

Right of Way and Land Surveys

April 2025

Project Title: Accuracies and Standards for the Caltrans' Spatial Reference Network (CTSRN) Project

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DRISI provides solutions and knowledge that improves California's transportation system.

Accuracies and Standards for the Caltrans' Spatial Reference Network (CTSRN)

Researching the California Department of Transportation (Caltrans) GNSS specifications and providing recommendations to update current standards and practices for maintaining the CTSRN.

WHAT IS THE NEED?

Caltrans has a Real Time Network (RTN) that provides precise Global Navigation Satellite System (GNSS) positioning to the Division of Right of Way and Land Surveys and others. With advancements in satellite positioning systems, the amount of Network Real-Time Kinematic (NRTK) surveys tied to the CTSRN have increased.

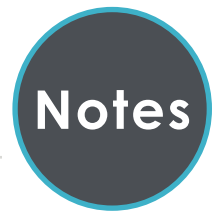
Caltrans needs to update its GNSS specifications and accuracy standards to address NRTK survey methods and advancements in GNSS technology.

WHAT ARE WE DOING?

This research will examine the use of NRTK surveys connected to a continuous Global Navigation Satellite System (cGNSS) within the Caltrans Spatial Reference Network (CTSRN). Survey stations will be setup at test sites and Caltrans setup procedures will be followed to establish horizontal and vertical control. The NRTK data will be collected at the test sites then processed using Trimble Business Center, then the following key points will be assessed:

- Repeatability of NRTK within the CTSRN
- Frequency of human error and repeatability of measurements when utilizing CTSRN
- Accuracy of NRTK measurements within CTSRN
- Effects of varied constellation configurations on accuracy
- Accuracy related to time-based measurements and precision achieved through redundancy
- Seasonal effects of measurements when using CTSRN

WHAT IS OUR GOAL?



The goal of this project is to provide Caltrans better accuracies and recommendations for best practices and procedures in using the CTSRN.

WHAT IS THE BENEFIT?

The project plans to provide Caltrans with innovations in current CTSRN practices. These NTRK surveys are expected to provide greater accuracy in spatial data collection for use in land surveys and construction, thus enabling higher quality and timely completion of construction projects.

WHAT IS THE PROGRESS TO DATE?

The Caltrans task manager (TM) conducted a Project Panel meeting with the Caltrans customer, Surveys, and the university researchers. The university research team resolved bias errors from the initial data collection, remeasured Truth Data coordinates, and delivered a Truth Data report with current measurements based upon the CTSRN using the National Oceanic and Atmospheric Administration's technical procedures and with all measurements over a 24-hour period.

The next immediate steps are to request a No-Cost Extension Amendment for time lost from lengthy contract execution and unexpected biases in the initial data collection and remeasure Truth Data for any land movements.

For more information, please contact the TM.