Southern Illinois University
Small Unmanned Aerial Systems / Unmanned Aerial Vehicles
sUAS / UAV Operating Standards

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Table of Contents:

01.00 -- Authority:

These “Operating Standards” reflect the operating authority granted to the University by the FAA regulations Part 107. The University may, from time to time, request and be granted waivers that would include specific operating parameters that might be in conflict with these Operating Standards. The parameters and permissions granted by such waivers should be considered as amended to these Operating Standards and applicable only to the project for which the waiver was granted by the FAA.

02.00 -- Introduction:

These Operating Standards are intended to promote the safe, efficient, and lawful operation of small unmanned aerial systems (sUAS) / unmanned aerial vehicles (UAV) on University property, and the operation of any sUAS / UAV operated on behalf of the University. Safety is the primary concern in each sUAS / UAV flight, regardless of the nature of the flight.

It is not the intent of these Operating Standards to circumvent or supersede regulations for UAV operations as promulgated by the Federal Aviation Administration (FAA). In any situation where federal, state, or other University regulations or policies and these Standards disagree, the more restrictive shall apply.

The Operating Standards are not intended to be all-inclusive, but to be used as a supplement to other institutional guidelines, FAA regulations, aircraft manufacturers’ approved flight manuals, approved operating manuals, service manuals, etc.

The Operating Standards have been written to address operations as they exist when the Standards were drafted. These standards and operating parameters will be modified as necessary to meet changing regulations.

A copy of the Operating Standards (electronic and/or paper) must be made available to every person having operations responsibilities.

It shall be the responsibility of every person involved in a sUAS / UAV related project to make every effort not to violate a person's reasonable expectation of privacy when operating the flight hardware and to operate safely. When operating the equipment in question, the Pilot-in-Command / Remote Pilot-in-Command will abide by all FAA Regulations and University Operating Standards for flight.

In general, these Operating Standards apply to any sUAS / UAV operation, whether conducted indoors or outdoors, on University property or on behalf of the University at any location. See the section on Indoor Use of UAS for more details.

For purposes of these Operating Standards and the University’s policy all sUAS / UAV must meet the definition of Small Unmanned Aircraft, as determined by the FAA regulations, and as may be amended by the FAA.

03.00 -- Definitions:

AGL	Above Ground Level.
ARP	Airport Reference Point.
ATC	Air Traffic Control.
CFR	Code of Federal Regulation.
Drone	The generic term for “Quad-Rotor”, “Flight Hardware”, “Drone”, “UAV” can and will be used interchangeably.
D-NOTAM / NOTAM	Drone-Notice to Airman / Notice to Airman.
e-CFR	Electronic Code of Federal Regulations.
FAA	Federal Aviation Administration or Administration.
FAR	Federal Aviation Regulation.
Flight Personal	Pilot, Visual Observer, Equipment Operator (if present) responsible for direct control of the operation.
Flight Hardware	The hardware (remote controllers, monitor screens, the actual UAV, batteries, related equipment) needed to conduct a flight. The term can and will be used interchangeably with sUAS / UAS.
FSDO	Flight Standards District Office.
GLONASS	Global Navigation Satellite System – the Russian satellite location system.
GPS	Global Positing System -- the American satellite location system.
Groundspeed	The speed of any operating aerial vehicle (either manned or unmanned) if it was traveling at speed at ground level.
Guest	Any person(s) who has an interest in the Project (e.g., funding agency representative, SIU administrator, etc.) and is approved by the Project Director (PD) or Pilot-In-Charge (PiC) to observe the UAS / UAV operations, but is not considered to be a trained observer. A guest is not required to meet the qualifications of a Participant.
NAS	National Airspace System.
NM	Nautical mile.
Nonparticipating Persons	Persons not participating in flight operations.
TFR	Temporary Flight Restrictions.
NOTAM	Notice to Airman.
NTSB	Nation Transportation Safety Board.
Operator	The person or entity responsible for the overall aircraft and may include maintenance, general operations, specific procedures, selecting properly trained and certified flight crewmembers, etc. For purposes of these Operating Standards, the University is the operator of all UAS / UAV flight hardware that are flown on behalf of the University, whether flown on University or non-university property.

Operational Occurrence Reporting (OOR)	The identification of all hazards related to any operation, either real or perceived, is one key

	related to safety. An OOR is a "protocol" that should be used without hesitation to report any anticipated, current, or experienced safety hazard, or occurrence to those responsible for the operation in question.
Part 107	The Federal Aviation Administration Regulation that governs the use of remotely controlled Small Unmanned Aircraft Systems (sUAS) – more formally known as "Title 14 (Aeronautics and Space), Chapter1, Subchapter F, Part 107".
Participating Person(s) / Participant(s)	Person(s) that are participating in flight operations other than the PIC and VO.
PIC / RPIC	(Remote) Pilot In Command.
Project Director (PD)	The individual responsible for the design and conduct of the entire project for which the UAS / UAV is to be used.
Project Application:	The documentation / paperwork that is filled out to record various aspects a project.
Quad-rotors (aka drones)	The "original" classification of the flight hardware more commonly refer to as "Drones" or "UAV"s.
RC	Remote Control.
SIUC / SIU	Southern Illinois University, Carbondale / Southern Illinois University.
Sortie	The word sortie is a military term related to the execution of a mission. It has migrated to civilian use in reference to a project or task involving aircraft.
sUAS / UAS / UAV	Small Unmanned Aerial Systems / Unmanned Aerial Systems / Unmanned Aerial Vehicle.
UAS Coordinator	Institutional official, or his/her designee, responsible for the administration of the University's UAS policy and approval process.
UAS Operations	The totality of the activity for which the UAS / UAV will be used and all parameters controlling that use, including location, type of aircraft, persons involved, permits required, etc.
UAS Operator	The University is recognized as the operator for purposes of its responsibility to the FAA.
University property	Any property owned or controlled by the University or a legal affiliate of the University (e.g., leased property).
VLOS	Visual Line Of Site.
VO	Visual Observer -- A trained person who assists the unmanned aircraft pilot-in-command in the duties associated with collision avoidance. This includes, but is not limited to, avoidance of other traffic, clouds, obstructions, terrain, etc.

