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survey of public and private lands. The next section in this chapter will cover the present day rectangular system.

1-33 Because Texas was an independent republic before acceptance into the Union, it had its own unique system of surveys. Grants of land for construction of railroads were the order of the early days in Texas. The State of Texas required the railroads to provide the original survey work. For each section of land the railroad was granted, the railroad had to survey a similar section and give the results to the state.

Many large grants of land in Texas were subdivided by private companies. No regulations were established as to how the work was to be done. The surveyor was required only to set all the corners of a tract, establish the boundaries with respect to adjacent tracts and make a field note description and a plat.

As a result, no regular control lines were run and land surveying in Texas today remains extremely challenging.

The Rectangular Survey System

1-34 As settlers moved westward into wild and unsurveyed areas of the newly created United States Public Domain, they found land suitable for farming and just built a cabin, cleared land and began to farm. There were no formalities of ownership— they "squatted." When civilization began to catch up with them, they found that they had to do something to get title to the land.

1-35 Beginning in 1830 a series of pre-emption laws were passed preserving rights of those who settled in advance of surveys. Settlers could bid on the land they had been occupying.

Settlers ahead of surveys formed associations, called preemption clubs, so they could forcefully intimidate non-members to keep them from bidding at auction on parcels settled by the members.

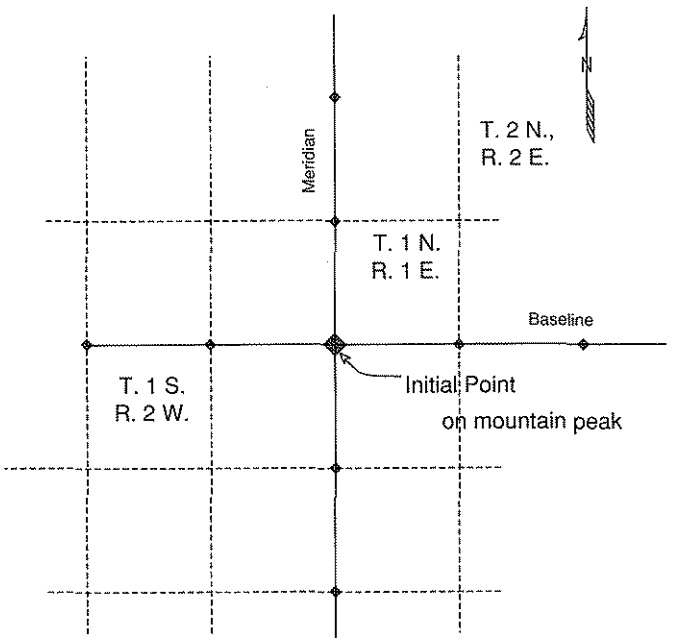
1-36 Some of the settlers were so far from the lands already surveyed that there was no hope for the idea of extending the lines of the then-existing system back in civilization. As these early-birds complained to the government that they wanted to buy the farms they had cleared, the government had to find a way to provide the surveys required by law.

The choice was to establish a whole new starting point for surveys in the remote areas where settlers had chosen to claim. These starting points were called *initial points*.

Initial points were set, seemingly, at random. Actually there were usually good reasons for the choice.

1-37 The instructions from the Surveyor General regarding the establishment of initial points involved several techniques. One technique was to place the initial point on a prominent elevation with a commanding view in the cardinal directions. This would allow direct sightings to be made for the control lines to be run: The principal meridian running north and south and the base line, running east and west.

Another technique was to choose the point so as to miss the large river crossings and mountain ranges. This was tried in the Washington-Oregon area. An east-west line was picked to avoid crossing the Columbia river while running the base line. A north-south line was chosen in an attempt to avoid the Cascade Range. Those two lines were intersected and the initial point placed there. See the sketch on the next page.



The General Land Office in Washington, D.C. recommended that initial points be placed on mountain tops to allow direct sighting in the four cardinal directions.

Some lines were chosen by reference to easily describable geographic features such as a certain bend in a well known river.

