

CULTURAL HISTORY

The United States Public Land Survey System Congressional Township Numbering System

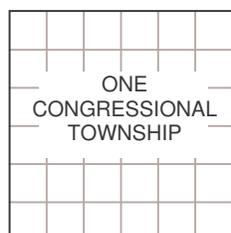
By Neal McLain

I will begin this month's column with a review of the last two columns.

In 1783, Great Britain and the United States formally ended the American Revolutionary War by treaty signed at Paris.^[1] Under this treaty, the United States — then governed by the Second Continental Congress — acquired title to lands lying northwest of the Ohio River, an area then known as the *Northwest Territory*. We know this area today as the states of Indiana, Michigan, Illinois, Wisconsin, and part of Minnesota.

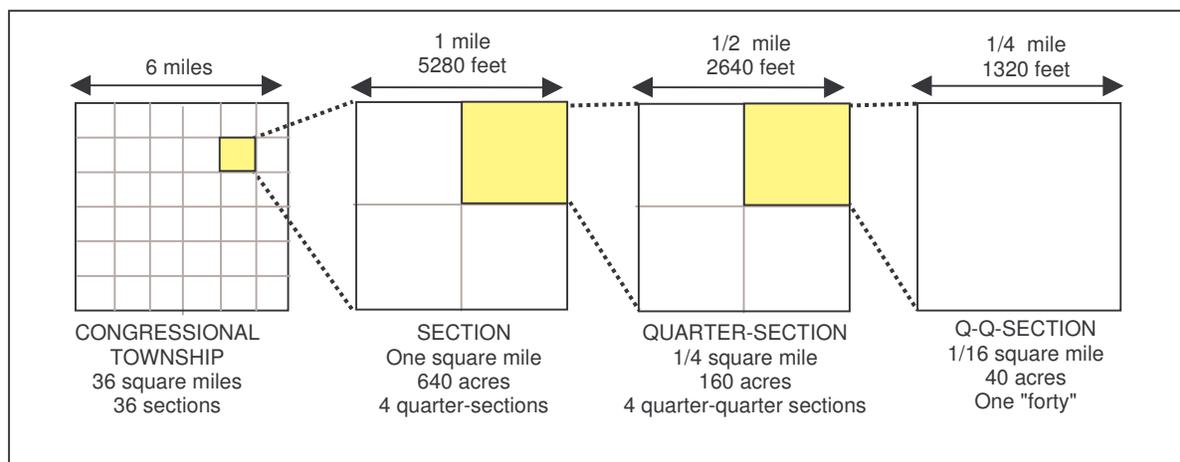
The Congress saw the sale of these lands as a source of revenue. But before it could sell any land, it was necessary to survey it into salable parcels. To address this need, the Congress enacted the *Land Ordinance of 1785*.^[2] This ordinance established a survey system now known as the United States Public Land Survey System (PLSS).^[3]

The PLSS was adopted by successor Congresses to govern the surveys of the Louisiana Purchase and new territories acquired thereafter. Since 1785, approximately 72% of the land area of the United States, located in 30 *Public Land States*, has been surveyed under PLSS guidelines.^[4] Although Texas is not one of the Public Land States, many of the procedures established under the Land Ordinance were subsequently adopted by the Texas Legislature for the surveys of its own public lands.



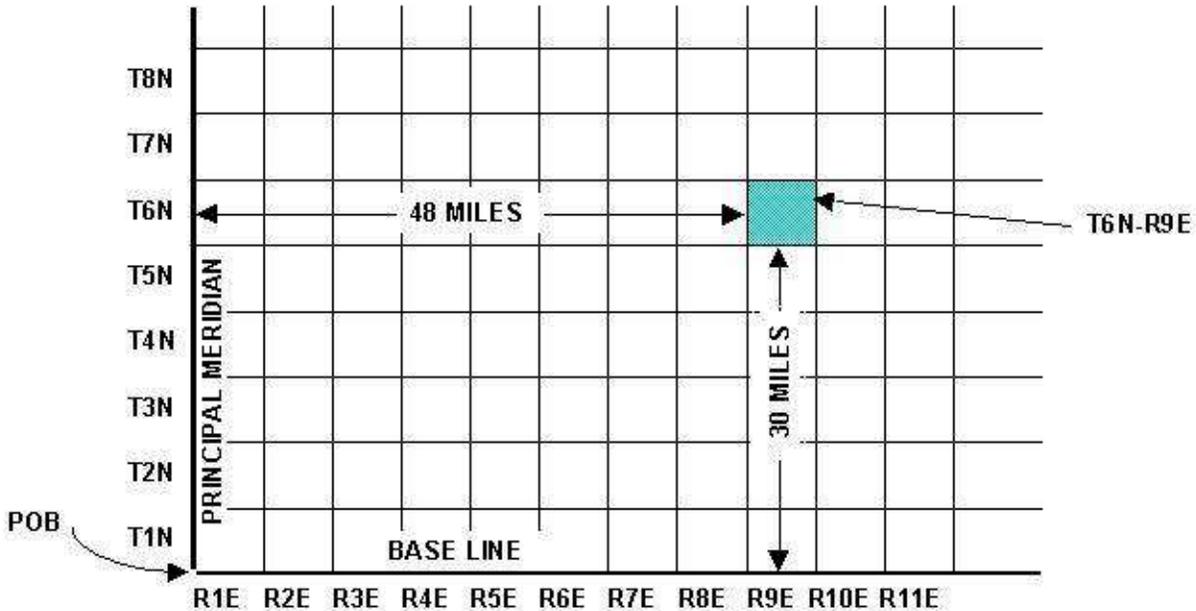
The Land Ordinance specified that public lands were to be surveyed into parcels called *townships*. We now call these parcels *Congressional Townships*. A Congressional Township is a square parcel of land measuring six miles (more or less) on each side, oriented along cardinal (north-south and east-west) lines. The use of the word "township" does not imply anything about land use, land ownership, population, ecology, terrain, or government.

