Henry County Office of Emergency Management (HCOEM)

Standard Operating Procedures
and
Standard Operating Guidelines
for
Unmanned Aircraft Systems
(UAS)

Ver. 1.3

Definitions

AIRWORTHINESS: For the Unmanned Aerial System (UAS) to be considered airworthy, both the aircraft and all of the other associated support equipment of the UAS must be in a condition for safe operation. If any element of the systems is not in condition for safe operation, then the UA would not be considered airworthy.

COA: is an authorization issued by the Air Traffic Organization to a public operator for a specific UA activity. After a complete application is submitted, FAA conducts a comprehensive operational and technical review. If necessary, provisions or limitations may be imposed as part of the approval to ensure the UA can operate safely with other airspace users. In most cases, FAA will provide a formal response within 60 days from the time a completed application is submitted.)

FOUO: This category identifies information that is exempt from mandatory release under the provision of the Freedom of Information Act (FOIA). FOUO is not a security classification, it is protective marking /caveat. It is not classified according to Executive Order, but is exempt from disclosure to the public under exemptions 2 through 9 of the FOIA.

HENRY COUNTY OFFICE OF EMERGENCY MANAGEMENT (HCOEM) – the office responsible for providing incident support throughout Henry County.

INSPECTION: The routine performance of inspection tasks at prescribed intervals. The inspection must ensure the airworthiness of an aircraft up to and including its overhaul or life limits.

MODEL AIRCRAFT – Remote controlled aircrafts used by hobbyists, which are built, produced, manufactured and operated for the purposes of sport, recreation and/or competition. Model aircraft use is not regulated at the federal level and many UAS hobbyist belong to the Academy of Model Aeronautics, a professional association representing the interests of the hobby.

OFF-AIRPORT: Any location used to launch or recover an unmanned aircraft that is not considered an airport (i.e., an open field).

OPERATING AIRSPACE: All HCOEM UAS shall operate only in FAA Class "G" airspace (less than 1200 feet). Under normal conditions all HCOEM aircraft shall not exceed 300 foot above ground level.

PILOT IN COMMAND (PIC): The person who has final authority and responsibility for the operation and safety of flight, has been designated as pilot in command before or during the flight, and holds the appropriate category, class, and type rating, if appropriate, for the conduct of the flight. The pilot in command position may rotate duties as necessary with equally qualified pilots. The individual designated as PIC may change during flight.

PUBLIC AIRCRAFT: An aircraft operated by a public user which is intrinsically governmental in nature (i.e. federal, state, and local agencies). Examples of public entities are in Henry County are the Henry County Office of Emergency Management, Sheriff's Office, Fire Departments, Health Department and other local, state, and federal government agencies; and state universities. Refer to 14 CFR 1.1, *General Definitions*, for a complete definition of a public aircraft.

REQUIRED UAS FACT SHEET DATA – A Data sheet providing FAA specified data required for COA application. Each FAA approved UAS must have a System Fact Sheet on file with the Henry County Office of Emergency Management prior to deployment.

SCHEDULED MAINTENANCE (ROUTINE): The performance of maintenance tasks at prescribed intervals.

SUPERVISOR: Henry County Office of Emergency Management supervisors that are granted the authority by the Director to authorize UAS deployments are; the Director, Deputy Director, HazMat Lieutenant, Search and Rescue Lieutenant and Air Wing Lieutenant.

UAS FLIGHT CREW MEMBER – A pilot, observer, or other person(s) assigned duties for a UAS flight mission or training exercise.

UAS PILOT – A person exercising control over a UAS during flight. Same as PIC.

UNMANNED AIRCRAFT: A device used or intended to be used for flight in the air that has no onboard pilot. This includes all classes of airplanes, helicopters, airships, and translational lift aircraft that have no onboard pilot. Unmanned aircraft are understood to include only those aircraft controllable in three axes and therefore, exclude traditional balloons

UNMANNED AIRCRAFT SYSTEM (UAS) – The preferred industry definition of aircraft designed to navigate in the air without an on-board pilot. The authorization to use UAS is regulated by the Federal Aviation Administration (FAA).

Fixed wing – A flight system that uses a wing or wings that are fixed in a certain position to provide it with lifting force caused by forward movement. The force is determined by the forward speed and the wings' shape. It's the traditional type that you imagine when you think of a plane.

Single Rotor – A flight system utilizing a rotary wing called rotor blades to produce upwards lift by rotating along a mast. The change of direction is facilitated by changing the relative speed of the rotors. The most typical rotary type aircraft is the helicopter.

Multi-Rotor – A flight system utilizing multiple rotary wings (usually 4 or more) called rotor blades to produce upwards lift by rotating along a mast. The change of direction is facilitated by changing the relative speed of the rotors. The most typical multi-rotary type aircraft is the quad (4 blades) helicopter, but systems of 6, 8 or more rotor blades exist.

UNSCHEDULED MAINTENANCE (NON-ROUTINE): The performance of maintenance tasks when mechanical irregularities occur.

VISUAL LINE-OF-SIGHT: A method of control and collision avoidance that refers to the pilot or observer directly viewing the unmanned aircraft with human eyesight. Corrective lenses (spectacles or contact lenses) may be used by the pilot or visual observer.

VISUAL OBSERVER: A trained person who assists the unmanned aircraft pilot in the duties associated with collision avoidance. This includes, but is not limited to, avoidance of other traffic, clouds, obstructions and terrain.

VTOL – Vertical take-off and landing

Version Change Log

Version #	Date	Change	By
1	05/22/2014	1st Version provided to FAA	Ronald D. Huffman
1.1	05/27/2014	Updates as suggested by FAA representative Steve Pansky/SAIC	Ronald D. Huffman
1.2	08/07/2014	Addition of new House Bill 1009 and addition of Version Change Log	Ronald D. Huffman
1.3	12/04/2014	Changes to preflight check list	Ronald D. Huffman

Introduction

The Henry County Office of Emergency Management (HCOEM) has instituted an Unmanned Aircraft Systems program to aid in public safety, planning, mitigation, response and recovery operations in Henry County. We are working with the FAA to gain the proper documentation (COA) to meet the current standards. Within this program document are the rules and regulations that shall be followed to insure that the public trust is maintained along with providing a safe and effective program.

This document provides procedures for the usage and safe operation of Unmanned Aircraft (UA) in environments that they may be asked to participate in. While it is difficult to make a one size fits all document for the many different types, locations and missions that UAS may be flown, this should be considered the comprehensive guideline as of its printing. Further, not all of these instructions will apply to all situations, as always err to the side of safety.

Practical uses of Unmanned Aircraft

In today's ever changing world with ever decreasing budgets the cost of hiring a commercial manned aircraft is just not feasible for most incidents or events. The low cost, speed of deployment and information that a small UA provides could be the difference between life and death of responders or the public we serve.

UA's can be used to provide images after tornados that could considerably speed up the process of locating victims laying in a field, the identity of chemicals involved in a train derailment, aid in locating lost children and so much more.

Cost Benefit

The cost benefit of utilizing a UAS designed for public safety as compared to manned aircraft is substantial. It should be noted that UASs are not designed to take the place of manned aircraft when needed. The use of UASs would supplement the capabilities of response and planning agencies to provide enhanced services to the public and provide rapid deployment when needed.

