

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION	
CERTIFICATE OF WAIVER OR AUTHORIZATION	
ISSUED TO University of Colorado Boulder	Part 91
ADDRESS 1111 Engineering Drive Boulder, CO 80309	
This certificate is issued for the operations specifically described hereinafter. No person shall conduct any operation pursuant to the authority of this certificate except in accordance with the standard and special provisions contained in this certificate, and such other requirements of the Federal Aviation Regulations not specifically waived by this certificate.	
OPERATIONS AUTHORIZED Operation of small Unmanned Aircraft System(s) weighing less than 55 pounds and operating at speeds of less than 87 kts (100 mph) in Class G airspace at or below 80 feet Above Ground Level (AGL) over Boulder, CO, under the jurisdiction of Denver TRACON (D01). See Special Provisions.	
LIST OF WAIVED REGULATIONS BY SECTION AND TITLE N/A	
STANDARD PROVISIONS	
<ol style="list-style-type: none">1. A copy of the application made for this certificate shall be attached and become a part hereof.2. This certificate shall be presented for inspection upon the request of any authorized representative of the Federal Aviation Administration, or of any State or municipal official charged with the duty of enforcing local laws or regulations.3. The holder of this certificate shall be responsible for the strict observance of the terms and provisions contained herein4. This certificate is nontransferable.	
Note-This certificate constitutes a waiver of those Federal rules or regulations specifically referred to above. It does not constitute a waiver of any State law or local ordinance.	
SPECIAL PROVISIONS	
Special Provisions Nos. A thru D, inclusive, are set forth on the reverse side hereof.	
The certificate, 2019-WSA-3210, is effective from February 15, 2019 to February 14, 2021, inclusive, and is subject to cancellation at any time upon notice by the Administrator or his/her authorized representative.	
BY DIRECTION OF THE ADMINISTRATOR	
<u>FAA Western Service Area</u> (Region)	<u>B. G. Chew</u> (Signature)
<u>February 12, 2019</u> (Date)	<u>Tactical Operations Manager (AJV-W23)</u> (Title)

Purpose: To prescribe UAS operating requirements in the National Airspace System (NAS) for the purpose of Public Aircraft Operations. The holder of this COA will be referred herein as the “Proponent

Public Aircraft

1. A public aircraft operation is determined by statute, 49 USC §40102(a)(41) and §40125.
2. All public aircraft flights conducted under a COA must comply with the terms of the statute.
3. All flights must be conducted per the declarations submitted in the application, and as specified in the following Standard/Special Provisions.
4. This COA provides an alternate means of complying with 14 CFR §91.113(b) for unmanned aircraft operations
5. All operations will be conducted in compliance with Title 14 CFR §91 and the conditions of the authorization issued herein. If the operator cannot adhere to any of these requirements a separate FAA Form 7711-2 Waiver application may be required.

STANDARD PROVISIONS

A. General

1. The review of this activity is based upon current understanding of UAS operations and their impact in the NAS. This COA will not be considered a precedent for future operations. As changes occur to policy, procedures, and regulatory requirements, limitation and conditions for UAS operations will be adjusted.
2. All personnel connected with the UAS operation must read and comply with the contents of this authorization and its provisions.
3. A copy of the COA including the special limitations must be immediately available to all operational personnel at each operating location whenever UAS operations are conducted.
4. This authorization may be canceled at any time by the Administrator, the person authorized to grant the authorization, or the representative designated to monitor a specific operation. As a general rule, this authorization may be canceled when it is no longer required, there is an abuse of its provisions, or when unforeseen safety factors develop. Failure to comply with the authorization is cause for cancellation. The proponent will receive a written notice of cancellation.
5. During the time this COA is approved and active, a site safety evaluation/visit may be accomplished to ensure COA compliance, assess any adverse impact on ATC or airspace, and ensure this COA is not burdensome or ineffective. Deviations, accidents/incidents/mishaps, complaints, etc., will prompt a COA review or site visit to address the issue. Refusal to allow a site safety evaluation/visit may result in cancellation of the COA. Note: This section does not pertain to agencies that have other existing agreements in place with the FAA.
6. Radiofrequency spectrum authorization is independent of the COA process and requires the proponent to obtain Federal Communications Commission (FCC) equipment certification (47 CFR Part 2, Subpart J and 47 CFR Part 87, Subpart D) and frequency

