



U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

800 Independence Ave., S.W.  
Washington, D.C. 20591

June 1, 2015

Exemption No. 11730  
Regulatory Docket No. FAA-2015-0856

Mr. Kai Loedel  
Chief Operating Officer  
MC Consultants, Inc.  
2055 Corte del Nogal  
Carlsbad, CA 92011

Dear Mr. Loedel:

This letter is to inform you that we have granted your request for exemption. It transmits our decision, explains its basis, and gives you the conditions and limitations of the exemption, including the date it ends.

By letter dated March 20, 2015, you petitioned the Federal Aviation Administration (FAA) on behalf of MC Consultants, Inc. (hereinafter petitioner or operator) for an exemption. The petitioner requested to operate an unmanned aircraft system (UAS) to conduct aerial inspections and surveys of structures and facilities as part of exterior building evaluations.

See Appendix A for the petition submitted to the FAA describing the proposed operations and the regulations that the petitioner seeks an exemption.

The FAA has determined that good cause exists for not publishing a summary of the petition in the Federal Register because the requested exemption would not set a precedent, and any delay in acting on this petition would be detrimental to the petitioner.

### **Airworthiness Certification**

The UAS proposed by the petitioner are the DJI Phantom 2 Vision+ and DJI Inspire 1.

The petitioner requested relief from 14 CFR part 21, *Certification procedures for products and parts, Subpart H—Airworthiness Certificates*. In accordance with the statutory criteria provided in Section 333 of Public Law 112–95 in reference to 49 U.S.C. § 44704, and in consideration of the size, weight, speed, and limited operating area associated with the aircraft and its operation, the Secretary of Transportation has determined that this aircraft meets the conditions of Section 333. Therefore, the FAA finds that the requested relief from 14 CFR part 21 and any associated noise certification and testing requirements of part 36, is not necessary.

### **The Basis for Our Decision**

You have requested to use a UAS for aerial data collection<sup>1</sup>. The FAA has issued grants of exemption in circumstances similar in all material respects to those presented in your petition. In Grants of Exemption Nos. 11062 to Astraeus Aerial (*see* Docket No. FAA–2014–0352), 11109 to Clayco, Inc. (*see* Docket No. FAA–2014–0507), 11112 to VDOS Global, LLC (*see* Docket No. FAA–2014–0382), and 11213 to Aeryon Labs, Inc. (*see* Docket No. FAA–2014–0642), the FAA found that the enhanced safety achieved using an unmanned aircraft (UA) with the specifications described by the petitioner and carrying no passengers or crew, rather than a manned aircraft of significantly greater proportions, carrying crew in addition to flammable fuel, gives the FAA good cause to find that the UAS operation enabled by this exemption is in the public interest.

Having reviewed your reasons for requesting an exemption, I find that—

- They are similar in all material respects to relief previously requested in Grant of Exemption Nos. 11062, 11109, 11112, and 11213;
- The reasons stated by the FAA for granting Exemption Nos. 11062, 11109, 11112, and 11213 also apply to the situation you present; and
- A grant of exemption is in the public interest.

### **Our Decision**

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 106(f), 40113, and 44701, delegated to me by the Administrator, MC Consultants, Inc. is granted an exemption from 14 CFR §§ 61.23(a) and (c), 61.101(e)(4) and (5), 61.113(a), 61.315(a), 91.7(a), 91.119(c), 91.121, 91.151(a)(1), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), to the extent necessary to allow the petitioner to operate a UAS to perform aerial data collection. This exemption is subject to the conditions and limitations listed below.

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<sup>1</sup> Aerial data collection includes any remote sensing and measuring by an instrument(s) aboard the UA. Examples include imagery (photography, video, infrared, etc.), electronic measurement (precision surveying, RF analysis, etc.), chemical measurement (particulate measurement, etc.), or any other gathering of data by instruments aboard the UA.

## Conditions and Limitations

In this grant of exemption, MC Consultants, Inc. is hereafter referred to as the operator.

Failure to comply with any of the conditions and limitations of this grant of exemption will be grounds for the immediate suspension or rescission of this exemption.

1. Operations authorized by this grant of exemption are limited to the DJI Phantom 2 Vision+ and DJI Inspire 1 when weighing less than 55 pounds including payload. Proposed operations of any other aircraft will require a new petition or a petition to amend this exemption.
2. Operations for the purpose of closed-set motion picture and television filming are not permitted.
3. The UA may not be operated at a speed exceeding 87 knots (100 miles per hour). The exemption holder may use either groundspeed or calibrated airspeed to determine compliance with the 87 knot speed restriction. In no case will the UA be operated at airspeeds greater than the maximum UA operating airspeed recommended by the aircraft manufacturer.
4. The UA must be operated at an altitude of no more than 400 feet above ground level (AGL). Altitude must be reported in feet AGL.
5. The UA must be operated within visual line of sight (VLOS) of the PIC at all times. This requires the PIC to be able to use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate or U.S. driver's license.
6. All operations must utilize a visual observer (VO). The UA must be operated within the visual line of sight (VLOS) of the PIC and VO at all times. The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times; electronic messaging or texting is not permitted during flight operations. The PIC must be designated before the flight and cannot transfer his or her designation for the duration of the flight. The PIC must ensure that the VO can perform the duties required of the VO.
7. This exemption and all documents needed to operate the UAS and conduct its operations in accordance with the conditions and limitations stated in this grant of exemption, are hereinafter referred to as the operating documents. The operating documents must be accessible during UAS operations and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations in this exemption and the procedures outlined in the operating documents,

the conditions and limitations herein take precedence and must be followed. Otherwise, the operator must follow the procedures as outlined in its operating documents. The operator may update or revise its operating documents. It is the operator's responsibility to track such revisions and present updated and revised documents to the Administrator or any law enforcement official upon request. The operator must also present updated and revised documents if it petitions for extension or amendment to this grant of exemption. If the operator determines that any update or revision would affect the basis upon which the FAA granted this exemption, then the operator must petition for an amendment to its grant of exemption. The FAA's UAS Integration Office (AFS-80) may be contacted if questions arise regarding updates or revisions to the operating documents.

8. Any UAS that has undergone maintenance or alterations that affect the UAS operation or flight characteristics, e.g., replacement of a flight critical component, must undergo a functional test flight prior to conducting further operations under this exemption. Functional test flights may only be conducted by a PIC with a VO and must remain at least 500 feet from other people. The functional test flight must be conducted in such a manner so as to not pose an undue hazard to persons and property.
9. The operator is responsible for maintaining and inspecting the UAS to ensure that it is in a condition for safe operation.
10. Prior to each flight, the PIC must conduct a pre-flight inspection and determine the UAS 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 UAS, the aircraft is prohibited from operating until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight.
11. The operator must follow the UAS manufacturer's maintenance, overhaul, replacement, inspection, and life limit requirements for the aircraft and aircraft components.
12. Each UAS operated under this exemption must comply with all manufacturer safety bulletins.
13. Under this grant of exemption, a PIC must hold either an airline transport, commercial, private, recreational, or sport pilot certificate. The PIC must also hold a current FAA airman medical certificate or a valid U.S. driver's license issued by a state, the District of Columbia, Puerto Rico, a territory, a possession, or the Federal government. The PIC must also meet the flight review requirements specified in 14 CFR § 61.56 in an aircraft in which the PIC is rated on his or her pilot certificate.