04.00 -- University UAS Operation Policy:

SIUC's small Unmanned Aircraft Systems (sUAS) / Unmanned Aerial Vehicles (UAV) policy was implemented to protect the safety and privacy of faculty, staff, students, visitors, the community at large; and to protect University buildings and property. Additionally, it addresses liability, insurance, and regulatory concerns while facilitating the use of UAS technology for research, teaching, business operations and outreach activities. The policy applies to all faculty, staff, students, University contractors and visitors.

Recreational Use: The use of a sUAS / UAVs in, on, or above University owned, rented, or leased facilities by any person for recreational purposes is strictly prohibited.

For those who want to operate a sUAS / UAV for research, teaching, business operations, and / or outreach activities in, on, or above SIUC properties, an application must be submitted to the Plant and Service Operations UAV Coordinator for approval or denial. To initiate the application process, please contact PSO.

This policy applies to the use of sUAS / UAV indoors and /or outdoors on all University leased or owned property. Additionally, it apples any time the sUAS / UAV is used for University business on non-University property.

The University policy prohibits the operation of an UAS / UAV on University property, or in the conduct of University business, unless the Project Director has obtained approval for the operation by application through the University process from the UAV Coordinator. Please contact PSO for further information.

05.00 -- University Approval for UAS Operations:

To obtain an approval for UAS / UAV operations:

05.01	*Complete a Southern Illinois University Carbondale Unmanned Aircraft Systems (sUAS)/ Unmanned Aerial Vehicle (UAV) Project Use Application and relevant attachments.*
05.02	Submit the application to Plant and Service Operations / UAS Coordinator for project approval or denial.
05.03	*Complete a Southern Illinois University Carbondale Unmanned Aircraft Systems (sUAS)/ Unmanned Aerial Vehicle (UAV) Registration Form and relevant attachments.*
05.04	Submit the registration to Plant and Service Operations / UAS Coordinator.
05.05	Assure that the operation of the sUAS / UAV will meet all FAA requirements and the University Operating Standards.

All sUAS / UAV operations must occur within the parameters of the project as described within the internal application and are subject to limitations imposed by the FAA regulations. UAS / UAV operations are also subject to the General Operating Parameters, regardless of where such operations will occur. The most current version of the University application and checklist must be used to apply for approval. The current version of the forms should be obtained.

06.00 -- General Operating Parameters:

Regardless of institutional policy and practice, all sUAS / UAV operations must be conducted according to the current Federal Aviation Administration (FAA) regulations. Additional restrictions may be placed on operations by FAA regulations and University policy.

Subsequent waivers granted to the University by the FAA may allow different operating parameters. Project Directors (PD) and the Pilot-In-Charge (PiC) should check with the UAS Coordinator for details of any operation restrictions.

06.01	Operations are limited to the UAV that is approved by the University. Generally, these must weigh less than 55 pounds including payload. Proposed operations of any other aircraft will require a new application using the internal sUAS / UAV approval process.
06.02	The UAV may not be operated at a speed exceeding 87 knots (100 miles per hour) or no greater than the maximum operating airspeed recommended by the manufacturer.
06.03	The UAV must be operated at an altitude of no greater than 400 feet above ground level (AGL) or 400 feet above the uppermost limit of a structure, if the UAV is flown within a 400 foot radius of the structure.
06.04	The UAV may be operated anywhere within the United States except for designated restricted airspace, international airspace, and other areas where the FAA prohibits such operations.
06.05	The UAV must be operated within visual line of sight (VLOS) of the Pilot-In-Command / Remote Pilot-in-Command (PiC / rPiC) or a Visual Observer (VO) at all times. This requires the PIC and VO to be able to use human vision unaided by any device other than corrective lenses. A first-person view camera cannot be used to meet the VLOS requirement. Minimum flight visibility, as observed from the remote control point must be no less than 3 miles.
06.06	A visual observer may be used to satisfy the VLOS requirement as long as the PiC is in communication with the VO. The VO and PiC must be able to communicate effectively at all times. The PiC must ensure that the VO can perform his/her duties. If effective communications *cannot be established and maintained* between the PiC and the VOs, the PiC must be able to see the UAV or terminate the current operation in question**.**
06.07	The PiC must be designated before the flight and cannot transfer his or her designation for the duration of the flight.
06.08	The UAV operating documents and other documents that detail the University's policies and requirements for UAS / UAV operations must be accessible by the PIC and other project participants during UAS / UAV operations. It is recommended that the relevant documents be printed out and kept with the flight hardware in question for accessibility.
06.09	The PiC must follow the procedures as outlined in the operating documents. Flight parameters of the particular activity for which the UAS is used cannot supersede the restrictions of the operating documents or these Operating Standards, except in an emergency.
06.10	Any UAS / UAV that has undergone maintenance or alterations that affect the UAS / UAV operation or flight characteristics (e.g., replacement of a flight critical component) must undergo a functional test flight prior to conducting actual operations.
06.11	Functional test flights may only be conducted by a PiC, with a visual observer, and must remain at least 500 feet from other people. The functional test flight must be conducted in such a manner so as not to pose an undue hazard to persons and property. See the section on Logs / Record Keeping for documentation requirements.
06.12	The PiC is responsible for maintaining and inspecting the UAS / UAV to ensure that it is in a condition for safe operation.
06.13	Prior to each flight, the PiC must conduct a pre-flight inspection and determine the UAV is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, e.g., inoperable components, items, or equipment. If the inspection reveals a condition that affects the safe operation of the UAV, the aircraft is prohibited from operating until the necessary maintenance has been performed and the UAV is

