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US DEPARTMENT OF TRANSPORTATION
1200 New Jersey Avenue
SE Room W-12-140
West Building Ground Floor
Washington, DC 20590-0001

December 30, 2014

Dear Administrator:

Enclosed please find the petition from Cambervision Inc. to the Federal Aviation Administration seeking an exemption from the requirements of Title 14 of the Code of Federal Regulations concerning the operation of an Unmanned Aircraft System for, commercial use and operation within the United States. The proposed exemption, if granted, will permit Cambervision's commercial use of the Unmanned Aircraft System ("UAS") for the purpose of research and development and aerial inspections of buildings and land within the United States.

Very Truly Yours,

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## SUMMARY FOR SEEKING EXEMPTION

CAMBERVISION, INC. ("Cambervision"), a Massachusetts Corporation, seeks an exemption from the requirements of Title 14 of the Code of Federal Regulations in particular an exemption from the following sections:

Part 21

14 C.F.R. §45.23(b)

14 C.F.R. §61.113 (a) and (b)

14 C.F.R. §91.7(a)

14 C.F.R. §91.9(b) (2)

14 C.F.R. §91.103

14 C.F.R. §91.109(a)

14 C.F.R. §91.119(b)

14 C.F.R. §91.121

14 C.F.R. §91.151(a) (1)

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.F.R. §91.409(a) (2)

14 C.F.R. §91.417(a) and (b)

Cambervision seeks commercially fly an Unmanned Aircraft System (UAS) within the United States**.** The propose UAS is a small quadrocopter no more than 20 pounds fully loaded with equipment to be flown at no more than 400 feet above ground level ("AGL") and not within 5 miles of an airport. The exemption will have a positive impact on the public interest by providing services that are not available to the general public but are in high demand by both private and municipal parties. The exemption in particular will allow Cambervision to offer a spectrum of services using the UAS including community training workshops on the proper use and operation of UASs to

ensure safe operation by hobbyists and commercial users as well as to provide innovative and economically beneficial options of building/site inspections.

The Petitioner is dedicated to following the conditions and limitations as imposed by the FAA regarding the flight of the UAS and including but not limited to avoid and yield right-of-way to all manned operations, file necessary notices and flight plans as well as adhere to the city and state imposed regulations to ensure the utmost safety for the general public and the operators.

## COMPANY BACKGROUND

CAMBERVISION, INC. is a Massachusetts Corporation with a primary place of Business in Needham, MA. Founded by two entrepreneurs with a background in aviation and a strong interest and desire to bring innovative services to the public using an UAS that are more practical, economical and useful than other avenues. One of the founders has an extensive background with commercial and government aviation as well as a Mechanic's certificate from the Federal Aviation Administration issued for Airframe and Powerplant Mechanics.

The company is interested in performing Research and Development for a unique platform of services to be utilized commercially by a variety of professionals from architects, builders, real estate companies and property managers to municipal service departments and first responders.

Cambervision is dedicated to offering innovative and customized services to consumers using the UAS to better serve the community and the public interest by providing a safer alternative to current practices of building inspection and other services as well as by providing training workshops for UAS enthusiasts and commercial entities to ensure safer operations of the UAS in the National Airspace System ("NAS").

## UNMANNED AIRCRAFT SYSTEM SPECIFICATIONS

### I. AIRCRAFT: DJI

Cambervision seeks an exemption to operate a DJI, Model Phantom 2, version 2 ("DJI") for commercial use within the NAS.

The DJI is an X shaped quadrocopter equipped with an on-board flight computer with constant communication with the ground station transmitting live data regarding speed, compass direction of flight, and altitude levels amongst its in-flight data. The UAS contains a Global Positioning System ("GPS") tracking device and an on-board camera capable of capturing full color, high definition still photos and video. The UAS is also equipped with four sets of LED 'status-lights' which providing not only an enhanced visual from the ground but assisting the Pilot in Command ("PIC") to confirm battery, GPS and other functionalities of the UAS based on the color and status of the lights..

### a. Specifications

**Figure 1**: The DJI Phantom, Model 2, version 2.

## II. GROUND CONTROL STATION

The ground control ("GCS") station is the primary takeoff and landing point of the UAS and includes a setup, consisting of people and equipment, to promote the outmost safety for all persons involved in the operation including the operators, general public, and any objects or persons that may come into contact with the zone of operation ("Zone"). Specifically the ground station includes:

a. **Pilot in Command:** A designated pilot with a private pilot's license, a current third-class medical certificate and a deep knowledge and thorough understanding of the UAS and its operation as well as numerous hours of experience in operating

| | |
|---|---|
| **General Description** | A battery operated lightweight rotorcraft with additional onboard equipment and a separate ground station used for operation. |
| **Weight (including battery)** | Approximately 2.2 lbs. |
| **Flight path** | Vertical takeoff and landing |
| **Hovering Accuracy (Ready to Fly)** | Vertical: 0.8m/ Horizontal: 2.5 m |
| **Max. Ascent/Max. Descent Speed** | Ascent: 6m/s; Descent: 2m/s |
| **Max. Flight Speed** | 15m/s |
| **Number of copter blades** | Four |
| **Color** | White with red and green stripes |

the DJI. PIC will operate the UAS within visual line of sight (VLOS) at all times using human vision unaided by any device other than corrective lenses.

