

## Lesson A2–1

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# Understanding Land Measurement and Legal Descriptions

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**Unit A.** Mechanical Systems and Technology

**Problem Area 2.** Soil and Environmental Technology Systems

**Lesson 1.** Understanding Land Measurement and Legal Descriptions

### **New Mexico Content Standard:**

**Pathway Strand:** Natural Resources and Environmental Systems

**Standard: I:** Recognize importance of resource and human interrelations to conduct management activities in natural habitats.

**Benchmark: I-B:** Apply cartographic skills to natural resources.

**Performance Standard:** 1. Describe different types of maps. 2. Interpret map features and legend. 3. Determine map scale and distance. 4. Determine elevation and terrain features from topographic maps. 5. Use land survey and coordinate system.

**Student Learning Objectives.** Instruction in this lesson should result in students achieving the following objectives:

1. Explain the purpose of land measurement and legal descriptions.
2. Identify the systems of land measurement and legal description used in the United States.
3. Discuss the causes of irregular townships and sections.

**List of Resources.** The following resources may be useful in teaching this lesson:

**Recommended Resources.** One of the following resources should be selected to accompany the lesson:

VAS 2042. *Land Surveys and Descriptions*. Urbana, Illinois: Vocational Agriculture Service, University of Illinois at Urbana-Champaign.

## List of Equipment, Tools, Supplies, and Facilities

Writing surface  
Overhead projector  
Transparencies from attached masters

**Terms.** The following terms are presented in this lesson (shown in bold italics):

Artificial monuments  
Base lines  
Clear title  
Meridian  
Natural monuments  
Regular township  
Section

**Interest Approach.** Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

*Ask students to write out the directions to their house on a piece of paper. When finished ask them to give their paper to someone in the class that does not know where they live. Ask the other student if they think they would be able to find this house by following these directions. Discuss with the class why clear and understandable instructions are needed to give the legal description of a property.*

## Summary of Content and Teaching Strategies

**Objective I:** Explain the purpose of land measurement and legal descriptions.

**Anticipated Problem:** What is the purpose of land measurement and legal descriptions?

- I. Land is owned as private property in the United States and is transferred in various ways from one owner to another. To make this type of transfer possible, it is essential to have a system through which a purchaser can obtain a clear title to any tract of land. A **clear title** means that there are no legal claims against the ownership of the property. In order to trans-

fer the real estate, its location must be positively and specifically described. If this is not done, endless arguments and lawsuits may occur. Surveying land for the purpose of describing and locating it includes the work of identifying boundaries and recording descriptive data. Although different systems of surveys can be used, they all accomplish these two objectives:

- A. A land description gives the definite location of a specific tract of land. Such a description can fit no other tract. From it you can locate that specific area. The legal description of property is given on many documents and papers, such as abstracts, deeds, and tax statements.
- B. A land title, or title to a tract of land, is evidence of ownership. Title to real estate is dependent on a legal description of the property, which in turn must be based on an official survey.

*A variety of techniques may be used to assist students in mastering this objective. Students should use text materials to understand the purpose of land measurement and legal descriptions. Land Surveys and Descriptions is recommended.*

**Objective 2:** Identify the systems of land measurement and legal description used in the United States.

**Anticipated Problem:** What are the systems of land measurement and legal description used in the United States?

- II. There are two systems of describing land used in the United States. One is known as the system of metes and bounds and the other is the system of rectangular surveys.
  - A. Metes and bounds—The metes and bounds system of describing land is widely used in many parts of the world and was the system initially used in the United States. In the eastern part of the United States, an area extending from the northern boundary of Florida to Canada and to the western boundaries of Georgia, Tennessee, Kentucky, West Virginia, Pennsylvania, New York, and parts of Ohio, were described under this system. Texas, when admitted to the United States in 1845, had been previously a part of Mexico and has been described under a metes and bounds system. Since it is impossible to impose one system for land description on top of another, the old system has been retained. There are three basic items that can be included in a land description in the metes and bounds system. They are:
    - 1. Starting point—A description according to the metes and bounds system must have a starting place or point of reference. The description continues for specified distances along lines called courses until the tract has been circumscribed and the starting point is again reached. These points may be trees, stones, rivers, or lakes and are called **natural monuments**. Natural monuments and **artificial monuments**, such as government markers, fences, or highways, have the disadvantage that they may be moved or destroyed.

