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LAND SURVEYOR - 1975

C

Part C - Weight 50

This booklet contains the problems for Part C of this examination.

The general instructions are shown on the cover page of your workbook. Please read them.

When you have completed Part C arrange the problems in your workbook in proper sequence, and check your workbook to see that it is complete. No work will be accepted that is not turned in to the proctor at the close of the examination period.

You are to work the problems that are given in the examination booklet. You may make appropriate assumptions where they are asked for, or if a problem is incomplete, or if a problem is obviously in error. If an assumption is necessary, you should provide sufficient explanation so that the examiner can judge the reasons therefor. Assumptions must generally follow the logic and the requirements of the problem statement.

At the end of each problem, list any reference book, diagram or tables which you have used. Give book title, edition and page number.

You may use a self-contained calculator in this part of the examination. This means a hand operated type, or a battery operated type. Proctors are instructed to prohibit the use of any machine which requires a plug-in type power source.

You may keep this set of examination questions.

All problems in Part C are required.

ACC

Problem C-1 - Wt. 5

Instructions: Enter in your workbook the number of each part of this question and the letter which identifies your answer choice for that part.

1 The right of the sovereign to take private property for public use is called:

A Quitclaim B Escheatment C Eminent domain
D Patent E Easement

2 When subdividing a standard township in the system of Public Land Surveys, which section was surveyed first?

A 36 B 31 C 18 D 6 E 1

3 During the original U.S. Public Land Survey, the subdivision of quadrangles into townships would require that the range lines be run:

A parallel to the east boundary
B as a parallel of latitude
C parallel to the South boundary
D parallel to the West boundary
E due North
F none of these

4 If the SW corner of S31, R4W, T8S was lost, it would be restored by:

A old fences
B testimony
C corner accessories
D double proportionate measurement
E single proportionate measurement
F none of these

5 The south half of the SW 1/4 of a 1/4 section will have approximately how many acres?

A 10 acres
B 40 acres
C 20 acres
D none of the above

6 The 1/16 corner between the W 1/4 corner and the SW corner of Section 1

A 20 chains from the 1/4 corner
B 20 chains from the section corner
C half way between
D none of the above

ACC

Problem C-1 - Wt. 5

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F none of these

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A old fences D double proportionate measurement
B testimony E single proportionate measurement
C corner accessories F none of these

5 The south half of the SW 1/4 of a 1/4 section will have approximately how many acres?

A 10 acres C 20 acres
B 40 acres D none of the above

6 The 1/16 corner between the W 1/4 corner and the SW corner of Section 1

A 20 chains from the 1/4 corner
B 20 chains from the section corner
C half way between
D none of the above

Problem C2 - Wt. 10 (Required)

The figure drawn below represents a quadrilateral with the approximate values of the observed angles shown. Side AD is known.

REQUIRED:

5 A Which pair of triangles would yield the strongest determination (most reliable) of the length of the side BC?

Explain the factors involved when making this evaluation.

5 B What are the conditions that must be fulfilled in order to obtain mathematical consistency in the computation of the lengths of the lines?

Write the equations that express these conditions.

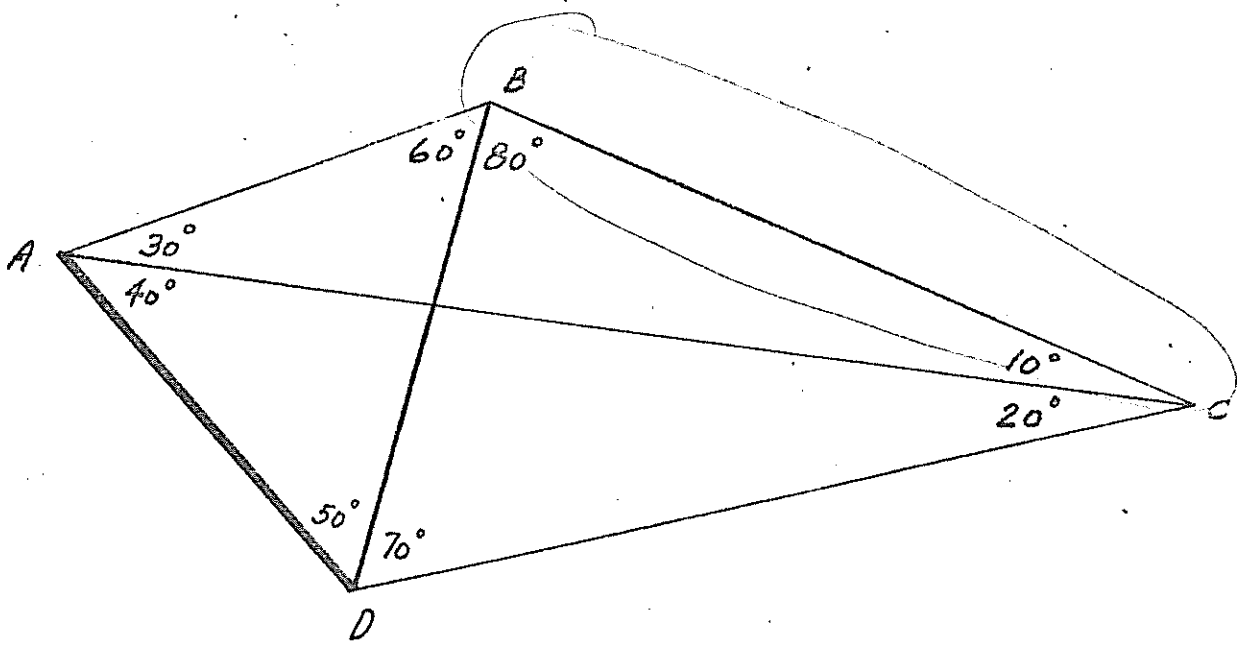


FIG. C2

Problem C3 - Wt. 10

Answer all parts.

Assume that Tract 16 is a square tract, oriented with the cardinal directions, with record dimensions of 1000 ft. by 1000 ft. Tract 16 was acquired by Jones by purchese from the original subdividers of the Lonesome Polecat Subdivision, which was platted and recorded in 1947 and has since seen no development. Explain your reasoning in answering the following questions.

2 A If Jones deeds to Brown the East half of Tract 16 on Jan. 10, 1963, and the West half of Tract 16 to Smith on Feb. 1, 1967, where would you set the Southeast corner of the Smith property if you found the distance between the original Southeast corner and the original Southwest corner of Tract 16 to be:

1. 1010 ft. 2. 990 ft.