**b. Flight Coordinator/Visual Observer** ("FC"): A second person, other than the PIC, with a visual of the UAS at all times and the ability and knowledgeable to assist the PIC as needed including verbal as well as physical command of the controls. The UAS will always be within the VLOS of the FC. The PIC and the FC will have the ability to communicate verbally at all times.

**c. Equipment:**

a. A 100mW, 2.4GHz radio transmitter/controller operated by the PIC.
b. A portable receiver receiving transmitted live video and flight data from the UAS onboard camera and computer. This data is projected onto the controller used by the PIC to monitor during the flight.

**d. Zone**: a designated area cordoned off by brightly colored cones to put the surrounding public on notice of the operation. One sandwich board with the name of the company, contact information, and description of the operation in order to alert the general public of the event taking place and allowing anyone interested to contact Cambervision with questions.

**e. Paperwork**: The ground station will also include a designated area for the a copy of the pilot's license, Operator's Manual for the DJI ("Manual") as amended with conditions or limitations scripted by the FAA, copy of the granted exemption, pursuant to the grant of this exemption by the FAA, copy of the insurance certificate, business cards and any other relevant paper work for the specific event.

**f. Other**: Anything else that is required in order to be in full compliance with the regulations of the City and State where the event is taking place.

## BASIS FOR PETITION FOR EXEMPTION

Pursuant to the authority granted to the FAA under Federal Aviation Regulations, 14 C.F.R. § 11.61(b) and the FAA Modernization and Reform Act of 2012, Section 333, *Special Rules for Certain Unmanned Aircraft Systems*, Cambervision respectfully requests to grant its petition for an exemption from the requirements of 14 C.F.R Part 21; 14 C.F.R. §61.113 (a) and (b); 14 C.F.R. §91.7(a); 14 C.F.R. §91.9(b)(2); 14 C.F.R. §91.103; 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.F.R. §91.409(a)(2); and 14 C.F.R. §91.417(a) and (b).

### A. Name and Address of Petitioner:

Cambervision, Inc.
35 Highland Circle
Needham, MA 02494

## B. Specific Sections of 14 C.F.R. From Which Cambervision Seeks Exemptions and the Extent of Relief Cambervision Seeks; The Reason Cambervision Seeks The Relief and Reasons why the Exemptions Would not Affect Public Safety

### 1. Cambervision seeks an exemption from 14. C.F.R. Part 21

***14 C.F.R. Part 21- Airworthiness Certificate***

14 C.F.R. Part 21 along with 14 C.F.R. §91.203(a) (1) establishes the necessary procedures in order to obtain an airworthiness certificate for a manned aircraft. The general purpose of an airworthiness certificate for an aircraft is to ensure the aircraft's safe functionality, good working order and to ensure the safety of those onboard as well as anyone in proximity to the aircraft at any time. The Federal Aviation Act, 49 U.S.C. §44701(f) and Section 333 of the Reform Act statutorily authorize the FAA to issue an exemption from the airworthiness requirements upon consideration of the aircraft's size, weight, speed and operational capability. Such considerations should be applied to Petitioner's UAS in determining that Cambervision should be exempt from the airworthiness requirement for its UAS.

The UAS to be operated by Cambervision is less than 55 lbs. fully loaded (inclusive of additional equipment such as GPS tracker, camera, etc.) and does not carry a pilot or passengers. Furthermore, the UAS does not contain explosives, fuel or any other flammable materials. The operation of the UAS will be strictly confined to a designated area and under full control of the PIC and FC.

***Safety Standard:*** The UAS is equipped with several safety features, which will further serve as a reason to exempt it from an airworthiness certificate. The UAS is equipped with a "Fail-Safe Feature which allows it to self-correct a failure that is beyond control of the PIC. Once a "Failure" is detected the UAS's automatic safety feature is triggered which prompts it to return to its GPS point of origin of takeoff. This along with the other safety features such as a proposed parachute (in early stages of development) provide an enhanced safety feature to the operator and the general public compared to manned aircraft that hold an airworthiness certificate and are used to perform the tasks proposed to be performed by the UAS.