According to the Association for Unmanned Vehicle Systems International (AUVSI), the average hourly cost of operating a UAS designed for public safety use ranges from $30 to $50. The cost associated with HCOEM unit is $0 per hour after there purchase (excluding maintenance and repairs). The cost of the HCOEM ready to fly UAS was less than $1,700. The cost of purchasing an emergency response owned (manned) aircraft could be in excess of $800,000. And this figure does not include personnel costs.

The cost to Henry County to use manned aerial services is something that has and most likely will not be budgeted for. The average hourly cost to operate aircraft can be little as over $100 per hour to over $1000.

According to our local airport plane rental starts at - $139.14 per hour and goes up from there.

Civil Air Patrol (CAP)

CAP can be activated by the County Emergency Operation Center directly and Col Reeves has sent us the following rates.

Wet Rates For IN WG Aircraft on Non-USAF Federal, State or Local Missions
Funded by External Agencies

IN WG Average Fuel Prices as of October 2013, Mx Rates Effective 1 July 2013

Aircraft Make/ Model	Minor Mx Rate	Fuel Burn/Hour	Fuel Cost/Gallon	Fuel Cost/ Hour	Cost Recovery Rate/Hour
C172	$59	10.0	$5.90	$59	$118
C182	$61	11.5	$5.90	$68	$129
GA8	$64	14.5	$5.90	$86	$150

Fuel Price **	$5.90

** Estimated Fuel Cost

National Guard

National Guard is a State Asset which is activated only by the Counties Emergency Operation Center contacting the State EOC and requesting specific assists. If the Executive Director activates the Guard it is because the State has approved the mission and the State would bear the costs. If it is a local mission only the requesting County is responsible for the mission costs, an example would be:

AVN – Rotary Wing (OH-58) Force Package Personnel – 3 (Pilot, Co-Pilot and Crew Chief) Equipment 1- OH58 (usually *24 Hour notice*)

Total for 4 Hour assignment $3,199.25

(This is simple Aerial Recon or Retransmission. Search and Rescue or AEROMEDEVAC is more.)

Community Engagement

The HCOEM being interested in integrating UAS technology in our operations shall actively engage our local communities in an effort to educate the public. Unfortunately due to extensive media coverage of military drone use, there is widespread fear of similar deployment tactics. Additionally, civil liberties organizations have concerns about violations of 4_{th} Amendment rights.

It's imperative that the use of UAS technology be as transparent as possible to ensure the community that the agency is in full compliance with all Local, State and Federal rules and Regulations. So how do we lay the publics fears to rest and promote a tool to help us protect and save lives, property and the environment.

- ❖ First we must document how we will acquire, manage and utilize this technology, including the costs, benefits and risks.
- ❖ Then we then plan to engage the community early in the planning process, including local governing bodies.

Full Disclosure

- ❖ All flights (except trainings) will be posted on our Facebook page at least 1 day prior

to non-emergency deployments to include:

- Where – General location (physical address)
- When – Date and Time
- Purpose – Reason for the flight (training, storm damage overview, planning, etc.)

❖ In the event of an emergency deployment the flight logs will be posted online as soon as reasonably possible.

Flight Log Retention and Availability

❖ All completed flight logs will be posted on our office website (www.henrycoema.org) within 48 hours of the flights termination.

   ❖ Any flight log that is not posted within the 48 hours period shall include an explanations as to why.

❖ All program files shall be available upon request (persons wishing to view flight logs must schedule a date and time with the HCOEM)

❖ Civilian observers are welcome to witness flight operations from a designated safe area.

We encourage the community to review and comment on agency procedures for the use of UAS. Transparency is the key to successful community support. For that reason, it is our intent to work with the local media to help facilitate community education and dialogue.

Unmanned Aircraft Systems Missions

Under the rules set forth by this document, Unmanned Aerial Systems cannot be used by the Henry County Office of Emergency Management for anything other than training and those specific uses listed below:

The use of HCOEM owned UAS's equipment shall be limited to:

Aerial Imagery for:

❖ CBRNE Incident (chemical, biological, radiological, nuclear, and explosives)
❖ Disaster Management, floods, tornado, ice storms, blizzard, etc.
❖ Reconnaissance before, during or after a natural or man made disaster/emergency to assist in planning and/or response operations.
❖ Missing Persons Search and Rescue including;

- Amber Alert (Children)
- Silver Alert (Senior)
- Other Missing children
- Missing persons with medical needs

Just like the football team that uses overhead images to identify a weakness in their defenses. Unmanned Aircraft are a valuable tool to assist local responders in planning and training before the need for an emergency response occurs. Identifying locations where persons could become trapped during the planning phase could be the key to providing live saving resources immediately after an incident.

Benefits to Pilot and Community Safety

Unmanned Aerial Systems (UAS) do not require a pilot on board to operate the UAS or attached equipment such as cameras, FLIR (forward looking infrared), etc. UAS operators remain safely on the ground reducing their exposure to threats. UASs are able to enter environments, which may be hazardous to pilots of manned aircraft. UASs provide superior situational awareness while minimizing the danger to which operators are exposed. UASs and trained operators minimize response time to most emergency situations compared to manned aircraft. They can be launched from a safe location within close proximity to the scene and provide quick information to incident commanders helping to save lives. UAS operators must always be in direct contact with incident command enhancing communication between command and air assets. For years Emergency Managers, incident commanders and the public at large had to depend on the media to provide an overview of the incident scene. Now with this technology we at the local level with a not so news worthy event can still have access to this resource.

Community safety is enhanced by the rapid response of air assets to an emergency. Many UASs can be launched within five minutes upon arrival at the scene. In most cases manned aircraft must take off and land at an airport under the direction of air traffic controllers, which can adversely or even delay response time. Our UAS is protected in a small case that can be carried in vehicles, thereby minimizing response time.

UASs come in two categories, vertical takeoff and landing (VTOL), and fixed wing. This allows for their use in different environments that may restrict the size of the launch area. VTOL may be launched and landed in a very limited space. At this time the HCOEM only possesses a single VTOL system.

Program Requirements/Operational Procedures

Documentation

- All flights will be approved by a supervisor and must be for a legitimate planning, public safety, and training or demonstration purposes. Supervisory authorization shall be documented in the flight log.

- An authorized supervisor will conduct a quarterly audit of all flight logs.

- A flight log which captures, pilot, ground crew, flight time, duration, date, authorization supervisory and reason for flight shall be maintained and available for inspection upon request.
  - The HCOEM standardized flight log shall be used.

- All UAS vehicles shall be painted in a high visibility paint or display high visibility markings if the construction of the UAS permits. Systems may also include visual devices such as lighting. This will facilitate line-of-sight control by the pilot and allow for easier ground monitoring.

- Unless restricted as For Official Use Only (FOUO) by Judicial Authorities, all flight logs, imagery and quarterly audits will be made available to the public to view in the Henry County Office of Emergency Management office.
  - All FOUO restricted flight documentation shall be delivered to the Judicial

Authority restricting it and all imagery shall be removed from all Henry County Office of Emergency Management systems and equipment.

- Equipping UAS with weapons of any kind is strictly prohibited.

