

# Unmanned Aircraft System Operations Handbook



California Department of Transportation  
October 2021

## California Department of Transportation

# Unmanned Aircraft System Operations Handbook

Prepared by

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*Cover photo: US 101 Montecito Mudslide Recovery (courtesy of Steve Devorkin)*

## Table of Contents

1.0	Introduction .....	3
2.0	Applicability and Objectives.....	3
3.0	Definitions, Roles, and Responsibilities .....	4
3.1	Definitions .....	4
3.1.1	UAS.....	4
3.1.2	UAS Operation .....	4
3.1.3	UAS Flight Crew.....	4
3.1.4	Remote Pilot .....	4
3.1.5	Visual Observer .....	4
3.1.6	Support Personnel .....	4
3.1.7	Supervisor .....	5
3.2	Roles and Responsibilities .....	5
3.2.1	Remote Pilot .....	5
3.2.2	Visual Observer .....	6
3.2.3	Support Personnel .....	6
3.2.4	Supervisor .....	6
4.0	UAS Acquisition.....	7
	Table 4.1-UAS/UAS Related Acquisition Milestones .....	7
	Figure 4.1-UAS/UAS Related Acquisition Flowchart.....	8
5.0	Regulatory Authority and Requirements.....	9
5.1	Federal Aviation Regulations.....	9
5.2	Remote Pilot Requirements .....	9
5.3	UAS Registration Requirements.....	10
5.4	Training.....	10
6.0	UAS Restrictions.....	10
6.1	Operational Restrictions.....	10
6.2	Airspace Restrictions .....	11
6.4	Right-of-Way.....	12
6.4.1	Private Property .....	12
6.4.2	Privacy .....	13
6.4.3	Public Lands .....	13

6.5	Closures .....	13
6.6	Operational Waivers.....	14
7.0	Operation Planning, Safety, and Documentation.....	15
	Figure 7.0 - UAS Operation Process.....	15
7.1	Operation Planning.....	16
7.1.1	Certificate and Registration Submittals .....	16
7.1.2	UAS Operations Plan.....	16
7.1.3	UAS Hazard Analysis .....	16
7.2	Safety.....	17
7.2.1	Safety Meeting.....	17
7.2.2	UAS Inspection.....	17
7.2.3	Safety Equipment.....	17
7.3	UAS Flight Log.....	18
8.0	UAS Incidents and Accidents .....	18
8.1	Incident Reporting and Investigation.....	18
8.2	FAA Reportable Accident.....	19
8.3	Suspension.....	19
9.0	UAS Operations by Non-Caltrans Entities.....	20
9.1	Contracted UAS Operations on Behalf of Caltrans .....	20
9.2	UAS Operations by Encroachment Permit .....	21
	Appendix 1 – UAS Operations Handbook Change Log .....	23

## 1.0 Introduction

Unmanned Aircraft System (UAS) is an all-encompassing term that refers to an unmanned aircraft, its ground-based controller, and the system of communication connecting the two. As UAS technology has improved, commercial UAS applications have increased dramatically. UAS applications for transportation agencies include, but are not limited to, bridge inspections, surveying and photogrammetry, construction site monitoring, and emergency inspections.

The California Department of Transportation (Caltrans) has authorized the use of UAS to conduct UAS operations within the State Highway System (SHS) and for Caltrans business as outlined in Deputy Directive DD-118. Incorporating UAS into Caltrans business practices can increase safety and efficiency, decrease cost, and help Caltrans meet its mission, vision, and goals.

This Unmanned Aircraft System Operations Handbook (UAS Handbook) provides procedures and requirements necessary to conduct UAS operations within the SHS and/or for Caltrans business safely and in compliance with federal and State statutes and regulations, Deputy Directive DD-118, and other Caltrans policies and procedures.

## 2.0 Applicability and Objectives

This UAS Handbook is applicable to all UAS operations by Caltrans staff, Caltrans consultants or contractors, and non-Caltrans entities (public, local agencies, and their contractors). All individuals involved with UAS operations within the State Highway System and/or for Caltrans business shall have read and understood this UAS Handbook. Caltrans owned UAS shall be used for official purposes only. Personal UAS shall NOT be used for Caltrans business by Caltrans employees. Unauthorized, improper, or unsafe UAS operations must be reported to the District or Headquarters Safety Offices and to the Division of Aeronautics.

This Handbook is intended to be for the internal use and management by Caltrans to achieve the following objectives:

- Ensure the safety of Caltrans employees, consultants, contractors, and the public
- Ensure compliance with federal, State, and local laws and regulations, Deputy Directive DD-118, and other Caltrans policies and procedures
- Establish minimum criteria for qualifications, safety, and operational procedures in compliance with federal statutes and regulations
- Facilitate the administration of UAS operations within the State Highway System and/or for Caltrans business

Questions regarding this Handbook may be directed to:

Office of Technical Services and Programs  
Division of Aeronautics (MS-40)  
California Department of Transportation  
Email: [UAS@dot.ca.gov](mailto:UAS@dot.ca.gov)

Districts and Divisions should evaluate the benefit/cost of incorporating UAS into their respective business practices, the applicability of UAS manufacturers, models, types, features, and the use of Caltrans employees or UAS contractors. Districts and Divisions may develop additional UAS guidelines, training requirements, and standard operating procedures, so long as they shall not conflict with federal, State, and local statutes, regulations, and ordinances; Deputy Directive DD-118; this UAS Handbook; nor any other Caltrans policy and procedure.

A Steering Committee consisting of the Chief of the Division of Aeronautics, Caltrans Legal Division, and select Caltrans Division Chiefs and Deputy Directors will review and approve updates to UAS policy and guidance as changes in statutes, regulations, or other circumstances warrant. The Steering Committee will rely on the Division of Aeronautics and Caltrans UAS Working Groups for recommended updates.

### **3.0 Definitions, Roles, and Responsibilities**

#### **3.1 Definitions**

##### **3.1.1 UAS**

The term UAS refers to the unmanned aircraft and the equipment necessary for the safe and efficient operation of that aircraft.

##### **3.1.2 UAS Operation**

A UAS Operation is any operation during which a UAS operates within the State Highway System and/or for Caltrans business.

