

# TxDOT Survey Levels of Accuracy (TSLA) for Global Navigation Satellite System



Revised 4/14/2026

## Level Specifications

The levels of Global Navigation Satellite System (GNSS) for surveying have been established by TxDOT to aid in maintaining standards of accuracy for the different types of GNSS 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).

*Table 1 GNSS positioning specifications for TxDOT*

<b>Job Type</b>	Major Control Densification	Primary Project Control	Local Project Control	Secondary Control Ground Control Points All other points set
<b>GNSS Type</b>	Static	Static	RTN	RTK

*Table 2 GNSS positioning relative to other points (local accuracy)*

	<b>Level 1</b>	<b>Level 2A</b>	<b>Level 2B</b>	<b>Level 3</b>
<b>Total baseline length error at 95% Confidence</b>	8mm(0.03ft) +1 ppm	8 mm(0.03ft) +1 ppm	8mm(0.03ft) +1 ppm	12 mm(0.04ft) +1 ppm

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	<b>Level 1</b>	<b>Level 2A</b>	<b>Level 2B</b>	<b>Level 3</b>
<b>Maximum Baseline Lengths between CORS or RTN and point</b>	40 miles *	30 miles *	30 miles *	5 miles (RTK) 30 miles (RTN) Inside network geometry **
<b>Maximum Baseline Lengths between points</b>	62 miles	2 miles	2 miles	N/A
<b>Minimum time per occupation</b>	2 hrs + 1 min per km baseline	1 hr + 1 min per km baseline	180 epochs with rod rotated 180 degrees between observations	180 epochs with rod rotated 180 degrees between observations
<b>Minimum number of occupations for static network</b>	2	2	2 (2 observations per occupation)	2 (2 observations per occupation)
<b>Minimum time between occupations</b>	2 hours	2 hours	2 hours	Per District Survey Coordinator

\* The distances shown shall be adhered to when achievable.

\*\* Any variances to these specifications shall be submitted for District Survey Coordinator approval and noted in the Surveyor’s Report.

*Table 3 GNSS positioning on the State Plane Grid (geodetic accuracy)*

	<b>Level 1</b>	<b>Level 2A</b>	<b>Level 2B</b>	<b>Level 3</b>
<b>Horizontal accuracy at 95% Confidence</b>	12 mm (0.04ft)	20 mm (0.07ft)	20 mm (0.07ft)	25 mm (0.08ft)

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Table 4 Elevation

	<b>Level 1</b>	<b>Level 2A</b>	<b>Level 2B</b>	<b>Level 3</b>
<b>Accuracy at 95% Confidence</b>	22 mm (0.07ft)	25 mm (0.08ft)	25 mm (0.08ft)	30 mm (0.10ft)

### Notes:

Monuments types can be found <https://www.txdot.gov/content/dam/docs/division/row/survey/monument-specifications.pdf>

For further details on Standard Operating Procedures for setting control see <https://ftp.txdot.gov/pub/txdot/row/surveyor-toolkit/survey-control.pdf>

Any variances to these specifications shall be submitted for District Survey Coordinator approval and noted in the Surveyor's Report .

RTK/RTN baselines are measured from base station to rover point.

A new initialized setup is required between occupations.

## Level Descriptions

### Level 1 Surveys

The purpose of this highest level of GNSS survey is for the setting of auxiliary control points to densify a network of NGS A and B order points and are usually set only on an as needed basis for very large projects. 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 a Registered Professional Land Surveyor (RPLS). See Section III: Monument Detail Specification Sheets, Control Diagram <https://www.txdot.gov/content/dam/docs/division/row/survey/monument-specifications.pdf>

## TxDOT Survey Levels of Accuracy for GNSS (TSLA)

### **Level 2A Surveys**

Intended for project primary control. Points shall be set in intervisible pairs. The high degree of accuracy is needed not just in relation to each other (local) but also on the High Accuracy Reference Network (HARN), so that the same points can be used in subsequent adjoining projects later. A standard naming convention and data sheets are also commonly used at this level. These surveys require direct RPLS supervision. See Section III: Monument Detail Specification Sheets, Control Diagram. <https://www.txdot.gov/content/dam/docs/division/row/survey/monument-specifications.pdf>

### **Level 2B Surveys**

Intended for project local control. A standard naming convention and data sheets are also commonly used at this level. All Local Control shall be established from Primary Control. 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 ground control points, property corners and base stations for topographic surveys.

## **References**

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

<https://txrtn.txdot.gov/Map/SensorMap.aspx>