Genesee County Remonumentation GPS Specifications

The following specifications will be used when capturing GPS coordinates for remonumented section corners:

1. Control stations of at least one level higher than the desired final product shall be utilized.

2. Global Positioning System (GPS) data collection for Section corner Remonumentation:

   a. At least 1 independent set of data shall be observed.

   b. An independent set shall consist of 3 observations followed by a break in lock and re-initialization followed by 3 more observations to each Continuously Operating Reference Station (CORS). All observations from the same control station must agree within 0.04 feet.

   c. Each point shall be observed from 2 different CORS stations. The towers in Genesee County are preferred, Davison or Swartz Creek, however the closest towers to the location being observed are allowable.

   d. Observation time in each session shall be adequate to ensure that all ambiguities are resolved and all integers are fixed and the desired positional tolerance is achieved.

   e. Control point tolerance should be set to 0.029 for Horizontal, and 0.049 for the Vertical tolerance.

   f. The current GEOID Model that should be used is the GEOID03.

   g. The current elevation Datum to be used is the NAVD (National American Vertical Datum) 1988.

3. Eight-five percent (85%) of all points observed must lie within the perimeter of the control network being utilized. Use of the High Accuracy Reference Network (HARN), the CORS of the Michigan Spatial Reference Network (MSRN), or an approved future control system is recommended.

4. The final coordinates shall be a result of a rigidly adjusted network using least squares adjustments software. The result of the adjustment shall be a mathematically proven positional tolerance at a 1.96 sigma, 95% confidence level, not to exceed 0.25 feet horizontally where non-trivial connections or a direct physical horizontal measurement are made to adjacent corners or 0.125 feet for all other coordinates where corners are one-half mile or more apart.

   a. Direct, physical horizontal measurement by independent means between a randomly selected 10 percent of the adjacent points shall be made, the result of such measurements indicating compliance with the required positional tolerance.

5. Instruments of geodetic grade, including antenna equipped with a multi-path mitigating device and fixed rod height with bipod at the rover, shall be utilized.

    a. Observations taken must meet or exceed the manufacturer's specifications for the type of work being performed.

    b. Field observations should generally not be taken under canopy; however, some canopy is acceptable if there are adequate satellites available at the proper angles to achieve the desired accuracy.

6. All field observations shall follow the current generally accepted principles of surveying, taking into account the following:

    a. Currently, the acceptable Positional Dilution of Precision (PDOP) is under 5. PDOP is the overall measure of the precision obtainable with a given satellite geometry and refers to Horizontal (HDOP) and Vertical (VDOP) measurements (northing, easting and elevation /latitude, longitude and altitude). PDOP is also an indicator expressing the relationship between the error in user position, and the error in satellite position.

    b. An elevation mask of no less than 15 degrees from the horizon

    c. Minimum number of satellites observed simultaneously between the base and the rover or the CORS stations shall not be less than 5.