##### **3.1.3 UAS Flight Crew**

A UAS Flight Crew is the team responsible to perform a UAS operation. The UAS Flight Crew must include, at a minimum, a Remote Pilot, and a Visual Observer. Support Personnel may be assigned, as needed, to ensure the safe and effective operation of the UAS.

##### **3.1.4 Remote Pilot**

The Remote Pilot shall hold a Federal Aviation Administration (FAA) Remote Pilot Certificate and is the only member of the UAS Flight Crew who may operate the flight controls of the unmanned aircraft during a UAS operation. The Remote Pilot has final authority and responsibility over the UAS flight.

##### **3.1.5 Visual Observer**

The Visual Observer assists the Remote Pilot to see and avoid other air traffic and objects in the air or on the ground.

##### **3.1.6 Support Personnel**

Support personnel are designated to support the Remote Pilot or Visual Observer to ensure the safety and success of a UAS operation.

### **3.1.7 Supervisor**

Supervisor refers to the first line supervisor of the Caltrans Remote Pilot, or the Caltrans representative providing oversight over a UAS operation by a UAS service provider, construction contractor, or encroachment permittee.

## **3.2 Roles and Responsibilities**

### **3.2.1 Remote Pilot**

The Remote Pilot is the crew leader and is directly responsible for mission safety and objectives. The Remote Pilot leads pre- and post-flight UAS activities as well as the UAS flight activity. Remote Pilot responsibilities are to:

- Obtain required approvals before operating a UAS, specifically:
  - Caltrans employees must obtain approval from their Supervisor
  - Construction contractors must obtain approval from the Resident Engineer
  - Other Caltrans consultants or contractors must obtain approval from their task order or contract manager
  - Authorized encroachment permittee must obtain approval from the Caltrans encroachment permit representative
- Operate UAS in compliance with federal and State statutes and regulations, the Caltrans UAS Operations Handbook, Caltrans policies and procedures, and Deputy Directive DD-118
- Ensure a UAS is properly registered with the FAA
- Possess a valid Remote Pilot Certificate issued by the FAA to operate a UAS
- Complete FAA appropriate recurrent training in a timely manner
- Inspect UAS prior to flight, in accordance with UAS manufacturer recommendations and this UAS Handbook
- Oversee scheduled maintenance of the UAS per manufacturer instructions
- Complete and submit UAS Operation pre-flight and post-flight information, and the Caltrans UAS Hazard Analysis data when required, as specified in this UAS Handbook
- Assign UAS Flight Crew duties
- Operate the UAS in a safe and effective manner
- Terminate UAS operations due to unsafe or changing conditions
- Ensure that any accidents or incidents are reported as required by this UAS Handbook and the FAA
- Participate and cooperate in investigations resulting from a UAS accident or incident or when a complaint or misuse of a UAS is reported
- Maintain and improve UAS related operational knowledge, skills, and abilities

Additional information and eligibility requirements to become a Remote Pilot can be found at: <https://faadronezone.faa.gov/#/>

### **3.2.2 Visual Observer**

The Visual Observer is responsible for aiding the Remote Pilot in maintaining situational awareness. The primary communication during flight is between the Remote Pilot and the Visual Observer. Responsibilities of the Visual Observer are to:

- Be familiar with the UAS operation
- Assist the Remote Pilot in identifying any potential hazards or changing conditions
- Scan the airspace for aircraft or collision hazards and maintain awareness of the position of the UAS, aircraft, and the surrounding airspace
- Listen for and observe any abnormal sounds or flight characteristics exhibited by the UAS
- Always maintain two-way communication with the Remote Pilot during the UAS operation
- Assist in carrying out emergency plans and procedures in the event of an emergency

### **3.2.3 Support Personnel**

Support personnel provide added support to the Remote Pilot or Visual Observer. Responsibilities of Support Personnel are to:

- Perform their duties as assigned by the Remote Pilot
- Monitor pedestrians, vehicles, airspace above the work site, weather conditions, and to report any potential hazards or changing conditions to the Remote Pilot

### **3.2.4 Supervisor**

Supervisors provide authorization and oversight of all UAS operations. Responsibilities of the Supervisor are to:

- Ensure UAS operations are conducted in compliance with federal and State statutes and regulations, Caltrans policies and procedures, the Caltrans UAS Operations Handbook, and Deputy Directive DD-118
- Ensure that individuals operating UAS have a valid FAA Remote Pilot Certificate and UAS Registration
- Ensure a copy of the FAA Remote Pilot Certificate and FAA UAS Certificate of Registration is provided to the Division of Aeronautics prior to the initial use of a UAS
  - Ensure a closure is in effect, when applicable, and work zone safety elements are present as needed
  - Terminate UAS activities if unsafe conditions are anticipated or encountered
  - Perform, assist, and participate in investigations when an accident, incident, complaint, or misuse involving a UAS is reported
  - Ensure that any incident or accidents are reported promptly as required by this UAS Handbook and the FAA
  - Ensure that the Caltrans UAS Operation Data (Pre-flight and Post-flight) are recorded and reported to the Division of Aeronautics as specified in this UAS Handbook
  - Ensure that Caltrans owned UAS are acquired in accordance with applicable policies and procedures