	found to be in a condition for safe flight. The pre-flight inspection must be documented.
06.14	The PiC must follow the UAS manufacturer's maintenance schedule; overhaul schedule, replacement schedule, inspection schedule, and life limit requirements for the aircraft and aircraft components.
06.15	Each UAV must comply with all manufacturer safety bulletins.
06.16	A PiC must hold credentials accepted by the FAA for the operation of an UAV. The PiC must have experience in operating the make and model of the UAV that he/she will control during any UAV Project.
06.17	The Project Director may not permit any PIC to operate unless the PiC demonstrates the ability to operate safely the UAS in a manner consistent with how the UAV will be operated, including evasive and emergency maneuvers and maintaining appropriate distances from persons, vessels, vehicles and structures. Flights for the purposes of training the PiC and VO (training, proficiency, and experience-building) and determining the PiC's ability to operate safely the UAV in a manner consistent with how the flight hardware will be operated are permitted. However, training operations may only be conducted during dedicated training sessions. During training, proficiency, and experience-building flights, all persons not essential for flight operations are considered non-participants, and the PiC must operate the UAV with appropriate distance from non-participants in accordance with these Operating Standards.
06.18	sUAS operations may not be conducted at night, as defined by the FAA. All operations must be conducted under visual meteorological conditions (VMC). Flights under special visual flight rules (SVFR) are not authorized.
06.19	The UAV may not operate within 5 nautical miles (nm) of an airport reference point (ARP) as denoted in the current FAA Airport/Facility Directory (AFD). For airports not denoted with an ARP, the center of the airport symbol as denoted on the current FAA-published aeronautical chart, unless a letter of agreement with that airport's management is obtained or otherwise permitted by a waiver granted by the FAA. The letter of agreement with the airport management must be made available to the FAA representative or any law enforcement official upon request. The Control Tower of the airport must be notified of flights within the restricted airspace of the airport before any such flight can occur.
06.20	The UAV may not operate within 2 nautical miles of a heliport unless the agent in control of the heliport has been notified of the flight and expressly gives permission for such flight to occur.
06.21	The UAV may not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud.
06.22	For tethered sUAS / UAV operations, the tether line must have colored pennants or streamers attached at not more than 50 foot intervals beginning at 150 feet above the surface of the earth and visible from at least one mile. This requirement for pennants or streamers is not applicable when operating exclusively below the top of and within 250 feet of any structure, so long as the sUAS operation does not obscure the lighting of the structure.
06.23	If the UAS / UAV loses communications or loses its GPS signal, the UAS / UAV must return to a predetermined location within the controlled-access property.
06.24	The PiC must abort the flight in the event of unpredicted obstacles, weather, or emergencies.
06.25	The PiC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for the sUAS / UAV to conduct the intended operation and to operate after that for at least 5 minutes or with the reserve power recommended by the manufacturer if greater.
06.26	All aircraft operated in accordance with a University approved project must be marked with the FAA provided registration number per FAA guidelines.
06.27	Documents used to ensure the safe operation and flight of the sUAS / UAV and any documents required under Part 107 must be available to the PiC at the Control Station of the sUAS / UAV any time the aircraft is operating. These documents must be made available to any law enforcement official or FAA representative upon request.
06.28	The UAV must remain clear of, and give way to, all manned aviation operations and

	activities at all times.
06.29	The sUAS / UAV may not be operated by the PiC from any moving device or vehicle except when the entire flight of the UAS is over a sparsely populated area.
06.30	No flight operations may be conducted over non-participating persons, vessels, vehicles, and structures unless: Barriers or structures are present that sufficiently protect non-participating persons from the UAV and/or debris in the event of an accident. The PiC must ensure that nonparticipating persons remain under such protection. If a situation arises where nonparticipating persons leave such protection, flight operations must cease immediately in a manner ensuring the safety of non-participating persons. The PIC, visual observers, trainees or essential persons are not considered nonparticipating persons.
06.31	No operations shall be conducted over private or controlled-access property without written permission from the property owner/controller (which includes lessee, easement holder or right-of-way holder) or authorized representative. Permission must be in writing and indicate the date and time (or range of dates and times) during which the sUAS / UAV will be operated.
06.32	Any incident, accident, or flight operation that results in injury to any person or damage to any property, including the UAS / UAV aircraft, must be reported to the University UAS Coordinator immediately. Refer to the section on Emergency Protocols for further details.
06.33	All UAS / UAVs purchased with University or sponsored project funds must be inventoried and must be identified as University property according to University policy.

07.00 -- Property Control of University-owned UAS:

All University Owned sUAS / UAVs must be inventoried and will be tagged as a high-theft item. A barcode tag will be assigned and affixed to the equipment by Property Control.

An UAS / UAV valued at less than $100 must still be registered with the University via the internal application process.

An UAS / UAV valued at less than $100 must be clearly identified as property of Southern Illinois University.

The UAS Coordinator shall maintain a file for each sUAS / UAV and a copy of all manufacturs documentation on the airframe in question.

07.01 – FAA Registration of UAVs:

All sUAS / UAVs that are 0.55 lbs. or greater must be registered with the FAA. That registration number must be displayed clearly on the airframe in question. Each UAV will have its own FAA registration number. Sharing of a number between multiple UAVs will not be allowed.

Ultimately, if an UAV is greater than 0.55 lbs. in weight, it will be tagged with a FAA registration number and *a SIU property control number.*

08.00 -- Indoor Operation of Flight Hardware:

Although indoor flights of UAVs are not regulated by the FAA, such flights still require the same precautions for assuring the safety of participants and non-participants, as well as the protection of property. With the exception of operating standards that clearly relate to outdoor operations, the operating standards described herein apply to UAS / UAV operations in confined spaces such as buildings and netting-enclosures. The most significant departure from FAA regulations when flying a sUAS / UAV indoors is that the PiC need not meet the FAA licensing requirements. However, this does not alleviate the requirement that the PiC be familiar with, and trained on, the UAS / UAV and that the PiC be knowledgeable of the University Operating Standards. Regardless of whether the flight is conducted indoors or outdoors, the personnel conducting the UAS operation assumes the same responsibilities.

All pertinent precautions should be taken when flying UAS indoors, including, but not limited to:

- Pre-flight and post-flight inspections, including completion of checklists…
- Planning for the UAS / UAV activity…
- Recordkeeping (flight logs and maintenance logs)…
- Communication with Administration and reporting of incidents…
- Personnel training…
- Maintenance of the UAS / UAV and adherence to the manufacturer's operating manual…
- Employ all reasonable safety precautions…

09.00 – sUAS / UAV Project Operating Requirements:

It is the responsibility of all project personnel, regardless of title or position, to assure the safety of all persons and property in and around the flight area. All personnel should assume the role of visual observer by watching for obstacles, non-participants, changing weather conditions, mechanical issues with the sUAS / UAV, etc. that might adversely affect the flight. All personnel should take the responsibility to keep the PiC informed of anything that might jeopardize the safety of the operation.

