

TGIS/TMARS Coordinate System and Coordinate Conversion

The TGIS/TMARS Coordinate System was defined for the TMARS (Tempe Mapping And Reporting System) CIP Project # 82032 in Spring of 1984. Over two hundred quarter corner monuments were surveyed or computed and established in this local coordinate system. This coordinate system is the basis of control for city engineering projects, land survey projects, and TGIS mapping and data.

The TGIS/TMARS Coordinate System is based on the Arizona Coordinate System, Central Zone of the State Plane Coordinate System of 1927, also known as Zone 202, SPCS 1927. The TGIS/TMARS Coordinate System grid is parallel with the Zone 202, SPCS 1927 grid and elevated to 1200 feet above mean sea level which approximates the average ground elevation of Tempe, Arizona. To distinguish these values from other coordinate systems, a false northing and easting value is applied.

All values in the TGIS/TMARS Coordinate System are in U.S. Survey Feet.

There are three conversion methods described:

1. Conversion formula for coordinate point in Zone 202, SPCS 1927 to the TGIS/TMARS Coordinate System:

$$\begin{aligned}X_{SPCS} &= \text{X coordinate value in Zone 202, SPCS 1927} \\Y_{SPCS} &= \text{Y coordinate value in Zone 202, SPCS 1927} \\X_{TCS} &= \text{X coordinate value in TGIS/TMARS Coordinate System} \\Y_{TCS} &= \text{Y coordinate value in TGIS/TMARS Coordinate System}\end{aligned}$$

$$\begin{aligned}X_{TCS} &= (X_{SPCS} / 0.9998428) - 200,000 \\Y_{TCS} &= (Y_{SPCS} / 0.9998428) - 600,000\end{aligned}$$

2. Conversion formula for coordinate point in the TGIS/TMARS Coordinate System to Zone 202, SPCS 1927:

$$\begin{aligned}X_{TCS} &= \text{X coordinate value in TGIS/TMARS Coordinate System} \\Y_{TCS} &= \text{Y coordinate value in TGIS/TMARS Coordinate System} \\X_{SPCS} &= \text{X coordinate value in Zone 202, SPCS 1927} \\Y_{SPCS} &= \text{Y coordinate value in Zone 202, SPCS 1927}\end{aligned}$$

$$\begin{aligned}X_{SPCS} &= (X_{TCS} + 200,000) \cdot 0.9998428 \\Y_{SPCS} &= (Y_{TCS} + 600,000) \cdot 0.9998428\end{aligned}$$

3. Coordinate System Definition for surveying and GIS applications

Since the TGIS/TMARS Coordinate System is based on a truncated Zone 202, SPCS 1927 definition, the coordinate system settings will be the same as Zone 202, SPCS 1927 with the following changes:

- The scale reduction value for Zone 202, SPCS 1927 is typically 0.9999. The TGIS/TMARS Coordinate System scale reduction value is 1.00005720899325.
- The X coordinate offset value for Zone 202, SPCS 1927 is typically 500,000. The TGIS/TMARS Coordinate System X coordinate offset value is +300,078.612 (positive 300,078.612).
- The Y coordinate offset value for Zone 202, SPCS 1927 is typically 0. The TGIS/TMARS Coordinate System Y coordinate offset value is -600,000.000 (negative 600,000.000).

Questions relating to the TGIS/TMARS Coordinate System should be directed to the Land Services Section. Questions relating to Tempe TGIS data should be directed to the GIS Mapping Section. Both Sections are in the Engineering Division of the Public Works Department and can be reached at (480) 350-8200.

Creation Date: 05-Sep-2003, Revision Date: None

Written by Michael Gatewood, Engineering Systems Supervisor, GIS Mapping Section

Reviewed by Jim Cristea, R.L.S., Engineering Manager, Land Services Section