14. The operator may not permit any PIC to operate unless the PIC demonstrates the ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption, including evasive and emergency maneuvers and maintaining appropriate distances from persons, vessels, vehicles and structures. PIC qualification flight hours and currency must be logged in a manner consistent with 14 CFR § 61.51(b). Flights for the purposes of training the operator's PICs and VOs (training, proficiency, and experience-building) and determining the PIC's ability to safely operate the UAS in a manner consistent with how the UAS will be operated under this exemption are permitted under the terms of this exemption. 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 nonparticipants, and the PIC must operate the UA with appropriate distance from nonparticipants in accordance with 14 CFR § 91.119.
15. UAS operations may not be conducted during night, as defined in 14 CFR § 1.1. All operations must be conducted under visual meteorological conditions (VMC). Flights under special visual flight rules (SVFR) are not authorized.
16. The UA may not operate within 5 nautical miles of an airport reference point (ARP) as denoted in the current FAA Airport/Facility Directory (AFD) or 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 COA issued to the exemption holder. The letter of agreement with the airport management must be made available to the Administrator or any law enforcement official upon request.
17. The UA may not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud or when visibility is less than 3 statute miles from the PIC.
18. If the UAS loses communications or loses its GPS signal, the UA must return to a pre-determined location within the private or controlled-access property.
19. The PIC must abort the flight in the event of unpredicted obstacles or emergencies.
20. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for the UA to conduct the intended operation and to operate after that for at least five minutes or with the reserve power recommended by the manufacturer if greater.
21. Air Traffic Organization (ATO) Certificate of Waiver or Authorization (COA). All operations shall be conducted in accordance with an ATO-issued COA. The exemption holder may apply for a new or amended COA if it intends to conduct operations that cannot be conducted under the terms of the attached COA.

22. All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with 14 CFR part 47, and have identification (N-Number) markings in accordance with 14 CFR part 45, Subpart C. Markings must be as large as practicable.
23. Documents used by the operator to ensure the safe operation and flight of the UAS and any documents required under 14 CFR §§ 91.9 and 91.203 must be available to the PIC at the Ground Control Station of the UAS any time the aircraft is operating. These documents must be made available to the Administrator or any law enforcement official upon request.
24. The UA must remain clear and give way to all manned aviation operations and activities at all times.
25. The UAS may not be operated by the PIC from any moving device or vehicle.
26. All Flight operations must be conducted at least 500 feet from all nonparticipating persons, vessels, vehicles, and structures unless:
  - a. Barriers or structures are present that sufficiently protect nonparticipating persons from the UA and/or debris in the event of an accident. The operator must ensure that nonparticipating persons remain under such protection. If a situation arises where nonparticipating persons leave such protection and are within 500 feet of the UA, flight operations must cease immediately in a manner ensuring the safety of nonparticipating persons; and
  - b. The owner/controller of any vessels, vehicles or structures has granted permission for operating closer to those objects and the PIC has made a safety assessment of the risk of operating closer to those objects and determined that it does not present an undue hazard.

The PIC, VO, operator trainees or essential persons are not considered nonparticipating persons under this exemption.

27. All operations shall be conducted over private or controlled-access property with permission from the property owner/controller or authorized representative. Permission from property owner/controller or authorized representative will be obtained for each flight to be conducted.
28. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported to the FAA's UAS Integration Office (AFS-80) within 24 hours. Accidents must be reported to the National Transportation Safety Board (NTSB) per instructions contained on the NTSB Web site: [www.nts.gov](http://www.nts.gov).

If this exemption permits operations for the purpose of closed-set motion picture and television filming and production, the following additional conditions and limitations apply.

29. The operator must have a motion picture and television operations manual (MPTOM) as documented in this grant of exemption.
30. At least 3 days before aerial filming, the operator of the UAS affected by this exemption must submit a written Plan of Activities to the local Flight Standards District Office (FSDO) with jurisdiction over the area of proposed filming. The 3-day notification may be waived with the concurrence of the FSDO. The plan of activities must include at least the following:
  - a. Dates and times for all flights;
  - b. Name and phone number of the operator for the UAS aerial filming conducted under this grant of exemption;
  - c. Name and phone number of the person responsible for the on-scene operation of the UAS;
  - d. Make, model, and serial or N-Number of UAS to be used;
  - e. Name and certificate number of UAS PICs involved in the aerial filming;
  - f. A statement that the operator has obtained permission from property owners and/or local officials to conduct the filming production event; the list of those who gave permission must be made available to the inspector upon request;
  - g. Signature of exemption holder or representative; and
  - h. A description of the flight activity, including maps or diagrams of any area, city, town, county, and/or state over which filming will be conducted and the altitudes essential to accomplish the operation.
31. Flight operations may be conducted closer than 500 feet from participating persons consenting to be involved and necessary for the filming production, as specified in the exemption holder's MPTOM.

Unless otherwise specified in this grant of exemption, the UAS, the UAS PIC, and the UAS operations must comply with all applicable parts of 14 CFR including, but not limited to, parts 45, 47, 61, and 91.

This exemption terminates on May 31, 2017, unless sooner superseded or rescinded.

Sincerely,

/s/

John S. Duncan  
Director, Flight Standards Service

Enclosures

March 20, 2015

U.S. Department of Transportation  
Docket Management System  
1200 New Jersey Ave.,  
SE Washington, DC 20590

Re: Petition of MC Consultants, Inc., for an Exemption Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012

To Whom it May Concern:

Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 ("Reform Act") and 14 C.F.R. Part 11, MC Consultants, Inc. ("MC") hereby applies for an exemption from the Federal Aviation Regulations ("FARs") identified below, to allow commercial operation of small unmanned aerial vehicles (*i.e.*, "small unmanned aircraft" or "UAS") for conducting aerial inspections and surveys of structures and facilities as part of exterior building evaluations.