09.01 -- Project Director:

Responsibilities:

09.01.01	Prepare a project design that meets the requirements of the Operating Standards.
09.01.02	Coordinate with the PIC and other project staff.
09.01.03	Assure that all University and other regulatory requirements are met before, during and after the project.
09.01.04	Prepare a project design that meets the requirements of the Operating Standards.
09.01.05	Communicate with other University departments as necessary, including Campus Police and local law enforcement before commencing and at the conclusion of an operation.

09.02 -- Remote Pilot-in-Command / Pilot-in-Command (rPiC / PiC):

Responsibilities:

09.02.01	Maintaining all training, flight and maintenance records.
09.02.02	Maintain contact with the FAA, local airports and heliports and notify airports and heliports of upcoming UAS flights as required by FAA regulations and/or letters of Agreement, and issue NOTAM as necessary prior to flights.
09.02.03	Evaluate airframes based on project needs.
09.02.04	Maintain operational control of the UAS at all times.
09.02.05	Assume responsibility for all parameters of the flight, safety of persons and property.

09.02.06	The PiC is directly responsible for, and is the final authority over the actual operation of the UAS / UAV flight hardware.
09.02.07	The PiC has absolute authority to reject a flight based on personnel safety or violation of FAA regulations.
09.02.08	The PIC is responsible for compliance with these Standards, University policy and procedure and FAA regulations.
09.02.09	The PIC's main duty during the flight of the UAS is to operate the UAS safely while accomplishing the goals of the flight.
09.02.10	**The PIC shall see-and-avoid any obstacle that will compromise safety during the flight.**
09.02.11	The PIC can only operate one UAS at any time.

The PiC must maintain the current required FAA credentials and qualifications and must be proficient on all sUAS / UAVs operated by the project. The PIC's primary duty is the *safe* operation of the UAS in accordance with the manufacturer's approved flight manual, FAA regulations, bulletins, TFRs, NOTAMS, METARS, University Operating Standards, etc.

09.03 -- Visual Observer:

Responsibilities:

09.03.01	Provide the PiC with the information necessary to operate safely the sUAS / UAV.
09.03.02	Be an observer for anything that may affect the PIC's ability to execute his/her responsibilities.
09.03.03	Visual observers shall alert PiC to any obstacle that will compromise safety during the flight.
09.03.04	The Project Director may serve as a VO, subject to the limitations of Operating Standards.
09.03.05	VOs shall remain alert for persons, property, vehicles, aircraft or other activities on the ground.
09.03.06	VOs shall not simultaneously operate any devices related to the operation, including cameras or sensors.
09.03.07	VOs shall assist the PiC in the main objective of safe operations of the sUAS / UAV.

Visual observers (VO) must have been provided with sufficient training to communicate clearly to the PIC any turning instructions required to stay clear of conflicting traffic, obstacles, non-project property, or persons. Visual observers will receive training on UAS operating rules and responsibilities, operating near other aircraft, right-of-way rules, cloud clearance, in-flight visibility. The Operating Standards pertaining to the use of alcohol or drugs, applies equally to the Visual Observers (VO).

The Project Director shall not serve simultaneously as a VO if he/she is also operating equipment attached to the UAS.

09.04 -- Other Project Participants:

These might include students, members of the public or other University personnel who are providing support to the project through data collection or analysis, site preparation, coordination with external parties (i.e., landowners, media), etc. Project Participants may operate the UAS / UAV attached equipment including cameras and sensing devices.

09.05 -- UAS Coordinator:

Responsibilities:

09.05.01	The UAS Coordinator will review / approve / deny the Project Use Application and maintain a file of all applications. Additionally, the UAS Coordinator will maintain such documentation as , FAA certifications, training records, etc. as well as records pertaining to each project on which a sUAS / UAS is employed.

10.00 – Communications with Administration:

Inquiries from the news media will be forwarded to Plant and Service Operations (PSO) and the UAV Coordinator.

Complaints or inquiries regarding UAS operations shall be referred to Plant and Service Operations (PSO) and the UAV Coordinator.

Any incidents or safety violations occurring before, during or after a UAS flight must be reported immediately to the UAS Coordinator, pursuant to the section on Operational Occurrence Reporting.

11.00 – Safety:

It is the duty of every participant within the project to contribute to the goal of continued safe operations. This contribution may come in many forms and includes operating in the safest manner practicable and never taking unnecessary risks. Any safety hazard, whether procedural, operational or maintenance related should be identified as soon as possible after, if not before, an incident occurs. If any project participant observes, or has knowledge, of an unsafe or dangerous act committed by another participant, the PIC is to be notified immediately so that corrective action may be taken.

11.01 – Operational Occurrence Reporting (OOR):

Occurrences are unplanned safety related events, including accidents and incidents that could affect safety. A hazard is something that has the potential to cause harm. The systematic identification and control of all major hazards is foundational to safety. An OOR provides a mechanism to report hazards and occurrences, real and perceived, to those responsible for UAS operations. There is no specific format for OOR as the information provided is what is important, not the format. The OOR protocol should be used without hesitation to report any anticipated, current, or experienced safety hazard, or occurrence. Further, an OOR can be submitted anonymously without fear of reprisal. Every hazard and/or occurrence will be investigated, with the results and corrective action taken communicated to all participants. The investigation will be conducted by the UAV Coordinator. The services of an independent subject matter expert may be necessary in some cases to assure a thorough and complete investigation.

Hazards requiring immediate attention will be brought to the attention of the Project Director, PIC or their direct supervisor, immediately. All participants are authorized to take action to report and correct a hazard if, in that participant's opinion, will result in accident or injury.

In regards to safety, all participants of the UAS project are responsible for the following

11.01.01	Ensuring all flight operations personnel understand applicable regulatory requirements, standards and organizational safety policies and procedures.
11.01.02	Observe and control safety systems by monitoring all operations.
11.01.03	Review standards and the practices of personnel as they impact operational safety.
11.01.04	Communicate all reported safety related problems and the corrective action taken. If there were any in-flight problems (or learned experiences), the proper procedures for handling that problem should be discussed.
11.01.05	**Copy and circulate pertinent safety information.**
11.01.06	Copy and circulate emergency safety bulletins related to the UAS or the operating area

11.02 – Medical Factors:

The Project Director, PIC and visual observers shall only deploy the UAS when rested and psychologically prepared for the tasks at hand. Physical illness, exhaustion, psychological problems, etc., can seriously impair judgment, memory and alertness. The safest rule is not to act as an UAS project participant when suffering from any of the above. Participants are expected to "stand down" when these problems could reasonably be expected to affect their ability to perform flight duties.

