



Caltrans photos by Jim O'Brien

Samer Momani, a District 7 associate environmental planner and licensed drone pilot, demonstrates how the device flies. Caltrans' drones have the potential to save the Department time and money, and provide collaborative possibilities with other agencies.

Drone Use Taking Off at Caltrans

Traffic Monitoring, Surveying, Inspections, Disaster Flyovers May Be Just a Start

Caltrans is taking to the skies to monitor the California highway network, establishing an unmanned aircraft program and team of pilots to improve access to hard-to-reach areas, perform inspections and surveys, and provide a broader look at disaster zones.

The Unmanned Aircraft Systems program, under Caltrans' Division of Aeronautics, is overseeing the deployment of drones in surveying, bridge inspections, construction projects, emergency responses and environmental/geological studies, with many more uses anticipated. As of mid-June, drones have been deployed on more than 100 missions that included shooting video for projects funded by the Road Repair and Accountability Act of 2017 (SB 1), documenting the mudslide that buried part of Highway 101 in January 2018 in the Santa Barbara area, and assisting in the 14-month process of reconstructing Highway 1 after a massive slide destroyed a section of the road along the Big Sur coast in 2017.

Initially embraced by wedding photographers and real estate salespeople, drones fly a variety of missions today. The Federal Aviation Administration has projected that sales of hobbyist and commercial drones will increase from 2.5 million in 2016 to 7 million by 2020. In addition to their current uses,

the unmanned craft also present Caltrans with a wider range of potential service options.

Caltrans now has 20 unmanned aircraft in its fleet and 38 certified drone pilots. Department planners foresee rapid growth in both those numbers. Pilot projects are assessing drones' potential specifically in bridge inspections, construction and surveying. Department officials are encouraged by the initial testing and anticipate that the drone program will be fully in place within one or two years. Caltrans recently was awarded \$50,000 by the Federal Highway Administration to accelerate its drone deployment, promote drone technology and inform the public about drone hazards.

Caltrans employees seeking to become remote pilots must complete a process that starts with their supervisor's approval. They must then pass an FAA aeronautical test that comprises 60 multiple-choice questions, and pay a \$150 fee. The next step is obtaining a remote-pilot registration with Caltrans. Personal drones cannot be used to perform State work.

The FAA governs the use of all airspace in the United States and sets policies for unmanned craft. Caltrans' remote pilots must adhere to federal rules that prohibit unmanned flights more than 400 feet above the ground, or in some cases 400

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feet above the object (e.g., building or bridge) being recorded. Flights must be conducted in daytime, in cooperative weather, and cannot take place over roads, shoulders, bike lanes or sidewalks unless those passageways are closed. The aircraft must remain in visual line of sight, not be navigated inside a cloud or smoke, and cannot be operated from a moving vehicle.

Caltrans' Division of Aeronautics has developed an operations handbook that sets out rules of use, and to ensure public and employee safety.

The latest drone models that fulfill Caltrans' current operational needs start at about \$1,500, but that price can rise quickly when the drone is equipped with more sophisticated, higher-capacity cameras or sensors. Optional items add to the cost, and can include speakers, lights and digital sensors that detect nearby aircraft. Because drone technology is rapidly changing, Caltrans has to consider drone and related equipment purchases carefully.



Samer Momani adjusts the drone he uses for various field operations. Machines that serve Caltrans' needs start at about \$1,500.

Want to see what Caltrans's unmanned aircraft program has been up to?

View Caltrans News Flashes that are accessible online. Here are two:

Episode 53: Caltrans Responds to Massive Mudslide on Hwy. 58

<http://bit.ly/newsflash53>

Episode 162: Rapid Response to Montecito Mudslide

<http://bit.ly/newsflash162>

Because small drones typically cannot fly much longer than 20 minutes at a time — a return "home" automatically is triggered when power starts to run out, to avoid crashes — it is imperative that pilots have access to several batteries so they can complete their assigned mission that same day. Ideally, drone operators go into the field with eight batteries, which suggests the need to stockpile batteries specifically designed for drone usage at Caltrans regional districts throughout the State.

Caltrans first explored drone technology in 1999, when it conducted a preliminary investigation into the possibility of drones being used for site reconnaissance in landslide investigations.

In 2008, the Department developed a 40-pound aerial robot with a camera to inspect bridges and other elevated highway structures. According to an internal report, however, "the device did not perform as expected in testing and has not been deployed."

Caltrans' new drone program can help the Department reach all five strategic goals outlined in its 2015-2020 Strategic Management Plan: safety and health, stewardship and efficiency, sustainability, system performance, and organizational excellence. The use of unmanned aircraft can spare Caltrans workers from such potentially perilous tasks as climbing about bridges or venturing into disaster sites and onto steep terrains, save time and money, reduce the use of fossil fuels, provide collaborative opportunities with other State agencies (including Cal Fire and California Highway Patrol), and keep Caltrans at the technological forefront. **MM**

Sources: Tarek Tabshouri, Chief Senior Transportation Engineer, and Curtis Davis, retired Transportation Planning Supervisor, Caltrans Division of Aeronautics; and Samer Momani, associate environmental planner, District 7