This petition is made based on information outlined in this Petition for Exemption, as well as the accompanying MC UAS Flight Operations Manual (hereinafter "MC Flight Operation Manual"), Phantom 2 Vision Plus Pilot Training Guide v1.1, Phantom 2 Vision Plus Quick Start Guide, Inspire 1 User Manual v1.0, Inspire 1 Safety Guidelines, Inspire 1 Maintenance Manual V1.0, 1345 Propeller Locks Quick Start Guide, Intelligent Flight Battery Safety Guidelines (collectively referred to as "Manufacturer Manuals"). A copy of MC's Operations Manuals and other supporting materials will be submitted to the FAA as confidential documents pursuant to 14 C.F.R. § 11.35(b), as the materials contain confidential commercial information that is highly proprietary to MC. In addition, these documents contain operating conditions and procedures that are not generally available to the public and are protected from release under the Freedom of Information Act, 5 U.S.C. § 552 *et seq.*

TABLE OF CONTENTS:

1. Glossary of Abbreviations
2. Description of Petitioner
3. Description of Proposed Operations
  - A. Forensic Evaluation and Building Condition Assessments
  - B. Vehicular Accident Investigations
4. Relevant Statutory Authority
5. MC's Proposed UAS Operations Meet the Requirements of Section 333 of the Reform Act
  - A. Approval is Warranted Based on the UAS's Size, Weight, Speed, and Operational Capability
  - B. Approval is Warranted Based on the Operational Restrictions Set Forth in the Operations Manual
6. Regulations From Which Exemption is Requested
  - A. 14 C.F.R. Part 21, Subpart H – Airworthiness Certificates and 14 C.F.R. § 91.20
  - B. 14 C.F.R. Part 27 Airworthiness Standards: Normal Category Rotorcraft
  - C. 14 C.F.R. § 91.7(a): Civil Aircraft Airworthiness
  - D. 14 C.F.R. § 91.9(b)(2): Civil Aircraft Flight Manual in the Aircraft and 14 C.F.R. § 91.203(a) and (b): Carrying Civil Aircraft Certification and Registration
  - E. 14 C.F.R. §§ 91.9(c), 45.23(b) and 45.27(a): Aircraft Marking and Identification Requirements
  - F. 14 C.F.R. § 91.103: Preflight Action
  - G. 14 C.F.R. § 91.119: Minimum Safe Altitudes
  - H. 14 C.F.R. § 91.121: Altimeter Settings
  - I. 14 C.F.R. § 91.151(a): Fuel Requirements for Flight in VFR Conditions
  - J. 14 C.F.R. § 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2); 91.417(a) and (b): Maintenance Inspections
  - K. 14 C.F.R. Part 61, 14 C.F.R. § 61.3, 14 C.F.R. § 61.113: Private Pilot Privileges and Limitations
7. Privacy
8. Public Interest
9. Conclusion

**SECTION 1: GLOSSARY OF ABBREVIATIONS**

AGL	Above Ground Level
AOI	Area of Interest
ATC	Air Traffic Control
ATO	Air Traffic Organization
C.F.R.	Code of Federal Regulations
COA	Certificate of Authorization
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
GCS	Ground Control Station
GPS	Global Positioning System
LOL	Loss of Link
NAS	National Airspace System
NOTAM	Notice to Airman
PIC	Pilot In Command
RTH	Return To Home
Section 333	FAA Modernization and Reform Act of 2012 (FMRA) Section 333
SOP	Standard Operating Procedures
UA	Unmanned Aircraft
UAS	Unmanned Aircraft System
VFR	Visual Flight Rules
VLOS	Visual Line of Site
VMC	Visual Meteorological Conditions
VO	Visual Observer
VTOL	Vertical Takeoff and Landing

## **SECTION 2: DESCRIPTION OF PETITIONER**

Established in 1989, MC Consultants is a leading national consulting firm with decades of experience and expertise in construction management, forensic investigations, litigation support, civil engineering, environmental investigations, and right-of-way management services. Our multidisciplinary team of consultants consists of highly credentialed professionals whose specialized knowledge and expertise allows us to deliver “the unmatched total solution” to every client. MC Consultants’ reputation for reliability and innovation is based on years of industry experience, seasoned leadership, and a distinguished team of professionals. The integration of experience and innovation provides opportunities for successful outcomes and enables us to efficiently deliver superior services and results that our clients have come to expect.

MC seeks to utilize the latest UAS technologies to provide higher level of efficiency and safer services for our clients. Forensic evaluations and building condition assessments performed by MC often involve the physical inspection of outdoor structures and facilities for the assessment of current element condition, damage, defects and accidents. These inspections typically involve recording images to document existing conditions. Depending on the nature of the inspection, obtaining images of certain physical features may not be feasible due to dangerous conditions, limited access on the structure, risk of damage to structures, or the excessive height of the required viewing angle.

The use of UAS-assisted photography and video will provide a practical means to perform forensic evaluations and building condition assessments that would be otherwise unsafe to the employees of MC and the general public. The primary benefit of this technology would be to assist in the close, detailed aerial inspection and examination of building materials. Inspection of steep-sloped roofs and multi-story exterior walls for residential and commercial buildings, examination of exhaust chimneys/stacks at industrial facilities, and the assessment of accidents by documenting evidence are just a few examples of where UAS-assisted photography would be of great benefit to MC consultants.

MC is dedicated to providing technologically driven and innovative solutions to address our client’s needs. The promise of UAS-assisted photography / video offers a safer and more efficient means to perform forensic evaluations and building condition assessments. The use of this technology will better serve clients and improve public safety. It is in this spirit that MC seeks an exemption to use UAS technology for the commercial purpose of performing aerial inspections during building evaluations.

The contact information for Petitioner is as follows:

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Email: Kai.Loedel@mccconsultants.com

### **SECTION 3: DESCRIPTION OF PROPOSED OPERATIONS**

MC is seeking exemption pursuant to Section 333 of the Reform Act to use small UASs weighing less than 6.7 pounds for conducting aerial inspections and surveys during its forensic evaluations and building condition assessments. All UAS operations will occur under controlled conditions. The proposed UAS operations will be conducted in accordance with the conditions and limitations of this Petition for Exemption and MC's Flight Operation Manual. As detailed in the MC Flight Operation Manual, the proposed UAS operations will be limited to daytime VFR conditions in uncontrolled airspace, and will occur at least 5 miles away from an airport as detailed in the Manufacturer's Manuals. In addition, MC's Flight Operation Manual incorporates redundant safeguards to assure that the aircraft does not travel outside the controlled area of UAS operations, including, but not limited to, GPS "geo-fencing" technologies. The geo-fencing technology will be used to restrict which geographic locations UAS operates within. All MC UAS operation will utilize geo fencing technology to set UAS limits of travel to a controlled area encompassing the building, facility, vehicular accident site, or forensic evaluation location that is under assessment.

MC will utilize the following UAS's for conducting aerial inspections and surveys during its forensic evaluations and building condition assessments (for compensation or hire within NAS):

- DJI Phantom 2 Vision+. The DJI Phantom 2 Vision+ is comprised of a vertical takeoff and landing (VTOL) Unmanned Aircraft (UA) and a transportable Ground Control Station (GCS). The DJI Phantom 2 Vision+ UA has a maximum gross weight of approximately 2.7 pounds, while having a diagonal distance (motor to motor) of approximately 14 inches, and maximum speed of 34 mph (approximately 29 knots). The DJI Phantom 2 Vision+ is equipped with four propellers, each being driven by a Lithium Polymer battery powered electric motor.
- DJI Inspire 1. The DJI Inspire 1 UAS is comprised of a vertical takeoff and landing (VTOL) Unmanned Aircraft (UA) and a transportable Ground Control Station (GCS). The DJI Inspire 1 UA has a maximum gross weight of approximately 6.7 pounds, while having a diameter of 23 inches, and maximum speed of 49 mph (approximately 42 knots). The DJI Inspire 1 UA is equipped with four propellers, each being driven by a Lithium Polymer battery powered electric motor.