All participants shall make a self-assessment of physical condition during pre-flight activities. Performance can be seriously hampered by prescription and over the counter drugs. The Project Director and PIC will be advised anytime such drugs are being taken. If it is determined that the medication being taken could hamper a PIC or visual observer, that participant shall be prohibited from the deployment or exercise.

No individual shall act as a participant within eight hours after consumption of any alcoholic beverage, while under the influence of alcohol, or while having an alcohol concentration of 0.04 or greater (FAR 91.17).

12.00 – Training:

All participants will have a training plan on file with the Project Director that details the training that person has received. The UAS Coordinator may maintain additional training records. The PIC and Project Director will develop an approved training plan jointly before any flight. It is the Project Director's responsibility to verify the training file for all personnel contains all pertinent information.

Visual observers must have completed sufficient training to communicate to the pilot any instructions required to remain clear of conflicting traffic. This training, at a minimum, shall include knowledge of the rules and responsibilities described within these Operating Standards, as well as FAA rules. These rules include Operating Near Other Aircraft; Right-of-Way Rules, Basic VFR Weather Minimums; knowledge of air traffic and radio communications, including the use of approved ATC/pilot phraseology; and knowledge of appropriate sections of the Aeronautical Information Manual.

In conjunction with fulfilling all FAA requirements for PIC/visual observer duties, new participants will also become familiar with UAS operations, the aircraft and its equipment.

The resources at the website *Know Before You Fly* (knowbeforeyoufly.org) can be used for training and orientation of project participants.

12.01 – Safety Training:

All participants shall receive training in the following subjects prior to participating in a UAS project:

12.01.01	Operating Standards
12.01.02	UAS operation and maintenance
12.01.03	Safe operation of a UAS
12.01.04	FAA regulations
12.01.05	Emergency safety procedures.
12.01.06	sUAS / UAV participant's role in safety

12.02 – Recurrent Training:

All participants within the project shall maintain proficiency in their PIC/visual observer abilities. Participants who do not have any documented training or flight time within a span of two years will have to show proficiency before being a participant/visual observer during a project. Recurrent training is not limited to actual participant/visual observer skills but includes knowledge of all pertinent UAS matters.

Failure to prove proficiency can result in removal from UAS projects.

Participants are encouraged to attend, and forward information on, FAA sponsored safety seminars.

Training shall only be conducted at approved locations and follow the provisions within the University Operating Standards and FAA regulations.

13.00 – Flight Rules:

The PIC will have sole discretion for declaring safety or violation of FAA rules. If the PIC determines that a project's parameters would violate FAA rules or endanger non-participants or participants, then the PIC will inform the Project Director of the reasons for refusing to operate the UAS and contact the UAS Coordinator if necessary. The sUAS / UAV will not be flown in this circumstance and the authority of the PIC is absolute.

In making his/her determination, the PIC should evaluate not only technical parameters of the flight (condition of the UAS, weather, location, etc.), but also input from other project participants, particularly the visual observers.

13.01 – Flight Boundaries:

The FAA restricts University-approved UAS activities to project locations within the United States, except restricted airspace and other areas, such as major cities, international airways, etc. where the FAA prohibits UAS operations. At no time shall UAS be flown other than as allowed by the FAA pursuant to Part 107, unless a separate waiver has been obtained for that flight by the University.

13.02 – Minimum Personnel Requirements:

The minimum personnel for any flight will be no less than the PIC and at least one representative of the University, unless the PIC is also a representative of the University.

A visual observer shall be used during training.

13.03 – Personnel and Property Protection:

Given the public mission of the University and the need to be "good neighbors" during any project, all participants should take necessary measures to behave in a professional matter and take into consideration that all projects are subject to observation by non-participants and that there may be media present. All participants must identify themselves, their relationship to the University and the purpose of their activities when such information is requested.

It is advisable that, particularly for projects that will be conducted for an extended period in the same location, signage or other identifying information be prominently displayed. Signage might include the University logo or name, the contact information of the Project Director and a descriptive title of the project. Such signage does not alleviate the need to contact adjacent property owners or local public safety officials before commencing a project.

14.00 – Pre-Flight:

All participants are responsible for a thorough preflight inspection of the UAS. It is highly advisable that pre-flight, flight, and post-flight checklists are created to enable safety operations of the flight hardware.

14.01 – Inspections:

The pre-flight inspection should include identification of defects or inoperable components of the UAS, as well as:

14.01.01	Battery / fuel charge.
14.01.02	Establish a zero-altitude initiation point / set "home point" and confirm accuracy and calibration of the onboard GPS. Additionally, the operator shall confirm good radio connection between the flight hardware and the remote control.
14.01.03	Before and after each flight, the PIC shall conduct a thorough inspection of the UAS in accordance with the instructions contained in the manufactures user's manual. Any physical equipment malfunction that cannot be resolved on-site, and which have an impact on safety or the project, will override the flight. These issues will be resolved before commencing the operation in question.
14.01.04	Any issues found that would put in jeopardy the safe operation of the UAS shall be documented and resolved immediately prior to flight.

If a hardware discrepancy cannot be resolved in a reasonable amount of time, it is the responsibility of the Project Director (PD) or the Pilot-in-Charge (PiC) to make the decision not to fly the hardware in question until all discrepancies are resolved.

14.02 – Weather (WX):

Before each flight, the PIC will ensure that he/she gathers sufficient information to be familiar with the weather situation existing throughout the area of flight. It is advisable to have some type of weather tracking device (i.e., weather radio, cell phone based weather app) to monitor developing weather conditions.

An anemometer is recommended in order to better estimate the wind speed and determine if the current wind speed is within the capabilities of the airframe being flown.

The weather conditions for the operation shall be recorded in the flight log.

14.03 – Planning:

The participants shall familiarize themselves with all available information concerning the flight including, but not limited to, the goals and scope of work for the project, the weather conditions, potential hazards, etc. The PICs will ensure that the location for take-off and emergency landing is adequate for a safe flight.

The take-off/landing location should be clearly marked and identifiable with short cones, caution tape or other recognizable boundary markers.

At least one emergency landing area should be identified per flight.

Participants will ensure that they are aware of their surroundings in the event that an emergency landing is necessary. This includes the ability to recover the UAS.