Cambervision would like to refer to Exemptions No.11062 and11067 in which the FAA previously determined that based on the [Petitioner's] UAS "limited size, weight, operating conditions, design safety features and the imposed conditions and limitations … the [Petitioner] has demonstrated that the operations would not adversely affect safety compared to similar operations conducted with aircraft that have been issued an airworthiness certificate under 14 C.F.R. Part 21, Subpart H".

In the alternative Petitioner respectfully requests that the Administrator finds that the exemption from 14 C.F.R. Part 21 is not necessary because the regulation is not applicable to the UAS to be used by the Petitioner.

**2. Cambervision seeks an exemption from 14 C.F.R. §45. 23(b)**

***14 C. F. R. §45.23(b) - Display of Marks; General***

(b) 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.

Provided that the exemption from Part 21 is granted and the UAS will not need an airworthiness certificate, Petitioner seeks an exemption from the requirement that the word "EXPERIMENTAL" be displayed on the DJI near each entrance to the cabin, cockpit or pilot station. The DJI Phantom is a small UAS and subsequently does not have a cabin, cockpit, pilot station or any other type of entrance. The size of the UAS does not permit any markings to be above one inch (1") in height and be longer than eight inches (8").

***Safety Standard:*** In order to achieve an equivalent level of safety and to most closely comply with the FAA regulations, Cambervision proposes to display the word "EXPERIMENTAL" on top of the UAS with the dimensions of the signage being one inch by eight inches (1"x8") in compliance with 14 F.C.R. §45.29 (f) (See Figure 2 below). This type of signage will allow the PIC, FC and others in close proximity to see the designation of the UAS.


**Figure 2:** The DJI Phantom with the proposed wording on top.

The FAA should grant Cambervision the exemption from the regulation regarding the requirement for signage. As the FAA decided in Exemptions No. 11062 and 11067 that an exemption from such requirements is warranted given that the aircraft obtains an N-number in accord with 14 C.F.R. Part 47, have identification (N-markings) in accord with 14 C.F.R. 45, Subpart C. and the markings must be as large as practicable the FAA Administrator should decide similarly in this instance. Cambervision will display

markings as large as practicable on the top of the UAS in the interest of safety and compliance. See also Exemptions Nos. 10700, 8738, 10167, and 10167A.

### 3. Cambervision seeks an exemption from 14 C.F.R. §61.113(a) and (b)

***14 C.F.R. §61.113- Private pilot privileges and limitations: Pilot in command.***

**(a)** Except as provided in paragraphs (b) through (h) of this section, no person who holds a private pilot certificate may act as pilot in command of an aircraft that is carrying passengers or property for compensation or hire; nor may that person, for compensation or hire, act as pilot in command of an aircraft.

**(b)** A private pilot may, for compensation or hire, act as pilot in command 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.

Cambervision seeks an exemption from the restriction outlined in parts (a) and (b) of the regulation prohibiting a holder of a private pilot's certificate to act as a pilot for an aircraft carrying property for compensation or hire. The UAS to be used by Cambervision will be used for commercial operation for compensation or for hire, however, will not be carrying any passengers or cargo allowing Cambervision to achieve the same level of safety of current operations by requiring the PIC to obtain a private pilot's license instead of a commercial pilot license. Unlike an aircraft that carries cargo or passengers, the UAS is remote controlled by an experienced PIC.

***Safety Standard:*** Pursuant to obtaining a grant of the exemption to operate the UAS for compensation, Cambervision will ensure that the PIC holds a private pilot's license, has a significant number of flying hours and follows the instructions as set forth in the Manual for the UAS. Since there are no persons on board and the UAS will be operated within the safety procedures outlined by the FAA regulations, the operation of the UAS by remote control with a private pilot's license by the PIC will exceed the present level of safety meant to be achieved by the requirements of 14 C.F.R. §61.113 (a) and (b).

As the FAA Administrator previously outlined in Exemption Nos. 11062 and 11067 "[a]nother consideration supporting the certificate requirement is that pilots holding a private pilot certificate are subject to security screening by the Department of Homeland Security" and this type of screening should overrule "security concerns over the UAS operations" that would be granted under this exemption. Additionally as the FAA concluded in the analysis of the areas of knowledge specified in 14 C.F.R. part 61 for that of a commercial pilot versus a private pilot, the results show that "the required areas of knowledge for a commercial versus private pilot cover the same fundamental principles". Granting Cambervision the exemption based on the safety outlines and requirements outlined by the FAA and the experience and expertise of the PIC, would not adversely affect the safety of the NAS.