#### 4.0 UAS Acquisition

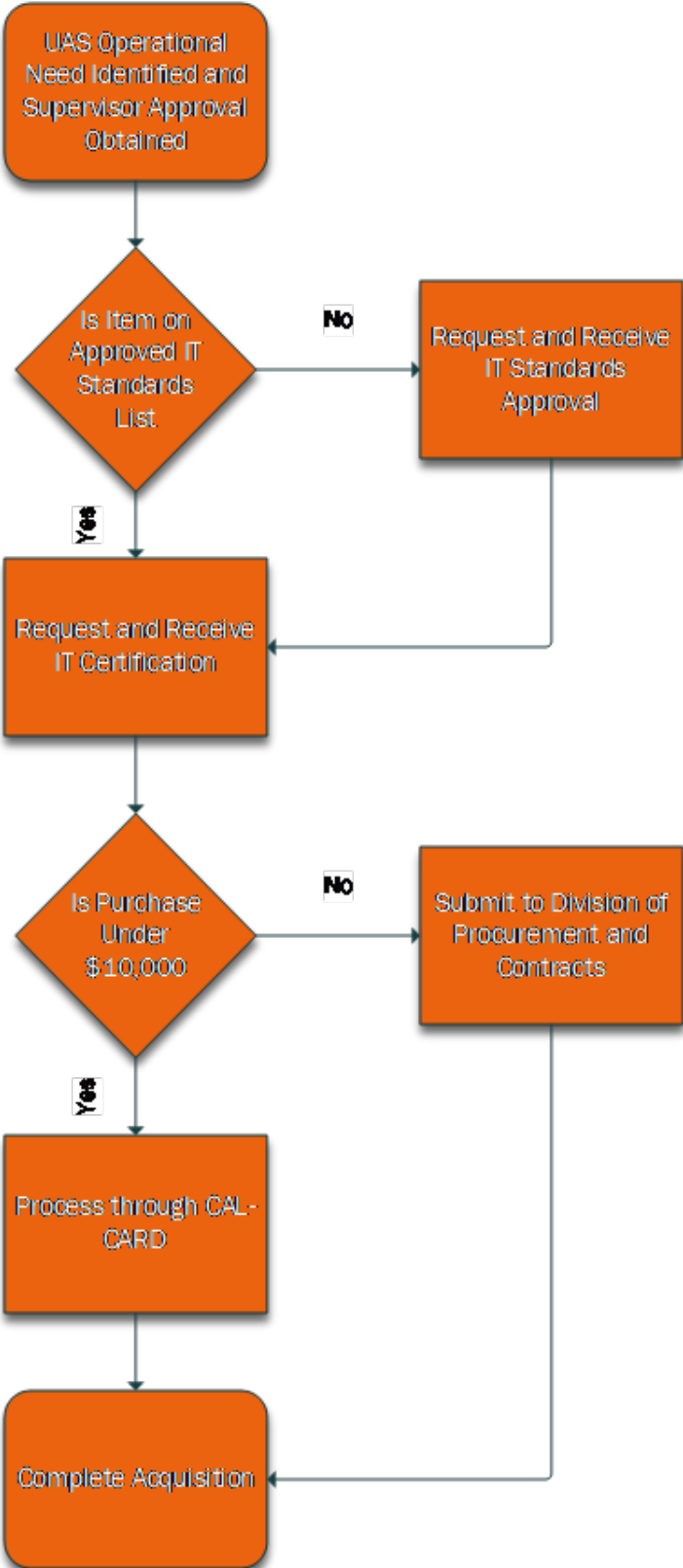
UAS hardware components and related software may be considered by the Division of Information Technology (IT) office to be an acquisition that requires IT approval. Caltrans UAS acquisitions shall follow both IT and Division of Procurement and Contracts (DPAC) procedures. Any Caltrans UAS hardware, component, or related software or hardware purchase requires supervisor approval.

The information below is intended to provide a guide to the IT acquisition process. DPAC is the final authority on required documentation for statewide acquisitions and may require additional information prior to executing a Purchase Order.

**Table 4.1-UAS/UAS Related Acquisition Milestones**

Acquisition Milestones	Office	Submittals	Processing Timeline
IT Standards Approval	<a href="#">Information Technology Standards, Desktop Support Section</a>	IT Hardware and Software Standards  If not listed:  <a href="#">Online Standards Exception Request</a>	10-15 business days to process exception request
IT Certification	<a href="#">Information Technology Certification Branch, Information Technology</a>	<ul style="list-style-type: none"> <li>• Applicable Procurement Method and Purchase Request Form</li> <li>• IT Justification Form (Form IT-0001)</li> <li>• IT Standards Approval</li> </ul>	Approximately 5–10 business days for IT Certification processing (during peak season, add 10–12 additional days)
Acquisition	<a href="#">Division of Procurements and Contracts</a>  IT Acquisition Office Or CAL-CARD	<ul style="list-style-type: none"> <li>• Applicable Procurement Method (i.e. RQS, CPO) and Purchase Request Form</li> <li>• IT Certification</li> </ul>	Up to 26 business days for DPAC processing depending on the procurement method (during peak season, add 10–12 additional days)

Figure 4.1-UAS/UAS Related Acquisition Flowchart



## 5.0 Regulatory Authority and Requirements

### 5.1 Federal Aviation Regulations

Caltrans recognizes that based on the preemption doctrine, the FAA is the sole regulatory authority over the National Airspace System. The FAA authorizes commercial and public UAS operations to be conducted in accordance with Title 14, Code of Federal Regulations (CFR) section 107 (also known as Federal Aviation Regulation [FAR] Part 107), a Section 333 Exemption and/or a Certificate of Authorization (COA) Waiver. All UAS operations within the State Highway System and/or for Caltrans business are considered public or commercial operations. It is expected that all UAS operations will occur under FAR Part 107 authority.

The maximum total weight of a UAS (including payload/cameras) operating under FAR Part 107 authority shall be less than 55 pounds. The 55-pound weight limit for UAS includes everything that is on board or otherwise attached to the aircraft at the time of takeoff. Should a UAS operation require a UAS greater than 55 pounds, either a COA or a Section 333 Exemption will be required. Caltrans employees shall contact the Division of Aeronautics for guidance and assistance in obtaining a COA or a Section 333 Exemption.

### 5.2 Remote Pilot Requirements

To be eligible to become a Remote Pilot, the FAA requires that an individual:

- Pass an initial UAS Aeronautical Knowledge Test (FAR Part 107 Unmanned Aircraft General Exam) at an FAA approved knowledge testing center
  - Complete FAA Form 8710-13 for a Remote Pilot Airman Certificate (FAA Airman Certificate and/or Rating Application) using the electronic FAA Integrated Airman Certificate and/or Rating Application system
  - Pass a Transportation Security Administration screening
- Or
- Hold a FAR Part 61 Pilot Certificate other than student pilot
  - Complete a flight review within the previous 24 months
  - Complete the online training course "Part 107 small Unmanned Aircraft Systems ALC-451"
  - Complete FAA Form 8710-13
  - Validate their identity as outlined by the FAA

The UAS Knowledge Test consists of multiple-choice questions on a range of aviation and piloting topics including regulations, airspace classification, aviation weather, airport operations, communication and emergency procedures, aeronautical decision-making, and UAS rating privileges, limitations, flight operations, loading, and maintenance. A list of FAA approved testing centers is available online at the FAA website. Study materials are available online on the FAA website or through private ground schools. Applicants should review the [Airman Certification Standards for Unmanned Aircraft Systems](#) (PDF), the [Remote Pilot Study Guide](#) (PDF), prior to taking the test.