2 B If Jones deeds to Brown the East 500 ft. of Tract 16 on Jan 10, 1963 and the West 500 ft. of Tract 16 to Smith on Feb 1, 1967, where would you set the Southeast corner of the Smith property if you found the distance between the original Southeast corner and the original Southwest corner of Tract 16 to be:

1. 1010 ft. 2. 990 ft.

2 C If Jones deeds to Brown the East 500 ft. of Tract 16 on Jan 10, 1963 and "all of Tract 16 except the East 500 ft." to Smith on Feb. 1, 1967, where would you set the Southeast corner of the Smith property if you found the distance between the original Southeast corner and the original Southwest corner of Tract 16 to be:

1. 1010 ft. 2. 990 ft.

2 D Assume that in Part B the Southwest corner of Tract 16 is LOST, where would you set the Southeast corner of the Smith property if you found proportionate distance between the original Southeast corner and the reestablished Southwest corner to be:

1. 1010 ft. 2. 990 ft.

2 E Jones deeds to Brown the East 500 ft. of Tract 16 on Jan. 10, 1963, and on Feb. 1, 1967 deeds to Smith the following property: "Beginning at the Southwest corner of Tract 16, thence Easterly, 500 ft. to a 3/4 inch iron pipe, thence Northerly, 1000 ft. to a 3/4 inch iron pipe, thence Westerly , 500 ft. to the Northwest corner of Tract 16, thence Southerly 1000 ft. to the point of beginning." If you recover the original Southwest and Southeast corners of Tract 16 and a 3/4 inch pipe 500 ft. east of the Southwest corner of Tract 16, where would you locate the Southwest corner of Brown's property if you find the distance between the Southeast corner and the Southwest corner of Tract 16 to be:

1. 1010 ft. 2. 990 ft.

Problem C4 - Wt. 10 (Answer both sections)

Section 1 - Wt. 5

On a vertical aerial photograph with a focal length of 100mm and a scale of 1:20,000 a vertical pole is visible. On the photograph the distance between the top of the pole and the nadir-point measures 35mm and the distance between the bottom of the pole and the nadir-point measures 25mm. Compute the height of the pole.

Section 2 - Wt. 5

The pole in Section 1 is also visible on the next vertical photograph of the strip. Compute the difference in parallax-bar readings for the top and lower end of the pole if the "B" (air base) equals 1000m.

Problem C5 - Wt. 5

A 50 foot strip of land owned by a railroad, cuts through the SE 1/4 of the SW 1/4 of Section 22 as shown below.

Show your work; give answer to the nearest hundreth of a foot.

REQUIRED

1/3 A What is the radius of the Northeasterly line of the railroad?

4 B What are the distances AB and AC?

2/3 C What are the chord length (ch) and the arc length (L) between B and C?

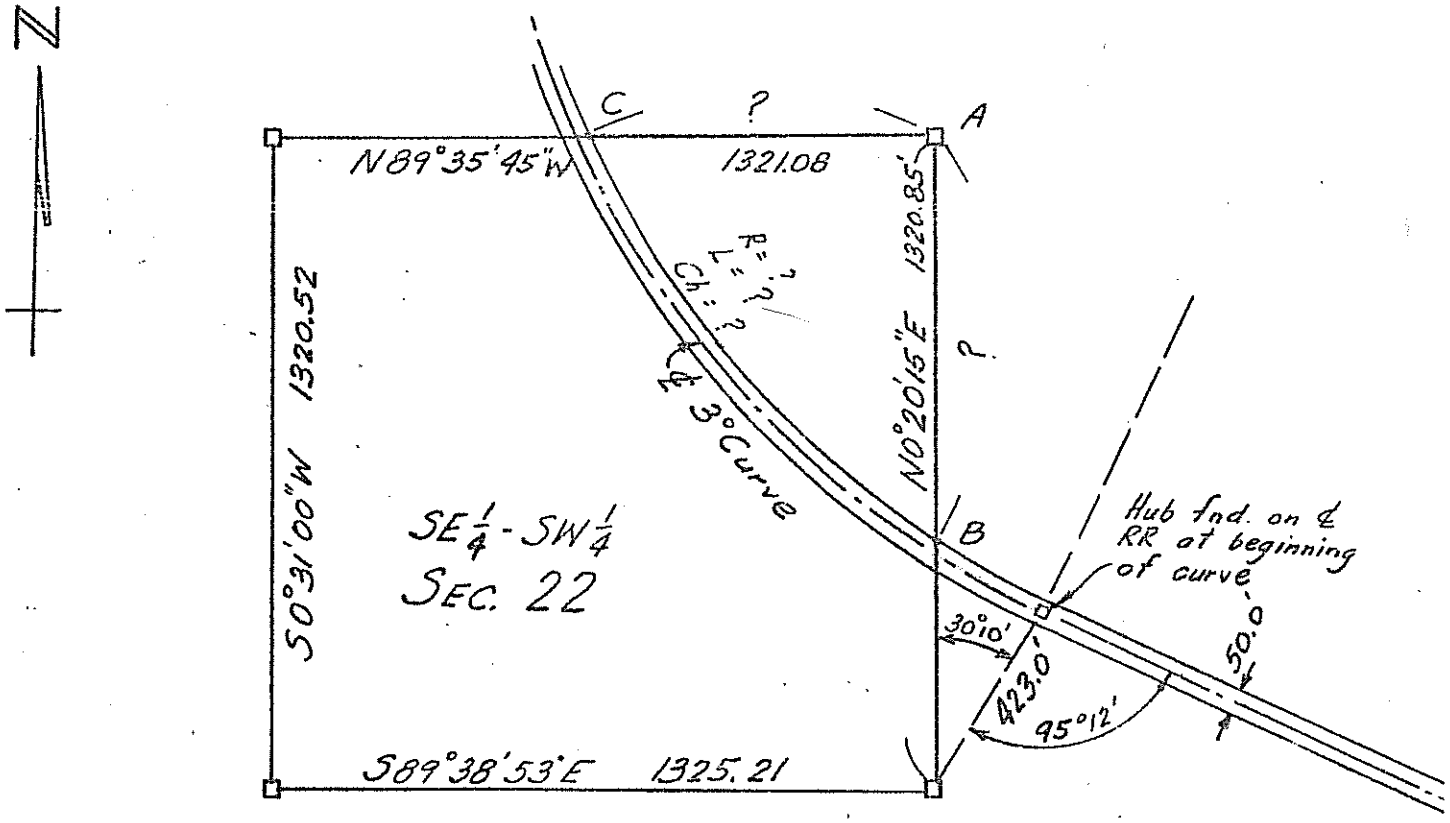


FIG. C5

Problem C6 - Wt. 10

The plat shown below shows the results of a field survey. The coordinate data is correct.

