1988 LAND SURVEYOR EXAMINATION

EXAMINATION ID NUMBER_____

PART A - 54.0 POINTS OF 102.0 TOTAL POINTS

TIME ALLOWED TO COMPLETE THIS SECTION - FOUR HOURS

WORKBOOK INSTRUCTIONS

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 A is the first section of this two-part examination. YOU ARE ASKED TO CONCENTRATE YOUR WORK ON THOSE PROBLEMS IN WHICH YOU MAY DO WELL. ALTHOUGH ALL PROBLEMS SHOULD BE ATTEMPTED, YOU ARE NOT EXPECTED TO EXCEL IN ALL OF THEM.

Each test item is contained in a separate folder appropriately marked on the front. Your answers must be completed on papers provided within each folder. IMPORTANT: ALL SHEETS MUST BE CONTAINED IN THE APPROPRIATE FOLDER WHEN YOU TURN IN YOUR EXAMINATION. If you need additional grid sheets, ask your proctor. Secure these additional pages within the appropriate folder.

Enter your identification number in the upper right-hand corner on EACH PAGE of the answer sheets where space is provided and INDICATE THE APPROPRIATE PROBLEM NUMBER. Do not write your name on any part of this examination.

Show all work in the folder provided for each problem. ANY WORK NOT CONTAINED IN THE APPROPRIATE FOLDER WILL NOT BE SCORED. Use one side of the page and do not put more than one problem in a folder. Be sure to mark your pages 1 of 3, 2 of 3, etc. Any work you do not want scored must be clearly lined through and marked "VOID" across it. Delineate the voided part clearly.

YOUR WORK IS A LAND SURVEYOR REPORT. YOUR SOLUTIONS, FINDINGS, AND STATEMENTS MUST BE ARRANGED IN AN ORDERLY MANNER WHICH IS ORGANIZED AND LEGIBLE.

After you have completed this portion of the examination, check your work, assemble the folders containing your answer sheets, and turn it in to your proctor.

This portion of the Land Surveyor Examination consists of the following:

Test Item No.	Subject Matter	Weight	Pages	
A1	Photogrammetry	5.0	_____	
A2	Boundary	6.0	_____	FOR
A3	Geodetic	10.0	_____	OFFICE
A4	Public Lands	15.0	_____	USE
A5	Boundary	12.0	_____	ONLY
A6	Map Act/LS Act	6.0	_____	
			_____	

Department of Consumer Affairs
State Board of Registration for Professional Engineers and Land Surveyors

Problem A-1 - Wt. 5.0 points

PROBLEM STATEMENT

You are asked by your client to prepare a topographic map for his
proposed project. He tells you that he will use this map to
design a subdivision (including grading plans and street plans).
He also states that he wants this map at a scale of 1" = 40' with
a one foot contour interval and spot elevations to supplement
contours when the contour lines are more than two inches apart.

Project site is 217 acres more or less, being a parcel 2700 feet
North-South by 3500 feet East-West. Terrain: moderate relief.

The photo control for this mapping project will be established by
field surveys.

Camera to be used for obtaining the mapping photography is
equipped with a six inch focal length lens and a 9" x 9" format
(negative size).

The map accuracy must comply with the U.S. Map Accuracy Standards.

REQUIRED

<center>CIRCLE THE CORRECT ANSWER</center>

1. U.S. Map Accuracy Standards are as follow;

    (a)   90% of the contours shall be plus or minus one-quarter of
          the contour interval.
    (b)   90% of the spot elevations should be within one-half of
          the contour interval.
    (c)   80% of the spot elevations should be within one-quarter
          of the contour interval.
    (d)   90% of the spot elevations should be within one-quarter
          of the contour interval.

2. The C-factor for a mapping system is determined by;

    (a)   Camera, aircraft, photo lab equipment and stereo plotting
          equipment.
    (b)   Ground control, flying height, camera and photo lab
          equipment.
    (c)   Flying height, weather, relief displacement and camera.
    (d)   Stereo plotter operator, camera, ground control and
          airplane altitude.

3. It was determined that a mapping system with a C-factor of
    1500 will be used in the above project. This system is
    considered;

    (a)   a first order system.
    (b)   a second order system.
    (c)   a third order system.
    (d)   a fourth order system.

<center>(Sheet 1 of 2)</center>

Problem A-1 (continued)

4. What is the altitude from which the photography must be obtained?
   (a)   4200 feet A.S.L.   (Above sea level)
   (b)   3000 feet A.G.L.   (Above ground level)
   (c)   1500 feet A.G.L.   (Above ground level)
   (d)   1500 feet A.S.L.   (Above sea level)

5. The scale of the photography is;
   (a)   1" = 200'
   (b)   1:3000
   (c)   1" = 100'
   (d)   1:1500

6. The enlargement ratio from photography to final map is;
   (a)   10
   (b)   40
   (c)   7.50
   (d)   6.25

ASSUME FOR THE FOLLOWING QUESTIONS THAT THE
FLIGHT PATH IS EAST-WEST

7. How many photographs will be required to obtain complete stereoscopic coverage of the area?

   (a)   10
   (b)   8
   (c)   11
   (d)   7

8. How many models will be required to map the parcel?

   (a)   10
   (b)   8
   (c)   11
   (d)   7

9. How many control points will be required to fully control the mapping photography?

   (a)   10
   (b)   4
   (c)   15
   (d)   18

10. How many flight lines will be required?

   (a)   1
   (b)   2
   (c)   3
   (d)   4

(Sheet 2 of 2)

Problem A-2 - Wt. 6.0 points
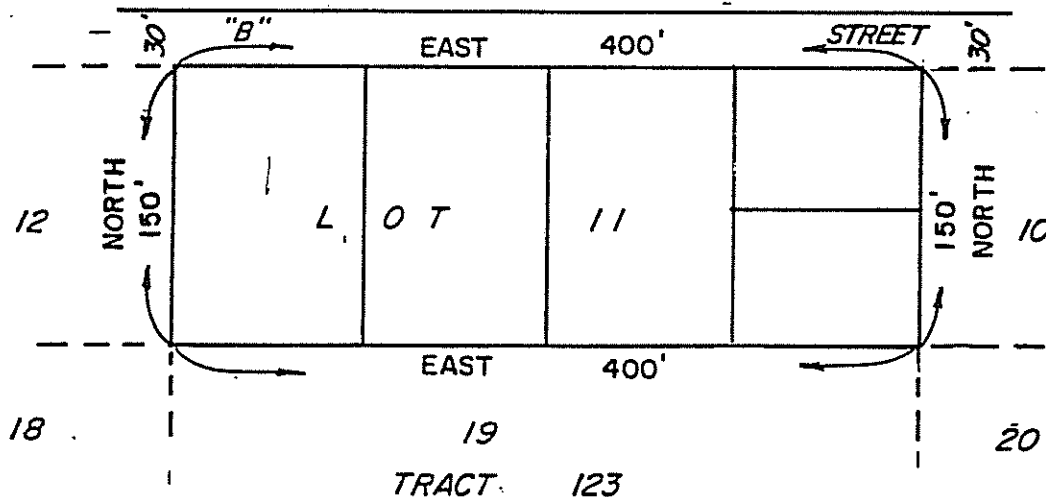
PROBLEM STATEMENT

The above sketch shows the record dimensions of Lot 11, Tract 123. The Lot was divided by deeds, numbered in the following order:

DEED # 1. July 3, 1945   "The West 100.00' of Lot 11 ".

DEED # 2. July 5, 1945   "The East 100.00' of the West 200.00' of Lot 11".

DEED # 3. July 6, 1945   "The East 100.00' of the West 300.00' of Lot 11".

DEED # 4. July 7, 1945   "The Northerly 75.00' of the East 100.00' of Lot 11".

REQUIRED

****
ANSWER THE FOLLOWING FOUR MULTIPLE CHOICE QUESTIONS NUMBERED 1 THRU 4 BASED ON THE INFORMATION ABOVE.

****
CIRCLE ONE LETTER (a) THRU (d) INDICATING YOUR ANSWER
****

1. The best way to describe the remaining parcel is:

a) The Southerly 75.00 feet of the Easterly 100.00 feet of Lot 11, Tract 123.

b) The Easterly 100.00 feet of the Southerly 75.00 feet of Lot 11, Tract 123.

c) Lot 11, Tract 123, Except the Westerly 300.00 feet, also except the Northerly 75.00 feet.

d) A portion of Lot 11, Tract 123, bounded on the West by the Easterly line of the Westerly 300.00 feet and on the North by the Northerly line of the Southerly 75.00 feet.

Problem A-2 continued

2. The description for Deed #4:

a) Is adequate; No gaps or overlaps may occur as a result
of a field survey.

b) Is an "exception description".

c) Should be an exception description.

d) Is invalid, no access is provided to the remaining
parcel.

3. If Lot 11, Tract 123, truly measures 401.50 along the
North and South lines, who has title to the excess ?

a) It would be proportioned among all the parcels
since they were created simultaneously.

b) The owner of Deed #1 since he is senior in right.

c) The State since no taxes were paid.

d) The original owner, his heirs or assignees.

