 Point	_____
10. Supplemental information sheet may be filed concurrently with the final map or recorded as a separate document (SMA 66434.2).	1 Point	_____
	TOTAL: 10 Points	_____

Comments:

Candidate ID Number_____

1989 California Professional Land Surveyor Examination

Section A

Problem 2

Grader Use Only — Do Not Write Below This Line

Grader ID Number:_____

PROBLEM A2

20 Points

PROBLEM STATEMENT

Due to a conflict in record data, the title company refuses to insure your client's legal description.

Your client's deed contains the following description:

> Beginning at the northwest corner of Lot 1; east along lot lines 120 feet; south to point on south line 100 feet east of southwest corner of Lot 1; west 100 feet to southwest corner; north to point of beginning.

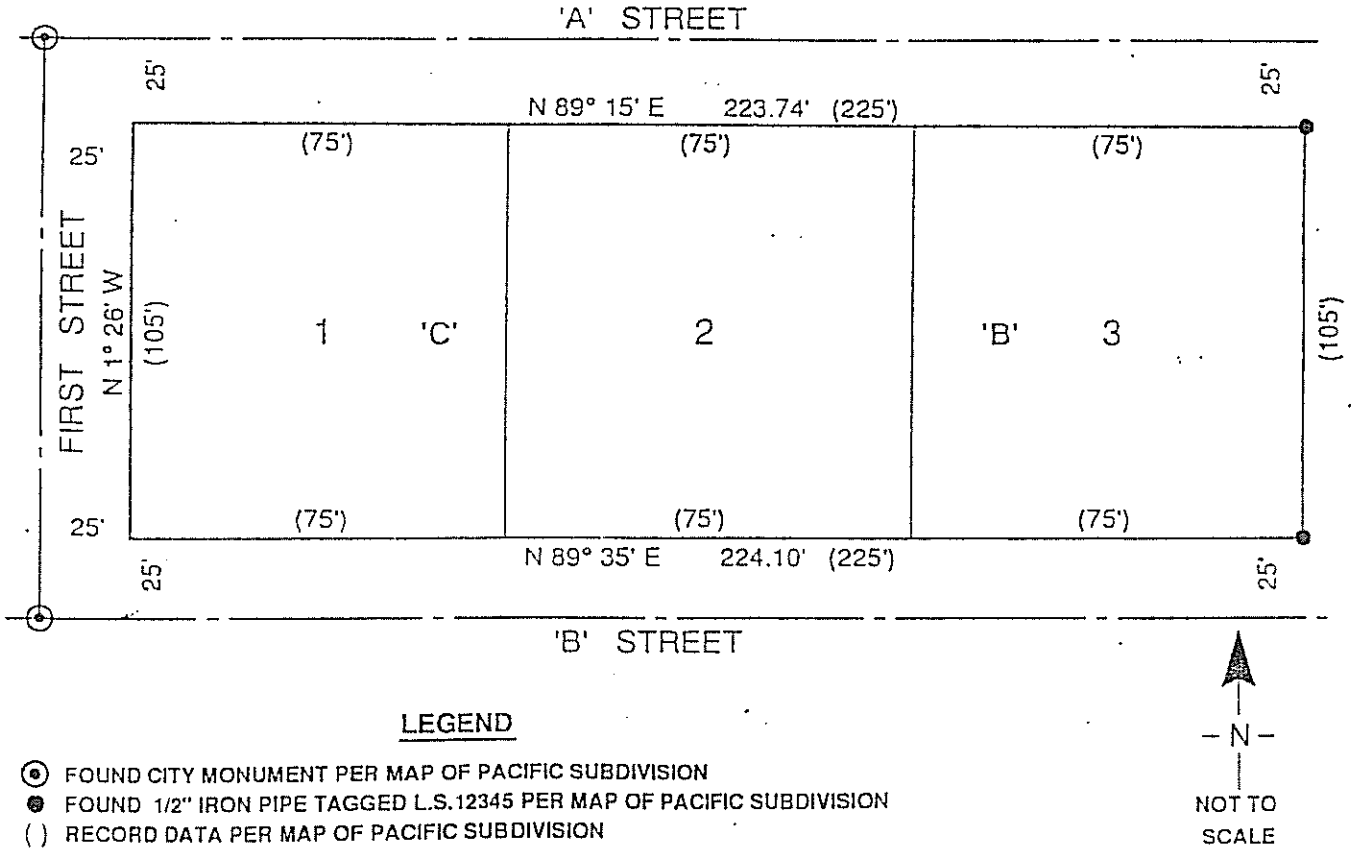
The title history is as follows:

Owner A acquired lots 1, 2, and 3 in 1964.

In 1970, Owner A conveyed to Owner B by deed recorded in Book 123 of Official Records Page 45, Lot 3 and portion of Lot 2 described as: beginning at the southeast corner of Lot 2; west along the Lot line 50 feet; north to point on northerly line 30 feet west of the northeast corner of Lot 2; east to northeast corner of Lot 2; south to point of beginning.

In 1975, Owner A conveyed to Owner C (your client's predecessor in title) using the same description as your client's deed.

Record of Survey of Lots 1, 2, & 3 of Pacific Subdivision
Filed in Book 86 of Maps, Page 50, Records of XYZ County, CA



PROBLEM REQUIREMENTS

1. Describe the procedure you would use to analyze the data required for providing a legal description of your client's property; this legal description must be acceptable to the title company. — 6 Points

2. What interpretations of those data would you make to determine your client's parcel dimensions? Show the dimensions along the northerly and southerly lines of Lot 2. — 4 Points

3. Prepare the legal description of your client's parcel. — 10 Points

Grading Plan - Problem A2

Grader ID No. _____
Candidate ID No. _____

1. a. Historical analysis of deeds to determine senior rights. 4 Points _____

   b. Review data on record of survey for comparison of data with original subdivision map. 2 Points _____

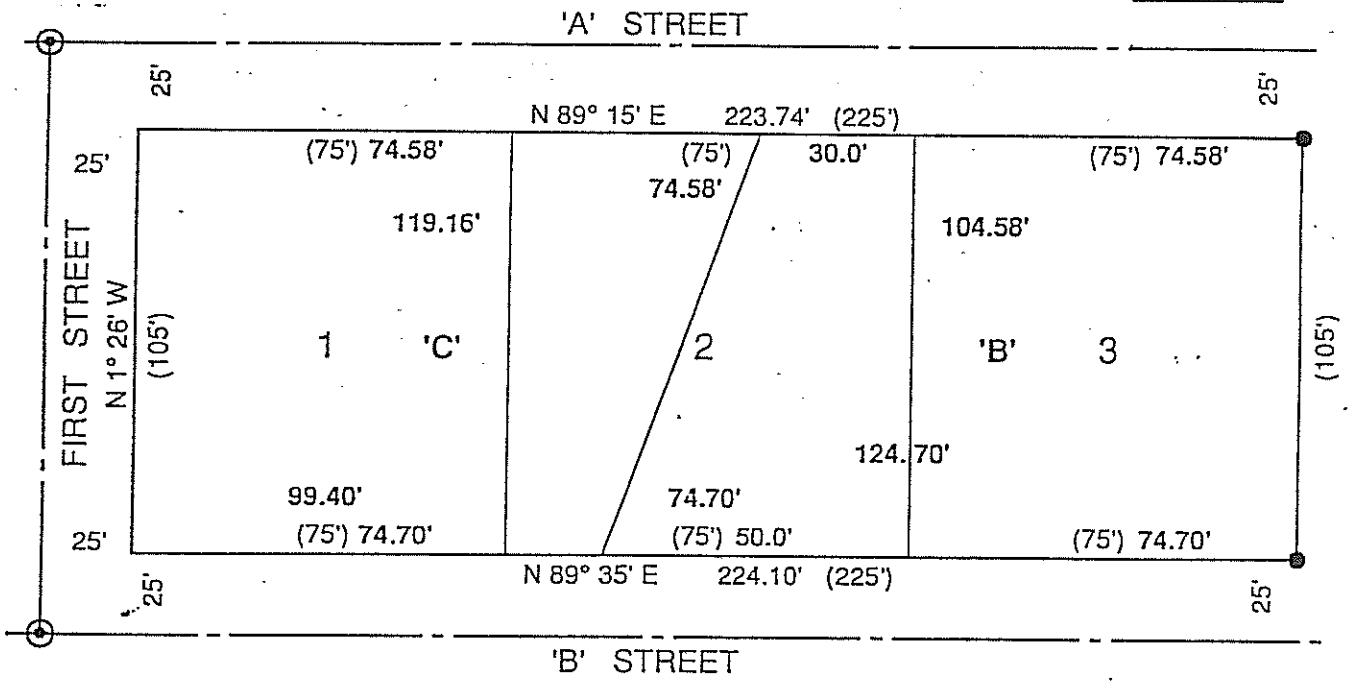
2. a. "B" is the senior parcel; "C" only has what is left. 2 Points _____

   b. Establish lot corners by proportional measure. Set deed line from lot corners as established.

$$\frac{75}{225} \times 224.10 = \text{South line lot dimension} = 74.70$$

$$\frac{75}{225} \times 223.74 = \text{North line lot dimension} = 74.58$$

2 Points _____



Part 3a of Problem A2 must include the complete preamble. 2 Points _____

3a. Example of an Acceptable Legal Description

All that certain real property situated in the County of XYZ, State of California, described as follows:

That portion of Lots 1 and 2 of Pacific Subdivision filed in Book 86 of Maps, Page 50, Records of XYZ County, California, described as follows:

Part 3b must include the complete body of the legal description. 8 Points _____

3b. Beginning at the northwest corner of said Lot 1; thence N 89° 15' E along the northerly line of said Lots 1 and 2, a distance of 119.16 feet to the northwest corner of the land described in the Deed to "B" recorded in Book 123 of Official Records, Page 45, Records of XYZ County, California; thence southerly along the westerly line of said land to the southwest corner thereof, being a point on the southerly line of said Lot 2; thence S 89° 35' W 99.40 feet to the southwest corner of said Lot 1; thence N 1° 26' W 105 feet to the point of beginning.