Section A - Wt. 5

Assume that you find the original monument at "F" to have coordinates of 32,486.80N & 15,346,20E Compute the correct bearing and distance from the Northeast corner of Section 2 to the South quarter corner of Section 36. (Give distances to the nearest 0.1 ft.)

Section B - Wt. 5

Assume that you find the original position at "F" to have coordinates as previously given in Part A above. Assume also that you have found rock mounds at "D" and "H". What location would you accept, or where would you set the North quarter corner of Section 1? Assume the usual "original survey" conditions prevail.

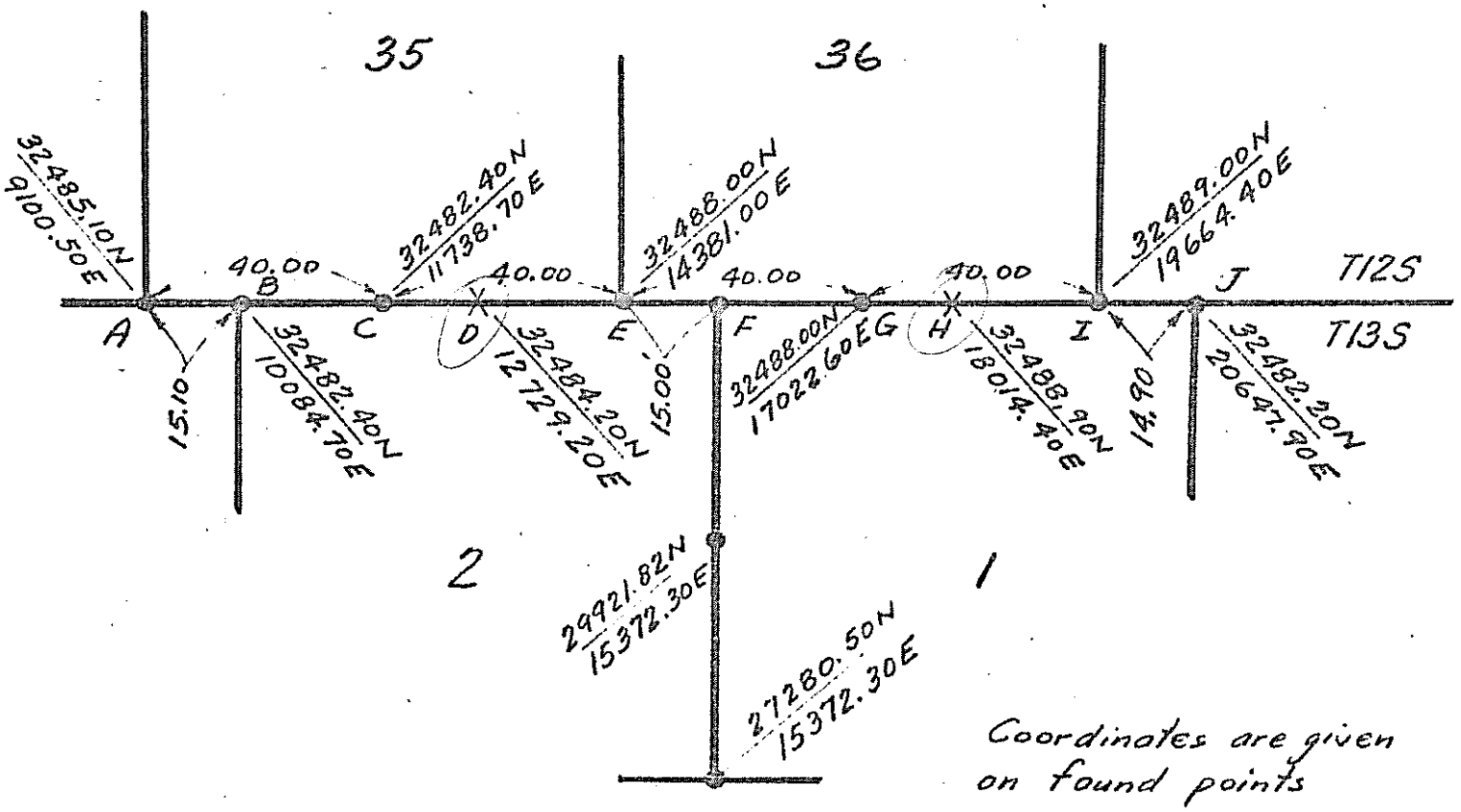


FIG. C6

Coordinates are given on found points

Record (GLO) distances given are in chains

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# 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, plus one chosen from D2 or D3, plus one chosen from D4 or D5.

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.

Problem D1 - Wt. 25 (Required)

You have been commissioned by a property owner to survey a fenced area located on the top of a hill in the City of Newmont. The parcel of land enclosed by the fence is to be sold to a public agency.

The plot on the following page represents the result of field work accomplished to date using a T-2 theodolite and an EDM. Three triangular shaped traverses were used which close according to the information given. The traverse closures need not be adjusted horizontally.

The concrete monuments on the exterior boundary of Parcel 1 are as called for in the quiet title decree description.

REQUIRED:

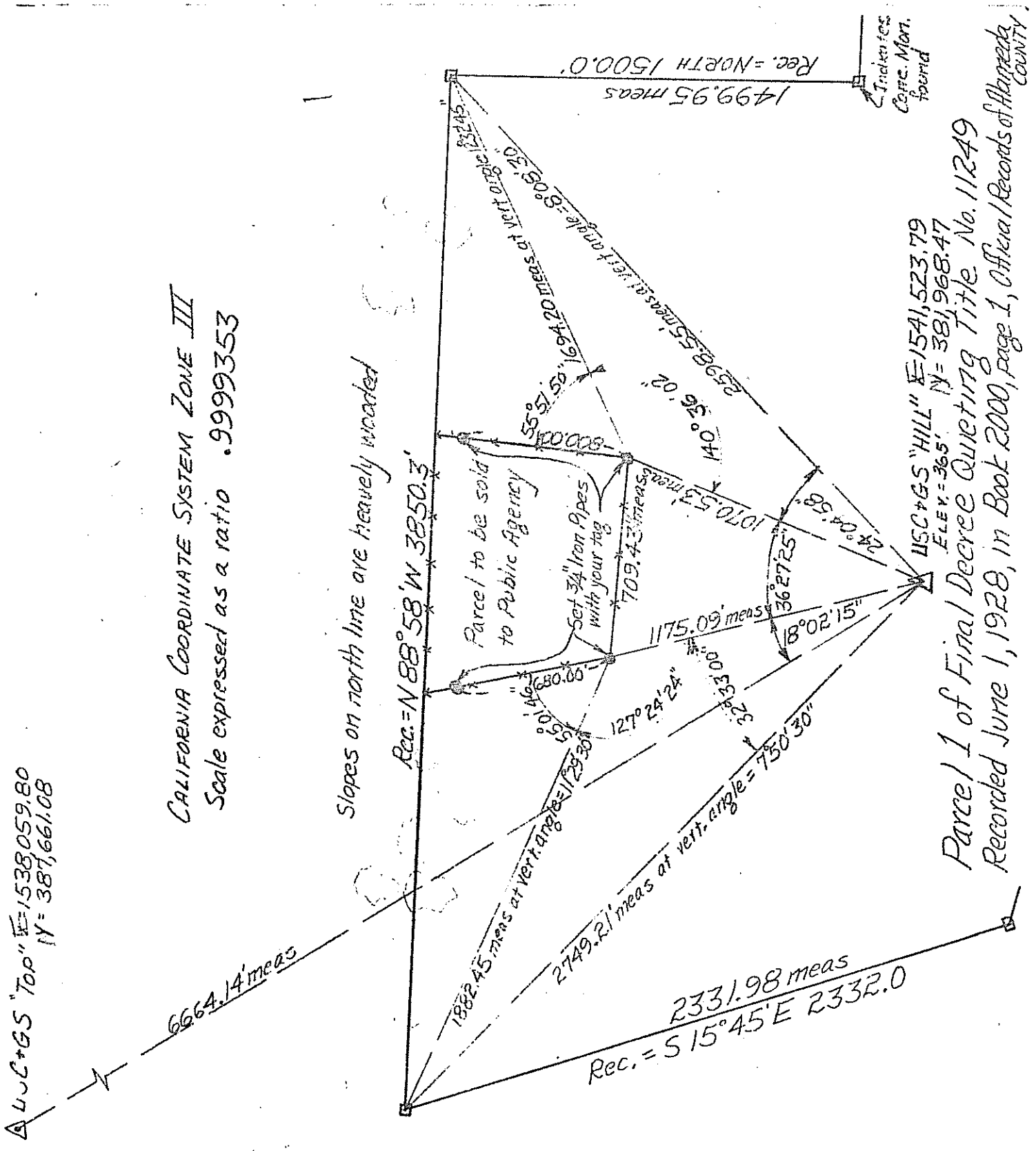
a. Calculate each of the following as they relate to the parcel subject to sale. Show all of your work.

   1. Bearings
   2. Distances
   3. Area ( in acres)

b. Prepare a description for the parcel subject to sale utilizing the California Coordinate System as the basis of hearings.

c. What are your options with respect to filing a record map as a follow-up to your survey? What should be done and why. Give reasons for your answer.

Problem D1 - Wt. 25 (Cont'd.)



NOTE: Work Problem D2 or D3 for 15 points.

Problem D2 - Wt. 15

The following page is reproduced data based upon the California Coordinate System - Zone III.

The drawing below shows a Section Corner with a reference to another station.

For △ RASCAL
$\phi$ = 37° 10' 16." 5517 N
$\lambda$ = 120° 13' 39." 9794 W
Elev = 509.8 metres

Constants for Zone III

Central Meridian = 120° 30'
$R_b$ = 27,512,992.04
$C^b$ = 2,000,000.00

Mean radius of the earth = 20,906,000 ft.

REQUIRED:

Determine the coordinates of the section corner in Zone III. Express values to the nearest 0.01 ft. Show all of your work.

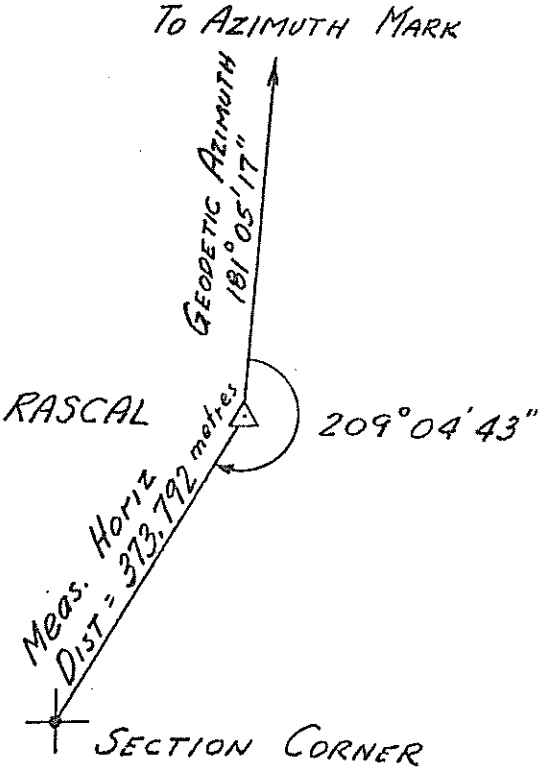



FIG. D2

# Lambert Projection for California III

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## Table II (Cont'd)

1" of Long. = 0°.6122320⁴ of θ

$R_b$ = 27 512 992.04
C = 2 000 000.00
CM = 120°30'00"

