



UNIT

13

PRINCIPLES OF BOUNDARY DETERMINATION

**Robert Lee McComb, PLS
Julian, CA**

Introduction

Boundary determination accounts for a major portion of the California LS exam and is being emphasized more on the LSIT. Examinees must be able to solve problems that require knowledge of the U.S. Public Land Survey System, knowledge of sequence and simultaneous conveyances, and knowledge of conflicting elements in deeds and rules governing the relative value of different pieces of evidence.

There are a number of good sources of information on boundary principles, several of which are listed in the reference section of this unit. It is a good idea to become familiar with a number of books, then choose the one that is most understandable, studying it thoroughly so that it can be used as a quick reference. Knowing one good source thoroughly is almost always better than having a passing knowledge of several.

This unit is organized around a fictional survey. The survey crew's mistakes and discoveries will serve to point out many boundary principles, but more than that, they will show the importance of research, planning, and organization in solving surveying problems.

Performance Expected on the Exams

Determine property boundaries based on the U.S. Public Land Survey System.

Establish boundaries along waterways.

Apply the rules for boundary determination in simultaneous conveyances.

Apply the rules for boundary determination between the holders of junior and senior rights.

Establish boundaries based on interpretation of legal descriptions.

Identify and resolve conflicting deed calls in legal descriptions.

Key Terms

Subdivision

Senior rights

Natural monument

Artificial monument

Corner

Call

Intent of deed

Easement

Basis of bearings

Statute law

Encroachment

Reservation

Evidence

Proration

Monument

Record monument

Accessories

Closing corner

Deed

Fee simple

Appurtenant

Common law

Course

Exception

Prescriptive right

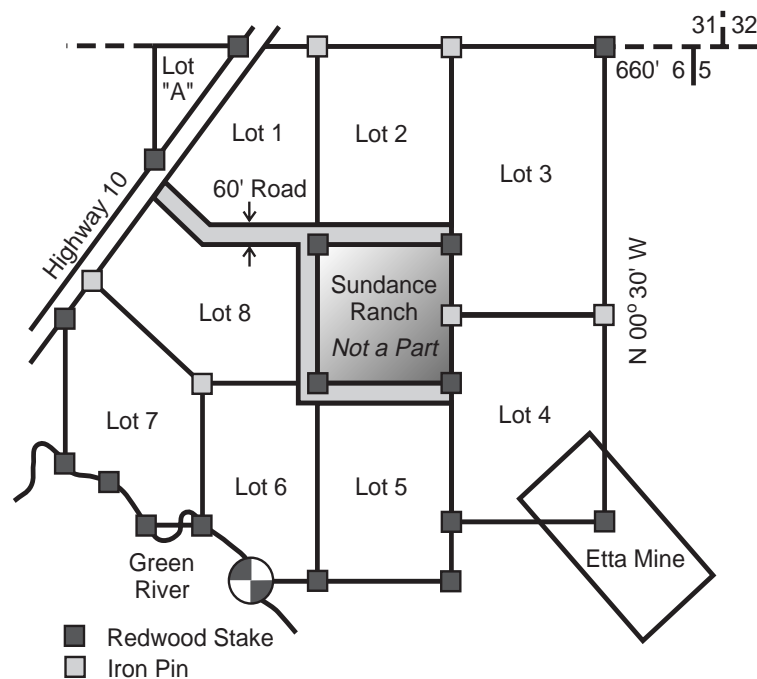
Parole evidence

Video Presentation Outline

The surveyor in our story has been hired by the Sundance Ranch Partnership to survey their land, locally known as the Sundance Ranch, together with the road that serves the property.

The following maps and descriptions will be used by the field crew as they locate the boundaries of the ranch.

Parker's Subdivision



Sundance Ranch Description

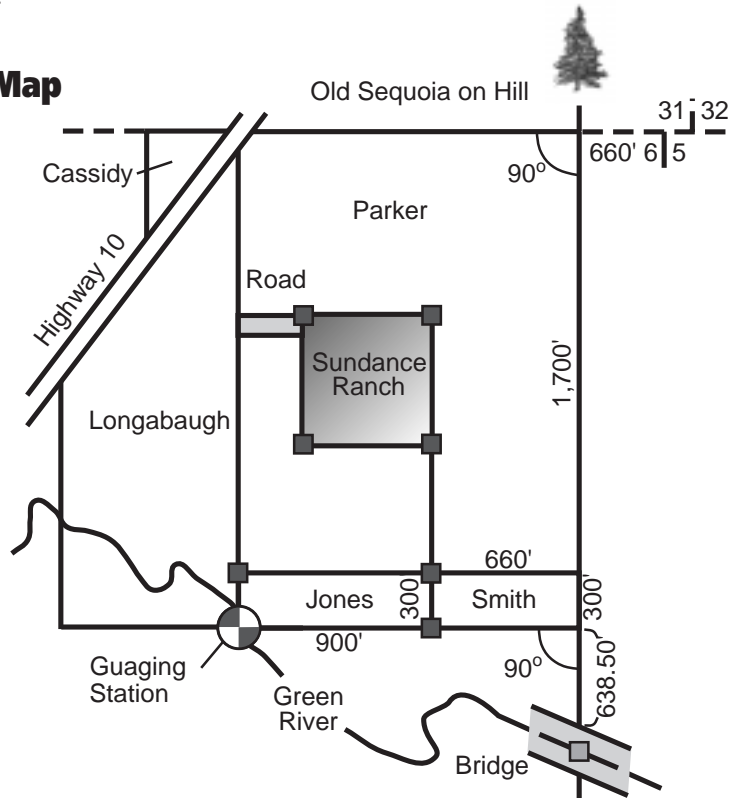
The northeasterly 1,250 ft of Parker's land in Section 6, excepting the north 700 ft and the east 660 ft, containing an area of 8.45 acres.

