593

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BOARD FOR PROFESSIONAL
ENGINEERS AND LAND SURVEYORS
2535 Capitol Oaks Drive, Suite 300
Sacramento, California 95833-2926

EXAMINEE ID NUMBER: _____

2005 CALIFORNIA STATE SPECIFIC PROFESSIONAL LAND SURVEYOR EXAMINATION

EXAMINATION BOOKLET

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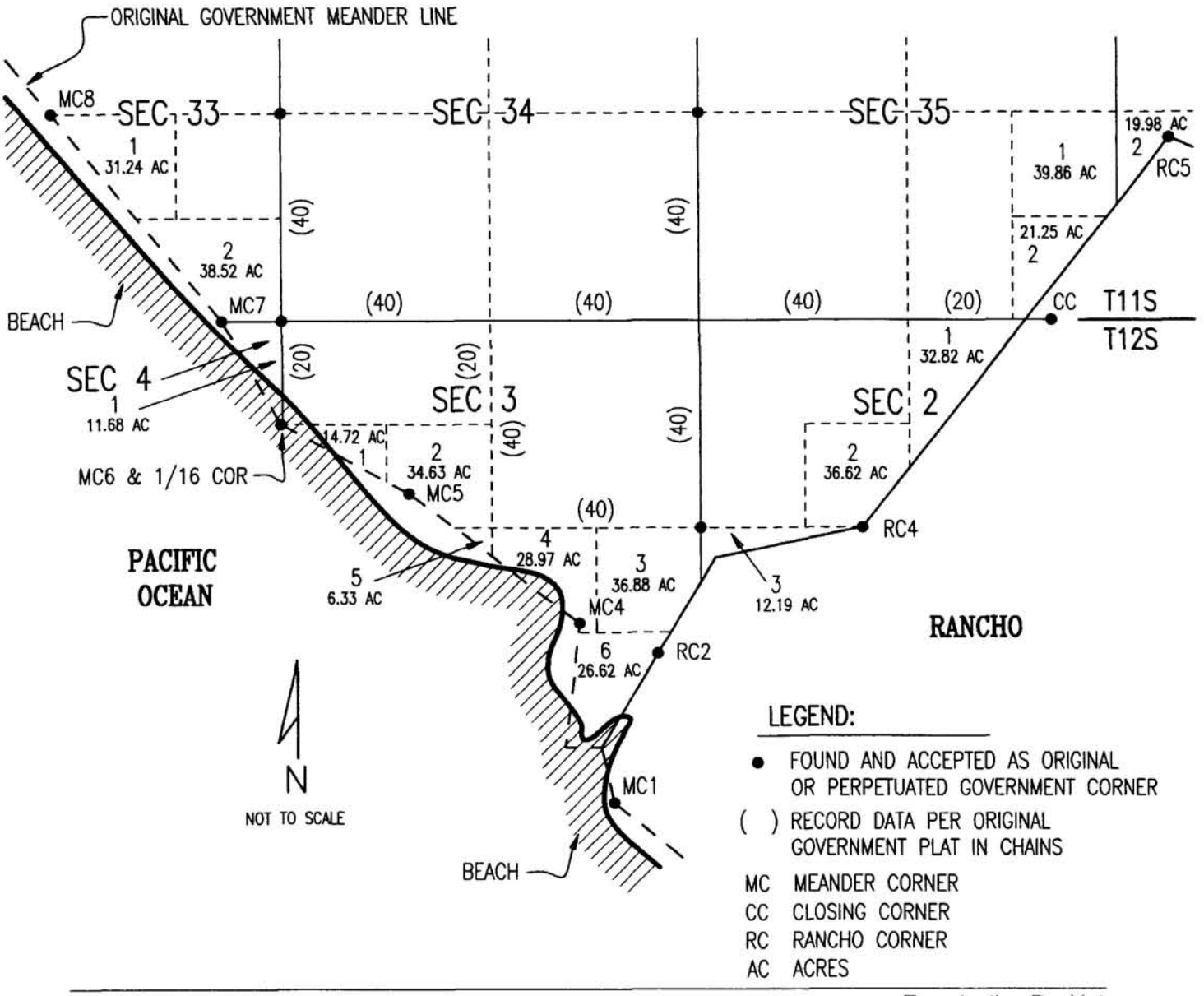
PROBLEM 1
125 Points

PROBLEM STATEMENT

Use the information and diagram below to answer the Problem Requirements on Pages 3 and 4.

Your company has been hired by the county to survey the lands of Ramirez, being Sections 2, 3 and 4 of T12S, R15W, Mount Diablo Meridian (M.D.M.) for the purpose of updating their geographic information system. They request that all government corners be recovered and/or re-established.

YOUR MAP OF SURVEY SHOWING A PORTION OF TOWNSHIP 11 SOUTH
AND TOWNSHIP 12 SOUTH, RANGE 15 WEST, MOUNT DIABLO MERIDIAN (M.D.M.)



