22 PUBLIC LAND SURVEYS

22.1* Convert 65.44 chains to feet.

4379 ft

22.2 What steps in the subdivision of public lands are left to local surveyors?

From Section .12, paragraph 1: "Subdivision of sections was performed by local surveyors and others as the owners took up the land."

22.3 In what states are public land surveys not applicable?

From Section 22.1, paragraph 2: "Title to the vacant lands, and therefore direction over the surveys within their own boundaries, was retained by the colonial states, the other New England and Atlantic coast states (except Florida), and later by the states of West Virginia, Kentucky, Tennessee, Texas, and Hawaii."

22.4 Describe the tangent method of establishing a standard parallel.

A 90° angle is turned to the east or west, as required from a true meridian, and corners are set every 40 ch. At the same time, proper offsets, which increase with increasing latitudes, are taken from *Standard Field Tables* issued by the BLM, and measured north from the tangent to the parallel.

22.5 Why are the boundaries of the public lands established by duly appointed surveyors unchangeable, even though incorrectly set in the original surveys?

From Section 22.2, paragraph 8: "Correcting mistakes or errors now would disrupt too many accepted property lines and result in an unmanageable number of lawsuits."

22.6 What is the convergence in feet of meridians for the following conditions:

(a)* 24 mi apart, extended 24 mi, at mean latitude 45°20′ N.

777.0 ft By Equation 22.2: $c = \frac{4}{3}24(24)\tan(45°20') = 776.99$ ft

(b) 6 mi apart, extended 12 mi, at mean latitude 32°45′N

61.8 ft By Equation 22.2: $c = \frac{4}{3}6(12)\tan 32°45' = 61.75$ft

22.7 What is the angular convergence, in seconds, for the two meridians defining a township exterior at mean latitude of:

(a) 43°00′N **4'52"** By Equation (22.1): $\theta = 52.13(6)tan\,43 = 291.7"$

(b) 32°00'N **3'15"** By Equation (22.1): $\theta = 52.13(6)tan\,32 = 195.4"$

22.8 What is the nominal distance in miles between the following?

(a)* First Guide Meridian East, and the west Range Line of R8E.

30 mi $9(6) - 24 = 30$

(b) SE corner of Sec. 14, T 6 S, R 5 E, Indian PM, and the NW corner of Sec. 23, T 6 S, R 3 E, Indian PM.

13 mi $2 + 6 + 5 = 13$

22.9 Define a tier in the public land survey system.

From Section 22.9, paragraph 3: "East and west rows of townships are named *tiers* and numbered in order north and south of the baseline. By common practice, the term tier is usually replaced by the township in designating the rows."

Sketch and label pertinent lines and legal distances, and compute nominal areas of the parcels described in Problems 22.10 through 22.12.

22.10 E 1/2, SE 1/4, Sec. 6, T 2 S, R 3 E, Salt River PM. **80 ac with sketch**

22.11 SW 1/4, NW 1/4, Sec. 15, T 1 N, R 2 E, Fairbanks PM. **40 ac with sketch**

22.12 NE 1/4, SE 1/4, SE 1/4, Sec. 30, T 1 S, R 4 E, 6th PM. **10 ac with sketch**

22.13 What are the nominal dimensions and acreages of the following parcels:

(a) NW 1/4, SE 1/4, Sec. 28. **20 ch by 20 ch; 40 ac**

(b) N 1/2, Sec. 9. **40 ch by 80 ch; 320 ac**

(c) SE 1/4, SE 1/4, SW 1/4, Sec. 26. **10 ch by 10 ch; 10 ac**

22.14 How many rods of fence are required to enclose the following:

(a)* A parcel including the NE 1/4, NE 1/4, Sec. 32, and the NW 1/4, NW 1/4, Sec. 33, T 2 N, R 3 E?

240 rods

(b) A parcel consisting of Secs. 14, 22, and 23 of T 2 N, R 1 W?

2650 rods

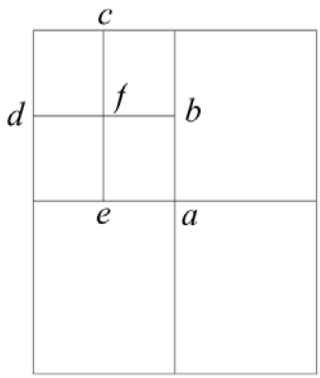
22.15 What lines of the U.S. public-land system were run as random lines?

From Sections 1.10 and 1.11: All east-west section lines and those section lines from the 5-mi line north, except to the standard parallels. Those laid out parallel are section lines both north-south and east-west.

