CALIFORNIA STATE BOARD OF REGISTRATION
FOR PROFESSIONAL ENGINEERS

L S

LAND SURVEYOR
1976

C

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.

2. In the workbook, you are to work Problem C1, C2 and C3 plus one chosen from C4 or C5, plus one chosen from C6 or C7.

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

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

5. Read the instructions on the workbook cover page.

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

7. You may keep this set of examination questions.

Problem C-1 - Wt. 10 (Required) (Each part = 1 point)

Instructions: Enter onto one page of your workbook the problem number and the letter which identifies your answer choice for that part.

1. In which of the following cases does the underlying fee to a dedicated street pass with a conveyance of an adjoining parcel?

   A Only when specifically stated in the deed
   B Always
   C Only when the deed does not relate a specific intent to the contrary

2. The seaward boundary of property fronting on the ocean is along which of the following lines?

   A Mean high tide line
   B Mean low water line
   C Mean sea level

3. The boundary along a navigable waterway (non-tidal) is along which of the following lines?

   A The high-water mark or line
   B The low-water mark or line
   C The center, or thread, of the stream or river

4. A meander line is run for which of the following purposes?

   A To delineate a water boundary line
   B To determine the area of land bounded by water
   C To define the limits of ownership on lands adjoining the water

5. Where adjoining land owners, instead of having a survey made according to their deeds, assume that stakes found by them denote their true boundary line and accept it as such, their action should be treated as:

   A Binding on each other and fixing their boundary
   B A mistake with no loss of rights to the true line
   C Creating a cloud on the title of each until the question is settled by a written agreement

6. In determining how the side lines of a lot are carried into an adjoining dedicated street upon vacation thereof, the rule in California states which of the following?

   A Lot side lines are extended straight to the centerline of the street

   B The lot side lines are brought to the centerline of the street at right angles or radially to said centerline

   C The side lines are taken to the centerline of the street such that the distances along the centerline follow the same proportion as do the frontage distances along the side lines of the street

   D There is no rule

   E None of the above

7. Which of the following does not constitute the practice of Land Surveying in California?

   A Writing and signing a legal description for a parcel of land
   B Soliciting surveying work for a friend or relative
   C Staking foundations for a single-family dwelling
   D Setting stakes for back lot corners in a new subdivision
   E Setting monuments which re-establishes a boundary line

8. For which of the following is the filing of a Record of Survey not required?

   A Setting the corners of a parcel deeded 10 years ago to your client
   B Setting an obliterated section corner from ties to its bearing trees
   C Restoring a lost section corner
   D All of the above
   E None of the above

9. Which of the following most nearly describes an act of acquiescence?

   A The use of a fence line for one's boundary without survey proof that the fence is in fact on the true boundary

   B Passive acceptance of the assertion of your adjoiner that a certain fence line marks the boundary between your respective properties when you know it really doesn't

   C Mutual consent to and acceptance of a (new) permanent boundary line where the respective parties could not definitely ascertain the true location of their described (common) boundary

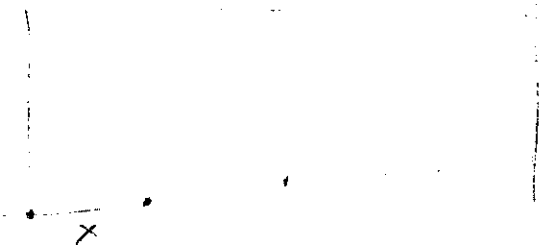
10. You have measured the south line of Section 19 in a certain township and found it to be 80.00 chains in length, between original corners. The length of the line as measured by the GLO survey of 1900 is 79.92 chains. The 1/4 corner on this line is lost; there are no terrain calls nor are there lines of occupation to locate the corner. How far from the SW corner of Section 19 would you set the SW corner of the SE 1/4 SW 1/4 Sec. 19?

