

Department of Consumer Affairs
CALIFORNIA STATE BOARD OF REGISTRATION
FOR PROFESSIONAL ENGINEERS

LS

D

LAND SURVEYING
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 D1 and D2 plus 2 others according to the proctor's instructions.
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 applicant's 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.

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Department of Consumer Affairs

Problem D1 - Wt. 15.0 (Required)

As a part of a property survey you need to locate or re-establish the corner common to Sections 3 and 4, T. 48 N., R. 17 E., and Sections 33 and 34, T. 49 N., R. 17 E., M.D.M.

At this time you have established horizontal control consisting of closed traverses from which you have determined the coordinates of the nearest 1/4 Section corners as follows:

	N.	E.	
1/4 S. 3 and 4	10,000.00	20,000.00	
<i>BT CHECK</i>			Found 2" I.P. & tag L.S. 1053 in rock mound with scribed 24" Yellow Pine S. 80° W., 26.5 ft. and rotting cedar stump S. 72° E., 40.0 ft.
1/4 S. 33 and 34	15,206.58	20,071.19	
<i>BT CHECK</i>			Found 3/4" steel rod in rock mound beside 8" x 9" x 16" stone marked "1/4 S". 10" Juniper S. 42 E., 65.0 ft. scribed "1/4 S. 34 B.T." <i>S - E GOOD</i>
1/4 S. 33 and 4	12,574.77	17,725.75	
<i>BT CHECK</i>			Found 2" I.P. with tag L.S. 1053 and 14" Juniper N. 2° W., 34.0 ft. 26" Yellow Pine S. 20° W., 112.5 ft., scribed "1/4 S. 4 B.T." <i>GOOD</i>
1/4 S. 34 and 3	12,566.66	22,669.87	
<i>NO TRACES</i>			Found 3/4" steel rod with L.S. 1691 stamped on side in rock mound. Remains of Juniper post scribed "S 1/4 S 34" lying at base of mound. A dry gulch crosses line 240 feet East of this corner. <i>OK</i>

In addition you have surveyed and thoroughly searched the area shown on Figure 1 which is drawn to a scale of one inch = fifty feet and accurately depicts the vicinity of the corner to Sections 3, 4, 33, and 34. Your drawing also shows angle points which are part of your horizontal control net with coordinates shown. Your basis of bearing was determined by a series of four solar observations at angle point 28.

Your search for the corner $\frac{33}{4} \mid \frac{34}{3}$ has disclosed no physical evidence of the original corner post. A complete review of all available records reveals no evidence of any previous recovery of this corner. The surrounding land is non-patented.

ALL GOV'T

A partial transcript of the original Government field notes is as follows:

August 12, 1881

Thence N. $89^{\circ} 56'$ W. on a true line, descending

36.40 Dry Gulch, course N. 35° W., and ascend gradually on sagebrush covered plain,

(12) 40.00 Standard $\frac{1}{4}$ corner Section 34 and 3.
Set Red Cedar post, 4" x 4" x 4 ft. long, 2 ft. in the ground and 2 ft. above ground.
Raised mound of stone, 4 ft. diam. and 2 ft. height.
No trees within limits.
Ascend gradually,

77.10 Summit of ridge, descend abruptly,

78.50 Cross Antelope Creek, 6 links wide, course S. 40° W., ascend, 99'

80.00 The Standard corner to Sections 3, 4, 33, and 34, T. 48 N. and T. 49 N., R. 17 E., M.D.M.
Set Red Cedar post, 4" x 4" x 4 ft. long, 2 ft. in the ground and raised mound of earth, 4 ft. diam. and 2 ft. height,
No trees within limits,

0.00 Continue N. $89^{\circ} 56'$ W., on a true line, ascending,

2.00 Top of ridge bears N. 45° E. and S. 45° W., descend across open plain, 132'

10.00 Enter Red Cedar thicket,

15.00 Leave Cedars, enter Pine timber,

(13) 40.00 Standard $\frac{1}{4}$ corner Sections 33 and 4.
Set post, 4" x 4" x 4 ft. long from which a Yellow Pine, 20 in. diam., bears S. 20° W., 170 lks dist., mkd $\frac{1}{4}$ S. 4 B.T.,
A Red Cedar, 10 in. diam., bears N. 5° W., 50 lks. dist., mkd $\frac{1}{4}$ S. 33 B.T.,
Descend,