22.16 In subdividing a township, which section line is run first? Which last?

From Section 22.11: The first is the north-south line between section 35 and 36. The last is the north-south line between sections 5 and 6.

22.17 Corners of the SE 1/4 of the NW 1/4 of Sec. 22 are to be monumented. If all section and quarter-section corners originally set are in place, explain the procedure to follow, and sketch all lines to be run and corners set.



Check the section and quarter corners that are in place. Connect opposite quarter corners and set the center corner *a*. Split the distances between the four corners of the NW 1/4, and set the quarter-quarter corners *b, c, d,* and *e*. Connect opposite quarter-quarter corners and set *f* the center of the NW 1/4. The SE 1/4 is shown as a solid area.

22.18 The quarter-section corner between Secs. 15 and 16 is found to be 39.86 ch from the corner common to Secs. 9, 10, 15, and 16. Where should the quarter-quarter-section corner be set along this line in subdividing Sec. 15?

Set the quarter-quarter corner at 39.86 ch/2, which is **19.93** ch or **1315** ft on the section line from the NW corner of Section 15.

22.19 As shown in the figure, in a normal township the exterior dimensions of Sec. 6 on the west, north, east, and south sides are 80, 78, 81, and 79 ch, respectively. Explain with a sketch how to divide the section into quarter sections. (See the following figure.)

Assuming all the section corners are in place, set the center of section at the intersection of EG and HF. Set the quarter-quarter corners 20 ch north from E, B, F, I, C, and G, and 20 ch west from A, E, B, F, I, and H. Connect the quarter-quarter corners thus throwing all the discrepancies to the north and west. Thus all quarter-quarter parcels are 20 ch by 20 ch, except for those along the upper tier of the section.

22.20 The problem figure shows original record distances. Corners *A, B, C*, and *D* are found, but corner *E* is lost. Measured distances are *AB* = 10,603.27 and *CD* = 10,718.42 ft. Explain how to establish corner *E*. (See the following figure.)

AE = **5367.90 ft**; *DK* = **5345.58 ft**

$$AE = \frac{81.82}{161.82}10603.27 = 5367.897 \qquad DK = \frac{79.6}{159.6}10718.03 = 5345.58$$

To restore the corners in Problems 22.21 through 22.24, which method is used, single proportion or double proportion?

22.21* Township corners on guide meridians; section corners on range lines

single; single

22.22 Section corners on section lines; township corners on township lines.

double; double

22.23 Quarter-section corners on range lines.

single

22.24 Quarter-quarter-section corners on section lines.

single

22.25 Why are meander lines not accepted as the boundaries defining ownership of lands adjacent to a stream or lake?

From Section 22.18, paragraph 3: "Meander lines follow the mean high water mark and are used only for plotting and protraction of the area. They are not boundaries defining the limits of the property adjacent to the water."

22.26 What is a witness corner?

From Section 22.17, paragraph 1: "Whenever possible, monuments were witnessed by two or three adjacent objects such as trees and rock outcrops."

22.27 Explain the difference between "obliterated corner" and "lost corner."

From Section 22.18, paragraphs 2 – 4: "An *obliterated corner* is one for which there are no remaining traces of the monument or its accessories, but whose location has been perpetuated or can be recovered beyond reasonable doubt. The corner may be restored from the acts or testimony of interested landowners, surveyors, qualified local authorities, witnesses, or from written evidence. Satisfactory evidence has value in the following order:

1. Evidence of the corner itself.
2. Bearing trees or other witness marks.
3. Fences, walls, or other evidence showing occupation of the property to the lines or corners.
4. Testimony of living persons.

A *lost corner* is one whose position cannot be determined beyond reasonable doubt, either from traces of the original marks or from acceptable evidence or testimony that bears on the original position. It can be restored only by rerunning lines from one or more independent corners (existing corners that were established at the same time and with the same care as the lost corner)."

22.28 The southern boundary of a township lies on a standard parallel at latitude 38°30′N.

What is the theoretical length of its northern boundary?

38.3 ft Latitude increases about 1.15′ per statute mile so mean latitude is about 38°30′ + 3(1.15′) = 38°33′27″. By Eq. (221.2): $c = 4/3(6)(6)\tan(38°33′27″) = 38.26$ ft.

22.29 Why are the areas of many public-lands sections smaller than the nominal size?

Convergence of the meridians and errors and mistakes in the original surveys that allowed low precisions.

22.30 Visit the NILS web site and briefly describe the four components of NILS.

The four major components are survey management, measurement management, parcel management, and the Geocommunicator. The students should briefly describe each of these.

22.31 Visit the BLM website at http://www.blm.gov/wo/st/en/prog/more/nils.html, and prepare a paper on the NILS project.

Individual report.