Problem D-2 (Cont'd)

| Long. | θ | Long. | θ | Long. | θ |
|---|---|---|---|---|---|
| 119° 26' | +0° 39' 10".9710 | 120° 01' | +0° 17' 45".2838 | 120° 36' | -0° 03' 40.4035 |
| 27 | +0 38 34.2371 | 02 | +0 17 08.5498 | 37 | -0 04 17.1375 |
| 28 | +0 37 57.5032 | 03 | +0 16 31.8159 | 38 | -0 04 53.8714 |
| 29 | +0 37 20.7693 | 04 | +0 15 55.0820 | 39 | -0 05 30.6053 |
| 30 | +0 36 44.0354 | 05 | +0 15 18.3481 | 40 | -0 06 07.3392 |
| 119° 31' | +0 36 07.3014 | 120° 06' | +0 14 41.6141 | 120° 41' | -0 06 44.0731 |
| 32 | +0 35 30.5675 | 07 | +0 14 04.8802 | 42 | -0 07 20.8071 |
| 33 | +0 34 53.8336 | 08 | +0 13 28.1463 | 43 | -0 07 57.5410 |
| 34 | +0 34 17.0997 | 09 | +0 12 51.4124 | 44 | -0 08 34.2749 |
| 35 | +0 33 40.3657 | 10 | +0 12 14.6785 | 45 | -0 09 11.0088 |
| 119° 36' | +0 33 03.6318 | 120° 11' | +0 11 37.9445 | 120° 46' | -0 09 47.7428 |
| 37 | +0 32 26.8979 | 12 | +0 11 01.2106 | 47 | -0 10 24.4767 |
| 38 | +0 31 50.1640 | 13 | +0 10 24.4767 | 48 | -0 11 01.2106 |
| 39 | +0 31 13.4301 | 14 | +0 09 47.7428 | 49 | -0 11 37.9445 |
| 40 | +0 30 36.6961 | 15 | +0 09 11.0088 | 50 | -0 12 14.6785 |
| 119° 41' | +0 29 59.9622 | 120° 16' | +0 08 34.2749 | 120° 51' | -0 12 51.4124 |
| 42 | +0 29 23.2283 | 17 | +0 07 57.5410 | 52 | -0 13 28.1463 |
| 43 | +0 28 46.4944 | 18 | +0 07 20.8071 | 53 | -0 14 04.8802 |
| 44 | +0 28 09.7604 | 19 | +0 06 44.0731 | 54 | -0 14 41.6141 |
| 45 | +0 27 33.0265 | 20 | +0 06 07.3392 | 55 | -0 15 18.3481 |

# 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° 06' | 27,294,529.78 | 216,462.26 | 101.13733 | -29.2 | 0.9999933 |
| 07 | 27,288,461.54 | 224,530.50 | 101.13733 | -43.2 | 0.9999901 |
| 08 | 27,282,393.30 | 230,598.74 | 101.13717 | -56.9 | 0.9999869 |
| 09 | 27,276,325.07 | 236,666.97 | 101.13717 | -70.2 | 0.9999838 |
| 10 | 27,270,256.84 | 242,735.20 | 101.13733 | -83.2 | 0.9999808 |
| 37° 11' | 27,264,188.60 | 248,803.44 | 101.13717 | -95.8 | 0.9999779 |
| 12 | 27,258,120.37 | 254,871.67 | 101.13717 | -108.0 | 0.9999751 |
| 13 | 27,252,052.14 | 260,939.90 | 101.13733 | -119.9 | 0.9999724 |
| 14 | 27,245,983.90 | 267,008.14 | 101.13733 | -131.4 | 0.9999697 |
| 15 | 27,239,915.66 | 273,076.38 | 101.13717 | -142.5 | 0.9999672 |
| 37° 16' | 27,233,847.43 | 279,144.61 | 101.13733 | -153.3 | 0.9999647 |
| 17 | 27,227,779.19 | 285,212.85 | 101.13750 | -163.7 | 0.9999623 |
| 18 | 27,221,710.94 | 291,281.10 | 101.13750 | -173.8 | 0.9999600 |
| 19 | 27,215,642.69 | 297,349.35 | 101.13750 | -183.5 | 0.9999577 |
| 20 | 27,209,574.44 | 303,417.60 | 101.13750 | -192.8 | 0.9999556 |

NOTE: Select Problem D2 or D3 for 15 points

Problem D3 - Wt. 15

The drawing at right shows a road profile for a short section of road construction which involves excavation and embankment. Assume that the excavated material has a shrinkage factor of 0.90.

The tabulation on the following page shows quantities of excavation and embankment with columns entitled "Enbankment plus Shrinkage" and "Mass Diagram Ordinate".

Free haul for this project is 500 feet.

REQUIRED:

a. Calculate the missing data in the two columns entitled "Embankment plus Shrinkage" and "Mass Diagram Ordinate". Complete the tabulation.

   You may reproduce the stationing in your workbook and relate the missing data to the stationing.

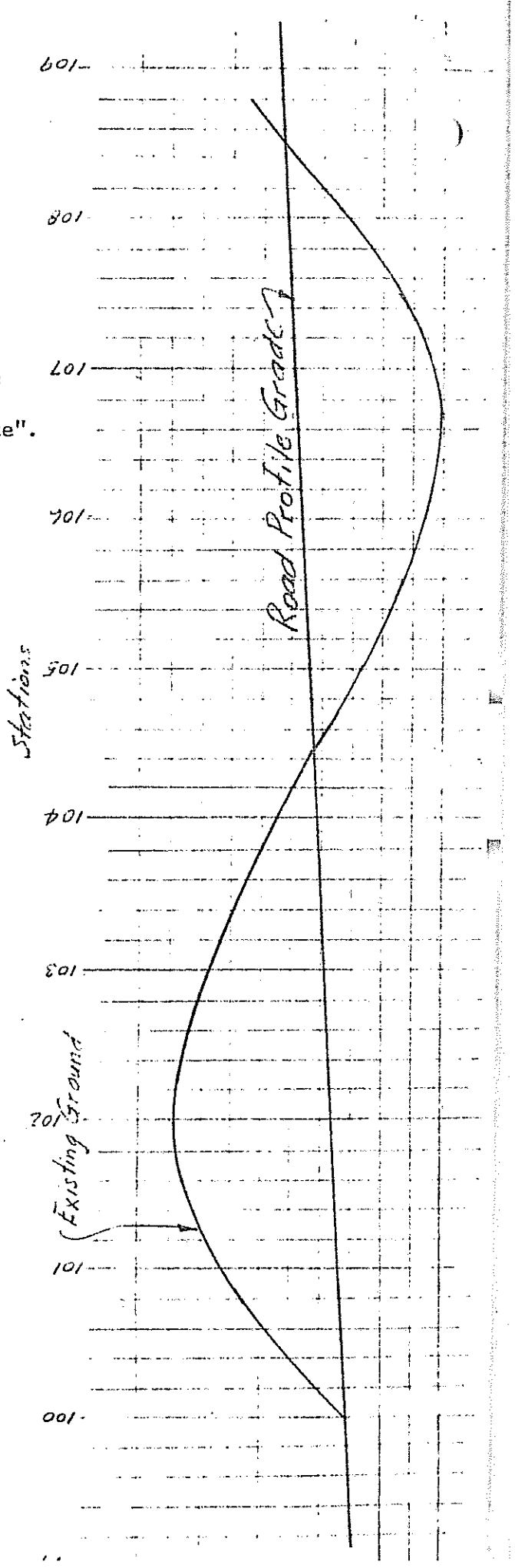
b. Plot a mass diagram. For this purpose, you may use a grid sheet in your workbook. Use scale as follows:

   Horizontal: 1"= 100' or 1"=1 station
   Vertical: 1"= 2000 cubic yards

c. On your mass diagram indicate the free haul sections.

d. Determine the average haul distance, the overhaul distance, and the station yards of overhaul. Show all of your calculations (Graphical method is acceptable).

e. Reproduce the road profile in your workbook, and indicate the direction of haul, and the disposition of the excavated material.