A 20.02 chains
B 20.00 chains
C 19.98 chains
D 19.94 chains
E 19.92 chains

20 MIN

79.92

19.92 x
79.92 80



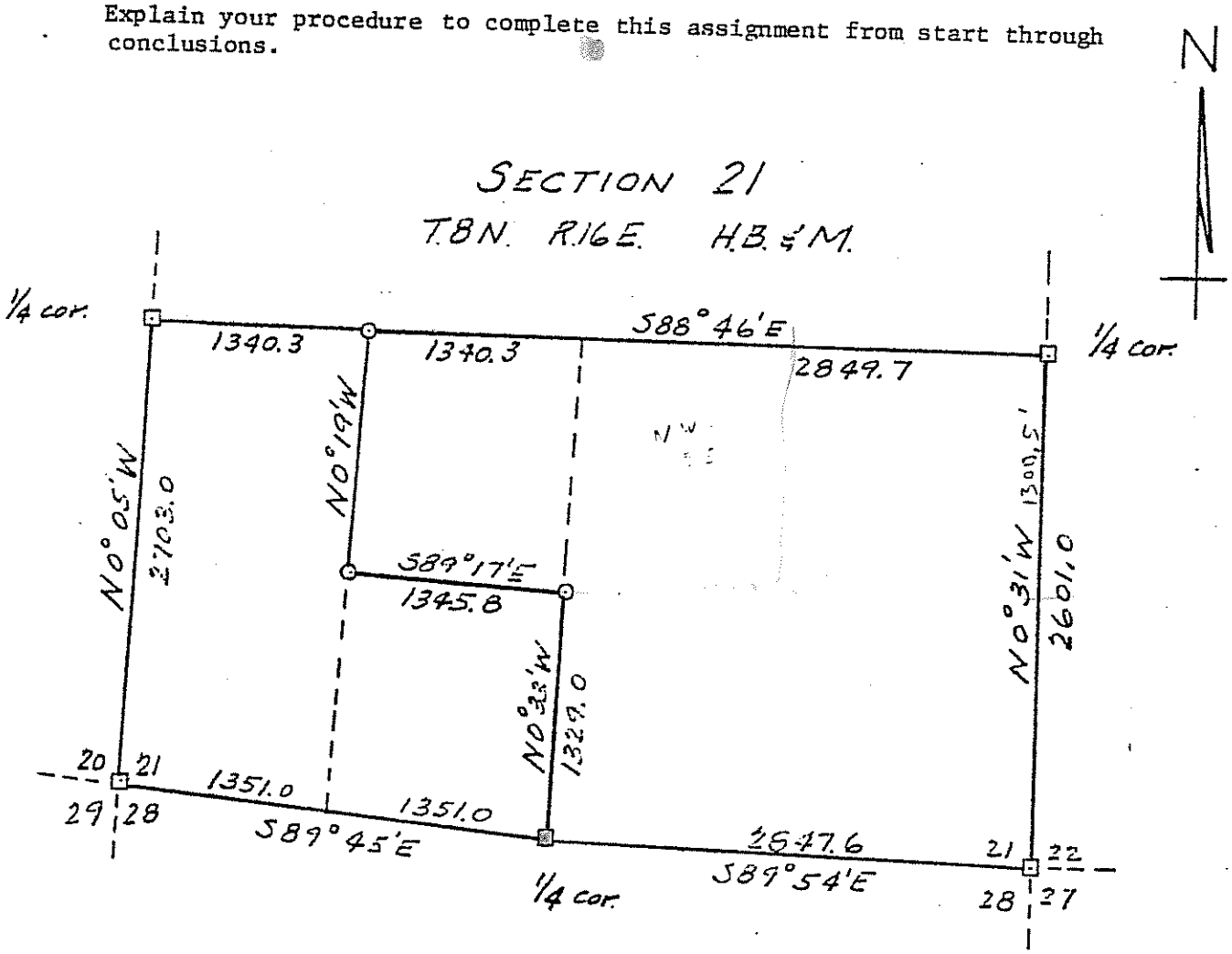
Problem C-2 - Wt. 10 (Required)

Shown below is a copy of a Record of Survey filed in Book 49 of maps, at page 5, H.C.R., and dated March 14, 1941, surveyed by Bob Smith L.S. 1000.

Mr. Jones, owner of the N. W. 1/4 of the S. E. 1/4 of Section 21, per deed recorded in Book 204 at page 97 of official records, brings the map below to your office and wants you to survey and monument his deeded parcel.

Assume Section 21 was surveyed originally under one G.L.O. contract in accordance with the manual in effect in 1874.

Explain your procedure to complete this assignment from start through conclusions.



□ Indicates original Govt. corner found
○ " 1" iron pipe set by L.S. 1000
All distances are in feet.

FIG. C2

Problem C-3 - Wt. 5 (Required)

You have a photograph taken with an 8-inch focal length camera from a height of 4,000 ft.

A What is the scale of the photograph?

B If this photograph is enlarged to twice its present dimensions, what will its scale then be?

C To facilitate reading purposes, it is desirable to enlarge the photograph to the scale of 1/1500. How much enlargement is required?

D If the original photograph has dimensions of 7 x 9 inches, what will its dimensions be after enlargement in part "C" above?

15 MIN

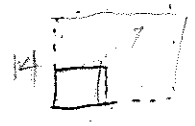
SCALE = $\frac{8"}{4000'}$

(A) 1" = 500'

(B) 1" = $\frac{250'}{\cancel{1500}}$

(C) 1" = 125" 4X ENLARGEMENT

(D) 28" x 36"



Note: Select Problem C-4 or C-5 for 10 points.

Problem C-4 - Wt. 10

The plan below shows the property of John Doe. Prepare a metes and bounds description of Doe's land. Make no assumptions.