Parker's Description

Beginning at the old sequoia on the hill north of town; thence toward the center of the bridge crossing the river to an intersection with the north line of said Section 6 and the True Point of Beginning; thence continuing toward said bridge 1,700 ft; thence south $89^{\circ} 30'$ west 660 ft, thence south $00^{\circ} 30'$ east 300 ft; thence south $89^{\circ} 30'$ west 900 ft to Logan's gauging station; thence along the

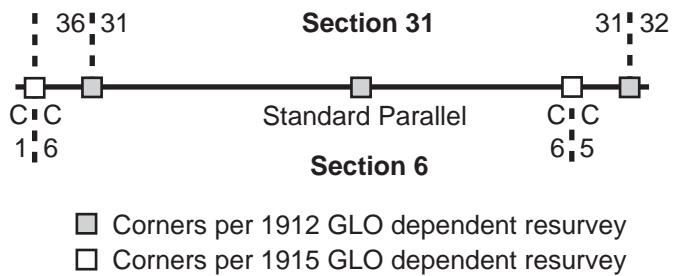
top of the left bank of the river north $46^{\circ} 30'$ west 200 ft; thence south $89^{\circ} 30'$ west to the cliff road; thence along the cliff road to the west line of the easterly 400 ft of the west half of Section 6, being the southeast corner of land conveyed to Ketchum by deed in the year 1900; thence northerly along Ketchum's east line to Highway 10; thence along said Highway 10 to the north-south centerline of Section 6; thence northerly along side north-south centerline to the north quarter-corner of Section 6; thence easterly to the True Point of Beginning.

L. Baltimore Map



Survey of a portion of Section 6 prepared by L. Baltimore, 1905.

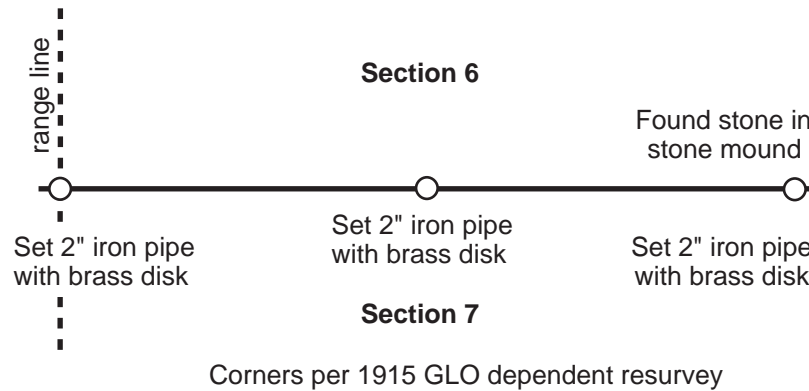
1912 and 1915 Dependent Resurveys of the Standard Parallel



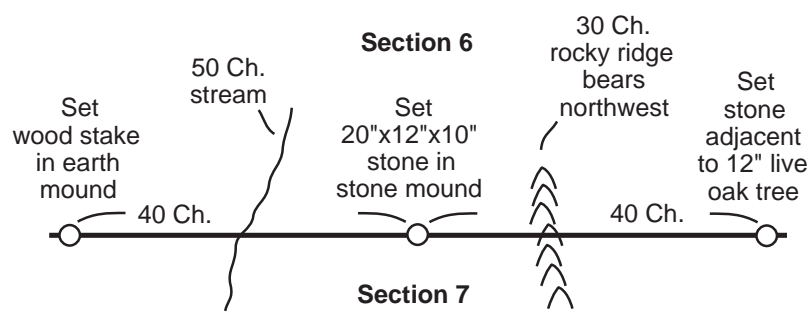
Cassidy's Description

All of Section 6 except the east one-eighth. Also excepting the west one-half.
Also excepting the south one-half.

1915 Dependent Resurvey of South Line of Section 6



1870 Original Survey of South Line of Section 6



Corners per 1870 GLO dependent resurvey topo calls from original notes

Sample Test Questions

- Use the following chain of title and the sketch showing bearings obtained from a field survey to answer the following questions.