TOTAL: 20 Points _____

Comments:

Candidate ID Number_____

1989 California Professional Land Surveyor Examination

Section A

Problem 3

Grader Use Only — Do Not Write Below This Line

Grader ID Number:_____

PROBLEM A3

14 Points

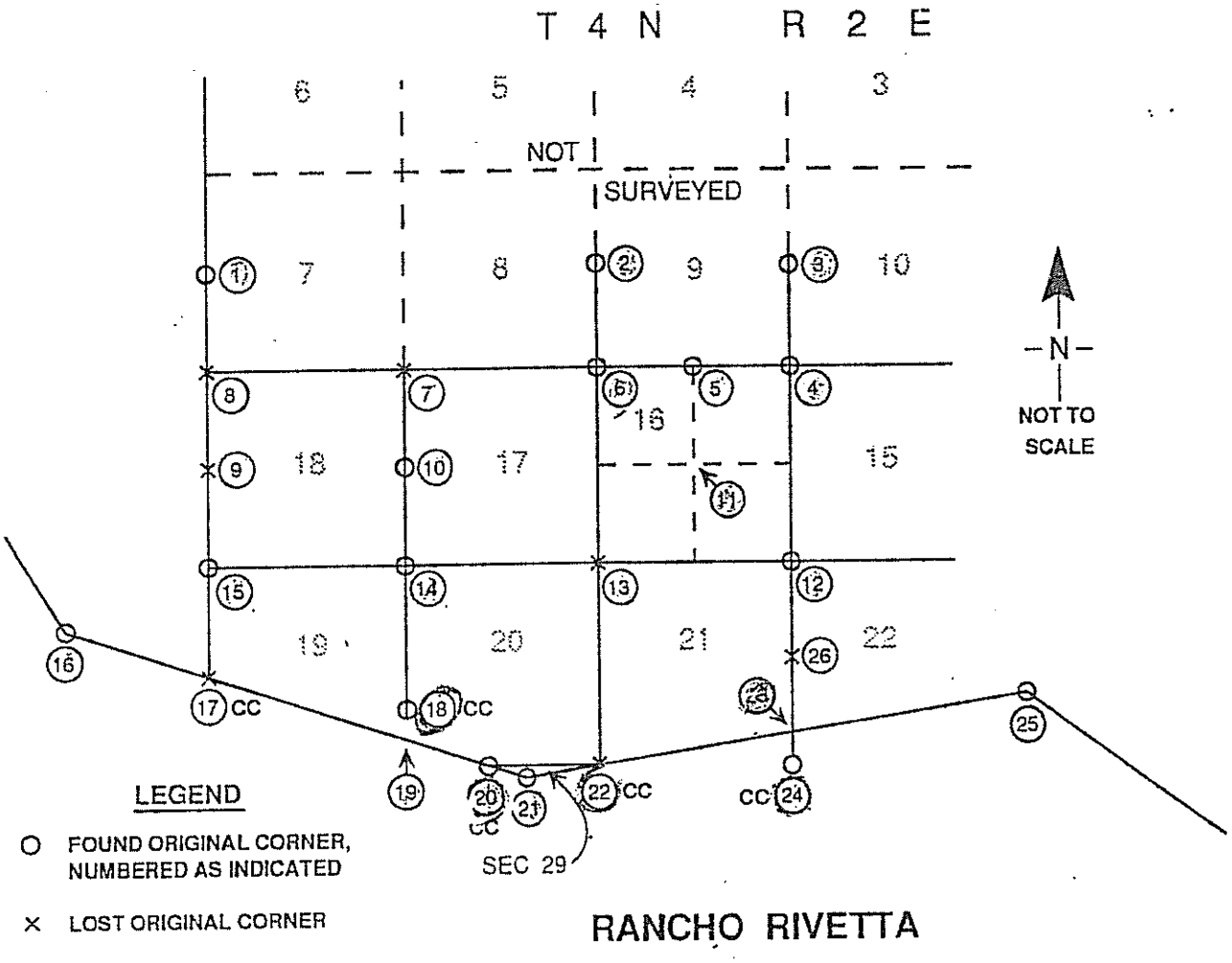
PROBLEM STATEMENT

The portion of a township plat shown below has been annotated to show which corners are lost and found at this date. Township 4 North, Range 2 East is bounded by regularly surveyed townships to the west, north, and east, and by Rancho Rivetta to the south.

The found original corners are U.S. Government survey monuments described in the notes of the survey. There are no topographical or accessory calls recovered; the lost original corners have been properly identified as such.

No excessive distortion was found in the record dimensions indicated in the plat and field notes for the rancho and township.

Exhibit Plat



PROBLEM REQUIREMENTS

1. Explain the procedure necessary to establish the corners in the following order: 8, 9, 17, 19, 23, 22, 26, 13, 11, 7 — 10 Points

2. As a licensed land surveyor, what would you be required to file to show the monumentation of:

   a. Corner 11 — 1 Point
   b. Corner 5 — 1 Point

3. Describe or cite the definition of:

   a. a lost corner — 1 Point
   b. an obliterated corner — 1 Point

Grading Plan - Problem A3

Grader ID No. _____
Candidate ID No. _____

1. a. **Corner No. 8** is established by single proportionate measurement between corners 1 and 15. (5:30 and 5:25) — 1 Point _____

   b. **Corner No. 9** is established by single proportionate measurement between corners 1 and 15. (5:30) — 1 Point _____

   c. **Corner No. 17** is established by single proportionate measurement between corners 16 and 21 (between corners 16 and 19 is acceptable; also acceptable between corners 16 and 18 as long as it is specified that the position is brought to Rancho line 16–21.- (5:41)
   If adequately justified, the intersection of a true line southerly from corner No. 15 and Rancho line 16–21 is acceptable. — 1 Point _____

   d. **Corner No. 19** is established at the intersection of a line run southerly from corner No. 14 through corner No. 18 to the intersection with the line between corner No. 16 and corner No. 21. (5:41) — 1 Point _____

   e. **Corner No. 23** is established at the intersection of a line between corners 12 and 24, and a line between corners 21 and 25. (5:41) — 1 Point _____

   f. **Corner No. 22** is established by single proportionate measurement between corners 21 and 25, (between corners 21 and 23 is acceptable; also acceptable between corners 21 and 24 as long as it is specified that the position is brought to Rancho line 21–25. (5:41) — 1 Point _____

   g. **Corner No. 26** is established on line at a proportionate measurement between corners 12 and 24. (5:41) — 1 Point _____

   h. **Corner No. 13** is established by double proportionate measurement between corners 12 and 14, and corners 22 and 6. (5:29) — 1 Point _____

   i. **Corner No. 11** is established by first establishing the missing 1/4 corners of Section 16 by single proportionate measurement between corners 6 and 13, 13 and 12, and 12 and 4, and then intersecting the lines between the four 1/4 corners. (3:87) — 1 Point _____

   j. **Corner No. 7** is established by establishing a temporary single proportionate position between corners 6 and 8; then a temporary position is established at a record distance in a cardinal direction from corner No. 10. Then the cardinal offsets are applied from the two temporary corners to establish the true position of corner No. 7. (5:30) — 1 Point _____

2. a. **Corner 11:** Record of Survey. (8773 A) — 1 Point _____

   b. **Corner 5:** Record of Survey or corner record. (8773 A) — 1 Point _____

3. a. "A lost corner is a point of a survey whose position cannot be determined, beyond reasonable doubt, either from traces of the original marks or from acceptable evidence or testimony that bears upon the original position, and whose location can be restored only by reference to one or more interdependent corners." — 1 Point _____

   b. "An obliterated corner is one at whose point there are no remaining traces of the monument or its accessories, but whose location has been perpetuated, or the point for which may be recovered beyond reasonable doubt by the acts and testimony of the interested landowners, competent surveyors, other qualified local authorities, or witnesses, or by some acceptable record evidence." — 1 Point _____

References are to Professional Land Surveyors Act/Board Rules and Manual of Instructions, 1973.

TOTAL: 14 Points _____

Comments:

Candidate ID Number_____

1989 California Professional Land Surveyor Examination

Section A

Problem 4

Grader Use Only — Do Not Write Below This Line

Grader ID Number:_____

PROBLEM A4

16 Points

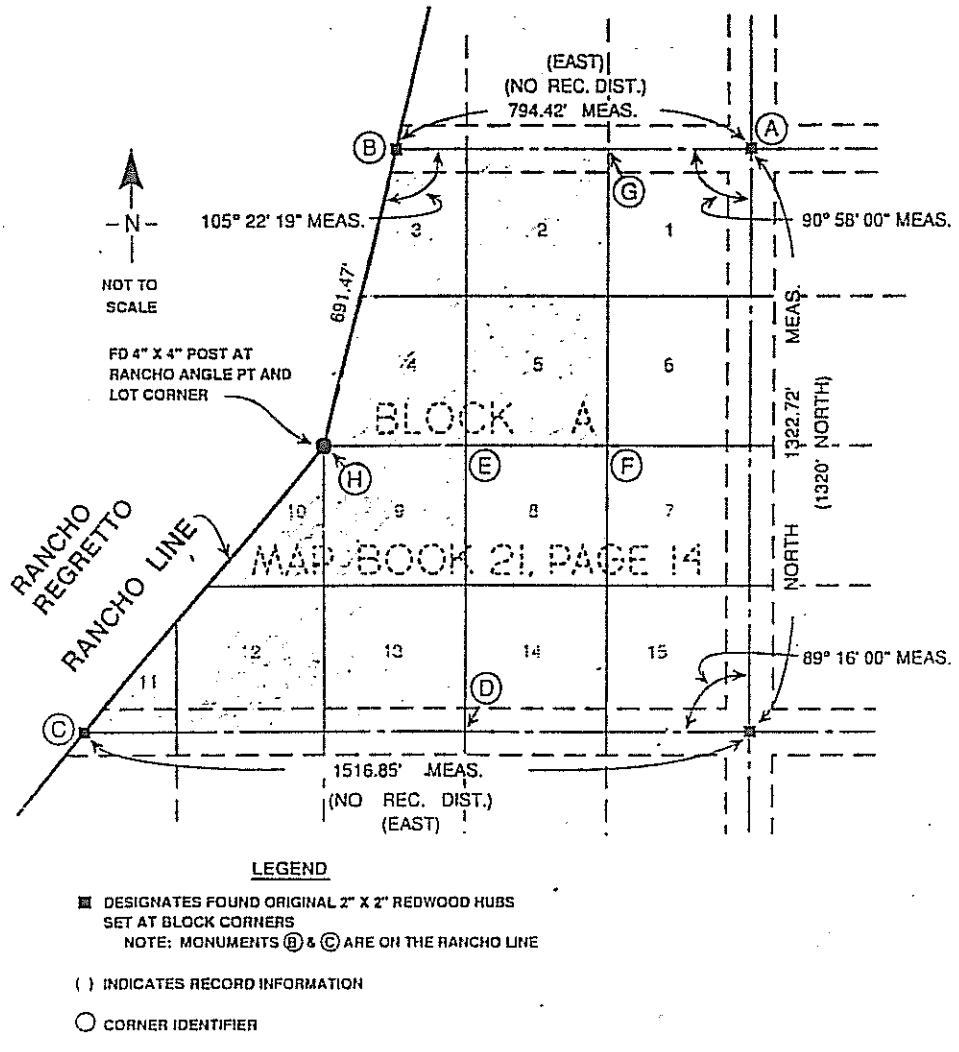
PROBLEM STATEMENT

Your client is interested in purchasing a portion of Block A of the McDonald's Farm Subdivision in Marin County, State of California as shown on the copy of the record map below. The client would like to purchase Lots 2 through 5 and Lots 9 through 13 of the McDonald's Farm Subdivision, Map Book 21, Page 14. You have obtained the measurements from your field crew as shown on the map below. The original map filed in 1920 reveals that all square lots were intended to contain 2.5 acres. The streets are 60 feet wide. A bearing of North shall be assumed for the center line of the street on the east side of Block A.