62.40 Dry Gulch, course S. 10° E., ascend,

80.00 The Standard Corner to Sections 4, 5, 32, and 33.

September 2, 1881

From the Standard corner to Sections 33 and 34, T. 49 N.,
R. 17 E., M.D.M.,
N. 0° 16' E., on a true line parallel to East boundary of
township, ascend,

- 105'
- 1.60 Old Applegate Trail, bears S. 87° W., and N. 87° E.,
- 18.50 Summit of low ridge, descend,
- 36.00 Enter scattered Red Cedars,
- 40.00 The ¼ Sect. cor. to Sect. 33 and 34
Set lava stone, 16 x 9 x 8 in., mkd ¼ S, in mound of stone,
4 ft. diam. and 3 ft. ht., from which,
a Red Cedar, 7 in. diam., bears S. 42° E., 100 lks. dist.,
scribed ¼ S. 34 B.T.,
No other trees within limits,
- 66

May 5, 1882

From the corner to Sections 3, 4, 9, and 10, T. 48 N.,
R. 17 E., M.D.M.,
North on a random line across level prairie,

- 26.80 Enter pine timber, ascend gradually,
- 40.00 Set stake for temp. ¼ S. corner,
- 52.50 Leave timber at summit of low ridge,
- 61.00 A settler's cabin bears East 10 chains,
- 77.00 Cross Antelope Creek, a flowing stream 8 links wide,
course S.W. and ascend,
- 78.92 Intersect N. Bdry of Township, 12 links W. of cor. to
S. 3, 4, 33, and 34,

Thence, S. 0° 05' W. on a True line bet. S. 3 and S. 4, descend,

- 119'
- 1.80 Antelope Creek, S. 45° W., and ascend,
- 38.92 Set post, 4" x 4" x 4', in mound of stone, for ¼ S. 3 and 4,
T. 48. N., R. 17 E., M.D.M.,
From which
A Yellow Pine, 18 in. diam., bears S. 80° W., 40 lks. dist.,
mkd ¼ S. 4 B.T.,
An Incense Cedar, 46 in. diam., bears S. 70° E., 58 lks.
dist., mkd ¼ S. 3 B.T.,
- 26.4'
- 38.2'
- 78.92 Corner to Sec. 3, 4, 9, and 10.

REQUIRED:

- a. Determine the coordinate you will use for setting the corner.
- b. Calculate the bearing and distance from angle point No. 29 to your coordinate for the section corner.
- c. Draw a detail of the area at the section corner including any data which you would show on a Record-of-Survey.