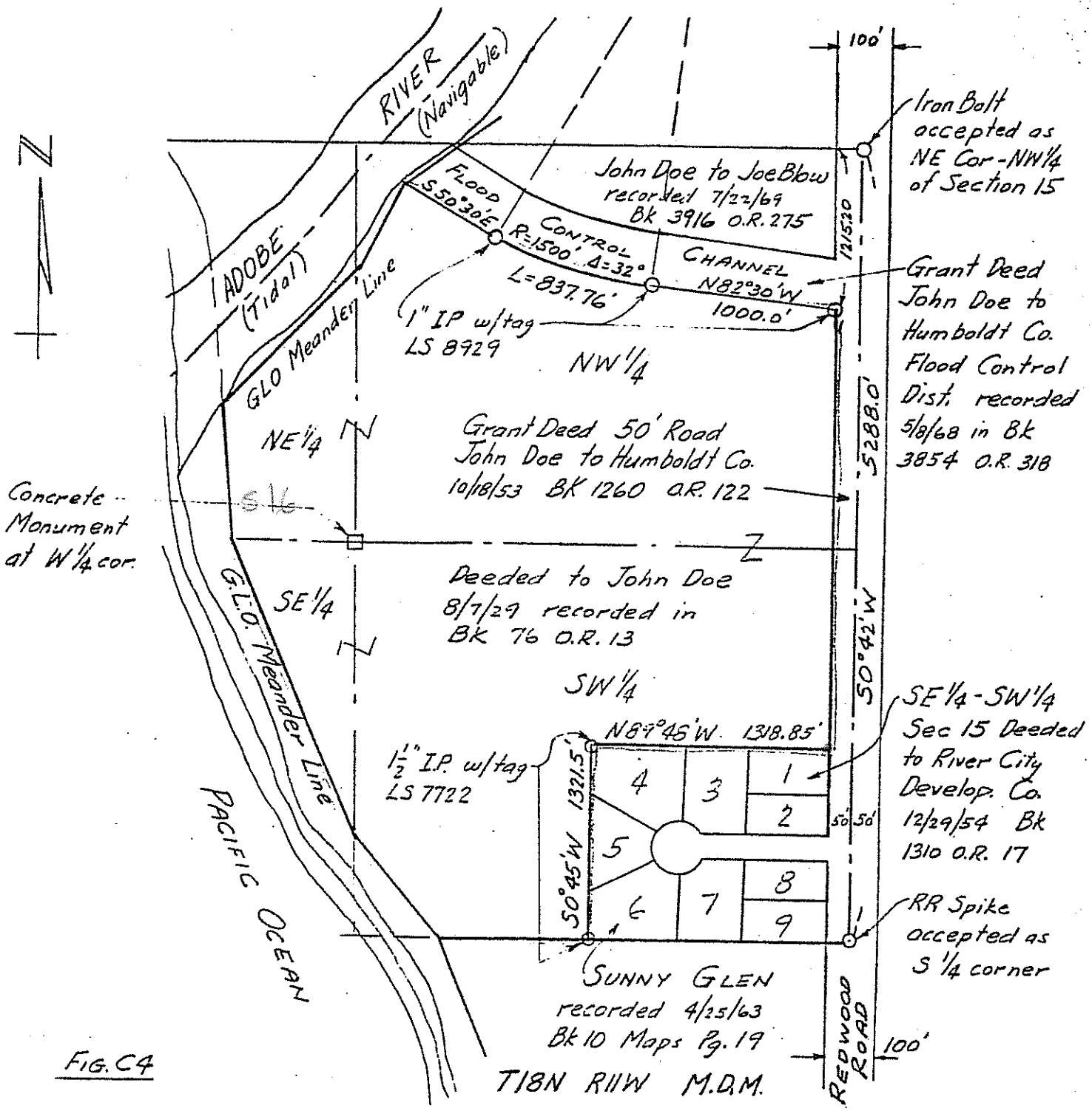


FIG. C4

5 min/ pr

240
50

Note: Select Problem C-4 or C-5 for 10 points.

Problem C-5 - Wt. 10

Prepare a description for a 50' wide road easement across the property shown on the plan below. You have calculated the center line alignment from the data shown on a recorded Tract Map and a deed to Jones.