licenses (47 CFR Part 87) in the Aeronautical Radionavigation, Aeronautical Mobile (Route), or Aeronautical Mobile Services, as appropriate, for the control link, ATC radios, transponders, detect and avoid systems, and navigation systems used to support this COA. For systems operating exclusively below 400 feet, and within visual line of sight, the control link equipment may be licensed under 47 CFR Part 15 (Radio Frequency Devices). Equipment licensed under 47 CFR Part 5 (Experimental) does not provide the protection necessary for NAS operations.

B. Airworthiness Certification.

The Unmanned Aircraft System will be maintained in a condition for safe operation while conducting operations in the NAS. The proponent has made its own determination that the unmanned aircraft is airworthy. The unmanned aircraft system must be operated in strict compliance with all provisions and conditions contained in the Airworthiness Safety Release, including all documents and provisions referenced in the COA application.

C. Operations.

1. The UA must be operated within visual line of sight (VLOS) of the Pilot in Command (PIC) and the person manipulating the flight controls at all times unless otherwise specified in a Special Provision. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses. Although the remote PIC and person manipulating the controls must maintain the capability to see the UA, using one or more Visual Observers (VO) allows the remote PIC and person manipulating the controls to conduct other mission-critical duties (such as checking displays) while still ensuring situational awareness of the UA.
2. Must yield right of way to other aircraft, manned or unmanned.
3. First-person view camera cannot satisfy “see-and-avoid” requirement but can be used as long as the visual requirement is satisfied in other ways.
4. Minimum visibility of 3 statute miles from control station.
5. No person may act as a remote pilot in command or VO for more than one unmanned aircraft at one time unless otherwise authorized as a separate provision.
6. No operations from a moving vehicle or watercraft unless the operation is over a sparsely populated area and the PIC and VO are co-located.
7. Lost link must remain within visual line of sight of the PIC and VO.
8. The remote pilot in command must:
 - a. Make available to the FAA, upon request, the small UAS for inspection, and any associated documents/records required to be kept under the rule.
 - b. Conduct a preflight inspection, to include specific aircraft and control station systems checks, to ensure the small UAS is in a condition for safe operation.
9. The remote pilot in command may deviate from the requirements of this rule in response to an in-flight emergency.
10. Tethered Operations must adhere to the Obstruction Marking and Lighting Requirements of AC No:70/7460-1L. Standards for marking and lighting obstructions that have been deemed to be a hazard to navigable airspace.

D. Notice to Airmen (NOTAM).

1. A Distant (D) NOTAM must be issued prior to conducting UAS operations not more than 72 hours in advance, but not less than 24 hours for UAS operations prior to the operation for routine operations. This requirement may be accomplished:
 - a. Through the proponent's local base operations or (D) NOTAM issuing authority, or
 - b. By contacting the NOTAM Flight Service Station at 1-877-4-US-NTMS (1-877-487-6867). The issuing agency will require:
 - (1) Name and contact information of the pilot filing the (D) NOTAM request
 - (2) Location, altitude and operating area
 - (3) Time and nature of the activity.
2. The area of operation defined in the (D) NOTAM must only be for the actual area to be flown for each day defined by a point and the minimum radius required to conduct the operation.
3. Operator must cancel (D) NOTAMs when UAS operations are completed or will not be conducted.
4. For first responders only. Due to the immediacy of some emergency management operations, the (D) NOTAM notification requirement may be issued as soon as practical before flight and if the issuance of a (D) NOTAM may endanger the safety of persons on the ground, it may be excluded. If the (D) NOTAM is not issued, the proponent must be prepared to provide justification to the FAA upon request.