#### **Sub-Section A: Forensic Evaluation and Building Condition Assessments**

MC performs hundreds of forensic evaluations and various building condition assessments every year. These evaluations include both distant and close observation and photographic documentation. Close proximity inspections of building elements include review and documentation of exterior roof coverings, exterior claddings, windows, doors, exterior balconies, safety railing, etc. While most of the building elements are easily accessible by ladder, some elements require the use of aerial work platforms and various types of scaffolding. However, some building elements such as tall roofs are at such a height, that conventional ladders cannot reach them, and the use of other inspection methods may not be feasible due to site conditions and project logistics. UAS assisted photography will aid in documenting the observable conditions of these building components that are not accessible by any other safe or practical means. While the use of ladders, aerial work platforms and

suspended scaffolding are appropriate in some cases, depending on inspection conditions, these methods may expose both the inspecting engineers and the general public to unnecessary risk of harm or serious injury, making their use impractical or impossible. UAS-assisted photography provides a safe and effective alternative means for performing forensic evaluations and various building condition assessments, while also minimizing the risk of harm to inspectors and the general public. GPS "geo-fencing" technologies may be used to set UAS limits of travel to a controlled area encompassing the building or facility that is under evaluation.

#### Sub-Section B: Vehicular Accident Investigations

MC periodically evaluates vehicular accidents to determine causation through state-of-the-art data collection, three-dimensional computer simulation, and analysis software tools. MC analyzes single and multiple-vehicle accidents of all types and investigates the roles of human, vehicle and environmental factors in such accidents. Accident reconstruction engineers perform thorough analyses to develop a reconstruction of the accident that is consistent with physical evidence. Our analytical procedure consists of a series of systematic steps that includes reviewing documents, identifying technical issues, documenting the accident site, and conducting vehicle and component inspections. The site evaluations commonly involve examination of the affected vehicle(s), as well as documenting conditions at the site where the accident occurred. Site evaluations may require close examination to identify details such as skid marks, grade variations, and roadway defects. Overall observation and distant photographic documentation are necessary to assess the site conditions of the accident location, but often cannot be feasibly obtained using traditional fixed-wing or rotorcraft aircraft. Aerial images provided by UAS technology would aid in the analysis of vehicle pathways, traffic behavior at intersections, and visualizing the general area of the accident. Knowledge gained from vehicle accident investigations is used by the transportation industry to improve public safety. When necessary, local law enforcement shall be used to establish a secure zone around a traffic intersection to allow safe and efficient UAS operation. GPS "geo-fencing" technologies may be used to set UAS limits of travel to a controlled area encompassing the accident site.

#### **SECTION 4: RELEVANT STATUTORY AUTHORITY**

This Petition for Exemption is submitted pursuant to Section 333(a) through (c) of the Reform Act. Congress has directed the FAA "to safely accelerate the integration of civil unmanned aircraft systems into the national airspace system." Pursuant to Section 333 of the Reform Act, the FAA Administrator is to permit unmanned aircraft systems to operate in the National Air Space ("NAS") where it is safe to do so based on the following considerations:

- The UAS size, weight, speed, and operation capability;
- Operation of the UAS in close proximity to airports and populated areas; and
- Operation of the UAS within the visual line of sight of the operator.

In addition, the FAA Administrator has general authority to grant exemptions from the agency's safety regulations and minimum standards when the Administrator decides a requested exemption is in the public interest. See 49 U.S.C. § 106(f) (defining the authority of the Administrator); 49 U.S.C. § 44701(f) (permitting exemptions from §§ 44701(a), (b) and §§ 44702 – 44716, et seq.). A party requesting an exemption must explain the reasons why the exemption, (1) would benefit the public as a whole, and (2) would not adversely affect safety

(or how it would provide a level of safety at least equal to the existing rules). See 14 C.F.R. § 11.81 (petitions for exemption).

## **SECTION 5: PROPOSED UAS OPERATIONS MEET THE REQUIREMENTS OF SECTION 333**

The small UAS operations proposed by MC in this Petition for Exemption qualify for expedited approval pursuant to Section 333 of the Reform Act as each of the statutory criteria and relevant factors are satisfied.

- Approval is Warranted Based on the UAS's Size, Weight, Speed, and Operational Capability

MC will employ the DJI Phantom 2 Vision+ quadcopter for the operations specified in this Petition for Exemption. This is the same UAS model approved for use in the FAA's Grant of Exemption to Douglas Trudeau, Docket No. FAA-2014-0481. This UAS has a maximum take-off weight of less than 3 pounds. The flight speed will not exceed 30 knots, and it will not be flown in controlled airspace or at an altitude that exceeds 400 feet AGL without prior written authorization and approval from the FAA. All flights will be flown in such a way that they can be safely terminated once the operator receives the first low battery warning (approximately 30% of the battery's maximum charge). The DJI Phantom 2 Vision+ does not carry any flammable propellant or fuel. The UAS also has an integrated GPS system that calculates the UAS's position and height and relays that information via a secure connection to the operator. Additionally, as acknowledged by the FAA in its prior grant of exemption to Douglas Trudeau, the DJI Phantom 2 Vision+, "Has the capability to operate safely after experiencing certain in-flight contingencies or failures and uses an auto-pilot system to maintain UAS stability and control. The UAS is also able to respond to a loss of GPS or a lost-link event with pre-coordinated automated flight maneuvers."

- Approval is Warranted Based on the Operational Restrictions Set Forth in the Flight Operations Manual

The MC Flight Operations Manual and the Manufacturer's Manuals for the selected UAS will contain all the procedures and limitations necessary to safely and successfully perform the operations specified in this Petition for Exemption. To assist the FAA in making a safety assessment of MC's proposed operations, below is a summary of operational limitations and conditions that will ensure an equivalent or higher level of safety to operations conducted under current regulatory guidelines:

1. The DJI Phantom 2 Vision+ weighs less than 3 pounds, fully loaded.
2. The DJI Inspire 1 weighs less than 7 pounds, fully loaded.
3. The radio frequencies used for operations and control of the UAS (2.4GHz) will comply with the Federal Communications Commission ("FCC") or other appropriate government oversight agency requirements.
4. Minimum crew for each operation will consist of a pilot, who will be Pilot-in Command ("PIC") of the UAS, and one or more Visual Observers ("Observer") as necessary to safely conduct the mission.