Problem D-3 - Wt. 15 (Cont'd)

| Station | Exc. CY | Emb. CY | Emb. + Shrinkage | Mass Diagram Ordinate |
|---|---|---|---|---|
| 100 | | | | |
| | 250 | 0 | | |
| +50 | | | | |
| | 750 | 0 | | |
| 101 | | | | |
| | 900 | 0 | | |
| +50 | | | | |
| | 1500 | 0 | | |
| 102 | | | | |
| | 850 | 0 | | |
| +50 | | | | |
| | 625 | 0 | | |
| 103 | | | | |
| | 415 | 0 | | |
| +50 | | | | |
| | 225 | 0 | | |
| 104 | | | | |
| | 100 | 0 | | |
| +50 | | | | |
| | 0 | 174 | | |
| 105 | | | | |
| | 0 | 395 | | |
| +50 | | | | |
| | 0 | 780 | | |
| 106 | | | | |
| | 0 | 1400 | | |
| +50 | | | | |
| | 0 | 1540 | | |
| 107 | | | | |
| | 0 | 515 | | |
| +50 | | | | |
| | 0 | 249 | | |
| 108 | | | | |
| | 0 | 0 | | |
| +50 | | | | |

NOTE: Work Problem D4 or D5 for 10 Points

Problem D4 - Wt. 10

A project area measures 100 km X 50 km with the longer distance lying in the East-West direction. The area is to be mapped at a scale of 1"=200 feet using a Kelsh plotter with a 5X enlargement-photo to model, and a 2X enlargement-model to map.

The terrain is fairly uniform with no extreme differences in elevation. The flight lines are to be in the East-West direction. One flight line is to coincide with the North boundary, and one flight line with the South boundary. The endlap is to be 65%, and the sidelap is to be at least 15%. One photograph is to be added at the beginning, and one at the end of each flight. The camera has a 6 inch focal length with a 9 inch square format.

REQUIRED:

a. Compute the flight height above average terrain,

b. Compute the total number of flight lines and the ground distance between each flight line.

c. Compute the number of photographs required in each flight line.

NOTE: Work Problem D4 or D5 for 10 Points

Problem D5 - Wt. 10

The astronomic azimuth of the sun may be determined from the

_____ hour angle method, or the
altitude method.

REQUIRED:

a. Describe each of the two methods identified, giving the appropopriate formula for each.

b. Write a brief discussion on the advantages and disadvantages of each of the two methods.

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LS D

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Please turn to Page 2 and
begin the examination.

Problem D1 - Wt. 25 (Required)

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The concrete monuments on the exterior boundary of Parcel 1 are as called for in the quiet title decree description.

REQUIRED:

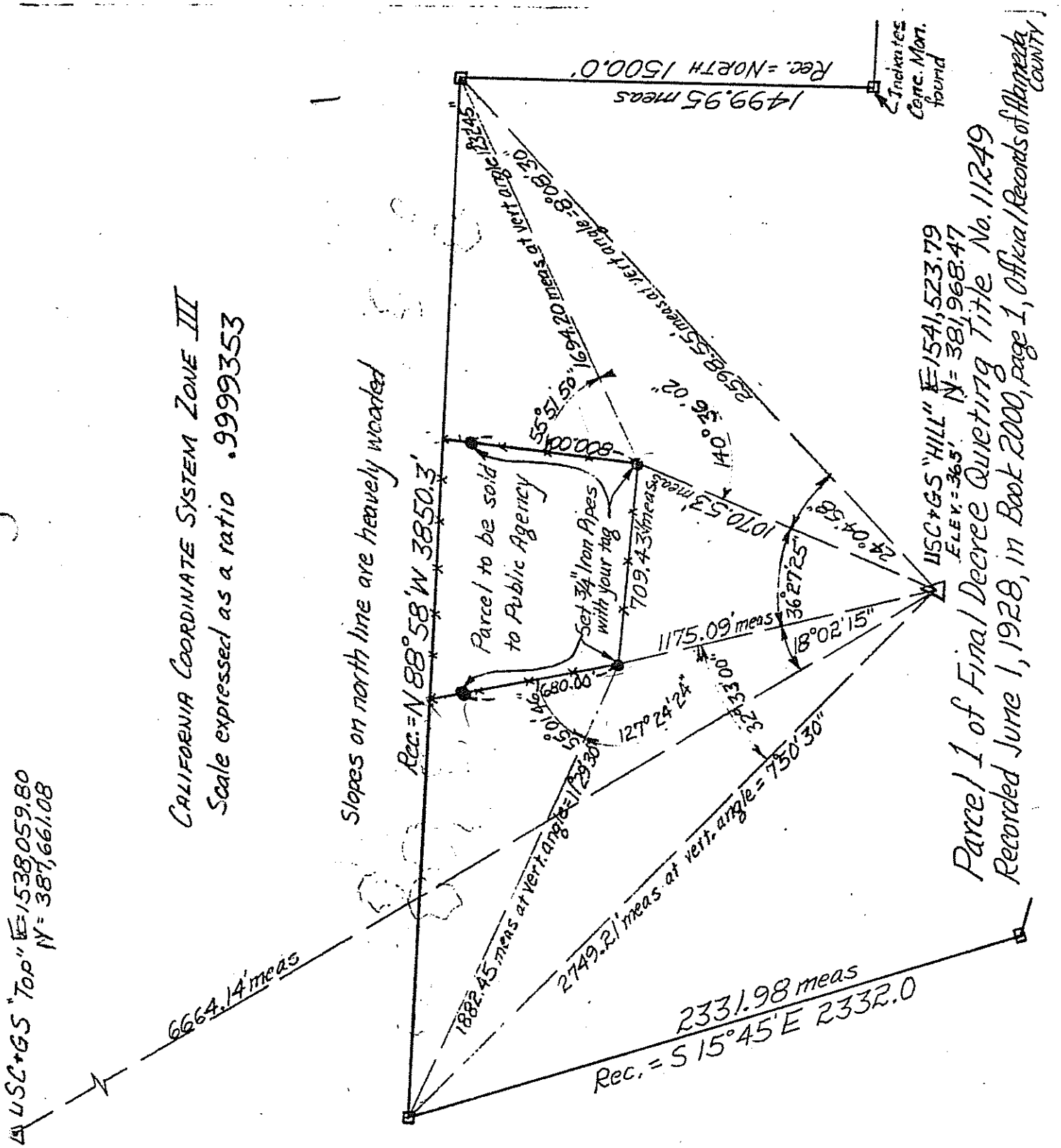
15 a. Calculate each of the following as they relate to the parcel subject to sale. Show all of your work.