PROBLEM REQUIREMENTS

Answer the following in the Solution Booklet for Problem 1. Make no assumptions. Only the answers written in the spaces provided in the Problem 1 Solution Booklet will be graded. Your calculations do not need to be shown and will not be graded. All responses related to this problem shall be based on the *1973 Manual of Surveying Instructions.*

1. Identify the controlling element(s) (corners and/or lines) and **briefly** describe the method you would use to re-establish the following corners. Once you have re-established a corner, you may use it as a controlling element for subsequent responses.

   a. NE section corner of Section 3. — **Controlling Element(s): 6 Points; Method: 6 Points**

   b. NE corner of Lot 1 of Section 2. — **Controlling Element(s): 6 Points; Method: 7 Points**

   c. North 1/4 corner of Section 3. — **Controlling Element(s): 6 Points; Method: 6 Points**

   d. Center 1/4 corner of Section 3. — **Controlling Element(s): 6 Points; Method: 9 Points**

   e. Rancho corner on the southerly line of Government Lot 3, Section 2. — **Controlling Element(s): 6 Points; Method: 9 Points**

The county now wishes to purchase from Ramirez the entire NW 1/4 (including Government Lots 1 and 2) of Section 3, T12S, R15W, M.D.M., except the north 600 feet, for the purpose of creating a new county ocean-side park.

2. Identify the controlling element(s) (corners and/or lines) and **briefly** describe the method(s) you would use to establish the corners on the west line of the land that the county wishes to acquire from Ramirez.

   a. NW corner — **Controlling Element(s): 6 Points; Method: 6 Points**

   b. SW corner — **Controlling Element(s): 6 Points; Method: 6 Points**

Go on to the next page.

PROBLEM 1 (Continued)

PROBLEM REQUIREMENTS (Continued)

After the county has acquired the above property, Ramirez sells the remaining portion of his property by deed to Willis per the following description:

> The N ½ of the NW ¼ of the NW ¼ and the N ½ of the NE ¼ of the NW ¼ of Section 3, T12S, R15W, M.D.M., containing 40 acres.

Willis wishes to build a fence along her south property line. She requests that you establish her south boundary and set line points every 200 feet along this boundary for construction purposes only.

3. Prior to beginning this survey, what **two** actions must you take to comply with California state law? **Actions: 16 Points**

4. a. Identify the controlling element(s) for establishing her south boundary. **Controlling Element(s): 7 Points**

b. Identify the **most** important issue regarding the establishment of her south boundary and **briefly** justify your response. **Issue: 3 Points** **Justification: 5 Points**

5. What document, if any, **must** you prepare in order to finalize this survey? **Document: 3 Points**

PROBLEM 2
135 Points

PROBLEM STATEMENT

Use the information below and the diagram on the facing page to answer Problem Requirements 1a and 1b.

You are the surveyor in responsible charge of a small survey company working on a project within Block M of the Sweet City Subdivision.

PROBLEM REQUIREMENTS

Answer the following in the Solution Booklet for Problem 2. Make no assumptions. Only the answers written in the spaces provided in the Problem 2 Solution Booklet will be graded. Your calculations do not need to be shown and will not be graded.

The owners of Lots 4 and 10 of Block M, have asked your company to prepare two legal descriptions for a lot line adjustment between Lots 4 and 10 of Block M of the Sweet City Subdivision, based on record information shown in Figure 1 on Page 7. Your staff has prepared the following legal descriptions for your review.

Proposed Parcel C
That portion of Block M, in the Sweet City Subdivision, County of Sky, State of California, as shown on that map recorded in Book 10, Page 50 of maps, of said County, described as follows:

Beginning at the southwest corner of said Block M; thence N 21° 07' W along the westerly line of Block M a distance of 160.8 feet to the northwest corner of Lot 10 of said Block M, said point being the True Point of Beginning; thence East along the north line of Lots 10 and 4, 110 feet; thence southerly, parallel with the west line of Lot 4, 50 feet to the southerly line of Lot 4; thence West along the south line of Lots 4 and 10, 90.7 feet to the southwest corner of Lot 10; thence N 21° 07' W along the westerly line of Lot 10, 53.6 feet to the True Point of Beginning.

Proposed Parcel D
That portion of Block M, in the Sweet City Subdivision, County of Sky, State of California, as shown on that map recorded in Book 10, Page 50 of maps, of said County, described as follows:

Beginning at the southeast corner of said Block M; thence North along the east line of Block M, 150 feet to the northeast corner of Lot 4 of said Block M, being the True Point of Beginning; thence West along the north line of Lot 4, 90 feet; thence South 50 feet to the south line of said Lot 4; thence East along the south line of Lot 4, 90 feet to the southeast corner of said Lot 4; thence North along the east line of Lot 4, 50 feet to the True Point of Beginning.

1. a. Your analysis of the descriptions prepared by your staff reveals a potential problem. Identify this problem and describe **two** reasons why the problem may occur. — **Problem: 10 Points** **Reasons: 15 Points**