4. If Lot 11, Tract 123 were to be divided under today's
regulations, which document would be required if all
the lots are designated residential ?

a) Parcel Map

b) Final Map

c) Record of Survey

d) Certificate of compliance

Problem A-2 continued

PROBLEM STATEMENT

Assume Lot 11, Tract 123 was further subdivided into the configuration shown in the sketch, by a resubdivision and a map was filed in 1945 creating the five parcels shown.

REQUIRED

ANSWER THE FOLLOWING TWO MULTIPLE CHOICE QUESTIONS NUMBERED 5 AND 6 GIVEN THE ADDITIONAL FOLLOWING INFORMATION
****
CIRCLE ONE LETTER (a) THRU (e) INDICATING YOUR ANSWER
****

5. Which statement is most correct ?

a) The first lot sold will have senior rights.

b) The map created a simultaneous conveyance situation.

c) In the event of an excess or deficiency in the length of the North and/or South lines of Lot 11, each of the Westerly three lots will get their full width based on their order of conveyance.

d) All of the above.

e) None of the above.

6. All the lots in the new resubdivision were purchased by Mr. Bostwick in 1946. They were never developed.
   In 1987 his heirs sold the entire parcel to Mr. Nostorn who wants to merge all the lots and construct a 20 unit condominium project. The Local Agency has no merger ordinance. Pursuant to State law he must file which, if any, of the following documents ?

a) Final Map

b) Parcel Map

c) Record of Survey

d) Certificate of compliance

e) None of the above

Problem A-3 - Wt. 10.0 points

PROBLEM STATEMENT

Determine the State Plane Coordinates, ZONE 3, for Station
"BROTHERS" based on the sketch below and the attached information
of Zone 3 and Zone 4.

REQUIRED

SHOW ALL FORMULAE AND INTERMEDIATE VALUES USED FOR THE SOLUTION.

Assumptions:

Azimuths are North Azimuths.
Observed distance has been reduced for slope only.

Earth's radius of 20,906,000 feet for sea level computations.
Average latitude of 36°30'00" for scale factor computations.

Station "BROTHERS"
Elev. = 3405 feet

Horizontal Distance = 10,283.224 feet

98°51'25.5"

Azimuth Mark

Geodetic Azimuth =
71°31'27.1"
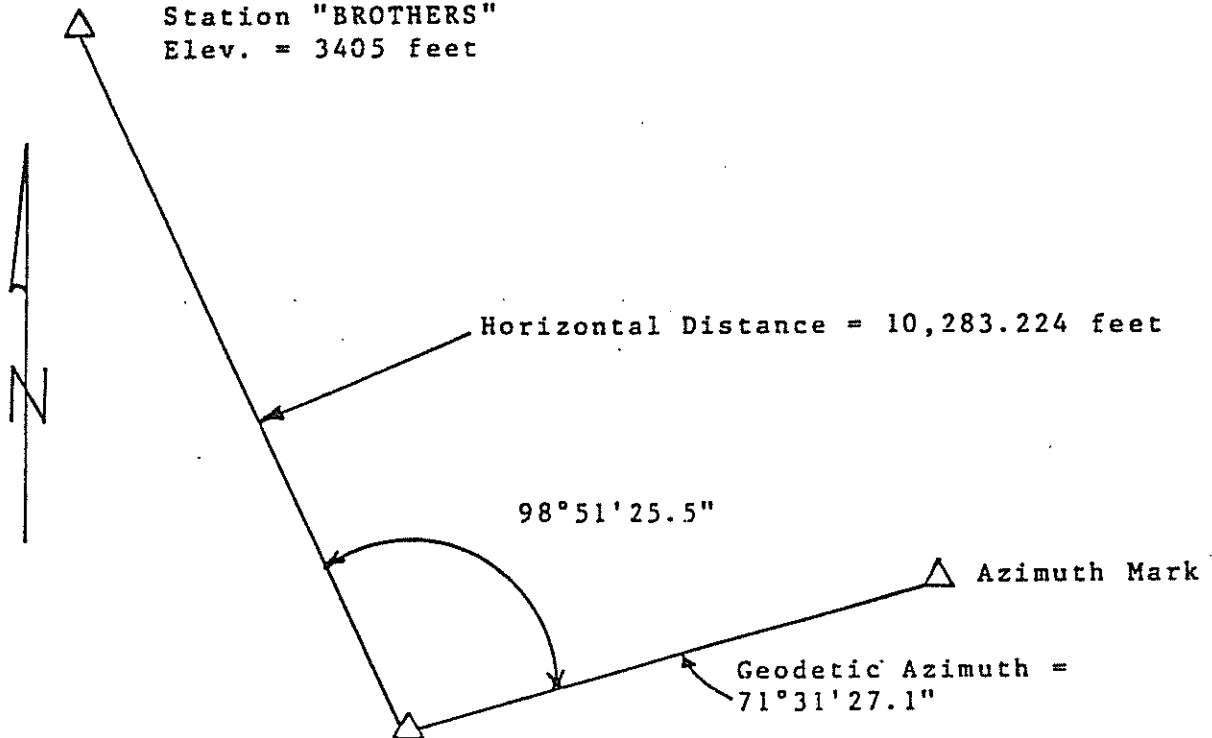
Station "BLUE"
Elev. = 4310 feet

(NAD 27)
Latitude = 36°29'12.0000"
Longitude =121°31'52.4000"

Zone 4
x = 1,255,971.68
y =   429,660.24

(Sheet 1 of 4)

Problem A-3 con't

Constants for California zones

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
$\dfrac{1}{2\rho_o^2 \sin 1''}$	2.359×10^{-10}	2.360×10^{-10}
$\log \dfrac{1}{2\rho_o^2 \sin 1''}$	0.372 7729 - 10	0.372 8843 - 10
$\log \ell$	9.78691 60557 - 10	9.77567 38907 - 10
$\log k$	7.62062 61231	7.62714 43424

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° 21'	28,282,825.65	370,103.31	101.12033	-207.2	0.9999523
22	28,276,761.47	376,170.53	101.12050	-213.1	0.9999509
23	28,270,694.20	382,237.76	101.12067	-218.6	0.9999497
24	28,264,626.96	388,305.00	101.12083	-223.7	0.9999485
25	28,258,559.71	394,372.25	101.12100	-228.4	0.9999474
36° 26'	28,252,492.45	400,439.51	101.12117	-232.8	0.9999464
27	28,246,425.18	406,506.78	101.12133	-236.9	0.9999455
28	28,240,357.90	412,574.06	101.12157	-240.6	0.9999446
29	28,234,290.60	418,641.36	101.12183	-243.9	0.9999438
30	28,228,223.29	424,708.67	101.12200	-246.8	0.9999432
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

Lambert Projection for California IV

Table II (Cont'd)

1" of Long. = 0.59656714 of θ

Long.	θ	Long.	θ	Long.	θ
120° 46'	-1° 03' 14.2942	121° 21'	-1° 24' 07.1272	121° 56'	-1° 44' 59.9602
47	-1 03 50.0895	22	-1 24 42.9225	57	-1 45 35.7555
48	-1 04 25.8847	23	-1 25 18.7177	58	-1 46 11.5507
59	-1 05 01.6799	24	-1 25 54.5129	59	-1 46 47.3459
50	-1 05 37.4752	25	-1 26 30.3082	122° 00'	-1 47 23.1412
120° 51'	-1 06 13.2704	121° 26'	-1 27 06.1034	122° 01'	-1 47 58.9364
52	-1 06 49.0656	27	-1 27 41.3986	02	-1 48 34.7316
53	-1 07 24.3608	28	-1 28 17.6938	03	-1 49 10.5268
54	-1 08 00.5561	29	-1 28 53.4891	04	-1 49 46.3221
55	-1 08 36.4513	30	-1 29 29.2843	05	-1 50 22.1173
120° 56'	-1 09 12.2465	121° 31'	-1 30 05.0795	122° 06'	-1 50 57.9125
57	-1 09 48.0418	32	-1 30 40.8748	07	-1 51 33.7078
58	-1 10 23.8370	33	-1 31 16.6700	08	-1 52 09.5030
59	-1 10 59.6322	34	-1 31 52.4652	09	-1 52 45.2982
121° 00'	-1 11 35.4274	35	-1 32 28.2604	10	-1 53 21.0934
121° 01'	-1 12 11.2227	121° 36'	-1 33 04.0557	122° 11'	-1 53 56.8887
02	-1 12 47.0179	37	-1 33 39.3509	12	-1 54 32.6839
03	-1 13 22.8131	38	-1 34 15.6461	13	-1 55 08.4791
04	-1 13 58.6084	39	-1 34 51.4414	14	-1 55 44.2744

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° 30'	27,512,992.04	0	101.14417	+717.4	1.0001652
31	27,506,923.39	6,068.65	101.14383	+690.4	1.0001590
32	27,500,854.76	12,137.28	101.14367	+663.7	1.0001528
33	27,494,786.14	18,205.90	101.14317	+637.3	1.0001467
34	27,488,717.55	24,274.49	101.14283	+611.4	1.0001408
35	27,482,648.98	30,343.06	101.14267	+585.8	1.0001349
36° 36'	27,476,580.42	36,411.62	101.14217	+560.5	1.0001291
37	27,470,511.89	42,480.15	101.14200	+535.6	1.0001233
38	27,464,443.37	48,548.67	101.14183	+511.1	1.0001177
39	27,458,374.86	54,017.18	101.14133	+486.9	1.0001121
40	27,452,306.38	60,685.66	101.14117	+463.1	1.0001066
36° 41'	27,446,237.91	66,754.13	101.14100	+439.6	1.0001012
42	27,440,169.45	72,822.59	101.14067	+416.5	1.0000959
43	27,434,101.01	78,891.03	101.14050	+393.8	1.0000907
44	27,428,032.58	84,959.46	101.14017	+371.4	1.0000855
45	27,421,964.17	91,027.87	101.14000	+349.4	1.0000805

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."7781	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 02	03.5940	48		

Problem A-4 - Wt. 15.0 points

N) 15013.95
E) 10296.95

N) 14999.39
E) 12940.66

N) 15015.96
E) 17830.45

⑥
S.C.
1/4 S 36

S.C. ④
36|31

CC.
N)15014.37
E)17640.44

② S.C. ①

(2.80)

6th STD.