PROBLEM REQUIREMENT

On the sheet provided, show the bearing and distance for each line of the parcel to be purchased. Use the grid paper provided to show your work. 16 Points

Block A, McDonald's Farm Subdivision



LEGEND

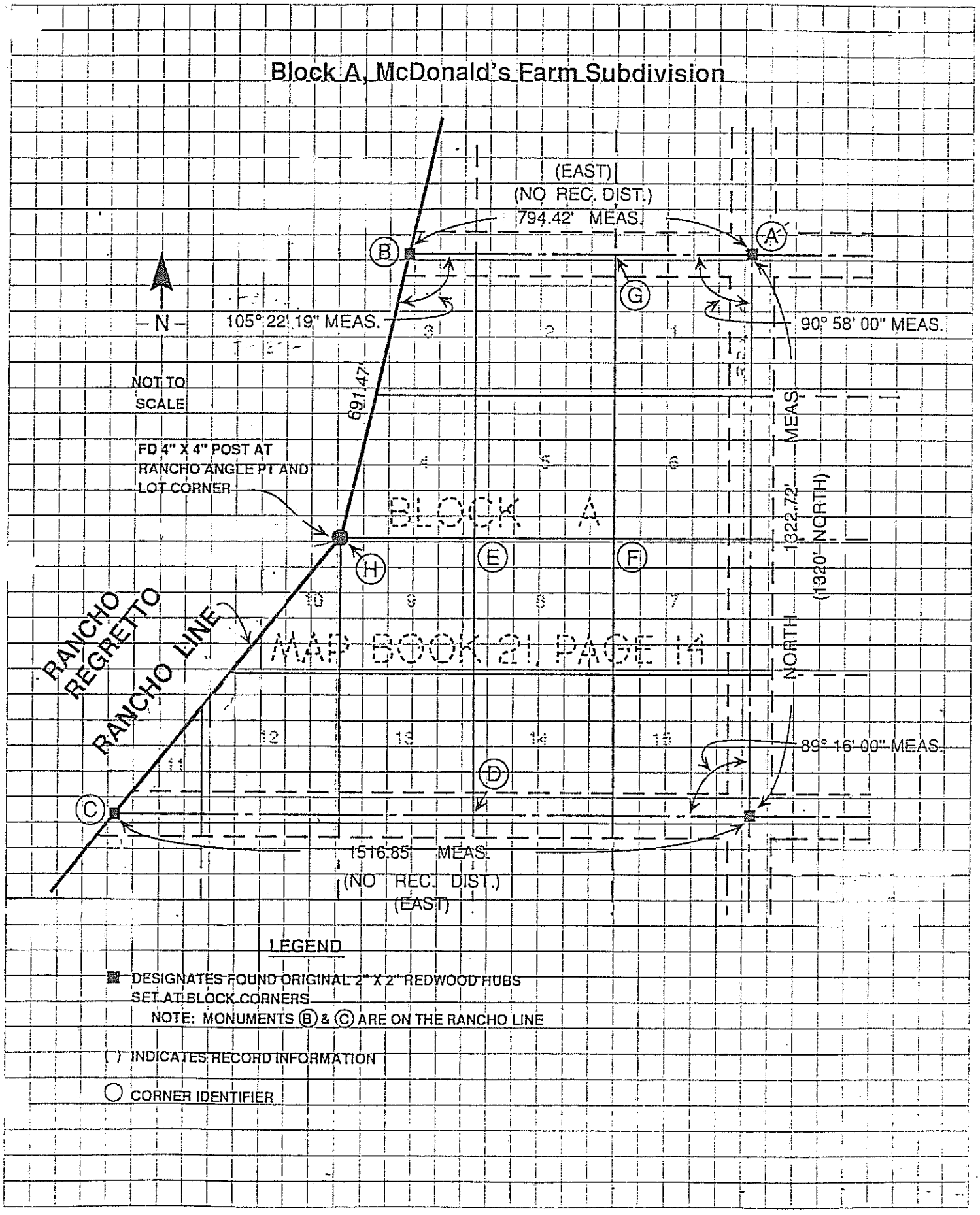
■ DESIGNATES FOUND ORIGINAL 2" X 2" REDWOOD HUBS SET AT BLOCK CORNERS
NOTE: MONUMENTS Ⓑ & Ⓒ ARE ON THE RANCHO LINE

( ) INDICATES RECORD INFORMATION

○ CORNER IDENTIFIER

Candidate ID Number

Problem No.



LEGEND

■ DESIGNATES FOUND ORIGINAL 2" X 2" REDWOOD HUBS SET AT BLOCK CORNERS

NOTE: MONUMENTS Ⓑ & Ⓒ ARE ON THE RANCHO LINE

( ) INDICATES RECORD INFORMATION

○ CORNER IDENTIFIER

	Bearing	Distance	
a. Line A – G	_____	_____	2 Points
b. Line B – G	_____	_____	2 Points
c. Line C – H	_____	_____	2 Points
d. Line D – C	_____	_____	2 Points
e. Line E – D	_____	_____	2 Points
f. Line F – E	_____	_____	2 Points
g. Line G – F	_____	_____	2 Points
h. Line H – B	_____	_____	2 Points

Grading Plan - Problem A4

Grader ID No. _____
Candidate ID No. _____

	Bearing	Distance		
a. Line A – G	N 89° 02' 00" W	330.00	2 Points	_____
b. Line B – G	N 89° 02' 00" W	464.42	2 Points	_____
c. Line C – H	N 38° 56' 45" E	839.82	2 Points	_____
d. Line D – C	N 89° 16' 00" W	856.85	2 Points	_____
e. Line E – D	N 0° 03' 47" E	660.39	2 Points	_____
f. Line F – E	N 89° 21' 00" W	329.63	2 Points	_____
g. Line G – F	N 0° 01' 47" W	663.19	2 Points	_____
h. Line H – B	N 16° 20' 19" E	691.47	2 Points	_____
			TOTAL: 16 Points	_____

Comments:

Candidate ID Number _____

1989 California Professional Land Surveyor Examination

Section A

Problem 5

Grader Use Only — Do Not Write Below This Line

Grader ID Number:_____

PROBLEM A5

20 Points

PROBLEM STATEMENT

California coordinates and basis of bearings for Station ROTS are shown on Sheet 2 along with data for a solar observation at Station RUK.

PROBLEM REQUIREMENTS

Use the data provided and the diagram on the following page to solve the problem requirements below. Show your work.

1. Determine the latitude and longitude of Station RUK to the nearest **0.01** seconds. — 10 Points

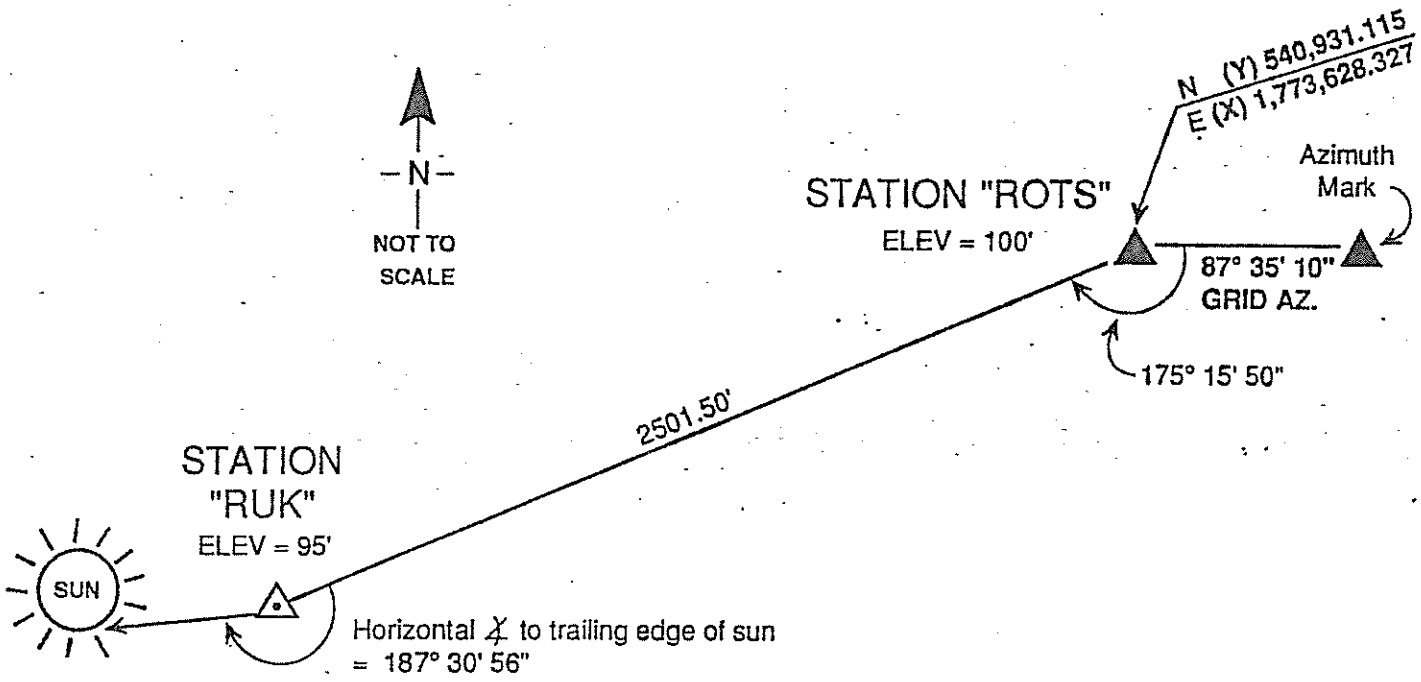
2. Reduce the solar observation either by the hour angle or the altitude method. — 5 Points