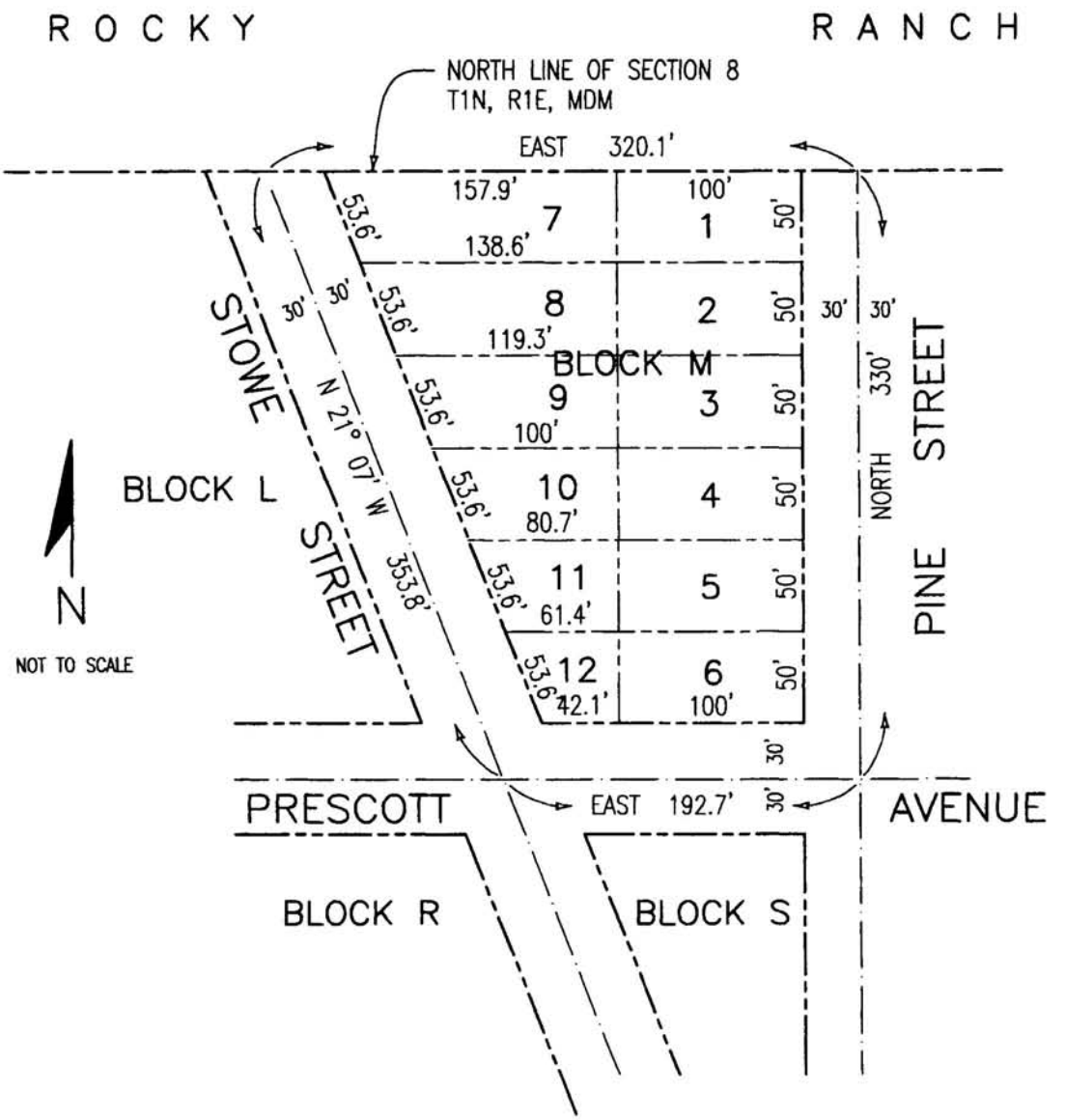
b. What action must be completed to transfer title for this lot line adjustment? — **Answer: 5 Points**

PROBLEM 2 (Continued)

FIGURE 1

RECORD PLAT OF SWEET CITY SUBDIVISION

BOOK 10, PAGE 50 OF MAPS, SKY COUNTY, CALIFORNIA
MARCH, 1938
BEING A SUBDIVISION OF A PORTION OF THE NORTHEAST
QUARTER OF SECTION 8, T1N, R1E, MDM



SURVEYOR'S NOTE:
SET 1" IRON PIPE AND TAG L.S. 0000 AT ALL LOT CORNERS

Go on to the next page.

PROBLEM 2 (Continued)

PROBLEM STATEMENT

Use the information below, Figure 1 on the previous page, and Figure 2 on the facing page to answer Problem Requirements 2a through 4c.

The owners to the north in Block M ask you to survey the boundaries of their land that is described as follows:

Parcel A
Lots 1 and 7 and the North half of Lot 2, all in Block M of Sweet City Subdivision, according to the map of Sweet City, recorded in Book 10 of Maps, Page 50, Official Records of Sky County, State of California, being the lands of Dan Dean as described in Book 14 of Deeds, Page 37, Sky County Records.

Parcel B
The North 25.00 feet of Lot 8 of Block M of Sweet City Subdivision, according to the map of Sweet City, recorded in Book 10 of Maps, Page 50, Official Records of Sky County, State of California, being the lands of Dan Dean as described in Book 14 of Deeds, Page 37, Sky County Records.

PROBLEM REQUIREMENTS

Answer the following in the Solution Booklet for Problem 2. Make no assumptions. Only the answers written in the spaces provided in the Problem 2 Solution Booklet will be graded. Your calculations do not need to be shown and will not be graded.

Research of records discloses that the original government survey for the township was completed in 1881. No other survey records are available. No centerline monuments were ever set. No other occupation or improvements exist on the block. Figure 1 shows the original record subdivision plat containing your client's land. Figure 2 shows the results of your survey.

