

TxDOT Survey Levels of Accuracy for GPS (TSLA)



Three levels of Global Positioning System (GPS) surveying have been established by TxDOT to aid in maintaining standards of accuracy for different types of GPS surveys.

The most accurate stations in the state are the Continuously Operating Reference Stations (CORS) of the National Spatial Reference System (NSRS). These stations are overseen by the NGS and their placements are not included in the TxDOT Levels of Surveys. A number of these are maintained by TxDOT and are referred to as Regional Reference Points (RRP).

The following information provides GPS positioning specifications for TxDOT.

	Level 1	Level 2	Level 3
Typical job type	RRP's, CORS or major control densification	Primary project control points	Property corners, secondary project control, flight panels
Type of GPS	static	static	fast static or RTK
GPS Positioning Relative to Other Points (Local Accuracy)			
Instrument setup error	2 mm with zero setup errors	2 mm	3 mm
Total baseline length error at 2 sigma	8 mm + 1 ppm	8 mm + 1 ppm	12 mm + 1 ppm (see Note 1)
Maximum baseline length for referencing from CORS station	200 km	200 km	N/A
Maximum baseline lengths between points on a project	100 km	25 km	5 km (no limits within a VRS cell)
Minimum time per occupation	2 hrs + 1 min per km baseline	1 hr + 1 min per km baseline	180 epochs with rod rotated 180 degrees between observations
Minimum number of occupations for static network (see Note 2)	2	2	2
Minimum time between occupations	3 hrs	2 hrs	1 hr
GPS Positioning on the State Plane Grid (Geodetic Accuracy)			
Horizontal accuracy at 2 sigma	12 mm	20 mm	25 mm
Elevation			
Accuracy at 2 sigma (assuming 100% perfect geoid model)	22 mm	25 mm	30 mm

Note 1 - RTK baselines are measured from base station to rover point.

Note 2 - A complete new setup is required for each occupation.

Level 1 Surveys

The basic purpose of this highest level of GPS surveys is for setting auxiliary points to densify a network of NGS A and B order points that augment the above mentioned CORS stations. This will allow shorter observation times for performing static surveys in placing all lower quality control points. A typical data sheet for one of these points will show the amount of detail and documentation involved. In the usual seven (7) digit station name, the first three (3) digits represent the county number and the last four (4) digits denote the discreet point number assigned by the district. This level of surveys requires the direct supervision of an Registered Professional Land Surveyor (RPLS) and these points are usually set only on an as needed basis for very large projects.

Level 2 Surveys

Intended mainly for project control, these points usually include an azimuth mark for use with conventional surveying equipment. The high degree of accuracy is needed not just in relation to each other (local) but also on the High Accuracy Reference Network (HARN) network so that the same points can be used in subsequent adjoining projects years later. A standard naming convention and data sheets are also commonly used at this level. These surveys require direct RPLS supervision.

Level 3 Surveys

Still sometimes held tightly but can be relaxed enough to use fast static or kinematic methods with two, or more, higher level reference stations. Appropriate for use mostly for surveying photogram- metric center line panels, property corners and base stations for topographic surveys. RTK will require the use of two or more base stations, or two (2) observations from a networked RTK connection.

References

<https://geodesy.noaa.gov/>