(80.00)

31|32

T. 31 N.
T. 30N.

C.C. ⑤
N) 15002.07
E) 12753.34

6

6
5
(9.52)

4.
(19.44)

3.
(29.15)

③ 2.
(29.22)

1.
(29.50)

(34.53) ⑮

⑫

⑯ (33.60)

5.
(27.12)

(40.00)

(80.00)

N) 12791.76
E) 12747.40

¼
⑦

⑭

W.C.

⑧ W.C.
12832.75 N.
17631.57 E.

⑬

6.
(27.57)

(80.00)

(160.00)

(41.07)

LEGEND

▲ OR ◆ INDICATES FOUND CORNER
O INDICATES CORNER TO BE SET
( ) EMBRACES G.L.O. DATA
COORDINATES ARE FROM
YOUR FIELD SURVEY

NOTE:
ALL FOUND CORNERS ARE ACCEPTED

(40.00)

7.
(28.03)

⑨

1 | 6
12 | 7

R.12 E.
R.13 E.

(34.13)

1/4
N)10,130.20
E) 14980.67

⑩

(40.00)

6 | 5
7 | 8

⑪
N) 10,096.96
E) 17,599.03

REQUIRED

BASED ON THE DIAGRAM ABOVE ANSWER THE FOLLOWING MULTIPLE CHOICE
QUESTIONS, NUMBERED 1 THRU 9, BY SELECTING THE ANSWER YOU BELIEVE
TO BE CORRECT FROM THE CHOICES GIVEN AS INDICATED BY THE LETTERS a.,
b., c., and d. CIRCLE THE CORRECT ANSWER.

****

1. What is the record length of the north line of Section 6, T 30 N, R 13 E ?
   - a. 92.32 chs
   - b. 73.28 chs
   - c. 80.00 chs
   - d. 67.68 chs

2. How would you establish the NE corner of Section 6, T 30 N, R 13 E ?
   - a. Accept the found monument as it is an original corner.
   - b. On line between Pt #1 and Pt #4, holding the distance of 9.52 chs from Pt #1.
   - c. At the intersection of the line between Pt #8 and Pt #2 and the standard parallel.
   - d. On the standard parallel at the proportionate distance from Pt #1.

(Sheet 1 of 2)

Problem A-4 continued

3. How would you establish the N 1/4 corner of Section 6,
   T 30 N, R 13 E ?
   a. Midway between Pt #2 and Pt #5.
   b. On the standard parallel 40 chs from Pt #2.
   c. On the standard parallel and 40.42 chs from the
      NE corner of Section 6.
   d. On the standard parallel and 36.64 chs from the
      NE corner of Section 6.

4. How would you establish the NW corner of Section 6,
   T 30 N, R 13 E ?
   a. On line between Pt #5 and Pt #7 at 34.53 chs from Pt #7.
   b. On line between Pt #4 and Pt #6 at 2.80 chs from Pt #4.
   c. Accept the found monument, as it is an original corner.
   d. None of the above.

5. The record length of the north line of Lot 4, Section 6,
   T 30 N, R 13 E is ?
   a. 20 chs
   b. 19.44 chs
   c. 17.2 chs
   d. 13.28 chs

6. The record length of the west line of Lot 4, Section 6,
   T 30 N, R 13 E is ?
   a. 17.26 chs
   b. 14.53 chs
   c. 20.00 chs
   d. 19.44 chs

7. What are the record dimensions of Lot 7, Section 6,
   T 30 N, R 13 E ?
   a. 20 chs on all sides.
   b. E and W lines 20 chs; N and S lines 17.06 chs.
   c. E and W lines 20 chs; S line is 14.13 chs; N line
      is 13.90 chs.
   d. E and W lines 20 chs; N and S lines 14.13 chs.

8. How would you establish the NW corner of the SW 1/4 of
   the NE 1/4 of Section 6, T 30 N, R 13 E ?
   a. Single proportion between Pt #14 and Pt #3.
   b. At the intersection of lines 15-16 and 14-3.
   c. On line between Pt #14 and Pt #3 and 20 chs from Pt #3.
   d. Single proportion between Pt #15 and Pt #16.

9. What are the ground coordinates of the E 1/4 corner of
   Section 6, T 30 N, R 13 E as you would establish it
   based on measured values ?
   a. N 12,762.13; E 17,630.73
   b. N 12,832.75; E 17,631.57
   c. N 12,761.47; E 17,630.72
   d. None of the above.

(Sheet 2 of 2)

Problem A-5 - Wt. 12.0 points

PROBLEM STATEMENT

Lots 1 to 6 all lie in one Tract;
Middle St. being a dedicated street
in the tract, and the east 25 feet
of Long St., together with the west
30 feet of Short St., being dedicated
by the tract.

The dimensions shown are record (R),
except those marked otherwise. Where
indicated, the measured (M) dimensions
are to physical objects, ascertained to
have been constructed near the time of
the original subdivision.

The deed you are to locate in ground
position is "Lot 4".

REQUIRED

By calculation and analysis determine
the most probable length of the lot
fronting on "A" Street.

The ₵ of Middle St. was established
by the split of curbs.

Explain your reasons for your determination.

SKETCH NOT TO SCALE

A = 92° R   ▲ = Found original
    93° M   monument

B = 88° R & M
C = 90° R & M

Long St.

25'
25'

30' | 30

100

100N

6

100

100.20M

5

$\begin{cases} 92°R \text{ to lot line} \\ 92°30'M \text{ to old wall} \end{cases}$

old stone wall

165.50M

135

4

771.50M

A

B

curb

60' Middle St.

120

3

100

old fence

230M

100

2

A St.

100

1

30'
30'

C

Short St.

