21 BOUNDARY SURVEYS

Asterisks (*) indicate problems that have answers given in Appendix G.

21.1 Define the following terms:

(a) Retracement survey
From Section 21.2, paragraph 1:

"*retracement surveys* to recover and monument or mark boundary lines that were previously surveyed "

(b) Practical location
From Section 21.3, paragraph 2:

"The term *practical location* is used by the legal profession to describe an agreement, either explicit or implied, in which two adjoining property owners mark out an ambiguous boundary, or settle a boundary dispute."

(c) Color of title

From Section 21.11, paragraph 1: "a claim to a parcel of real property based on some written instrument, though a defective one."

(d) Parol evidence
From Section 21.2, paragraph 3:

"Often it is necessary to obtain *parol evidence*; that is, testimony from people who have knowledge of accepted land lines and the location of corners, reference points, fences, and other information about the correct lines."

21.2 What are the essential elements of a metes-and-bounds property description?

From Section 21.4, paragraph 5:

(1) Point of commencement, (2) Point of beginning, (3) Definite corners, (4) Lengths and directions of property sides, (5) Names of adjoining property owners, and (6) Areas.

21.3 Visit your county courthouse and obtain a copy of a metes-and-bounds property description. Write a critique of the description, with suggestions on how the description could have been improved.

Student critique required.

21.4 In a description by metes and bounds, what purpose may be served by the phrase "more or less" following the acreage?

From Section 21.4, paragraph 5:

> "The expression 'more or less,' which may follow a computed area, allows for minor errors, and avoids nuisance suits for insignificant variations."

21.5 Write a metes-and-bounds description for the house and lot where you live. Draw a map of the property.

Student metes-and-bounds description of personal lot.

21.6 Write a metes-and-bounds description for the exterior boundary of lot 16 in Figure 21.2.

Metes-and bounds description of boundary in Figure 21.2.

21.7 What are the essential elements required when writing a deed description by coordinates?

From Section 21.6:
The date of the survey and the reference datum.

21.8 From the metes-and-bounds description of the lot in the Town of Little Wolf, described in Section 21.4, compute the lot's misclosure.

From WolfPack: **0.003 ft**

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Title: Figure 21.1 Type: Polygon traverse
                                                Unbalanced
Course      Length       Bearing        Dep        Lat
-----------------------------------------------------------
 1-2        424.26   N90°00'00.0"E   424.260      0.000
 2-3        150.00   S45°00'00.0"E   106.066   -106.066
 3-4        200.00   S45°00'00.0"W  -141.421   -141.421
 4-5        141.42   S90°00'00.0"W  -141.420     -0.000
 5-1        350.00   N45°00'00.0"W  -247.487    247.487
         ----------                 ---------  ---------
  Sum =   1,265.68                    -0.003     -0.000

           Balanced                        Coordinates
       Dep        Lat     Point         X              Y
-------------------------------------------------------------
     424.261      0.000     1       5,000.00       5,000.00
     106.066   -106.066     2       5,424.26       5,000.00
    -141.421   -141.421     3       5,530.33       4,893.93
    -141.420     -0.000     4       5,388.91       4,752.51
    -247.487    247.487     5       5,247.49       4,752.51

    Linear misclosure  = 0.003
    Relative Precision = 1 in 466,600

    Area: 85,000 sq. ft.
          1.951 acres {if distance units are feet}
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21.9 What is the point of commencement in a property description?

From Section 21.2, paragraphs 6:
"1. *Point of commencement (POC).* This is an established reference point such as a corner of the PLSS or NSRS monument to which the property description is tied or referenced. It serves as the starting point for the description."

21.10 What is the point of beginning in a property description?

From Section 21.2, paragraph 7:
"2. *Point of beginning (POB).* This point must be identifiable, permanent, well referenced, and one of the property corners. Coordinates, preferably state plane, should be given if known or computable. Note that a POB is no more important than others and a called for monument in place at the next corner establishes its position, even though bearing and distance calls to it may not agree."

21.11 What is the primary objective in performing a retracement surveys?

From Section 21.7, paragraph 1:
"Retracement surveys are run for the purpose of relocating or reestablishing previously surveyed boundary lines."

21.12* List in their order of importance the following types of evidence when conducting retracement surveys: (a) measurements, (b) call for a survey, (c) intent of the parties, (d) monuments, and (e) senior rights.

From Section 21.7, paragraph 3: (e) Senior rights, (c) intent of parties, (b) call for survey, (d) monuments, (a) measurements

21.13 In performing retracement surveys, list in their order of importance, the four different types of measurements called for in a description for your state.