Applicants who successfully complete these requirements will be issued a Temporary Airman Certificate, followed by a permanent Remote Pilot Certificate. The FAA requires that all certificates must be easily accessible by the Remote Pilot during all UAS operations. The FAA Remote Pilot Certificate is valid for two years. Certificate holders must pass either a recurrent online training course or recurrent knowledge test every two years. For additional information, visit the FAA UAS website <https://www.faa.gov/uas/>.

### **5.3 UAS Registration Requirements**

Federal law requires that UAS flown for government or commercial purposes must be registered with the FAA and marked with a registration number. Online FAA UAS registration is available at: <https://faadronezone.faa.gov/#/>.

Registrants must supply their name, work address, and work email, in addition to the manufacturer, model, and serial number for each UAS. A permanent marker, label, or engraving may be used as long as the number remains affixed to the aircraft during routine handling and all operating conditions, and is readily accessible and legible upon close visual inspection. Effective 02-25-2019 all Caltrans registered UAS are required to affix the FAA registration marking to the exterior of the UAS. Failure to register an unmanned aircraft may result in federal regulatory and criminal penalties.

### **5.4 Training**

Registration with and participation in the Caltrans UAS Program requires approval from the employee's Office or Division. Employees are required to register with the Division of Aeronautics, UAS Program and to complete the Caltrans UAS Training Program (Training Program) prior to operating a UAS for or on behalf of Caltrans. UAS Remote Pilots will maintain currency requirements as outlined in the Training Program. Training costs are the responsibility of the employee's Program or District.

Remote pilot trainees should practice with a Caltrans designated UAS trainer or other experienced Remote Pilot at a designated UAS training site, other public land with permission from the respective agency, or within Caltrans Right-of-Way at a location where encroachment on vehicular or pedestrian traffic is highly unlikely. A strip of Right-of-Way adjacent to a roadway would not be considered an appropriate location.

UAS operations that take place at a location other than a Caltrans facility or State designated location, including in the field or on-site in preparation of a UAS operation, shall be considered a UAS operation with subsequent reporting requirements.

## **6.0 UAS Restrictions**

### **6.1 Operational Restrictions**

The operational restrictions below are a combination of FAR Part 107 and Caltrans internal policies and procedures not exceeding the federal preemption doctrine.

Unless granted a waiver from the FAA from a Part 107 restriction, a Remote Pilot operating a UAS shall NOT:

- Operate UAS contrary to FAR Part 107
- Operate UAS in a careless or reckless manner that may endanger the life or property of another
- Operate UAS in restricted airspace (See Airspace Restrictions Section)
- Operate UAS in violation of State statutes or local ordinances
  
- Operate UAS in violation of the DD 118 and this Handbook.
- Allow an object to be dropped from UAS in a manner that creates an undue hazard to persons or property
- Impede emergency personnel in the performance of their duties (See Emergency Response Section)
- Operate UAS at an unsafe speed (not to exceed 100 miles per hour)
- Operate UAS at an altitude higher than 400 feet above ground level, unless the UAS is flown within a 400-foot radius of a structure and does not fly higher than 400 feet above the structure's uppermost limit
- Operate UAS at night or during civil twilight hours unless the UAS has lighted anti-collision visible for at least three statute miles
- Operate a UAS beyond the visual line of sight
- Operate UAS in any situation where local conditions have changed considerably prior to or during flight
- Operate UAS when weather conditions or visibility do not meet FAA requirements or may adversely affect operational safety
- Operate a UAS above any cloud or smoke that presents obstructions to visibility between the UAS and the Remote Pilot
- Operate UAS when manned aircraft (fixed-wing or rotor-wing) are observed nearby
- Operate UAS that is carrying hazardous materials
- Act as a Remote Pilot or Visual Observer in the operation of more than one UAS at the same time
- Operate UAS from a moving vehicle
- Operate UAS from a water-borne vehicle unless the UAS is flown over a sparsely populated area
- Operate UAS over people unless they are directly participating in the operation of the UAS or are located under a covered structure or inside a stationary vehicle that can provide reasonable protection from a falling UAS

## **6.2 Airspace Restrictions**

- Each UAS must yield the right-of-way to all aircraft, airborne vehicles, and launch and re-entry vehicles. Yielding the right-of-way means that the UAS must give way to aircraft or airborne vehicles and may not pass over, under, or ahead of them unless well clear of the aircraft or vehicle.
- No person shall operate a UAS so close to another aircraft as to create a collision hazard.

- No person shall operate a UAS in Class B, Class C, or Class D Airspace as defined by the FAA, or within the lateral boundaries of the surface area of Class E Airspace designated for an airport, unless that person has prior authorization from Air Traffic Control or has a COA or a Waiver to do so.
- No person shall operate a UAS in a manner that interferes with operations and traffic patterns at any airport, heliport, or seaplane base.
- No person shall operate a UAS where Temporary Flight Restrictions (TFR) are in place as designated by a Notice-To-Airmen (NOTAM), unless cleared to do so by the controlling agency subject per Title 14 of the Code of Federal Regulations (CFR) section 91.137.
- The Remote Pilot shall identify the airspace, any TFRs, and nearby airport, heliport, or seaplane bases and ensure the operation is in compliance with all applicable airspace regulations prior to each UAS operation. The Remote Pilot may consult the FAA TFR portal ([http://tfr.faa.gov/tfr\\_map\\_ims/html/ns/scale3/tile\\_1\\_2.html](http://tfr.faa.gov/tfr_map_ims/html/ns/scale3/tile_1_2.html)), aeronautical charts, or applicable mobile device applications to perform this review.