N
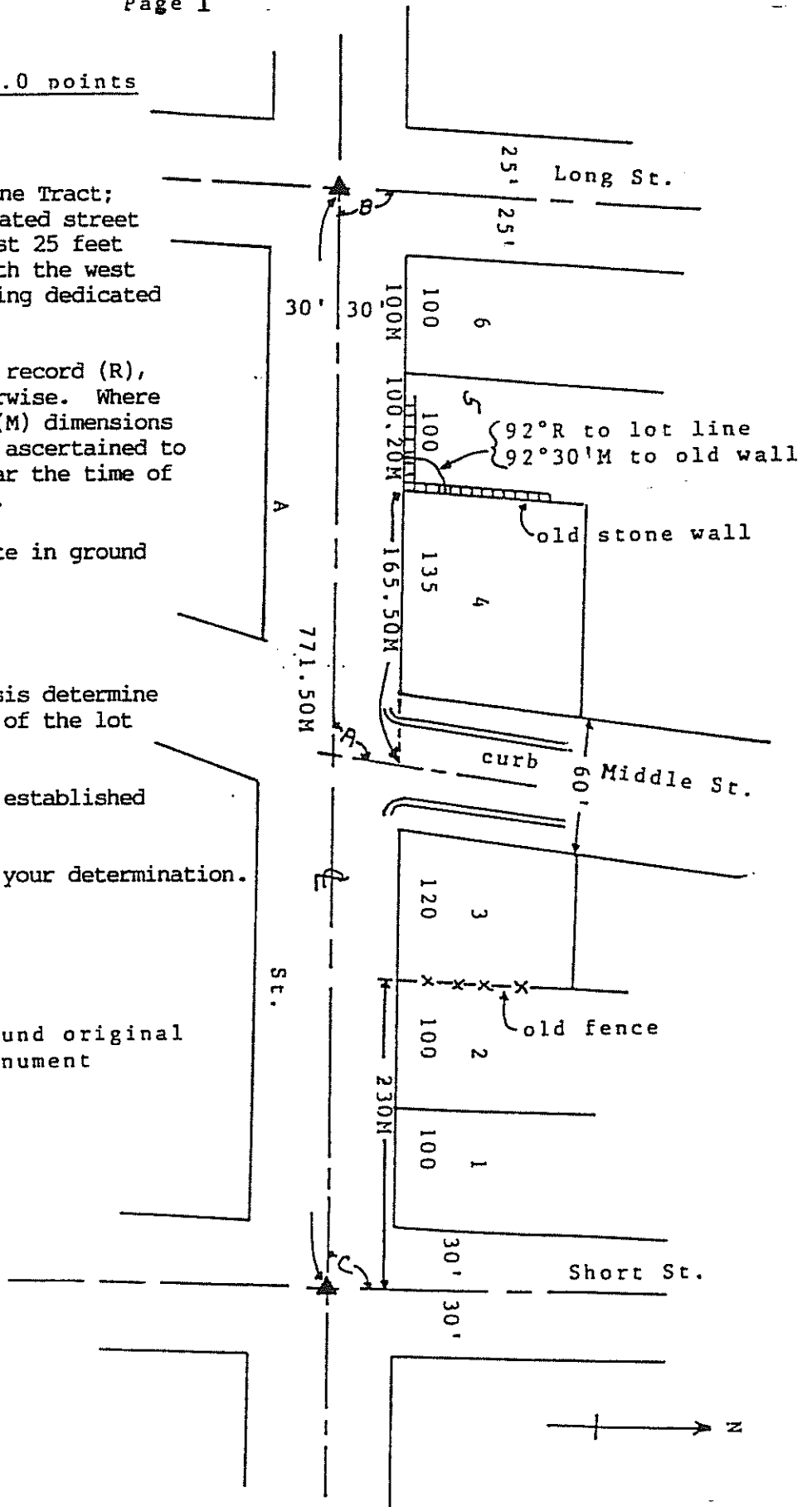
Problem A-6 - Wt. 6.0 Points

PROBLEM STATEMENT

Mr. Frank Giraf has asked you to subdivide his property as
shown on the sketch as timely and cost efficiently as
possible. In your discussion with the local agency you have
been told that an additional 5 foot offer of dedication will
be required along Old Milwaukee Road. Also you have to
define specific building sites as shown.
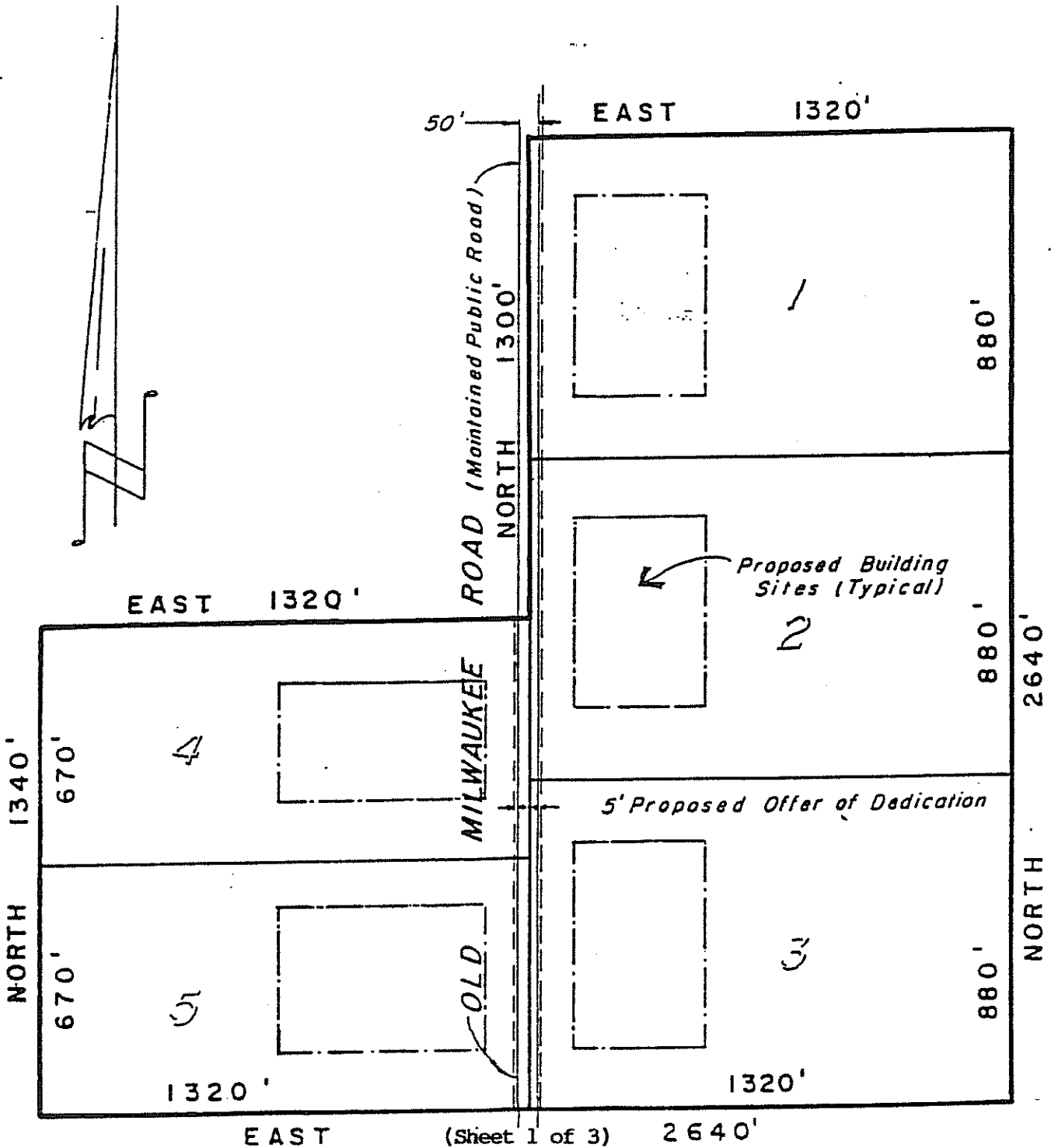
Problem A-6 - cont.

REQUIRED   CIRCLE THE CORRECT ANSWER

1.   Under the Subdivision Map Act what is required to create the
     six lots.

   a.   Final Map
   b.   Parcel Map
   c.   Certificate of Compliance
   d.   Vesting Tentative Map
   e.   A Deed or Record of Survey

2.   The requirement of the Offer of Dedication

   a.   Must be made on the map
   b.   Must be made by separate document and signed by the local agency
   c.   Must be made by separate document and signed by those parties
   d.   having record title interest in the real property
   e.   may be made either on the map or by separate document.

3.   If a tentative map has been approved, pursuant to the
     Subdivision Map Act it will expire in

   a.   2 years
   b.   5 years
   c.   10 years
   d.   2 years and up to 3 additional years if extended by the
          legislative body
   e.   2 years and an additional 12 months if extended by the
          legislative body
   f.   2 years and up to 8 additional years if extended by the
          legislative body

4.   The Local Agency requires you to show the new building site
locations on the map. You refuse, citing:

   a.   Sec. 66499.35(e) of the Subdivision Map Act
   b.   Sec. 66475.4(b)   of the Subdivision Map Act
   c.   Sec. 66434(f)   of the Subdivision Map Act
   d.   Sec. 8768   of the Land Surveyors Act
   e.   Sec. 8762(c)   of the Land Surveyors Act

Problem A-6 - cont.

While reviewing the following statements which relate to various State laws, you may assume that you are a Licensed Land Surveyor.

REQUIRED

You have resurveyed a city subdivision lot and have reset one corner monument from ties to three adjacent monuments, you subsequently determine that you may file a corner record.

CIRCLE THE CORRECT ANSWER

5. The corner record :

   a.   shall be filed with the City Engineer within 90 days.
   b.   shall be filed with the County Surveyor within 90 days.
   c.   shall be indexed by the County Recorder.
   d.   Shall be filed in a book by the County Surveyor.
   e.   none of the above statements are correct.

6. If for the above described survey you determine that a record of survey should be filed then :

   a.   regardless of the cost of examining the map, the County
   b.   Surveyor may charge $50.00 for the service.
   c.   the County Surveyor may charge a fee which is authorized by the Board of Supervisors.
   d.   the County Surveyor may charge no more then $50.00
   e.   the County Surveyor may charge no more then $100.00.
   f.   you must file the record of survey with the County Surveyor within 120 days.
   g.   None of the above statements are correct.

7. For the same record of survey map :

   a.   it may show the size of any monuments you set
   b.   it must be drawn with a 1/2 inch wide blank border all the way around the sheet.
   c.   it must conform to Section 8748.5 of the Land Surveyors Act.
   d.   it must be sealed by you.
   e.   none of the above statements are correct.

8.   Which sections of the Land Surveyor's act cover the following?
(answer in this format . . . . 8753(c))

(a) _____ offering to perform land surveying work for others.
(b) _____ retracing the alignment of a railroad
(c) _____ Practicing land surveying by a Civil Engineer.
(d) _____ revocation of license for fraudulant practice.
(e) _____ "material discrepancy"

EXAMINATION ID NUMBER_____._____

PART B - 48.0 POINTS OF 102.0 TOTAL POINTS

TIME ALLOWED TO COMPLETE THIS SECTION - FOUR HOURS

WORKBOOK INSTRUCTIONS

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 B is the second section of this two-part examination. YOU ARE ASKED TO CONCENTRATE YOUR WORK ON THOSE PROBLEMS IN WHICH YOU MAY DO WELL. ALTHOUGH ALL PROBLEMS SHOULD BE ATTEMPTED, YOU ARE NOT EXPECTED TO EXCEL IN ALL OF THEM.

