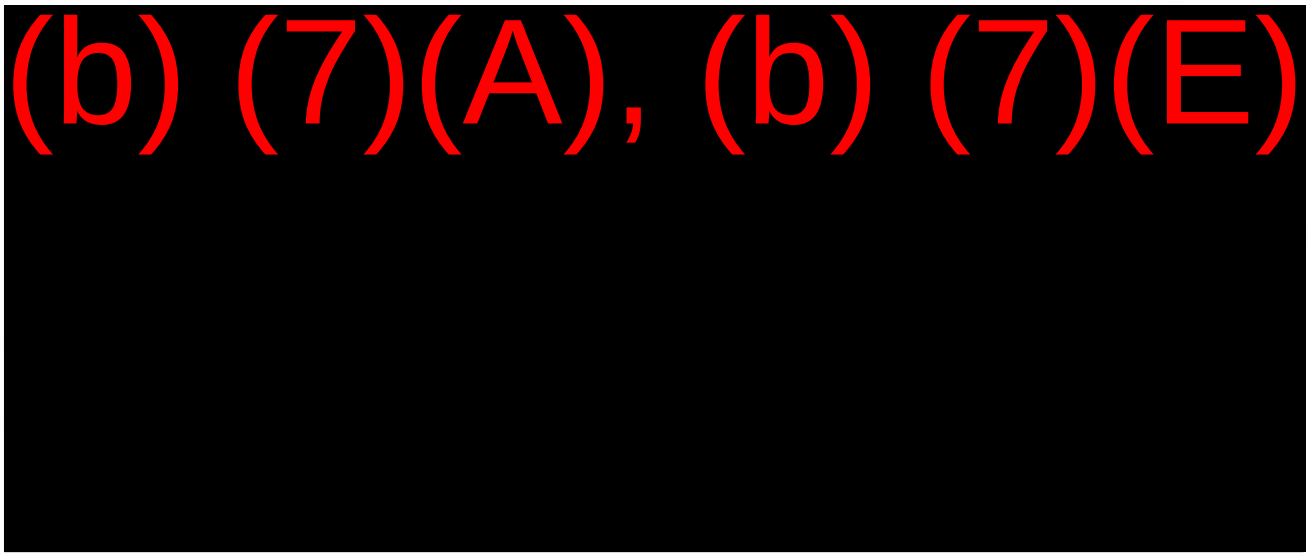
3.5.4 Synthetic Aperture Radar (SAR)

Moving-target-indicator (MTI) radar modes have the ability to detect targets in the presence of radar confounding land terrain and can be superimposed on radar images of the terrain to better indicate the environmental context of detected objects.

3.5.4.1 SAR Performance Specifications

The SAR shall (T) incorporate the following functions or provisions.



3.5.5 Reserved

3.5.6 Communication Suite

3.5.6.1 Airborne Communications Equipment

The UA shall have a minimum of ~~four (4)~~ four (4) aircraft radio units that are operated by the crewmembers in the controlling GCS. The crewmembers shall have full control of all of the radio functions of the airborne tactical radios. The Airborne Communications Equipment shall have the following capabilities:

a. Route incoming GCS operator communications to the desired transmission radio

b. Provide the capability to simultaneously monitor multiple airborne radios using available datalink voice channels independently

c. Allow a minimum of two airborne radios to be used simultaneously and independently for transmit.

3.5.6.1.1 Airborne AM/FM Radio (2)

The software programmable VHF / UHF transceivers shall enable crewmembers to communicate on all civilian and military ATC frequencies. The radios shall (T) be capable of receiving and transmitting on the VHF and UHF frequencies from 80-512 MHz. An ARC- 210/RT-1851 (or equivalent) model radio for ATC communications is required.

~~3.5.6.1.2 Airborne Secure Radio (1)~~

~~The airborne secure radio is a software programmable, multimode integrated transceiver shall enable crew members to communicate to other transceiver within LOS of the UA. It provides digital 2-way multimode voice and data communications over the 30-512 MHz frequency range in normal, secure, or jam-resistant modes. The UHF/VHF UAS communications capability shall (T) be digital data capable, and shall (T) interface with industry standard systems, architectures, and protocols. The ARC- 210/RT-1851 model radio (or equivalent) is required for airborne secure radio communications.~~

3.5.6.1.3 Airborne Tactical Radios (2)

Tactical radios shall enable UAS crewmembers to talk on all law enforcement, military, medical, marine, S&R and public service frequencies from 30 MHz to 960 MHz (VHF/UHF). The radios shall (T) have APCO Project 25 compliant digital communications capable of tuning in 1.25 kHz steps, able to operate on 12.5 kHz and 25 kHz FM channels over several different frequency bands. The radio system shall (T) have embedded Type 3 Encryption (Voice Private) with an Over-the-Air Re-key (OTAR) capability. This radio shall perform in-band relays and cross-band relays, simulcast on multiple radios, relay and simulcast at the same time, operate full duplex or half duplex (selectable), and function as a repeater. The second tactical radio is necessary to provide a voice communication relay from one tactical radio to the other on different frequencies. Wulfsberg RT-5000 (or equivalent) model radios for tactical radio communications are required for Airborne Tactical Radios.

3.5.6.1.4 Additional Airborne Radios

The UAS should (O) have the capability to accept additional radio units to the aircraft based on the mission.

3.5.6.2 Deployable GCS and LRGCS/MGCS Communications Equipment

The UAS shall (T) have communication controls which permit the pilot, sensor operator, and CDO to select two-way voice communications using any of the system's ~~external wire lines,~~ airborne or ground radio sets~~.~~. Each intercom station (ICS) position shall (T) be able to communicate with other ICS positions or transmit and receive on GCS based radio sets.