1895 - Harriman deeds to Woodcock:

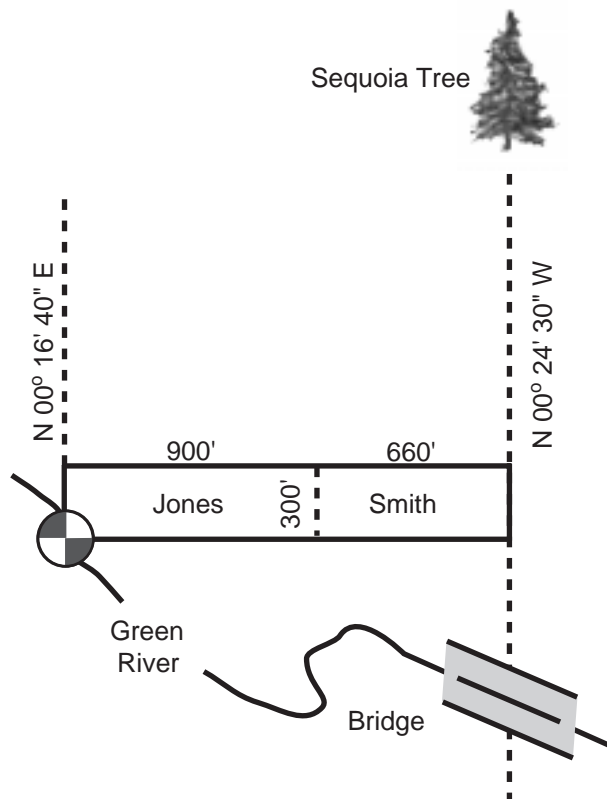
“The southerly 300 ft of the northerly 2,000 ft of the easterly 2,220 ft of Section 6. EXCEPTING that portion lying easterly of a line drawn from the old sequoia to the center of the bridge.”

1898 - Woodcock wills to his heirs upon his death:

To Jones: “The westerly 900 ft of Woodcock land.”

To Smith: “The easterly 660 ft of Woodcock land.”

- Who has senior title?
- How should the line common to Smith and Jones be reestablished?
- If the conveyances were worded, “the westerly 6.20 acres” and “the easterly “4.55 acres,” how would reestablishment of the common line be done?



2. From the following chain of title, how many acres did Kellerman receive in 1898?

1895 - Harriman deeds to McCarty:

“The westerly 820 ft of the northerly 2,000 ft of the easterly 3,040 ft of Section 6.”

1896 - McCarty deeds to Logan:

“The south 8 acres of the westerly 820 ft of the northerly 2,000 ft of the easterly 3,040 ft of Section 6.”

1897 - McCarty deeds to Place:

“The west 10 acres of the westerly 820 ft of the northerly 2,000 ft of the easterly 3,040 ft of Section 6. EXCEPTING the south 8 acres.”

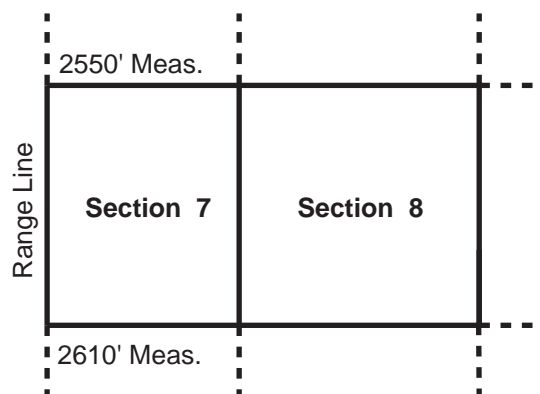
1898 - McCarty deeds to Kellerman:

“The northerly 25 acres of the westerly 820 ft of the northerly 2,000 ft of the easterly 3,040 ft of Section 6, EXCEPTING the west 10 acres and the south 8 acres.”

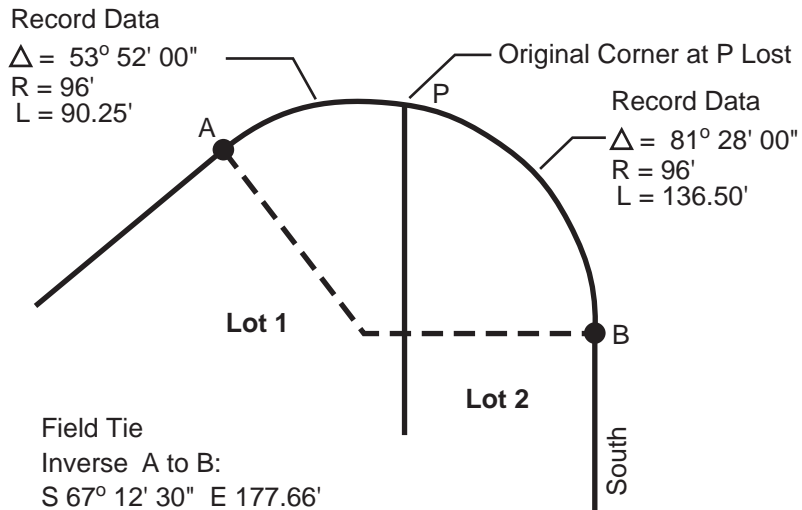
3. In the video presentation, the question was raised concerning the validity of proportioning the monuments, apparently lost, along the east line of the Sundance Ranch as part of the subdivision map.