50 min

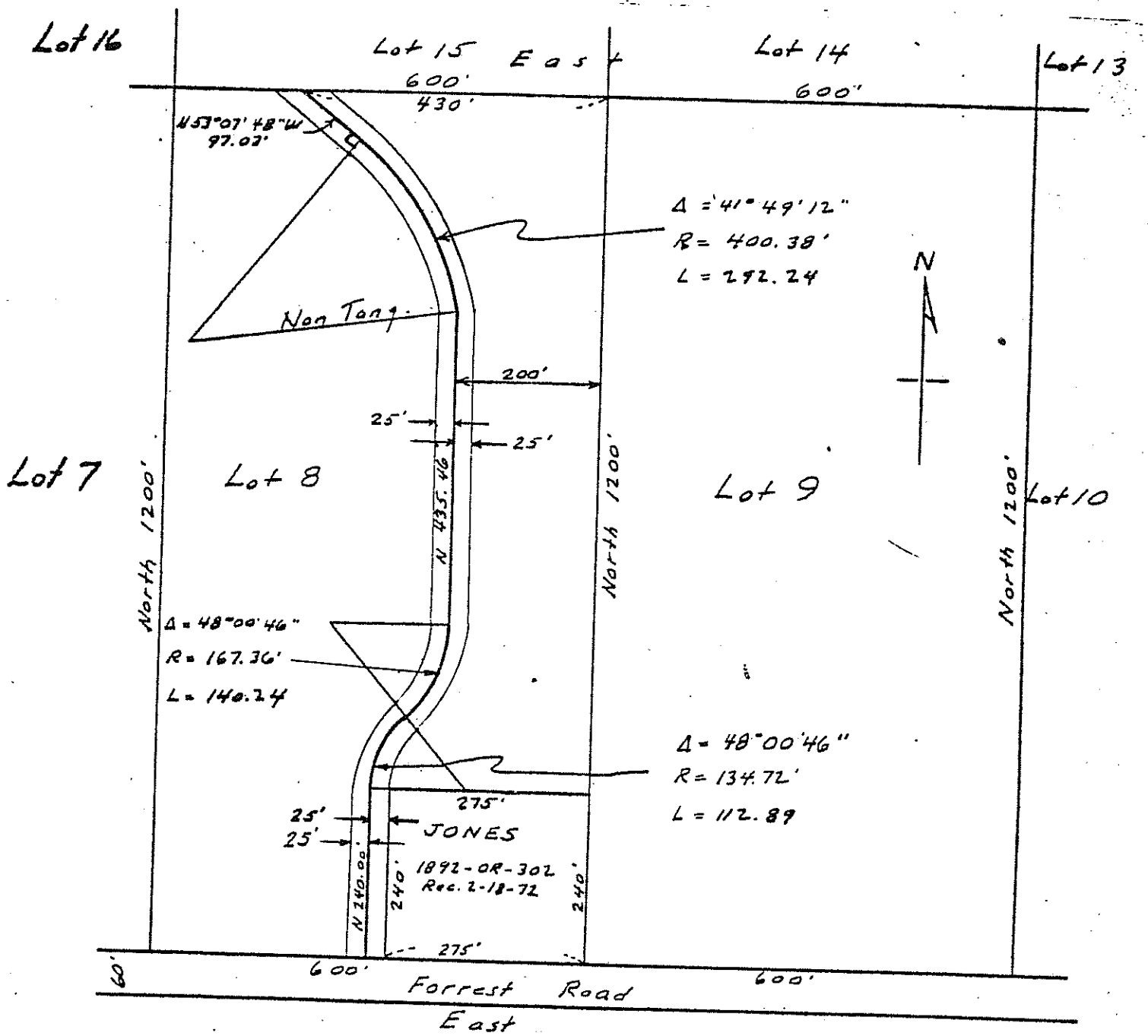


FIG. C5

Tract No. 1067 Pine Tree Estates
County of Barstow, State of California
Filed in Book 17 of Maps, Page 22, Nov. 10, 1925

Note: Select Problem C-6 or C-7 for 15 points.

Problem C-6 - Wt. 15

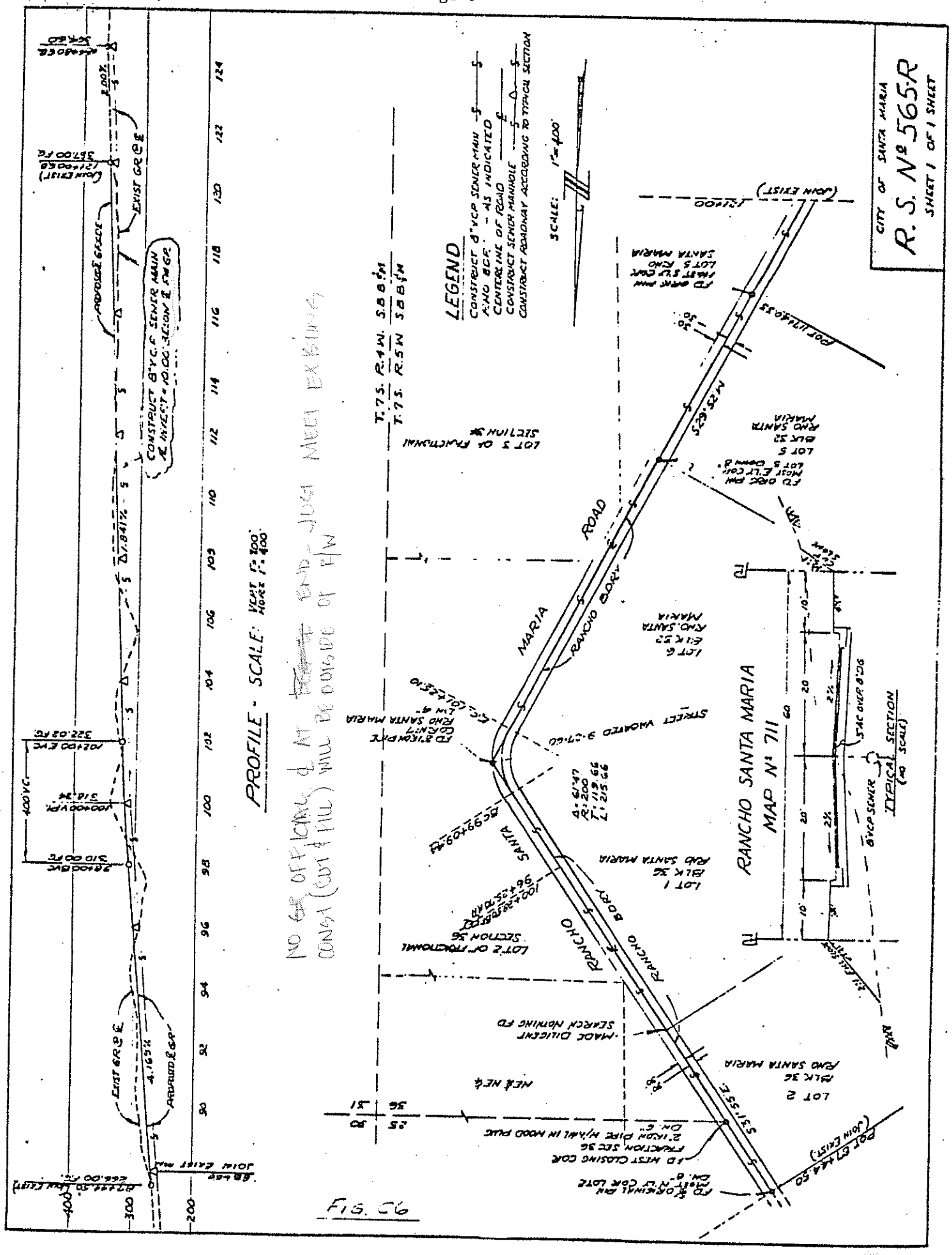
You have been requested to submit a proposal for construction staking on a project depicted by the plan on the following page.