5. The UAS shall be operated within Visual Line of Sight ("VLOS") of the PIC and Observer at all times. The PIC will use human vision unaided by any device other than corrective lenses.
6. The UAS shall be operated during daylight only. Operations shall occur during daytime VFR Meteorological Conditions; flights under special visual flight rules ("SVFR") shall not be conducted. UAS operations under Instrument Flight Rules, at night, or beyond VLOS are prohibited.
7. The Observer designated for any operation will be in constant voice contact with the PIC.
8. The additional requirements identified in the exemption grant shall be added to MC's Flight Operations Manual. The Flight Operations Manual will be maintained and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations in the granted exemptions and the MC Flight Operations Manual, the conditions and limitations in the granted exemptions will be incorporated into the Flight Operations Manual.
9. The UAS will be operated and maintained according to the Manufacturer's Manuals and any required manufacturer Safety/Service Bulletins.
10. All aircraft operated in accordance with this exemption will be identified by serial number, registered in accordance with 14 C.F.R. part 47, and have identification markings in accordance with 14 C.F.R. part 45, Subpart C. Markings must be as large as practicable.
11. Prior to each flight the PIC shall inspect the UAS to confirm that it is in a condition safe for flight. The PIC shall not operate the UAS if the inspection reveals a condition that affects the safe operation of the UAS until the necessary maintenance has been performed and the UAS is found to be in a condition for safe flight. All maintenance and alternations must be properly documented in the UAS records.
12. Any UAS that has undergone maintenance or alterations that affect the UAS operation or flight characteristics must undergo a functional test flight in accordance with MC's Flight Operations Manuals. The PIC who conducts the functional test flight must make an entry in the UAS aircraft records of the flight.
13. Prior to the operation, there will be a Flight Plan setting forth the operational limitations and conditions for the flight operations, as well as key personnel contact information and a description of any potential hazards on or in the vicinity of the survey site.
14. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough power to fly at normal cruising speed to the intended landing point and land the UAV once the low battery warning is received (approximately 30% of the battery's maximum charge).
15. The UAV shall remain clear and yield the right of way to all other manned operations and activities at all times (including, but not limited to, ultralight vehicles, parachute activities, parasailing activities, hang gliders, etc.).

16. The UAS will not be operated by the PIC from any moving device or vehicle.
17. Flights will be operated at an altitude of no more than 400 feet AGL and will never enter navigable controlled airspace.
18. Flights will be operated at a lateral distance of at least 200 feet from any nonparticipating persons, unless that person is in a position where he or she is shielded from the UAS and any possible debris resulting from UAS failure.
19. At no time will the UAS be operated so close to persons or objects to present an undue hazard to the PIC or Observer, pursuant to § 91.119(a).
20. UAS operations will occur at least 200 feet away from non-participating vehicles or structures unless the property owner/controller has granted permission, and the PIC has made a safety assessment of the risk of operating closer to those objects. At no time will the UAS be operated so close to structures or vehicles as to present an undue hazard to the PIC or Observer, per § 91.119(a).
21. Flights will be limited to a speed of 30 knots and vertical ascent / decent will be limited to 15 fps.
22. If the UAS loses communication with the PIC, the UAS has the capability to return to a pre-determined location within the operational area and land safely.
23. Contingency plans will be in place to safely terminate flight if there is a loss of communication between the PIC and the Observer.
24. The UAS will have the capability to safely abort flight in the case of unpredicted obstacles or emergencies. The PIC will abort the flight in the event of unpredicted obstacles or emergencies in accordance with the MC's Flight Operations Manuals.

## **SECTION 6: REGULATIONS FROM WHICH EXEMPTION IS REQUESTED**

The Federal Aviation Act expressly grants the FAA the authority to issue exemptions. This statutory authority, by its terms, includes exempting civil aircraft, as the term is defined under § 40101 of the Act, including UASs, from its safety regulations and minimum standards when the Administrator decides a requested exemption is in the public interest.

MC seeks an exemption from several interrelated provisions of Title 14 of the Code of Federal Regulations ("14 C.F.R") Parts 21, 45, 61 and 91 for purposes of conducting the requested operations using a UAS. Listed below are the specific sections of 14 C.F.R for which exemption is sought.

### **A. 14 C.F.R. Part 21, Subpart H – Airworthiness Certificates and 14 C.F.R. § 91.20**

The FAA has stated that no exemption is needed from this section if a finding is made under the Reform Act that the UAS selected provides an equivalent level of safety when compared to aircraft normally used for the same application. These criteria are met, and therefore no exemption is needed. See Grant of Exemption to Astraeus Aerial, Docket No. FAA-2014-0352 at 13-14, 22. If, however, the FAA determines that there are some characteristics of the chosen UAS that fail to meet the requirements of the Reform Act, an exemption is requested.

**B. 14 C.F.R. Part 27 Airworthiness Standards: Normal Category Rotorcraft**

Title 14 C.F.R. Part 27 sets forth the procedural requirements for airworthiness certification of normal category rotorcraft. To the extent that MC's small UASs would otherwise require certification under Part 27, Petitioner seeks an exemption from Part 27's airworthiness standards for the same reasons identified in the request for exemption from 14 C.F.R. Part 21, Subpart H, *supra*.

**C. 14 C.F.R. § 91.7(a): Civil Aircraft Airworthiness**

MC seeks an exemption from 14 C.F.R. § 91.7(a), which requires that a civil aircraft be in airworthy condition to be operated. The FAA has stated that no exemption is required for 14 C.F.R. § 91.7(a) to the extent that the requirements of Part 21 are waived or found inapplicable. See Docket No. FAA-2014-0352 at 13-14, 22. Accordingly, Petitioner requests that the requirements for § 91.7(a) be treated in accordance with Section V(A), *supra*.

**D. 14 C.F.R. § 91.9(b)(2): Civil Aircraft Flight Manual in the Aircraft and 14 C.F.R. § 91.203(a) and (b): Carrying Civil Aircraft Certification and Registration**

MC seeks exemption from 14 C.F.R. § 91.9(b)(2). Given the small size and configuration of the UAS, it would be impossible to keep airworthiness documents and other aircraft manuals on board the UAS because there is simply no room and the UAS has no cabin or cockpit.

**E. 14 C.F.R. §§ 91.9(c), 45.23(b) and 45.27(a): Aircraft Marking and Identification Requirements**

MC seeks an exemption from the aircraft marking and identification requirements contained in 14 C.F.R. §§ 91.9(c), 45.23(b) and 45.27(a).

14 C.F.R. § 91.9(c), Civil Aircraft Flight Manual, Marking and Placard requirements, provides that: No person may operate a U.S.-registered civil aircraft unless that aircraft is identified in accordance with Part 45 of this chapter.

14 C.F.R. § 45.23(b), Markings of the Aircraft, states: When marks include only the Roman capital letter "N" and the registration number is displayed on limited, restricted or light-sport category aircraft or experimental or provisionally certificated aircraft, the operator must also display on that aircraft near each entrance to the cabin, cockpit, or pilot station, in letters not less than 2 inches nor more than 6 inches high, the words "limited," "restricted," "light-sport," "experimental," or "provisional," as applicable.

14 C.F.R. § 45.27(a), Rotorcraft, states: Each operator of a rotorcraft must display on that rotorcraft horizontally on both surfaces of the cabin, fuselage, boom, or tail the marks required by § 45.23.

In a previous Grant of Exemption, the FAA determined that exemption from these requirements was warranted provided that the aircraft "have identification (N-Number) markings in accordance with 14 C.F.R Part 45, Subpart C if the markings are as large as practicable." FAA Docket No. FAA-2014-0352.