1. Bearings
2. Distances
3. Area ( in acres)

7 b. Prepare a description for the parcel subject to sale utilizing the California Coordinate System as the basis of hearings.

3 c. What are your options with respect to filing a record map as a follow-up to your survey? What should be done and why. Give reasons for your answer.

Problem D1 - Wt. 25 (Cont'd.)



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Problem D2 - Wt. 15

The following page is reproduced data based upon the California Coordinate System - Zone III.

The drawing below shows a Section Corner with a reference to another station.

For △ RASCAL
$\phi$ = 37° 10' 16." 5517 N
$\lambda$ = 120° 13' 39." 9794 W — CONVERT TO COORD
Elev = 509 metres

Constants for Zone III

Central Meridian = 120° 30'
$R_b$ = 27,512,992.04
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Mean radius of the earth = 20,906,000 ft.

REQUIRED:

Determine the coordinates of the section corner in Zone III. Express values to the nearest 0.01 ft. Show all of your work.

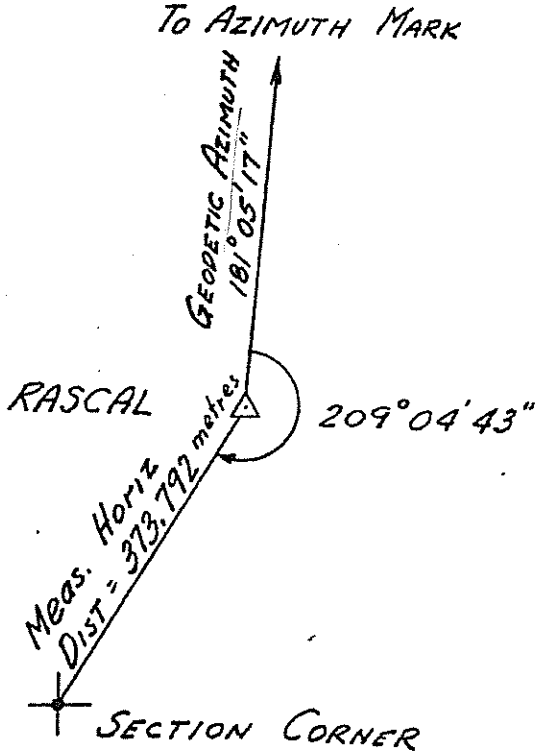


FIG. D2

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## Table II (Cont'd)

1" of Long. = 0".6122320⁴ of θ

$R_b = 27\,512\,992.04$
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$CM = 120°30'00"$

Problem D-2 (Cont'd)

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| 30 | +0 36 44.0354 | 05 | +0 15 18.3481 | 40 | -0 06 07.3392 |
| 119° 31' | +0 36 07.3014 | 120° 06' | +0 14 41.6141 | 120° 41' | -0 06 44.0731 |
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| 34 | +0 34 17.0997 | 09 | +0 12 51.4124 | 44 | -0 08 34.2749 |
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| 39 | +0 31 13.4301 | 14 | +0 09 47.7428 | 49 | -0 11 37.9445 |
| 40 | +0 30 36.6961 | 15 | +0 09 11.0088 | 50 | -0 12 14.6785 |
| 119° 41' | +0 29 59.9622 | 120° 16' | +0 08 34.2749 | 120° 51' | -0 12 51.4124 |
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| 43 | +0 28 46.4944 | 18 | +0 07 20.8071 | 53 | -0 14 04.8802 |
| 44 | +0 28 09.7604 | 19 | +0 06 44.0731 | 54 | -0 14 41.6141 |
| 45 | +0 27 33.0265 | 20 | +0 06 07.3392 | 55 | -0 15 18.3481 |

# 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° 06' | 27,294,529.78 | 216,462.26 | 101.13733 | -29.2 | 0.9999933 |
| 07 | 27,288,461.54 | 224,530.50 | 101.13733 | -43.2 | 0.9999901 |
| 08 | 27,282,393.30 | 230,598.74 | 101.13717 | -56.9 | 0.9999869 |
| 09 | 27,276,325.07 | 236,666.97 | 101.13717 | -70.2 | 0.9999838 |
| 10 | 27,270,256.84 | 242,735.20 | 101.13733 | -83.2 | 0.9999808 |
| 37° 11' | 27,264,188.60 | 248,803.44 | 101.13717 | -95.8 | 0.9999779 |
| 12 | 27,258,120.37 | 254,871.67 | 101.13717 | -108.0 | 0.9999751 |
| 13 | 27,252,052.14 | 260,939.90 | 101.13733 | -119.9 | 0.9999724 |
| 14 | 27,245,983.90 | 267,008.14 | 101.13733 | -131.4 | 0.9999697 |
| 15 | 27,239,915.66 | 273,076.38 | 101.13717 | -142.5 | 0.9999672 |
| 37° 16' | 27,233,847.43 | 279,144.61 | 101.13733 | -153.3 | 0.9999647 |
| 17 | 27,227,779.19 | 285,212.85 | 101.13750 | -163.7 | 0.9999623 |
| 18 | 27,221,710.94 | 291,281.10 | 101.13750 | -173.8 | 0.9999600 |
| 19 | 27,215,642.69 | 297,349.35 | 101.13750 | -183.5 | 0.9999577 |
| 20 | 27,209,574.44 | 303,417.60 | 101.13750 | -192.8 | 0.9999556 |

NOTE: Select Problem D2 or D3 for 15 points

Problem D3 - Wt. 15

The drawing at right shows a road profile for a short section of road construction which involves excavation and embankment. Assume that the excavated material has a shrinkage factor of 0.90.