REQUIRED:

1 Examine the plan - note and explain deficiencies, if any, that you may find, and explain how you would proceed.

2 What items of work would you include in your proposal?

3 Discuss what exclusions, if any, you would include in your proposal.


CITY OF SANTA MARIA
R. S. Nº 565-R
SHEET 1 OF 1 SHEET
LEGEND
CONSTRUCT 8" VCP SEWER MAIN
AND BCE - AS INDICATED
CENTERLINE OF ROAD
CONSTRUCT SEWER MANHOLE
CONSTRUCT ROADWAY ACCORDING TO TYPICAL SECTION
SCALE: 1"=400'
T. 7 S. R. 34 W. S.B.B.M.
T. 7 S. R. 35 W. S.B.B.M.
SECTION 36
LOT 2 OF FRACTIONAL
RANCHO SANTA MARIA
MAP Nº 711
TYPICAL SECTION
(NO SCALE)
PROFILE - SCALE: VERT 1"=100'
HORZ 1"=400'
FIG. C6

Note: Select Problem C-6 or C-7 for 15 points.

Problem C-7 - Wt. 15

Establish a straight center-line between the existing found record monuments as located from the transit line. Show your calculations based on a logical solution of a straight line and its best fit under the given conditions. Show your calculated position of the adjusted center line and its relationship to the record monuments. No credit will be given for a trial and error solution.

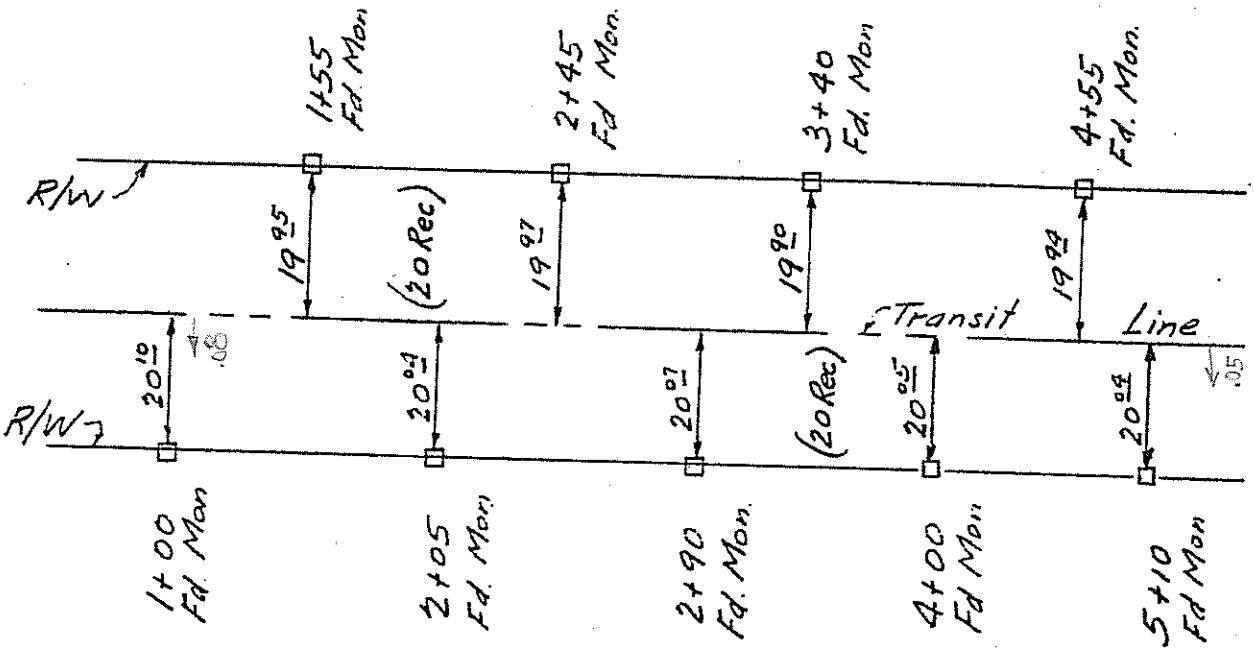


FIG. C7

CALIFORNIA STATE BOARD OF REGISTRATION
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1976

PRINCIPLES AND PRACTICE

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2. In the workbook, you are to work Problem D1, D2, D3 and D4, plus one chosen from D5 or D6.

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

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

5. Read the instructions on the workbook cover page.

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

7. You may keep this set of examination questions.

Problem D-1 - Wt. 10 (Required) (Answer all parts)

Answer each of the following questions in your own words. List any references used.

A List the mandatory requirements that prescribe the form of a Record of Survey Map. Pg 26 #8763

B List the mandatory requirements that outline the contents of a Record of Survey Map. Pg 26 #8764

C Whose signatures are required on a Record of Survey Map? LS OR RE, CO SURVEYOR BOARD

D Who may practice, offer to practice, or represent himself as a Land Surveyor? LS OR RE

E What act or activities performed by a person constitutes the practice of Land Surveying within the meaning of the Land Surveyors' Act? #8726 Pg 22

F List those titles that are reserved to a licensed Land Surveyor, by law. * 8751

G On what items is it mandatory for a licensed Land Surveyor to place his signature and show his license number, or stamp his seal? MAPS, PLATS, REPORTS * 8761

H When may a licensed Land Surveyor administer or certify oaths? #8760 A,B,C

I Who is vested with the power to administer the provisions and requirements of the Land Surveyors Act? #8710 STATE BOARD OF REGISTRATION

J When is it mandatory for a surveyor to file a Corner Record?