Should the Sundance Ranch, which is shown as “not a part” on the subdivision map (see map in Video Outline) bear a proportional excess or deficiency with other lots in the subdivision, such as Lots 2 and 5?

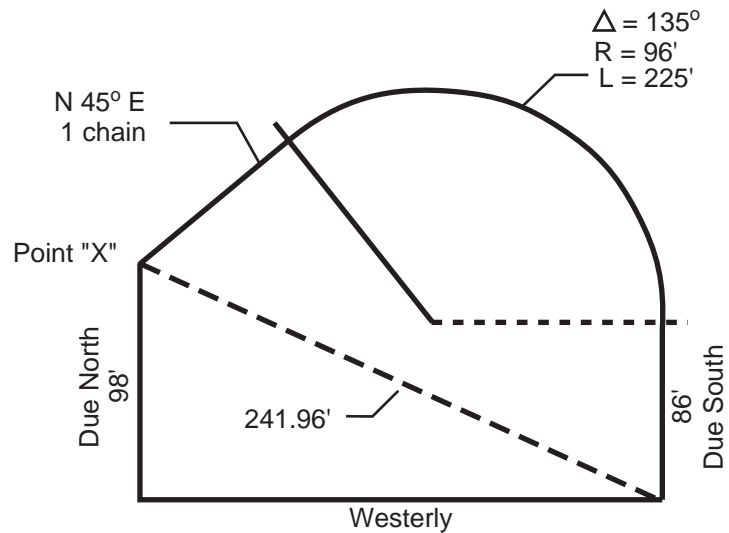
4. In Section 7 shown below, explain how it is possible for the west half of the Section to be nonexistent.



5. Lost corners, originally set from a single point along a bearing and distance, are restored by what method?
6. Based on the information shown below, what is the curve data for Lot 1? Original monuments at A and B are existent.

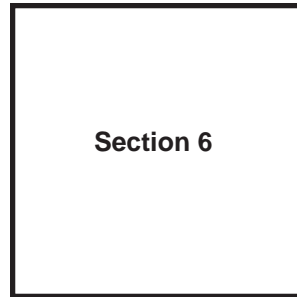


7. Is there enough information given in the following sketch to write a nonambiguous legal description for the figure given, provided *all* the information is used, excepting that which can be disproved? Identify the two errors in the drawing and reflect them in a correct legal description.



8. Sketch the following easements across Section 6 shown below.

“The north 200 ft and the east 100 ft of the south 1600 ft of the north 1800 ft of Section 6.”



Can you write a better legal description for the above set of easements?

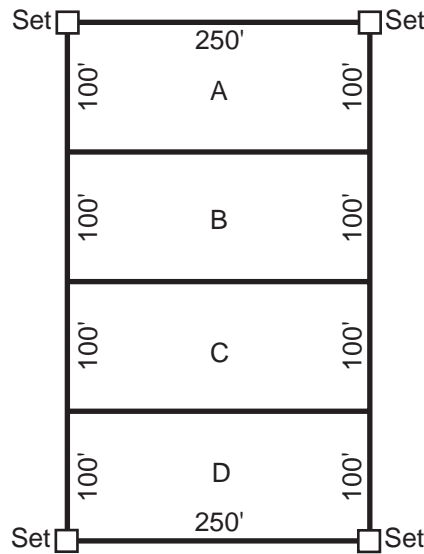
9. Problem B-1 1990 LS

You have been asked to survey and monument Lot 3 of the XYZ Subdivision in Rainbow County, California shown on page 13-10. Lot A of the ABC Subdivision was conveyed in August 1933. Lot B of the ABC Subdivision was conveyed to a different party in June 1936.

- A. Given only the information shown on the plats below, indicate the lengths of the sides w, x, y, and z of Lot 3 on your field survey.
- B. Using only the information given in the problem statement above and in the plats shown below, write a legal description for Lot B.
- C. What type of document(s) will you be required by law to prepare?

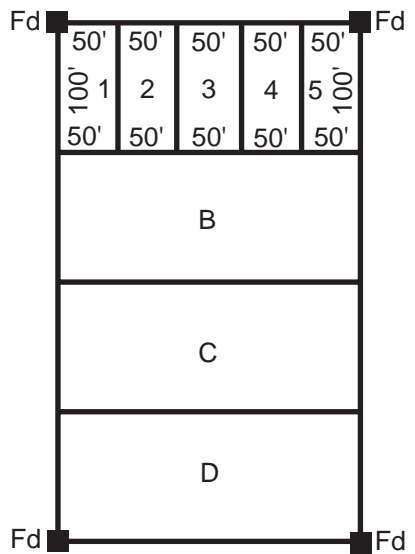
ABC Subdivision

Filed in Book 3
of Maps at Page 25
in July 1932



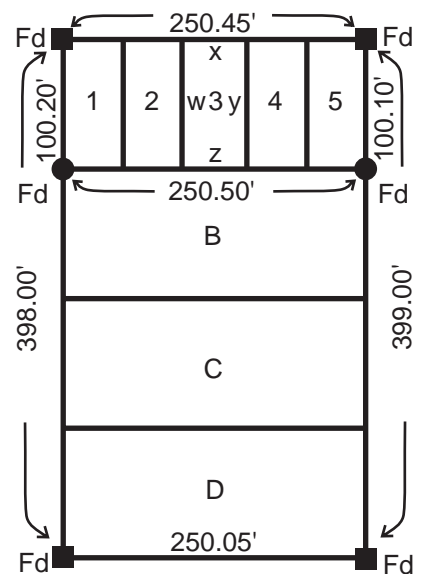
XYZ Subdivision

Filed in Book 7
of Maps at Page 73
in May 1946
(a Division of Lot A
of ABC Subdivision)