From Section 21.7, paragraph 3: In most states, it is (**1**) distance, (**2**) direction, (**3**) area, and (**4**) coordinates. However in some states, such as Pennsylvania it is (**1**) direction, (**2**) distance, (**3**) area, and (**4**) coordinates.

21.14 List in order the steps that must be performed in making subdivision surveys?

From Section 21.8, paragraph 7:
(1) Exterior survey; (2) Interior survey, design, and layout

21.15 Identify all types of pertinent information or data that should appear on the plat of a completed property survey.

From Section 21-5, paragraph 2:
The plat must show the types and locations of monuments, dimensions of all blocks and lots, and other pertinent information such as the locations and dimensions of

streets and easements, if any.

21.16 Why are lot-and-block descriptions not subject to junior and senior rights?

From Section 21.5, paragraph 3: "Lot-and-block descriptions typically are created simultaneously and thus are not subject to junior and senior rights."

21.17 Two disputing neighbors employ a surveyor to check their boundary line. Discuss the surveyor's authority if (a) the line established is agreeable to both clients, and (b) the line is not accepted by one or both of them.

(a) Obtain written agreement, record the accepted lines on the original plat, and have corrected deeds recorded.
(b) From Section 21.4, paragraph 4: Marks can be set on the ground, but their acceptance cannot be forced by a surveyor – it must be resolved in the courts.

21.18 What is required to adversely possess land?

From Section 21.11, paragraph 1.

"To claim land or rights to it by *adverse possession,* its occupation or use must be (1) actual, (2) exclusive, (3) open and notorious, (4) hostile, and (5) continuous. It may also be necessary for the property to be held under *color of title* (a claim to a parcel of real property based on some written instrument, though a defective one). In some states all taxes must be paid. The time required to establish a claim of adverse possession varies from a minimum of 5 years in California to a maximum of 60 years for urban property in New York. The customary period is 20 years."

21.19 Compute the misclosure of lot 19 in Figure 21.2. On the basis of your findings, would this plat be acceptable for recording? Explain.

Lot 19

Course	Distance	Azimuth	Departure	Latitude
AB	56.76	95°30'	56.50	–5.44
BC	113.30	156°17'40"	45.55	–103.74
CD	10.00	246°17'40"	–9.16	–4.02
DE	70.41	260°53'50"	–69.52	–11.14
EF	36.16	275°30'	–35.99	3.47
FA	123.27	5°30'	11.82	122.70

	Σ = 409.90		Σ = –0.80	Σ = 1.83

Linear misclosure: 2.00

Relative precision: 1:200

The lot does not close mathematically. It has a relative precision of only 1:200, which is not acceptable for a property survey.

21.20* Compute the area of lot 19 of Figure 21.2.

9720 sq. ft.

Lot 19		Double area	
X	Y		
56.50	−5.44		−247.8
45.55	−103.74	−5,861.3	950.3
−9.16	−4.02	−183.1	279.5
−69.52	-11.14	102.0	400.9
−35.99	3.47	−241.2	41.0
11.82	122.70	−4,416.0	6,932.6
56.50	−5.44	−64.3	
		−10,663.9	8,356.4

Lot 19:

Area of segment = ½ × 139.62^2[29°12'20"×π/180° – sin(29°12'20")] = 212 sq. ft.

Area: ½|10,663.9 + 8356.4| + 212 = **9720 sq. ft.**

21.21 Determine the misclosure of lot 50 of Figure 21.2, and compute its area.

Computer solution:

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Title: Problem 21-21 Type: Polygon traverse
                                                Unbalanced
Course      Length       Azimuth        Dep        Lat
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
 1-2         30.38      8°30'00.0"     4.490     30.046
 2-3        123.00     35°00'00.0"    70.550    100.756
 3-4         90.77      9°30'00.0"    14.981     89.525
 4-5         90.11    143°00'00.0"    54.230    -71.965
 5-6         95.50    148°42'00.0"    49.614    -81.601
 6-7         19.67    238°42'00.0"   -16.807    -10.219
 7-8        133.19    245°00'30.0"  -120.719    -56.271
 8-1         62.59    251°19'00.0"   -59.292    -20.050
          ----------                 ---------  ---------
  Sum =     645.21                    -2.953    -19.779