2. Courses and Distances—Courses are identified by direction, with distances being linear measurements along these lines. Sometimes a course has been partly described as connecting two natural monuments, such as trees, but generally it is described in terms of its angle to a point of reference. The usual point of reference is a *meridian* or true north and south line.
  3. Irregular boundaries—Some tracts of land, such as those bordering lakes or rivers, have irregular boundaries. A tract described as lying along a river is typically interpreted as having one boundary at the middle line between the shores of the stream. Lake boundaries are somewhat different. The owners of land adjoining a natural lake own to the center, if the lake is not navigable; otherwise the title to the bed of the lake is in trust for the people. The ownership of artificial lake beds depends upon the words of conveyance used in transferring the shoreline property. Streets and highways can sometimes also serve as boundaries.
  4. Rectangular land surveys—In 1785 the Continental Congress of the United States passed an ordinance directing that a rectangular system be used in surveying public lands. Thomas Jefferson was directed to organize it. The United States was the first country to use such a system, but Canada later adopted it. The rectangular survey system was set up to accomplish two things: (1) provide for definite location of the land by establishing corner markers on the ground, and (2) provide a short, complete, direct, and easily understood legal description. The system involves the use of principal meridians, base lines, townships, sections, and tracts.
- B. Principal meridians and base lines—These lines form the skeleton of the rectangular survey system. The intersection of the base line and the principal meridian is the starting point of the survey for a given area. The meridians are north and south lines. The *base lines* are east and west lines.
1. Townships and sections—The location of a township can be expressed in terms of ranges east or west of the principal meridian and in terms of tiers of townships north or south of the base line. A *regular township* is six miles square. A section is located within a township. Each square mile of a township is considered a *section*. In all surveys since 1796, the sections in each township have been numbered from 1 to 36, beginning at the upper right, or northeast, corner of the township.
  2. Tracts of land—A tract of land is located within a section. If the tract in question is smaller than a section or is located in more than one section, the fraction or fractions of the section or sections must be indicated. This is done by identifying and locating the fractional portion of each section for each tract of land. In land descriptions the last fraction given is the largest area or portion of the section. We read from left to right. However, in writing a description from a map or in locating a tract of land on a map, we proceed from right to left.

*A variety of techniques may be used to assist students in mastering this objective. Students should use text materials to understand the systems of land measurement and legal description used in the United States. Land Surveys and Descriptions is recommended. Use TM: A2–1A thru TM: A2–1E to aid in the discussion on this topic.*

**Objective 3:** Discuss the causes of irregular townships and sections.

**Anticipated Problem:** What causes irregular townships and sections?

- III. It can be observed that not all townships and sections in a rectangular survey are square. There are several possible reasons for this. They are:
- A. Curvature of the Earth—Applying a rectangular system to a curved surface, such as the Earth, results in some irregularities. Meridian lines get closer together as they approach the north and south poles. Therefore, a township based off these lines cannot be a perfect square. It is impossible for all sections to be perfectly square and to contain exactly 640 acres. Sections containing more or less than 640 acres may be found in the north and west rows of sections in a township. Most of the other sections will be approximately 640 acres in size. When designing this system, surveyors were requested to throw all deficiencies or excesses in acreage into the north and west sides of the townships.
  - B. Human error—The surveyors who conducted these surveys are human and therefore made mistakes. Occasionally errors in surveying have resulted in townships with sections of odd shapes and sizes.
  - C. Surveys meeting—Where the survey from one principal meridian meets the survey from another, both irregular townships and sections are sure to occur. The same is true where surveys from two different base lines meet.

*A variety of techniques may be used to assist students in mastering this objective. Students should use text materials to understand the causes of irregular townships and sections. Land Surveys and Descriptions is recommended. Use TM: A2–1F to aid in the discussion on this topic.*

**Review/Summary.** Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Questions at the end of each chapter in the recommended textbooks may also be used in the review/summary.