A Congressional township can be subdivided into smaller parcels known as *sections*, *quarter-sections*, and *quarter-quarter-sections*. A quarter-quarter section contains 40 acres, and is often referred to as a *forty*, as in "the back forty."



Congressional Township Numbering System

Each Congressional township is identified by two numbers: a *township number* (usually shortened to *town number*) north or south of the base line, and a *range number* east or west of the principal meridian. For example, **Town 6 North Range 9 East** identifies a township six townships north, and nine ranges east, of the Point of Beginning.



Every 40-acre parcel in any of the 30 Public Land States can be uniquely described by seven parameters:

- Quarter-quarter section
- Quarter section
- Section number
- Town[ship] number north or south of Base Line
- Name of the Base Line
- Range number east or west of Principal Meridian
- Name of the Principal Meridian

Example:

The Northeast Quarter of the Northwest Quarter of Section 10, Town 6 North of the Indian Base Line, Range 10 East of the Indian Meridian.

In modern surveying and tax records, PLSS land descriptions are usually abbreviated. The names of the base line and the principal meridian are often omitted because they're understood by default in most surveying and tax situations, and what's left is abbreviated.

Congressional Township Numbering System

Typical abbreviations include:

NE 1/4 NW 1/4 Sec 10 Town 6 North Range 10 East
 NE 1/4 NW 1/4 Sec 10 T6N R10E
 NEQ NWQ 10 T6N R10E
 NE-NW-10-6N-10E
 6N10E

Theoretically, this numbering system would produce a regular grid of square townships, each containing 36 square sections, extending across an entire state or territory. In fact, there are many discontinuities in the grid. Several factors account for this:

- The earth is a sphere; consequently, meridians get closer together as one moves north. To adjust for this factor, PLSS surveyors established new reference lines parallel to the original base line and principal meridian. Typically, such corrections were established every four to six townships.
- The original surveys contained numerous errors resulting from such factors as primitive equipment, difficult working conditions, poorly-trained personnel, and shifts in local magnetic declination.

The ideal rectangular grid didn't always work for another reason: many things interrupted the grid, such as lakes, rivers, mountains, deserts, glaciers, existing survey lines, and Indian treaty boundaries. The General Land Office provided the surveyors with specific rules for handling these situations, but the actual field work didn't always comply with the rules. The actual results were generally something like this:

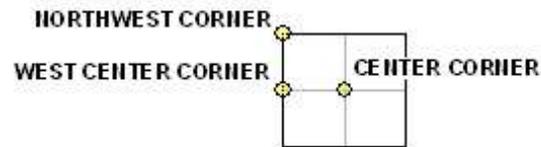
- In the case of relatively narrow waterways (creeks, small lakes), the survey lines were carried across and continued without interruption on the other side.
- In the case of large waterways (generally, any river wider than three chains), survey lines were run to the edge (the high water mark, but in some cases the edge of a bank above a floodplain), and a *meander corner* marker was set. The survey might have been continued on the other side, or it might have been conducted by a different survey crew at a different time, and it might have been referenced to a different POB. In the latter cases, no attempt would have been made to line up the survey lines on the two sides.
- In the case of mountains and deserts, the survey was supposed to continue across without interruption. The surveyors presumably did their best, but the evidence of modern USGS topographic maps sometimes casts doubt on their diligence. In many cases, section lines are shown as dashed red lines on topo maps, indicating "location approximate."
- In the case of an existing survey line or treaty line, the new survey lines are supposed to *close* against the existing line: the surveyor was supposed to establish the point where the new survey line meets the existing line, and erect a marker at the point, but not encroach beyond the existing line.

All of the above situations were (or should have been) described in field notes.

Congressional Township Numbering System

CORNERS

Corners are important landmarks for land surveys in Public Lands Survey. A *section corner* is one of the four outside corners of a PLSS section. Other relevant terms are *center corner*, *west center corner*, *north center corner*, etc.



The original surveyors marked every corner with some sort of marker — a stake, a pile of rocks, a pit, or a blaze in nearby tree. These situations, too, were (or should have been) described in field notes.

