

The Public Land Survey System in Kansas

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Introduction

If you have ever had to identify the legal location assigned to a particular piece of land — that is, the section, township, and range, and smaller divisions — then you have encountered the Public Land Survey System. The Public Land Survey System was established by the United States government to locate, describe, and record parcels of land for legal purposes. In this system, land is surveyed in a north-south, east-west rectangular grid and divided into townships that are generally 6 miles on a side and contain 36 sections that are each about 1 mile square and contain 640 acres. This system is in effect in Kansas. This publication is designed to provide a basic understanding of the Public Land Survey System and how to use it.

History

The U.S. Public Land Survey System (PLSS) became official government policy shortly after the Revolutionary War, with the passing of the Land Ordinance of 1785. This ordinance grew out of a political movement led by Thomas Jefferson and John Adams that held that an essential part of a democracy was the right to own property. They argued that the land should not be given out in large grants to wealthy men and land speculation companies, but rather that it should be divided into small parcels and sold for low prices to make it possible for the common man to own land. This ordinance set up a standardized national survey system

that incorporated the better features of the systems previously used by the colonies, particularly the New England colonies in which “towns” were laid out in rectangles 6 to 10 miles square that were then divided into individual parcels. The first land to be surveyed under the 1785 ordinance was in southeastern Ohio, adjacent to the western boundary of Pennsylvania. The PLSS eventually included all of the U.S. westward from Ohio to the Pacific Ocean and northward to the Arctic.

The PLSS was extended into Kansas by the Act of July 22, 1854, which established the office of the Surveyor General for the territories of Kansas and Nebraska. The first person to fill that position, John Calhoun, set up his office in Fort Leavenworth, Kansas Territory, in 1854. He was instructed

to survey the parallel of 40° North latitude, as a baseline for the survey, from the Missouri River westward for a distance of 108 miles, or 18 townships, where the initial point of the Sixth Principal Meridian was to be established (fig. 1).

The township boundaries were to be surveyed north and south from this baseline — which was the boundary between the two territories and later the state line — and east and west from the Sixth Principal Meridian. The surveys progressed rapidly in the open prairies, and within 21 years all of Kansas had been surveyed.

Townships and Sections

A township is a basic unit of land within the PLSS. Normally, townships are approximately 6 miles on a side. They are bounded on the north and

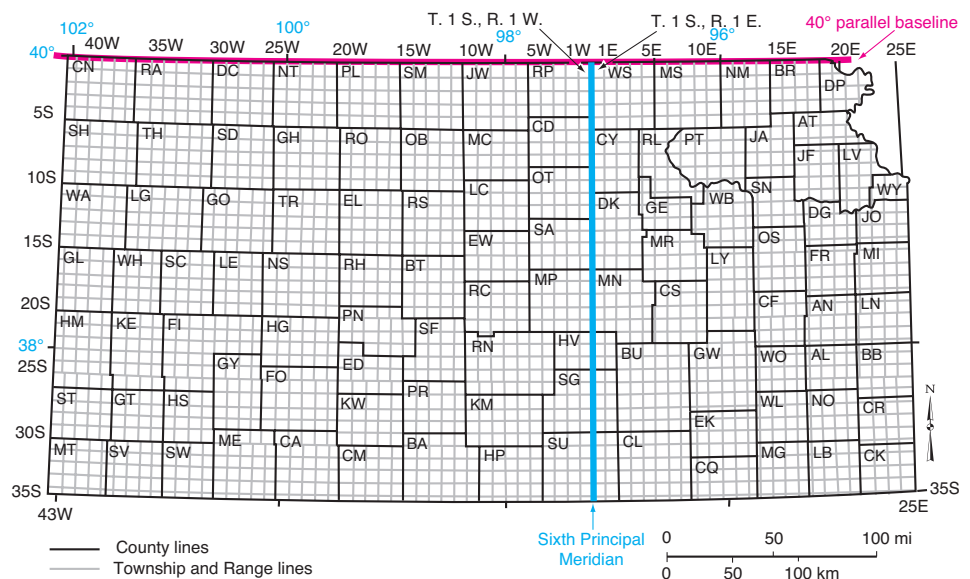


Figure 1. Map of township and range lines in Kansas. Townships are numbered 1 to 35 from the Nebraska state line on the north to the Oklahoma state line on the south. Ranges are numbered 1 to 25 east from the Sixth Principal Meridian, and 1 to 43 west from the Sixth Principal Meridian.