**Evaluation.** Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activity. A sample written test is attached

## Answers to Sample Test:

### Part One: Matching

1 = b, 2 = e, 3 = a, 4 = f, 5 = c, 6 = d

### Part Two: Completion

1. township
2. irregularities

3. Thomas Jefferson

**Part Three: Short Answer**

Curvature of the earth; human error; different surveys meeting.

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# Test

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## Lesson A2–1: Understanding Land Measurement and Legal Descriptions

### Part One: Matching

*Instructions.* Match the term with the correct response. Write the letter of the term by the definition.

- |                         |                     |             |
|-------------------------|---------------------|-------------|
| a. artificial monuments | b. base lines       | c. meridian |
| d. natural monuments    | e. regular township | f. section  |

- \_\_\_\_\_ 1. East and west lines.
- \_\_\_\_\_ 2. Six miles square.
- \_\_\_\_\_ 3. Government markers, fences, or highways used are references in a metes and bounds survey.
- \_\_\_\_\_ 4. Each square mile of a township.
- \_\_\_\_\_ 5. North and south lines.
- \_\_\_\_\_ 6. Trees, stones, rivers, or lakes used are references in a metes and bounds survey.

### Part Two: Completion

*Instructions.* Provide the word or words to complete the following statements.

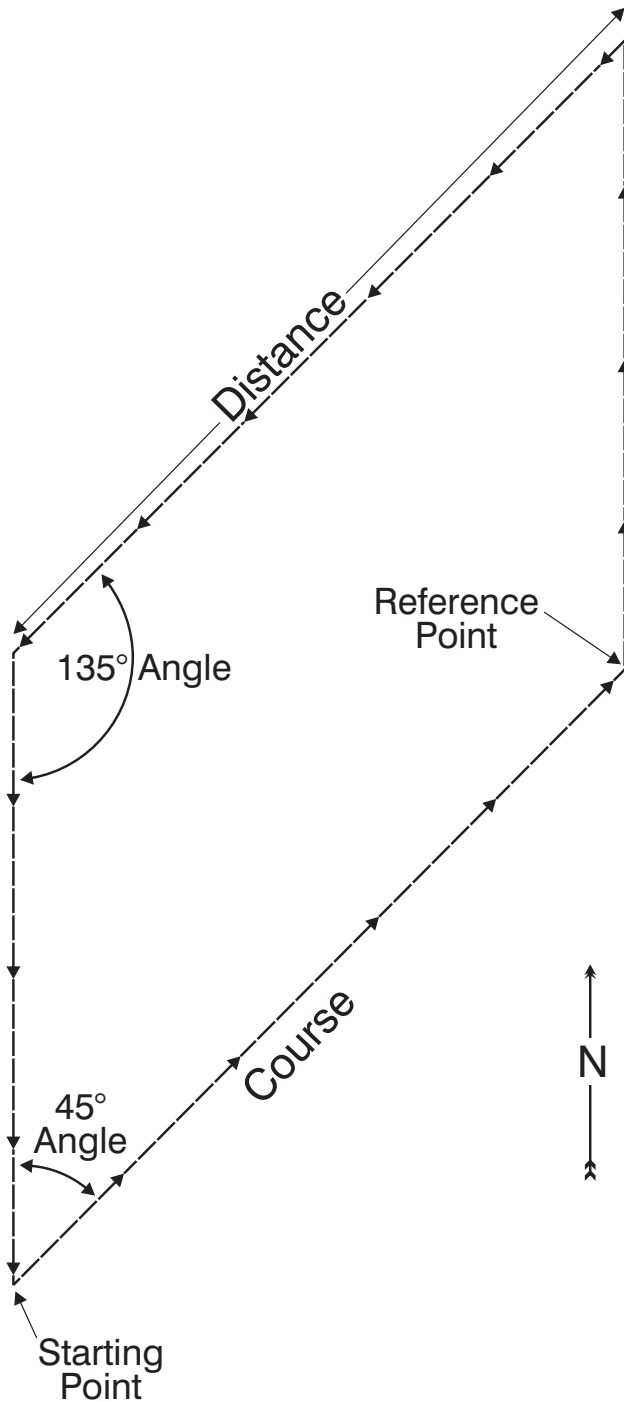
1. The location of a \_\_\_\_\_ can be expressed in terms of ranges east or west of the principal meridian and in terms of tiers of townships north or south of the base line.
2. Applying a rectangular system to a curved surface, such as the Earth, results in some \_\_\_\_\_.
3. \_\_\_\_\_ was directed to organize the rectangular survey system.