### **6.3 Emergency Response**

Deploying a UAS to aid in an emergency or disaster requires coordination with the Caltrans Office of Emergency Management. Temporary Flight Restrictions (TFR) are imposed by the FAA to prohibit UAS or other aircraft in a location where emergency activities are occurring. Flying in a TFR requires the permission of the controlling agency and is subject to Title 14 of the CFR section 91.137, “Temporary flight restrictions in the vicinity of disaster/hazard areas.”

California Penal Code section 402 (a) (2) makes it a misdemeanor to fly UAS at the scene of an emergency for the purpose of viewing the activities and/or impeding emergency personnel in the performance of their duties, unless it is part of the duties of that person’s employment or those activities. Furthermore, California Civil Code section 43.101 (a) limits the civil liability of an emergency responder, public entity, or public employee for damage to a UAS, if the UAS interferes with the emergency services. FAR Part 107 restrictions are still in effect during an emergency. See Section 6.6, Operational Waivers for additional information.

### **6.4 Right-of-Way**

#### **6.4.1 Private Property**

Maintaining public safety and trust is of the utmost importance to Caltrans. Operations in the proximity of populated areas may be perceived by the public as a threat or a nuisance and may result in a grievance or complaint. Caltrans UAS Remote Pilots should maintain awareness of State Right-of-Way limits and avoid operating over non-public areas when practicable. The UAS Remote Pilot and crew shall exercise good judgement and maintain professional and respectful interactions with the public, including halting a UAS operation if necessary. UAS shall not be launched or retrieved from private property unless permission has been granted from the property owner. UAS Remote Pilots should coordinate with their supervisor prior to a planned UAS operation over residential homes or populated areas. UAS operations should include risk mitigation activities, such as notifying nearby residents if appropriate. Caltrans Remote Pilots shall adhere to any applicable laws and

should follow existing policies and procedures regarding private property notification. Inquiries from the public should be referred to the District Public Information Office (PIO). Advance coordination with the PIO is encouraged for operations near residential homes or populated areas.

#### **6.4.2 Privacy**

California Civil Code section 1708.8 states that a person is liable for invasion of privacy when a person attempts to capture, in a manner that is offensive, any visual image, sound recording, or other physical impression through the use of a visual or auditory enhancing device of another person engaging in a personal or familial activity in which the other person has a reasonable expectation of privacy. All Caltrans Remote Pilots shall operate UAS in compliance with California Civil Code section 1708.8. All UAS footage and data is subject to the California Public Records Request Act.

#### **6.4.3 Public Lands**

While civilian airspace is the jurisdiction of the Federal Aviation Administration, other federal and state agencies and local entities may have restricted or otherwise limited UAS operations over their right-of-way. All Caltrans Remote Pilots must comply with federal and State laws and regulations, agency policies, and local ordinances governing UAS.

Caltrans UAS Remote Pilots should launch and land UAS within State Right-of-Way when able to do so. When planning to launch and land outside of State Right-of-Way, Caltrans Remote Pilots should verify that no UAS restrictions are in place prior to doing so.

State law (SB 1355) prohibits the operation of an unmanned aircraft system on or above the grounds of a state prison, jail, juvenile hall, camp, or ranch. No Caltrans UAS operations shall occur within the boundaries of federal, State, or local prisons, jails, or similar facilities.

State and National Parks have placed restrictions on UAS operations within their boundaries. Caltrans Remote Pilots must coordinate with and obtain any required permits from park officials with the California Department of Parks and Recreation for State Parks, or the National Park Service for national parks prior to operating within the boundaries of a State or national park.

### **6.5 Closures**

FAR Part 107 prohibits flying over people or moving vehicles. UAS may pose a hazard to the traveling public by crashing into or near motorists, bicyclists, or pedestrians, or by having loose parts of the UAS dislodge and fall. UAS may also pose a hazard by creating a visual distraction for the travelling public.

UAS shall not fly over, or hover over, travel lanes, bicycle lanes, shoulders, or sidewalks within the State Highway System and/or for Caltrans business unless a closure is in effect, with the exception of crossing over a highway when necessary and feasible to do so (see below). UAS operations that require flying over or hovering over, travel lanes, bicycle lanes, shoulders, or sidewalks along the State Highway System require coordination with the District Traffic Manager or designee to determine the type and extent of closure. This coordination shall take into account the likely flight

path of the UAS and the safety of the UAS Flight Crew. Closures shall be set up in accordance with Caltrans policies, specifications, and Standard Plans.

A UAS may only cross over a highway without a closure, when the Remote Pilot, with the Visual Observer/Supporting Personnel acting as spotters, can ensure that the UAS would not fly over vehicles, bicyclists, or pedestrians underneath its path, nor create a visual distraction to the travelling public. A UAS cross-over shall not be attempted otherwise unless a closure is in effect. The Remote Pilot shall plan the UAS operation to avoid or minimize the need to perform a cross-over.

A UAS crossing over a highway shall do so in a path approximately perpendicular to the highway. Crossing over a highway shall not be programmed into an autonomous UAS flight plan without a closure.