**F. 14 C.F.R. § 91.103: Preflight Action**

MC seeks an exemption from 14 C.F.R. § 91.103, which requires a PIC to become familiar with specific information before each flight, including information contained in the FAA-approved Flight Manual on board the aircraft. While the PIC will be familiar with all information necessary to safely conduct the flight, an exemption is requested to the extent that an FAA-approved Flight Manual is required.

**G. 14 C.F.R. § 91.119: Minimum Safe Altitudes**

MC seeks an exemption from the minimum safe altitude requirements of 14 C.F.R. § 91.119. Section 91.119 prescribes the minimum safe altitudes under which aircraft may not operate, including 500 feet above the surface and away from any person, vessel, vehicle, or structure in non-congested areas. See 14 C.F.R. § 91.119(c). Section 91.119(d) allows for a helicopter to operate at less than those minimum altitudes when it can be operated "without hazard to persons or property on the surface," provided that "each person operating the helicopter complies with any routes or altitudes specifically prescribed for helicopters by the FAA."

An exemption is required because the proposed UAS operations will occur below 400 feet AGL. Additionally, due to the nature of the proposed operations, the Pilot and/or Observers(s) may need to be less than 500 feet away from the UAS.

**H. 14 C.F.R. § 91.121: Altimeter Settings**

MC seeks an exemption from 14 C.F.R. § 91.121, which requires a person operating an aircraft to maintain cruising altitude or flight level by reference to an altimeter that is set to the elevation of the departure airport or barometric pressure. An exemption is required to the extent that the UASs do not have a barometric altimeter, but rather GPS altitude display.

**I. 14 C.F.R. § 91.151(a): Fuel Requirements for Flight in VFR Conditions**

MC seeks an exemption from 14 C.F.R. § 91.151(a)'s fuel requirements for flight in VFR conditions. The technological limitations on UAS battery power means that no meaningful flight operations can be conducted while still maintaining a 30-minute battery reserve. An exemption from the fuel requirements of 14 C.F.R. § 91.151(a) is therefore required. Additional information: Individual MC Flight operations will be limited 15 minutes or less.

**J. 14 C.F.R. § 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2); 91.417(a) and (b):  
Maintenance Inspections**

MC seeks an exemption from the maintenance inspection requirements contained in 14 C.F.R. § 91.405(a), 91.407(a)(1), 91.409(a)(2); 91.417(a) and (b). These regulations specify maintenance and inspection standards in reference to 14 C.F.R. Part 43. See, e.g., 14 C.F.R. § 91.405(a) (stating that each owner or operator of an aircraft "[s]hall have the aircraft inspected as prescribed in subpart E of this part and shall between required inspections ...have discrepancies repaired as prescribed in part 43 of this chapter"). An exemption from these regulations is needed because Part 43 and these sections only apply to aircraft with an airworthiness certificate, which the UAS to be operated under this grant of exemption will not have.

**K. 14 C.F.R. Part 61, 14 C.F.R. § 61.3, 14 C.F.R. § 61.113: Private Pilot Privileges and Limitations**

61.113: subsections (a) and (b) prescribe the following, in relevant part:

(a) No person who holds a private pilot certificate may act as a pilot in command (PIC) of an aircraft that is carrying passengers or property for compensation or hire; nor may that person, for compensation or hire, act as PIC of an aircraft.

(b) A private pilot may, for compensation or hire, act as PIC of an aircraft in connection with any business or employment if -

(1) The flight is only incidental to that business or employment; and

(2) The aircraft does not carry passengers or property for compensation or hire.

MC seeks exemption from 14 CFR § 61.113, which restricts private pilot certificate holders from flying aircraft for compensation or hire, and would also require a second class medical certificate. The purpose of Part 61 is to ensure that the skill and competency of any PIC matches the airspace in which the PIC will be operating, as well as requiring certifications if the private pilot is carrying passengers or cargo for hire. In this case, while the UASs will be operated as part of a commercial operation, it carries neither passengers nor cargo. In the Grant of Exemption to Astraeus Aerial17, the FAA determined that the unique characteristics of UAS operation outside of controlled airspace did not warrant the addition cost and restrictions attendant with requiring a the PIC to have a Commercial Pilot Certificate and Class II Medical Certificate. The fulfillment of the additional requirements for a private pilot to become qualified as a commercial pilot would not lead to any additional safety benefits when UAS operations are involved. Furthermore, while helpful, a pilot license will not ensure remote control piloting skills. The risks associated with the operation of small UAS is far less than the risks associated with the commercial activities outlined in 14 CFR § 61.113 (a) & (b).

**SECTION 7: PRIVACY**

All MC UAS operations will be conducted in accordance with applicable federal, state, or local laws regarding privacy. All operations shall be conducted over private or controlled-access property with permission from the land/building owner/controller or authorized representative. Permission from land owner/controller or authorized representative will be obtained for each flight to be conducted. Notification of inspection activities (including UAS operations) will be delivered via land/building owner/controller or authorized representative a minimum of 24 hours prior to inspection day/UAS operations.

**SECTION 8: PUBLIC INTEREST**

The public interest will be served by granting MC's Petition for Exemption. Congress has established a national policy that favors early integration of UAS into the NAS in controlled, safe working environments such as those proposed in this Petition. Granting this Petition for Exemption helps fulfill Congress' goal in passing Section 333(a) through (c) of the Reform Act—the FAA Administrator's assessment of whether certain UAS may operate safely in the NAS before completion of the statutorily required rulemaking. The proposed UAS operations in this Petition for Exemption significantly improve safety and reduce risk by alleviating the public's exposure to danger associated with traditional aerial survey and inspection methods,

namely, full size fixed-wing aircraft and rotorcraft as well as the use of inherently dangerous equipment use such as scaffolding and aerial work platforms. The UASs that MC intends to use weight less than 3 pounds (DJI Phantom 2 Vision+) and less than 7 pounds (DJI Inspire 1), are battery powered, and create no emissions. Moreover, in the unlikely event that one of Petitioner's UASs crash, there is no fuel to ignite and explode. Any accident involving Petitioner's lightweight UASs will present significantly less danger to the pilot and other individuals on the ground than one involving a full size aircraft or significantly larger UAS. Furthermore, MC's UASs will be capable of documenting conditions that may have been otherwise inaccessible using traditional inspection and survey methods. UAS-assisted photography will also reduce the risk of harm to inspecting engineers and consultants by not exposing them to hazards associated with inspection of dangerous or unsafe physical conditions often present in buildings and structures that have been damaged.

## **SECTION 9: SUMMARY AND CONCLUSION**

MC seeks exemption from the following rules in Title 14 of the Code of Federal Regulations: 14 C.F.R. 21, subpart H; 14 C.P.R. 45.23(b); 14 C.F.R. §§ 61.113 (a) & (b); 14 C.F.R. § 91.7 (a); 14 C.F.R. § 91.9 (b)(2); 14 C.F.R. § 91.103(b); 14 C.F.R. § 91.109; 14 C.F.R. § 91.119; 14 C.F.R. § 91.121; 14 C.F.R. § 91.151(a); 14 C.F.R. §§ 91.203(a) and (b); 14 C.F.R. § 91.405 (a); 14 C.F.R. § 91.407 (a)(1); 14 C.P.R. § 91.409 (a)(2); 14 C.P.R. § 91.409 (a)(2); and, 14 C.P.R. §§ 91.417 (a) & (b) to commercially operate lightweight unmanned UAS during forensic evaluations and building condition assessments.