K When is it mandatory for a surveyor to file a Record of Survey? * 8773 8780

Problem D-2 - Wt. 10 (Required) (Answer all parts)
The following questions relating to subdivisions in California are based on the existing laws in effect January 1976.
Answer each of the following questions in your own words. List any references used.

A Who can prepare a parcel, or final map? LS or RE

B A parcel map is required for which subdivisions? 66426. A, B, C, D

C A final map is required for which subdivisions? ALL SUBDIVISIONS CREATING 5 OR MORE LOTS

D What map can be compiled from record?

E What conditions must exist in order to compile a map from recorded data? 66450

F When a field survey is required for a subdivision, to what state standard must it conform? LOCAL AGENCIES.

G What does a local ordinance regulate regarding a parcel or final map? 66411

H Who shall examine a parcel, or final map? COUNTY RECORDER

I List five reasons a certificate of correction or amending map may be filed. CHANGE OF DISTANCE. MAP ERROR OR OMISSION 66469

J When performing a field survey for a parcel, or final map, to what minimum standard shall the monuments conform? LOCAL STANDARDS

K When is it mandatory for local agencies to disapprove a Subdivision Map? 66474

Problem D-3 - Wt. 10 (Required)

You have been requested to prepare a proposal to complete the final monumentation on a subdivision project for which plans have been approved, improvement and monumentation bonds posted, and final map has been recorded by another surveyor.

REQUIRED:

1. Explain how you would proceed.

2. Assume your proposal is accepted. Discuss what steps you would then take to complete this project.

(1) VISIT SITE
(2) INQUIRE W/ SUBDIVIDER, REVIEW PLANS
(3) DETERMINE WHAT STAKING (CONST) & MONUMENTATION MUST BE DONE

Problem D-4 - Wt. 10 (Required)

The plan below shows a block which is a part of an 1896 subdivision. Record dimensions are shown that were a part of the original subdivision map. Measured distances between original monuments are also shown.

REQUIRED:

2 A What is the length of each side of Lot 4? (4 sides)

2 B What is the length of each side of Lot 5? (4 sides)

2 C Assume the subdivision map (in addition to the dimensions given on the other plan) also gave dimensions of 201' on the Easterly line of Lot 1, and 301' in the East line of Lot 6. What is the length of each side of Lot 6? (4 sides)

2 D Assume that the subdivision map did not give the dimension on the North side of Lot 1, nor that on the South line of Lot 6. What is the length of each of the sides of Lot 1? (4 sides)

2 E Assume the original corner was found at the S.W. corner of Lot 3 and the measured distance was 200' from the N.W. corner, and the original S.E. corner of Lot 1 was found 201.0' southerly of the N.E. corner. What is the length of each of the four sides of Lot 3?