3. Determine the angle of closure at station RUK. — 5 Points

PROBLEM A5

20 Points

California Zone 4, NAD 27



SOLAR OBSERVATION

Date = May 5, 1988
Time = 5:23:35.0 PDST
Watch is 0.5" fast
D.U.T. = -0.3"
Vert. ∠ to center of sun = 28° 05' 49"
(Corrected for parallax and refraction)

Solar Ephemeris Table

	GHA	Declination	SemiDiameter
May 4 W	180° 48' 22.7"	15° 58' 04.3"	15' 53.2"
May 5 Th	180° 49' 44.8"	16° 15' 19.0"	15' 53.0"
May 6 F	180° 50' 58.4"	16° 32' 17.5"	15' 52.7"
May 7 S	180° 52' 03.3"	16° 48' 59.7"	15' 52.5"

PROBLEM A5

20 Points

Lambert Projection for California IV
Table I

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
36°	31'	28,222,155.97	430,775.99	101.12233	−249.4	0.9999426
	32	28,216,088.63	436,843.33	101.12250	−251.6	0.9999421
	33	28,210,021.28	442,910.68	101.12267	−253.5	0.9999416
	34	28,203,953.92	448,978.04	101.12300	−255.0	0.9999413
	35	28,197,886.54	455,045.42	101.12333	−256.1	0.9999410
36°	36'	28,191,819.14	461,112.82	101.12350	−256.9	0.9999408
	37	28,185,751.73	467,180.23	101.12383	−257.2	0.9999408
	38	28,179,684.30	473,247.66	101.12417	−257.3	0.9999408
	39	28,173,616.85	479,315.11	101.12433	−256.9	0.9999408
	40	28,167,549.39	485,382.57	101.12483	−256.2	0.9999410
36°	41'	28,161,481.90	491,450.06	101.12500	−255.1	0.9999413
	42	28,155,414.40	497,517.56	101.12533	−253.7	0.9999416
	43	28,149,346.88	503,585.08	101.12567	−251.9	0.9999420
	44	28,143,279.34	509,652.62	101.12617	−249.7	0.9999425
	45	28,137,211.77	515,720.19	101.12633	−247.1	0.9999431
36°	46'	28,131,144.19	521,787.77	101.12667	−244.2	0.9999438
	47	28,125,076.59	527,855.37	101.12717	−240.9	0.9999445
	48	28,119,008.96	533,923.00	101.12750	−237.3	0.9999454
	49	28,112,941.31	539,990.65	101.12783	−233.3	0.9999463
	50	28,106,873.64	546,058.32	101.12833	−228.9	0.9999473
36°	51'	28,100,805.94	552,126.02	101.12867	−224.2	0.9999484
	52	28,094,738.22	558,193.74	101.12917	−219.0	0.9999496
	53	28,088,670.47	564,261.49	101.12950	−213.6	0.9999508
	54	28,082,602.70	570,329.26	101.12983	−207.7	0.9999522
	55	28,076,534.91	576,397.05	101.13033	−201.5	0.9999536
36°	56'	28,070,467.09	582,464.87	101.13083	−194.9	0.9999551
	57	28,064,399.24	588,532.72	101.13133	−188.0	0.9999567
	58	28,058,331.36	594,600.60	101.13167	−180.6	0.9999584
	59	28,052,263.46	600,668.50	101.13217	−173.0	0.9999602
37°	00'	28,046,195.53	606,736.43	101.13283	−164.9	0.9999620
37°	01'	28,040,127.56	612,804.40	101.13317	−156.5	0.9999640
	02	28,034,059.57	618,872.39	101.13367	−147.7	0.9999660
	03	28,027,991.55	624,940.41	101.13417	−138.6	0.9999681
	04	28,021,923.50	631,008.46	101.13467	−129.0	0.9999703
	05	28,015,855.42	637,076.54	101.13517	−119.2	0.9999726

PROBLEM A5

Constants for California Zones

Constants	I	II
C	2,000,000	2,000,000
Central Meridian	122° 00'	122° 00'
R_b	24,792,436.23	26,312,257.65
y_o	547,078.17	516,407.35
ℓ	0.65388 43192	0.63046 79732
$\frac{1}{2\rho_o^2 \sin 1''}$	2.358×10^{-10}	2.359×10^{-10}
$\log \frac{1}{2\rho_o^2 \sin 1''}$	0.372 4621 - 10	0.372 6393 - 10
$\log \ell$	9.81550 09227 - 10	9.79966 30299 - 10
log k	7.60545 70526	7.61359 91422

Constants	III	IV
C	2,000,000	2,000,000
Central Meridian	120° 30'	119° 00'
R_b	27,512,992.04	28,652,931.96
y_o	455,516.19	470,526.63
ℓ	0.61223 20427	0.59658 71443
$\frac{1}{2\rho_o^2 \sin 1''}$	2.359×10^{-10}	2.360×10^{-10}
$\log \frac{1}{2\rho_o^2 \sin 1''}$	0.372 7729 -10	0.372 8843 - 10
$\log \ell$	9.78691 60557 -10	9.77567 38907 - 10
log k	7.62062 61281	7.62714 43424

Grader ID No. _____
Candidate ID No. _____

Grading Plan – Problem A5

Geodetic Conversion Using Coast and Geodetic Survey Format
(Alternate Solution 1 of 2)

Part One

36° 48' 57.01" ← 5 Points _____
119° 46' 54.51" ← 5 Points _____

SUBTOTAL 10 Points _____

State Plane Coordinates to Geodetic
(Alternate Solution 2 of 2)

Part One

2 Points _____

Step 1 2 Points _____
Step 2 1 Point _____
Step 3 2 Points _____
Step 4 2 Points _____
Step 5 1 Point _____
Step 6

SUBTOTAL 10 Points _____

Part Two

Solar Observation by Hour Angle Method
(Alternate Solution 1 of 2)

UT1 = 00:23:34.2 Date becomes May 6, 1989 1 Point _____

*Dec δ = Dec 0 hours + (Dec 24 hours – Dec 0 hours) ($\frac{UT1}{24}$)

= 16° 32' 34" ← 1 Point _____

Azimuth to center of sun = arc tan [–sin LHA/ (cos ϕ tan δ – sin ϕ cos LHA)]
AZ = –89° 47' 47.8" + 360° = 270° 12' 12" ← 3 Points _____

SUBTOTAL 5 Points _____

Grading Plan – Problem A5

Grader ID No. _____
Candidate ID No. _____

Part Two

Solar Observation by Altitude Method
(Alternate Solution 2 of 2)

UT1 = 00:23:34.2 Date becomes May 6, 1989 — **1 Point** _____

*Dec δ= Dec 0 hours + (Dec 24 hours – Dec 0 hours) ($\frac{UT1}{24}$)

= 16° 32' 34" ← — **1 Point** _____

Mathematical methodology correct
Azimuth to center of sun = arc cos [(sin δ –sin h sin ϕ) / cos h cos ϕ] — **2 Points** _____

AZ = –89° 47' 48" + 360° = 270° 12' 12" ← — **1 Point** _____

SUBTOTAL 5 Points _____

Part Three

AZIMUTH OF LINE

Az to center of sun	=	270° 12' 12"	
Correction for sun's SemiDiameter is 0° 15' 52.7" / cos 28° 05' 49"	=	– 0° 18' 00" ←	1 Point _____
Azimuth to left edge of sun	=	269° 54' 12" ←	1 Point _____
Horz. Angle	=	–187° 30' 56"	
True Azimuth of line by sun	=	82° 23' 16" ←	1 Point _____

GRID AZIMUTH

True Azimuth of line at RUK	=	82° 23' 16"	
Theta at RUK	=	–(–0° 27' 59") (from Part I)	
Grid Azimuth of line	=	82° 51' 15" ←	1 Point _____

ANGLE OF CLOSURE

Grid Azimuth of line from sun +180°	=	262° 51' 15"	
Grid Azimuth of line from ROTS	=	– 262° 51' 00"	
Angle of Closure	=	0° 00' 15" ←	1 Point _____

Note: These are precise solutions, small differences are to be expected due to rounding.

SUBTOTAL: 5 Points _____

TOTAL: 20 Points _____

Comments:

Candidate ID Number_____

1989 California Professional Land Surveyor Examination

Section B

Problem 1

Grader Use Only — Do Not Write Below This Line

Grader ID Number:_____

PROBLEM B1

19 Points

PROBLEM STATEMENT

This problem has two parts. Part I examines the ability to match surveying terms with the listed definitions. Part II requires completion of a series of statements by supplying the missing word or words.

PROBLEM REQUIREMENTS

PART I: Example

Each of the definitions, numbered 1 through 7 below, defines a term listed below. Enter the letter designating the correct term in the blank to the left of its definition. 7 Points

Example:

A. MECHANIC B. SURVEYOR C. PLUMBER

__B__ One whose occupation is determining lengths, directions, boundary lines, and contours.

PART I: Definitions

A. Alluvion
B. Avulsion
C. Equitable Estoppel
D. Evidence Beyond Reasonable Doubt
E. Extrinsic Evidence
F. Grant
G. Intrinsic Evidence
H. Latent Defect
I. Ordinary High-Water Mark
J. Ordinary Mean Water
K. Ownership
L. Patent Defect
M. Preponderance of Evidence
N. Title
O. Title Report
P. Unwritten Rights
Q. Written Rights

1. _____ The union of all the elements that constitute ownership. 1 Point

2. _____ Summary of recorded documents that constitute Constructive Notice. 1 Point

3. _____ Information not contained in a deed, but allowed to apply or give affect to a description. 1 Point

4. _____ An error in a deed description that may be ascertained from the information contained therein. 1 Point

5. _____ The basis for deciding civil cases involving boundary litigation. 1 Point

6. _____ The boundary of an upland owner bordering on tide water. 1 Point

7. _____ The material gradually and imperceptibly accumulated by the recession of water. 1 Point

PART II: Fill in the Blanks — 12 Points

For the statements listed, fill in the blanks to make the statements correct.