- All UAS technology is equipped with "auto return" technology, which automatically returns the vehicle to the launch location if radio connectivity is lost.

- Emergency Management UAS equipment will only be operated by personnel, both pilots and crewmembers, who have been properly trained and certified competent in the operation of the system by the Director. All HCOEM personnel with UAS responsibilities, including supervisors, must complete training in the policies and procedures governing their use.

Disciplinary policy:

The rules set forth in this document shall be followed at all times. Unauthorized use of UAS technology by the anyone is strictly prohibited. Improper and or unsafe acts as identified in this document shall be investigated by a supervisor, documented and reported to the Director. The Director shall decide on the proper disciplinary action from the list below;

- Minor – Unsafe acts or causing damage to equipment
  - 1st minor infraction – meeting and oral reprimand
  - 2nd minor infraction – loss of privileges until the Director determines that the offender has received the proper training and written reprimand.
  - 3rd minor infraction – loss of PIC privileges for one year.
- Major – Any unauthorized use of UAS technology that violates the public trust.
  - All "Major" infractions shall be documented and submitted to the Henry County Sheriffs Office and Henry County Prosecutors Office and the offender shall loose all flight privileges until the Director has cleared them for flight operations.

Flight Operations
General

- Prior to take off all aircraft with a GPS location system shall be turned on and allowed to gather the necessary data to allow it to return to home if the signal is lost from the transmitter.

- When equipment with VTOL (Vertical Take-Off and Landing) capabilities are deployed to meet an approved mission task, it shall be recovered within the same general area if possible.

- Due to the nature of the program, launch and recovery operations may occur at many locations within the County. But no matter where they occur, the guidelines as identified here in remain the same.

- A designated safe area of at least 10 feet shall be maintained during lift off between UAS's and personnel

- UAS's should not be flown within unsafe distances to any object or person

- *Weather* –The PIC shall verify the weather conditions in the immediate area of operations. A local source of weather may be utilized, the internet, phone application or may be observed on site. The PIC shall have final determination of risk due to weather and authority over any mission.

- *Hazards to the public* – The PIC shall make every effort to ensure that flight operations will not pose any undue risk to the public not directly involved with the effort. The PIC shall have final determination of risk to the public and authority over any launch of his/her own aircraft.

- *Hazards to property* – The PIC shall make every effort to ensure that flight operations will not pose any undue risk to any property in the area involved with the effort. The PIC shall have final determination of risk to the property and authority over launch of his/her own aircraft

- *Hazards to personnel* – The PIC shall make every effort to ensure that flight operations will not pose any undue risk to the personnel directly involved with the effort. The PIC shall have final determination of risk to the public and authority over any launch of his/her aircraft

- *Proximity to controlled airspace* – The PIC shall ensure that all unreported operations take place at least one (1) mile from any controlled airspace. Operations inside any controlled airspace shall be performed with permission of, and in constant communication with, the controlling authority of the airspace. The PIC shall have final authority over launch after clearance has been granted by the controlling authority. The controlling authority maintains the right to abort any flight operation regardless of the stage that operation is in.

Launch and Landing Zones

Launch Site Selection

Launch site selection shall be driven by safety first and foremost. Selection of launch sites will be considered based upon:

1. Ability to maintain adequate buffer zones between aircraft and personnel The PIC shall

maintain a buffer of at least 25 feet for VTOL aircraft between aircraft operations and all non-essential personnel. Observers shall act as safety supervisors while not performing the duty of in flight observer.

2. Environmental Assessment
No launches shall occur until all environmental assessments have been considered. The PIC has the final authority to abort any launch based upon hazards to the environment, themselves, or other personnel in the area.

3. The PIC shall make every effort to select a launch site that minimizes departures over populated areas. If flights over populated areas must take place the PIC shall plan each flight to minimize the time in of areas of concern.

Landing site & Alternate landing sites

1. Primary Landing site
Typically the primary landing shall be the same as the launch site. The PIC has final authority for any approaches to the primary site and may wave off any approach deemed unsafe.

2. Alternate landing sites
The PIC shall designate at least one alternate landing site. In the event that the primary landing site is deemed unsafe, procedures to utilize the secondary site will be invoked.

3. Mission Abort Sites
The PIC may *optionally* designate an "abort site" whereby the aircraft may be "dumped" in an emergency situation. The abort site shall be so far removed as to provide absolute minimal risk should the aircraft be required to vacate airspace in an emergency. Should the PIC deem it necessary the UA may be flown to this site and inserted without regard to the safety of the aircraft or flight equipment.

4. Approaches over populated areas.
The PIC shall make every effort to select a landing site that minimizes approaches over populated areas.

5. Landing Safety & Crowd control
All landing sites shall be maintained and operated as the launch sites. Personnel shall maintain a buffer of at least 25 feet for VTOL aircraft between aircraft operations and all non-essential personnel.

Preflight, Takeoff, and Post flight Checklists

Primary Responsibility
Preflight activities shall be completed and verified by the PIC before takeoff, this is generally done upon arrival at the location where the operation is to be performed. The PIC shall conduct an area assessment and verify all actions performed on the aircraft before takeoff. These include inspection of aircraft, assessment of the operating location, coordination with other crew members involved in the operation, if one exists the incident commander and

equipment checkouts.

Mission Plan

The mission plan shall contain all actions and contingencies for the mission planned. Any limiting factors in the flight environment may alter the intended operation and modify the mission plan accordingly. Contingency planning should include safe routes in the event of a system failure, degraded performance, or lost communication link, if such a failsafe exists.

Pre-Flight Briefing

A discussion led by the PIC prior to aircraft launch which shall include but not be limited to:

1. Review of mission goals and methods to achieve goals, including handoff procedures.

2. Review of current and forecasted weather conditions and weather limitations on mission.

3. Review of current Notice to Airmen (NoTAMs) and Temporary Flight Restrictions (TFRs) that have been issued for the proposed flight area.

4. Identification of mission limitations and safety issues such as battery charge, GPS strength, and potential for radio interference.

5. Review of proposed flight area, including maximum ceiling and floor.

6. Review of communication procedures between PIC, Observer, Camera Operator, and other ground support, including the availability of two cell phones to communicate with Air Traffic Control in the event of a fly-away or other flight emergency.

7. Review of emergency/contingency procedures including aircraft system failure, flight termination, divert, and lost link procedures.

8. Review of required video or digital images.

9. Contents of the COA

10. Frequencies to be used.

11. Execution of a pre-flight check following the approved checklist.

Aircraft

1. General Airworthiness. The Air Wing Lieutenant shall be responsible for ensuring that the UAS is maintained and flight ready according to the manufacturer's recommendations and related industry standards. In addition, the Air Wing Lieutenant may rely upon the testing data and evaluation data provided by other government agencies, the aircraft manufacturer, and independent testing facilities.

2. Mission Specific Airworthiness. The PIC shall be responsible for ensuring that the UAS is airworthy prior to each mission. The PIC may rely upon the inspection and reports provided by agency personnel appointed with the responsibility for maintaining the UAS.

3. Radio Frequency. The UAS shall use the assigned radio frequencies and antenna equipment approved in the most current COA issued by the FAA.