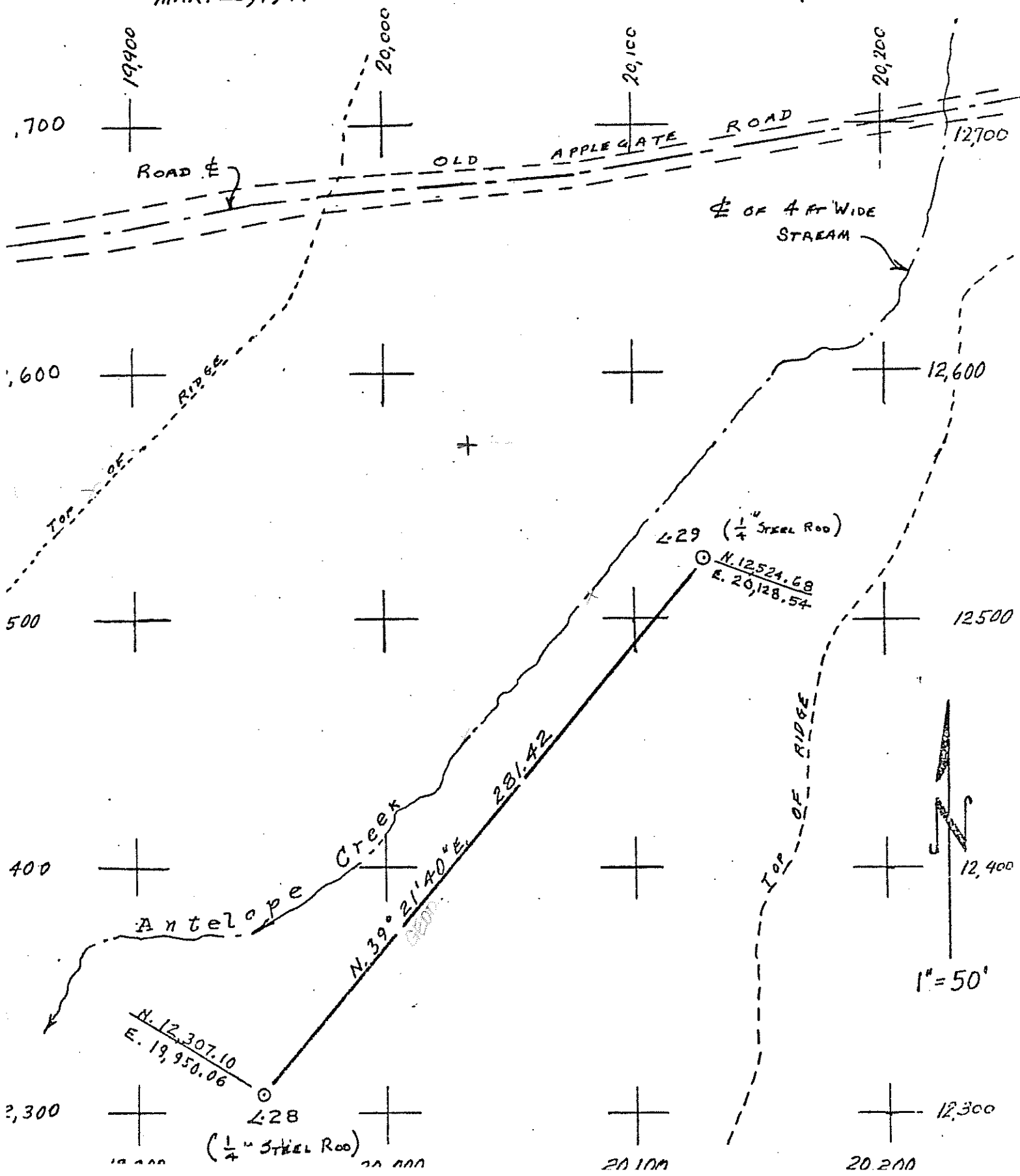
FIGURE D1

TOPOGRAPHIC DETAILS VICINITY

COR. 3, 4, 33, 34,

MAR. 26, 1974

T. 48 N. T. 49 N. R. 17 E.



Problem D2 - Wt. 10.0 (Required)

You have been commissioned by Peter T. Edwards to survey his land in Section 11, T45N, R18E, MDM. Your research and survey work to date has produced the following information:

Section 11 has been subdivided by another surveyor who established and monumented the center $\frac{1}{4}$ corner in connection with his survey for John Baker. Your recent survey work verifies the subdivision of the section except that your calculated position of the center $\frac{1}{4}$ corner is 0.27 feet North and 0.05 feet East of the center of the found monument.

Trout Creek is a perennial stream which averages 12 feet in width and 2.5 feet in maximum depth throughout its course in Section 11 except for brief periods of high water during winter months when the maximum width is 18 feet. Mr. Edwards has said that he plans to build a new chain link fence around the entire property he owns in Section 11 when your survey is completed. The fence is to keep people out and to confine your clients valuable herd of purebred hogs.

Current ownerships in Section 11 were created by the following deeds:

Bill Adams purchased the SW $\frac{1}{4}$ of Section 11 from Thomas Jones in July 1948, recorded in Vol. 148 of Official Records at Page 219.

John Baker purchased the NW $\frac{1}{4}$ of Section 11 from P. J. Wilson in November 1950, recorded in Vol. 162 of Official Records at Page 112.

Harry Churchill purchased the SE $\frac{1}{4}$ of Section 11 and the E $\frac{1}{2}$ of the NE $\frac{1}{4}$ of Section 11 from Charles King in May 1956, recorded in Vol. 218 of Official Records at Page 391.

Later, in September 1972, Harry Churchill purchased the W $\frac{1}{2}$ of the NE $\frac{1}{4}$ of Section 11 from the Alleghany Minerals Corporation, recorded in Vol. 384 of Official Records at Page 20.