Cambervision would like to refer to Exemptions No.11062 and11067 in which the FAA previously determined that a commercial pilot's license is not required to operate an UAS.

4. **Cambervision seeks an exemption from 14 C.F.R. §91.7(a)**

***14 C.F.R. §91.7(a)-Civil aircraft airworthiness***

(a) No person may operate a civil aircraft unless it is in an airworthy condition.

Cambervision requests an exemption from the regulation, pursuant to Cambervision obtaining of an exemption to 14 C.F.R. Part 21, there will be no airworthiness certificate issued for the UAS and consequently a standard for airworthiness is not applicable.

***Safety Standard:*** Cambervision' s compliance with an established pre-flight safety checklist, standard of operation as described in the Manual and outlined in the maintenance requirements prior to each flight ensures that an equivalent level of safety will be provided during all times of operation . The PIC will be in compliance with the requirements of 14 C.F.R. §91.7(b) when determining whether the aircraft is in a condition for safe flight.

As the FAA determined in Exemption Nos. 11062 and 11067 that a requirement of airworthiness does not need to be met if a certificate of airworthiness is not required, the FAA should determine similarly in favor of Cambervision that if they are granted the exemption from a certificate of airworthiness, the provision of 14 C.F.R. §91.7(a) and (b) is not necessary.

**5. Cambervision seeks an exemption from 14 C.F.R. §91.9(b)(2)**

***14 C.F.R. §91.9(b) (2) - Civil Aircraft Manual Requirements***

No person may operate a U.S.-registered civil aircraft—

(2) For which an Airplane or Rotorcraft Flight Manual is not required by §21.5 of this chapter, unless there is available in the aircraft a current approved Airplane or Rotorcraft Flight Manual, approved manual material, markings, and placards, or any combination thereof.

Cambervision seeks an exemption from maintaining a flight manual aboard the UAS.

***Safety Standard:*** Given the size and design of the UAS it is not possible to carry the manual onboard during operation. To ensure full compliance with safety requirements the manual will be available at the ground station and immediately accessible by the PIC and FC at all times during operation.

Petitioner would like to refer to Exemption Nos. 8607, 8737, 8738, 9299, 9299A, 9565, 9565B, 10167, 10167A, 10602, 32827, 10700 and 11067 where the Administrator issued a similar exemption as requested here. In the alternative, Petitioner requests that the Administrator finds that the exemption is not necessary based on the FAA

Memorandum subject "Interpretation regarding whether certain required documents may be kept at an unmanned aircraft's control station" dated August 8, 2014.

### 6. Cambervision seeks an exemption from 14 C.F.R. §91.103

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

Each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight. This information must include—

(a) For a flight under IFR or a flight not in the vicinity of an airport, weather reports and forecasts, fuel requirements, alternatives available if the planned flight cannot be completed, and any known traffic delays of which the pilot in command has been advised by ATC;

(b) For any flight, runway lengths at airports of intended use, and the following takeoff and landing distance information:

(1) For civil aircraft for which an approved Airplane or Rotorcraft Flight Manual containing takeoff and landing distance data is required, the takeoff and landing distance data contained therein; and

(2) For civil aircraft other than those specified in paragraph (b)(1) of this section, other reliable information appropriate to the aircraft, relating to aircraft performance under expected values of airport elevation and runway slope, aircraft gross weight, and wind and temperature.

Cambervision seeks an exemption from the Preflight Action requirements as prescribed in 14 C.F.R. §91.103 which requires the PIC to take certain actions before flights to ensure safety.

***Safety Standard:*** The PIC will be familiar with all of the manual requirements and recommendations as well as perform a "Cross-Check Quadrant $^{TM}$ "a customized pre-flight check list of actions to be performed prior to operation of the UAS. Combined, the PIC will take actions such as inspection of the UAS, the weather elements, and physical inspection of the area of operation and aircraft performance data prior to the initiation of every single flight. The Operator's Manual and Operational limitations will be kept at the ground station within reach of the PIC at all times. The information collected at the time of the pre-flight check will be compiled into a report and kept in Petitioner's office for record keeping. The pre-flight procedures will allow an equivalent if not higher level of safety to be reached. The PIC will also take into account visibility and distance from clouds as well as sun glare and the ability to see other traffic when conducting the pre-flight inspections.

In the alternative Petitioner requests the Administrator to find that the exemption is not necessary, as the FAA administrator found in Exemption Nos. 11062 and 11067, that with conditions and limitations the exemption is not necessary.