            Balanced                          Coordinates
        Dep        Lat     Point         X             Y
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
        4.629     30.978     1       1,000.00       1,000.00
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  71.113    104.526     2       1,004.63       1,030.98
  15.397     92.308     3       1,075.74       1,135.50
  54.642    -69.203     4       1,091.14       1,227.81
  50.051    -78.673     5       1,145.78       1,158.61
 -16.717     -9.616     6       1,195.83       1,079.94
-120.110    -52.188     7       1,179.12       1,070.32
 -59.005    -18.131     8       1,059.01       1,018.13

Linear misclosure  = 19.998
Relative Precision = 1 in 0

Area: 18,200 sq. ft.
       0.418 acres {if distance units are feet}
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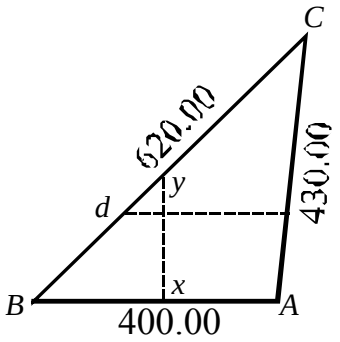
21.22 For the accompanying figure; using a line perpendicular to *AB* through *x*, divide the parcel into two equal parts, and determine lengths *xy* and *By*.

a = 620 s – a = 105
b = 430 s – b = 295
c = 400 s – c = 325
Σ = 1450 $Area = \sqrt{725(105)(295)(325)} = 85{,}431\ \text{ft}^2$

2/5 Area = 34,172 ft^2

$$B = \cos^{-1}\left(\frac{620^2 + 400^2 - 430^2}{2 \times 620 \times 400}\right) = 43°32'53"$$



Area BXY = ½(BX)(XY) = 34,172
XY = BX tan B = 0.950555 BX
34,172 = ½×0.950555 BX^2; so

BX = 268.14 ft
XY = 268.14 (0.950555) = 254.88 ft
$BY = \sqrt{266.14^2 + 254.88^2} = 368.50 ft$

21.23 For the figure of Problem 21.22, calculate the length of line *de*, parallel to *BA*, which will divide the tract into two equal parts. Give lengths *Bd* , *de* and *eA*.

From Problem 22.22, Area = 85,431 sq. ft.
Required Area = 85,431 – 34,172 = 51,260 sq. ft.
51,260 = [400 + *de*/2]*h*; *de* = 400 – *h*/tan *B*;
where from Problem 22-22, *B* = 43°32'53"
C = sin^{-1}[2(85,431)/(620.0×43.0)] = 39°51'31"

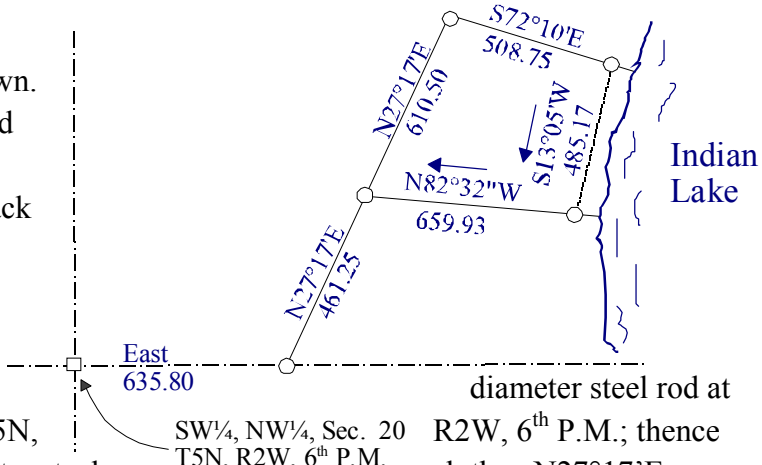
A = 180° – 43°32'53" – 39°51'31" = 96°35'36"
51,260 = [400/2 + 400/2 – *h*/(2 tan *B*) + (*h*/2) tan (*A*+90°)]*h*
51,260 = 400 *h* – 0.4682 *h*^{2}
h = 157.00 ft

de = 400 – 157.00/tan(43°32'53") + 157.00 tan(6°35'36") = 252.98 ft
Bd = 157.00/sin(43°32'53") = 227.88 ft

Departure of Ae = 227.88 sin 43°32'53" + 252.98 – 400 = 9.98 ft

$Ae = \sqrt{9.98^2 + 157.00^2} = 1576.31\,\text{ft}$

21.24 Prepare a metes-and-bound description for the parcel shown. Assume all corners are marked with 1-in. diameter steel rods, and a 20 ft meander line setback from Indian Lake.