3.5.6.2.1 ATC Radio (1)

A software programmable VHF / UHF transceiver shall enable crewmembers to communicate on all civilian and military ATC frequencies. The radio shall (T) be capable of receiving and transmitting on the VHF and UHF frequencies from 30 to 400-MHz. ARC- 210/RT-1851 model radio (or equivalent) is required for ATC radio communications.

3.5.6.2.2 Unclassified Secure Radio (1)

The GCS shall (T) include an unclassified secure radio.
The unclassified secure radio shall (T) be a software programmable, multimode integrated transceiver.

The unclassified secure radio shall (T) allow crew members to communicate with another compatible transceiver within LOS of the GCS

The unclassified secure radio shall (T) allow crew members to communicate with another compatible transceiver using an independent SATCOM link.

The unclassified secure radio shall (T) be capable of digital 2-way voice and data communications over the 30-512 MHz frequency range in normal, secure, or jam-resistant modes.

CBP has selected the ARC- 210/RT-1851 model radio (or equivalent) for the GCS unclassified secure radio.

3.5.6.2.3 GCS Communications/Intercom Management Controller

The communications/intercom management controller shall provide an intercom station for each operator to manage individual intercom and radio communications. The intercom positions will be: pilot, sensor operator, command duty officer (CDO) stations, and two additional ICS positions.

Operators shall have control as follows:

a. The pilot shall (T) have the ability to control all of the functions and operate all radio assets in the airborne communication suite and the GCS radio units independently and simultaneously.

b. The sensor operator shall (T) have the ability to control all of the functions and operate all radio assets in the airborne communication suite and the GCS radio units independently and simultaneously.

c. The CDO shall (T) have the ability to receive and transmit on all airborne and ground radio systems.

d. The remaining ICS positions shall (T) provide the ability to receive from all airborne radios and receive and transmit from the GCS radios.

The GCS intercom management controller shall (T) have the following capabilities:

a. Monitor multiple voice data links and ground radios.

b. Provide microphone and headset connections and controls necessary to allow intercom and radio operation at all ICS positions.

c. All ICS positions will have control of which voice data links or ground radios are being received at that position.

d. The pilot, sensor operator, and CDO shall be able to select a link segment for access to airborne radio suite.

e. The Pilot ICS station shall have priority over all other ICS stations for radio communications.

f. Any of the ICS positions shall be able to adjust the volume of any ground radio, intercom or voice data link selected at its ICS position.

g. Capable of supporting voice over IP communication

3.5.7 Ground Control Station (GCS)

The GCS is the command and control center for the UAS. Each GCS controls and monitors aircraft via the Link Segment. The Link Segment receives telemetry and imagery data from the aircraft and transmits command and control data to the aircraft from the GCS. Operationally, the GCS shall (T) support: single aircraft command and control; Link Segment command and control; embedded communication and intercom suite; mission payload command and control; imagery annotation and imagery processing functions; and tactical communications with the users. The operational flight control programs (OFP) should (O) be isolated, via hardware and/or software, from the mission planning, mission support, payload interface, and data handling software segments. The OFP should have DO-178B Level B certification. The isolated sub-components (non-flight critical) should have DO-178B Level C certification and be isolated such that any change or replacement of a sub-component does not require re-certification of the OFP.

3.5.7.1 GCS Architecture

The GCS workstations shall (T) be capable of hosting all functionality associated with NATO STANAG 4586 Level 1 through 5 control of the aircraft and payload.

3.5.7.1.1 Commercial or Non-developmental Items

If any commercial or non-developmental items (NDI) subsystems are used in the GCS, all applicable DHS, National, and International spectrum management policies and regulations are to be satisfied.

3.5.7.2 GCS Data Recording

The GCS shall (T) have provisions for the following:

a. Recording aircraft up-link and down-link command and control data, payload data, and internal and external voice communications, and video in standard US (NTSC, NTIF and MPEG 2) format.

b. The GCS intercom system shall (T) have the provision to control if and when the internal and external voice communications are recorded.

c. Providing a method for further dissemination of payload data.

d. Supporting the ability to have third party software applications external to the GCS to display real-time and recorded aircraft positional data (X, Y, Z, Heading); payload positional information (Heading, Azimuth, Depression Angle); and video information.

e. Positional and payload information shall adhere to the DIS standard or other agreed in advance open published protocol data unit (PDU) based standard.

3.5.7.3 Mission Planning

The GCS shall (T) be capable of providing the following automated mission planning functions:

a. Import of National Geospatial-Intelligence Agency (NGA) DTED,.

b. Point and click route planning and (O) fuel calculations.

c. Weight and balance calculations for takeoff, climb, cruise, descent, and landing performance based on weight, drag index and environmental conditions.

d. Upload mission planning data to the aircraft while on the ground. Change mission planning data during flight.

3.5.7.4 Mission Control

During the mission, the GCS shall (T) be capable of:

a. Controlling at least one aircraft and payload without the use of external communication/data relay stations at a distance of 150 nm, line-of-sight (LOS) permitting.

b. Providing the capability to override automated/pre-programmed inputs to the aircraft and payload.

c. Be able to turn on and off aircraft equipment.

d. Providing the means to pass control of the payloads to an SCT.

e. Changing the mission plan and uploading the new mission plan to the aircraft using the command and control data link.