2. Based on the measurements shown in Figure 2, calculate your client's property line distances to the nearest 0.01' and **briefly** describe the method used to determine each of the following distances:

- **a.** the East line of Lot 1
- **b.** the West line of Lot 7
- **c.** the West line of Parcel B

Distances: 18 Points
Methods: 30 Points

3. Identify any rights that may exist in relation to your client's property and Rocky Ranch U.S. Air Force Base. Provide a **brief** justification for your answer.

Answer: 5 Points
Justification: 15 Points

For Problem Requirement 4, consider **only** the land within Section 8.

4. a. Identify any title issues that may exist adjacent to your client's property. Provide a **brief** justification for your answer.

Answer: 6 Points
Justification: 11 Points

b. If any title issues exist and your client's attorney is **able** to locate all parties involved, what is the **most** appropriate action to take in order to resolve the title issue(s)?

Answer: 10 Points

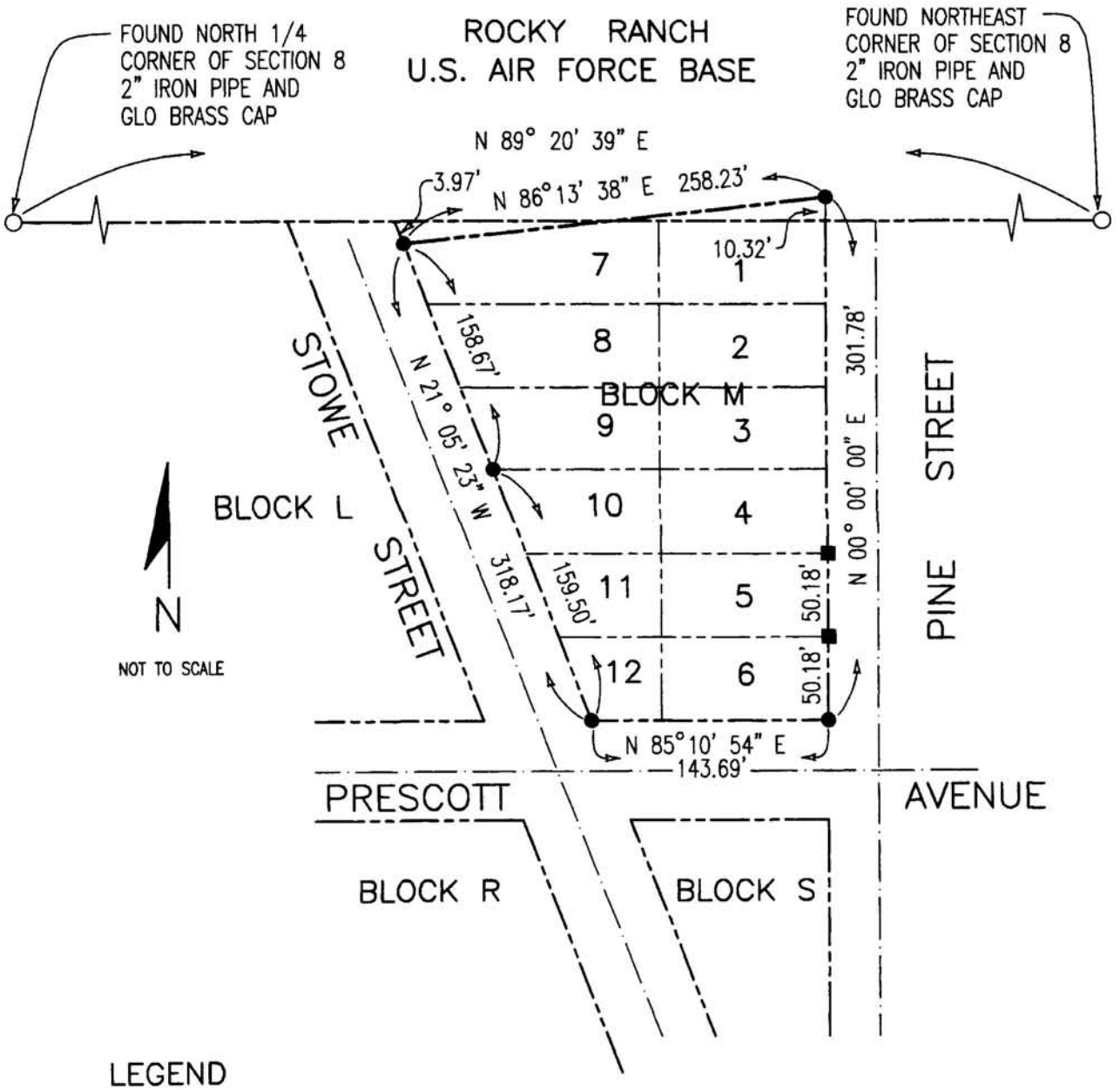
c. If any title issues exist and your client's attorney is **unable** to locate all parties involved, what is the **most** appropriate action to take in order to resolve the title issue(s)?