7. **Cambervision seeks an exemption from 14 C.F.R. §91.109(a)**

***14 C.F.R. §91.109(a) - Flight Instruction***

(a) no person may operate a civil aircraft (except a manned free balloon) that is being used for flight instruction unless that aircraft has fully functional dual controls…

Petitioner requests an exemption from the regulation because the UAS and other remotely piloted aircraft, by design, do not have functional dual controls. Flight control of the UAS is accomplished by the PIC's use of a control box which communicates with the aircraft via radio signal communication.

***Safety Standard:*** Since the UAS is not carrying a pilot or passengers the equivalent level of safety will be achieved with the remote control of the UAS and without dual controls. The PIC is in full control of the UAS at all times. Because the flight will be performed in a cordoned off area, any trouble that the UAS might experience will be rectified in a safe manner by the PIC and the FC without any interference or danger to the public.

Petitioner would like to refer Exemption Nos. 11062 and 11067 where the Administrator found that UAS may be operated without dual controls. See also 5778K and 9862A.

In the alternative the Petitioner would like to request the Administrator to determine that the 14 C.F.R. §91.109(a) regulation is not applicable to Cambervision since Cambervision does not plan to use the UAS in an environment where dual controls are necessary such as instrument flight instruction and the PIC will be the only controller in operation of the UAS at all times.

**8. Cambervision seeks an exemption from 14 C.F.R. §91.119(b)**

***14 C.F.R. §91.119(b) - Minimum Safe Altitudes: General***

Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:

(b) *Over congested areas.* Over any congested area of a city, town, or settlement, or over any open air assembly of persons, an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.

Cambervision seeks an exemption from the requirement of a subsection (b) and relies on subsection (d) for an exemption. Subsection (d) permits the operation of a helicopter at less than the prescribed minimums, given that the operator is in compliance with any route or altitudes prescribed for helicopters by the FAA.

Cambervision requests an exemption to operate the UAS at 400 feet AGL. Except for the limited conditions stated in the Manual the UAS will not operate above 400 feet AGL. The equivalent level of safety will be achieved provided the size, weight and speed of the UAS.

***Safety Standard:*** Cambervision's operation will provide at least an equivalent level of safety if not higher at 400 feet AGL to those in relation to the minimum safe altitudes as outlined in regulation 91.119. Most civil airplanes operate at 500 feet AGL or above therefore the operation of the UAS by petitioner will not be in direct interference with manned aircraft in the NAS. [1] The operation of the UAS will be in a cordoned off area with security perimeters set up by the PIC. All property owners and abutters who may be affected will receive advanced notice of the operation and the propose flight operations as set forth in Section K of the Manual. The PIC will be in the ground control station equipped with the set up as described in detail above in the "Unmanned Aircraft Specifications". Cambervision will ensure a "safe zone" around the area of PIC operation as large as is allowable in an urban setting. At all times anyone interested in the operation criteria of the UAS can contact Petitioner to obtain the necessary information.

Cambervision plans to design and equip a parachute landing system for the UAS in order to ensure a high level of safety for those involved and around the operational area. The UAS is equipped with an automatic system that detects "trouble" such as low battery or connection loss and automatically triggers the UAS to land safely back at its point of lift off based on the GPS coordinates of the take off.

Compared to flight operations with aircraft or rotorcraft weighing far more than the UAS proposed to be used by Cambervision and lack of flammable fuel and a pilot or passengers on board any risk associated with these operations is far less as compared manned aircraft operated in accord with the minimum altitude requirements as outline in the regulation.

**9. Cambervision seeks an exemption from 14 C.F.R. §91.121**

***14 C.F.R. §91.121- Altimeter Settings***

(a) Each person operating an aircraft shall maintain the cruising altitude or flight level of that aircraft, as the case may be, by reference to an altimeter that is set, when operating—
…

Cambervision requests an exemption from the Altimeter Settings requirement because the UAS does not have a barometric altimeter, but is instead equipped with a GPS altitude reading device.

***Safety Standard:*** With an exemption from the regulation, an equivalent level of safety will be achieved by the operator, pursuant to the Manual and pre-flight check lists and by confirming the altitude of the launch site as shown on the GPS altitude indicator before flight. To ensure that the exemption from the regulation does not adversely affect safety the petitioner proposes to operate the UAS at or below 400 feet AGL, provide altitude information to the PIC via a digitally encoded telemetric data feed, which downlinks from the ground-base on-screen display. Prior to each flight, a zero altitude

[1] Dershowitz, Adam Dr. , PhD., P.E. , CFEI, "UAS Safety Analysis Exponent Project", December 2014, page 4.

initiation point will be established and confirmed for accuracy buy the UAS PIC and the altitude information will be generated by equipment installed onboard the aircraft, as specified using GPS triangulation.