### Part Three: Short Answer

*Instructions.* Provide information to answer the following question.

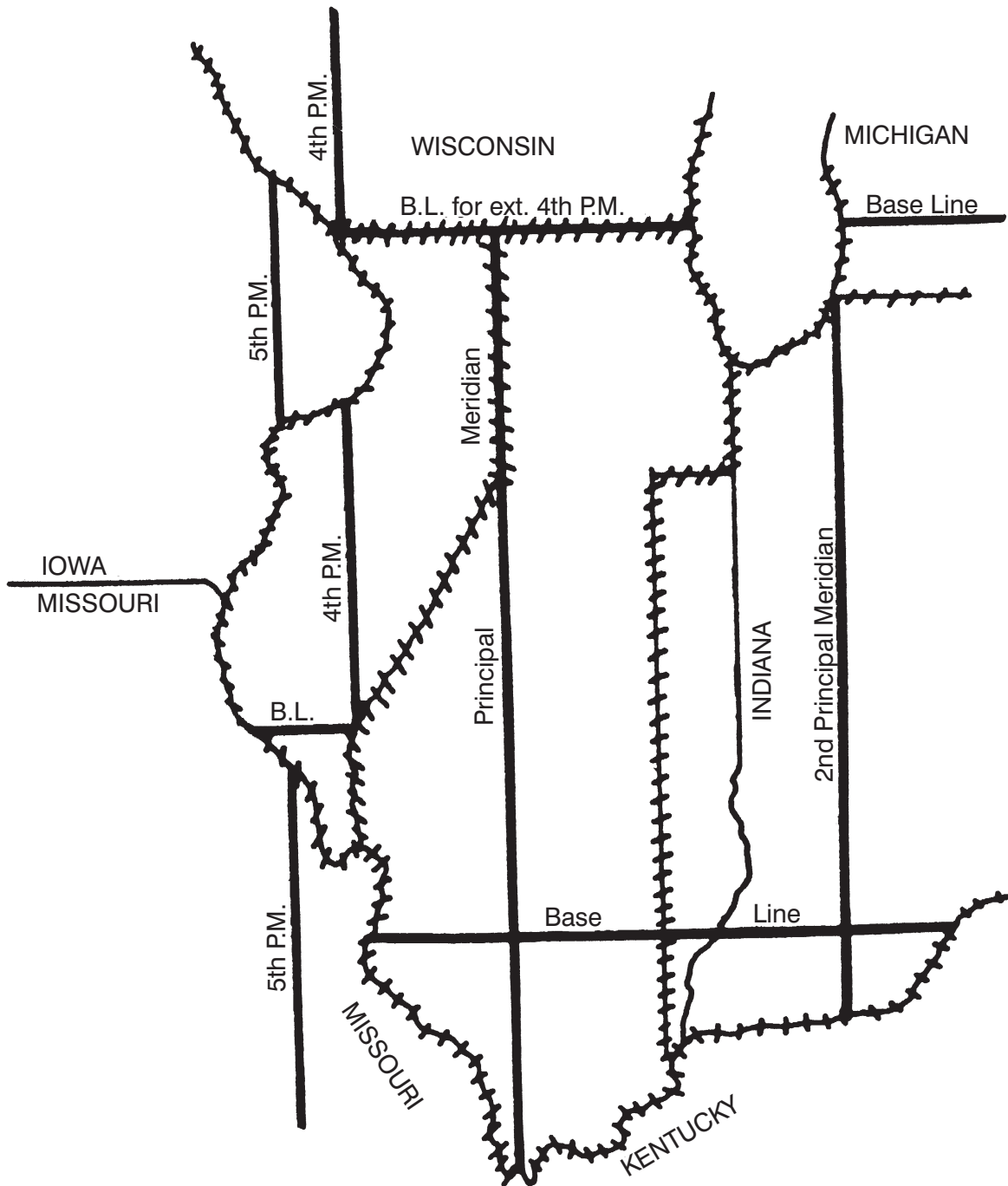
What are three causes of irregular townships and sections?