south by township lines and on the east and west by range lines. Townships are designated by both a township and a range number. In Kansas, the townships are numbered 1 to 35 sequentially from the baseline at approximately 40° North latitude (the state line bordering Nebraska) southward to the Oklahoma border (fig. 1). Ranges are numbered east and west from the Sixth Principal Meridian — the east ranges are numbered from 1 to 25 to the Missouri border, and the west ranges from 1 to 43 to the Colorado border. Thus, for example, the first township east of the principal meridian and next to the Nebraska border is Township 1 South, Range 1 East (T. 1 S., R. 1 E.), whereas the one just west of the principal meridian is T. 1 S., R. 1 W. The township in the southeast corner of the state is T. 35 S.,

R. 25 E., and the one in the southwest corner of the state is T. 35 S., R. 43 W.

Because the surface of the earth is curved, parallels of longitude, and thus north-south survey meridians in the U.S., converge toward the north. Consequently, the range lines must be offset periodically to preserve the 6-mile by 6-mile configuration of the townships; otherwise, townships would be considerably narrower in the northern part of the state than in the southern part. Such offsets were set up along standard parallels, or correction lines, that were established every 30 miles south of the baseline. This is most easily seen in the northwestern part of the state, where east-west county lines coincide with the correction lines, and the north-south range lines are offset across those lines (e.g., across the east-west county

line between Cheyenne and Sherman counties) (fig. 1).

Townships are divided into 36 sections of approximately 1 square mile or 640 acres each (fig. 2). Numbering of the sections begins in the northeast corner of the township and proceeds back and forth, east and west, until the last section, Section 36, is reached in the southeast corner of the township. Sections, in turn, can be divided into smaller units, by quarters. For example, one quarter of a section is 160 acres, one quarter of a quarter is 40 acres, and one quarter of a quarter of a quarter is 10 acres, and so forth. For example, the 10-acre parcel shown on fig. 2 is designated as the southwest quarter of the southeast quarter of Section 7, Township 9 South, Range 5 East, which is usually abbreviated