Petitioner would like to refer to Exemption Nos. 11062 and 11067 where the Administrator found that UAS is permitted to be operated with a digitally encoded telemetric data feed instead of an onboard barometric altimeter. See also Exemption Nos. 5778K and 9862A.

**10. Cambervision seeks an exemption from 14 C.F.R. §91.151(a)(1)**

***14 C.F.R. §91.151 (a) -Fuel requirements for flight in VFR conditions***

(a) No person may begin a flight in an airplane under VFR conditions unless (considering wind and forecast weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed—

Cambervision seeks an exemption from the fuel requirement regulation because the Battery Life of the UAS, as outlined in the Operating Manual, is 25 minutes when flown without additional equipment and 15 minutes fully loaded with a camera and GPS tracking unit. The UAS battery life does not fit within the requirement of (a) (1) and Cambervision is not planning on flying the UAS in the nighttime,

***Safety Standard:*** Cambervision proposes to limit the flight to 10 minutes total time after takeoff. Petitioner believes that an equivalent level of safety will be achieved by limiting flights to 10 minutes or 25% of battery power, which ever happens first which is well within the limits of the Manual. This proposed restriction will allow an adequate amount of time for the UAS to return to its intended landing zone during the operation.

As the FAA granted relief for manned aircraft to operate at less than the minimums prescribed in 14 C.F.R. §91.151(a)(1) the FAA should grant a similar exemption to Petitioner in that the UAS can operate 10 minute flights or within 25% of battery life reserve. See similar rulings in Exemption Nos. 2689, 5745, 10650, 11062 and 11067. See also similar UAS-specific relief granted in Exemption Nos. 8811, 10808, and 10673 for daytime, Visual Flight Rules (VFR) conditions.

**11. Cambervision seeks an exemption from 14 C.F.R. §91.203(a) and (b)**

***14 C.F.R. §91.203(a) and (b)-Civil Aircraft: Certifications Required***

(a) Except as provided in §91.715, no person may operate a civil aircraft unless it has within it the following:

> (1) An appropriate and current airworthiness certificate. Each U.S. airworthiness certificate used to comply with this subparagraph (except a special flight permit, a copy of the applicable operations specifications issued under §21.197(c) of this chapter, appropriate sections of the air carrier manual required by parts 121 and 135 of this chapter containing that portion of the operations specifications issued under §21.197(c), or an authorization under §91.611) must have on it the

registration number assigned to the aircraft under part 47 of this chapter. However, the airworthiness certificate need not have on it an assigned special identification number before 10 days after that number is first affixed to the aircraft. A revised airworthiness certificate having on it an assigned special identification number, that has been affixed to an aircraft, may only be obtained upon application to an FAA Flight Standards district office.

(2) An effective U.S. registration certificate issued to its owner or, for operation within the United States, the second copy of the Aircraft registration Application as provided for in §47.31(c), or a registration certification issued under the laws of a foreign country.

(b) No person may operate a civil aircraft unless the airworthiness certificate required by paragraph (a) of this section or a special flight authorization issued under §91.715 is displayed at the cabin or cockpit entrance so that it is legible to passengers or crew.

Cambervision requests an exemption from sections (a) and (b) of the regulation because the Administrator grants the earlier requested exemption from Chapter 14 Part 21 the UAS will not be required to obtain an airworthiness certificate. Additionally the UAS is less than 55 lbs. when fully loaded and does not contain an onboard pilot therefore there is no ability or place to carry the certification and registration documents as prescribed.

***Safety Standard:*** Cambervision proposes to achieve the equivalent level of safety that is premised by the regulation by keeping the necessary and required documents at the ground control station within immediate reach by the PIC at all times and will be made available to the Administrator and law enforcement immediately upon request.

For similar exemptions to this regulation granted by the FAA see Exemption Nos. 9565, 9665, 9789, 9789A, 9797, 9797A, 9816A, 10700, 11062 and 11067. In the alternative, Petitioner requests that the Administrator finds that the exemption is not necessary based on the FAA Memorandum subject "Interpretation regarding whether certain required documents may be kept at an unmanned aircraft's control station" dated August 8, 2014.

**12. Cambervision seeks an exemption from 14 C.F.R. §91.405(a), 91.407(a)(1), 91.409(a)(2) and 91.417(a) and (b)**

***14 C.F.R. §91.405(a), 91.407(a) (1), 91.409(a) (2) and 91.417(a) and (b) - Maintenance Exceptions***

Cambervision seeks an exemption from the above outlined regulations governing the maintenance requirements, because these section along with Part 43 apply only to aircraft with an airworthiness certificate, which if the petition is granted by the Administrator, will not apply to the Petitioner

***Safety Standard:*** With the grant of the exemption, an equivalent or higher level of safety will be achieved during the operation of the UAS. The Petitioner will inspect the UAS regularly and address all mechanical issues immediately. The PIC will ensure that

the UAS is in proper working order prior to every flight, perform required maintenance and keep a record log of any maintenance issues and their respective resolutions. In the instance that the UAS is dormant for a prolonged period of time, the operator will inspect the UAS bi-weekly to ensure its working order. All maintenance and inspections will be performed in accordance with the Operator's Manual and flights will not be conducted until the Cross-Check Quadron ™ is performed prior to each flight.