1. Unwritten transfers of real property are prohibited by the _____. 1 Point

2. Recording a deed imparts _____. 1 Point

3. Conveyances are construed most strongly against the _____. 1 Point

4. The ownership of overlapping descriptions is generally decided by _____. 1 Point

5. Unwritten rights may be established by _____, _____, or _____. 1 Point

6. The trunk of a line tree is located more on the land of Owner A than that of Owner B. The tree is owned _____. 1 Point

7. Ownership bounded by a lake is a _____. 1 Point

8. In California, the elements of adverse possession require _____, _____, _____, _____, and _____ possession for the statute period of time of ____ years. 2 Points

9. The boundaries of California are the responsibility of the _____. 1 Point

10. The California Coordinate System is legally defined by _____. 1 Point

11. List three calls in a description in decreasing order of priority. _____, _____, _____. 1 Point

Grading Plan - Problem B1

Grader ID No. _____
Candidate ID No. _____

PART I:

1. N	The union of all the elements that constitute ownership.	1 Point	_____
2. O	Summary of recorded documents that constitute Constructive Notice.	1 Point	_____
3. E	Information not contained in a deed, but allowed to apply or give affect to a description.	1 Point	_____
4. L	An error in a deed description that may be ascertained from the information contained therein.	1 Point	_____
5. M	The basis for deciding civil cases involving boundary litigation.	1 Point	_____
6. I	The boundary of an upland owner bordering on tide water.	1 Point	_____
7. A	The material gradually and imperceptibly accumulated by the recession of water.	1 Point	_____

PART II:

1.	Unwritten transfers of real property are prohibited by the *Statute of Frauds*.	1 Point	_____
2.	Recording a deed imparts *Constructive Notice*.	1 Point	_____
3.	Conveyances are construed most strongly against the *Grantor*.	1 Point	_____
4.	The ownership of overlapping descriptions is generally decided by *Junior-Senior Rights*.	1 Point	_____
*5.	Unwritten rights may be established by *Equitable Estoppel*, *Adverse Possession*, *Parole Agreement*, *Acquiescence*. (List three items.)	1 Point	_____
6.	The trunk of a line tree is located more on the land of Owner A than on that of Owner B. The tree is owned *In Common*.	1 Point	_____
7.	Ownership bounded by a lake is a *littoral boundary*.	1 Point	_____
8.	In California, the elements of adverse possession require *Open*, *Notorious*, *Actual*, *Hostile*, and *Continuous* possession for the statute period of time of *five* years.	2 Points	_____
9.	The boundaries of California are the responsibility of the *State Lands Commission*.	1 Point	_____
*10.	The California Coordinate System is legally defined by *State Statute* (or State Law).	1 Point	_____
*11.	List three calls in a description in decreasing order of priority. *Natural Monument*, *Artificial Monument*, *Bounds*, *Distance*, *Direction*, *Area*.	1 Point	_____
		TOTAL: 19 Points	_____

*These questions may have other acceptable answers.

Comments:

Candidate ID Number_____

1989 California Professional Land Surveyor Examination

Section B

Problem 2

Grader Use Only — Do Not Write Below This Line

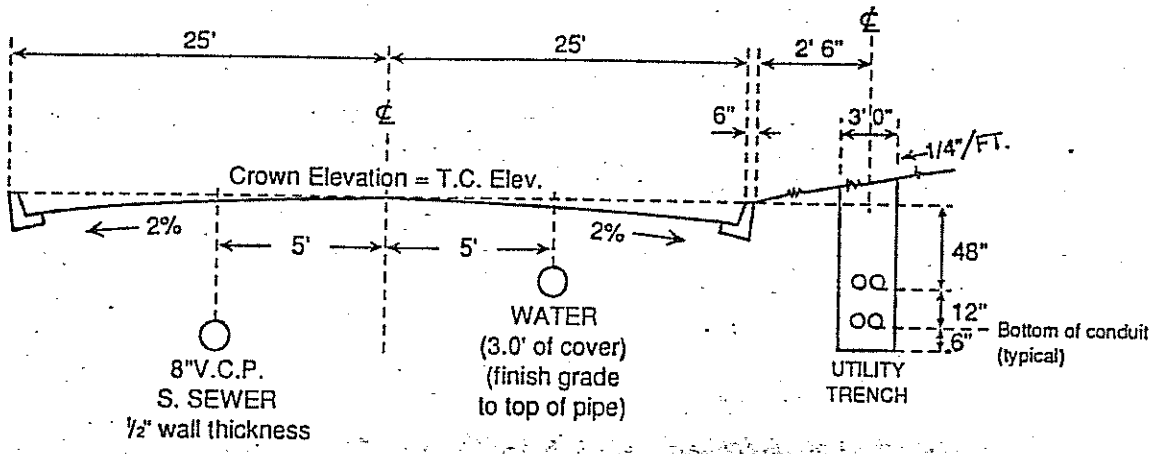
Grader ID Number:_____

PROBLEM B2

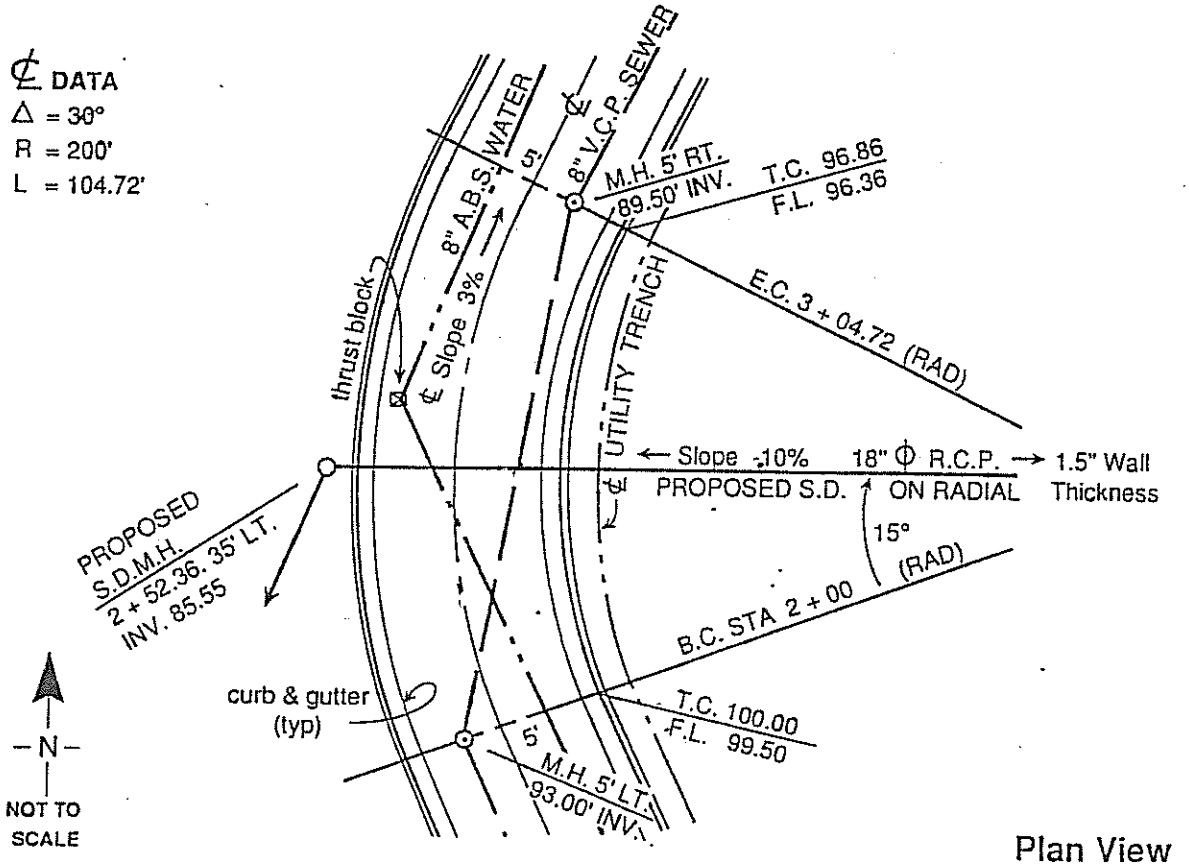
15 Points

PROBLEM STATEMENT

You have been asked to stake a new storm drain line that is to cross an existing road section containing the utilities as shown in the diagram below.