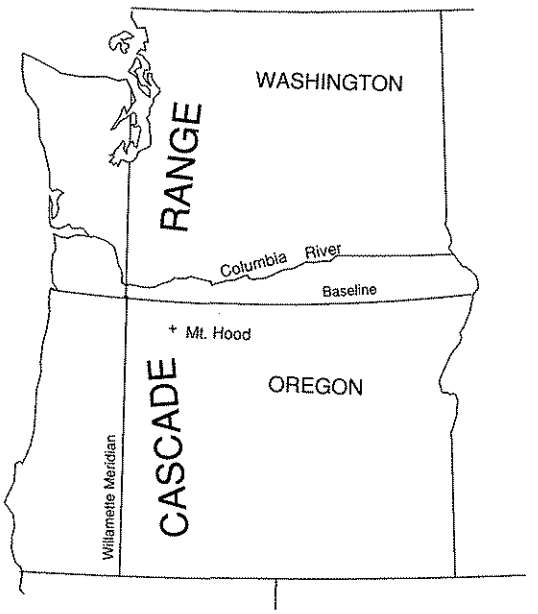
1-38 Once the initial point was established, the measurement of the baseline and the principal meridian began. Meridians are run straight north or south using sightings on the north star or on the sun to keep going straight. Base lines are run due east or west depending on the direction of measurement.

1-39 These important lines were measured twice— double chained it was called— and extra payment was made for that work to insure a reasonably accurate control line. Monuments for subdivision corners were established all along the baseline and meridian.

1-40 Subsidiary control lines were run from these base lines and meridians. Many different schemes were used, mostly varying the distance between the subsidiary lines, called guide meridians, running north & south and standard parallels, running east and west.

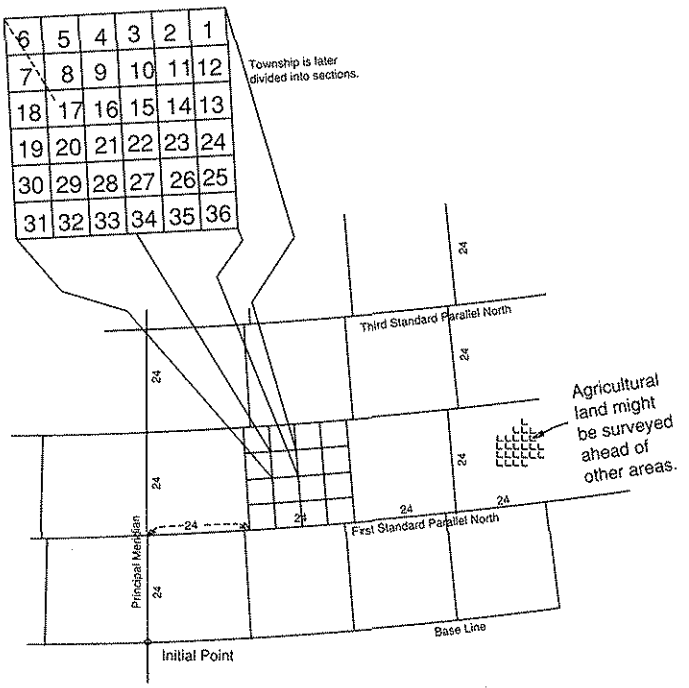
Meridians were intended to be *straight* lines. They point to the North Pole.

Base lines were not straight lines; they were intended to be *curved* lines. Curved lines are more difficult to survey than are straight lines because the surveyor's instrument is more adapted to projecting a straight line.

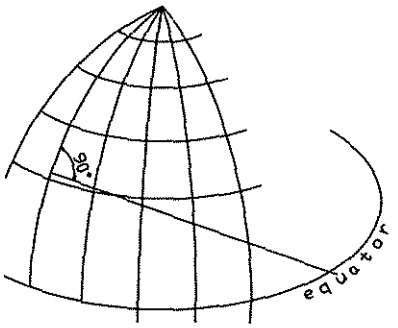


The Willamette Meridian in Oregon.

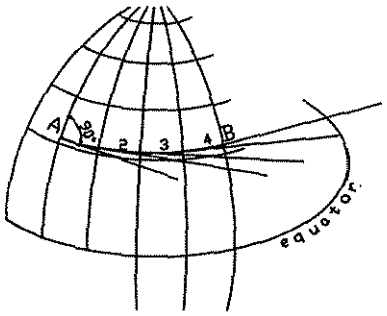
1-41 At any point in the United States if one turns exactly 90 degrees to the right from true north, the instrument used will point due east. Right? From that due east sighting a surveyor can set a flag at the horizon and leave a flag at the initial point chosen. Now if the surveyor moves to the flag he just set and sights back to his beginning point, he can set another flag at 180 degrees on a straight line from this point. If one were to extend the line several thousand miles in this manner, you would wind up crossing the Equator (assuming no oceans were in the way). To understand this, lay a flat flexible ruler on a globe such that the ruler is parallel to one of the east-west latitude lines. The ruler will be seen to head toward the Equator.

