Public Land Survey system

The United States Public Land Survey System (abbreviated PLSS or USPLS) is a locational reference system, but not strictly a planar coordinate system. It is different from the systems you have been reading about in a few important ways.

- It is used to locate areas, not points.
- It isn't rigorous enough for spatial analysis like the calculation of distance or direction.
- It is not a grid imposed on a map projection (a system invented in a room), but lines measured on the ground by surveyors.

The PLSS was established by Congress in 1785. Its purpose was to partition public lands into small, clearly-defined units so that settlement of the western United States could proceed in an orderly way. It covers about three-quarters of the country—the original thirteen colonies and Texas don't belong to it. There are other exceptions as well.

Areas covered by the Public Land Survey system are shown in purple.

How it works

The basic unit of the PLSS is the township, an area six miles square. The system as a whole is a vast block of adjacent townships. Although it is not divided neatly into zones, the PLSS is made up of several regions, each with its own origin. Each origin is the intersection of a meridian (called a *principal meridian*) and a parallel (called a *baseline*). These more or less arbitrarily chosen locations define the starting point of the survey for a given region and the numbering scheme of the townships it includes.
The principal meridians and baselines are shown in the following graphic. Each separate patch of color is a different region.

Principal meridians and baselines of the Public Land Survey system. This map was downloaded from the Web site of the Bureau of Land Management in California, Geographic Services department. See the module references for the URL.

The system divides into smaller and smaller units, always based on squares, as shown in the following graphics.

PLSS townships in southern California. Townships colored pink have been surveyed from the San Bernardino Principal Meridian and its baseline (red lines). The extent of a survey is often limited by state boundaries, as is the case here. The gray areas are not part of the system. Some are unsurveyed because of difficult terrain, others are special land grants.

Each township, or six-square-mile block, is identified by a Township and Range label. The labels start at the intersection of the principal meridian and baseline. Township values (rows) increment north and south of the baseline. Range values (columns) increment east and west of the principal meridian. The numbering scheme continues to the boundary of an adjacent survey.

A township is divided into 36 sections, each a square mile (640 acres). Sections are numbered by row, beginning in the upper right corner. The numbers reverse direction with each row.

A section, in turn, is divided into 160-acre quarters, identified by quadrant (NW, NE, SW, SE). These quarters can be further divided into halves, quarters, and so on, with each piece identified by its geographic position. For example, the ten-acre square labeled in the graphic is the northwest

quarter of the northeast quarter of the northwest quarter of the section.

To identify a location in PLSS, you start at the most detailed level and work your way out. In the graphic below, the location (indicated by blue squares) is:
SW1/4, NE 1/4, Section 28, T.4N.-R.2E., San Bernardino P.M.

How a sample location is identified in the PLSS.

Since the PLSS framework is constructed from ground surveys, it has plenty of irregularities. In the first place, you can't lay out a grid of perfect squares over a large distance on the round earth. The PLSS makes corrections at every fourth township line and every fourth range line, so that townships are slightly offset from one another every 24 miles. In addition, many practical problems occur in the course of such a huge project and many surveying errors are made. Nonetheless, the PLSS is a very successful system and remains the basis for most land ownership documents in the United States.