12. How do I interpret the different grid systems on this topographic map?

Many topographic maps show three grid systems. Read on.

First: The section-township-range system (also called the Land Office Grid System) is the most common grid system on topographic maps, and also is used for most legal property descriptions of real estate. In Oklahoma, land is divided into squares about six miles on a side; the squares are called townships. (Because of the curvature of the Earth, the squares are not exact.) Except in the Panhandle, the townships lie north or south of an east-west baseline running through Davis, Sulphur, and Duncan about 0.5 mile north of latitude 34°30'N. North of the baseline the townships are labeled T. 1 N. (for the first row), T. 2 N. (the next row north), etc.; south of the baseline are townships T. 1 S., T. 2 S., etc.

Townships are also designated east and west of a north-south line called the principal meridian. In Oklahoma, this line is called the Indian Meridian. It is about 0.2 mile east of longitude 97°15'W and passes just west of Pauls Valley. Townships east of the meridian are labeled R. 1 E. (the first column), R. 2 E. (the second), etc., and to the west they are R. 1 W., R. 2 W., etc.

Thus, all the townships in most of Oklahoma can be located north or south and east or west of the intersection of the point where the baseline intersects the Indian Meridian. Example: T. 16 N., R. 21 E. (The Panhandle counties have a different baseline and principal meridian; thus, the townships are designated differently than the rest of Oklahoma.)

Each township is divided into 36 square miles called sections. (Again, the squares are inexact.) The sections are numbered beginning with Section 1 in the northeast corner of the township; Section 2 is immediately to the west. The numbering "snakes" through the township, with Section 6 in the northwest corner, 7 south of 6, etc. (Fig. 1).

Sections make up the most obvious grid system on the USGS topographic maps; other systems are less apparent.

Second: All topographic maps show latitude and longitude in degrees, minutes, and seconds; most USGS maps are bounded by degrees and minutes, and may be identified that way. For example, the 1:24,000-scale maps also are called "seven-and-a-half-minute maps" because they are 7.5 minutes on a side. The 1:100,000-scale maps also are called "one-degree maps" (even though they are 1° east-west by 30' north-south).

Latitude and longitude are given at map corners; intermediate divisions are marked along the sides by small tick marks and inside the mapped area by small crosses.

Third: Another grid system is Universal Transverse Mercator, or UTM; it is becoming increasingly popular because hand-held Global Positioning System (or GPS) receivers are widely used, and most models display readings directly as UTM numbers. On some maps, the UTM system can be identified by numbers and grid ticks along the sides of the map; the ticks identify points that are 1 kilometer apart on the ground. On other maps, the UTM grid lines extend across the map.

The UTM system is based on distance in meters north (or south) of the equator and east of arbitrary lines of longitude at 6° intervals. Oklahoma lies in three UTM zones: zone 13 (which includes the western part of the Panhandle) is bounded on the west by longitude 108°W; zone 14 (most of Oklahoma) is bounded on the west by longitude 102°W; zone 15 (eastern Oklahoma) is bounded on the west by longitude 96°W.

As an example of locating a point using the UTM grid system, consider the tower on the State Fairgrounds in Oklahoma City: it lies between the 3926000 and 3927000 east-west grid lines (labeled on the left and right sides of the Oklahoma City 7.5' quadrangle map) and 629000 and 630000 north-south grid lines (unlabeled along the top and bottom of the map). These numbers mean that the tower is between 3,926,000 and 3,927,000 meters north of the equator and between 629,000 and 630,000 meters east of the 102°W longitude line. Careful measurement between the UTM grid lines on the map could locate the tower more precisely.