Each test item is contained in a separate folder appropriately marked on the front. Your answers must be completed on papers provided within each folder. IMPORTANT: ALL SHEETS MUST BE CONTAINED IN THE APPROPRIATE FOLDER WHEN YOU TURN IN YOUR EXAMINATION. If you need additional grid sheets, ask your proctor. Secure these additional pages within the appropriate folder.

Enter your identification number in the upper right-hand corner on EACH PAGE of the answer sheets where space is provided and INDICATE THE APPROPRIATE PROBLEM NUMBER. Do not write your name on any part of this examination.

Show all work in the folder provided for each problem. ANY WORK NOT CONTAINED IN THE APPROPRIATE FOLDER WILL NOT BE SCORED. Use one side of the page and do not put more than one problem in a folder. Be sure to mark your pages 1 of 3, 2 of 3, etc. Any work you do not want scored must be clearly lined through and marked "VOID" across it. Delineate the voided part clearly.

YOUR WORK IS A LAND SURVEYOR REPORT. YOUR SOLUTIONS, FINDINGS, AND STATEMENTS MUST BE ARRANGED IN AN ORDERLY MANNER WHICH IS ORGANIZED AND LEGIBLE.

After you have completed this portion of the examination, check your work, assemble the folders containing your answer sheets, and turn it in to your proctor.

This portion of the Land Surveyor Examination consists of the following:

Test Item No.	Subject Matter	Weight	Pages	
B1	Construction	6.0	_____	
B2	Boundary	12.0	_____	FOR
B3	Astronomy	10.0	_____	OFFICE
B4	Legal Description	10.0	_____	USE
B5	Public Lands	5.0	_____	ONLY
B6	Boundary	5.0	_____	

Department of Consumer Affairs
State Board of Registration for Professional Engineers and Land Surveyors

PROBLEM B-1 (Part A) - Wt. 2.0 points

PROBLEM STATEMENT

A proposed sewer line to service an existing easement is to be constructed on a curve as shown on the diagram below.

The radius of the curve connecting the two manholes is to be 90 feet.

Assume the B.C. of the 90' radius tangent curve is to be the center of the manhole to be constructed 6' Lt. of the road centerline.

REQUIRED

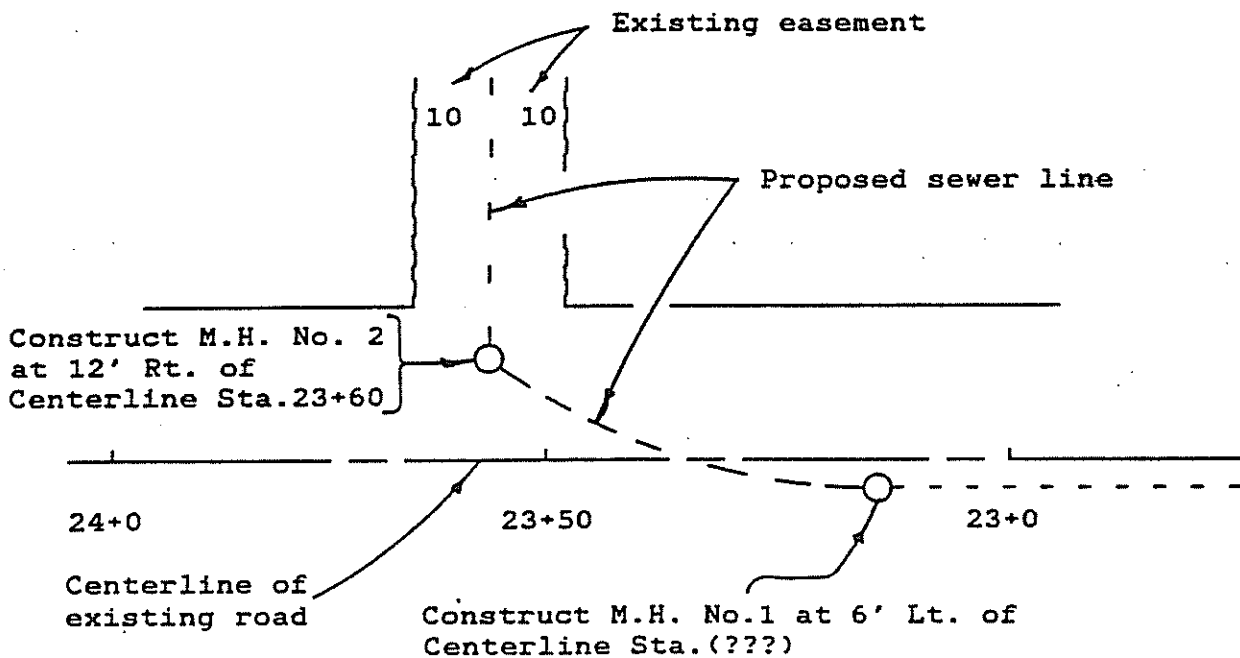What is the centerline station of M.H. No. 1?

Show your work or no credit will be given!

DIAGRAM IS NOT TO SCALE
****

PROBLEM B-1 (Part B) - Wt. 2.0 points

PROBLEM STATEMENT

A road is to be constructed on a uniform grade of + 4.88 percent and with a cross section as shown in the diagram.

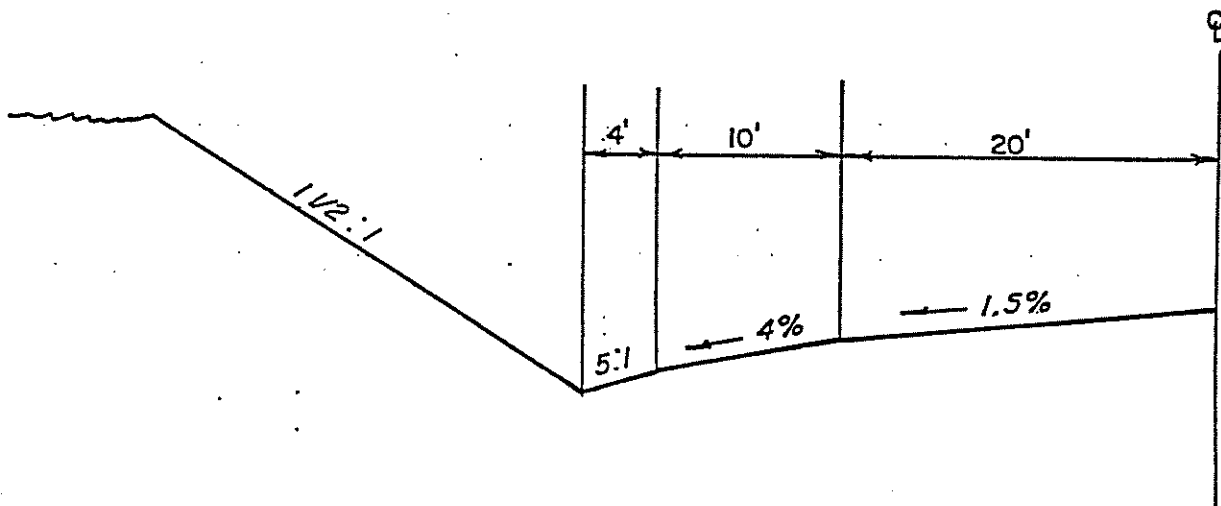The centerline profile grade at Station 4 + 19.88 is 378.59.

At Station 12 + 50 the ground elevation is 439.6 at the left catchpoint.

REQUIRED

What is the distance from centerline to catchpoint.

Show your work or no credit will be given!

****
DIAGRAM IS NOT TO SCALE

PROBLEM B-1 (Part C) - Wt. 2.0 points

PROBLEM STATEMENT

You have been given an improvement plan, a portion of which is shown below. The data for curves ① and ② is missing from your plan.