Typical Road Section 2 + 00



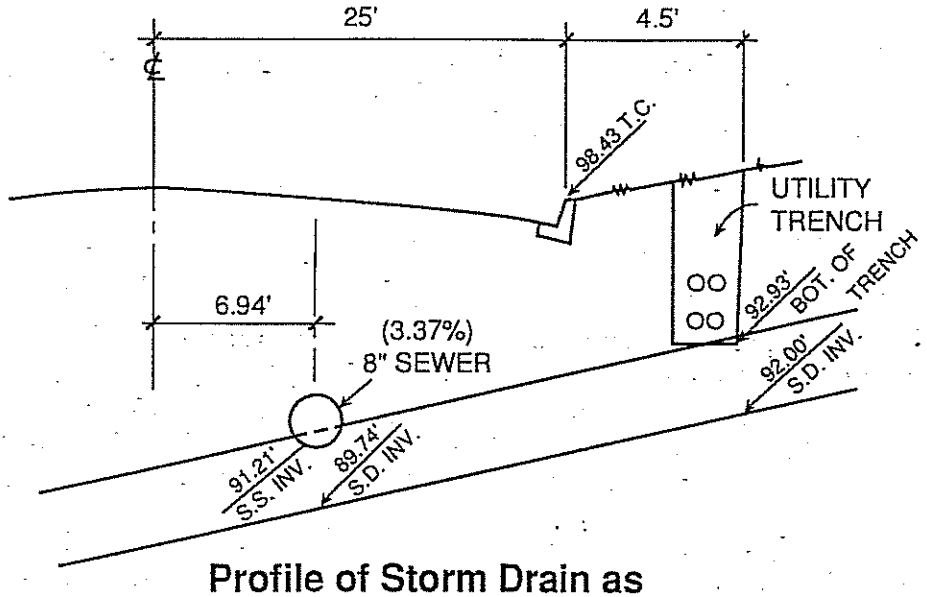
Plan View

PROBLEM REQUIREMENTS

1. Identify the problem(s) most likely to occur and describe how they might be resolved. Sketch and dimension the profile of the storm drain to show the position of the crossings. — 12 Points

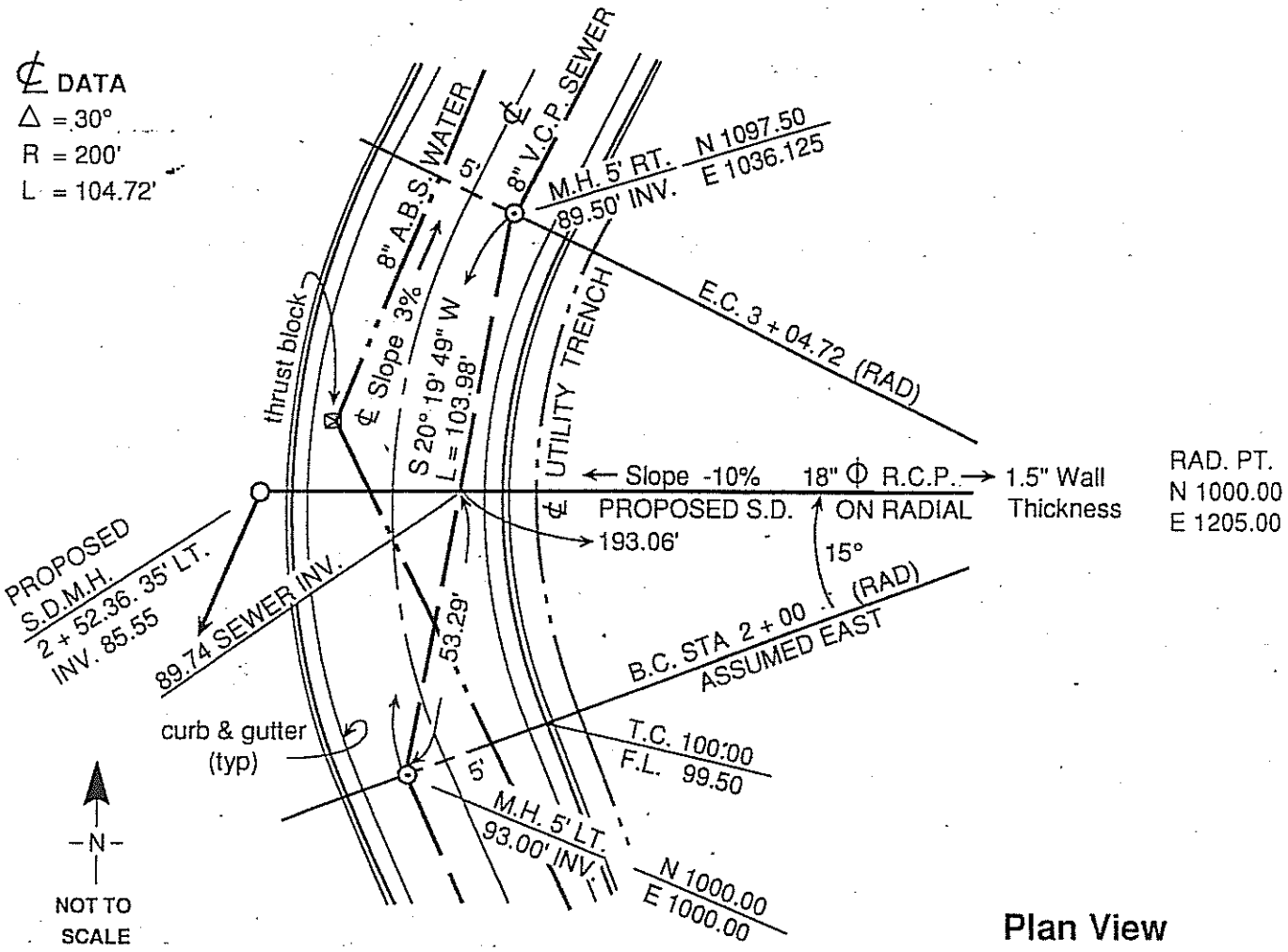
2. Does your work require a review? Explain your answer. — 3 Points

Grading Plan - Problem B2



Profile of Storm Drain as Designed Denoting Conflicts

℄ DATA
△ = 30°
R = 200'
L = 104.72'



Plan View

Grading Plan - Problem B2

Grader ID No. _____
Candidate ID No. _____

1. a. Review the diagrams for three possible crossing conflicts.

water-storm drain pipes	1 Point	_____
storm drain-utility trench	1 Point	_____
storm drain-sanitary sewer pipes	1 Point	_____

Note: The potential waterline conflicts could be dismissed by a simple visual inspection of the road section.

b. Determine inverts at the crossing of the storm drain and the sanitary sewer and consider storm drain pipe diameters.

correct inverts	4 Points	_____
S.D. pipe diameter	1 Point	_____

c. Determine the crossing relationship between the storm drain and the utility trench in the following way:

computing the grade to the back side of the utility trench	2 Points	_____

d. Resolution: the storm drain needs to be lowered.

There needs to be adequate separation between:

the utility trench and the storm-drain pipe	1 Point	_____
the utility conduit and the storm-drain pipe	1 Point	_____

2. Conflicts should be reported to the engineer of record along with suggested solutions. 3 Points _____

TOTAL: 15 Points _____

Comments:

Candidate ID Number_____

1989 California Professional Land Surveyor Examination

Section B

Problem 3

Grader Use Only — Do Not Write Below This Line

Grader ID Number:_____

PROBLEM B3

14 Points

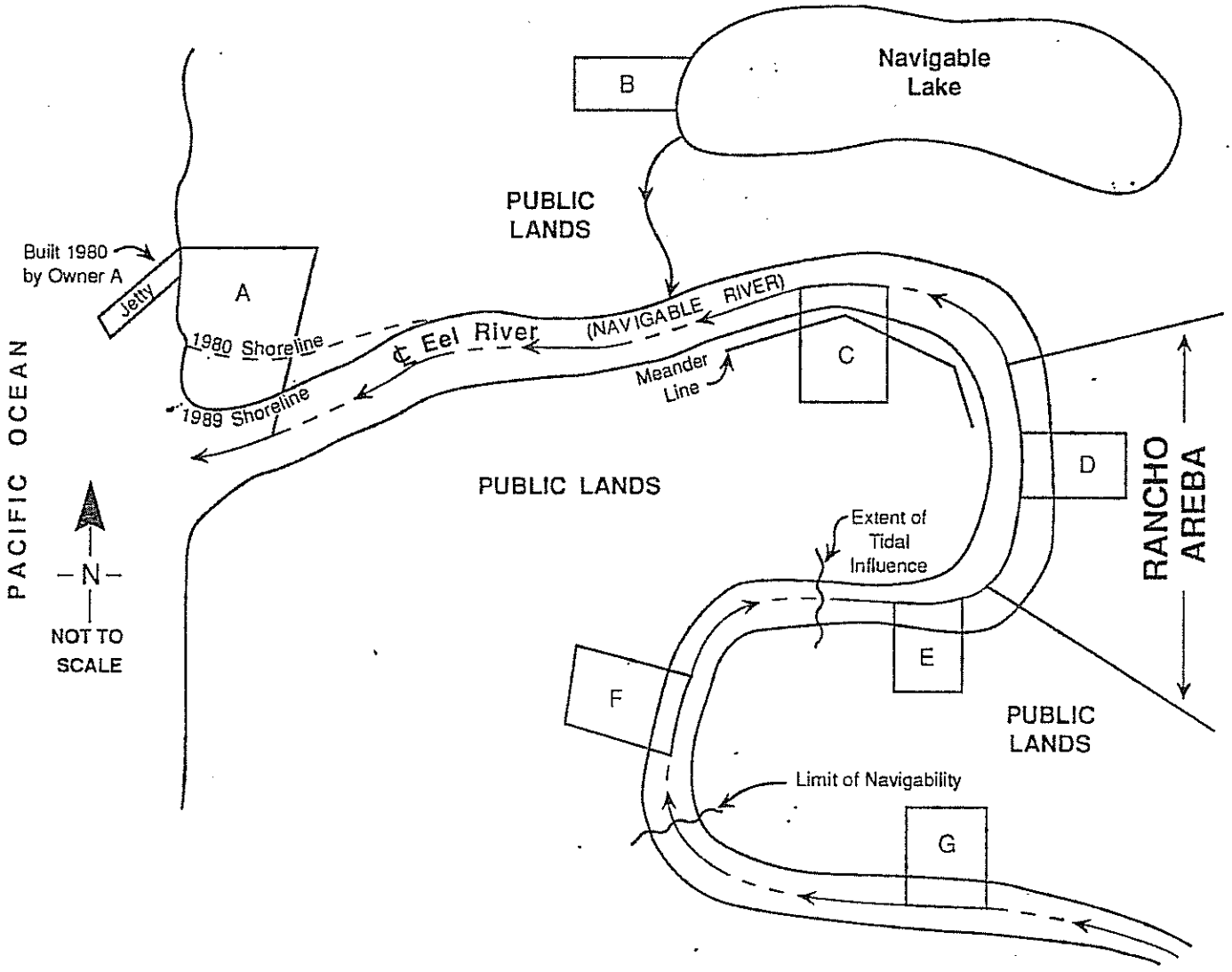
PROBLEM STATEMENT

The diagram below illustrates seven parcels labeled A through G. All parcels have littoral or riparian rights.

PROBLEM REQUIREMENTS

For each parcel, A through G, describe the boundary line and, when applicable, describe any limitations to ownership.

