

### Michigan GeoRef System



0,0 origin (NAD 83) 40°24' 05.6528" N, 91° 52' 56.2121" W

Projection:	Oblique Mecator
Datum:	NAD83
Ellipsoid:	GRS80
Standard Units:	Meters
Scale factor at projection's center:	0.9996
Longitude of projection's origin:	86° 00' 00" W
Latitude of projection's origin:	45° 18' 33" N
Azimuth at center of projection:	337.25556
False Easting:	2546731.496
False Northing:	-4354009.816

## Michigan Georef System

Michigan GeoRef is an alternative to the State Plane Coordinate System. But, unlike Michigan State Plane, GeoRef was designed to project the State using a single zone rather than three zones.

The Michigan State Plane System specifies that 10,000 ft. on the ground can appear as no less than 9,999 ft. and no more than 10,001 ft. (1 part in 10,000) in the projected image or map.

The Michigan GeoRef System, on the other hand, allows that same 10,000 ft. to vary from 9,996 ft. to 10,004 ft. (4 parts in 10,000) in apparent length.

[www.michigan.gov/documents/DNR\\_Map\\_Proj\\_and\\_MI\\_Georef\\_Info\\_20889\\_7.pdf](http://www.michigan.gov/documents/DNR_Map_Proj_and_MI_Georef_Info_20889_7.pdf)

## Ellipsoids



Earth is not a perfect spheroid, it's lumpy. So the semi-major and semi-minor axes that fit one geographic area will not fit another.

Satellite technology has revealed several elliptical deviations. For example, the South Pole is closer to the equator than the North Pole.

Different ellipsoids are used to map various locations.

# Datums

## Geodetic Datums:

- Horizontal Datum: considers the curvature of the earth
- Vertical Datum: a reference point for calculating elevations

## Horizontal Geodetic Datums

Meades Ranch in Kansas is designated as the geodetic base origin for the North American Datum of 1927 (NAD27) at 39.224079N, 98.541807W. This is at or very near the geographic center of the 48 contiguous.

The base point was the reference point for almost all land survey measurements in the United States from 1927 until the establishment of the North American Datum of 1983 (NAD83) and the World Geodetic System of 1984 (WGS84). NAD 27 was based on the Clarke Ellipsoid of 1866.





A series of triangulation stations are located across the geographic area of interest. (North America – includes stations in Canada, US, and Mexico).

An ellipsoid (spheroid, geoid) is selected.

# Spatial Information Formats

Raster format

Grid format made up of individual cell (pixels)

Pixel area is defined, though the area is not always recognized

Vector format

Composed of nodes and arcs

Each pixel or node is associated with a X, Y and possibly a Z coordinate