## **6.6 Operational Waivers**

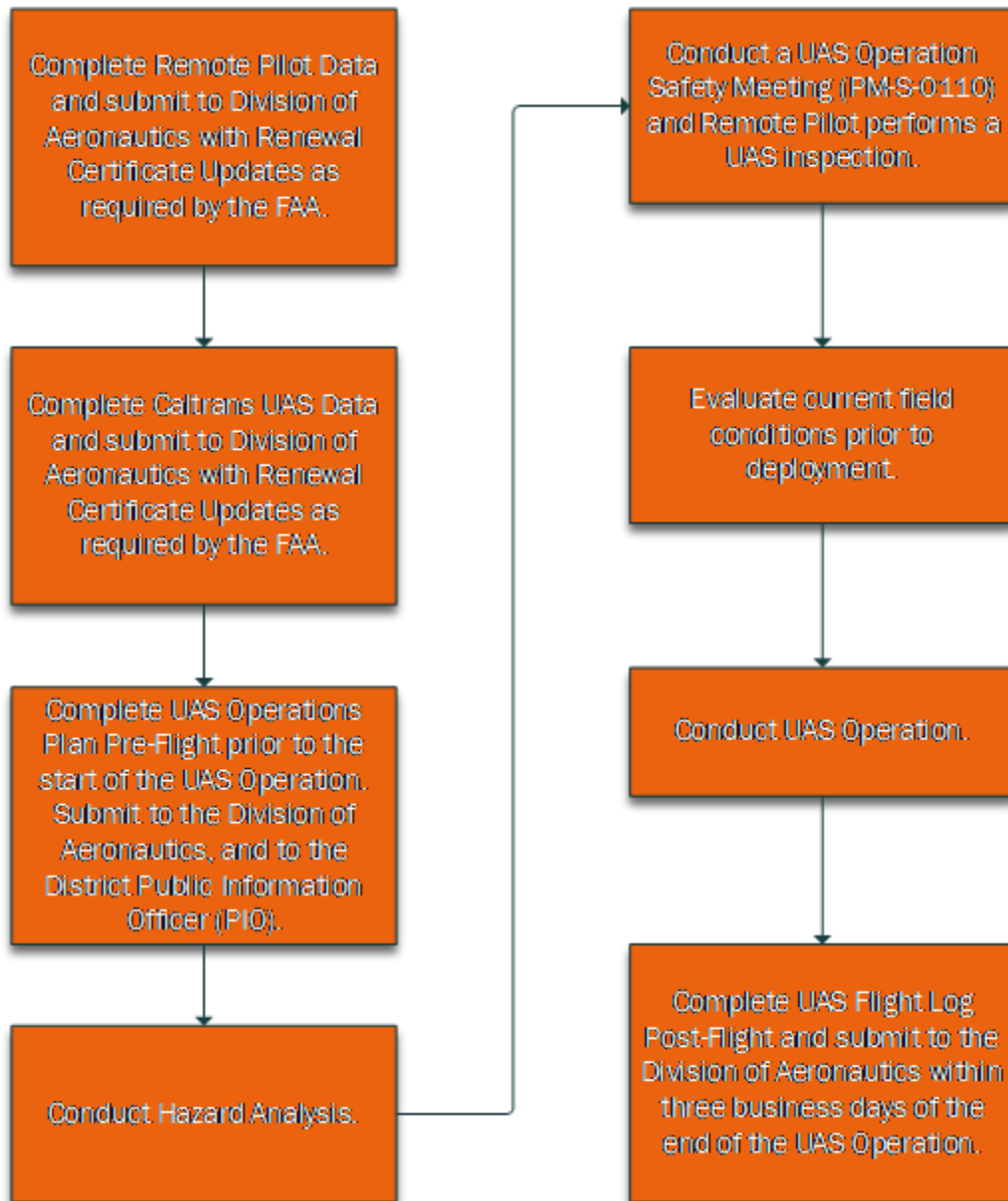
The FAA may issue waivers, including requests to operate in controlled airspace, to certain operational restrictions under FAR Part 107 through an online process available through the FAA or FAA approved third party applications.

If emergency operational waivers are required, the FAA's System Operations Support Center may be contacted at (202) 267-8276 to request expedited approval of operational waivers. Division of Aeronautics shall be notified if an emergency operational waiver has been pursued with the FAA.



## 7.0 Operation Planning, Safety, and Documentation

Figure 7.0 - UAS Operation Process



## **7.1 Operation Planning**

### **7.1.1 Certificate and Registration Submittals**

A District or Division shall submit the Caltrans UAS Remote Pilot data with a copy of the FAA Remote Pilot Certificate of registration, and the Caltrans Unmanned Aircraft System data to the Division of Aeronautics. The District or Division shall receive acknowledgement of receipt prior to the initial deployment of a UAS. UAS shall not be operated prior to completion of this step.

Renewal certification updates as required by the FAA shall be submitted as well. This requirement applies to Caltrans employees operating UAS as well as Caltrans contracted UAS service providers. Contracted service providers shall also submit their UAS Remote Pilot data and Unmanned Aircraft System data to the Division of Aeronautics.

All submittals to the Division of Aeronautics may be completed online by contacting the Division of Aeronautics at [UAS@dot.ca.gov](mailto:UAS@dot.ca.gov).

See Section 9.0 for submittal requirements by non-Caltrans entities by permit.

### **7.1.2 UAS Operations Plan**

The UAS Operation Pre-Flight data shall be submitted to the Division of Aeronautics prior to the start of any UAS operation.

The UAS Operations Plan covers:

- Location, date, and purpose of a UAS operation
- Assignment of a UAS Remote Pilot, Visual Observer, and Support Personnel as needed
- UAS manufacturer, model, and FAA UAS Certificate of Registration number

### **7.1.3 UAS Hazard Analysis**

A UAS Hazard Analysis identifies potential hazards associated with a UAS operation to eliminate, guard against, or avoid those hazards. The Caltrans UAS Hazard Analysis information shall be completed prior to any UAS operation. Weather, visibility, and other field conditions must be rechecked prior to deploying the UAS. Each District or Division may prescribe additional requirements as needed. The Hazard Analysis includes:

- Awareness of controlled airspace including the use of aeronautical charts or FAA approved third party applications.
- Evaluation of all potential civil or military aviation activities nearby, including small landing strips, heliports, or potential crop-dusting activities in agricultural areas
- Checks of TFRs
- Checks of forecasted weather conditions including anticipated wind speed
- Verification of minimum flight visibility of three statute miles before the flight
- Awareness of State Right-of-Way boundaries
- Awareness of nearby facilities, residences, roads, and structures

- Right-of-way permissions secured as applicable
- Assurance that there is no overflight of people or moving vehicles
- Protection of the UAS Flight Crew from live traffic or other job site hazards
- Notification of traffic control (closures) in effect for any overflight of roadways, shoulders, bike lanes, or sidewalks
- Designation of emergency landing area
- Identification of overhead obstructions including powerlines, trees, buildings, and communication towers
- Assurance that the UAS Flight Crew size is sufficient to effectively conduct the operation

## **7.2 Safety**

### **7.2.1 Safety Meeting**

A Safety Meeting shall be conducted prior to a UAS operation to discuss the planned operation, the Caltrans UAS Hazard Analysis information, and other potential safety concerns, emergency response, roles, and responsibilities. A Safety Meeting Report (PM-S-0110 or its equivalent) shall be used to document the meeting.