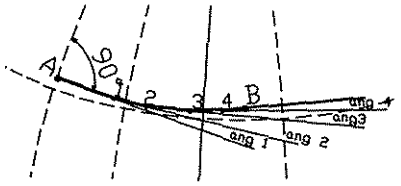


Standard Parallels and Guide Meridians were run first to control the township boundaries and to locate settlements where surveys were needed in remote areas.



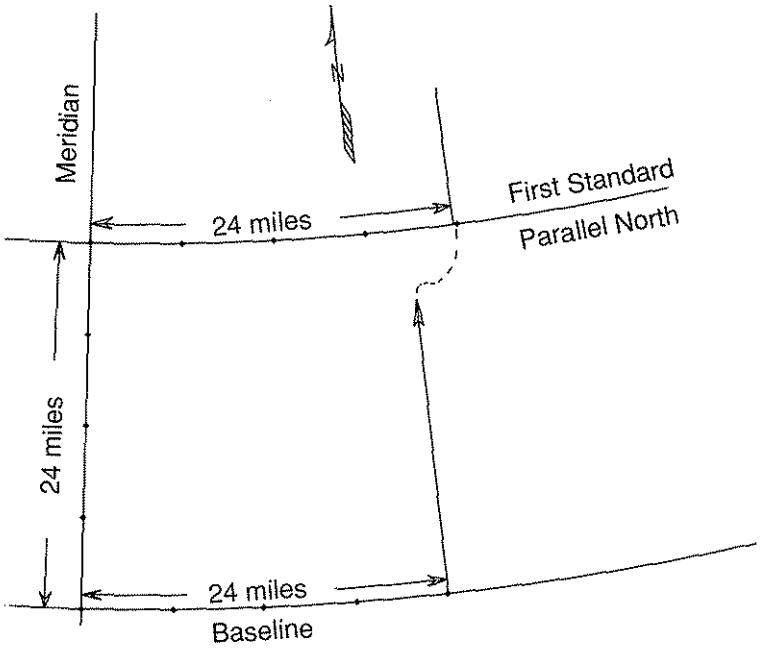
A line 90° from north and prolonged, will cross the equator if the starting point is not on the equator.





A series of angles calculated for the latitude of the line are turned to stay on a parallel of latitude at fixed distances.

The surveyors had several methods for curving the line so as to stay on the same parallel of latitude when running the base lines.



Because the meridians of longitude converge at the earth's poles, there will be a regular offset at the standard parallels.

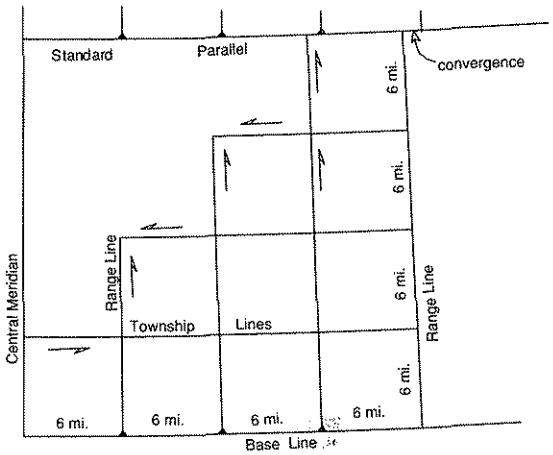
1-42 Suppose that a grid of 24 miles by 24 miles were to be layed off from the base line and meridian. And suppose also that the north-south grid lines were to run toward the north pole just as a central meridian was run.

1-43 When measuring across the northerly line of the first grid, the 24 mile measurement would go beyond the line which was run from the south as in the sketch below— even assuming absolutely correct measurement. The amount of excess depends upon the latitude.

The reason for this situation is that the two meridian lines, on the sides of the grid, point to the north pole. Thus, the lines are forced to converge.

Therefore on a standard parallel line the section corners do not line up exactly except at the principal meridian.

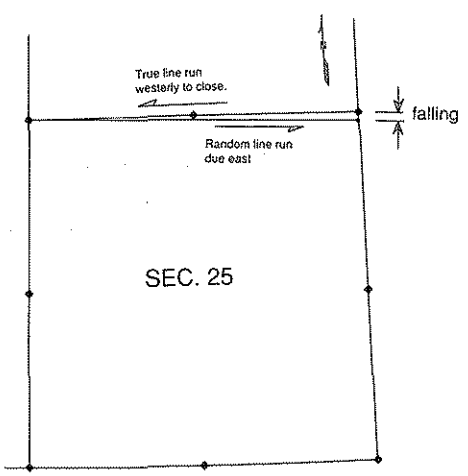
1-44 Within the guide meridians and standard parallels the next step was to survey in the range lines and township lines (also called township out boundaries).



