

*The Public Land
Survey.*

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In the treaty of peace signed by Great Britain and the United States in 1783 a great quantity of land besides that contained in the colonies was ceded to the United States. This together with that ceded by the individual colonies constituted a public domain of 704 935 square miles or 239 171 787 acres which at that time was simply wild undivided territory.

In order that this great mass of land might be properly located and disposed of, Congress appointed a committee of five to draft some plans on which the work should be done; and accordingly on May 7th 1787 the committee submitted the following plan. — The public land shall be divided in many two mile squares, and these again into mile squares numbered from 1-100 beginning at the north west and running from west to east and from east to west alternately throughout the square.

On April 26th 1785 this was amended and submitted again; now requiring the country to be divided into townships begin

miles square by lines running due north and south and others east and west.

These were to be again divided into one mile squares (640 acres) consisting of two sections of 320 acres each. This was again ~~divided~~ decided May 20th 1785 reducing the township to six miles square composed of thirty six sections one mile square and numbered from one to thirty six beginning at the southeast corner and running from south to north in each tier of sections. It was under this system that the original surveys of the United States were made; the United States Geographer managing the work.

The 1796 Congress passed an act authorizing the appointment of a surveyor general. Also a different numbering of the sections of the townships in future surveys. The numbering should be from one to thirty six beginning with the north east section and running from east to west and from west to east alternately throughout the township. Later it was decided to divide the sections into quarters. This system is still in use.

The general process at present for laying out new territory is as follows. -

First. Through some convenient and suitable point in the territory a principal meridian is established conforming to the true meridian.

Second. At right angles to this a base line is established extending east and west to the limits of the territory.

Third. Standard parallels of latitude are established every twenty four miles north of the north line of Kansas and every thirty miles south of said line and initiated from the principal meridian.

Fourth. Guide meridians conforming to the principal meridian are initiated at intervals of twenty four miles along the base line and standard parallels.

Fifth. Those twenty four (or thirty) mile squares are divided as nearly as possible into townships of thirty square miles each.

Sixth. These townships are again divided into sections and quarters.

Throughout the entire process proper care must be taken to plainly and securely mark all lines and corners.

Establishment of Principal Meridian.

In the opinion of the writer the most accurate method for this is that given by F. Hodgman in his "Land Surveying." It is as follows:- First. The exact length of time required for polaris to make a complete circuit around the pole ($23^{\text{h}} 56^{\text{m}} 4\frac{9}{100}\text{s}$) is ascertained. Second. The exact time of the upper culmination is determined. Third.

By establishing a proportion between the time required to make a complete circuit to the time elapsed between the last upper culmination and the time of observation, and 360° to the required azimuth, that azimuth can be determined. Fourth.

Establish the line of polaris at the time of observation and then by laying off the angle (east or west as the case may be) as determined above, the true meridian is the result. Although this seems quite complicated, yet so much of the work is the same for every calculation that appropriate tables have been constructed (Hodgman's "Land Surveying" Appendix P. 22) by the use of which the surveyor's work is rendered very brief and simple,

and any one with a reasonable knowledge of the art of surveying can perform the work correctly.

Another method which is very similar I will not give in detail. Instead of using the hour angle of polaris, the star is taken at its point of greatest elongation, and as its azimuth is always the same for this point, all that is necessary is to establish the meridian of the star at this point and then lay off from this the given azimuth and the resulting line is the true meridian.

A third method is by the use of the solar compass, or a solar attachment to the ordinary transit. The attachment to the transit consists of two arcs graduated, one for setting off the declination of the sun and the other the hours of the day. Upon these is borne a target and some distance from it a hole through which the sun shines on the target. Then by setting off the latitude of the locality on the vertical angle arc of the transit, the declination (at the time of observation) of the sun on its arc, the hour of the day

on its arc and then turning the instrument till the sun spot falls directly on the target, the line of sight of the telescope will be the true meridian.

This once established, as many meridians may be established as are desired.

When this is done, the next thing is to establish the base line, which is done by simply running through the desired point a perpendicular to the principal meridian.

Then at intervals of twenty four miles (thirty south of the north line of Kansas) back upon the principal meridian lines are run east and west parallel to the base line called standard parallels. Also at intervals of twenty four miles upon the base line and standard parallels guide meridians are established conforming to the principal meridian, thus dividing the land into twenty four mile squares, or more perfectly trapezoids.

These are divided into townships by meridians conforming to the principal meridian and east and west lines

parallel to the base line. The townships according to law should be first six miles square and contain 23240 acres but owing to the convergency of the meridians, this is impossible. To avoid this difficulty as much as possible no meridian is run farther than from one parallel to another when the distances are again laid off and a new set of meridians established forming a new series of townships. This accounts for the offset in section lines at various places throughout the country. The townships thus do not contain exactly 23240 acres but a little less. They are not squares, but trapezoids. Their north and south boundaries being parallel but not equal and their east and west boundaries being equal but not parallel.

At the same time at which the township corners are laid off on the meridians and parallels, the section and quarter section corners are laid off. Thus from these lines are run, north and south lines from south to north and east and west lines from the principal

meridian except the line between the two northern tiers of sections which is always run from east to west.

In order to make the results of the above work permanent, some means is necessary to perpetuate the corners established. The system adopted by the government is as follows.

Township corners. There are four general ways of perpetuating these. First. by a stake at the corner. This must be at least four feet long and five inches in diameter and driven two feet in the ground. The part above the ground is squared to receive the markings and is set with the angles to the cardinal points. Upon the surface is marked the town and range also on each the section which it faces. If it faces four townships, six notches are cut on each corner; if it faces only two townships and those on the north, notches are cut on the west, north and east corner, but if it faces only two townships and those on the south, notches are cut on the west, south and east corner, and C.C. is marked on the surface.

There must also be four bearing trees with the range, township, section and distance and bearing from the corner marked on them. In case, however there are no trees, pits must be dug to take their places. These must be twelve inches deep, eighteen inches wide and two feet long and six feet from the post.

Section Corners. These are established at intervals of one mile each and are situated in a similar manner to the township corners - by posts, mounds, stones or trees. If it is a post, it must be four feet long, two in the ground and two above. If then the post is common to two sections, it is set with the corner to the line and the number of the section marked on the surface of the post facing it. The range and township are also marked on the north east face. If the posts are on the township line, they will have as many notches cut on their respective corners as they are miles distant from the township corner. If they are interior corners, they

have as many notches on the south and east corners as they are miles distant from the south and east lines of the township. These posts must also be witnessed by a tree and if not a pit in each section border by eighteen by eighteen inches. If the marking is a mound, it must be four and one half feet in diameter and two feet high with a post in the center four feet long, one foot in the ground, two in the mound and one above. The markings on the post are the same as those on the post without the mound. Corner stones when used shall, on township lines be set the same as posts, but when in the interior they will face the north. They are marked and witnessed the same as posts. When a tree occurs on a corner, it is marked the same as a post would be and takes the place of the post.

Quarter Section Corners. These are established at intervals of 40 chains each, except in the north and west tier of sections of the township where they are set forty

chains from the inner corner. They are perpetuated by the same means as section corners except that the only marking is $(\frac{1}{4}S)$ and that only two trees are required for witnesses.

For a more detailed and complete description of the above outlined work, the author will refer his readers to the following works:-

J. B. Hawis "Manual of U.S. Surveying"

E. Hodgman's "Land Surveying."

Barthart's "Plane Surveying"

Johnson's "Theory and Practice in Surveying"

J. B. Towner,