Assume that curves ① and ② are equal reversing curves.
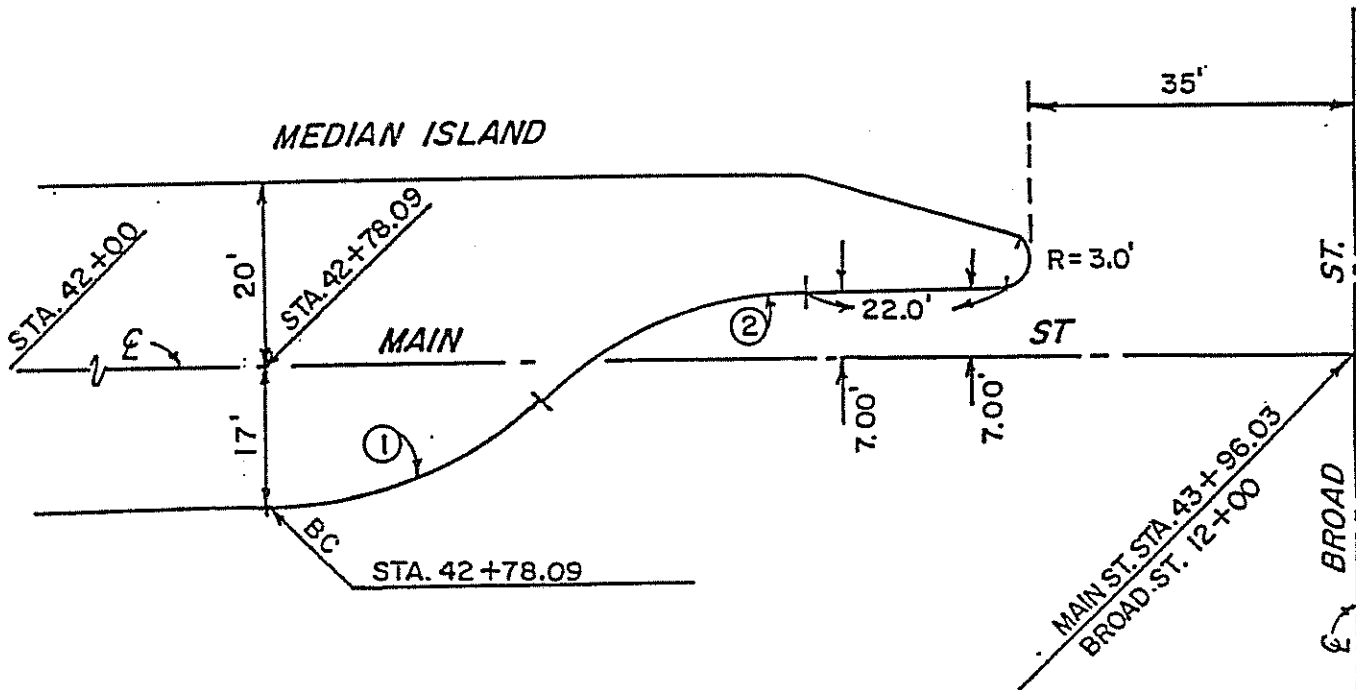
REQUIRED

Solve for the following curve parts:
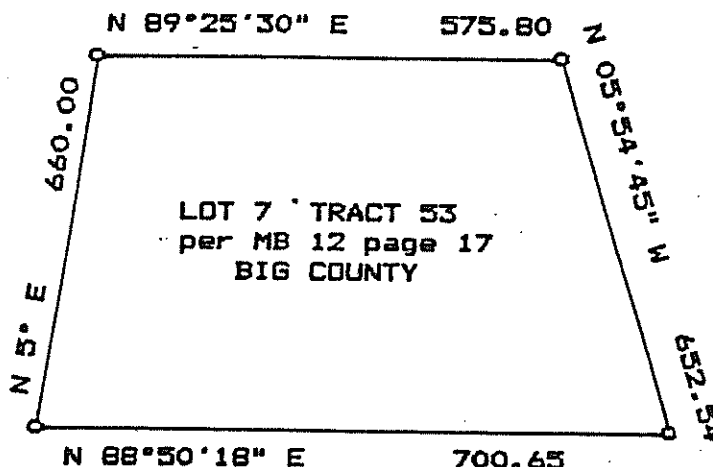
DELTA   ?

RADIUS   ?

TANGENT ?

Show your work or no credit will be given!

Problem B-2 - Wt. 12 points

L E G E N D

⌐ = Found Monument

NORTH

N 89°25'30" E   575.80

660.00

N 05°54'45" W

LOT 7 ' TRACT 53
per MB 12 page 17
BIG COUNTY

N 5° E

652.54

N 88°50'18" E   700.65

The sketch above shows Lot 7 of Tract 53. All of the original
corners have been found and accepted. The dimensions shown are
from your field survey. Lot 7 was subdivided by deeds as stated
below. Mr Brown was the original owner.

1. Jan. 15, 1953 - Brown to Smith; The s'ly 200 feet of Lot 7,
   Tract 53, Bk 1135, Pg 3 of Deeds.

2. March 11, 1954 - Brown to Jones; The westerly 400.00 feet of
   Lot 7, Tract 53, as measured along the N'ly line thereof.
   Excepting therefrom the S'ly 200.00 feet of said Lot.
   Bk 1318, Pg 165 of Deeds.

3. Feb. 12, 1956 - Brown to Green; The E'ly 200.00 feet of Lot 7,
   excepting the S'ly 200.00 feet of said Lot 7.
   Bk 1827, Pg 171 of Deeds

In June of this year the County Water District wishes to purchase
the remainder of Lot 7 from Jane Brown, the heir of the original
owner. You have been hired by the District to monument the parcel
they will purchase, prepare a legal description for it and
prepare a plat map showing the dimensions of the parcel.

REQUIRED

1. On the sketch provided plot the dimensions (bearings and
   distances) needed to properly delineate the parcel in
   question. Show which monuments you used for control and which
   ones you set.

2. Prepare a complete legal description for the parcel in
   question.

3. What requirements of State Law, if any, must be satisfied when
   your survey is completed.

(Sheet 1 of 2)

Problem B-2 - Wt- 12.0 points

WORK SKETCH
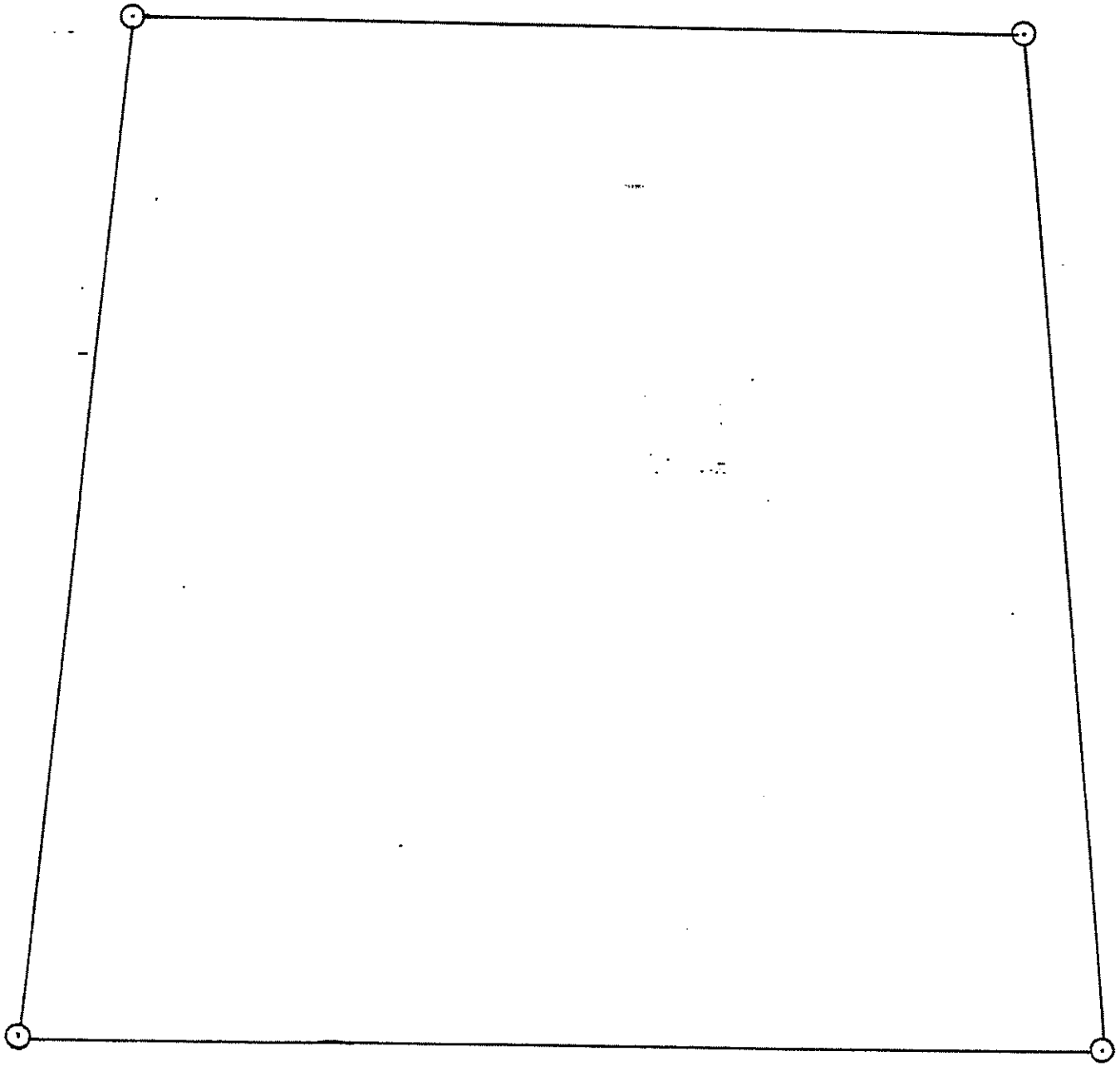
Scale: 1"= 100'

Problem B-3 - Wt. 10.0 points

Answer the following questions T (true) or F (false).