3.5.7.5 General Characteristics for the Deployable GCS and L&R GCS

3.5.7.5.1 Environmental Control

Heating and cooling vents shall (T) be provided for all occupied spaces in the UAS GCS. At outside ambient temperatures of -40° F, the heating system maintains an effective temperature of at least 64° F within the personnel space; at outside ambient temperatures of 120° F, the cooling system maintains an effective temperature of no greater than 84° F within the personnel space. Personnel shall (T) be provided an acoustical environment which should not cause personnel injury, interfere with voice or any other communications, cause fatigue, or in any other way degrade system effectiveness.

3.5.7.5.2 Electrical Power

The UAS ground equipment shall (T) use standard U.S. electrical power sources, available with standard mobile electrical power sources, integrated to supply the appropriate electrical power on a continuous operation. The UAS ground equipment shall (T) be capable of restoring and/or maintaining electrical back-up power in sufficient time to avoid critical mission data loss, computer memory loss, or loss of aircraft control. The UAS mission objectives should (O) continue to be achievable after restoration of electrical power. The UAS should (O) have electrical/electronic equipment protection devices to prevent power surge/power failure damage.

Emergency Power - The GCS shall (T) have sufficient backup electrical power to continue to operate the system and/or recover the air vehicle for a minimum of 10 minutes in the event of the primary power failure until a standby electrical power source can be connected.

3.5.7.5.3 Lightening Protection

The GCS system shall (T) meet the direct lightning requirements as defined in MIL-STD-464, paragraph 5.4, Figure 1. Indirect lightning effects for UAS ground equipment should (O) be considered and mitigated.

3.5.8 Link Segment

3.5.8.1 General Description

a. The Link Segment shall (T) consist of redundant command and control links and non-redundant sensor data links for LOS operations. BLOS secondary command and control link may be lost link flight procedures until within range of an LOS link.

b. If the UAS determines the primary command and control link to be unusable, it shall (T) switch automatically to the secondary data link in such a manner to continue successful and safe aircraft flight and mission operations. The UAS shall (T) allow operator selection of data links. The Link Segment shall provide the capability for encrypting the primary(T) and secondary(O) command and data links.

c. A "zeroize" capability to clear encryption codes and keys automatically (initiated with imminent loss of flight) or manually should (O) be required.

d. The Link Segment shall (T) provide data distribution (imagery and system data) from the aircraft to the GCS and RVT, via discrete and selectable frequencies and also provide imagery to "on the move" CBP agents in vehicles or on foot.

e. The link segment shall include equipment necessary for LOS and BLOS operations.

3.5.8.2 LOS Command Link Performance

(b) (7)(A), (b) (7)(E)

3.5.8.3 BLOS Ground SATCOM Terminal

The BLOS Ground SATCOM Terminal shall (T) contain the necessary equipment for a primary command and control link via wide band SATCOM communications.

The BLOS Ground SATCOM Terminal shall be capable of flying 4 (T) 6 (O) aircraft simultaneously and independently.

The BLOS Ground SATCOM Terminal shall (T) provide backup emergency power for 10 minutes after loss of primary power.

The BLOS Ground SATCOM Terminal shall (T) be capable of Ku SATCOM communications for the frequency range of 12.75 – 14.50 GHZ.

The BLOS Ground SATCOM Terminal shall (T) include redundant primary transmitters.

The BLOS Ground SATCOM Terminal transmitters shall (T) be cable of flying 4 (T) 6 (O) aircraft independently.

The BLOS Ground SATCOM Terminal shall (T) provide redundant up converters.

Each BLOS Ground SATCOM Terminal up converters shall (T) include a primary and backup channel.

The BLOS Ground SATCOM Terminal shall (T) provide redundant down converters.

Each BLOS Ground SATCOM Terminal down converters shall (T) include a primary and backup channel.

The BLOS Ground SATCOM Terminal shall include one addition up converter and down converter.

3.5.8.4 Lost Link

The UAS shall inform mission crew within 10 sec if link is lost (T).

3.5.9 Sensor Control Terminal (SCT)

~~#### 3.5.9.1 Mission~~

~~The SCT shall (T) provide the user with control of imagining payloads and access to payload imagery and data, independent of the GCS, from an aircraft at a minimum distance of 20 nm (T) 30 nm (O) nm. Payload imagery and aircraft related information, to include: aircraft position, heading, and MSL altitude, date/time group, target location, previously "marked" targets stored in a retrievable database, and north seeking arrow, shall (T) be displayed to the users via the SCT.~~

a. Each SCT shall be capable of receiving video from the EO/IR sensor or imagery from the SAR/MTI sensor at a minimum distance of 20 nm (T) 30 nm (O) from the aircraft.

b. Each SCT shall (T) be capable of steering the EO/IR sensor in azimuth and elevation, selecting WFOV and narrow field of view (NFOV) (or variable zoom if sensor is capable), and engaging autofocus, autotrack, autoscan, and mark targets into a retrievable database when 20 nm (T) 30 nm (O) from the aircraft.

c. Each SCT shall provide display screen resolution equal to that of the EO/IR video (T).

3.5.9.2 SCT Configuration

The SCT shall (T) use computer hardware capable of providing NATO STANAG 4586 Level 3 functionality and possess provisions for recording imagery and data.

3.5.9.3 Environment

Each SCT shall (T) be ruggedized to withstand off-road travel and be able to operate in the same conditions as the GCS, as defined in section 3.5.8.1.1.

3.5.9.4 SCT BIT

The SCT shall (T) be capable of performing BIT and providing the users with health and maintenance data.

3.5.9.5 Information Interface

All external interfaces shall (T) use industry standard interface ports.