Answer: 10 Points

PROBLEM 2 (Continued)

FIGURE 2

RESULTS OF YOUR SURVEY



LEGEND

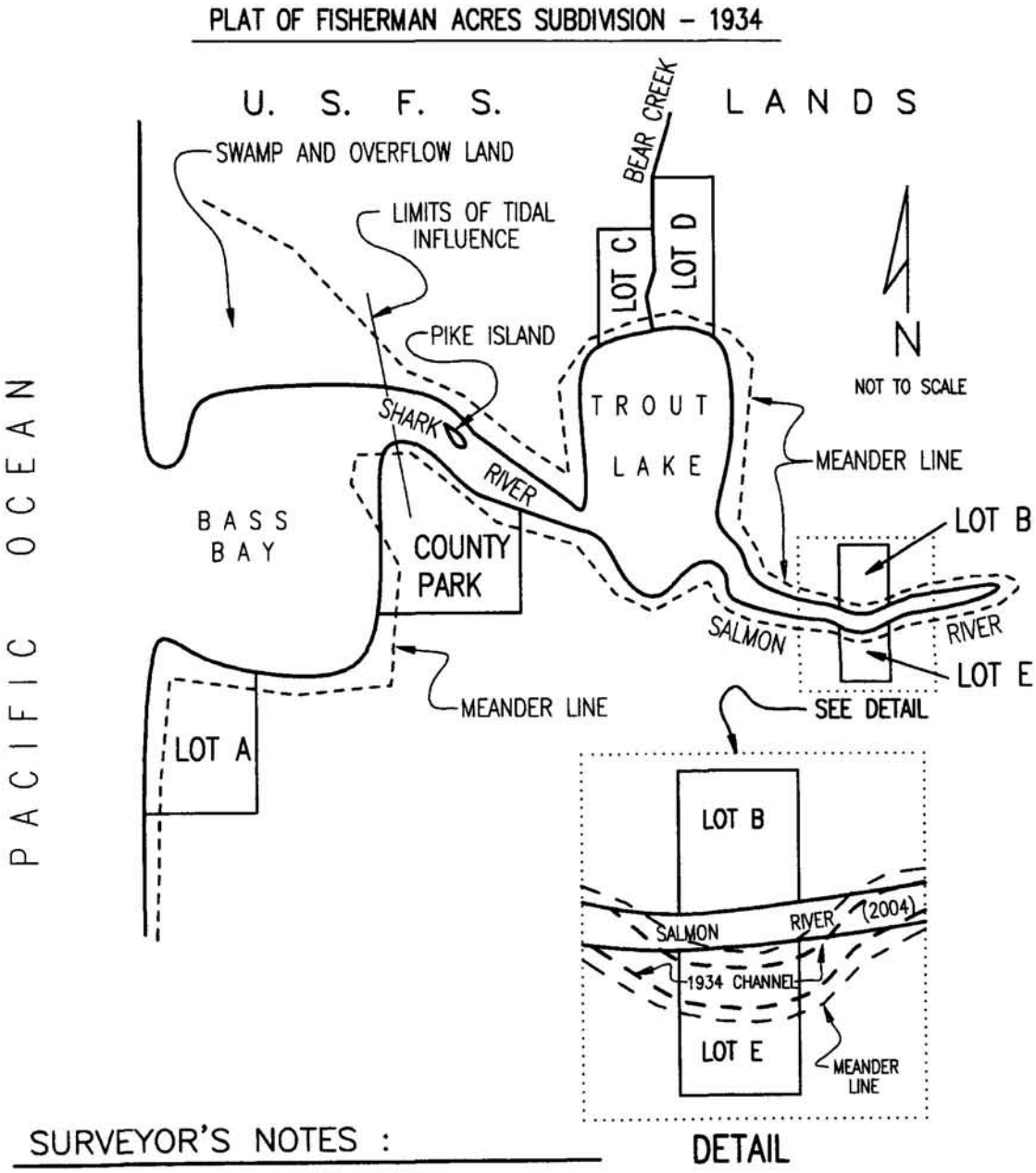
- ● FOUND ORIGINAL, UNDISTURBED 1" IRON PIPE L.S. 0000 PER SWEET CITY SUBDIVISION MAP
- ■ FOUND RECENT 2" IRON PIPE, NO TAG, NO RECORD

Go on to the next page.

PROBLEM 3
70 Points

PROBLEM STATEMENT

Use the diagram below to answer the Problem Requirements on the facing page.



SURVEYOR'S NOTES :

- SHARK RIVER IS A NAVIGABLE RIVER
- TROUT LAKE IS A NAVIGABLE LAKE
- SALMON RIVER AND BEAR CREEK ARE NON–NAVIGABLE
- CHANNEL FOR SALMON RIVER HAS CHANGED

PROBLEM 3 (Continued)

PROBLEM REQUIREMENTS

Answer the following in the Solution Booklet for Problem 3. Make no assumptions. Only the answers written in the spaces provided in the Problem 3 Solution Booklet will be graded.

Your client is considering purchasing a lot in Fisherman Acres Subdivision and the attorney for your client has asked for your opinion in determining the following.

1. a. The deeds for Lot B and Lot E both call to Salmon River. If the channel gradually changed location, what effect, if any, would this have on the common boundary of the two lots? **Briefly** explain your answer. — **Answer: 4 Points** **Explanation: 7 Points**

b. The deeds for Lot B and Lot E both call to Salmon River. If the location of the channel changed during the 1997 "El Niño" flood, what effect, if any, would this have on the common boundary of the two lots? **Briefly** explain your answer. — **Answer: 5 Points** **Explanation: 10 Points**

c. The deed for Lot A calls to Bass Bay. Describe the northerly property line of Lot A. **Briefly** explain your answer. — **Description: 3 Points** **Explanation: 5 Points**

d. The deed for Lot C calls to Trout Lake. Describe the southerly boundary of Lot C. **Briefly** explain your answer. — **Description: 4 Points** **Explanation: 7 Points**

e. The deeds for Lot C and Lot D both call to Bear Creek. Describe the easterly boundary of Lot C. **Briefly** explain your answer. — **Description: 3 Points** **Explanation: 5 Points**

f. If Pike Island was formed during the 1997 "El Niño" flood, who would own the island? **Briefly** explain your answer. — **Answer: 3 Points** **Explanation: 5 Points**

2. Which law, rule, or regulation governs water boundaries in California? — **Answer: 9 Points**

Go on to the next page.