4. Maintenance. The Air Wing Lieutenant is responsible for the maintenance of the UAS, which shall be performed by Aviation Unit pilots specifically trained on the maintenance of the UAS or by manufacturer certified representatives and personnel. The PIC and/or Observer shall perform a pre-flight and post-flight inspection of the UAS. Any equipment issues shall be entered in the aircraft's log and immediately reported to the Director. It shall be the responsibility of the Air Wing Lieutenant to determine whether the reported issues need to be corrected prior to the next flight, which will then be documented in the aircraft's log.

5. Software and hardware changes. All changes shall be documented in the unmanned aircraft logbook by persons authorized to conduct UAS maintenance. All previously proven systems, to include payloads, may be installed or removed as required for missions and documented in the appropriate aircraft log. Test flights must be conducted and documented after major changes in the hardware or software.

6. Storage Transport. The aircraft shall be stored in a secure manner to limit possible damage to the unit while in transit. The blades are to be folded into the blade holder on the boom of the helicopter and the full helicopter should be stored in the assigned aircraft case. The case top should be installed directly down on top of the helicopter and all latches secured prior to transport. Batteries must be transported in an appropriate container to prevent possible damage to the batteries. Batteries should not be dropped or punctured.

7. Battery Charge. Any components necessitating a charged battery shall be charged in accordance with manufacturer's recommendations. To the extent permissible by manufacturer's recommendations, the UAS shall be fully charged when not in use. The Lithium-ion Polymer (LiPO) batteries should be charged and stored in a cool and dry location. Because of the fire hazard risk, batteries should not be left unattended when charging at full or rapid charge (vs. trickle charging) and should be charged at the recommended amperage and not exceeded. If the LiPO batteries begin smoking or expanding (puffing) they should immediately be isolated for risk of explosion or fire. Never completely discharge LiPO batteries or they will become un-useable (i.e. unable to hold a charge).

Airframe

The airframe shall be given a thorough inspection thru the use of a checklist. The content of the checklist will be as follows:
1. Before the first flight of the day, verify all transmitter, on-board aircraft, and camera batteries are fully charged.
2. Check all control surfaces for signs of damage, loose equipment and overall condition.
3. Check the motor/engine and mounting system to make sure it is firmly attached to the airframe.
4. Check the propeller or rotor blades for chips, cracks, looseness and any deformation
5. Check the landing gear (if applicable) for damage, for secure attachment, and the wheels are in good shape and rotate freely (if applicable).
6. Check that the servos are firmly attached to the airframe and all receiver connections are secure.
7. Check all electrical connections making sure they are plugged in and secured to

the airframe.
8. Check that the photography equipment and mounting system are secure and operational.
9. Perform an overall visual check of the aircraft prior to arming any power systems.
10. Repair or replace any part found to be un-airworthy in the pre-flight prior to takeoff.

Flight Control/Ground station
1. Ensure there are no frequency conflicts with any other operating systems in the area.
2. Make sure that all of your body parts, clothing, other obstructions, and bystanders are well away from any propeller or rotor and its arc before turning power on to any systems. Make sure the aircraft is secure and will not move if the motor was suddenly powered up accidentally.
3. Announce out loud - "CLEAR PROP".
4. Turn on the transmitter. If it displays information such as aircraft memory and battery voltage, be sure these numbers are correct.
5. Make sure that the throttle stick on the transmitter is in the power off position.
6. Connect the battery and/or turn on the power switch to the aircraft.
7. Follow the recommended range test procedures as outlined in your radio transmitter/receiver owner's manual.
8. Check that all servos are steady and not chattering or making any other abnormal noise when in operation or idle.
9. Check the motor/engine for proper operation.
10. Ensure the triggering device is working correctly.

Before Take Off:
1. Confirm transmitter antenna is fully extended.
2. Confirm transmitter trims settings in proper position.
3. Confirm receiver antenna is fully extended.
4. Check that the take off area is clear of obstructions and people.
5. Double check weather conditions and review potential emergency landing areas.
6. Set a flight timer alarm.
7. Announce out loud - "PREPARING TO TAKE OFF."
8. Launch aircraft.

In-Flight:
1. Climb to a safe altitude away from potential hazards and check control systems.
2. DO NOT EXCEED 1000 FEET ABOVE GROUND LEVEL
3. Keep aircraft at a safe operating distance from people and buildings.
4. If aircraft must be flown over buildings or people, maintain a safe altitude for recovery & make every effort to minimize exposure.
5. Continually scan the flight and ground areas for potential hazards.

Landing:
1. Check the control systems.
2. Scan landing area for potential obstruction hazards and recheck weather conditions.
3. Alert those in the area that you intend to land the UAS.
4. Always be prepared to go around.
5. Carefully land the aircraft away from obstructions and people.

Post-Flight:
1. Turn the power off to the aircraft and all associated equipment.
2. Visually check aircraft for signs of damage and/or excessive wear.
3. Remove the battery and replace it with a fresh one. Recharge the removed battery and place it in the carrying case.
4. Secure the aircraft and all associated equipment.

Field Repairs

After recovery of the aircraft, if an inspection should reveal any damage, the PIC may authorize or conduct the field repair of the aircraft. Field repairs can consist of two types, critical and non-critical.

1. Non-critical repairs are repairs made to the airframe or components that are not critical to the flight control or function of the aircraft in its assigned mission.

2. Critical repairs or those repairs that must be made that directly affect the ability of the aircraft to perform its function and to continue the mission. Typical repairs of this nature would be such as replacing a motor or replacing a prop.

Environmental considerations

Personnel shall leave as small an environmental footprint as possible. The immediate area around the flight operations shall be policed for equipment, personal items, or trash. Any material that was removed to make way for flight operations shall be returned and re-established as it was found.

The above guidelines and SOP's will be adhered to at all HCOEM events. Failure to adhere to the guidelines shall be evaluated on a case by case basis and my be grounds for expulsion from the HCOEM. Further, any member knowingly operating their aircraft in a manner that is grotesquely dangerous (at an HCOEM event/incident or otherwise) will not be allowed access to any future HCOEM event/incident/scene without the Directors approval.

Pilots
1. Pilot Rating. PIC's flying in Class G airspace only must have a proven proficiency in the requirements in this document.

2. Initial Training. All pilots who will be flying missions for the HCOEM shall be properly trained by either manufacturer representatives or HCOEM instructors. The pilots will have a current working knowledge of the airspace intended for operations, Air Traffic Control communication requirements, specific UAS aerodynamic factors, and the ability to obtain and interpret weather. All pilots must meet the following flight experience requirements and be current with their flight log entries.

   1. Basic Flight Operations Training. Each pilot must complete all the requirements of the manufactures training document.
   2. Mission Training. All pilots must undergo Specific Mission Training to increase specific core competencies in UAS operations, systems and roles with conducting a mission in accordance with the applicable mission. This

training is in addition to Basic Flight Operations Training.

3.   Training. All pilots must have a minimum of three qualifying training events UAS flights to include take-offs and landings to be eligible to fly UAS missions.

       a.   In order to accomplish required training, pilots shall participate in all required training as assigned.

       b.   Recurrent training is not limited to actual pilot/observer skills, but includes knowledge of all pertinent UAS aviation matters.

       c.   All members within the UAS unit shall read the current COA and maintain proficiency in their operator/observer abilities. Members who do not have documented training or flight time prior to a mission shall demonstrate proficiency to the Director, Deputy Director or on scene Supervisor before performing pilot/observer duties during a mission.

       d.   Failure to maintain/prove proficiency can result in removal from UAS operations.