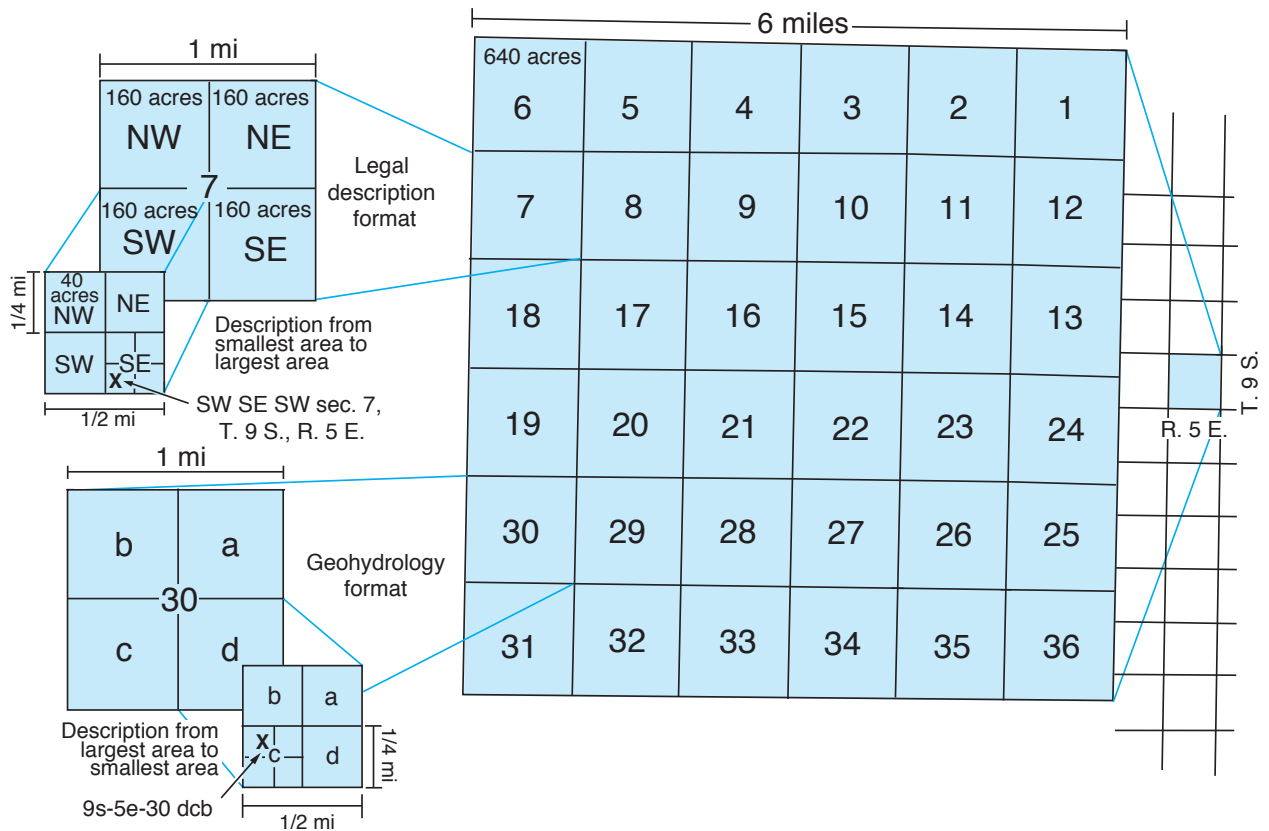


Figure 2. Diagram illustrating section numbering and method of assigning legal land descriptions under the PLSS. The section shown in the upper left of the figure is described as Section 7, Township 9 South, Range 5 East, which is usually abbreviated as sec. 7, T. 9 S., R. 5 E. The method for subdividing sections by quarters is also shown, as well as the legal description. The alternative, geohydrology format is illustrated on Section 30, in the lower left of the figure.

as SW1/4 SE1/4 SW1/4 sec. 7, T. 9 S., R. 5 E. or SW SE SW sec. 7, T. 9 S., R. 5 E. This may be further abbreviated as SW SE SW 7-9S-5E. Note that these descriptions begin with the smallest area (a 10-acre parcel) and progress to the largest area (a township).

An Alternative Method —

Geohydrologists at the U.S. Geological Survey use a modification of the PLSS to identify parcels of land. Their method is used in numerous hydrological reports and databases that are available to the public in print or on the Kansas Geological Survey website <http://www.kgs.ku.edu/>. According to this method, quarter designations are replaced by the letters a, b, c, and d in a counterclockwise manner, starting in the northeast corner (fig. 2). Additionally, the descriptions are listed from the largest to the smallest area, just the opposite of the standard method. For example, a location described as NW SW SE sec. 30, T. 9 S., R. 5 E. in the standard method becomes 9S-5E-30 dcb in the geohydrologists' method. **Note: this alternate method is not to be used for official legal descriptions.**

How To Use the PLSS

To identify the legal description of a particular piece of land, one must first locate the property on a map that shows sections, townships, and ranges, such as a U.S. Geological Survey topographic map (fig. 3) or a county ownership map. The township number can be found along the sides of the map and the range number along the top or bottom of the map. Once the township and range have been determined, one can find the section number within that 6-mile square and then determine the exact location within the section by dividing the section into quarters (fig. 3). For example, as fig. 3 illustrates, the church in the village of Lone Star is located in the SE NE NE sec. 1, T. 14 S., R. 18 E., and the pond northwest of