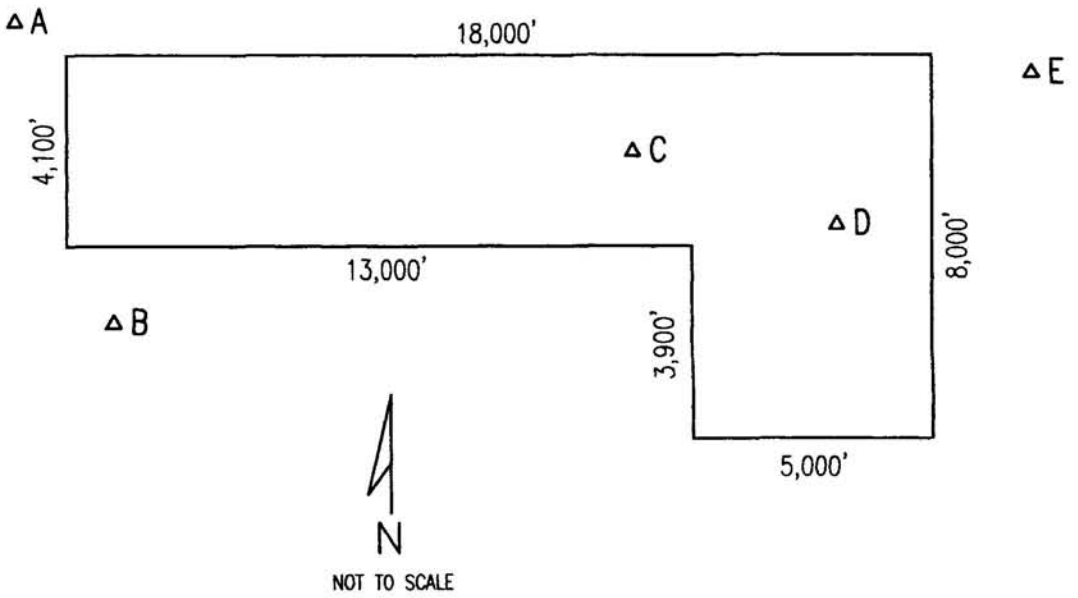
PROBLEM 4
70 Points

PROBLEM STATEMENT – Part A

Use the information and diagram below and the control data sheet on the facing page to answer the Problem 4, Part A, Problem Requirements on Page 18.

Your client, a local airplane glider club, asks you to provide mapping services, based on state plane coordinates, for their property shown below.

Your project planning, research, and field inspection indicate that the control stations shown on the control data sheet on the facing page exist in the proximity of the project area.



PROBLEM 4 (Continued)

Control Data Sheet

Designation	**Station A**		
NAD 83 (1992)	36 46 57.00369(N)	118 11 04.99347(W)	ADJUSTED
NAVD 88	1,213.5 (meters)	3,981 (feet)	GPS Obs.
Epoch Date	1991.35		
Horizontal Order	B		
Vertical Order			

	North	East	Units	Scale Factor	Combined Factor	Converg.
SPC CA 4	2,168,995.72	6,800,415.07	sFT	0.999944485	0.999754085	+0° 29' 10.987"

Horizontal coordinates were established by GPS observations.

Designation	**Station B**		
NAD 83 (1998)	36 45 41.75797(N)	118 11 01.36978(W)	ADJUSTED
NAVD 88	1,252.249 (meters)	4,108.42 (feet)	LEVELING
Epoch Date	1998.50		
Horizontal Order	First		
Vertical Order	Second Class II		

	North	East	Units	Scale Factor	Combined Factor	Converg.
SPC CA 4	2,161,388.96	6,800,774.51	sFT	0.999943557	0.999747088	+0° 29' 13.149"

Horizontal coordinates were established by GPS observations.

Designation	**Station C**		
NAD 83 (1992)	36 46 04.28918(N)	118 09 14.86484(W)	ADJUSTED
NAVD 88	1,201.48 (meters)	3,941.8 (feet)	VERTCON
Epoch Date	1991.35		
Horizontal Order	Third		
Vertical Order	Third		

	North	East	Units	Scale Factor	Combined Factor	Converg.
SPC CA 4	2,163,742.42	6,809,420.22	sFT	0.999943821	0.999755316	+0° 30' 16.688"

Horizontal coordinates were established by classical geodetic methods.

Designation	**Station D**		
NAD 83 (1998)	36 45 49.83828(N)	118 07 55.13360(W)	ADJUSTED
NAVD 88	1,226.73 (meters)	4,024.7 (feet)	VERTCON
Epoch Date	1998.50		
Horizontal Order	Second		
Vertical Order	Third		

	North	East	Units	Scale Factor	Combined Factor	Converg.
SPC CA 4	2,162,338.96	6,815,920.23	sFT	0.999943651	0.999751184	+0° 31' 04.255"

Horizontal coordinates were established by classical geodetic methods.