Township lines were run at six mile intervals.

Eventually the township lines were set at six mile intervals along the base line and standard lines; range lines were set at six mile intervals along meridians and guide meridians.

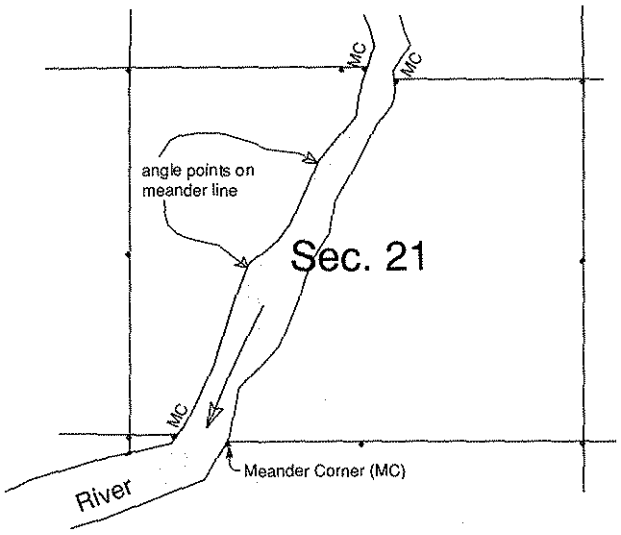
Each township was subdivided into sections, nominally 1 mile in dimension. The sections are numbered in serpentine fashion starting with 1 in the northeast corner, continuing to 36 in the southeast corner, as in the sketch on page 11.



East-West interior lines were to be run "random and true".

1-45 Surveyors in the old days were usually to begin at the south line of the township and run straight north from the township line corner monuments which had been set at one mile intervals with quarter corners set in between. By starting at the corner to sections 35 and 36 and running one mile north, the corner common to sections 25, 26, 35 and 36 could be set. From there the requirement was to run east and check in on the previously set corner to section 25 and 36 on the range line. If an error was greater than specifications, the surveyor was to calculate a true line bearing to return to the corner to sections 25, 26, 35 and 36 and return on the true line to that corner, establishing a 1/4 section corner at half way. The process was called running "random and true" lines.

This process was to be continued until the township was subdivided.



Meander Corner monuments, abbreviated MCs, were set at each point where a section line intersected a meanderable river or lake.

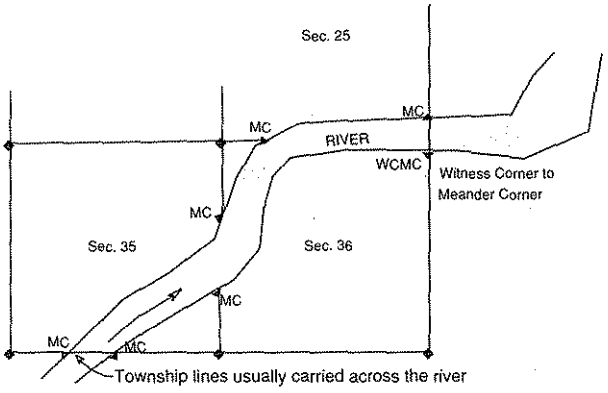
1-46 All well and good but when rivers and lakes were encountered, things had to change. This was discovered very early in the history of the system.

The procedure was to *meander* the stream or lake.

The Meander River in Asia Minor (now Menderes) had a very winding course so the name was borrowed and applied to the windings of all streams. Finally it became the name for the courses used to plot the stream or lake.

1-47 When a section line was extended until it intersected a major stream or lake, a corner monument was established on the section line at the bank of the water body. The monument was marked with the letters "MC" which was the acronym for meander corner. The survey would cross the water body unless only one side of the river was to be surveyed.

1-48 After all the section lines had been completed, the meandering could proceed. Beginning at the meander corner, points were selected visually along the bank and the bearing and distance measured from the meander corner. This process was continued until the next meander corner was reached. No monuments were set, ordinarily, at the angle points of the meander lines.



Where the river bank was not suitable for setting a permanent monument, a witness corner to the meander corner was set, abbreviated WCMC.

1-49 When sections are not complete because a water body prevented survey, they are termed fractional sections.

1-50 In the General Land Office days (Before that agency was reorganized in 1946 into the Bureau of Land Management) the survey was submitted for approval and, after approval, filed in the land office. The dates of survey approval have legal significance to this day.