# LAND DESCRIPTION IN THE METES AND BOUNDS SYSTEM





# EXAMPLE OF PRINCIPLE MERIDIANS AND BASE LINES



# TOWNSHIPS IN THE RECTANGULAR SURVEY SYSTEM

				4 N			
				3 N			X
				2 N			
				1 N			
	<b>Base</b>				<b>Line</b>		
4 W	3 W	2 W	1 W	1 E	2 E	3 E	4 E
				1 S			
				2 S			
				3 S			
				4 S			

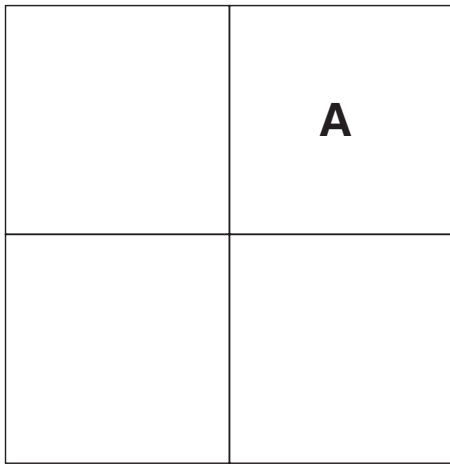
A township is located with reference to its base line and principal meridian. Township X is the third township north of the base line and the fourth township east of the principal meridian.

## SECTIONS WITHIN A TOWNSHIP

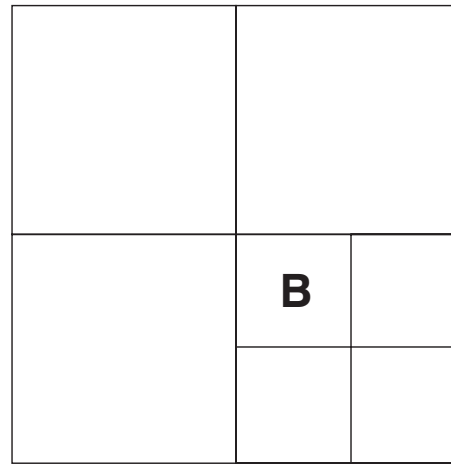
6	5	4	3	2	1
7	8	9	<del>10</del>	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

