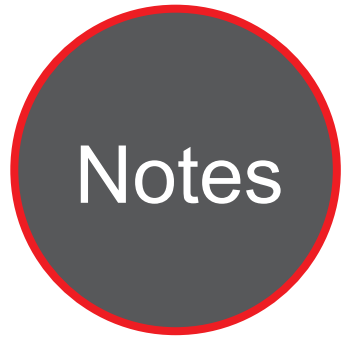




Caltrans Division of Research,  
Innovation and System Information

# Research



DECEMBER 2022

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

Task Number: 4120

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

Researching 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 other Caltrans programs. With advancements in satellite positioning systems, the amount of Network Real-Time Kinematic (NRTK) surveys tied to the CTSRN has 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 and then processed using Trimble Business Center. Next, the following key points will be assessed:

- Repeatability of NRTK within the CTSRN
- Frequency of human error and repeatability of measurements when utilizing the CTSRN
- Accuracy of NRTK measurements within the 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 the CTSRN



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## WHAT IS OUR GOAL?

The goal of this project is to provide Caltrans with 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 contract manager continued collaborations with the Caltrans customer and the Fresno State University research contractor towards finalizing the research task proposal.

The next immediate steps for this research includes finalizing the research task proposal and submitting a revised contract request package to DRISI's Operations and Resources Management team in January 2023 with the intention of a contract request package submittal to Caltrans Division of Procurement and Contracts in February 2023.

For more information, please contact the Task Manager.