Your Field Survey

Prepared in
April 1990



Legend

- = Set 3" x 3" Redwood Post with Nail
- = Found 3" x 3" Redwood Post with Nail (Original)
- = Found 1" Iron Pipe (Origin Unknown)

10. Problem A-3 1990 LS

In June 1969, Meyers conveyed to your client the west one-half of Lot 5 of Rainbow Acres. In December 1970, Meyers sold a portion of the remainder of Lot 5 to Landis with the following legal description:

“The southerly 100.00 ft of that portion of Lot 5 of Rainbow Acres, in the County of Rainbow, in the State of California, as per map recorded April 16, 1954 in Book 3 of Maps, Page 3, in the Office of the County Recorder of said county described as follows:

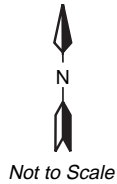
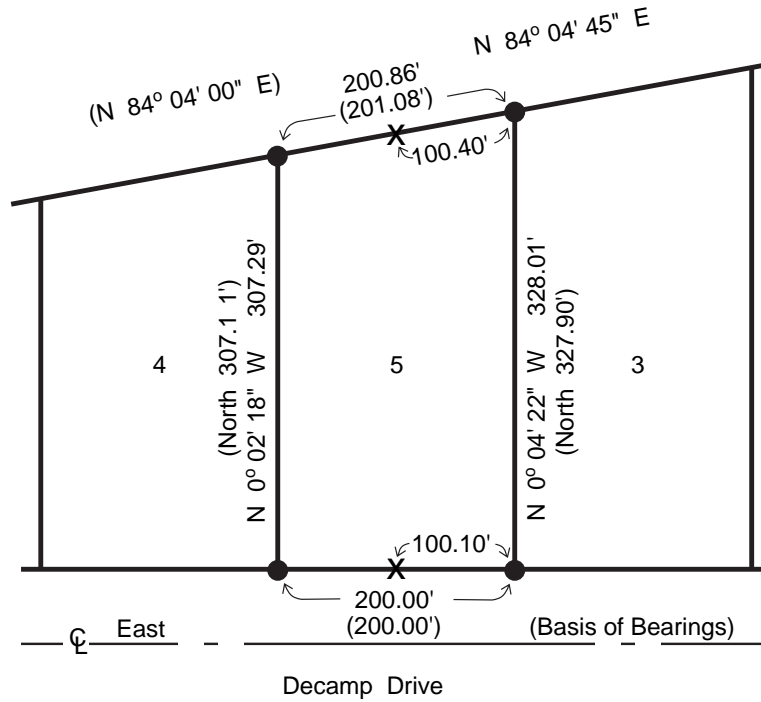
Beginning at the southeast corner of Lot 5; thence west along the southerly line thereof 100.00 ft to a 1-in iron pipe; thence north parallel with the easterly line of said Lot, 317.60 ft to a 1-in iron pipe on the northerly line of said lot; thence north $84^{\circ} 04' 00''$ east along said northerly line 100.54 ft to the northeast corner thereof; thence south, 327.90 ft to the point of beginning.”

You have been asked to survey and monument your client’s parcel of land. The record values of Lot 5, as well as the results of your boundary survey, are shown in the plat on the following page.

Required:

- A. Describe how you would determine the boundaries of your client’s property. (Calculations are not required.)
- B. Describe the effect of the Landis deed on your client’s property.
- C. Prepare a legal description for the remainder of Meyers’ property. (Do not use a metes and bounds description.)
- E. Is the filing of a Corner Record sufficient documentation of your survey? Explain your answer and cite references.

RAINBOW ACRES
 Recorded in Book 3, page 3 of Maps, County of Rainbow



Legend

- FD 3/4" Iron Pipe With Disk L.S. XXX Per Map of Rainbow Acres
- X FD 1" Iron Pipe, No Record, Origin Unknown
- () Record Value Per Rainbow Acres Map

Answer Key

Two challenges faced by surveyors are to assert a confident solution to real-world problems, and to assume the liability therefor. Reliance upon texts, or popular interpretations of court cases, or the opinions generated by helpful colleagues cannot be used to indemnify one from the weighty responsibility of professional judgment. So it is with these problem solutions. The answers do not purport to be exact solutions, and are subject to other valid solutions and future legal opinions which may spring into being and suddenly apply.