14.04 – Checklists:

The PIC will utilize a pre-flight checklist(s) to ensure the highest level of safety for deployment. The use of a checklist is a significant method to combat sUAS / UAV accidents. A sample pre-flight checklist is provided as an attachment. This document can be adapted for use with any UAV enabled system. A similar post-flight checklist should be developed for the particular UAS and utilized after each flight.

It is recommended that various checklists be developed to assist in the preparation, flying, and post-flight stages of the operation. Additionally, a contingency checklist should be developed in case of an incident or accident occurs during actual flight operations. The following items are a suggestion for the development of various checklists. The preflight checklist that the operator / Pilot-in-Charge (PiC) / Project Director shall develop can include (but not be limited to):

Preflight -- Office:

14.04.01: INITIATE REQUEST:	Fill out Project Application / Project Tracking Sheet.
14.04.02: PREP WORK:	Prepare flight hardware per manufacture's recommendations.
14.04.03: PREP WORK:	Verify battery charge level – ensure all batteries for flight hardware, remotes, and monitors are fully charged. Charge as necessary.
14.04.04: PREP WORK:	Verify computer media as required.
14.04.05: PREP WORK:	Review proposed site to conduct safe operations: Google Earth? Site Visitation? Conduct prep work as required to ensure safe operations.
14.04.06: VERIFY:	Verify weather conditions for flight: Local Forecasts… METARs… 1 800 WX Briefs, etc…
14.04.07: VERIFY:	Verify NOTAMs / D-NOTAMs: Verify TFRs -- pilotweb.nas.faa.gov/PilotWeb/ (UAS entry)… tfr.faa.gov/… skyvector.com/ (map)… app.airmap.io (map)… app.classic.airmap.io (map)… dji.com/flysafe/geo-map (map)…
14.04.08: BRIEFING:	Conduct a pre-operation briefing to define operational specifics -- UAS Coordinator Project Director? Pilot-In-Charge (PiC)? Visual Observers (VO)? Participants? Site – Hazards? Camera – Sills / Videos? Discuss operation with upper management?
14.04.09: CONFIRMATION:	Confirmation entry for the distance from the project in question to operational fields are at allowable distances. Confirmation entry for all permissions have been obtained from property owners and that the necessary notifications have been made to law enforcement, air traffic control, and adjacent property owners (if necessary).

Preflight – Field Operations:

04.04.10: REVERIFY:	Prepare flight hardware per manufacture's recommendations.
14.04.11: REVERIFY:	Verify batteries are fully charged. Use fully charged batteries first. DO NOT use partially charged batteries *unless* it is of a short duration flight. Always keep in mind that using a partially discharged battery will mean shorter flight times.
14.04.12: REVERFY:	Verify computer media as required. Be sure that a microSD card is available for recording and mounted in the camera.
14.04.13: REVERIFY:	Verify weather conditions for flight: Local Forecasts METARs 1 800 WX Briefs, etc.
14.04.14: REVERIFY:	Verify NOTAMs / D-NOTAMs: Verify TFRs -- pilotweb.nas.faa.gov/PilotWeb/ (UAS entry) tfr.faa.gov/ skyvector.com/ (map) app.airmap.io (map) app.classic.airmap.io (map) dji.com/flysafe/geo-map (map)
14.04.15: PACK / TRAVEL TO SITE:	(pack for travel – per manufacture's recommendations) (travel to site)
14.04.16: CONTACT:	Contact local control tower (if necessary) -- 30 minutes minimum before flight execution for clearance to proceed.
14.04.17: CONTACT:	CONTACT SIU DPS-- 30 minutes minimum before flight execution (notification).
14.04.18: REVIEW:	Verify site for necessary changes to flight plan.
14.04.19: SETUP:	Prep UAV for flight (per checklist).
14.04.20: SETUP:	Confirmation entry that the assembly of the aircraft is correct in reference to the manufacture's assembly instructions.
14.04.21: SETUP:	Confirmation entry that the UAV meets all safety criteria (manufacture's, University's, FAA) before execution of flight
14.04.22: POWER:	Power up the remote control (per manufacture's recommendations) first before powering UAV.
14.04.23: OBSERVERS / PARTICIPANTS:	Place Observers / Participants as discussed.
14.04.24: POWER:	Power up UAV only after the remote control has completed its power-up sequence.
14.04.25: VERIFY:	Verify compass, GPS, IMU are all correctly calibrated – if not, calibrate per manufacture's instructions.
14.04.26: CONDUCT:	Conduct a test of flight hardware. Assure that the controller is connected to and controlling the UAV in question.

Flight Execution – Field Operations:

14.04.27: EXECUTE:	Conduct flight as discussed in preflight.
14.04.28: EXECUTE -- Flight Deviations:	Be aware of any conditions that will alter the flight as discussed. Verify site for necessary changes to flight plan.
14.04.29: EXECUTE – FLIGHT:	The PiC needs to announce to all non-participants that flight operations are commencing and to stay clear of the defined operational area.
14.04.30: EXECUTE – FLIGHT:	The PiC needs to be aware of all non-participants to ensure the UAV does not stray over someone. The PiC must fly at speeds less that 100mph. The PiC must remain below the flight ceiling of 400'. The only exception is flying over tall structures – the working limitation is *the PiC must be w/i 400' of the structure in question and no higher than 400' above the structure's highest point.* The PiC or the designated VO must keep the UAV in site at all times. The PiC must give way to all aircraft to avoid a collision.
14.04.31: TERMINATE – EMERGENCY CONDITIONS:	Emergency Procedures *(if necessary). Refer to Section 05: Emergency Procedures, Contacts, and Reporting.*
14.04.32 TERMINATE (Low Batter Warning):	Land UAV back at departure point as soon as possible.
14.04.33 REPEAT (As Necessary):	To continue flight until completed: Wait until rotors have spun down before approaching UAV Power UAV down first. Power Remote Control down next. Replace battery(ies) as needed. Visually inspect blades for damage -- replace as needed. Visually inspect UAV for damage. Terminate operations if UAV needs maintenance.
14.04.34: REPEAT (As Necessary):	(Return to step 14.04.23 to reinitialize the flight hardware – continue from that point forward).