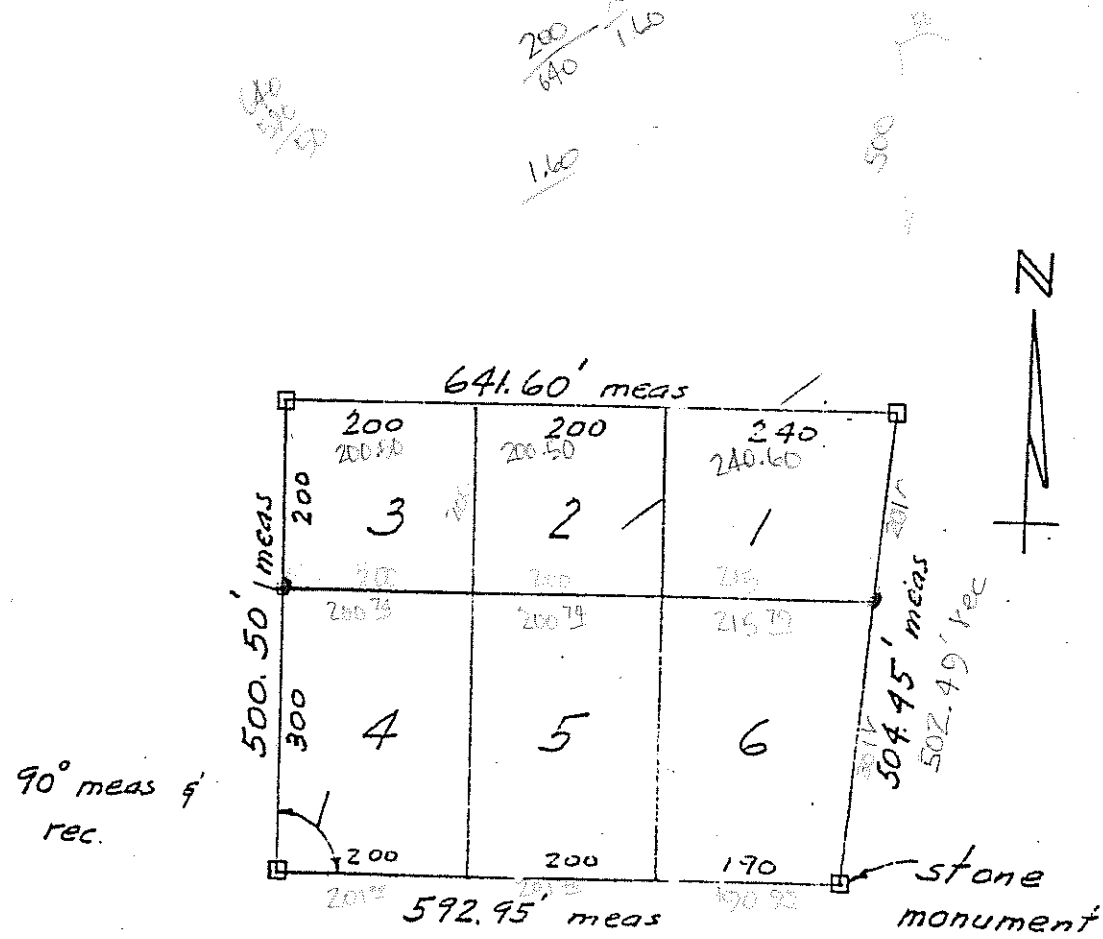


FIG. D4

Note: Select Problem D5 or D6 for 10 points.

Problem D-5 - Wt. 10

You are to determine a new control station, using an Electronic Distance Measuring device and a 1" Theodolite as your equipment.

Your required accuracy is triangulation, second order.

1 All measurements are taken from first order triangulation station "Pool"

2 Station "Pool" co-ordinates Y=549,447.03' X=2,070,801.38' Elevation = 3,141.26'

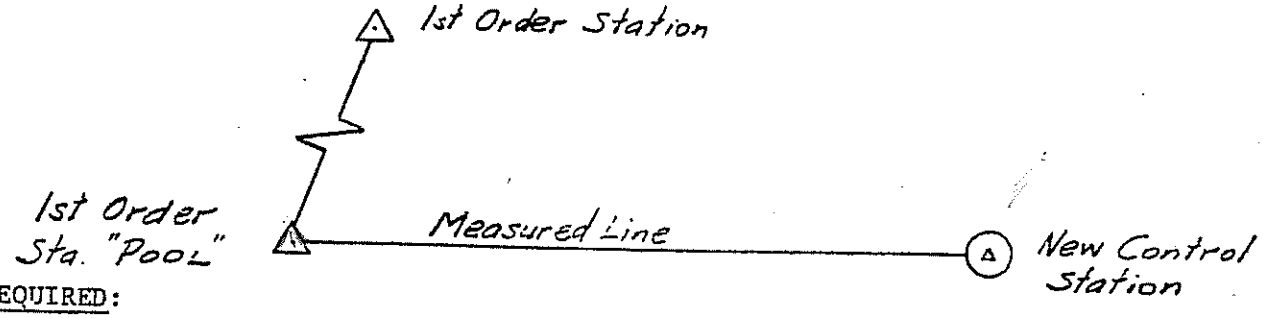
3. The measured EDM slope distance from station "POOL" to new control station is 9585.04'.

4 The measured vertical taken from station "Pool" to new control station is 94° 27' 28.6"

5. The mean latitude of slope distance is 38° 00' 55"

6. Use mean radius of the earth as 20,906,000'.

7 Lambert Projection, California Zone III, Table 1, Page 29, is furnished



REQUIRED:

A Determine elevation of new station computed to ± 0.50' 2396.04'

B Compute horizontal distance at the station with lowest elevation ~~9556.04~~

C Compute sea level distance between stations

D Compute grid distance between stations

Lambert Projection for California III

Table I (Cont'd)

Lat.	R feet	Y' y value on central meridian feet	Tabular difference for 1 sec. of lat.	Scale in units of 7th place of logs	Scale expressed as a ratio
37° 41'	27,082,139.33	430,852.71	101.14117	-304.6	0.9999299
42	27,076,070.86	436,921.18	101.14133	-305.9	0.9999296
43	27,070,002.38	442,989.66	101.14167	-306.8	0.9999294
44	27,063,933.88	449,058.16	101.14200	-307.4	0.9999292
45	27,057.865.36	455,126.68	101.14233	-307.6	0.9999292
37° 46'	27,051,796.82	461,195.22	101.14250	-307.4	0.9999292
47	27,045,728.27	467,263.77	101.14283	-306.9	0.9999293
48	27,039,659.70	473,332.34	101.14317	-306.0	0.9999295
49	27,033,591.11	479,400.93	101.14367	-304.8	0.9999298
50	27,027,522.49	485,469.55	101.14383	-303.1	0.9999302
37° 51'	27,021,453.86	491,538.18	101.14417	-301.1	0.9999307
52	27,015,385.21	497,606.83	101.14450	-298.8	0.9999312
53	27,009,316.54	503,675.50	101.14483	-296.0	0.9999318
54	27,003,247.85	509,744.19	101.14533	-292.9	0.9999325
55	26,997,179.13	515,812.91	101.14567	-289.5	0.9999333
37° 56'	26,991,110.39	521,881.65	101.14600	-285.7	0.9999342
57	26,985,041.63	527,950.41	101.14633	-281.5	0.9999352
58	26,978,972.85	534,019.19	101.14683	-276.9	0.9999362
59	26,972,904.04	540,088.00	101.14717	-272.0	0.9999374
38° 00'	26,966,835.21	546,156.83	101.14767	-266.7	0.9999385
38° 01'	26,960,766.35	552,225.69	101.14800	-261.0	0.9999399
02	26,954,697.47	558,294.57	101.14850	-255.0	0.9999413
03	26,948,628.56	564,363.48	101.14900	-248.6	0.9999428
04	26,942,559.62	570,432.42	101.14933	-241.9	0.9999443
05	26,936,490.66	576,501.38	101.14933	-234.8	0.9999459
38° 06'	26,930,421.67	582,570.37	101.15033	-227.3	0.9999477
07	26,924,352.65	588,639.39	101.15083	-219.4	0.9999495
08	26,918,283.60	594,708.44	101.15133	-211.2	0.9999514
09	26,912,214.52	600,777.52	101.15183	-202.6	0.9999533
10	26,906,145.41	606,846.63	101.15233	-193.6	0.9999554
38° 11'	26,900,076.27	612,915.77	101.15267	-184.3	0.9999576
12	26,894,007.11	618,984.93	101.15333	-174.5	0.9999598
13	26,887,937.91	625,054.13	101.15383	-164.5	0.9999621
14	26,881,868.68	631,123.36	101.15450	-154.0	0.9999645
15	26,875,799.41	637,192.63	101.15483	-143.2	0.9999670