3.5.9.6 Electrical Power Interface

The SCT shall (T) operate from standard AC or DC electrical power sources. The SCT can be powered from a GCS shelter or from vehicle, or battery when remote from other power sources.

3.5.9.7 Physical Characteristics

a. Each SCT shall (T) be portable by a single person, and be capable of being setup and placed into operation by one person within 10 minutes.

b. Each SCT shall (T) be capable of being powered from a patrol vehicle's electrical system.

3.5.10 Remote Video Terminal (RVT)

3.5.10.1 Mission

(b) (7)(A), (b) (7)(E)

b. The RVT shall (T) provide a minimum screen resolution of 320x240.

3.5.10.2 RVT Configuration

The RVT shall (T) use computer hardware capable providing NATO STANAG 4586 Level 2 functionality.

3.5.10.3 Environment

Each RVT shall (T) be ruggedized to withstand off-road travel and be able to operate in the same conditions as the rest of the UAS pieces, as defined in section 3.2.7.3.

3.5.10.4 RVT BIT

The RVT shall (T) be capable of performing BIT and providing the users with health and maintenance data.

3.5.10.5 Information Interface

All external interfaces shall (T) use standard interface ports.

3.5.10.6 Electrical Power Interface

The RVT shall (T) operate from standard AC or DC electrical power sources, to include being powered from a GCS shelter or from vehicle, or battery when remote from other power sources.

3.5.10.7 Physical Characteristics

Each RVT shall be portable by a single person (T) or as a handheld device (O) and be capable of being setup and placed into operation by one person within 10 minutes. Each RVT shall also (T) be capable of being powered from a patrol vehicle's electrical system.

4.0 VERIFICATION

The verification process, which the Government intends to use to determine whether the UAS conforms to all of the threshold requirements delineated in Section 3 of this specification, is explained in this section. The Government reserves the right to develop test verification plans to verify the UAS meets the threshold requirements.

The Government shall determine who will be responsible for conducting, all verifications required herein. Test plans, procedures, verifications, and reports will be subject to review and concurrence by the prime contractor and the government. Appendix A, Threshold Requirement/Verification Cross-Reference Matrix, illustrates the requirement and verification methods necessary to ensure UAS compliance. Performance parameters or equipment characteristics of objective goals, which are related to a threshold requirement delineated in Section 3, are cross-referenced in Appendix B.

4.1 Methods of Verification

The methods utilized to accomplish verification include:

4.1.1 (N/A) Not Applicable

Verification is not warranted.

4.1.2 Analysis

Verification will be accomplished by technical evaluation or mathematical models and simulations, algorithms, charts, graphs, circuit diagrams, or scientific principles and procedures to provide evidence that stated requirements were met.

4.1.3 Demonstration

Verification will be accomplished by actual operation, adjustment, or re-configuration of items to provide evidence that the designed functions were accomplished under specific scenarios. The test article may be instrumented and quantitative limits of performance monitored/measured.

4.1.4 Examination

Verification will be accomplished by inspection, without the use of special laboratory equipment or procedures, to determine conformance to the specified requirements which can be determined by the investigators. Examination will be non-destructive and can include: sight, hearing, smell, touch, and physical manipulation, mechanical and electrical gauging and measurement, and other forms of investigation.

4.1.5 Test

Verification will be accomplished by systematic exercising of the applicable item under appropriate conditions with instrumentation to measure required parameters. Collection, analysis, and evaluation of quantitative data will determine that the measured parameters equal or exceed specified requirements. Vendor shall comply with all FAA STC requirements whether by "one-only" STC (aircraft/engine/propeller) or "multiple" STC (aircraft/engine/propeller) and TSO / TSO update requirements. All presented documentation must be able to be verified through FAA, ACO or Flight Inspection Safety District Office.

4.2 Classification of Verification

Verification classification levels are defined below and include:

4.2.1 Design

The UAS design includes the GCS, RVT, SCT, aircraft, payload, and Link Segment. As such, design verifications will be conducted on the total system design to verify the requirements

specified in Section 3, and the interoperability of each element. Individual UAS elements will be verified independently prior to being verified as part of the total UAS.

4.2.2 First Article Inspection

Reserved

4.2.3 Acceptance Inspection

Reserved

4.2.4 Special Inspection

Reserved

4.3 Test Plans, Methods, and Procedures

Verification analyses, demonstrations, examinations, and tests will be conducted in accordance with the DHS-approved detailed test methods and procedures. These test procedures will include tests, test sequence, test criteria, and number of tests required. Testing will be accomplished in accordance with the program Integrated Master Schedule and the Master Test Plan. If an item or element has been previously tested and has met the requirements of this specification, additional testing is not required if substantiating data/reports so indicate.

4.4 Detailed Verification Requirements

4.4.1 Environmental Verification

4.4.1.1 Electromagnetic Environmental Effects (E3) Requirements

The UAS when in its field configurations should (O) be verified to meet the requirements of Section 3.3.3 of this specification. Verification methods and requirements are to be measured in accordance with the methods defined and shall meet the performance requirements defined in MIL-STD-461. The Contractor or a National Voluntary Laboratory Accreditation Program (NVLAP) facility will be used to verify qualification limits.

4.4.1.1.1 E3 Facilities

If required, Government E3 testing and evaluation facilities can be utilized to accomplish E3 verifications. DHS shall determine the most cost effective facility to perform the subject tests and will incorporate such data into the program Integrated Master Schedule and the Master Test Plan.

4.4.1.1.2 COTS and NDI

Compliance of NDI and commercial-off-the-shelf items (COTS) to MIL-STD 461E limits are to be verified by test, analysis, or a combination thereof.