15.00 – Post-Flight:

Post-flight activates essentially takes place at the end of an operation. However, it is recommended that a post flight checklist be developed to assist in preparing the sUAS / UAV for transport. Additionally, a routine should be develop in inspecting for damage and noting it in a "maintenance log". Additionally, a post-flight office level check should be developed to aid in the inspection and preparation of the flight hardware for its next flight. The following items are a suggestion for the development of various checklists. The preflight checklist that the operator / Pilot-in-Charge (PiC) / Project Director shall develop can include (but not be limited to):

15.01 – Checklists:

Post-Flight -- Field Operations:

15.01.01: TERMINATE:	Land UAV. Return to departure point if desired.
15.01.02: WAIT:	Wait until all rotors have spun down before approaching the UAV.
15.01.03: POWER:	Power down UAV first (per manufacturer's instructions) DO NOT power down remote until UAV *is completely powered downed.*
15.01.04: POWER:	Power down remote control (per manufacturer's instructions) only after UAV is completely powered down.
15.01.05: CONTACT:	Contact Control Tower (if contacted beforehand) -- 30 minutes maximum to inform of conclusion of flight activity.
15.01.06: CONTACT:	CONTACT DPS – 30 minutes maximum to inform of conclusion of flight activity.
15.01.07: INSPECT	Inspect the UAV for any maintenance-needed items and log accordingly before packing.
15.01.08: PACK:	Break down UAV per manufacture's recommendations.
15.01.09: PACK / TRAVEL TO OFFICE:	(pack for travel – per manufacture's recommendations) (return to office)

Post-Flight – In office wrap up and preparations for next use:

15.01.10: Flight Hardware Verification:	Verify battery charge level – test all batteries for flight hardware, remotes, and monitors for charge level and place on charge as necessary.
15.01.11: Computer media (micro SD card):	Remove micro SD card from camera gimbal. Place in computer and download files as desired. Prep card for next use by erasing all files from card, removing it from computer, and return it to the camera gimbal. Reformat card as necessary.
15.01.12: Fill out documentation logs:	Fill out *all required fields* in the UAV Flight Logbook: PSO UAV-01. (for each UAV, there should be a separate logbook / log file)
15.01.13: Fill out documentation logs:	Fill out *all required fields* in the UAV Maintenance Logbook: PSO UAV #01. (for each UAV, there should be a separate logbook / log file)
15.01.14: Fill out documentation logs:	Fill out *all required fields* in the UAV Operator's Logbook (for each UAV operator, there should be a separate logbook / log file)

15.02 – Recordkeeping – Flight Logs and Maintenance Logs:

The FFA *requires* various logs (documentation) to be kept on various aspect of sUAS / UAV usage and maintenance. Refer to *107.7 Inspection, testing, and demonstration of compliance* for further information. In an interesting observation, *there seems to be no "standard" log design for UAV operations.* However, as a "best practice" protocol, the following information will be tracked and logged to assure compliance with FAA regulations.

For each UAV, there shall be logs kept on its operation and maintenance. For each UAV used for any operation or at any time, information about the flight and maintenance shall be track separately.

15.02.01: UAV Flight Log	For operating a sUAS / UAV, the following information will be tracked: Date of operation… Operator (Pilot-in-Charge / Remote-Pilot-in-Charge)... Location (either in Latitude / Longitude, generic location address, or both)… Time of operation… Duration of operation (UAV flight time)… Weather conditions… Any pertinent notes… Additionally, the following can be included: A record of all participants / guests

Optionally, the operator can keep a personal "Operator Logbook" for himself / herself. In this case, the FAA does *not require* an operator to keep a personal logbook. However, the practice of keeping documentation on the flight operation you personally perform is highly recommended. The primary reason to keep a personal flight log is you will have your own copy of what operations you have performed and what flight hardware you have used. This will come in handy if you want the information to track the number of hours you have flown, what flight hardware you have used, or documentation for job prospects. Additionally, since it is possible there will be multiple operators of the same flight hardware, it makes sense to track your own work for future reference.

As with the flight log(s), the FAA does not present any design criteria for tracking data for your personal log. However, the following design seems to coincide with most information tracked by most operators.

15.02.02: UAV Operator's Log Book	For personal tracking of sUAS / UAV usage, the following information should be tracked: Date of operation… Purpose... Location (either in Latitude / Longitude, generic location address, or both)… Time of operation… Duration of operation (UAV flight time)… Weather conditions… Any pertinent notes…

Please note: this log appears very similar to the UAV Flight Log(s) used to track the usage of each individual UAV(s). In this case, it is tracking the flight hardware and time of your operations.

Additionally, a separate record must be maintained documenting:

15.02.03: Documentation:	Training of all project participants.
15.02.04: Documentation:	Correspondences with airports / heliports especially showing permissions / denials by airfields or heliports.
15.02.05: Documentation	Correspondences with property owners especially showing approval or denial for access to their property.
15.02.06: Documentation:	Records of any incident, citizen inquiry, or complaint received before, during or after the flight.

As with the flight log(s), the FAA does not present any design criteria for maintenance logs. However, the following log design seems to coincide with information tracked by most operators.

15.02.07: UAV Maintenance Log	For maintenance of a sUAS / UAV, the following information will be tracked: Date of applicable maintenance… Operator (Pilot-in-Charge / Remote-Pilot-in-Charge)... Maintenance Action Requested… Maintenance Action Taken… Any pertinent notes…

In this case, tracking the work needed and the work done to a UAV is stating what maintenance is needed (for example, new propeller blades) and what maintenance was performed.

There is very little "true maintenance" that is required for most battery operated UAV equipment. However, there are standard items *that must be check*ed before and after each use. Any damage or flight hardware discrepancies shall be noted and remedied as soon as possible. These issues *shall be noted* in the maintenance log as action needed / action taken items.

Essentially, there are two (02) types of maintenance for UAVs: either "scheduled" or "unscheduled".

> "Scheduled maintenance": Any required work that is performed on an UAV that is a reoccurring or is a scheduled event. Such occurrences that falls within this category can be considered preventative maintenance. Items include prop / blade replacement on a regularly scheduled basis. Additionally, regularly scheduled battery replacement falls under this category.
>
> "Unscheduled maintenance": Any required work on an UAV that falls outside of the scheduled maintenance routine. Such occurrences that falls within this category includes prop / blade failure in the field, battery failure, gimbal isolator replacement, or in the extreme case, hardware or motor failure. The last two being unrecoverable and would require return for repair at the appropriate service center or manufacture.

