

Right of Way and Land Surveys

April 2025

Project Title: Evaluating Mobile Laser Scanning

Task Number: 3870

Start Date: October 1, 2021

Completion Date: July 31, 2025

Task Manager:

Arvern P. Lofton, P.E.
Transportation Engineer (Electrical)
arvern.lofton@dot.ca.gov

Research and Development of the Caltrans' Geospatial Technology Proving Ground

Integrating mobile mapping and LiDAR-based geospatial data collection systems into Caltrans' business practices for safe, efficient delivery of transportation projects.

WHAT IS THE NEED?

The California Department of Transportation (Caltrans) continually seeks ways to deliver transportation projects more safely and efficiently. To produce high-quality projects and optimize limited transportation dollars, Caltrans needs to continually innovate and improve existing processes and procedures. In addition, the Department needs to evaluate methods to lower project support costs, accelerate project schedules, minimize rework, and be transparent and accountable to taxpayers.

Minimizing the risk to workers and traveling motorists during Caltrans' operations is an on-going priority. Identifying which tools are best to use for specific purposes and how to integrate data collected from various platforms determines the safest and most cost-efficient way of doing business. Caltrans, via research Task 3179 under Contract 65A0749, established a Geospatial Technology Proving Ground (GTPG) facility to support the integration of mobile mapping and LiDAR-based data collection systems into Caltrans' business practices. The Caltrans Survey Program and other Caltrans Divisions have a need for research to capitalize on the efficiencies gained through a "collect once, use it many times" best practice.

WHAT ARE WE DOING?

A significant component of the research is deployment support for the new Caltrans-owned Trimble MX9 Mobile Terrestrial Laser Scanning (MTLS) system. MX9 deployment support includes the following activities:

- Investigating further solutions to semipermanent MTLS



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



targeting at the GTPG and along the State Highway System

- Validating MX9 accuracy using the GTPG
- Evaluating custom Open Street Map files with Caltrans postmile markers
- Establishing MX9 data collection and processing workflow
- Evaluating MX9 cloud-to-cloud registration results using the GTPG
- Evaluating long Global Navigation Satellite System baseline length effects on MTLs data accuracy

Next, the research includes the investigation of time-based vs. distance-based MTLs target spacing with the new MX9 system using the GTPG. The project involves collaborating with Caltrans Construction to conduct As-Built survey pilot projects utilizing the MX9 and the newly released MX50 MTLs system, documenting lessons learned and best practices for capturing As-Built during and/or after construction, and recommending best platforms for digital As-Built.

In addition, exploring the means to improve crossfunctional programmatic data collection and to achieve the "collect once, use it many times" best practice remains a cornerstone of the research. The research comprises of experimenting and evaluating MX9 use for Americans with Disabilities Act ramp survey. Subsequently, the research involves updating the Caltrans MTLs Guidelines document by adding data collection methods, software, and processing workflow for the MX9 as well as reflecting any changes to the Riegl software and workflow for the VMX-1 MTLs system. The final step of this task encompasses the research findings into a final report.

WHAT IS OUR GOAL?

The goal of the research is to leverage the existing GTPG facility to improve efficiencies of utilizing common collected geospatial data from a wide variety of Caltrans programs for various Caltrans projects and field operations. In addition, the goal

includes capitalizing on the efficiencies gained from the research to transition the "collect once, use it many times" theory into an applicable best practice into Caltrans business operations.

WHAT IS THE BENEFIT?

Enablement of the Survey Program to deliver better products in alignment with the Department's Enterprise Statewide Field Data Collection efforts. Caltrans Surveys can lead the Department in attaining its goal of "collect once, use it many times" practice for all Geospatial data, thus yielding known safety, efficiency, and cost benefits.

WHAT IS THE PROGRESS TO DATE?

The university researchers drafted a preliminary final report and submitted a three month No-Cost Extension (NCE) Amendment request due to unexpected, longer times to process and analyze the MTLs target spacing. DRISI leadership approved the NCE Amendment request, which extends the research task's end date to July 31, 2025.

The next immediate steps for this research include post-processing and analyzing the collected MX9 MTLs target spacing data, completing the ADA ramp survey and inspection requirements documentation, and incorporating the analysis into the final report.

For more information, please contact the Caltrans task manager.