1. A. Smith and Jones were willed land at the same time. Because they received simultaneous conveyances, neither Smith nor Jones enjoys seniority.
- B. The initial task is to survey Woodcock's original land as described in his 1895 deed from Harriman. Next, the footages provided in Woodcock's will of 1898 are compared to this survey and any measured excess or deficiency proportionally applied to the 900 ft and 660 ft calls in the will. The correction to be applied to record demensions is determined independently for the north and south lines of Smith and Jones and is linear, as with subdivision lots. If the excess, or deficiency, is denoted by "e," then the overall length of the line as measured would be $a + b + e$. The overall record length is, of course, $a + b$ (900 + 660), so the ratio $(a + b + e)/(a + b)$ would be applied as a multiplier, the so-called factor of proration, to the 900 ft and 660 ft lengths to be prorated along the line.
- C. Linear proportion applies when either area or footage are stated. When area is stated, it is not sufficient to merely fix the common line between Smith and Jones by a linear ratio, but another rule is necessarily added to control the direction of the common line. The rule of mean bearing may be considered here, but that rule usually applies to equal subdivisions of area. In this case, it makes sense to proportion the bearing to reflect the prescribed ratio of areas. Since the east bearing would be rotated $0^{\circ} 41' 10''$ to become parallel to the west boundary, the proportional line will rotate 4.55/10.75 parts from the east line, i.e.:

$$0^{\circ} 41' 10'' (4.55/10.75) + N 0^{\circ} 24' 30'' W = N 0^{\circ} 07' 05'' W.$$

Another solution would be to make the common line bear astronomic north. The rationale for this is strengthened by the fact that the east and west lines, as stated in Woodcock's deed, are presumed nonparallel, and no basis of bearings is contained in the deed wording.

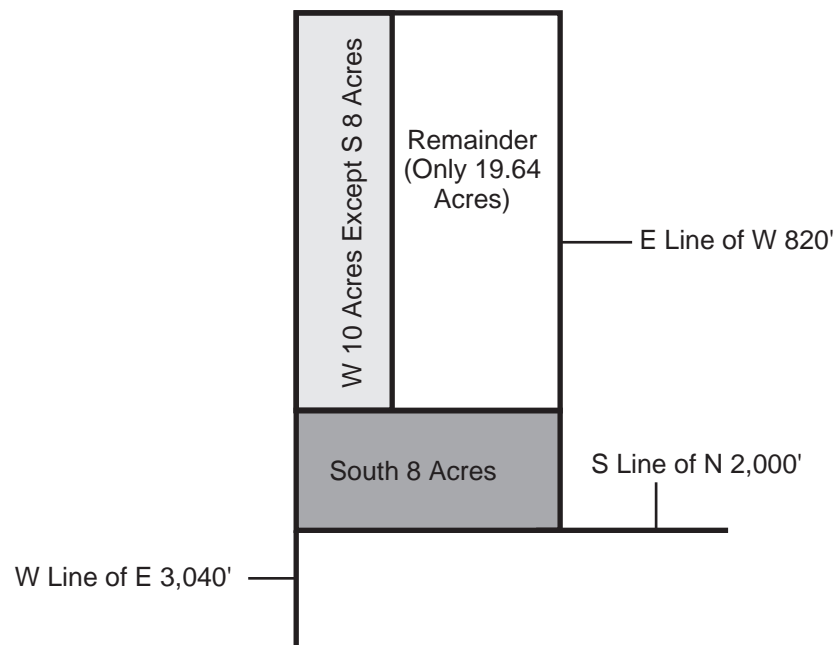
The actual areas of Smith and Jones will be equal to their record area times the total surveyed area divided by the record total area.

- The deeds are sequential because they occurred at different times. The earliest deed, Harriman to McCarty, in 1895, is senior to the others, the bottom of the hierarchy ending with the most junior deed, McCarty to Kellerman, in 1898.

The 1896 deed from McCarty to Logan is straightforward. Next comes McCarty's deed to Place, the description of which raises a strong objection. In the first sentence 10 acres is clearly conveyed, but the exception in the second sentence then seems to subtract 8 acres from the grant. That would leave only 2 acres to the grantee, an unlikely intent, particularly since we have the earlier 1896 deed to Logan which establishes a clear meaning to the phrase, "the south 8 acres".

A surveyor may not interpret those terms of a deed suggesting intent, but it is permitted for a surveyor to demonstrate that alternate meanings within the wording exist. A court might interpret the given situation in light of the principle that grants are to be interpreted in favor of the grantee in cases where two meanings are possible, which would give Place a full 10 acres.

Following this reasoning, the 1898 deed to Kellerman was intended to grant 25 acres. Unfortunately, only 19.64 acres remained after the previous two grants. As junior in sequence, the 1898 deed receives only what is left.