Note: Select Problem D-5 or D-6 for 10 points.

Problem D-6 - Wt. 10

Specifications for a major pumping plant require that an elevation be determined at the plant site to an accuracy of +/- 0.065 foot. The nearest vertical control is shown in the accompanying vicinity map.

Discuss each of the following items as they would relate to the planning and execution of the project. Support your conclusions/recommendations with appropriate mathematical analyses. State your assumptions and show all of your work.

A The order of levelling required to accomplish the desired result, and the route necessary for same. The levelling must be run between two different bench marks.

B Total miles of levelling (excluding reruns).

C Expected reliability of results. (if different from that required)

D Instruments and procedures you would use to obtain the most economical survey.

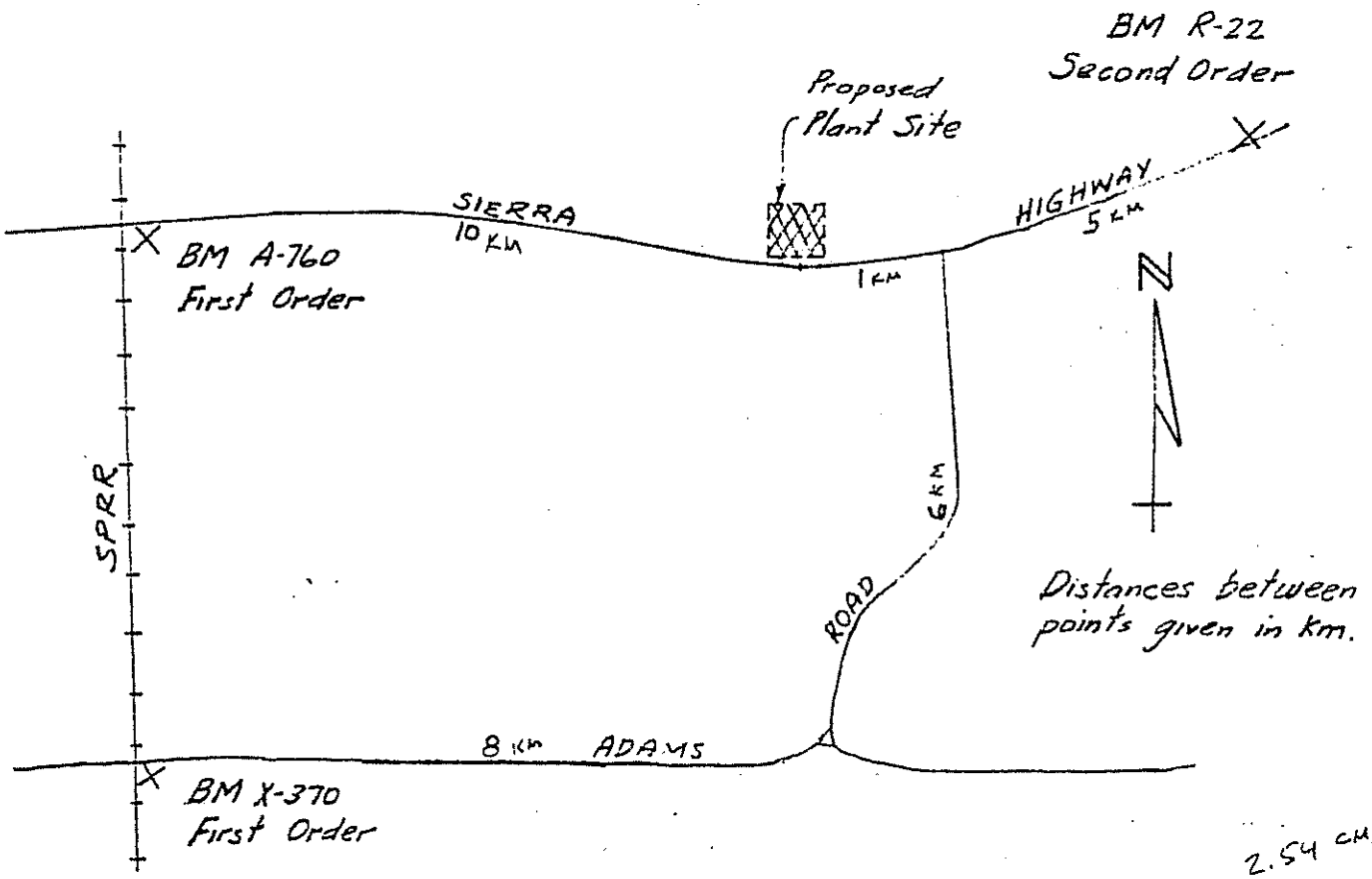


FIG. D6