Granting MC Consultants request for exemption will reduce current risk levels and thereby enhance safety. UAS technologies applied to building inspection services will provide higher level of efficiency and safer services for our clients. Forensic evaluations and building condition assessments performed by MC often involve the physical inspection of outdoor structures and facilities for the assessment of current element condition, damage, defects and accidents. Obtaining images of certain physical features may not be feasible due to dangerous conditions, limited access on the structure or the excessive height of the required viewing angle.

The use of UAS-assisted photography will provide a practical means to perform forensic evaluations and building condition assessments that would be otherwise unsafe to the employees of MC and the general public. UAS-assisted photography also offers a safer and more efficient means to perform forensic evaluations and building condition assessments. The use of this technology will better serve clients and improve public safety.

MC Consultants respectfully requests that the FAA grant its exemption request without delay. The FAA has the authority to issue the exemption sought by MC Consultants pursuant to the Federal Aviation Act, 85 P.L. 726 (1958), as amended (the "Act").

Respectfully submitted,

Kai Loedel  
Chief Operating Officer  
MC Consultants, Inc.  
2055 Corte del Nogal  
Carlsbad, CA 92011

The following attached items contain proprietary and commercial information exempt from disclosure under the Freedom of Information Act, 5 U.S.C. § 522 et seq., and should be held in a separate file pursuant to 14 C.F.R. § 11.35(b).

**Attachments:**

1. MC Consultants, Inc.:
  - a. MC\_UAS\_Flight\_Operations\_Manual\_v1.0
2. DJI Phantom 2 Vision+:
  - a. Phantom\_2\_Vision\_Plus\_Pilot\_Training\_Guide\_v1.1
  - b. Phantom\_2\_Vision\_Plus\_Quick\_Start\_Guide
  - c. Phantom\_2\_Vision\_Plus\_User\_Manual\_v1.8
  - d. Smart\_Flight\_Battery\_Safety\_Guidelines
3. DJI Inspire 1:
  - a. Inspire\_1\_User\_Manual\_v1.0
  - b. Inspire\_1\_Safety\_Guidelines
  - c. Inspire\_1\_Maintenance\_ManualV1.0
  - d. 1345\_Propeller\_Locks\_Quick\_Start\_Guide
  - e. Intelligent\_Flight\_Battery\_Safety\_Guidelines

## MC Consultants Flight Operations Manual (v1.0)

### 1. GENERAL PROTOCOL:

- 1.1. Review and consult the UAS manufacturers manuals:
  - 1.1.1. DJI Phantom 2 Vision+:
    - 1.1.1.1. Phantom\_2\_Vision\_Plus\_Pilot\_Training\_Guide\_v1.1
    - 1.1.1.2. Phantom\_2\_Vision\_Plus\_Quick\_Start\_Guide
    - 1.1.1.3. Phantom\_2\_Vision\_Plus\_User\_Manual\_v1.8
    - 1.1.1.4. Smart\_Flight\_Battery\_Safety\_Guidelines
  - 1.1.2. DJI Inspire 1:
    - 1.1.2.1. Inspire\_1\_User\_Manual\_v1.0
    - 1.1.2.2. Inspire\_1\_Safety\_Guidelines
    - 1.1.2.3. Inspire\_1\_Maintenance\_Manual\_v1.0
    - 1.1.2.4. 1345\_Propeller\_Locks\_Quick\_Start\_Guide
    - 1.1.2.5. Intelligent\_Flight\_Battery\_Safety\_Guidelines
- 1.2. Minimum crew for each operation shall consist of a pilot, who will be Pilot-in Command ("PIC") of the UAS, and one or more Visual Observers ("VO") as necessary to safely conduct the mission
- 1.3. The UAS shall be operated within Visual Line of Sight ("VLOS") of the PIC and VO at all times. The PIC will use human vision unaided by any device other than corrective lenses
- 1.4. The UAS shall be operated during daylight only. Operations shall occur during daytime VFR Meteorological Conditions; flights under special visual flight rules ("SVFR") shall not be conducted. UAS operations under Instrument Flight Rules, at night, or beyond VLOS are prohibited
- 1.5. The Observer designated for any operation will be in constant voice contact with the PIC
- 1.6. Prior to operation, PIC and VO are to prepare a Flight Plan setting forth the operational limitations and conditions for the flight operations and a description of any potential hazards on or in the vicinity of the survey site
- 1.7. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough power to fly at normal cruising speed to the intended landing point and land the UAV once the low battery warning is received (approximately 30% of the battery's maximum charge)
- 1.8. The UAV shall remain clear and yield the right of way to all other manned operations and activities at all times (including, but not limited to, ultralight vehicles, parachute activities, parasailing activities, hang gliders, etc.)
- 1.9. The UAS shall not be operated by the PIC from any moving device or vehicle
- 1.10. Flights will be operated at an altitude of no more than 400 feet AGL and will never enter navigable controlled airspace
- 1.11. Flights will be operated at a lateral distance of at least 200 feet from any nonparticipating persons, unless that person is in a position where he or she is shielded from the UAS and any possible debris resulting from UAS failure
- 1.12. Warning signage shall be placed within 150 feet of UAV operations.
- 1.13. At no time shall the UAS be operated so close to persons or objects to present an undue hazard to the PIC or Observer

- 1.14. UAS operations shall occur at least 200 feet away from non-participating vehicles or structures unless the property owner/controller has granted permission, and the PIC has made a safety assessment of the risk of operating closer to those objects. At no time shall the UAS be operated so close to structures or vehicles as to present an undue hazard to the PIC or Observer
- 1.15. Flights shall be limited to a speed of 30 knots and vertical ascent / decent will be limited to 15 fps
- 1.16. Contingency plan must be in place to safely terminate flight if there is a loss of communication between the PIC and the Observer
- 1.17. The PIC shall abort flight in the case of unpredicted obstacles or emergencies. Refer to section four below

## **2. PRE-FLIGHT PROTOCOL:**

- 2.1. Review local weather forecast
- 2.2. Inspect surroundings
  - 2.2.1. Visually review the flight location and surroundings
  - 2.2.2. Identify potential risks and challenges
    - 2.2.2.1. Vicinity of public safety helipads/heliports
    - 2.2.2.2. Vicinity of medical helipads/heliports
    - 2.2.2.3. Vicinity of airport(s)
    - 2.2.2.4. Vicinity of light poles
    - 2.2.2.5. Vicinity of utility poles/towers/lines
    - 2.2.2.6. Vicinity of trees
    - 2.2.2.7. Vicinity of elevated obstructions
    - 2.2.2.8. Vicinity of roadways with moderate to heavy traffic
    - 2.2.2.9. Flocks of birds that may cause interference and potentially impact flight
    - 2.2.2.10. Public gatherings that may attract viewer
    - 2.2.2.11. Identify optimal point of control to maintain direct line of sight at all times
    - 2.2.2.12. Identify optimal point of home position and launch/land location
- 2.3. Place warning signage in appropriate locations
  - 2.3.1. Place sign(s) that warn potential observers or bystanders in public spaces
    - 2.3.1.1. Warning signs should state the following