2 Points Each



Grading Plan - Problem B3

Grader ID No. _____
Candidate ID No. _____

A.	The location of the 1980 shoreline is the boundary. (The construction of the jetty has altered the natural conditions causing artificial accretion, which belongs to the State of California.) (Gov't. Code 670, 830 and Brown, Robillard, and Wilson, 3rd Ed., 9.1, 9.2)	2 Points	_____
B.	The low-water mark is the boundary. The area between the low-water mark and the ordinary high-water mark is subject to a public trust easement. (Civil Code 670, 830)	2 Points	_____
C.	The boundary is the ordinary high-water mark. (The meander line was used by the government to determine areas but not to limit ownership.) (Civil Code 670, 830, Manual of Instructions 1973, Sec. 3–115 to 3–112)	2 Points	_____
D.	The boundary is the ordinary high-water mark of the river. (Civil Code 670, 830)	2 Points	_____
E.	The boundary is the ordinary high-water mark. (Civil Code 670, 830 and Manual of Instructions, 1973, Sec. 7.46–7.51)	2 Points	_____
F.	The boundary is the low-water mark. (Civil Code 670, 830 and Sec. 7.46–7.51)	2 Points	_____
G.	The boundary is the center of the river.	2 Points	_____
		TOTAL: 14 Points	_____

Comments:

Candidate ID Number_____

1989 California Professional Land Surveyor Examination

Section B

Problem 4

Grader Use Only — Do Not Write Below This Line

Grader ID Number:_____

_____

PROBLEM B4

10 Points

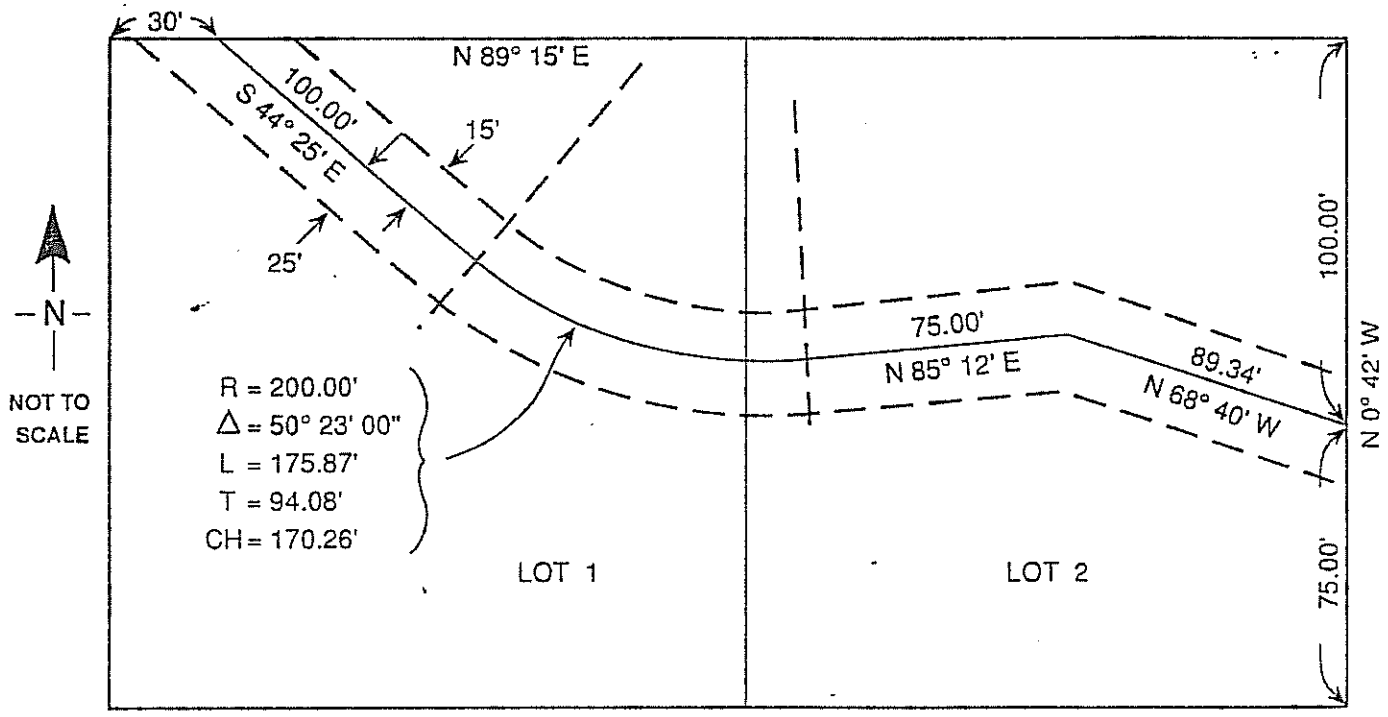
PROBLEM STATEMENT

The purpose of this problem is to test the candidate's understanding of terms, definitions, and descriptions related to easements.

PROBLEM REQUIREMENTS

1. Prepare a strip-type legal description for the easement shown in the diagram below. 5 Points

Proposed Storm Drain Easement, Tract No. 54210
Book 105 of Maps, Page 44, Records of San Benito County, CA



2. Define the following terms:

   a. appurtenant easement 1 Point

   b. dominant tenement 1 Point

   c. servient tenement 1 Point

   d. easement overburdening 1 Point

   e. right-of-way 1 Point

Grading Plan - Problem B4

Grader ID No. _____
Candidate ID No. _____

Part 1 of Problem B4 should include four elements:
(1) where (2) type of easement (3) map (4) width **2 Points** _____

1. Example of an Acceptable Legal Description:

All that certain real property situated in the County of San Benito, State of California, described as follows:

An easement for storm drain purposes over the portion of Lots 1 and 2 of tract No. 54210 as shown on the map filed in Book 105 of Maps, Page 44, Records of San Benito County, California, that is included within a strip of land 40.00 feet wide, lying 15.00 feet northerly of and concentric with and 25.00 feet southerly of and concentric with the following described line:

Part 2 of Problem B4 is a linear description: **3 Points** _____

Beginning at a point on the northerly line of said Lot 1, distance N 89° 15' E 30.00 feet from the northwesterly corner thereof; thence S 44° 25' E 100.00 feet; thence easterly along a tangent curve concave northerly having a radius of 200.00 feet through a central angle of 50° 23' 00" an arc distance of 175.87 feet; thence N 85° 12' E 75.00 feet; thence S 68° 40' E 89.34 feet to the easterly line of said Lot 2.

The sidelines of said strip are to be prolonged or shortened to terminate northerly in said northerly line of Lot 1 and to terminate easterly in said easterly line of Lot 2.

2. a. appurtenant easement – an easement that is created for the benefit of, and attached to the land of, the owner of a dominant tenement **1 Point** _____

   b. dominant tenement – the land to which an easement is attached or service is owed **1 Point** _____

   c. servient tenement – the land that is burdened with a servitude **1 Point** _____

   d. easement overburdening – an unauthorized increase in burden over a servient tenement **1 Point** _____

   e. right-of-way – an easement expressly for passage purposes **1 Point** _____

TOTAL: 10 Points _____

Comments:

PROBLEM 1989 - B4

STRIP DESCRIPTION:

AN EASEMENT FOR STORM DRAIN PURPOSES IN THE CITY OF ___, COUNTY OF SAN BENITO, CA., OVER AND ACROSS LOTS 1 AND 2 OF TRACT 54210 AS SHOWN ON A MAP FILED IN BOOK 105 OF MAPS AT PAGE 44, RECORDS OF SAID COUNTY; BEING A STRIP OF LAND, 40.00 FEET WIDE LYING 15.00 FEET NORTHERLY AND 25.00 FEET SOUTHERLY OF THE FOLLOWING DESCRIBED CENTERLINE:
BEGINNING AT THE N.W. CORNER OF SAID LOT ONE, THENCE N 89° 15' E, 30.00 FEET, ALONG THE NORTH LINE OF SAID LOT TO THE TRUE POINT OF BEGINNING, THENCE S 44° 25' E, 100.00 FEET TO THE BEGINNING OF A CURVE, CONCAVE N'LY, HAVING A RADIUS OF 200.00 FEET, THENCE 175.87 ALONG SAID CURVE, THRU A CENTRAL ANGLE OF 50° 23' 00", TO THE END OF CURVE, THENCE N 85° 12' E, 75.00 FEET, THENCE S 68° 40' E, 89.34 FEET TO BE E'LY LINE OF SAID LOT 2.

OR (THENCE S'ELY TO A POINT ON THE E'LY LINE OF SAID LOT 2 LYING DISTANT THEREON 100.00 FEET FROM THE N.E. CORNER OF SAID LOT)

END OF DESCRIPTION. THE SIDE LINES OF SAID STRIP SHALL BE LENGTHENED OR SHORTENED, AS TO BEGIN AND TERMINATE IN THE N'LY LINE OF SAID LOT 1 AND THE E'LY LINE OF SAID LOT 2.

Candidate ID Number_____

1989 California Professional Land Surveyor Examination

Section B

Problem 5

Grader Use Only — Do Not Write Below This Line

Grader ID Number:_____

PROBLEM B5

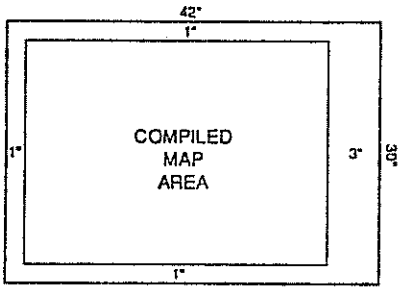
18 Points

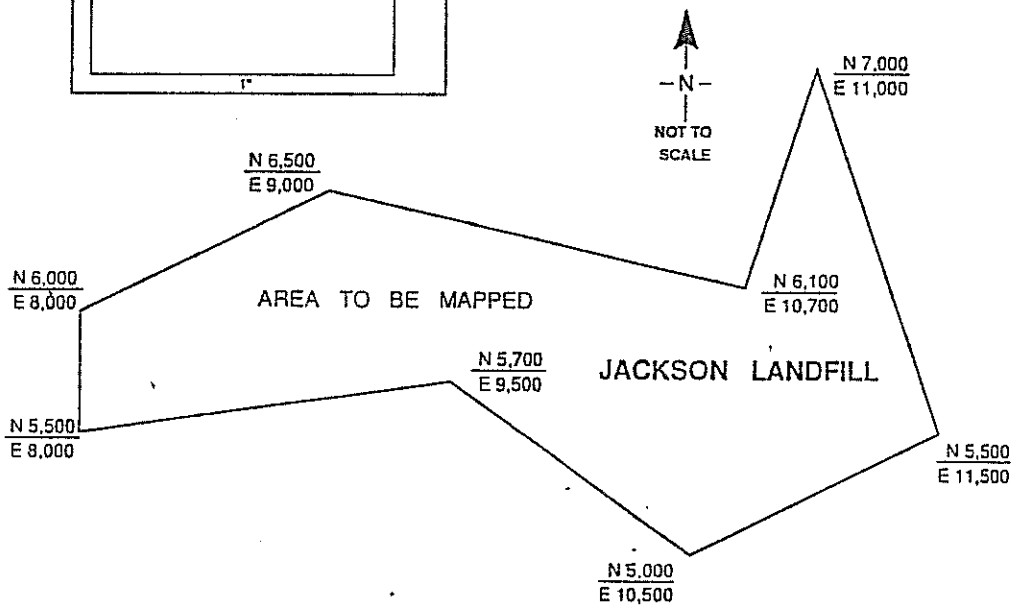
PROBLEM STATEMENT

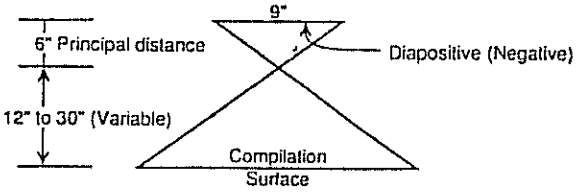
Your client has requested that you provide a topographic map of the Jackson landfill by photogrammetric methods. In so doing, you are required to use the following criteria and equipment.