NOTE : FALSE STATEMENTS REQUIRE A BRIEF EXPLANATION.

1. ____ Astronomic azimuth is based on true north.
2. ____ Grid azimuth is based on true north.
3. ____ Geodetic azimuth is astronomic azimuth - θ + 2nd term.
4. ____ To determine true north from observations on Polaris, the latitude of the observer must be known.
5. ____ GHA = LHA - west longitude.
6. ____ The best time to observe the sun to determine azimuth using the altitude method is 1/2 hour after sunrise or 1/2 hour before sunset.
7. ____ Exact time is more important when using the hour angle method versus the altitude method.
8. ____ The hour angle method requires both horizontal and vertical observations to determine the azimuth.
9. ____ It is not necessary to know the latitude of the observer when using the hour angle method.
10. ____ The best time to observe the sun to determine azimuth using the hour angle method is just after sunrise or just before sunset.
11. ____ Standard time must be converted to local time to determine Greenwich time.
12. ____ Local time is increased (in California) by 8 hours to determine Greenwich time.
13. ____ True solar time is local civil time minus the equation of time.
14. ____ A level line at sea level is parallel with a level line at 8000 feet.
15. ____ One sidereal day is longer than one solar day measured in civil time.

WHICH OF THE FOLLOWING IS THE BEST ANSWER?

16. ____ At what time will the effects of a small error in the determination of observers latitude be minimized when making azimuth observations on Polaris?
    (a)   12:00 midnight
    (b)   when Polaris is at elongation
    (c)   When Polaris is at culmination
    (d)   when the LHA is 90 degrees
    (e)   when the GHA is 90 degrees

17. ____ At what time will the effects of a small error in the determination of the time of observation be minimized when making azimuth observations on Polaris?
    (a)   12:00 midnight
    (b)   when Polaris is at elongation
    (c)   when Polaris is at culmination
    (d)   when LHA is 180 degrees
    (e)   when GHA is 180 degrees

PROBLEM B-4 - WT. 10.0 points

PROBLEM STATEMENT

Mr. Giraf, who owns Parcels 1 thru 3 inclusive of Parcel Map No. 12,000 in the County of Calaveras, State of California as shown on the map recorded in Book 14 of Parcel Maps at page 35. He is selling Parcel 1 to Mr. Moosehead.

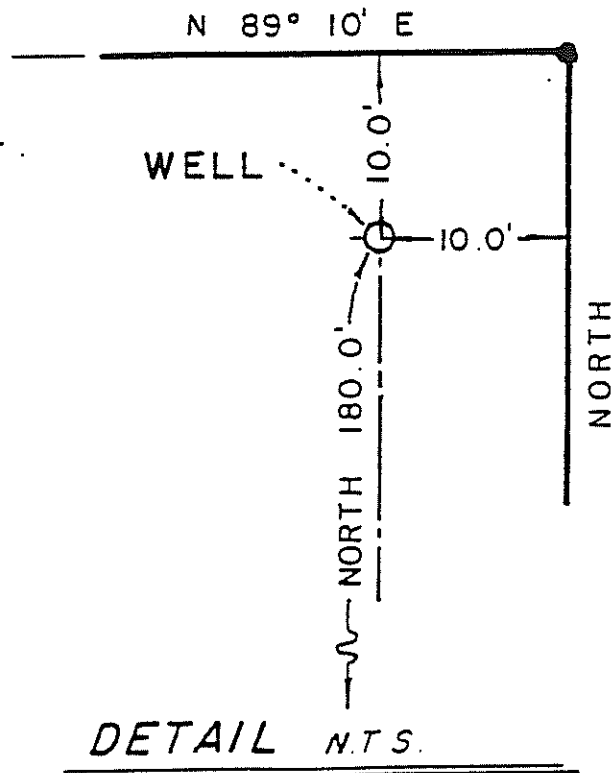He needs to retain a Well easement, a pipeline easement and an access easement.

The well easement is to be 25 feet by 25 feet at the northeast corner of Parcel 1. The pipes have not been installed. Provide a 10 foot easement along the easterly line for them. The access easement is to follow the existing access road to the well and should be 20 feet wide.
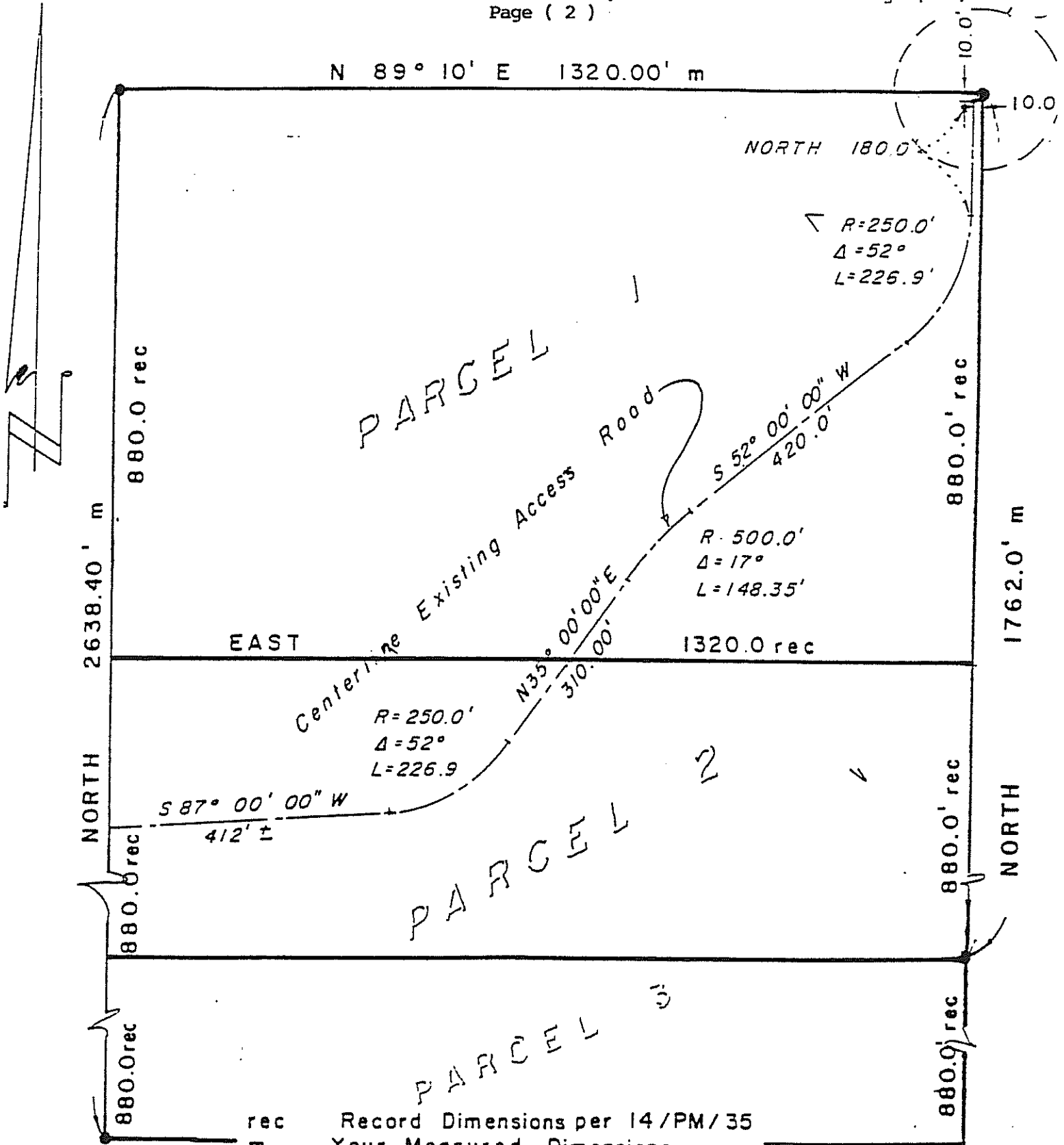
The owner is not interested in doing a boundary survey of any of the parcels.

The sketch below shows the information gathered from a field survey for the easements. The road and well information shown below were not on the filed Parcel Map.

REQUIRED

Write complete descriptions for the requested easements.

N 89° 10' E

WELL

10.0'

10.0'

NORTH 180.0'

NORTH

NORTH

DETAIL N.T.S.