4.   In-service Training. Each pilot must undergo in-service training every 12 months to include updated industry standards and field exercises, as well as a review of current laws governing the use of aviation assets.

Observer

An Observer is required for all practice and mission flights of the UAS.

1.   Initial Training: UAS Observers shall meet all conditions of the most recent COA issued by the FAA. Observers will have a current working knowledge of the airspace intended for operations, Air Traffic Control phraseology and communication requirements, specific UAS aerodynamic factors, and the ability to obtain and interpret weather. The Observer will receive specific training on the obligation to see and avoid other aircraft and the ability to identify position for purposes of relaying position reports to the PIC.

2.   Pre-flight Briefing: Observers must participate in the pre-flight briefing.

Camera and Remote Sensing Operator

1.   Initial Training: The Camera Operator/PIC will receive specific training on camera and sensing equipment operations, including recording and storing and retrieving digital data prior to assisting with mission flights.

2.   Pre-flight Briefing: Camera Operators must participate in the pre-flight briefing.

Flight Conditions

1.   Daylight: All UAS operations shall be conducted during daylight. Night flight is prohibited unless specifically authorized by the FAA in an Emergency COA.

2.   Line-of-sight: All UAS operations shall be conducted within line-of-sight of the PIC or Observer such that the Pilot or Observer may detect and avoid hazards such as aircraft and property.

3.   Altitude: All flights shall be conducted at or below 1200 feet Above Ground Level (AGL), unless otherwise noted in the COA or approved by FAA in an Emergency COA. All flights will be conducted under VFR (Visual Flight Rules) for Class G weather conditions.

4.   Weather: The PIC is responsible for obtaining current weather reports from an appropriate source for the area of operations. Flight operations are not authorized in any conditions that are not suggested by the manufacturer or the FAA.

Operating Guidelines

1.   Heat: The operational guidelines for heat are less than 110 degrees Fahrenheit (37.77 degrees Celsius) at ground level. Operation in temperatures over this mark should be noted with the air density as obtained from the pre-flight weather report. The battery and length of flight should be adjusted accordingly based upon high humidity and temperature with air density. These local conditions may warrant the PIC opting to not fly based upon these flight conditions.

2.   Cold: The operational guidelines for cold are greater than 0 degrees Fahrenheit (-17.77 degrees Celsius) at ground level. Operation in temperatures under this mark should be noted with the air density as obtained from the pre-flight weather report. The battery and length of flight should be adjusted accordingly. Also, if the moisture level is high, conditions should be noted for icing on wings and flight surfaces. These conditions may warrant the PIC opting to not fly based up these flight conditions.

3.   Wind: The UAS will not be operated in sustained winds greater than 10 mph. Wind velocity can be obtained from a hand-held anemometer used at the training location or mission site. The PIC may decide that wind conditions at the area of operation are too hazardous and opt to not fly.

4.   Rain, Snow and Fog: The operational guidelines for these conditions are based upon visibility and operator safety at the local site. The PIC and Observer must adhere to the line-of-sight and VFR weather minimum requirements.

Flight Requirements

1. Mission Requests. All requests for UAS to provide support for a mission shall be forwarded to the Director. Considerations for use of UAS shall include the following:

    a. The location of the mission, for purposes of insuring the safety of people and property.
    b. Reason for the request
    c. The intended area of operation, for purposes of evaluating the ability to mitigate potential air-to-air conflicts.
        • Such evaluation will consider the current landing patterns at airports in the vicinity.
        • Whenever the approach path of an airplane to a nearby airport would involve flying over the intended area of operation, such operations shall be coordinated with the appropriate air-traffic control facility.
        • All coordination will be done in accordance with any requirements in the COA issued by the FAA.
    d. The weather and its potential affect on the aircraft, including the potential to carry the aircraft to an area of air-to-air conflict.
    e. The training of the PIC and Observer.
    f. The potential usefulness of the information gathered by the UAS versus information gathered through other means.
    g. Any other relevant risk factors to successfully complete a risk benefit analysis for the use of UAS in the specific mission. Risk factors may include but are not limited to tree canopy, distance between buildings, smoke, etc.
    h. Strength of radio and GPS signal as indicated on the UAS.

2. Personnel Designation. Once the Director has approved the mission request, the PIC, Observer, Camera Operator, and person responsible for controlling access to the take-off and landing site and coordinate with individual(s) requesting the mission shall be identified.

3. Pre-flight Preparation. Before any mission the PIC must conduct a Pre-Flight Briefing.

4. Scene Review. The PIC and Observer are responsible for identifying any unsafe conditions at the scene. This includes, but is not limited to:

    a. Take-off and landing site: This area should be free of obstructions, items on the ground and debris that may interfere with the rotors. This includes creation of a flight line, from which all crew and civilians must remain clear.
    b. Flight perimeter: The site must utilize law enforcement officers and standard protocols to minimize civilian traffic or interference during the operation.
    c. Safety View: The flight team should identify trees, bushes, power lines,

and other potential obstructions and coordinate the pre-flight briefing accordingly.

    d.   Interference: The flight team should identify Communications and Cell Towers, TV and Microwave sources, which might create interference with the flight equipment. The equipment should be tested on the ground to insure proper communications and operation before the flight.

    e.   Sectional chart: The flight team will maintain a current copy of a VFR Sectional Chart for the area in which flight operations will occur.

5. Notice to Airmen (NoTAM). A distance (D) NoTAM shall be issued for all UAS training and mission operations through the local NoTAM issuing authority at the DFW Flight Service Station (FSS). NoTAM's can be found at http://www.faa.gov/air_traffic/publications/notices/

6. If a flight must occur within 1 mile of the New Castle/Henry County Municipal Airport the PIC (or designee) shall notify the airport at least 30 minutes prior to operation. Such notification should include the following:

    a.   The intended location, time and duration of the flight.
    b.   The maximum altitude of the flight.
    c.   A cell phone number of an individual for emergency contact.
    d.   The PIC (or designee) shall provide flight notification to any other entities required in the COA.
    e.   The PIC shall immediately notify the New Castle/Henry County Municipal Airport and any others previously notified immediately at the conclusion of the UAS flight.

7. Coordination with Air Traffic Control (ATC) at the New Castle/Henry County Municipal Airport. The PIC and or Observer will maintain direct, two-way communication and have the ability to maneuver the UAS in response to ATC instructions.

    a.   The PIC must not accept ATC instructions that require visual separation from the UAS.
    b.   The ATC may assign a radio frequency for air traffic during the flight.
    c.   The ATC may provide a written waiver of two-way communication.

8. Documentation. A copy of the current COA, Flight log, Maintenance log, and Pilot Certifications must be available upon request at all times. PIC's and Observers must be available upon request at all times..