### C. Reasons Why the Exemption Would Not Adversely Affect Public Safety And How the Exemption Would Provide a Level of Safety at least Equal to The Existing Rule

Taking into consideration the safety standards outlined above granting Cambervision an exemption to permit commercial operation of the UAS will not adversely affect public safety and would provide a level of safety at least equal to the existing rule and in several cases provide a higher level of safety. The UAS is a battery operated unmanned aircraft with no flammable fuel, pilot or passengers on board and operated by an operator with at least a private pilot's license. The UAS will in several instances replace a manned aircraft hired to perform the same task or serve as an alternative to using persons climbing to high elevations and eliminating the risk of incident of injury or fall.

The UAS will be operated by an experienced PIC who will be in full control of the UAS at all times with a FC who will provide another visual and keep the UAS in a VLOS at all times. . PIC will have access to all necessary up to date equipment, machinery and mechanicals necessary for the proper and airworthy operation of the UAS. Furthermore, Cambervision will carry liability insurance for the operation of the UAS in excess of $1,000,000 and provide the insurance certificates upon request. Cambervision proposes to operate the UAS with the utmost diligence, care and responsibility as outlined in the exemptions, regulations and additional restrictions and guidelines as proposed by the FAA.

With following the safety provisions as outlined in the Manual and being in strict compliance with FAA regulations, restrictions and conditions the operation of the UAS will not adversely affect public safety and the exemption will provide a level of safety at a level greater than the existing rule by providing alternative ways to inspect areas of high elevation instead of using physical man power to do so, thus preventing injuries and other hazards.

### D. The Exemption is in the Public Interest

Granting Cambervision's request for a petition for the exemption from the regulations outlined above will further the public interest by allowing Cambervision to provide commercial services and thus expanding the stream of commerce. Providing such services the public holds many benefits because these options are much more economical and safer than current available options, create safe and useful options for first responders to use in emergency situations and allows Cambervision to conduct research and development for other uses of the UAS with future hopes of providing a positive

economic impact on the community as a whole while not implicating privacy and ensuring all equivalent safety levels and standards.

Cambervision proposes to use the UAS system to perform citywide, implemented by the City of Boston, mandatory building inspections providing a more economical and safe alternative than the current inspection method in place. These inspections are applicable to low and high rise buildings as well as all appurtenant building parts. Currently the inspections are performed by a visual evaluation through a telescope on the ground or a physical escalation of the building itself. Cambervision will provide a service to inspect the buildings using the UAS operated by a licensed PIC adhering to all applicable FAA regulations as outlined by the Administrator as well as the recommendations set forth in the Manual. Use of the UAS will ensure a higher level of safety for the public and provide more accurate reporting including areas of the building such as overhangs and awnings which are not easily accessible.

This exemption will also further the public interest by providing the option of having access to aerial photography and videography. The use of the UAS will provide government and private reporting agencies, real estate and development firms as well as architects the option to use a UAS to obtain aerial views, replacing the use of a manned aircraft. Use of the UAS is both more economical and safer and decreases congestion of the NAS. The use of the UAS versus a manned aircraft will also create a reduction in noise and air pollution, an increase in safety and a better economic alternative for the public.

Finally, the public will benefit from the use of the UAS by Cambervision because Cambervision proposes to perform research and development for other uses of the UAS which although not yet fully developed are proposed to benefit the first responders by using the UAS to investigate areas of high activity and danger zones creating a safer alternative than utilizing a person to perform the same investigation. The possibility of UAS utilization creates a safer, economical and indispensable alternative to current options.

The enhanced safety achieved by using a UAS with a licensed PIC and the added safety gear to be used strictly in compliance with the uses outlined above while carrying no passengers or crew is in the public interest to replace the use of a manned aircraft of significantly greater proportions , carrying crew and flammable fuel. This use provides an alternative use with more accuracy and a higher level of safety

## E. A Summary to be Published in the Federal Registrar

Applicant, Cambervision Inc., seeks an exemption from the following regulations Part 21; 14 C.F.R. §45.23(b); 14 C.F.R. §61.113 (a) and (b); 14 C.F.R. §91.7(a); 14 C.F.R. §91.9(b)(2);14 C.F.R. §91.103; 14 C.F.R. §91.109(a); 14 C.F.R. §91.119(b);14 C.F.R. §91.121; 14 C.F.R. §91.151(a)(1); 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.F.R. §91.409(a)(2); 14 C.F.R. §91.417(a) and (b), as established by the FAA, in order to commercially operate an unmanned aerial system weighing less than 20 lbs. and operating at a maximum altitude of 400 feet AGL for aerial imagery and research and development for other commercial uses including but not limited to building inspections.