### **7.2.2 UAS Inspection**

All UAS should be operated according to manufacturer recommendations, user guide, and maintenance requirements. Prior to each flight operation, the Remote Pilot must check the UAS to determine whether it is in a condition for safe operation. Equipment will be visually inspected to include the following:

- Condition of aircraft including motors, propellers, and electrical connections
- Display of the UAS Certificate of Registration number on the UAS
- Aircraft radio control transmitter
- Camera and gimbal and any other sensor/payload
- Battery condition
- Video transmitter, receiver, and antennae

### **7.2.3 Safety Equipment**

At a minimum, the following equipment and gear shall be on hand during a UAS operation:

- Personal Protective Equipment, as described in the Caltrans Safety and Health Manual
- Cellular phones or radio equipment depending on location
- First Aid kit
- Fire extinguisher

### **7.3 UAS Flight Log**

After each UAS operation, the Caltrans UAS Operation Post-Flight data shall be completed and submitted to the Division of Aeronautics within three days of completion of the UAS operation. If a UAS operation requires multiple consecutive days to complete, the Post-Flight Log shall be completed and submitted three days from the day of the last operation. The Post-Flight Log will include dates, arrival and departure times, total flight time, incident or accident indicator, and any pertinent notes or comments. Multiple non-consecutive operations at different locations shall be considered separate operations and shall require separate submittals. Non-consecutive operations taking place at the same location may be considered as one UAS operation upon approval of the Division of Aeronautics however shall not exceed five days in duration.

## **8.0 UAS Incidents and Accidents**

### **8.1 Incident Reporting and Investigation**

A UAS incident is a UAS operation that results in a complaint, injury, illness, and/or property damage. Incidents are reported and may be investigated to implement procedures to reduce the likelihood of future occurrences. Reporting incidents can improve and inform Caltrans-wide UAS safety efforts.

In case of a UAS incident, the Remote Pilot and/or UAS Crew shall complete and submit to their Supervisor, the Caltrans UAS Operations Incident/Accident Report, which documents:

- Time, date, location of the incident
- Employees involved
- Third party involvement and contact information
- UAS manufacturer, model, and FAA UAS Certificate of Registration number
- Condition/damage assessment of the UAS after the incident
- Details pertinent to the incident

The District or Headquarters Health and Safety Office shall be immediately notified as well as the Division of Aeronautics. UAS incidents shall be investigated by the Supervisor to determine the cause and any recommended potential remedial action in compliance with the Caltrans Safety and Health Manual. In the event of an injury, employees shall follow the Caltrans Safety and Health Manual requirements to:

- Call 911 for an emergency or take an injured employee to an authorized medical clinic in a non-emergency
- Document and report procedures including Report of An Occupational Injury or Illness (Form PM-S-0006)
- Notify the Supervisor and the Health and Safety Office
- Report any accidents or incidents by completing and submitting the Caltrans UAS Operations Incident/Accident report to the Division of Aeronautics (UAS@dot.ca.gov)

## **8.2 FAA Reportable Accident**

The FAA requires that a Remote Pilot report any accident to the FAA within ten days of the accident if any of the following occur:

- Serious injury to any person or any loss of consciousness
- Damage to any property, other than the small unmanned aircraft, unless one of the following conditions is satisfied:
  - The cost of repair (including materials and labor) does not exceed \$500
  - The fair market value of the property does not exceed \$500 in the event of total loss

The FAA defines “serious injury” as any injury that:

- Requires hospitalization for more than 48 hours, commencing within seven days from the date an injury was received
- Results in a fracture of any bone (except simple fractures of fingers, toes, or nose)
- Causes severe hemorrhages or nerve, muscle, or tendon damage
- Involves any internal organ
- Involves second-or third-degree burns or any burns affecting more than five percent of body surface

FAA accident reports are filed electronically online at the FAA’s accident reporting website (<https://faadronezone.faa.gov>). Remote Pilots are required to comply with this federal regulation. In the event of an FAA reportable accident, the Remote Pilot shall complete and submit to the Division of Aeronautics the Caltrans UAS Operations Incident/Accident Report. A copy of the FAA accident report shall also be provided within three days of the event.

## **8.3 Suspension**

Authorization for a Remote Pilot to operate a UAS for Caltrans business, or permission under an encroachment permit, may be suspended for reasons including, but not limited to:

- Lack of compliance with this UAS Handbook, FAA requirements, and/or Caltrans policies and procedures
- Lack of required knowledge and/or skills, or lapsed and/or incomplete records, certifications, or certification renewals

Either the Division of Aeronautics, or the relevant District or Division may suspend a Remote Pilot’s authority to operate a UAS for Caltrans business. Suspension of a Remote Pilot’s authority shall be reported to the Division of Aeronautics immediately upon suspension.

## **9.0 UAS Operations by Non-Caltrans Entities**

UAS operations by Non-Caltrans entities on the State Highway System (SHS) Right of Way and/or by Caltrans contract, shall occur in full compliance with federal, State, and local laws, rules, regulations, ordinances, and this UAS Handbook. Caltrans may place additional requirements, restrictions, or terminate the use of a UAS for reasons that include but are not limited to: safety, public nuisance, or non-compliance with federal, State, and local laws, rules, regulations, ordinances, and this UAS Handbook.

UAS Insurance is required for all UAS operations by Non-Caltrans entities on the SHS Right-of-Way and/or by Caltrans contract. The minimum insurance required for a permitted UAS Operation is \$2 million for each person/occurrence for bodily injury and \$2 million for property damage for each occurrence specifically covering UAS use. Districts or Divisions may request additional and higher UAS insurance limits, coverages, or bonding on a case-by-case basis.