3. The confusion here, if there is any, probably stems from the proper interpretation of the situation in terms of either simultaneous or sequential conveyances. The Sundance Ranch is senior to the subdivision and not a part of the subdivision. Its position should be reestablished according to its deed as a sequential conveyance before the time of the subdivision. Proration would not be expected since there are no simultaneous lines to infer proportional distribution.
4. It is possible, and fairly common, for the original government surveys to have accumulated large measurement errors. Because all of the error in measurements east and west in a township ends up in the last half mile of the north and south lines of Section 7, accumulated errors of a half mile can result in elimination of the west half of the section. If the error is in favor of the section, the west half can theoretically be at least as large as an entire section.
5. Reestablishment is by record bearing and distance, using an astronomical basis of bearings. This is true if the original field survey was based upon an astronomical reference bearing and if there is no other evidence available to retrace the original survey.
6. This curve solution follows the rules of simultaneous conveyances for subdivision lots. As subdivision lots, linear proration is used to distribute any excess or deficiency. One solution to this problem is to proportion the radius and length of curve based on the relationship between the field tie inverse between A and B and the record calculated inverse. This method preserves the original delta of the curve.

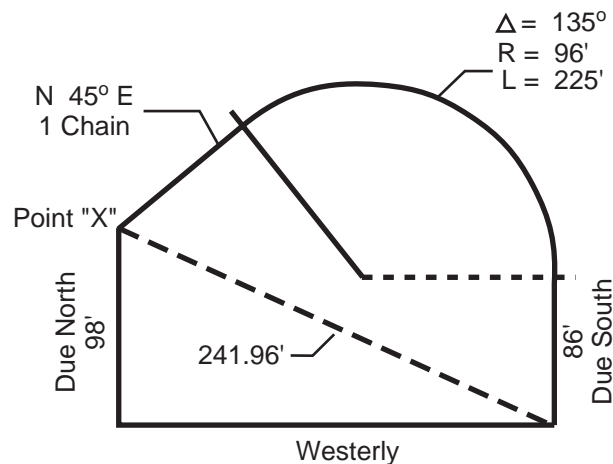
$$\begin{aligned}\frac{R}{96 \text{ ft}} &= \frac{177.66 \text{ ft}}{177.60 \text{ ft}} \\ R &= 96.03 \text{ ft} \\ \frac{L}{90.25 \text{ ft}} &= \frac{177.66 \text{ ft}}{177.60 \text{ ft}} \\ L &= 90.28 \text{ ft}\end{aligned}$$

An alternative solution will proportion the frontage along the curve but preserve the original even footed radius for the curve. Start by calculating the delta for the curve from A to B from the inverse distance from A to B and a radius of 96 ft.

$$\begin{aligned}
 LC &= 2R \sin \frac{\Delta}{2} \\
 177.66 &= 2(96) \sin \frac{\Delta}{2} \\
 \Delta &= 135^\circ 25' 52'' \\
 \frac{53^\circ 52' 00''}{\Delta} &= \frac{135^\circ 20' 00''}{135^\circ 25' 52''} \\
 \Delta &= 53^\circ 54' 20'' \\
 L &= \frac{\Delta}{360} 2\pi R \\
 L &= 90.32
 \end{aligned}$$

7. Let's begin this problem by a straightforward plunge into a legal description. Let's assume that everything on the drawing is correct for now. We will also impose the rule that everything on the drawing *must* be used to generate the legal description. Let's also plan to be brief and non-redundant. Later on, we'll throw out ambiguous as well as surplus information. We can begin anywhere, but the point "X" has been conveniently marked, so we'll use that.

"Beginning at Point 'X'; thence north 45° east 1 (one) chain to the beginning of a tangent 96-ft radius curve, concave southwesterly; thence along the arc of said curve through a central angle of 135° a distance of 225 ft; thence leaving said curve due south 86 ft to a point that is 241.96 ft southeasterly of the point of beginning; thence westerly to a point lying due south, 98 ft, from the point of beginning; thence to the point of beginning."



The next thing we should do is run a traverse around this boundary to see if it closes mathematically. If we're lucky, during the process we may spot errors in the information provided and hopefully correct them with certain boundary principles.

The curve data contains an arc length rounded to the nearest five ft, or so it seems based upon holding the delta and radius. Verification of the delta is inferred by the bearings in and out of the curve, and use of the radius as an even ft stems from the notion that arc lengths are usually derived from calculation from the other curve elements. The first source of error is found in the length of curve.

The next course runs due south. The use of the term "due" suggests that the basis of bearing should be taken as astronomical. The appearance of this term along this course in the boundary does not change the bearing along the first course, i.e., N 45° E, but clarifies the direction of that line as referential to true north. However, the length of this course must accommodate the next piece of information in the diagram, that of the distance of 241.96 ft from the point of beginning. Holding the bearing of south and performing a bearing-distance intersection from the end of the curve to the point of beginning yields a distance of 98.00 ft along this south course, not 86 ft as shown in the diagram. Thus, the second error in the description is located.