9. Flight operations.

    a.   All flight operations shall be conducted in accordance with the manufacturer's recommendations.
    b.   The UAS must operate with position/navigation or anti-collision lights on at

all times unless authorized by the FAA.

    c.   If at any time the PIC and/or Observer believe there is a potential for air-to-air conflict, risk of harm to individuals or property, the PIC shall immediately land the aircraft.

    d.   In the event of lost communications with the aircraft, lost link procedures shall be executed including immediate landing of the aircraft. If the aircraft does not immediately execute these orders, the PIC shall notify the appropriate ATC. If the PIC loses visual contact, ATC shall be immediately notified.

10.   Emergency Exceptions. An application for an Emergency COA must have prior approval from the Director before being submitted to the FAA.

Prohibited Acts

1. Warrantless Search: The HCOEM UAS shall not be operated in violation of the Indiana and United States constitutions, statutes, or regulations. When a search warrant is required by law and no warrant exception exists, flight is prohibited unless a search warrant signed by an authorized Judge is obtained.

2. Routine Patrol: UAS shall not be used for routine patrol duties.

3. Exceeding Aircraft Limitations: The UAS shall not be flown in conditions that exceed the manufacturer's recommended limitations, including range, ceiling, wind strength, and battery charge.

4. High Risk Missions: The UAS shall not be flown for any mission in which the PIC determines the risk of flying the UAS outweighs the benefit to the mission. Risks may include hazards to individuals or property on the ground, possible collision hazard with other aircraft, loss of control of the UAS. The OIC cannot countermand a PIC's determination to not fly a mission. However, the OIC can countermand a PIC's determination to fly a mission. The PIC has sole accountability for the UAS during flight operations.

5. Spraying and Dropping: The PIC is prohibited from spraying or dropping anything from the aircraft and carrying hazardous materials.

6. Prohibited Airspace: UAS flights are prohibited in anything other than Class G airspace.

7. Defined Incident Perimeter: Unless authorized by the FAA only one UAS shall be operated in a defined incident perimeter, by a single control station, and by one pilot at a time.

8. Daisy-chaining Observers: Unless authorized by the FAA, daisy-chaining Observers to extend line-of-sight is prohibited.

9. Manned Aircraft in Operating Area: UAS flights are prohibited when other manned aircraft are operating within the defined incident perimeter.

10. Flying for Compensation: As a "public aircraft," flying for compensation or hire is prohibited. Cost reimbursement between government units is permitted.

Documentation and Reporting

Flight Documentation. The PIC or their designee shall complete all department flight documentation including pertinent information about the aircraft, flight conditions, type of mission, and mission parameters. Monthly reports containing the above information or indicating no flights occurred during the month shall be submitted to the FAA through the COA online system by the HCOEM employee authorized by the FAA to submit the documentation.

Incident and Crash Documentation. The OIC shall be responsible for reporting any major incidents or crashes to the FAA through the COA online system and supplying any additional documentation that may be required.

Personnel qualifications

Pilot in Command (PIC)

The PIC shall be the individual with responsibility for all other personnel involved with the operation;
1. Knowledge of general aviation practices
2. 20/20 corrected vision
3. Familiarity and operations of HCOEM aircraft to include;
   a. The operator should have sufficient flight time to be familiar of all flight characteristics
   b. Familiar with the latest revision of ground control equipment
   c. Emergency recovery procedures in failed link situations
4. Familiar with mission planning and preflight procedures
5. Versed in emergency procedures and contingency operations
6. Familiar with acceptable field repair and maintenance procedures

Ground System Crew/Observers

1. Knowledge of general aviation practices
2. 20/20 corrected vision
3. Familiarity and operations of HCOEM aircraft to include;
   a. The operator should have sufficient flight time to be familiar of all flight characteristics
   b. Familiar with the latest revision of ground control equipment
   c. Emergency recovery procedures in failed link situations
4. Familiar with mission planning and preflight procedures
5. Versed in emergency procedures and contingency operations
6. Familiar with acceptable field repair and maintenance procedures

Civilian Observers

1. Shall understand the inherent risks of being in the vicinity of flight operations

Training

All training flights shall be conducted at the Henry County Emergency Services Training Center located at 527 North Hillsboro Road, New Castle IN 47362 or other public lands or private lands

if authorized in writing.

Present at training evolutions shall be the pilot in command and at least 1 crew member/observer.

Training flights shall follow the same guidelines listed above. All training sessions must file a flight report immediately after the flight.

Pilot

Each UAS Pilot must have a minimum of 2 hours of flight training as a pilot prior to any actual deployment for emergency or support operations. Flight training hours may be a combination of flight simulator (up to 1 hour of computer based training may be counted) and actual flight time. Each pilot shall pass a written examination testing the pilot's knowledge of these policies and equipment usage. Each pilot shall have passed the practical examination testing the pilot's abilities and knowledge of equipment usage.

Each pilot must be approved by the Director.

Crew Member/Observer

Crew Members must have a minimum of 1 hours of experience assisting in flight operations and observer training/experience prior to any actual deployment for emergency or support operations. And shall pass a written examination testing their knowledge of these policies and equipment usage.

Each crew members/observer must be approved by the Director.

Legal Considerations

Indiana House Bill 1009

As of July 1st 2014 Indiana added the following:

SECTION 19. IC 35-33-5-9 IS ADDED TO THE INDIANA CODE AS A NEW SECTION TO READ AS FOLLOWS [EFFECTIVE JULY 1, 2014]:

Sec. 9. (a) Except as provided in subsection (b), a law enforcement officer must obtain a search warrant in order to use an unmanned aerial vehicle.

   (b) A law enforcement officer or governmental entity *may use* an unmanned aerial vehicle without obtaining a search warrant if the law enforcement officer determines that the use of the unmanned aerial vehicle:
   (1) is required due to:
      (A) the existence of exigent circumstances necessitating a warrantless search;
         (B) the substantial likelihood of a terrorist attack;
      (C) the need to conduct a search and rescue or recovery operation;
         (D) the need to conduct efforts:
(i) in response to; or
      (ii) to mitigate; the results of a natural disaster or any other disaster; or
      (E) the need to perform a geographical, an environmental, or any other survey for a purpose that is not a criminal justice purpose; or
   (2) will be conducted with the consent of any affected property owner.

Chapter 8.5. Unlawful Photography and Surveillance on Private Property

Sec. 1. (a) This section does not apply to any of the following:

(1) Electronic or video toll collection facilities or activities authorized under any of the following:

(A) IC 8-15-2.
(B) IC 8-15-3.
(C) IC 8-15.5.
(D) IC 8-15.7.
(E) IC 8-16. (F) IC 9-21-3.5.

(2) A law enforcement officer who has obtained:
(A) a search warrant; or
(B) the consent of the owner or private property;
to place a camera or electronic surveillance equipment on private property.

(b)   A person who knowingly or intentionally places a camera or electronic surveillance equipment that records images or data of any kind while unattended on the private property of another person without the consent of the owner or tenant of the private property commits a Class A misdemeanor.

As you can see the Indiana House Bill does allow specific uses of this type of technology for the purposes identified in the SOP/SOG.