Designation	**Station E**		
NAD 83 (1992)	36 46 45.34289(N)	118 07 07.64438(W)	ADJUSTED
NAVD 88	1,215.371 (meters)	3,987.43 (feet)	ADJUSTED
Epoch Date	1991.35		
Horizontal Order	B		
Vertical Order	First Class II		

	North	East	Units	Scale Factor	Combined Factor	Converg.
SPC CA 4	2,167,987.05	6,819,732.56	sFT	0.999944333	0.999753648	+0° 31' 32.586"

Horizontal coordinates were established by GPS observations.

Go on to the next page.

PROBLEM 4 (Continued)

PROBLEM REQUIREMENTS – Part A

Answer the following in the Solution Booklet for Problem 4. Make no assumptions. Only the answers written in the spaces provided in the Problem 4 Solution Booklet will be graded. Your calculations do not need to be shown and will not be graded.

1. To be in conformance with California state law, which stations on the control data sheet must you use to establish your coordinates? **Briefly** justify your answer. **Answer: 6 Points** **Justification: 4 Points**

2. Why is it important to work in the correct zone when determining survey measurements for this project? **Answer: 5 Points**

3. Use the information provided for Station B and Station D to answer **3a** through **3c** below.

   a. Calculate the average combined factor between Stations B and D. **Answer: 4 Points**

   b. Calculate the ground distance between Stations B and D. **Answer: 4 Points**

   c. What is the geodetic azimuth from Station B to Station D? **Answer: 4 Points**

PROBLEM 4 (Continued)

PROBLEM REQUIREMENTS – Part A (Continued)

Answer the following in the Solution Booklet for Problem 4. Make no assumptions. Only the answers written in the spaces provided in the Problem 4 Solution Booklet will be graded. Your calculations do not need to be shown and will not be graded.

You have determined that topographic mapping of the area would best be accomplished using photogrammetric methods. The following information is given:

- C-factor of 1200
- 5' contour interval
- 6" focal length
- 9" x 9" format
- sidelap = 30%; endlap = 60%

4. a. What is the flying height above mean terrain? **Answer: 3 Points**

b. What is the **minimum** number of flight lines required to map the desired area? **Answer: 4 Points**

c. What effect, if any, would increasing the sidelap to 40% have on the **minimum** number of flight lines for this project? **Briefly** explain your answer. **Answer: 3 Points**
Explanation: 5 Points

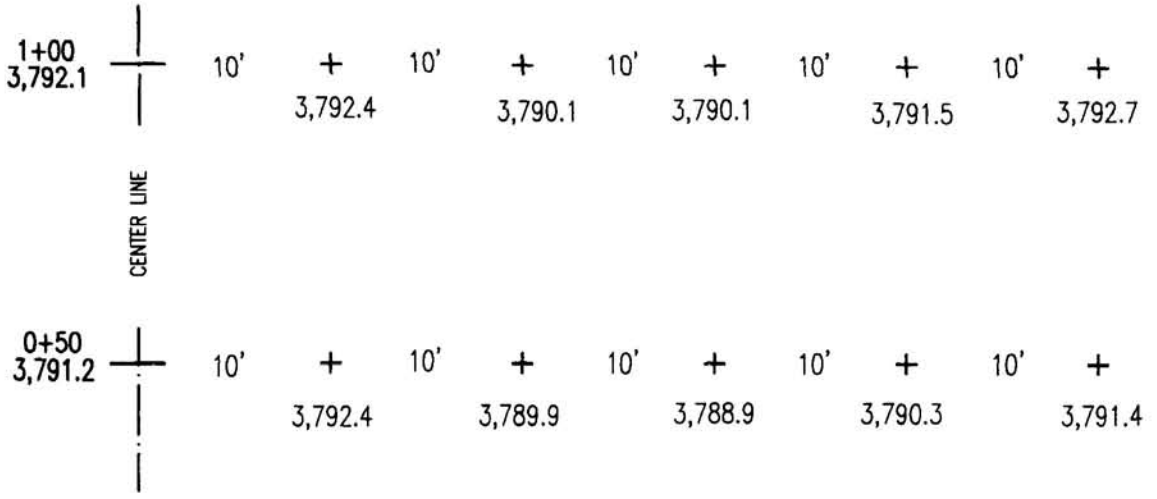
Go on to the next page.

PROBLEM 4 (Continued)

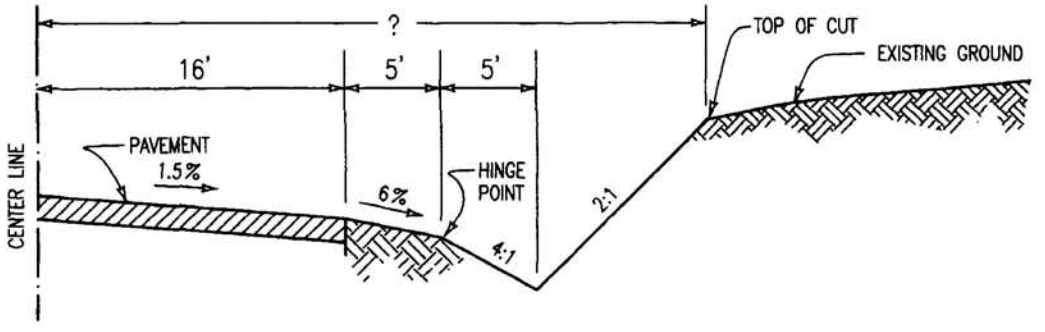
PROBLEM STATEMENT – Part B

Use the information and diagram below to answer the Problem 4, Part B, Problem Requirements on the facing page.