In April 1961, Peter T. Edwards purchased a parcel from Harry Churchill according to the following description:

A parcel of land in the State of California, County of Del Oro, being a portion of Section 11, Township 45 North, Range 18 East, Mount Diablo Base and Meridian, and more particularly described as follows:

Beginning at the intersection of the Westerly Right-of-Way line of State Highway 1291 and the Southerly boundary of Section 11,

Thence Northeasterly along the aforesaid Right-of-Way line to Trout Creek, *CENTER*

Thence Southwesterly along Trout Creek to the South boundary of said Section 11,

Thence Easterly along the South boundary of Section 11 to the Point of Beginning. Recorded in Volume 267 of Official Records of Page 475.

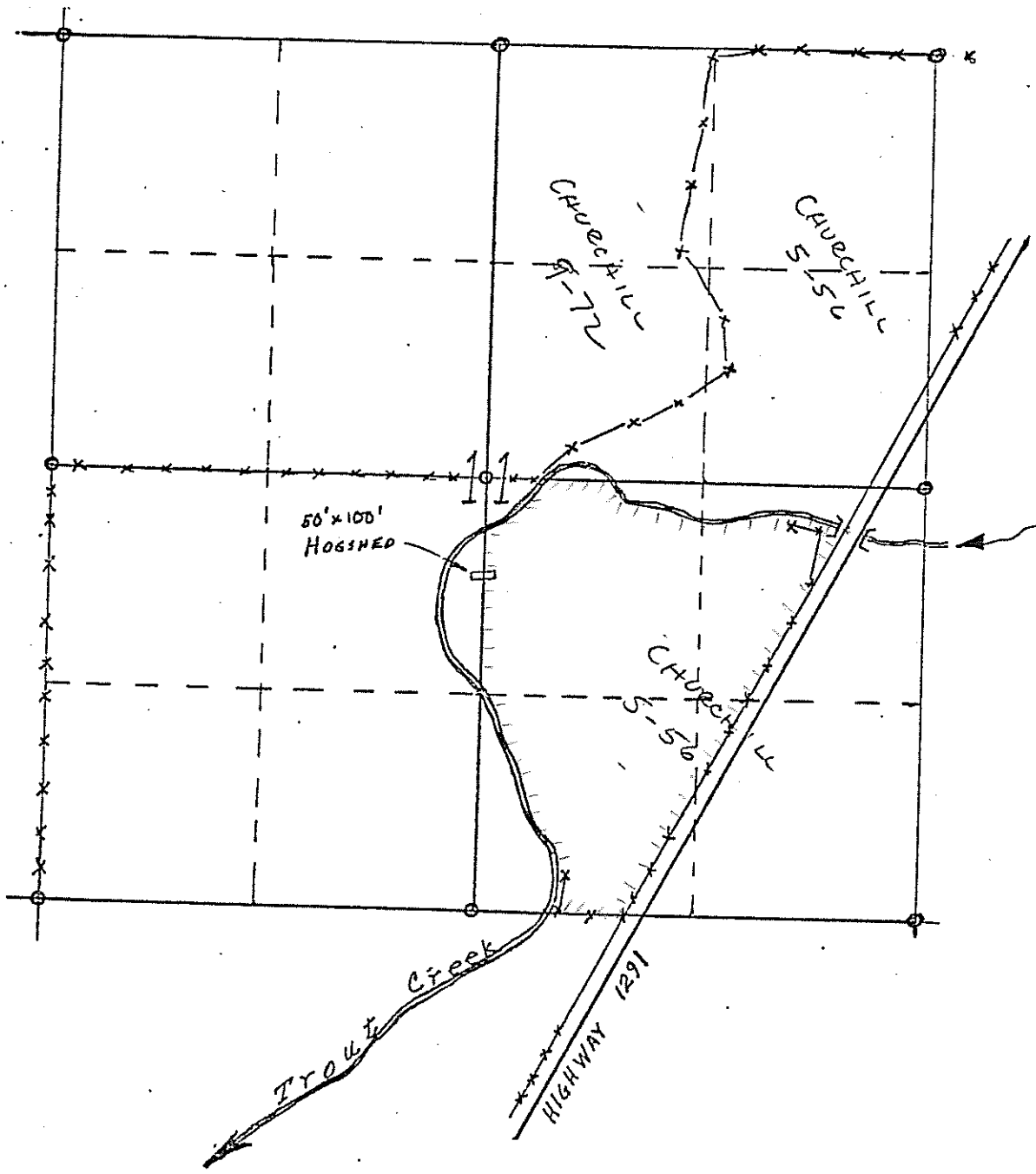
In August 1973 you were hired by Mr. Edwards to survey the boundary of his land. A graphically correct sketch showing the location of State Highway 1291 and of Trout Creek as determined by your survey is shown as Figure D2.