N 89° 10' E 1320.00' m

10.0

NORTH 180.0

10.0

R=250.0'
Δ=52°
L=226.9'

PARCEL 1

880.0 rec

Centerline Existing Access Road

S 52° 00' 00" W
420.0'

880.0' rec

2638.40' m

R·500.0'
Δ=17°
L=148.35'

EAST   1320.0 rec

N35° 00'00"E
310.00'

R=250.0'
Δ=52°
L=226.9

PARCEL 2

1762.0' m

NORTH

880.0 rec

S 87° 00' 00" W
412' ±

880.0' rec

NORTH

PARCEL 3

880.0 rec

880.0 rec

rec   Record Dimensions per 14/PM/35
m   Your Measured Dimensions
●   Found Monument as shown on 14/PM/35
All Road B Well Dimensions are Your Measurements
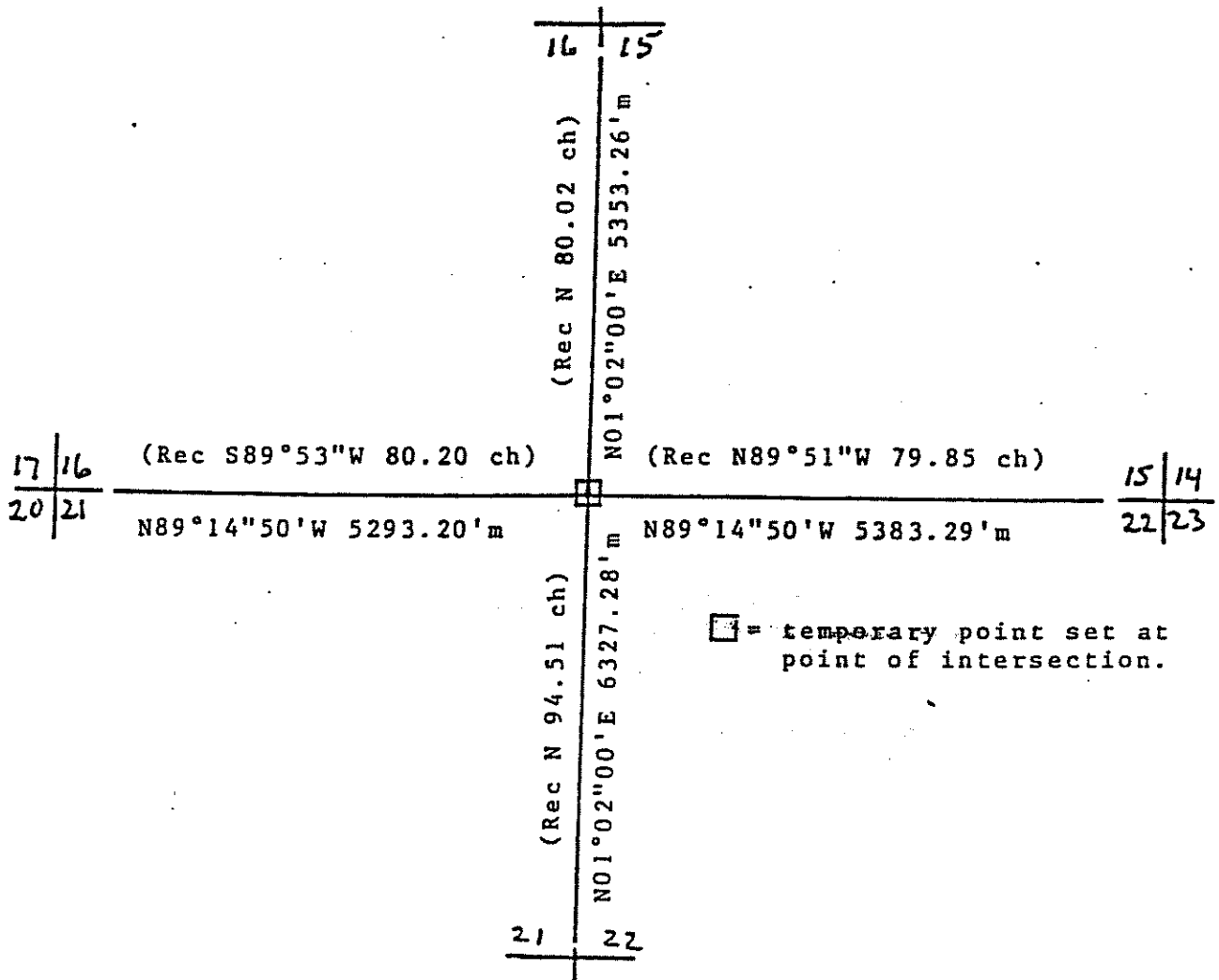
Problem B-5 - Wt. 5.0 points

PROBLEM STATEMENT

The below data indicates record data and field measurements performed in order to reset Section Corner

$$\frac{16\,|\,15}{21\,|\,22}$$

REQUIRED

1. What method (name) would you use to reset this corner?

2. Describe in detail your proceedure.

3. Show all your calculations & sketch the location of the reset Section Corner.

```
                           16 | 15

                      (Rec N 80.02 ch)
                      N01°02"00'E 5353.26' m

 17 | 16    (Rec S89°53"W 80.20 ch)  |  (Rec N89°51"W 79.85 ch)    15 | 14
 20 | 21                             □                             22 | 23
           N89°14"50'W 5293.20'm     |    N89°14"50'W 5383.29'm

                      (Rec N 94.51 ch)
                      N01°02"00'E 6327.28' m

                                              □ = temporary point set at
                                                  point of intersection.

                           21 | 22
```

(Sheet 1 of 1)

PROBLEM B-6 - Wt. 5.0 points

PROBLEM STATEMENT

Mr. Jones owns Blackacre per map book and page which was recorded in 1929 and is a parcel of land, per record being 208 feet by 208 feet with sides north and south, east and west.

In 1933 Mr. Jones conveys by grant deed the east 100 feet to Mr. Smith.

In April 1934 Mr. Jones conveys by grant deed the west 100 feet of the east 200 feet to Mr. Brown.

In May 1934 Mr. Jones dies. His will, which is valid, leaves all of his property to his son, Mr. Jones, Jr. A Decree of Distribution takes effect in February 1935.

In June 1934 Mr. Brown conveys Blackacre, except the east 100 feet, to Mr. Green. Mr. Green discovers there may be a strip on the west still owned by Mr. Jones and obtains a quitclaim deed from Mr. Jones, Jr. in August 1934.
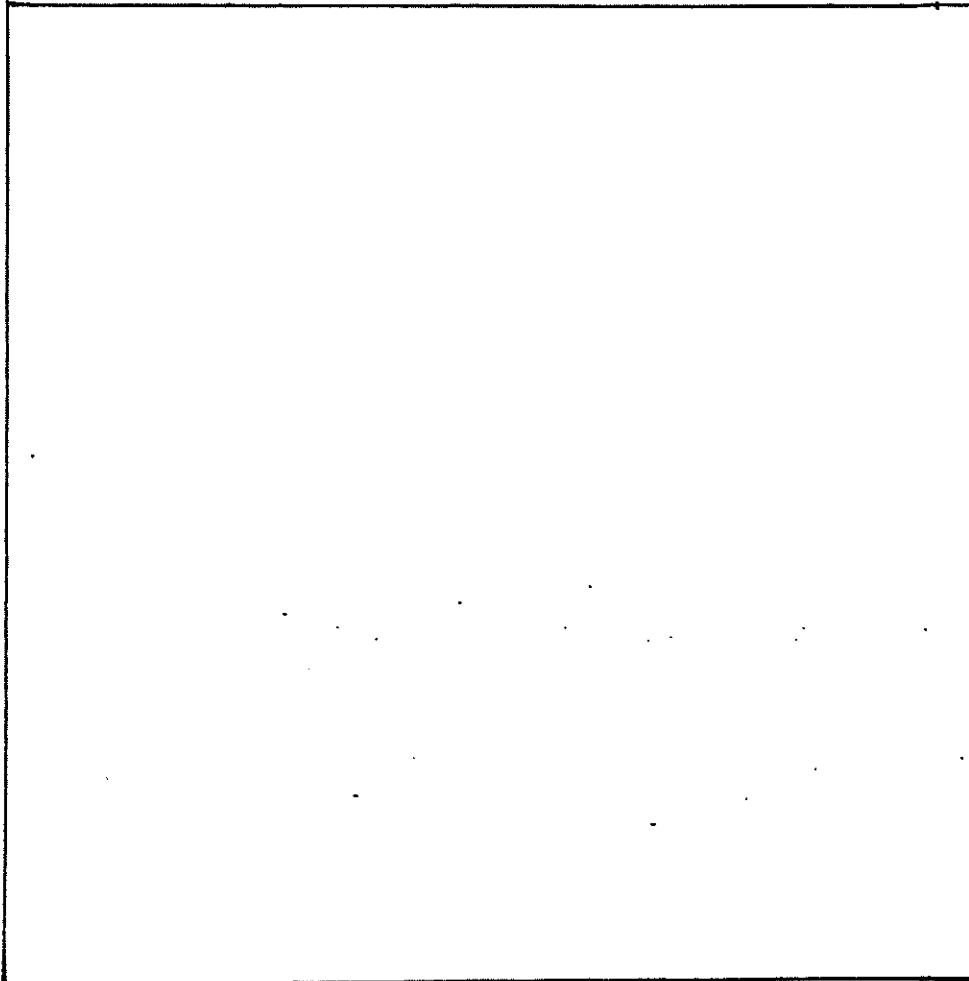
No other transactions appear of record.

REQUIRED

Your assignment is to survey Mr. Green's parcel. To do so you must determine Mr. Green's record of ownership of Blackacre. A field survey shows original monuments still exist and the dimensions measure 207.88 north-south and 208.05 east-west.

On the attached worksheet plot and dimension Mr. Green's parcel and explain your solution.

Problem B-6

Work Sheet

Scale: 1" = 40'