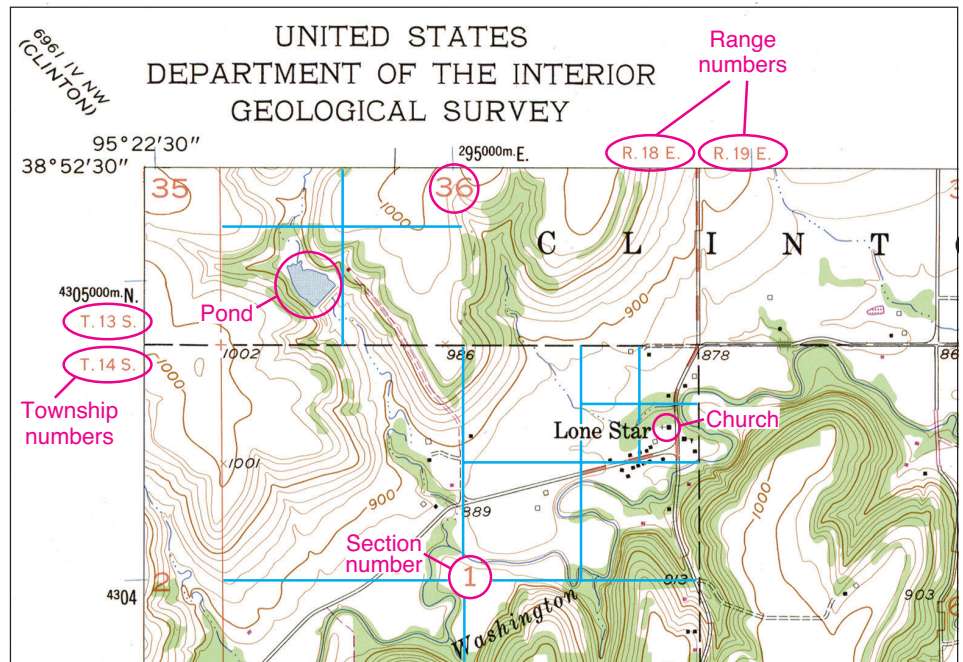


Figure 3. Topographic map of a small area in Douglas County, Kansas. The church in Lone Star is in sec. 1, T. 14 S., R. 18 E., and the pond just northwest of there is in sec. 36, T. 13 S., R. 18 E. (from USGS Lone Star, Kansas, 7.5 min. quadrangle).

Lone Star is located in the SW SW sec. 36, T. 13 S., R. 18 E.

Although a relatively simple system, the PLSS is unfamiliar to many people, and mistakes are common. Here are some of the mistakes people make when assigning legal descriptions:

- listing quarters in the wrong order (be certain they are listed from smallest to largest),
- switching township and range numbers (townships run from north to south, ranges east and west),
- mislabeling ranges or not labeling them at all (determine whether the range is east or west of the principal meridian and label it as such), and
- designating two townships and two ranges (a section can be in only one township, which is designated by one township number and one range number).

Irregularities

In Kansas, not all townships and sections are perfectly square. Some

townships have fewer than 36 sections, and some sections contain fewer than 640 acres, particularly along the east, south, and west borders of Kansas where the survey terminated (fig. 1). Because of the way sections were surveyed (beginning in the southeast corner of the townships), sections along the west and north lines of the townships have accommodated any adjustments that were necessary to fit within the previously surveyed township and range lines. Another source of irregularity results from the misplacement, in 1855, of the Sixth Principal Meridian 60 miles west of the Missouri River, instead of the prescribed 108 miles. By the time the meridian was reestablished at its proper location, extensive surveying had been done using the incorrectly established meridian, and thus it was preserved as a guide meridian (range line) without offsets. The major consequence of this misstep is that the sections on the west edges of all townships in Range 8 East are wider than usual, most notably at

the Kansas-Oklahoma border, where sections are more than 13,000 feet wide.