If UAS coverage is added to a general liability policy, there must be a separate endorsement (a separate attachment) showing proof of UAS coverage. If UAS coverage is provided by an aviation-specific insurance carrier, then a separate policy endorsement showing UAS coverage is not necessary provided the entire policy covers UAS use. For both types of insurance covering UAS use, a separate endorsement is required naming the State of California and its officers, agents, and employees as additional insured parties. This endorsement will be a separate attachment from the proof of UAS insurance coverage and/or general liability insurance coverage. Written proof of UAS insurance coverage must be provided to Caltrans prior to the UAS Operation. Caltrans does not accept an ACORD (Association for Cooperative Operations Research and Development) form as evidence of insurance.

### **9.1 Contracted UAS Operations on Behalf of Caltrans**

Contracted Caltrans UAS operations are associated with activities that may include but are not limited to, Construction, Architectural & Engineering contracts, and accident investigations and are managed with a Caltrans Representative providing oversight responsibilities. The Caltrans Representative may be a project or task manager, resident engineer, or another authorized employee.

The Caltrans Representative shall provide the consultant or contractor with a copy of the most current Caltrans UAS Operations Handbook and ensure the following information is submitted to the Division of Aeronautics, UAS Program, prior to any UAS operation taking place:

1. UAS Remote Pilot data and a copy of the FAR Part 107 Remote Pilot Certificate (For Part 333 Exemption, COA, or other operational waivers, contact the Division of Aeronautics)
2. Unmanned Aircraft System data and a copy of the FAA UAS Certificate of Registration

In addition, the consultant or contractor shall provide the following information to the Division of Aeronautics, UAS Program, for each UAS operation flown for or on behalf of Caltrans\*:

1. UAS Operation Pre-Flight and Post-Flight data
2. UAS Operations Incident/Accident Report, if applicable

For additional information or applicable forms, contact the Division of Aeronautics, UAS Program at [UAS@dot.ca.gov](mailto:UAS@dot.ca.gov).

(\*If the contract requires an encroachment permit to be obtained, the Caltrans Representative shall follow the UAS Encroachment Permit reporting requirements.)

All data obtained from or relating to the UAS operation within the State Right-of-Way and/or for Caltrans business by UAS contracted operation, shall be made available to Caltrans unless otherwise directed by Caltrans.

Neither Caltrans nor any of their officers and employees are responsible for any injury, damage, or liability occurring by reason of anything done or omitted to be done by UAS providers, its contractors, sub-contractors, and/or its agents under or in connection with the operations of UAS. It is understood and agreed that UAS providers will defend, indemnify, and save harmless Caltrans and all of their officers and employees from all claims, suits, or actions of every name, kind, and description brought forth under, but not limited to, tortious, contractual, inverse condemnation, or other theories or assertions of liability occurring by reason of anything done or omitted to be done by UAS providers, its contractors, sub-contractors, and/or its agents.

In those instances where Caltrans Districts or Divisions are procuring UAS services, they may procure UAS services through a contract in compliance with the law and all applicable contract requirements and provisions of the Caltrans Division of Procurement and Contracts (DPAC). In those instances where Caltrans Contractors or sub-contractors are engaging the services of UAS providers, the contractors and sub-contractors must notify the UAS provider of their requirement to be compliant with the provisions of the UAS Handbook.

## **9.2 UAS Operations by Encroachment Permit**

An encroachment permit from Caltrans is required before launching from or landing a UAS within the SHS Right-of-Way, and before entering the SHS Right-of-Way to operate or participate in UAS related activities by all non-Caltrans entities not under contract with Caltrans. This requirement also applies to entities under contract with Caltrans, if required by the contract (see Section 9.1 Contracted UAS Operations on Behalf of Caltrans). Forms and instructions on applying for and obtaining an encroachment permit are available on Caltrans' Encroachment Permits webpage that can be accessed at <https://dot.ca.gov/programs/traffic-operations/ep>.

An encroachment permit for UAS operations may be issued only when associated with authorized construction work or other encroachment permit activities such as filming, special events, surveys, or accident reconstruction work. UAS operations for other purposes, such as recreation, private, or business uses are not allowed within the SHS

Right-of-Way. For authorized UAS Operations, the permittee must comply with the Caltrans UAS Handbook and UAS encroachment policy in the Caltrans' Encroachment Permits Manual.



## Appendix 1 – UAS Operations Handbook Change Log

Changes reflected apply to both the online and PDF versions of the UAS Handbook.

Date	Section	Details
2019-10-08		Published UAS Operations Handbook, October 2019 – V1
2020-09-04	Various	Minor edits to correct punctuation and formatting throughout.
2020-09-04	6.4 Right-of-Way and Privacy	Remove and replace Section 6.4 to reflect direction of the UAS Steering Committee on UAS Operations Outside of State Right-of-Way, and Public Lands
2020-09-04	7.1.1 Certificate and Registration Submittals	Minor edits and to remove form numbers.
2020-09-04	7.1.2 UAS Operations Plan	Minor edits and to remove form numbers.
2020-09-04	7.1.3 UAS Hazard Analysis	Minor edits to remove form numbers and to include wording consistent with other sections of the Handbook.
2020-09-04	7.2.1 Safety Meeting	Minor edits and change reference to PM-S-0110 to include “or its equivalent.”
2020-09-04	7.3 UAS Flight Log	Minor edits to remove form numbers and include a multi-day mission is not to exceed five days in duration without the filing of a new operations plan.
2020-09-04	8.1 Incident Reporting and Investigation	Minor edits to remove form numbers and more accurately reflect the current workflows.
2020-09-04	9.0 UAS Operations by Non-Caltrans Entities	The title of the section has changed. Section has been rewritten and reworked to consolidate information.
2020-09-04	9.1 Contracted UAS Operations on Behalf of Caltrans	The title of the section has changed. Content has been rewritten and reworked to remove the table for submittal requirements and to consolidate information.
2020-09-04	9.2 UAS Operations by Encroachment Permit	Section has been rewritten and reworked to remove the submittal requirements table and to consolidate information.
2020-09-04	9.3 UAS Insurance Requirements	The Section has been removed and combined with Section 9.0.
2021-10-18	5.4 Training	This section has been updated to add the Caltrans UAS Training Program, and Remote Pilot registration requirements with the Caltrans UAS Program.
2021-10-18	6.4 Right-of-Way	This section has been updated to split Private Property and Privacy into separate sections and to update language to reflect approved ROW content.