Most of the original markers have long since disappeared, resulting in *obliterated corners* or *lost corners*. In the years since the original surveys, much effort has been expended recovering the original corners. Once recovered, they have been marked with permanent *monuments*, either steel stakes or steel structures designed for the purpose:

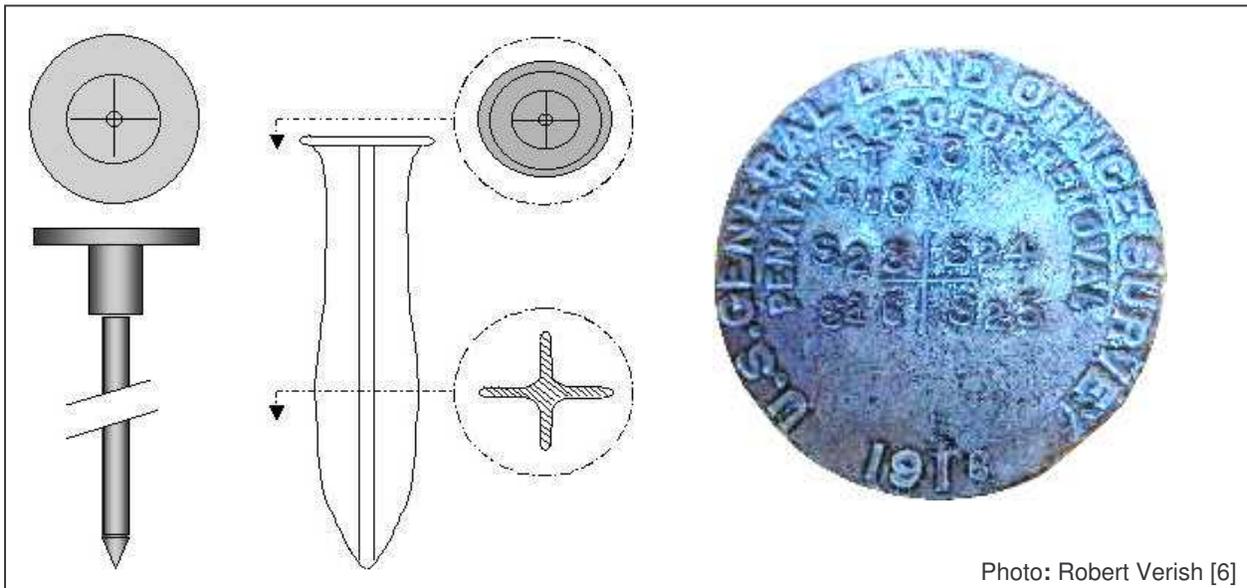


Photo: Robert Verish [6]

Typical monument structures

The horizontal tablet at the top of the monument is stamped or engraved with location and ownership information. For example, the inscription on the tablet shown at right indicates that it was set by the U. S. General Land Office Survey in 1916, and that it identifies the location of the common corner of **Sections 23, 24, 25, and 26 in T30N R18W**. Monuments are usually set in concrete or bedrock outcrops, and may be set at ground level, or an inch or so below grade. Monuments located in public roads (often in the middle of intersections) are usually placed below the road surface for protection.

Congressional Township Numbering System

The physical location of a monumented corner is inviolate. Although the latitude and longitude of a corner may change with every advance in measurement technology, the actual physical location of the corner on the ground never changes. If the ground itself moves because of an earthquake or the motion of the underlying tectonic plate, the corner moves with it, but it never moves with respect to the surrounding ground.

In Public Land States, PLSS land descriptions stand today as the underlying reference grid for all other land descriptions. In these states, every recorded survey must be tied to a monumented PLSS corner.

Next month: Public Lands in Texas.

[1] *The Treaty of Paris (1783)*. Signed on 3 September 1783; ratified by the Congress of the Confederation on 14 January 1784 and by the King of Great Britain on 9 April 1784; formally ended the American Revolutionary War between the Kingdom of Great Britain and the United States of America. Wikipedia, The Free Encyclopedia. Accessed 28 Dec 2009. <http://en.wikipedia.org/wiki/Treaty_of_Paris_%281783%29>

[2] *Land Ordinance of 1785*. Wikipedia, The Free Encyclopedia. Accessed 28 Dec 2009. <http://en.wikipedia.org/w/index.php?title=Land_Ordinance_of_1785&oldid=333426344>.

[3] *The Public Land Survey System (PLSS)*. United States Department of the Interior: National Atlas of the United States, 2009. Accessed 28 Dec 2009. <http://www.nationalatlas.gov/articles/boundaries/a_plss.html>

[4] Russell C. Brinker and Paul R. Wolf. *Elementary Surveying (IEP series in Civil Engineering)*. Sixth Edition. New York: Harper & Row, 1977. 401.

[5] *Principal Meridians and Base Lines*. U. S. Department of the Interior, Bureau of Land Management, Cadastral Survey. Accessed 30 Dec 2009. A high-resolution version of this map is available at <<http://www.blm.gov/wo/st/en/prog/more/cadastralsurvey/meridians.html>>.

[6] Robert Verish. *Survey Marker. The Cairns of Gold Basin: Unusual piles of rock were found while "visual-only-searching" for meteorites in the Gold Basin strewn field*. Used by permission. Accessed 31 Dec 2009. <<http://meteorite-recovery.tripod.com/2009/apr09.htm>>