The Glider Club now asks you to stake an access road. You are provided with the survey cross-sections at Stations 0+50 and 1+00 as shown below. Also provided is the typical design cross-section. Assume uniform slopes between cross-section elevations. Station 0+75 has a centerline design elevation of 3,785.0 feet.



CROSS–SECTIONS OF EXISTING GROUND



TYPICAL CROSS–SECTION

NOT TO SCALE

PROBLEM 4 (Continued)

PROBLEM REQUIREMENTS – Part B

Answer the following in the Solution Booklet for Problem 4. Make no assumptions. Only the answers written in the spaces provided in the Problem 4 Solution Booklet will be graded. Your calculations do not need to be shown and will not be graded.

5. a. What is the cut from original ground to the flowline at Station 0+75? **Answer: 7 Points**

b. What is the elevation at the top of the cut at Station 0+75? **Answer: 7 Points**

c. What is the original ground slope from the hinge point to the flowline at Station 0+75? **Answer: 7 Points**

d. What is the horizontal distance from the centerline to the top of the cut at Station 0+75? **Answer: 7 Points**

Examination Instructions

DO NOT BEGIN THESE INSTRUCTIONS UNTIL TOLD TO DO SO.

When instructed, remove all material from the envelope and verify that you have one (1) examination booklet and four (4) solution booklets. If any material is missing, raise your hand and your proctor will assist you.

In the upper left-hand corner of your examinee label sheet, write your Examinee Identification Number (ID Number) and your name. Place one examinee label in the space provided on your envelope and write your ID Number below it. Place an examinee label in the space provided on the cover of this test booklet and on each of the four (4) solution booklets and write your ID Number below. Do not open this booklet until instructed to do so.

The 2005 California State Specific Professional Land Surveyor Examination consists of the following problems:

Problem Number	Description	Point Values	
1	Public Lands	125 points	
2	Boundary Non-PLSS	135 points	
3	Water Boundary	70 points	
4	Control and Construction	70 points	**Total: 400 points**

The questions have been designed to realistically reflect the actual conditions and practice of California land surveying. Make **no** assumptions unless you are asked to do so. All problems are governed by the provisions of Sections 8741 and 8741.1 of the *Business and Professions Code* (Professional Land Surveyors Act).Graphic information is **not** to scale unless otherwise noted. The assignment of points to each question is **not** based on the time required to complete an answer. Instead, points have been based on the relative importance of each question to California land surveying.

After reading the directions for each exam problem, try to solve all of the problem requirements. You will be graded on the answers you provide in relation to those requirements and, **when specified**, also on the method you use to solve the problem. Therefore, **when instructed**, you must show all your work, including all formulas and calculations; if you do not show all your work when required, you will not receive answer credit. Units must be provided for all numeric answers to receive answer credit. Cite references where specified. Class notes, tapes, or other unaccredited, unpublished materials are not acceptable citations. Acceptable references are legal statutes or published material relating to California land surveying practice.

Do **not** write your answers in this test booklet. A specific solution booklet has been designated for each problem. The problem number is printed on the cover of each solution booklet. The solution booklets may contain special information or instructions unique to the problem. Present your answers on the pages of the appropriate solution booklet. **Only the work presented in the appropriate solution booklet will be scored. No additional paper will be provided; you may not use your own paper for notes.** You may use test booklet pages for notes, but these pages will **not** be scored. Follow the steps listed below to present your solutions:

- The problem number is provided on the front cover of each solution booklet.
- Write your Examinee ID Number on the front cover of the solution booklet, below the examinee label that you have affixed. Also write your ID Number in the upper right-hand corner of **each** page of the solution booklet. **Do not write your name on any part of the solution booklet.** If a problem requires a signature, seal, and expiration date, you **must** use fictitious information.
- Number your solution booklet pages: "1 of 3," "2 of 3," etc.
- Certain problems require a specific number of answers. When this is the case, you must provide **only** the number of answers required. Any answers provided beyond the number required will **not** be graded. To maximize your answer points, avoid duplication in these answers.
- Clearly delineate any work that you do **not** want to be scored by drawing a line through that part and marking "**VOID**" across it.

When you have completed the examination, check your work and be sure that you have affixed examinee labels to the envelope, test booklet, and solution booklets. Also, check to be sure that you have written your ID Number in the space below each examinee label you have affixed. Place your test booklet, solution booklets, and examinee label sheet on top of the envelope. **Do not put these materials into the envelope, as the proctor must verify that all examination materials are returned. Give these examination materials to the proctor.**

If you have a concern regarding the validity of a test question, you may request a comment form from the proctor at the door. Use one form per problem. This form is to be completed at home and returned to the Board within ten (10) days of the examination date.

IT IS ILLEGAL TO REPRODUCE OR REMOVE ANY PORTION OF THIS EXAMINATION DURING OR AFTER TEST ADMINISTRATION.