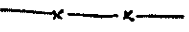

REQUIRED:

- a. Draw a sketch in your workbook similar to Figure D2 but indicate by means of colored pencil, or other distinctive marking, the boundary of Mr. Edwards' land according to the deeds as given here. Comment in writing on any problems you foresee in completing this survey and state how you expect to solve them. Describe the monuments you would set and where you would set them.
- b. What advice would you give to your client, if any?
- c. Describe how you would stake the boundary lines for fencing purposes.

FIGURE D2

1" = 1000'



-  CIRCLES ARE 2 INCH PIPES SET ON A PREVIOUS SURVEY.
-  EXISTING FENCE
-  Creek and Flow direction.

Problem D3 - Wt. 12.5

Work both Sections

SECTION 1

- a. What is a "corner record" as defined by the Statutes? 8773
WRITTEN RECORD OF CORNER ESTABLISHMENT OR RESTORATION
- b. Corner records are required for what types of corners? PUBLIC LAND SURVEY CORNERS
- c. At the option of the surveyor, corner records may be filed for what corners? 8773 (C)
- d. Corner records are filed with whom?
- e. Corner records must be signed by whom?
- f. When a corner record is filed, what are the provisions regarding perpetuation of the corner? 8773.3
- g. In what situations is a corner record NOT required for a corner which normally requires such record? CORNER RECORD PREV. FILED - NO CHANGE
- h. What do you believe are the purposes served by corner records?

SECTION 2

- a. In the absence of any local governmental requirement or specification relating to the type, size, kind or material to be used in corner monuments, what kind of monument would you use at a property corner in order to comply with Section 8771 of the Land Surveyors' Act?
- b. Describe the regulation post adopted by the Bureau of Land Management to monument section corners. P 106 4-7
- c. Distinguish between a Subdivision Map, a Parcel Map, and a Record of Survey Map.

Problem D4 - Wt. 12.5

The plat shown below represents Lot 2 of the HILLVIEW TRACT. The known information is shown.

REQUIRED:

- a. Reproduce the plat in your workbook and show the following:
 1. The West 12 feet
 2. The North 100 feet of the West 150 feet
 3. The Easterly 32 feet
 4. The Southerly 32 feet of the Westerly 200 feet measured on the South line
 5. The North 50 feet.

In the event you find that any description is indeterminate, or unlocatable, explain the reason why you find it so.

- b. Write a description for the Public Utility easement along the North lines of the lot.
- c. Write a description for the 20-foot driveway shown for the benefit of Lot 1 which has been denied access to Road "A". The driveway shown on the plat is not shown on the recorded Tract Map and it is not described in any document of record.