The grant of the exemption allowing for commercial operation will maintain an equivalent if not higher level of safety than the one proposed by the FAA regulations, benefit the public interest and create a positive impact on the stream of commerce. Currently, the only way to obtain aerial imagery is to employ a manned aircraft system which often weights more than 4,000lbs, carries a pilot and flammable fuel and requires a designed large area landing pad or airport in order to get into the air. The other option to obtain aerial imagery is to physically scale a building in order to achieve a higher altitude for the imagery needed. The UAS, which is powered by battery and remote operated from a ground control station, provides a much safer and easier alternative eliminating eliminate most of the risk associated with accidents of a manned aircraft or injuries and accidents of climbing heights.

The operation of the UAS conducted with strict accord of the FAA regulations and within the conditions outlined above will provide an equivalent if not higher level of safety supporting the grant of the exemption request by Cambervision, including the exemption from the requirements of Part 21 and allowing commercial operations.

### F. Additional Information, Views or Arguments Available to Support the Request For an Exemption For CAMBERVISION, INC.

A recent "UAS Safety Analysis Exponent Project" conducted by Dr. Adam Dershowitz , PhD., P.E. , CFEI, a managing Engineer in Exponent's Thermal Science practice, at the request of UAS America Fund , LLC and Kramer Levin Naftalis and Frankel, LLP concludes "that there is no significant added risk to other airspace users posed by this type of commercial drone operation" that is proposed to be used by Cambervision.

The study is based on an analysis of 25 years of safety data involving small and medium sized birds, representing a simulated drone flight, and the rate of collisions with manned aircrafts. The study further concludes that using the proposed regulations of a maximum altitude of 400 feet AGL and a radius of 5 miles from airports there is no indication of imposed significant risk in allowing the operation of small UAS at or below 400 feet AGL and at least 5 miles or further from airports.

Cambervision further requests that the FAA recommend special condition, limitations and guidelines for the operation of the DJI, which contain safety standards that the Administrator finds necessary to establish a level of safety equivalent to the level established by Chapter 14 and the applicable subsections.

## NO PRIVACY ISSUES ARISE AT THE GRANT OF THE EXEMPTION

If Cambervision is granted an exemption there are no privacy issues with regard to the operation of the UAS. Any privacy concerns, which might arise, can be alleviated by providing advanced notice to the possible affected persons.

The UAS will be operated at the request of a client. At the inception of the agreement Cambervision will provide the client a Notice at least a few days in advance

outlining the operation which the client will need to distribute to foreseeable person that might be affected. This advanced notice will permit the client to field any concerns that might arise ahead of time and if necessary allow possible affected persons to vacate the area for the time of the flight operation.

This type of action is no different than if a building inspection is done manually by an "inspector" positioning themselves on the fire escape with the same access to the window of a person's apartment.

Once the UAS is ready for takeoff, the ground station will be clearly marked with orange cones and a good sized sign noting the exact procedure in place and creating a chance for people to avoid the area if they do not wish to be caught on the film. This type of procedure can be equated with a movie production in a public area where people are notified in the same manner in order to have the option to avoid the area altogether.

When the UAS is rising up into its flight the main focus of the camera is the building itself, if there are faces of persons who did not provide consent to be filmed which are caught in the frame, following proper protocol Cambervision will use specifically designated software to blur out the faces before turning the finished product over to the client whether it is an architect who will further use the video to generate an analysis report or submit it over to their respective client.

## CONCLUSION

For the reasons outlined above and with authority granted to the FAA by 14 C.F.R. §11.61 and Section 333 of the FAA Modernization and Reform Act of 2012, Cambervision requests and Exemption to commercially operate the UAS, DJI Phantom, without an airworthiness certificate for experimental uses. The grant of this exemption will advance the public interest, provide an economic benefit to the public and allow Cambervision to develop new and innovative uses for UASs in a safe and compliant manner.

## GLOSSARY /ABBREVIATIONS

UAS- Unmanned Aerial System

PIC- Pilot in Command

FC-Flight Coordinator

VC-Visual Controller

GPS- Global Positioning System

VLOS- Visual Line of Sight