Federal Legislation Governing the Use of UASs

The FAA Modernization and Reform Act of 2012 (49 U.S.C. § 40101, et seq.) is the only legislation passed by the United States Congress on the topic of unmanned aircraft systems to date. The act sets out requirements for new laws and regulations concerning unmanned aircrafts. The requirements are to ensure public safety and uniformity throughout national airspace and that civil unmanned aircraft systems include a sense and avoid capability. The act defines different types of unmanned aircraft and aircraft systems including:

1. **Unmanned aircraft** – an aircraft operated without the possibility of direct human intervention from within or on the aircraft.

2. **Small unmanned aircraft** – an unmanned aircraft weighing less than 55 pounds.

3. **Unmanned aircraft system** – an unmanned aircraft and associated elements (including communication links and the components that control the unmanned aircraft) required for the pilot in command to operate safely and efficiently in the national airspace system.

4. **Public unmanned aircraft system** – an unmanned aircraft system meeting the qualifications and conditions required for operation of a public aircraft.

It should be noted that laws and regulations related to the use of UAS are evolving and what may be true today is not necessarily true tomorrow. For example, the FAA is expected to release

proposed rules in 2015 establishing policies, procedures and standards for small UAS which law enforcement and others may use. Additionally, there are several bills under consideration by the U.S. Congress, including: Preserving American Privacy Act of 2013, Preserving Freedom from Unwarranted Surveillance Act of 2013, Drone Aircraft Privacy and Transparency Act of 2013, and Safeguarding Privacy and the Fostering Aerospace Innovation Act of 2013. Enactment of these bills will impact agencies' use of UASs and agencies should diligently monitor the law for future changes.

Required UAS Fact Sheet Data
Each UAS must have a System Fact Sheet on file with the Henry County Office of Emergency Management prior to deployment.

Required System Fact Sheet Data
 (1) Organizational and operational points of contact.
 (2) Operational description (for example, method of navigation, see-and-avoid).
 (3) Systems description (for example, airframe, control station, communications).
 (4) Airframe performance characteristics.
 (5) Airworthiness.
 (6) Contingency procedures (for example, lost command/control link, lost communications, and emergency).
 (7) Avionics equipment.
 (8) Lighting.
 (9) Frequency spectrum analysis.
 (10) Method of air traffic control (ATC) communications.
 (11) Surveillance capability (for example, electronic and visual).
 (12) System monitoring/recording capability.
 (13) Flightcrew qualifications.
 (14) Flight operations description (flight plan).
 (15) Special circumstances.
 (16) Reports of past incidents or accidents (for those applicants who have previously held a COA).

Inter-Communications Requirements

Any visual observer or other person charged with providing collision avoidance for the UAS must have immediate communication with the UAS pilot. If the UAS pilot is talking to air traffic control, monitoring of the air traffic control frequency by all UAS crew members is recommended for shared situational awareness. However, unless it is necessary, the UAS PIC or the supplemental pilots are the only crewmembers that will talk to Air Traffic Control.

Dropping Objects/Hazardous Materials

The dropping of any object is prohibited.

Flight Over Populated Areas

Routine UAS operations shall not be conducted over urban or populated areas. UAS operations may be approved in emergency or relief situations if the proposed mitigation strategies are found to be acceptable.

Flight Over Heavily Trafficked Roads or Open-air Assembly of People

UAS operations shall avoid these areas. If flight in these areas is required, the applicant will be required to support proposed mitigations with system safety studies that indicate the operations can be conducted safely. Acceptable system safety studies must include a hazard analysis, risk assessment, and other appropriate documentation that support an "extremely improbable" determination. Additionally, it is the applicant's responsibility to demonstrate that injury to persons or property along the flight path is extremely improbable. UAS with performance characteristics that impede normal air traffic operations may be restricted in their operations.

Day/Nighttime Operations

All UAS operations should be conducted during daylight hours. Nighttime operations may be considered in other airspace if the applicant provides a safety case and sufficient mitigation to avoid collision hazards at night.

Flights In Class G Airspace

All UAS operations (IFR or VFR) outside of active Restricted, Prohibited or Warning Areas and below flight level (FL) 180 shall be conducted in visual meteorological conditions (VMC) and a minimum flight visibility of not less than three statue miles (SM) shall be maintained at all times.

Autonomous Operations

It is generally understood that most UAS have some level of autonomy associated with its operation. UAS that are designed to be completely autonomous, with no capability of pilot intervention, are not authorized in the national airspace system. Although the pilot may be technically considered out-of-the-loop in a lost link scenario, this restriction does not apply to UAS operating under lost link.

Operations from Off-Airport Locations

In most cases, an off-airport locations should be situated no closer than one nautical mile (NM) from any airport or heliport. The operational areas, including the launch and recovery zones, should be free from obstructions and reasonable efforts should be made to keep operations away from structures and heavily trafficked roads.

Image Retention Restrictions.

All images and videos shall be retained in the Henry County Office of Emergency Management and made available to whoever wishes to make an appointment to view them. All images and videos are the property of the Henry County Office of Emergency Management and are not for sale. All images and or videos may be used for planning, training, response, mitigation or display purposes providing;

Images of identifiable individuals captured by aerial technologies:

Images that show reasonable suspicion of criminal activity shall not be blurred and SHALL be provided to law enforcement. When individuals are identifiable an attempt shall be made to contact them and offer them the opportunity to sign the Image Release Form. Individuals that do not wish to sign the form and request in writing that their image be blurred shall have their face blurred prior to the release of photos that contain a identifiable facial photo. The Image Release Form can be found in APPENDIX "D" and the PIC shall have several copies available prior to lift off.
Note: only those individuals that are identifiable need sign.

Public Notice

This document strives to make public the policies and procedures for the use of aerial technologies and are open to all that wish to see them.

Democratic control

Deployment and policy decisions surrounding the use of HCOEM UAVs have been documented herein and are available upon request.

Auditing and effectiveness tracking

When aerial technology is deployed, independent audits may be conducted by the Henry County Emergency Management Advisory Council, the Henry County Commissioners and/or the public so that citizens and other watchdogs can tell generally how and how often they are being used, whether the original rationale for their deployment is holding up, whether they represent a worthwhile expense and are a benefit to the Henry County Office of Emergency Management.

 Organizational and operational points of contact.
>   Ronald D. Huffman
>   216 South 12th Street,
>   New Castle, IN 47362
>   (765) 521-0582

- Airworthiness.
    - See Appendix "A"
- Contingency procedures (for example, lost command/control link, lost communications, and emergency).
    - See manufacturers manual located with the UAS
- And Appendix "A"
- Avionics equipment.
    - See Appendix "A"
- Lighting.
    - See Appendix "A"
- Frequency spectrum analysis.
    - See Appendix "A"
- Method of air traffic control (ATC) communications.
    - Direct - (765) 529-7903

- Surveillance capability (for example, electronic and visual).
  - See Appendix "A"
- System monitoring/recording capability.
  - See Appendix "A"
- Flightcrew qualifications.
  - See page 22
- Flight operations description (flight plan).
  - See Appendix "B"
- Special circumstances.
  - See Appendix "B"
- Reports of past incidents or accidents (for those applicants who have previously held a COA).
  - N/A