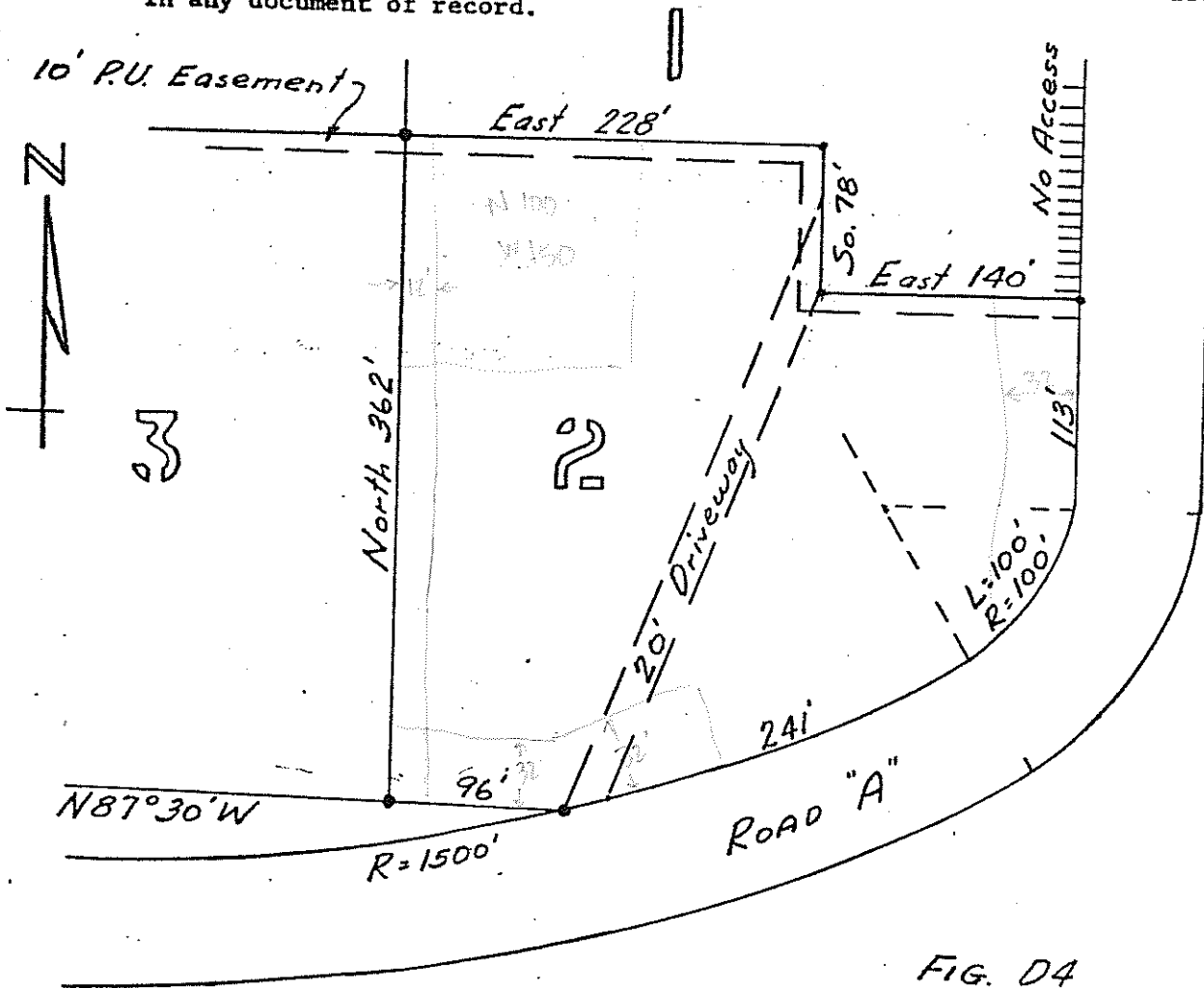


FIG. D4
Scale: 1" = 100'

Problem D5 - Wt. 12.5

John Buck has asked you to subdivide his property into two parts so that the Easterly part, adjacent to the highway, must equal 8 acres, and the direction of the line dividing the two parts must be N 55° 10' E. The descriptive portion of Buck's deed has been obtained from the Sagamon County records and is reproduced as follows:

Beginning at a 2 inch iron pipe at the intersection of the northerly line of the property of Robert Smith, as recorded in Book 74 of Official Records of Sagamon County, California, page 999, with the westerly R/W line of State Highway 47; thence along said R/W line N 47° 48' E, 1000.6 feet; thence leaving said highway N 62° 38' W, 573.3 along the southerly lands of Roy Weed, as recorded in Book 74, Official Records of said county, page 23, to a 4 inch x 4 inch redwood post marked R. Weed; thence S 76° 40' W, 330.3 feet along said lands of Weed; thence S 5° 26' W, 804.99 feet along said lands of Weed to the said northerly line of Smith; thence S 70° 39' E, 175.42 feet along said northerly line of Smith to the beginning of this description.

REQUIRED:

- Calculate the distance along Buck's Northerly line from the highway to the dividing line.
- Determine the length of the dividing line.
- Prepare a scale plat suitable for presentation to your client (with pencil) on 8½" x 11" paper, showing the perimeter description, adjoiners, and dividing line.

NOTE: Show all your calculations on a separate sheet. Your work will be judged both for effectiveness of presentation and for accuracy.

Problem D6 - Wt. 12.5

Determine the azimuth of the sun, and the local apparent time at observation station "A" (latitude: 38°55.0'N) at the instant in the afternoon when the sun's altitude is 25°40.0'N and its declination is -19°15.0'.

$$\cos A = \frac{\sin \delta}{\cos \phi \cos h} - \tan \phi \tan h$$

$$= \sin -19^{\circ}15'$$

$$\cos 38^{\circ}55' \times \cos 25^{\circ}40' - \tan 38^{\circ}55' \times \tan 25^{\circ}40'$$