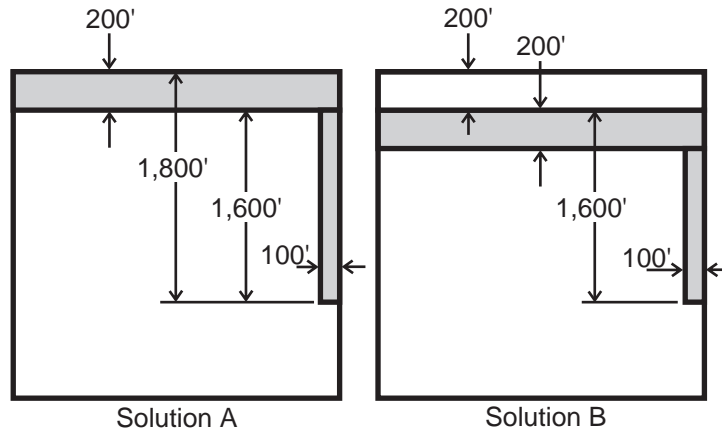
A complex legal description similar to the example at hand may be relegated to Wattles' discussion of majority probability (see *Land Survey Descriptions*, William C. Wattles) whereby all factors in a description interplay to suggest the most logical solution. If a scenario contains factors that predominate toward a given interpretation, then the predominance tends to support the interpretation.

The correct legal description in this case would then be worded:

"Beginning at Point 'X'; thence N 45° E 1 (one) chain to the beginning of a tangent 96-ft radius curve, concave southwesterly; thence along the arc of said curve through a central angle of 135°; thence leaving said curve due south to a point that is 241.96 ft southeasterly of the point of beginning; thence westerly to a point on a line bearing due south, 98 ft, from the point of beginning; thence to the point of beginning."

The above legal description is correct according to the diagram given, with ambiguities removed. Notice that certain computed information has been omitted without affecting the meaning of the description.

8. Taken from real life, this description originated within a title company and was later reinterpreted by a private engineer who filed a map depicting Solution B. The engineer was unaware of Solution A, which, it turned out, was the original intent of the scrivener. The engineer's map was revised after great effort through the public agency and after several thousand dollars were expended to attorneys and professional consultants.



Proper grammar, punctuation, word usage are all essential to unambiguous legal descriptions. What the scrivener had in mind originally can be compressed into the following noun-preposition sentence structure:

“(The north 200 ft) *and* (the east 100 ft of the south 1600 ft) (of the north 1800 ft of Section 6).”

The last phrase in parenthesis, “the north 1800 ft . . . of Section 6” modifies both parts of the two-part, or collective, noun contained in the first two parentheses, which are connected by the conjunction, *and*. The prepositional phrase “of the south 1600 ft” is intended to modify only the second part of this two-part noun. The title company intended to impart this meaning which produces Solution A; however, the engineer chose to pick out the modifiers as follows:

“(The north 200 ft) *and* (the east 100 ft) (of the south 1600 ft of the north 1800 ft of Section 6).”

The conjunction connects a two-part noun, as before, but this time the entire series of prepositional phrases that occurs afterwards is taken as a single phrase to modify both parts of the collective noun. The meaning on the ground imparts Solution B.

Which interpretation is correct? It may not be possible to tell without additional information about the intent of the sentence which, in most cases, we would not have. In the real life situation, that additional information existed, but only in terms of an admission by the title company that they had created an ambiguous description. This example typifies the reason legal descriptions for land and easements are often separated as individual parcels like this:

Parcel 1: "The north 200 ft of Section 6."

Parcel 2: "The east 100 ft of the south 1600 ft of the north 1800 ft of Section 6."

Parcel 2 can also be written without reference to the south 1600 ft. It is perfectly all right to let easements overlap in this case.

9.
 - A.
 - w = 99.60 ft Hold block corners and prorate lot lines.
 - x = 50.09 ft Hold block corners, compute original lot lines, and prorate new lot lines.
 - y = 99.65 ft Hold block corners and prorate lot lines.
 - z = 50.07 ft Prorate between found block corners.
 - B. Lot B of ABC Subdivision filed in Book 3 of Maps at page 25, in Rainbow County, California.
 - C. Record of Survey is required.
10.
 - A.
 1. Calculate the boundaries of the west one-half of Lot 5 by using one-half the area of Lot 5.
 2. The easterly boundary will be set on a mean bearing of the east and west lines of Lot 5.
 - B. The Landis deed has no effect on the client's property since it is junior to the client's deed.
 - C. The east one-half of Lot 5 of Rainbow Acres, in the County of Rainbow, in the State of California, as per map recorded April 16, 1954 in Book 3 of Maps, page 3, in the Office of the County Recorder of said county.
Excepting the southerly 100 ft.
 - D. A Record of Survey is required. Section 8762 of LS Act.

References

- _____, *Manual of Instruction for the Survey of the Public Lands of the United States*, U.S. Government Printing Office, 1973.
- Brown, Curtis, *Evidence and Procedures for Boundary Location*, Second Edition, John Wiley and Sons, New York, 1981.
- Brown, Curtis, and Robillard, and Wilson, *Boundary Control and Legal Principles*, Third Edition, John Wiley and Sons, New York, 1986.
- Robillard, Walter, and Bouman, *Clark on Surveying and Boundaries*, Fifth Edition, Bobbs Merrill Co., New York, 1987.
- Skelton, Ray Hamilton, *Boundaries and Adjacent Properties*, Bobbs Merrill Co., Indianapolis, 1930.
- Wattles, Gurdon H., *Writing Legal Descriptions*, Gurdon H. Wattles Publications, Orange, CA, 1979.