

Right of Way
and
Land Surveys

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Project Title:
Evaluating Mobile Laser Scanning

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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:



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

- Investigating further solutions to semi-permanent MTLs targeting at the GTPG and along the State Highway System
- Validating MX9 accuracy using the GTPG
- Evaluating custom Open Street Map tiles 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 cross-functional 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 Caltrans task manager held a research Project Panel Meeting on October 20, 2022 with the Caltrans customer, Surveys, Construction, DRISI representatives, and the university researchers. The university researchers continued technical and deployment support for the newly procured MX9 and MX50 MTLs systems and successfully sustained a 5 frames per second rate via re-testing and re-evaluating the Phase One camera on a modified setup with a laptop and 10 Gigabit system.

The next immediate steps for this research include collaborating with the vendor to resolve the MX9 Gen2 system camera issues and re-installing, testing, and calibrating the MX9 Gen1 system on a different Caltrans vehicle. In addition, the university research team plans to procure and install a new computer system with a 10 Gigabit network for the Phase One camera.

For more information, please contact the task manager.