

## Modal

**November 2025**

**Project Title:**

Incorporating New UAS Technology into the Caltrans UAS Safety Management System

**Task Number:** 4312

**Start Date:** June 1, 2024

**Completion Date:** November 30, 2025

**Task Manager:**

Akm Islam  
Transportation Engineer Electrical  
[Akm.Islam@dot.ca.gov](mailto:Akm.Islam@dot.ca.gov)

## Incorporating New UAS Technology into the Caltrans UAS Safety Management System

Seeks to update the current California Department of Transportation (Caltrans) Unmanned Aircraft Systems (UAS) Safety Management System (USMS) with Standard Operating Procedures (SOPs), training requirements/curriculum and policy recommendations to address the latest innovative UAS technology.

### WHAT IS THE NEED?

Unmanned Aircraft Systems (UAS) Safety Management System (USMS) to incorporate use of new unmanned aircraft models and operations including tethered, autonomous, Beyond Visual Line of Site (BVLOS) and fixed wing UAS.

A tethered UAS is attached to, and powered from, a ground station/battery pack placed in the back of a maintenance truck which will provide hours of continuous flight instead of 20 minutes with a typical UAS. Caltrans maintenance field crews can use tethered UAS to provide continual transmission from the site of an emergency or incident to Emergency Operations Centers and Traffic Management Centers (TMCs). Additionally, tethered UAS are permitted for use in situations where cloud cover prohibits the use of typical UAS. Autonomous, BVLOS, and corridor mapping UAS operate further, higher, and at a greater frequency than traditional UAS and will expand UAS case-uses for surveying and construction. These new UAS platforms and operations will benefit Caltrans by providing additional safety, efficiency, and accuracy which will be realized in contrast to traditional/typical UAS.

### WHAT ARE WE DOING?

The outcome of the research will be used to update the current Caltrans USMS. This research project proposes to enhance the existing UAS program by evaluating new UAS technology from a Safety Management System perspective to accommodate new modalities in 1) Expanded operations,



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

including beyond visual line of sight, UAS docking systems, and tethered UAS, 2) Advanced Autonomy, Vertical Takeoff and Landing (VTOL) UAS and Fixed-wing UAS, and 3) Advanced Connectivity Oversight and Management. The key deliverables include a gap analysis report, recommendations for revised policies and procedures, and an updated training curriculum. The UAS program will implement recommendations by the researchers throughout the life of this proposed research to ensure safety procedures are being addressed as we go along. At the end of the research, the UAS program plans to have merged this new research into the existing USMS. Any outstanding items not incorporated by project end will be implemented within one year of the end of project.

The project proposes the researcher will investigate novel technology operational practices, training requirements, and management oversight. They will also develop training curriculum and recommendations for policies and procedures. The investigation segment will employ a systematic approach to evaluate the operational management of deployment on supplementary equipment, logistics, crew coordination needs, and network/cellular access and provide a Caltrans USMS Gap Analysis report. The curriculum will be subsequently developed, and following this, the creation of a recommendation report.

## WHAT IS OUR GOAL?

Seeks to update the current Caltrans USMS with Standard Operating Procedures (SOPs), training requirements/curriculum and policy recommendations to address the latest innovative UAS technology.

## WHAT IS THE BENEFIT?

UAS adoption improves safety for Caltrans employees, contractors, and the public, increases efficiency, and produces savings. Once implemented, the research will allow Caltrans employees to safely use new UAS technology for

construction, surveying, traffic operations, and emergency management.

## WHAT IS THE PROGRESS TO DATE?

The Caltrans UAS Safety Management System (SMS) program offers a structured framework to ensure that unmanned aircraft operations are conducted safely, effectively, and in compliance with both regulatory and organizational requirements. The report for the task, Investigate Novel Technology Operational Practices, Training Requirements, and Management Oversight, has been drafted and submitted for review. This report aims to identify systemic gaps in organizational, technical, and human factors that hinder the program's ability to scale safely under future Federal Aviation Administration (FAA) Part 108 frameworks.

Caltrans has a strong policy and safety foundation, but several areas constrain SMS maturity and integration across the organization. These are listed below:

### Organizational and Data Gaps

- Flight and hazard records are inconsistently completed, reducing visibility into operational risk trends.
- Risk assessments and corrective actions are not consistently linked, weakening continuous improvement.
- Data are stored in flat spreadsheets, preventing traceability and long-term performance analysis.

### Operational and Human Factors Gaps

- Field operators report redundant paperwork, unclear form sequencing, and limited tool integration.
- Training and advancement opportunities are uneven, especially for newer or less frequent pilots.
- Emerging UAS platforms (tethered, fixed-wing, VTOL) shift workload from manual control to cognitive supervision, increasing monitoring demands.

### Systemic Alignment Needs

- SMS data and automation telemetry must be integrated to enable predictive safety insight.
- Feedback mechanisms should connect field operations to policy and training development.

Overall, Caltrans' UAS Program demonstrates strong intent and structure but remains limited by fragmented data systems, inconsistent documentation practices, and incomplete feedback loops. Addressing these gaps is critical for achieving organizational-level safety assurance and readiness for future Part 108 operations.