**A regular township contains 36 sections  
numbered as shown.**

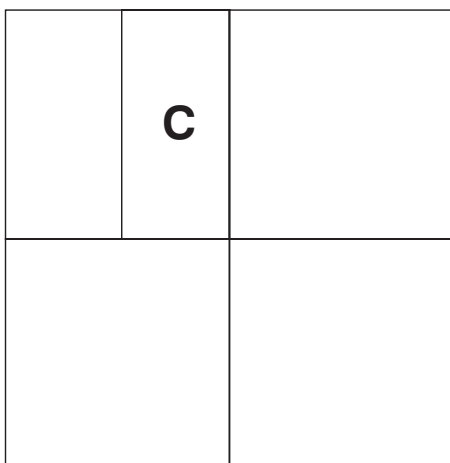
# DESCRIPTIONS OF FOUR SECTIONS OF LAND WITHIN A SECTION



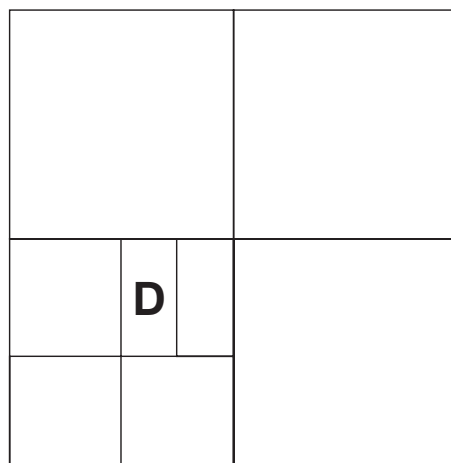
**A—N.E.  $\frac{1}{4}$   
160 acres**



**B—N.W.  $\frac{1}{4}$  of S.E.  $\frac{1}{4}$   
40 acres**

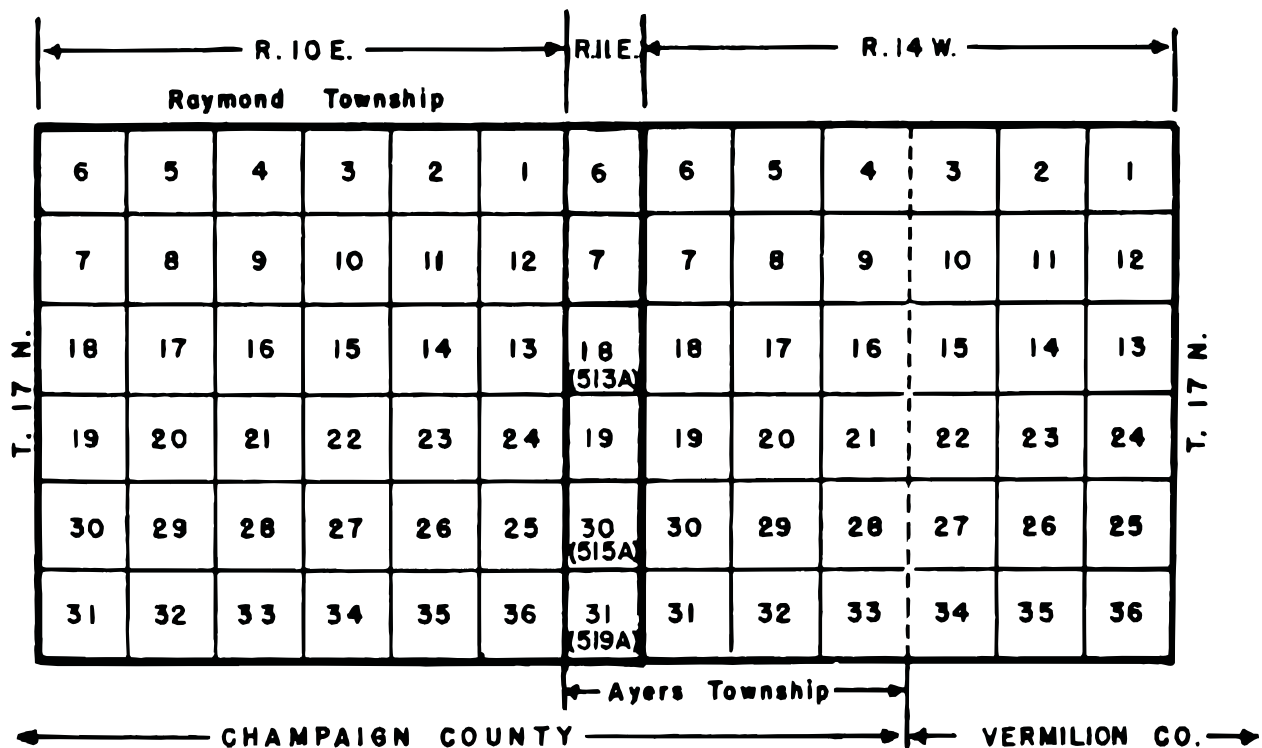


**C—E.  $\frac{1}{2}$  of N.W.  $\frac{1}{4}$   
80 acres**



**D—W.  $\frac{1}{2}$  of N.E.  $\frac{1}{4}$  of S.W.  $\frac{1}{4}$   
20 acres**

# IRREGULAR SECTIONS WITHIN A SURVEY



Townships and sections are usually irregular where a survey east from one principal meridian meets a survey west from another. In this example, R11 is less than a mile wide.