1. The map must fit on a single mylar sheet with borders as specified in the diagram below.
2. The common engineering map scale that allows the entire project to be compiled at the maximum size that will fit on the specified single sheet.
3. The camera focal length is 6"; the film format is 9" x 9".
4. The plotter has 9" x 9" diapositive plate carriers and a C-factor of 2000, as shown in the diagram below.
5. A forward photo overlap of 60% and a sidelap of 30% or an accepted common practice are required.
6. The terrain varies from 1500 feet to 2100 feet above sea level.
7. The contour interval is 1 foot.

Map Sheet Size With Borders







PROBLEM REQUIREMENTS

Determine the following:

1. Usable map sheet dimensions	1 Point
2. East-West, North-South limits (length and width) of area to be mapped	1 Point
3. Maximum flying height above average terrain	2 Points
4. Flying height above sea level	3 Points
5. Photo scale	3 Points
6. Compilation scale that will fit on one map sheet (see diagram) and be drawn in one of the following common engineering scales (10, 20, 30, 40, 50, 60, 100)	3 Points
7. Definition of the "Neat Model"	1 Point
8. Dimensions of the "Neat Model"	2 Points
9. Number of models required to map the given area	2 Points

Grading Plan - Problem B5

Grader ID No. _____
Candidate ID No. _____

1. Available dimension is the sheet size less the border dimensions. Therefore,
   North-South is 30" – (2 x 1") = 28"
   East-West is 42" – (1" + 3") = 38" **1 Point** _____

2. Area to be mapped is the East-West and North-South limits.
   North-South = 7000 – 5000 = 2000
   East-West = 11500 – 8000 = 3500 **1 Point** _____

3. Flying height above average terrain must be maximum height for maximum coverage that will not exceed the C-factor of the plotter. **2 Points** _____

   Maximum height = C-factor x contour interval
   = 2000 x 1
   = 2000 feet

4. Flying height above sea level is the flying height plus the elevation of average terrain above sea level.

   Average terrain elevation $= \frac{\text{highest elevation + lowest elevation}}{2}$
   $= \frac{2100 + 1500}{2}$
   = 1800 feet

   Flying height above sea level = flying height + elevation of average terrain
   = 2000 + 1800
   = 3800 feet above sea level **3 Points** _____

5. Photo scale for maximum coverage:

   Photo scale $= \frac{\text{camera focal length}}{\text{flying height}}$
   $= \frac{6 \text{ inches}}{2000 \text{ feet}} = \frac{0.5 \text{ feet}}{2000 \text{ feet}}$
   = 1:4000 or 1" = 333.3' **3 Points** _____

6. Final mapping scale may vary depending on the projection distance set off in the plotter. The variation is related to photo scale divided by projection ratio, therefore, for plotters capable of ratios between 2 and 5.

   Mapping scale $= \frac{333}{2} = 166'$ to $\frac{333'}{5} = 67'$

   The most appropriate listed common scale is required; therefore, final mapping scale is 1" = 100'. **3 Points** _____

7. A "Neat Model" is the maximum compiling limits of a single stereo model. **1 Point** _____

PROBLEM B5

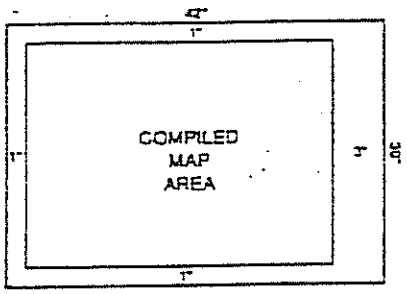
18 Points

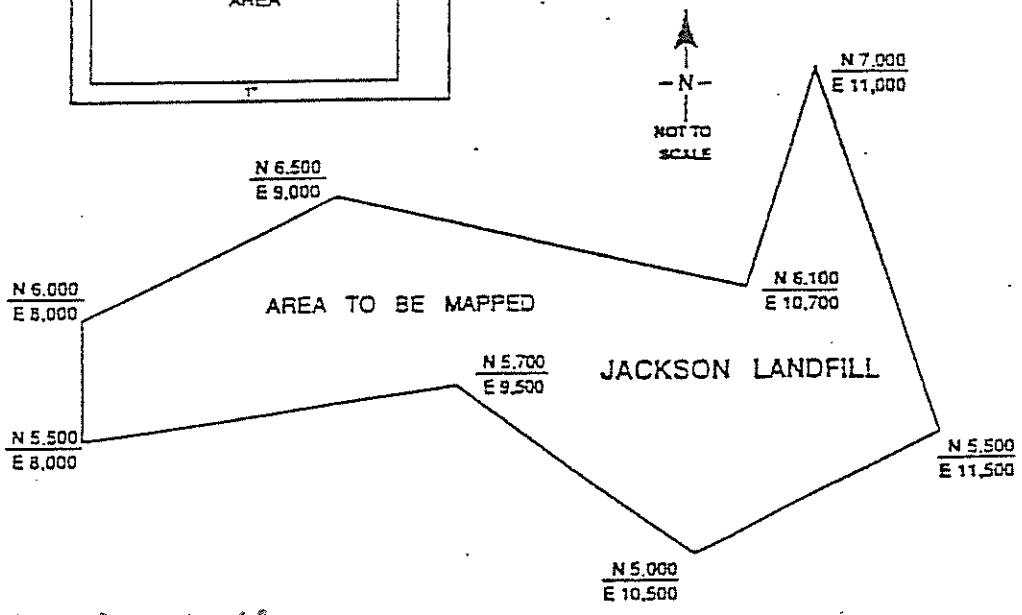
PROBLEM STATEMENT

Your client has requested that you provide a topographic map of the Jackson landfill by photogrammetric methods. In so doing, you are required to use the following criteria and equipment.

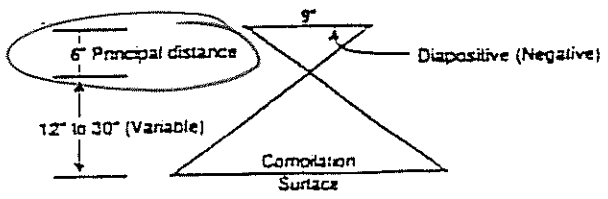
1. The map must fit on a single mylar sheet with borders as specified in the diagram below.
2. The common engineering map scale that allows the entire project to be compiled at the maximum size that will fit on the specified single sheet.
3. The camera focal length is 6"; the film format is 9" x 9".
4. The plotter has 9" x 9" diapositive plate carriers and a C-factor of 2000, as shown in the diagram below.
5. A forward photo overlap of 60% and a sidelap of 30% or an accepted common practice are required.
6. The terrain varies from 1500 feet to 2100 feet above sea level.
7. The contour interval is 1 foot.

Map Sheet Size With Borders





NOTE: PRINCIPAL DISTANCE = FOCAL LENGTH SO DIAPOSITIVE SCALE = PHOTO SCALE



PROBLEM REQUIREMENTS

Determine the following:

1. Usable map sheet dimensions	1 Point
2. East-West, North-South limits (length and width) of area to be mapped	1 Point
3. Maximum flying height above average terrain	2 Points
4. Flying height above sea level	3 Points
5. Photo scale	3 Points
6. Compilation scale that will fit on one map sheet (see diagram) and be drawn in one of the following common engineering scales (10, 20, 30, 40, 50, 60, 100)	3 Points
7. Definition of the "Neat Model"	1 Point
8. Dimensions of the "Neat Model"	2 Points
9. Number of models required to map the given area	2 Points

1989 GS

1. $42" - 1" - 3" = 38"$ $= 28" \times 38"$
$30" - 1" - 1" = 28"$

2) N 7,000 − N5,000 = 2,000' (FEET ASSUMED) N-S
E 11,500 − E 8,000 = 3500' E-W

6) 1" = 100' = 20" N-S AND 35" E-W MAP SCALE
PHOTO SCALE = MAP SCALE × E.R. E.R. = 2,10 S GIVEN

3) $FH = \frac{C\text{-FACTOR}}{C.I} = \frac{2,000'}{1'} = 2,000'$ AGL

4) $2,000 + \frac{1500 + 2100}{2} = 3,800'$

$\frac{.5'}{2000'} = 1:4,000$ PHOTO SCALE RANGE OF SCALES

$\frac{4,000}{2} = 1:2000$ OR 1" = 167'

$\frac{4000}{6} = 1:800$ OR 1" = 67'

GROUND COVERAGE = $\frac{6"}{2,000'} \times \frac{9"}{6} = 3,000'$ GROUND COVERAGE

8) NEAT MODEL = .4 × 9" = 3.6" .7 × 9" = 6.3"
3.6" × 6.3" PHOTO
.4 × 3000' = 1200' .7 × 3000' = 2,100'

9) 1 SLIGHT LINE $\frac{3500\ E\text{-}W}{1200'} = 2.9 = 3$ MODELS