*“ATTENTION! AERIAL PHOTOGRAPHY IN PROGRESS.  
FOR YOUR SAFETY PLEASE REMAIN 150 FEET BACK”*

- 2.4. Inspect UAS:
  - 2.4.1. Verify that all batteries are in proper working condition
    - 2.4.1.1. Visually inspect batteries for swelling, damage, or leakage
    - 2.4.1.2. Verify that all batteries are fully charged
  - 2.4.2. Verify that the UAV is in proper working condition
    - 2.4.2.1. Visually inspect the propellers for warps, chips, and cracks
    - 2.4.2.2. Visually inspect the UAV arms and body for damage/loose connections

### 3. FLIGHT PROTOCOL:

- 3.1. Install propellers and propeller locks (if applicable)
- 3.2. Install battery
- 3.3. Power on radio then power on UAV
- 3.4. Set geo-fence that limits UAV flight path to the inspection location only
- 3.5. Visually inspect immediate and adjacent surroundings
- 3.6. Lift UAV approximately 4 feet off of ground and allow to hover in place
- 3.7. Verify that all system inputs are responding normally
- 3.8. Maneuver UAV in a slow controlled manner at all times
- 3.9. Restrict flight altitude to a minimum elevation sufficient to acquire data
- 3.10. Remain alert to surroundings including the following:
  - 3.10.1. Approaching people and vehicles
    - 3.10.1.1. VO shall deflect all distraction from PIC
  - 3.10.2. Birds
  - 3.10.3. Manned aircraft
  - 3.10.4. Changes in wind speed and direction
  - 3.10.5. Location of the sun
  - 3.10.6. Changes in cloud coverage
- 3.11. Land UAV in same location as take off

### 4. UNPREDICTED OBSTACLES OR EMERGENCIES

- 4.1. If at any time the PIC or VO observes or encounters an unpredicted obstacle, the PIC shall immediately land the UAV in a safe location
- 4.2. The PIC may increase or decrease altitude based on the location of the unpredicted obstacle to avoid the obstacle
- 4.3. If an unpredicted obstacle is identified during normal flight, the PIC shall return the UAV to its home position to further identify the challenge and create a new flight plan
- 4.4. If the UAV begins to act in an unpredictable manner then the PIC shall land the UAV immediately

### 5. POST-FLIGHT PROTOCOL

- 5.1. Shut down UAS
- 5.2. Remove propellers
- 5.3. Allow all batteries and UAV to cool down
- 5.4. Place batteries, transmitter(s), propellers, and accessories into carrying case
- 5.5. Log flight time and any conditions that changed during flight
- 5.6. Charge batteries pursuant to manufacturers recommendations
- 5.7. Ensure that all systems have the most current version of firmware/software installed

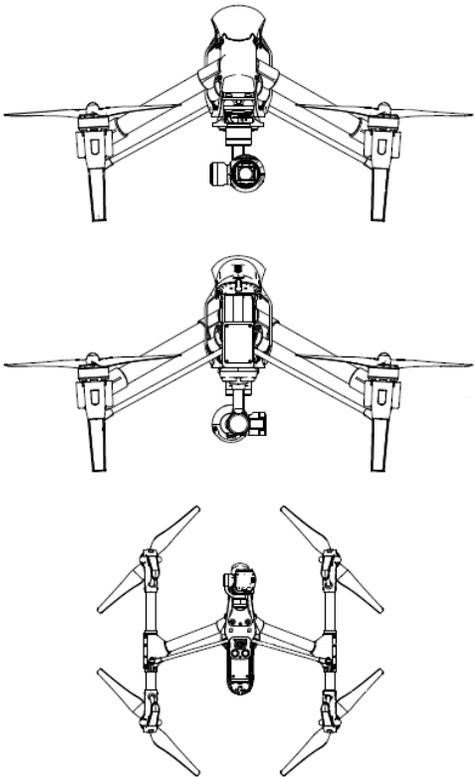
### 6. FLIGHT LOGS:

- 6.1. The PIC must maintain flight and maintenance logs using the forms below:

**MC Consultants Flight Operations Flight Log (v1.0)**

Pilot in Charge:		
Visual Observer:		
Date:		
Project Name:		
Project Number:		
Location:		
Weather Conditions:		
UAS:		
Flight Plan:		
Challenges:		
Flight Notes:		
Pre-Flight Checklist:	Inspect surroundings	<input type="checkbox"/>
	Note flight plan	<input type="checkbox"/>
	Note challenges	<input type="checkbox"/>
	Place warning signage	<input type="checkbox"/>
	Inspect UAS	<input type="checkbox"/>
	Inspect batteries	<input type="checkbox"/>
	Tighten props / install prop locks	<input type="checkbox"/>
	Inspect/tighten all connections	<input type="checkbox"/>
	Review flight plan	<input type="checkbox"/>
	Place warning signage	<input type="checkbox"/>
	Set geo-fence (if applicable)	<input type="checkbox"/>
	Test control inputs	<input type="checkbox"/>

**MC Consultants Flight Operations Maintenance Log (v1.0)**

Maintenance Performed by:		
UAS:	DJI Inspire 1	Identification Number
Date:		Notes:
Checklist:	Inspect UAS	<input type="checkbox"/>
	Inspect camera	<input type="checkbox"/>
	Inspect batteries	<input type="checkbox"/>
	Inspect cables	<input type="checkbox"/>
	Inspect charger	<input type="checkbox"/>
	Tighten all connections	<input type="checkbox"/>
	Inspect propellers	<input type="checkbox"/>
	Update software	<input type="checkbox"/>
	Update firmware	<input type="checkbox"/>
	Calibrate IMU	<input type="checkbox"/>
	Calibrate compass	<input type="checkbox"/>
	Test control inputs	<input type="checkbox"/>
	Charge batteries	<input type="checkbox"/>
Additional Notes:		
		

**MC Consultants Flight Operations Maintenance Log (v1.0)**

Maintenance Performed by:		
UAS:	DJI Phantom 2 Vision+	Identification Number
Date:		Notes:
Checklist:	Inspect UAS	<input type="checkbox"/>
	Inspect camera	<input type="checkbox"/>
	Inspect batteries	<input type="checkbox"/>
	Inspect cables	<input type="checkbox"/>
	Inspect charger	<input type="checkbox"/>
	Tighten all connections	<input type="checkbox"/>
	Inspect propellers	<input type="checkbox"/>
	Update software	<input type="checkbox"/>
	Update firmware	<input type="checkbox"/>
	Calibrate IMU	<input type="checkbox"/>
	Calibrate compass	<input type="checkbox"/>
	Test control inputs	<input type="checkbox"/>
	Charge batteries	<input type="checkbox"/>
Additional Notes:	