Other adjustments sometimes necessitated irregular sections elsewhere within a township. In some cases, the shapes of sections may be distorted, particularly where section lines change direction at a quarter corner (fig. 4). Navigable streams and lakes larger than 25 acres were excluded from the survey, resulting in partial sections in some places next to such bodies of water. Along the Missouri River, some areas that were originally surveyed in the Missouri system now lie within Kansas due to shifts in the course of the river. County surveyors in some of the affected river counties are currently extending the Kansas survey lines into those areas.

Land within the 1856 boundary of Fort Riley was not included within the original survey, and most of these lands still have not been surveyed within the PLSS. A relatively small area along the south and west boundaries of Fort Riley, called the

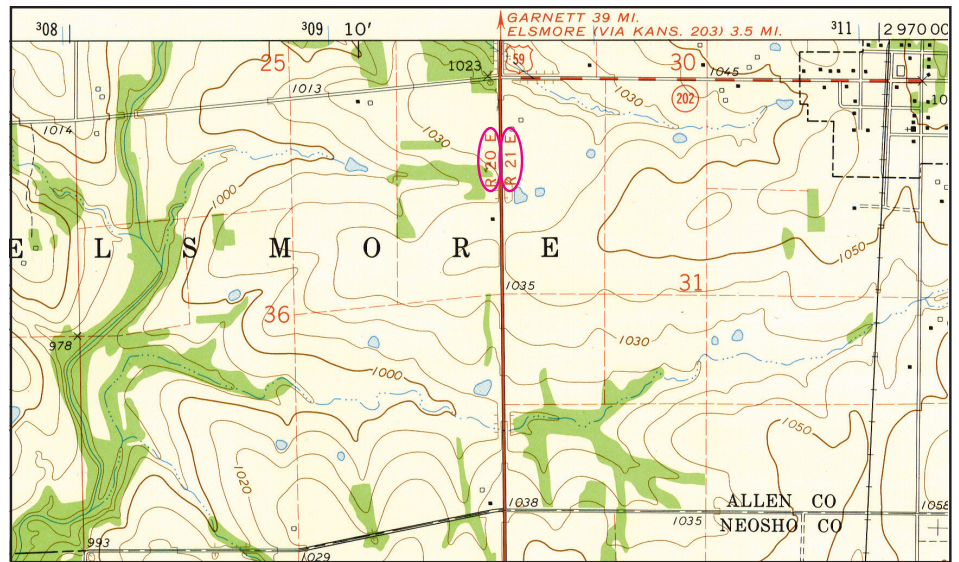


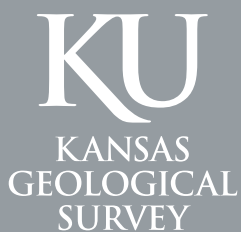
Figure 4. Topographic map showing an example in which section boundaries were distorted to allow survey lines to meet across the guide meridian between Range 20 East and Range 21 East in southern Allen County (from USGS Stark, Kansas, 7.5 min. quadrangle).

Republican River Bridge Company Lands, also was not included in the original survey, but was later surveyed according to legislation passed by Congress in 1869 that provided for “special section” numbers (1 to 13). These sections were surveyed in a random fashion without regard to existing section numbers or lines within the township. As a

consequence, within Township 11 South, Range 5 East, there are not only sections or partial sections 1 to 13, but also partial “special sections” 1 to 13.

Reference

White, C. A., 1982, A History of the Rectangular Survey System: U.S. Department of the Interior, Bureau of Land Management, 774 p.



The University of Kansas

The Kansas Geological Survey (KGS) is a research and service division of the University of Kansas that investigates and provides information about the state's natural resources. KGS scientists pursue research related to surface and subsurface geology, energy resources, groundwater, and environmental hazards. They develop innovative tools and techniques, monitor earthquakes and groundwater levels, investigate water-quality concerns, and map the state's surface geology.

The KGS has no regulatory authority and does not take positions on natural resource issues. The main headquarters of the KGS is in Lawrence in the West District of the University of Kansas, and the Kansas Geologic Sample Repository of the KGS is in Wichita.

Public Information Circular 20
January 2002

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