E. Reporting Requirements

1. Documentation of all operations associated with UAS activities is required regardless of the airspace in which the UAS operates. NOTE: Negative (zero flights) reports are required.
2. The Proponent must submit the following information on a monthly basis through the COA Application Processing System (CAPS):
 - a. Name of Proponent, and aircraft registration number,
 - b. UAS type and model,
 - c. All operating locations, to include city name and latitude/longitude,
 - d. Number of flights (per location, per aircraft),
 - e. Total aircraft operation hours,
 - f. Takeoff or landing damage, and
 - g. Equipment malfunction. Required reports include, but are not limited to, failures or malfunctions to the:
 - (1) Control station
 - (2) Electrical system
 - (3) Fuel system
 - (4) Navigation system
 - (5) On-board flight control system

(6) Powerplant

- h. The number and duration of lost link events (control, performance and health monitoring, or communications) per UAS, per flight.

3. Incident/Accident/Mishap Reporting

- a. The proponent must provide initial notification to the FAA via email at mail at 9-AJV-UASOrganization@faa.gov and via the CAPS forms (Incident/Accident) within 24 hours of an incident or accident that meets the following criteria:

(1) All accidents/mishaps involving UAS operations where any of the following occurs:

- (a) Fatal injury, where the operation of a UAS results in a death occurring within 30 days of the accident/mishap

(b) Serious injury, where the operation of a UAS results in:

- Hospitalization for more than 48 hours, commencing within 7 days from the date of the injury was received;
- A fracture of any bone (except simple fractures of fingers, toes, or nose);
- Severe hemorrhages, nerve, muscle, or tendon damage;
- Involving any internal organ; or
- Involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface.

(c) Total unmanned aircraft loss

- (d) Substantial damage to the unmanned aircraft system where there is damage to the airframe, power plant, or onboard systems that must be repaired prior to further flight

(e) Damage to property, other than the unmanned aircraft.

(2) Any incident/mishap that results in an unsafe/abnormal operation including but not limited to

- (a) A malfunction or failure of the unmanned aircraft's on-board flight control system (including navigation)

- (b) A malfunction or failure of ground control station flight control hardware or software (other than loss of control link)

(c) A power plant failure or malfunction

(d) An in-flight fire

(e) An aircraft collision involving another aircraft.

- (f) Any in-flight failure of the unmanned aircraft's electrical system requiring use of alternate or emergency power to complete the flight

(g) A deviation from any provision contained in the COA

(h) A deviation from an ATC clearance and/or Letter(s) of Agreement/Procedures

(i) A lost control link event resulting in

- Fly-away, or
 - Execution of a pre-planned/unplanned lost link procedure.
- b. Initial reports must contain the information identified in the CAPS Accident/Incident Report.
 - c. Follow-on reports describing the accident/incident/mishap(s) must be submitted by providing copies of proponent aviation accident/incident reports upon completion of safety investigations.
 - d. The above procedures are not a substitute for separate accident/incident reporting required by the National Transportation Safety Board under 49 CFR §830.5.
 - e. For other than Department of Defense operations, this COA is issued with the provision that the FAA be permitted involvement in the proponent's incident/accident/mishap investigation as prescribed by FAA Order 8020.11, Aircraft Accident and Incident Notification, Investigation, and Reporting.

F. Registration

The proponent must comply with the aircraft registration and marking requirements set forth in 14 CFR Parts 47 and 45, or Part 48, prior to conducting flight operations authorized by this COA. Title 49 United States Code (49 USC) sections 44101 through 44104 contain the laws requiring aircraft registration in the United States.

G. Night small UAS Operations

Small UAS operations may be conducted at night, as defined in 14 CFR § 1.1, provided:

1. All operations under the approved COA must use one or more VO's);
2. Prior to conducting operations that are the subject of the COA, the PIC and VO must be trained to recognize and overcome visual illusions caused by darkness, and understand physiological conditions which may degrade night vision. This training must be documented and must be presented for inspection upon request from the Administrator or an authorized representative;
3. The sUA must be equipped with lighted anti-collision lighting visible from a distance of no less than 3 statute miles. The intensity of the anti-collision lighting may be reduced if, because of operating conditions, it would be in the interest of safety to do so. Additionally, in order to comply with § 91.209, the aircraft must have position lighting that enables determination of location altitude, attitude, and direction of flight.