Either type of maintenance will be recorded in a "Maintenance Log". A maintenance logbook will be kept for each drone used in operations. All preformed maintenance on a UAV will be record as an action needed / action taken. As the logbook is updated digitally, a printout will be made. At all times, an up-to-date logbook will be kept with the UAV in question.

The sUAS / UAV manufacture may supply a maintenance schedule. If this is the case, the supplied maintenance schedule must be followed. Any work done on the flight hardware must be recorded in the maintenance log.

Flight logs and other records may be kept electronically (web- or computer-based) or in hard copy. It is the responsibility of the PIC to complete the necessary fight records. It is the responsibility of the Project Director to secure the log and to make it available for inspection.

The PIC is required to submit periodic reports to the UAS Coordinator in a timely manner, using the reporting format and process specified by the University.

16.00 – Emergency Protocols:

16.01: Avoidance

Unfortunately, operating a sUAS / UAV is *inherently dangerous.* It is unfortunate fact, there is very little an operator can do to recover from an incident once it starts. The best solution to operational incidents is avoidance in the first place. However, there will be a time where an incident will occur. It is the pilot-in-charge's responsibility to mitigate as best as possible.

Remember: DO NOT FLY OVER NON-PARTICIPANTS

16.01.01: Avoidance	Essentially, a pilot-in-charge (PiC) is responsible for accident avoidance. To that end, the PiC can "deviate" from any of the prescribed flight rules to "the extent necessary" to avoid an accident. Afterwards, if requested by the FAA, the PiC must provide a written report of the incident. Refer to *107.21 In-flight emergency for* more details.

16.02: Post Incident Protocol

The best possible outcome of an incident (for example a bird strike, flyaway, propeller blade breaks in mid-flight) is the UAV crashes and does not injury anyone or damages any property. The worst possible outcome is an out-of-control UAV severely injuring someone. Depending upon the severity of an incident, several actions may need to happen in short succession.

16.02.01: Terminate operations immediately	If the UAV is "flight-worthy", the PiC can elect to return to the operational landing site, land the UAV, and examine the UAV for damage.
16.02.02: Terminate operations immediately	If the UAV ***is not "flight-worthy" but "controllable"***, the PiC can elect to land the UAV ***immediately***, away from non-participants, buildings, etc.
16.02.02: Terminate operations immediately	If the UAV ***is in "uncontrollable-flight"***, not much can be done except for trying to steer the UAV away from non-participants, buildings, etc. I hope that there is enough control left to "crash" the UAV without damaging property or injuring anyone.

16.03: Post Incident Contacts

Actions that need to occur *immediately* will depend of the severity of the incident. If the UAV crashes into the ground, parking lot, lake, etc. without damaging any property, then no immediate action is necessary except contacting the university's UAV Coordinator. However, a report will need to be filed with the appropriate agencies. If someone was injured, 911, the local authorities, as well as the university must be contacted.

16.03.01: No injuries, no property damage, UAV crashes into tree – is damaged enough to require repair or replacement	Contact university officials – UAV Coordinator (SIU Legal)
16.03.02: If possible, secure and document	If possible, secure the area the UAV crashed. Record your impressions of the incident. Try to document eyewitnesses, if possible. Document (photograph) the UAV. If the UAV is unreachable, document its location, photograph as much as possible. Contact university officials – UAV Coordinator.
16.03.03: Injuries and / or property damage, UAV crashes and is damaged enough to require repair or replacement	**Contact 911, request assistance.** **Render assistance if possible.** **Contact university officials – UAV Coordinator. (SIU Legal)** **Cooperate with officials.**
16.03.04: If possible, secure and document	If possible, secure the area the UAV crashed. Record your impressions of the incident. Try to document eyewitness if possible. Document (photograph) the UAV. If the UAV is unreachable, document its location, photograph as much as possible. Contact university officials – UAV Coordinator.
16.03.05: Evidence	It is possible the local authorities will take the UAV for evidence. Cooperate and let them take it. Respectively request if you can photo document the crash area / flight hardware before authorities remove anything for your records, the university's records, the FAA, etc.

16.04: Post Incident Reporting

Reporting of accidents, as specified by the FAA in Part 107 (or in other regulations), shall be the responsibility of the University as the operator of the UAS, except in those circumstances where:

a. The PiC is a third party contractor, operating the UAS on behalf of the University; or
b. The PiC is a third party contract acting on their own behalf with an approved Project Use Application; or
c. The sUAS / UAV flight occurs on university or non-university property and it is not possible for the PIC or Project Director to report the accident to the UAS Coordinator. A report is to be given to UAS Coordinator as soon as possible.
d. Regardless of any previous reporting of accidents to the FAA, all accidents must be reported to the University UAS Coordinator as specified in these Operating Standards.

Contact the NTSB immediately:

16.04.01: Contact the NTSB Response Operations Center (ROC) 844.373.9922 (24 hour)	A written report may be necessary depending upon if the NTSB chooses to follow-up with an investigation. Not all UAV incidents will be investigated.

Contact the FAA no less than 10 days of the incident (the sooner, the better), and before any additional flights, the operator must contact the FAA (under the following conditions):

16.04.02: Contact the FAA FAA Regional Operations Center 817.222.5006 or FAA website https://faadronezone.faa.gov/ (login) or FAA Regional Office Springfield Flight Standard District Office (FSDO) 1250 North Airport Drive #1 Springfield Illinois 62707	**Serious injury** **Loss of conscience** **Death** **Damage to any property** **Damage to the UAV exceeds $500**

Although other information may be requested, the report should include the following items.

16.04.03: Report Information:	**Operator / PiC/ RPiC name and contact information** **FAA certification number** **sUAS / UAV registration number (FAA registration)** **Location of incident** **Date of incident** **Time of incident** **Person injured, extent of injury (if known)** **Property damage, extent of damage (if known)** **Description of incident**

17.00 – Miscellaneous:

17.01: Request for Waivers from Part 107

Any request for a waiver from the provisions of FAA Part 107 must be made via the University UAS Coordinator.

If there are any questions, please feel free to contact us at the number listed in the banner. Please ask for the UAV Coordinator or for one of the UAV Operators. We will be more than happy to help. It is our goal to help you to achieve your UAV program and operate safely.

Thank You
John Tracey Bennett
March 2018

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