The tabulation on the following page shows quantities of excavation and embankment with columns entitled "Enbankment plus Shrinkage" and "Mass Diagram Ordinate".

Free haul for this project is 500 feet.

REQUIRED:

a. Calculate the missing data in the two columns entitled "Embankment plus Shrinkage" and "Mass Diagram Ordinate". Complete the tabulation.

   You may reproduce the stationing in your workbook and relate the missing data to the stationing.

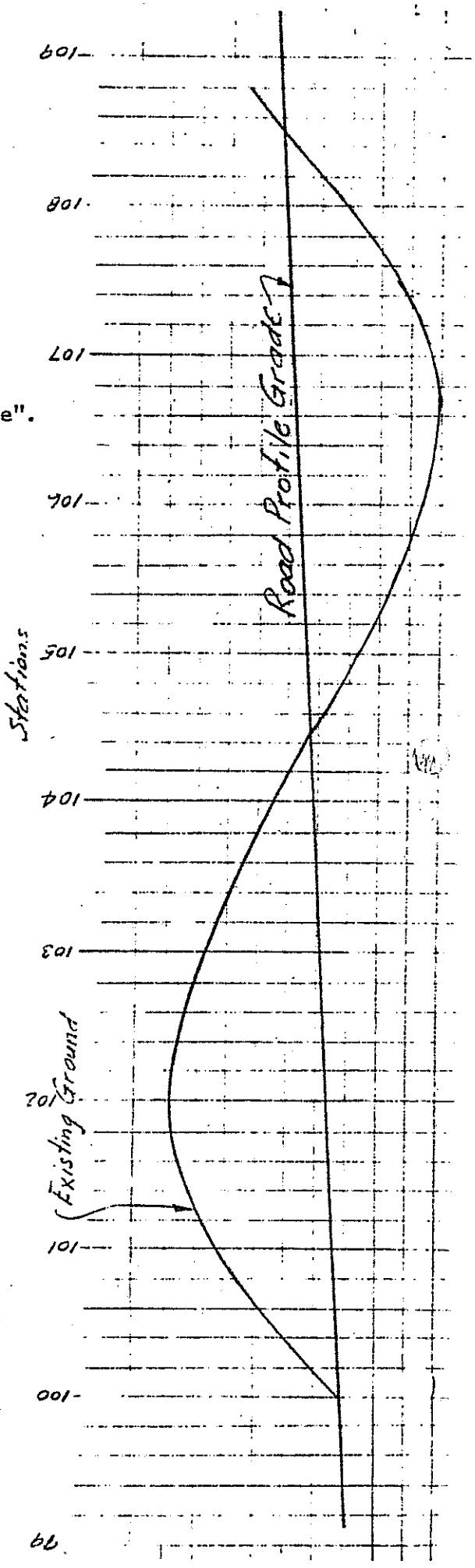
b. Plot a mass diagram. For this purpose, you may use a grid sheet in your workbook. Use scale as follows:

   Horizontal: 1"= 100' or 1"=1 station
   Vertical: 1"= 2000 cubic yards

c. On your mass diagram indicate the free haul sections.

d. Determine the average haul distance, the overhaul distance, and the station yards of overhaul. Show all of your calculations (Graphical method is acceptable).

e. Reproduce the road profile in your workbook, and indicate the direction of haul, and the disposition of the excavated material.



Problem D-3 - Wt. 15 (Cont'd)

| Station | Exc. CY | Emb. CY | Emb. + Shrinkage | Mass Diagram Ordinate |
|---|---|---|---|---|
| 100 | | | | |
| | 250 | 0 | | |
| +50 | | | | |
| | 750 | 0 | | |
| 101 | | | | |
| | 900 | 0 | | |
| +50 | | | | |
| | 1500 | 0 | | |
| 102 | | | | |
| | 850 | 0 | | |
| +50 | | | | |
| | 625 | 0 | | |
| 103 | | | | |
| | 415 | 0 | | |
| +50 | | | | |
| | 225 | 0 | | |
| 104 | | | | |
| | 100 | 0 | | |
| +50 | | | | |
| | 0 | 174 | | |
| 105 | | | | |
| | 0 | 395 | | |
| +50 | | | | |
| | 0 | 780 | | |
| 106 | | | | |
| | 0 | 1400 | | |
| +50 | | | | |
| | 0 | 1540 | | |
| 107 | | | | |
| | 0 | 515 | | |
| +50 | | | | |
| | 0 | 249 | | |
| 108 | | | | |
| | 0 | 0 | | |
| +50 | | | | |

NOTE: Work Problem D4 or D5 for 10 Points

Problem D4 - Wt. 10

A project area measures 100 km X 50 km with the longer distance lying in the East-West direction. The area is to be mapped at a scale of 1"=200 feet using a Kelsh plotter with a 5X enlargement-photo to model, and a 2X enlargement-model to map.

The terrain is fairly uniform with no extreme differences in elevation. The flight lines are to be in the East-West direction. One flight line is to coincide with the North boundary, and one flight line with the South boundary. The endlap is to be 65%, and the sidelap is to be at least 15%. One photograph is to be added at the beginning, and one at the end of each flight. The camera has a 6 inch focal length with a 9 inch square format.

REQUIRED:

3 a. Compute the flight height above average terrain, 12,000

4 b. Compute the total number of flight lines and the ground distance between each flight line. 12 @ 12,000' 11,880

3 c. Compute the number of photographs required in each flight line. 698

42 + 2 ADD
44 7700

$S = \frac{f}{h}$ $S = \frac{6}{h}$

9" PHOTO = 18,000 ft

328,084'

164,042'

(a) $\frac{1}{2000'} = \frac{6"}{h}$ $h = 12000'$

(b) ~~PHOTO~~ MODEL SCALE = $\frac{1"}{1000'}$ MAP TO MODEL 2X MODEL TO PHOTO 5X 10

PHOTO SCALE $\frac{1"}{2000'}$

1.35" OVERLAP
2 1/4" DISTORT

NOTE: Work Problem D4 or D5 for 10 Points

Problem D5 - Wt. 10

The astronomic azimuth of the sun may be determined from the

hour angle method, or the
altitude method.

REQUIRED:

a. Describe each of the two methods identified, giving the appropopriate formula for each.

b. Write a brief discussion on the advantages and disadvantages of each of the two methods.

$$\text{ALT} = \cos\tfrac{1}{2}A = \sqrt{\frac{\cos s \cos(s-p)}{\cos l \cos h}}$$