H. Minimum Safe Altitude Operations

A waiver from the requirements of 14 CFR 91.119(b) and (c) is approved as follows:

1. The groundspeed of the small UAS must not exceed 100 mph/87 knots.
2. Except for those operations where it is necessary to safeguard human life, no person may operate a small unmanned aircraft over a human being unless that human being is:
 - a. Directly participating in the operation of the small unmanned aircraft; or
 - b. Located under a covered structure or inside a stationary vehicle that can provide reasonable protection from a falling small unmanned aircraft

Note: People “directly participating in the operation of the small unmanned aircraft” may include qualified non-crewmembers, as defined in 49 USC 40125.

3. For those operations where it is necessary to operate over a human being in order to safeguard human life, the remote pilot in command must not operate any lower or in proximity to human beings necessary to accomplish the operation.

I. Special Use Airspace

1. Coordination and de-confliction between Military Training Routes (MTR) and Special Use Airspace (SUA) is the operator’s responsibility. When identifying an operational area the operator must evaluate whether an MTR or SUA will be affected. In the event the UAS operational area overlaps an MTR or SUA, the operator will contact the scheduling agency as soon as practicable in advance to coordinate and de-conflict. Approval from the scheduling agency is required for regulatory SUA, but not for MTR’s and non-regulatory SUA. If no response to coordination efforts, the operator must exercise extreme caution and remain vigilant of all MTRs and/ or non-regulatory SUAs.
2. Scheduling agencies for MTRs are listed in the Area Planning AP/1B Military Planning Routes North and South America. If unable to gain access to AP/1B contact the FAA at email address <mailto:9-AJV-115-UASOrganization@faa.gov> with the IR/VR routes affected and the FAA will provide the scheduling agency information. Scheduling agencies for SUAs are listed in the FAA JO 7400.10.

AIR TRAFFIC CONTROL SPECIAL PROVISIONS

A. Coordination Requirements.

Proponent filing a (D) NOTAM prior to commencing UAS operations will serve as sufficient notification to D01 about operations conducted under this authorization. Cancellation of the NOTAM will serve as notification to D01 of completion of flight in accordance with this provision.

B. Communication Requirements.

The PIC must be accessible for direct real-time communication and coordination purposes for the duration of UAS operations. Direct real-time coordination information, to include primary and backup methods, as well as the name of a point of contact must be provided in the NOTAM when filed or upon initial coordination with the affected ATC facility.

C. Procedural Requirements.

The operating area is located within the DEN 30 NM Mode C veil. The required coordination in these ATC Special Provisions, in conjunction with operations area location and altitude of operations is an acceptable mitigation of 14 CFR 91.215 requirements concerning the absence of a Mode C transponder.

D. Emergency/Contingency Procedures.

1. Lost Link Procedures: In the event of a lost link for more than three seconds, the UAS will return to the launch point and land.
2. Fly-Away Procedures:
 - a. In the event of an emergency, the PIC must immediately notify D01, state the nature of emergency and pilot intentions.
 - b. In the event of a fly-away toward an area or airport where the PIC has determined the UAS may create a hazard to aviation or persons on the ground, the PIC will immediately notify D01 at **303-342-1590**. The PIC will provide the following information:
 1. Direction of flight
 2. Last know altitude
 3. Maximum remaining flight time

AUTHORIZATION

This Certificate of Waiver or Authorization does not, in itself, waive any Title 14 Code of Federal Regulations not specifically stated, nor any state law or local ordinance. Should the proposed operation conflict with any state law or local ordinance, or require permission of local authorities or property owners, it is the responsibility of the proponent to resolve the matter. This COA does not authorize flight within Temporary Flight Restrictions, Special Flight Rule Areas, regulatory Special Use Airspace or the Washington DC Federal Restricted Zone (FRZ) without pre-approval. The proponent is hereby authorized to operate small Unmanned Aircraft System in the NAS within the areas defined in the Operations Authorized section of the cover page.

Operating Location

Class G Airspace
At or below 80 feet AGL



