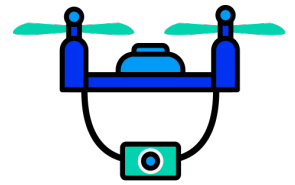


SMART

GRANTS PROGRAM



Deploying UAS Innovations for Remote, Autonomous Infrastructure Construction Inspection to Enhance Safety, Save Time, Reduce Costs and Lessen Carbon Emissions

California Department of Transportation

PROJECT PARTNERS

San Diego Association of Governments (SANDAG)
City of San Diego
Skydio
Trimble
ESRI



PROJECT CHALLENGE

The California Department of Transportation (Caltrans) aims to improve the efficiency and sustainability of its infrastructure assessments under the Infrastructure Investment and Jobs Act (IIJA). They propose a Stage 1 SMART demonstration to validate the use of dock-based Uncrewed Aircraft Systems (UAS) for remote autonomous operations. Currently using manually piloted UAS, with over 10,000 flights completed, Caltrans believes transitioning to autonomous systems will enhance workforce capacity and benefit California's environment and communities.

IMPACT

Caltrans' Stage 1 project aims to install dock-mounted Uncrewed Aircraft Systems (UAS) at two permitted construction sites: the Butte City Bridge Replacement and the East Otay Port of Entry. This initiative seeks to validate the capabilities of dock-based UAS in enhancing traditional inspections, reducing carbon emissions, and minimizing worker injuries. Data collected will integrate into Caltrans' Digital Construction Management System, automating data capture and improving project management. The findings will help scale UAS usage in Stage 2 and serve as a model nationwide.

CURRENT STATE OF THE ISSUE

The use of UAS technology has proven to save time and money and provide better data to assist in administering infrastructure construction contracts compared to traditional inspection methods, and UAS-enhanced projects have fewer worker injury claims. Caltrans' utilization of UAS is repeatable and scalable across projects and contracts due to technology maturity, solid training and detailed data collection and analysis. A limiting factor, however, is the current requirement for all 71 pilots to drive to and from each site to fly manual, visually observed missions. Travel, sometimes hundreds of miles, reduces the number of missions a pilot can fly in any given time period, which extends project timelines, requires costly fuel expenditures and generates calculable carbon emissions.

STAGE 1 OUTCOMES

Caltrans employs over 200 FAA Part 107 trained pilots for daily infrastructure inspections using manually piloted UAS. The introduction of dock-based UAS is set to enhance this technology, allowing remote inspections that streamline processes, expedite project completion, and reduce fuel costs and emissions. The demonstration will start with one or two dock systems at each site, with initial flights conducted under FAA regulations. After up to 100 flights, Caltrans will apply for BVLOS waivers to enable fully remote operations and continue refining procedures for scalable use.

STAGE 2 VISION

Stage 2 would involve 20+ simultaneous dock deployments which would necessitate recruiting and training new pilots. All Caltrans rank and file employees are unionized, mostly Service Employees International Union (SEIU) or Professional Engineers in California Government (PECG). Caltrans' UAS training and safety management system is shared with and benefits State agencies such as Cal Fire, California Highway Patrol and the Department 7 of Water Resources. Stage 2 would also involve the creation of a dedicated training site to be used by state and partner agencies to help expand dock operations throughout Caltrans and other partner agencies.