APPENDIX "A" – Aerial Equipment

Datasheet – 33-UAS1

System Fact Sheet Data
DJI Phantom 2 Vision+ Quadcopter

- Camera with 3-Axis Gimbal Stabilizer
- 14MP Still and 1080p Video
- Wi-Fi Downlink for Smartphones
- iOS/Android App for Monitoring/Control
- Up to 25 Minutes Flying Time
- GPS-Based Autopilot with Return to Home
- Intelligent Orientation Control (IOC)
- Stationary Hover with GPS Attitude Mode
- Self-Tightening Prop Design
- Weight 1242g (2lb 11.810oz)
- Range Communication Distance (open area) 500-700m

Aircraft	**Supported Battery** DJI 5200mAh LiPo Battery
	Weight (Battery & Propellers included) 1242g
	Hover Accuracy (Ready to Fly) Vertical: 0.8m; Horizontal: 2.5m
	Max Yaw Angular Velocity 200°/s
	Max Tiltable Angle 35°
	Max Ascent / Descent Speed Ascent: 6m/s; Descent: 2m/s
	Max Flight Speed 15m/s (Not Recommended)
	Diagonal motor-motor distance 350mm
Gimbal	**Working Current**

Static : 750mA; Dynamic : 900mA

Control Accuracy
±0.03°

Controllable Range
Pitch : -90° ‐ 0°

Maximum Angular Speed
Pitch : 90°/s

Operating Environment Temperature
0℃-40℃

Sensor size
1/2.3"

Effective Pixels
14 Megapixels

Camera

Resolution
4384×3288

HD Recording
1080p30

Recording FOV
110° / 85°

Operating Frequency
5.728 GHz ‐ 5.85 GHz

Communication Distance (open area)
CE Compliance: 400m; FCC Compliance: 800m

Remote Controller
Receiver Sensitivity (1%PER)
-93dBm

Transmitter Power
CE Compliance: 25mW; FCC Compliance: 100mW

Working Voltage
80 mA@6V

	Battery
	4 AA Batteries
	Operating Frequency
	2412-2462MHz
	Communication Distance (open area)
Range Extender	500-700m
	Transmitter Power
	20dBm
	Power Consumption
	2W
Radar positioning & return home	The flight radar displays the current position of the Phantom 2 Vision+ in relation to the pilot.
	Exceeding the control range of the remote control will trigger 'Return-to-Home'. The Phantom 2 Vision+ will automatically fly back to its takeoff point and land safely.
	System Requirement Of Mobile Device
	iOS version 6.1 or above/ Android system version 4.0 or above
	Mobile Device Support
DJI VISION App	• iOS recommended: iPhone 4s, iPhone 5, iPhone 5s, iPod touch 4, iPod touch 5 (available but not recommended: iPad 3, iPad 4, iPad mini) • Android recommended: Samsung Galaxy S3, S4, Note 2, Note 3 or phones of similar configuration

APPENDIX "B" – Flight Records

Flight Log

Date:	
Day:	
Start Time:	
End Time:	
UAS #:	
Flight Authorized By:	
Flight plan posted on Facebook prior to flight:	YES NO
Other locations Posted/Notified:	
Reason For Flight:	
Area Flown:	
Pilot In Command:	
Crew-Observer:	
Civilian Observer(s):	

Estimated Altitude:			
Photos Taken:	YES NO	In possession of:	
Video Taken:	YES NO	In possession of:	
Flight Notes:			
Returned To Service:	YES NO	If "NO" why?	

APPENDIX "C" – Preflight Checklist

Place a ✔ in each box that has been accomplished.

☐ NOTAM Flight Service Station at 1-877-4-US-NTMS (1-877-487-6867) contacted not more than 72 hours in advance, but not less than 48 hours prior to the operation.

☐ Before the first flight of the day, verify all transmitter, on-board aircraft and other required batteries are fully charged.

☐ Contact TRACON at (317) 227-5843 at least 1 hour prior to launch and provide:
  - The defined training area using a VOR Radial/DME fix and the maximum altitude (400'AGL)
  - The NOTAM number and the time for commencing and terminating operations.
  - Provide ATC with a reliable telephone number to facilitate coordination or immediate termination of UAS flight activities if deemed necessary for the safety of flight.

☐ Check all control surfaces for signs of damage, loose equipment and overall condition.

☐ Check the motor/engine and mounting system to make sure it is firmly attached to the airframe.

☐ Check the propeller or rotor blades for chips, cracks, looseness and any deformation

☐ Check the landing gear (if applicable) for damage, for secure attachment, and the wheels are in good shape and rotate freely (if applicable).

☐ Check that the equipment is firmly attached to the airframe and secure.

☐ Check all electrical connections making sure they are plugged in and secured to the airframe.

☐ Check that the photography equipment and mounting system are secure and operational.

☐ Perform an overall visual check of the aircraft prior to arming any power systems.

☐ Connect/install all batteries and verify system readiness

☐ Test systems

☐ Insure GPS functions correctly

☐ _____

☐ _____

☐ _____

☐ _____

☐ PIC will notify Indianapolis TRACON at (317) 227-5843 within 15 minutes of the end of the flight.

PIC _____ Date ____/____/_____

APPENDIX "D" – Image Release Form

Incident Date: _____

Incident Description: _____

Note: ONLY THOSE INDIVIDUALS THAT ARE IDENTIFIABLE NEED SIGN

I authorize the use of all aerial photos containing my image taken on the above date for media, response, training and planning purposes.

Signed: _____ Address: _____ Contact #: _____

I authorize the use of all aerial photos containing my image taken on the above date for media, response, training and planning purposes.

Signed: _____ Address: _____ Contact #: _____

I authorize the use of all aerial photos containing my image taken on the above date for media, response, training and planning purposes.

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I authorize the use of all aerial photos containing my image taken on the above date for media, response, training and planning purposes.

Signed: _____ Address: _____ Contact #: _____

I authorize the use of all aerial photos containing my image taken on the above date for media, response, training and planning purposes.

Signed: _____ Address: _____ Contact #: _____

APPENDIX "E" – PIC/Observer Experience Log

Every pilot/supplemental pilot/PIC must maintain a appropriate level of recent pilot experience in either the UAS being operated or in a certified simulator. At a minimum, he/she must conduct three takeoffs (launch) and three landings (recovery) in the specific UAS within the previous 90 days (excluding pilots who do not conduct launch/recovery during normal/emergency operations). If a supplemental pilot assumes the role of PIC, he/she must comply with PIC rating requirements.

Name: _____

Contact #: (_____) _____-_____ Email: _____
****

Location: _____

Date: ____/____/_____   Take off ☐ Landing ☐

Location: _____

Date: ____/____/_____   Take off ☐ Landing ☐

Location: _____

Date: ____/____/_____   Take off ☐ Landing ☐

Location: _____

Date: ____/____/_____   Take off ☐ Landing ☐

Location: _____

Date: ____/____/_____   Take off ☐ Landing ☐

Location: _____

Date: ____/____/_____   Take off ☐ Landing ☐

Location: _____

Date: ____/____/_____   Take off ☐ Landing ☐

Location: _____

Date: ____/____/_____   Take off ☐ Landing ☐

Location: _____

Date: ____/____/_____   Take off ☐ Landing ☐

Location: _____

Date: ____/____/_____   Take off ☐ Landing ☐

Location: _____

Date: ____/____/_____   Take off ☐ Landing ☐