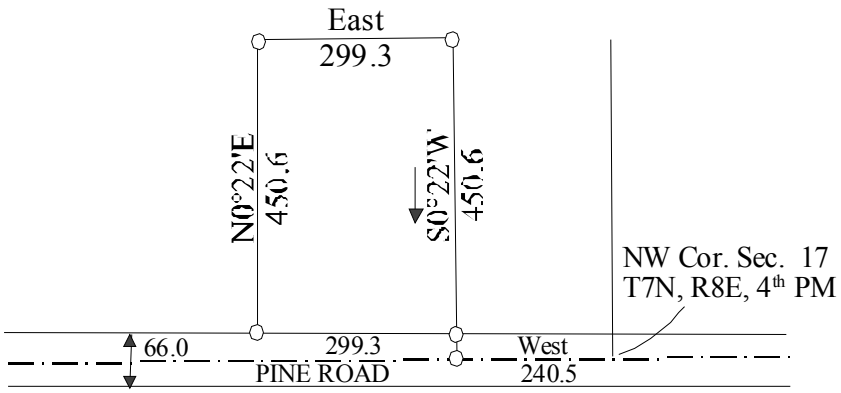


Commencing at a 1-in diameter steel rod at the SW¼ , NW¼ , Sec. 20, T5N, R2W, 6th P.M.; thence east, 635.80 ft to a 1-in diameter steel rod; then N27°17'E, 461.25 ft to a 1-in diameter steel rod which is the point of beginning of this parcel; thence N27°17'E, 610.50 ft to a 1-in diameter steel rod; thence S72°10'E, 508.75 ft to a 1-in diameter steel rod, located N72°10'E, 20 ft more or less from Indian Lake; said pipe being the beginning of a meander line along said Indian Lake; thence S13°05'W, 485.17 ft along the meander line to a 1-in diameter steel rod at the end of the meander line, said pipe being N82°32'W, 659.93 ft to a 1-in diameter steel rod at the point of beginning, including all lands lying between the meander line and the westerly shore of Indian Lake which lie between the extensions of the northerly and southerly boundaries of the parcel herein described; said parcel containing 7.39 acres, more or less.

21.25 Draw a plat map of the parcel in Problem 21.24 at a convenient scale. Label all monuments and the lengths and directions of each boundary line on the drawing. Include a title, scale, North arrow, and legend.

Scaled drawing required.

21.26 Prepare a metes-and-bounds description for the property shown. Assume all corners are marked with 2-in. diameter iron pipes.



Commencing at a 2-in diameter iron pipe at the NW corner, Sec 17, T7N, R8E, 4th PM; thence West, 240.5 ft along the centerline of Pine Road to a 2-in diameter iron pipe; thence North, 33.0 ft to a 2-in diameter iron pipe which is the point of beginning for this parcel; thence West, 299.3 ft. along the northerly right of way line of Pine Road to a 2-in diameter iron pipe; thence N0°22'E, 450.6 ft to a 2-in diameter iron pipe; thence East, 299.3 ft to a 2-in diameter iron pipe; thence S0°22'W, 450.6 ft to a 2-in diameter iron pipe at the point of beginning, said parcel containing 3.10 acres, more or less.

21.27 Create a 1.25-acre tract on the westerly side of the parcel in Problem 21-26 with a line parallel to the westerly property line. Give the lengths and bearings of all lines for both new parcels.

Required area = 1.25(43,560) = 54,450 sq. ft. = 450.6 *x* where *x* = 120.84 ft

West Lot

Course	Length	Bearing
BC	450.60	N0°22'E
CF	145.01	East
FE	450.06	S0°22'W
EB	145.01	West

East Lot: AE = 299.13 – 120.84 = 178.46 ft

Course	Length	Bearing
EF	450.60	N0°22'E
FD	120.84	East
DA	450.06	S0°22'W

AE	120.84	West

21.28 Discuss the ownership limits of a condominium unit.

Typically, to the center of the walls, floors and ceilings of the dwelling.

21.29 Define *common elements* and *limited common elements* in relation to condominiums. Given examples of each.

From Section 21.12, paragraph 2:

Common elements are elements jointly owned and used by all units such as sidewalks, stairways, swimming pool, tennis courts, etc.

Limited common elements are elements reserved for the exclusive use of a particular unit such as a designated parking space.

21.30 What types of measurements are typically made by surveyors in performing work for condominium developments?

As-built surveys.