5.0 MAINTAINABILITY REQUIREMENTS

The installation design of UAS mission equipment, subassemblies, LRUs and parts should allow for easy removal, replacement and adjustment of equipment on-site or in the field by aviation technicians using standard material, mechanics tools and electronic repair equipment. The contractor should consider the following criteria when selecting replacement mission equipment.

a. LRUs should be replaceable without removing other sub-items

b. LRUs with the same part number should be fully interchangeable

c. Interchange of system LRUs, as part of a maintenance action, should not require manual adjustment or calibration to be performed

d. Handles and lifting aids to assist with both manual and mechanical handling of the LRUs should be included

e. All labels should be easily read and properly oriented when the LRU is in its normally installed position

5.1 Delivery Preparation

All major units and parts shall be preserved, packaged, packed and marked for the level of shipment specified by the contract. Use of existing packaging techniques and equipment will be used to maintain the best value philosophy.

5.2 Accessibility Requirements

All avionics and electrical components requiring routine maintenance shall be readily accessible. The installation design of mission system equipment and line replaceable units, subassemblies and parts shall allow for the easy removal, replacement and adjustment of equipment on-site or in the field by aviation technicians using standard material, mechanic's tools and electronic repair equipment. Access panels and closures shall provide access to components requiring inspection, replacement, calibration and adjustment, as well as to disconnect fittings for ease of maintenance and reduction in maintenance time. Access to compartments that require entrance between scheduled inspections, other than those required to replace a component due to malfunction, shall provide easy entry. Connectors shall be mounted to allow for disconnection and reconnection with minimum effort during component removal. Wiring bundles shall be long enough to permit replacement of connectors at least three times without splicing or before replacing the wire bundles. Wiring bundles shall not be hard wired to any equipment or equipment racks. Built-In-Test features shall be included.

~~5.3 Maintenance, Test, Spares and Support Equipment List~~

~~The contractor shall provide a list of any specialized maintenance, test, recommended spare parts and support equipment, which are unique to the UAS, as an attachment to the contract. The itemized list shall annotate the replacement and/or rental price for new spare parts and overhaul/exchange parts. All overhauled/ exchanged parts shall be in proper working order and~~

~~meet the manufacturer's current manufacturing standards for the part in accordance will all applicable directives and service bulletins. The list shall include the following information:~~

~~a. Part numbers~~

~~b. Serial numbers~~

~~c. Lead time (in days)~~

~~d. Cost per part~~

~~e. Total quantity of parts~~

APPENDIX A: Threshold Requirement/Verification Matrix

REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX											
Method of Verification		**Classes of Verification**									
N/A – Not Applicable		**A – Design**									
1 – Analysis		**B – 1st Article**									
2 – Demonstration		**C – Acceptance**									
3 – Examination		**D – Special**									
4 – Test											
Section 3		**Verification Method**					**Verification Class**				**Section 4**
Requirement	**Description**	**1**	**2**	**3**	**4**	**N/A**	**A**	**B**	**C**	**D**	**Verification**
( ) = Shall Number											
3.2.1.1	Aircraft	X									4.4
3.2.1.2	Payloads	X									4.4
3.2.1.3 (1)	GCS, C-130 Transportable		X								4.4
3.2.1.3 (2)	GCS, Backup WS	X									4.4
3.2.1.3 (3)	Fixed GCS, WS	X									4.4
3.2.1.3 (4)	Launch and Recovery GCS (LRGCS)/Mobility GCS (MGCS)	X									4.4
3.2.1.3 (5)	Portable GCS		X								4.4
~~3.2.1.3 (6)~~	~~LRGCS/MGCS C-130 Transportable~~		~~X~~								~~4.4~~
~~3.2.1.3 (7)~~	~~LRGCS/MGCS Same Design~~	~~X~~									~~4.4~~
~~3.2.1.3 (8)~~	~~LRGCS/MGCS Optional Equipment~~	~~X~~									~~4.4~~
3.2.1.4	Link Segment, Primary & Secondary	X									4.4
~~3.2.2~~	~~Functional Configuration~~		X								4.4
3.2.3	Baseline Configuration		X								4.4
3.2.4	External Interfaces			X							4.4
3.2.5	Internal Interfaces			X							4.4
3.2.6.1	**Mission Capability LOS TOS (KPP)**		X		X						4.4
~~3.2.6.1~~	~~Mission Capability for maritime TOS~~		~~X~~		~~X~~						~~4.4~~
3.2.6.2	System Computations		X								4.4
3.2.6.3	Target Location Accuracy				X						4.4
3.2.6.4.1	Pre-Flight Programming		X								4.4

REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX											
Method of Verification		**Classes of Verification**									
N/A – Not Applicable		**A – Design**									
1 – Analysis		**B – 1st Article**									
2 – Demonstration		**C – Acceptance**									
3 – Examination		**D – Special**									
4 – Test											
Section 3		**Verification Method**					**Verification Class**				**Section 4**
Requirement	**Description**	**1**	**2**	**3**	**4**	**N/A**	**A**	**B**	**C**	**D**	**Verification**
( ) = Shall Number											
3.2.6.4.2	In-Flight Programming		X								4.4
3.2.6.5.1 (1)	Launch and Recovery manual flight		X		X						4.4
3.2.6.5.1 (2)	Auto L&R Override		X		X						4.4
3.2.6.5.1 (3)	Auto L&R Override Single Action		X		X						4.4
3.2.6.5.2	Command & Control Hand-off		X		X						4.4
3.2.6.6	Embedded Training										
3.2.7.1.1	FAA Conformance		X		X						4.4
3.2.7.1.2	FCC/IRAC Conformance		X		X						4.4
3.2.7.1.3	EPA Conformance		X		X						4.4
3.2.7.2.1	Set-up Times		X								4.4
3.2.7.2.2	Fueling - Gravity	X	X								4.4
3.2.7.2.3	Preparation for Transportation Times		X								4.4
3.2.7.2.4 (1)	Launch & Recovery Time		X								4.4
3.2.7.2.4 (2)	Launch and Recovery Time (Payload)		X								4.4
3.2.7.2.5	Environmental Impact	X									4.4
3.2.7.2.6.a	Electrical Power	X		X							4.4
3.2.7.2..6 (1)	Emergency Power (GCS)	X		X							4.4
3.2.7.2.6.b (2)	Emergency Power (UAV)	X		X							4.4
3.2.7.2.7	Human Engineering	X									4.4
3.2.7.3.1.a	Operational Temperature Extremes	X			X						4.4
3.2.7.3.1.c	Operational Temperature Shock	X									4.4

REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX											
Method of Verification		**Classes of Verification**									
N/A – Not Applicable		**A – Design**									
1 – Analysis		**B – 1st Article**									
2 – Demonstration		**C – Acceptance**									
3 – Examination		**D – Special**									
4 – Test											
Section 3		**Verification Method**					**Verification Class**				**Section 4**
Requirement	**Description**	**1**	**2**	**3**	**4**	**N/A**	**A**	**B**	**C**	**D**	**Verification**
( ) = Shall Number											
3.2.7.3.2	Humidity	X									4.4
3.2.7.3.3	Rain Non-Operating, Storage, and Transit	X									4.4
3.2.7.3.4.a	Snow Non-Operating, Storage, and Transit	X									4.4
3.2.7.3.4.b	Snow Operating	X									4.4
3.2.7.3.5.a	Icing Non-Operating, Storage, and Transit	X									4.4
3.2.7.3.5.b	Icing Operating	X									4.4
3.2.7.3.6 (1)	Wind	X									4.4
3.2.7.3.6 (2)	Wind (Tie-downs)	X									4.4
~~3.2.7.3.7~~	~~Fungus~~	~~X~~									~~4.4~~
~~3.2.7.3.8~~	~~Salt Fog~~	~~X~~									~~4.4~~
3.2.7.3.9	Blowing Sand and Dust	X			X						4.4
3.2.7.3.10.a	Altitudes, Storage and Transit	X	X								4.4
3.2.7.3.10.b	Altitudes, Operating	X									4.4
~~3.2.7.3.12~~	~~Induced Environment~~		~~X~~								~~4.4~~
3.2.7.3.11	Vibration	X	X								4.4
3.2.7.3.12	Mechanical Shock	X	X								4.4
3.2.7.3.13	Acceleration	X									4.4
3.2.7.4.1.a	MTBMA	X		X							4.4
3.2.7.4.1.b	MTBSA	X		X							4.4
3.2.7.4.2.a	**Mission Availability (KPP)**	X		X							4.4
3.2.7.4.2.b	Operational Availability	X		X							4.4
3.2.7.4.2.c	Inherent Availability	X		X							4.4
3.2.7.4.3.a	Mean Time Between Failure	X		X							4.4
3.2.7.4.3.b	Mean-Time-To-Repair	X			X						4.4

REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX											
Method of Verification		**Classes of Verification**									
N/A – Not Applicable		**A – Design**									
1 – Analysis		**B – 1st Article**									
2 – Demonstration		**C – Acceptance**									
3 – Examination		**D – Special**									
4 – Test											
Section 3		**Verification Method**					**Verification Class**				**Section 4**
Requirement	**Description**	**1**	**2**	**3**	**4**	**N/A**	**A**	**B**	**C**	**D**	**Verification**
( ) = Shall Number											
3.2.7.4.3.c	Independence of Failures	X									4.4
3.2.7.4.4.a	Diagnostics - Controls	X		X							4.4
3.2.7.4.4.b (1)	Diagnostics - Health Status	X		X							4.4
3.2.5.4.4.b (2)	Diagnostics - Health Status	X		X							4.4
3.2.7.4.5	System Operations Support		X		X						4.4
3.2.7.5 (1)	Transportability – Prep Times		X								4.4
3.2.7.5 (2)	Transportability – Overload		X								4.4
3.2.7.5.1	Ground Transportability		X								4.4
3.2.7.5.2	Rail Transportability	X									4.4
3.2.7.5.3	Air Transportability	X	X								4.4
3.2.7.5.4	Marine Transportability	X	X								4.4
~~3.3.1.1 (1)~~	~~Hazardous, Toxic and Ozone Depleting Chemicals - Avoid~~	~~X~~		~~X~~							~~4.4~~
~~3.3.1.1 (2)~~	~~Hazardous, Toxic and Ozone Depleting Chemicals - Safety~~	~~X~~		~~X~~							~~4.4~~
3.3.2.	Computer Network Hardware	X									4.4
~~3.3.2.2~~	~~Data Storage and Main Memory Reserve Capacity~~	~~X~~									~~4.4~~
~~3.3.2.3~~	~~Processing Speed/Throughput Reserve Capacity~~	~~X~~									~~4.4~~
~~3.3.2.4~~	~~Input/Output (I/O) Channel Requirements~~	~~X~~									~~4.4~~

REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX											
Method of Verification		**Classes of Verification**									
N/A – Not Applicable		**A – Design**									
1 – Analysis		**B – 1st Article**									
2 – Demonstration		**C – Acceptance**									
3 – Examination		**D – Special**									
4 – Test											
Section 3		**Verification Method**					**Verification Class**				**Section 4**
Requirement	**Description**	**1**	**2**	**3**	**4**	**N/A**	**A**	**B**	**C**	**D**	**Verification**
( ) = Shall Number											
3.3.2.4	Processor and Firmware Enhancements	X									4.4
3.3.2.5	Computer Software	X		X							4.4
3.3.2.7	Programming Languages	X									4.4
3.3.2.8	Commenting Standards			X							4.4
3.3.2.9 (1)	Error and Diagnostic Messages			X							4.4
3.3.2.9 (2)	Error and Diagnostic Messages			X							4.4
3.3.2.10	Character Set Standards			X							4.4
3.3.2.11	Software Security	X		X							4.4
3.3.2.12	Fault Tolerance		X								4.4
3.3.2.13	Computer Program Regeneration		X								4.4
3.3.3 (1)	Electromagnetic Environmental Effects (E3)				X						4.5.1.1
3.3.3 (2)	Electromagnetic Environmental Effects (E3)				X						4.5.1.1
3.3.3.1	Electromagnetic Compatibility (EMC)				X						4.5.1.1
3.3.3.2 (1)	Electromagnetic Vulnerability (EMV)				X						4.5.1.1
3.3.3.2 (2)	Electromagnetic Vulnerability (EMV)				X						4.5.1.1
3.3.3.3	Electromagnetic Interference (EMI)				X						4.5.1.1
3.3.3.4	Electromagnetic Radiation Hazards (HERP, HERF)				X						4.5.1.1

REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX											
Method of Verification		**Classes of Verification**									
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2 – Demonstration		**C – Acceptance**									
3 – Examination		**D – Special**									
4 – Test											
Section 3		**Verification Method**					**Verification Class**				**Section 4**
Requirement	**Description**	**1**	**2**	**3**	**4**	**N/A**	**A**	**B**	**C**	**D**	**Verification**
( ) = Shall Number											
3.3.3.5	Electrostatic Discharge (ESD)				X						4.5.1.1
3.3.4.1	System Safety	X		X							4.4
3.3.4.2 (1)	Safety Provisions	X	X	X							4.4
3.3.4.2 (2)	Safety Provisions	X	X	X							4.4
3.3.5 (1)	Security	X	X	X							
3.3.5 (2)	Security	X	X	X							
3.4	Logistics	X									4.4
3.4.1	Support Equipment		X								4.4
3.5.1.1	Design Life	X									4.4
3.5.1.2.1 (1)	Flight Profile - Radius					X					4.4
3.5.1.2.1 (2)	Flight Profile - TOS					X					4.4
3.5.1.2.1 (3)	Flight Profile – Fuel Reserve					X					4.4
3.5.1.2.1 (4)	Flight Profile - payload					X					4.4
3.5.1.2.2	**Flight Takeoff and Landing (KPP)**				X						4.4
3.5.1.2.3	**Operating in Level Flight (KPP)**	X	X								4.4
3.5.1.2.3.a	**Operating Altitude (KPP)**	X	X								4.4
3.5.1.2.4	Service Ceiling	X	X								4.4
3.5.1.3	**Noise Signatures (KPP)**	X	X								4.4
3.5.1.4.1	Reserve Power	X									4.4
3.5.1.4.2	BLOS Comms	X	X								4.4
3.5.1.4.4	Lost Link and Mission Abort	X	X								4.4
3.5.1.4.5	Airspeed	X	X								4.4
3.5.1.4.6	Weight		X								4.4

REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX											
Method of Verification		**Classes of Verification**									
N/A – Not Applicable		**A – Design**									
1 – Analysis		**B – 1st Article**									
2 – Demonstration		**C – Acceptance**									
3 – Examination		**D – Special**									
4 – Test											
Section 3		**Verification Method**					**Verification Class**				**Section 4**
Requirement	**Description**	**1**	**2**	**3**	**4**	**N/A**	**A**	**B**	**C**	**D**	**Verification**
( ) = Shall Number											
3.5.1.4.7	Aircraft Position Accuracy				X						4.4
3.5.1.4.8	Handling Qualities	X			X						4.4
3.5.1.4.8.a	Aircraft Launch and Recovery	X			X						4.4
3.5.1.4.8.b	Flight Outside the Flight Envelope	X									4.4
3.5.1.4.8.c	Transfer of Flight Control Modes	X	X								4.4
3.5.1.4.9.a	Temperature Extremes	X									4.4
3.5.1.4.9.b	Rain	X									4.4
3.5.1.4.9.c (1)	Icing Detection Capability	X									4.4
3.5.1.4.9.c (2)	Report Icing	X	X								4.4
3.5.1.4.9.c (3)	Transiting	X	X								4.4
~~3.5.1.4.9.d~~	~~Vibration~~	~~X~~	~~X~~								~~4.4~~
3.5.1.4.10 (1)	Aircraft Modes of Operation	X	X								4.4
3.5.1.4.10 (2)	Aircraft Modes of Operation		X								4.4
3.5.1.4.10 (3)	Aircraft Modes of Operation	X	X								4.4
3.5.1.4.11	In-Flight Operations		X								4.4
3.5.1.5.1	Data-Link		X		X						4.4
3.5.1.5.2	Airborne Communication Suite		X		X						4.4
3.5.1.5.3 (1)	Identification Friend or Foe (IFF)		X								4.4
3.5.1.5.3 (2)	Identification Friend or Foe (IFF)		X								4.4
3.5.1.5.4	Locator Beacon		X								4.4
3.5.1.5.5	Sat Tracker										

REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX											
Method of Verification		**Classes of Verification**									
N/A – Not Applicable		**A – Design**									
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2 – Demonstration		**C – Acceptance**									
3 – Examination		**D – Special**									
4 – Test											
Section 3		**Verification Method**					**Verification Class**				**Section 4**
Requirement	**Description**	**1**	**2**	**3**	**4**	**N/A**	**A**	**B**	**C**	**D**	**Verification**
( ) = Shall Number											
3.5.1.5.6	Navigation Lights		X								4.4
3.5.1.5.7	Navigation Modes		X								4.4
3.5.1.5.9	Laser Altimeter System Kit	X	X	X							4.4
3.5.1.5.10	Centerline Hardpoint Kit	X	X	X							4.4
3.5.1.5.11.a	Payload Provisions	X	X	X							4.4
3.5.1.5.11.b	Payload Provisions	X		X							4.4
3.5.1.5.11.f	Payload Provisions		X								4.4
3.5.1.5.12	Aircraft Servicing		X	X							4.4
3.5.1.5.12.a	Aircraft Servicing			X							4.4
3.5.1.5.12.d	Aircraft Servicing			X							4.4
3.5.2.1	**Payload Capability (KPP)**	X	X		X						4.4
3.5.2.2	Flight Operation	X	X	X							4.4
3.5.2.3.1	Automatic Tracking		X		X						4.4
3.5.2.3.2	Geographic Pointing		X		X						4.4
3.5.2.3.3	Fixed Pointing		X		X						4.4
3.5.2.3.4	Target Marking		X		X						4.4
3.5.2.4 (1)	Payload Control		X								4.4
3.5.2.4 (2)	Payload Control			X							4.4
3.5.2.5	Data Display		X								4.4
3.5.2.6	Payload Cooling System			X							4.4
3.5.2.7	Sensor Metadata			X							4.4
3.5.2.8	Payload Interfaces			X							4.4
3.5.3	EO/IR Sensor			X							4.4
3.5.3.1.a (1)	Digital Video Imaging Capability			X							4.4
3.5.3.1.a (2)	Digital Video Imaging Capability			X							4.4
3.5.3.1.b	Field of Regard			X							4.4

REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX											
Method of Verification		**Classes of Verification**									
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2 – Demonstration		**C – Acceptance**									
3 – Examination		**D – Special**									
4 – Test											
Section 3		**Verification Method**					**Verification Class**				**Section 4**
Requirement	**Description**	**1**	**2**	**3**	**4**	**N/A**	**A**	**B**	**C**	**D**	**Verification**
( ) = Shall Number											
3.5.3.1.c	Autotrack, Autofocus, autoscan functions			X							4.4
3.5.3.1.d	Focusing on the Exterior			X							4.4
3.5.3.1.e	Detecting a Standing Human			X							4.4
3.5.3.1.f	Recognizing a Standing Human			X							4.4
3.5.3.1.g	Identifying a Standing Human			X	X						4.4
3.5.3.1.h	Selectable Video Rates			X							4.4
3.5.3.1.i	NTSC Formatted Video			X							4.4
3.5.3.1.j	Recognizing a Back Pack			X							4.4
3.5.3.1.k	Retrievable Database			X							4.4
3.5.3.1.l	Stability Value			X							4.4
3.5.3.1.m	Slew Rate			X							4.4
3.5.3.1.n	Analyst Software		X								4.4
3.5.4	SAR			X							4.4
3.5.4.1.a	Wide Area Surveillance			X							4.4
3.5.4.1.b	Radiating Hazard to Personnel			X							4.4
3.5.4.1.c (1)	Ground Mapping Mode			X							4.4
3.5.4.1.c (2)	Search & Spot Sub-modes			X							4.4
3.5.4.1.d (1)	GMTI Mode			X							4.4
3.5.4.1.d (2)	GMTI Range			X							4.4
3.5.5.1.a	COTS Maritime Radar		X		X						4.4
3.5.5.1.b	Detection Performance		X		X						4.4
3.5.5.1.c	Detection Range		X		X						4.4
3.5.5.1.d	Probability of Detection		X		X						4.4
3.5.5.1.e	Analyst Software		X		X						4.4

REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX											
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N/A – Not Applicable		**A – Design**									
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2 – Demonstration		**C – Acceptance**									
3 – Examination		**D – Special**									
4 – Test											
Section 3		**Verification Method**					**Verification Class**				**Section 4**
Requirement	**Description**	**1**	**2**	**3**	**4**	**N/A**	**A**	**B**	**C**	**D**	**Verification**
( ) = Shall Number											
3.5.6.1.a	Signal Intercept - 360 Degree			X							4.4
3.5.6.1.2 (1)	Signal Intercept - Direction Finding			X							4.4
3.5.6.1.2 (2)	Signal Intercept - DF Accuracy			X							4.4
3.5.6.1.c	Signal Intercept - Automatic & manual DF			X							4.4
3.5.6.1.d	Signal Intercept - Minimum standoff distance			X							4.4
3.5.6.1.1	Airborne AM/FM Radio			X							4.4
~~3.5.6.1.2~~	~~Airborne Secure Radio~~			~~X~~							~~4.4~~
3.5.6.1.3 (1)	Airborne Tactical Radio			X							4.4
3.5.6.1.3 (2)	Airborne Tactical Radio			X							4.4
3.5.6.1.5	Airborne Audio Panel			X							4.4
3.5.6.2	GCS Communication			X							4.4
3.5.6.2.1	GCS ATC Radio			X							4.4
3.5.6.2.2	GCS Secure Radio			X							4.4
3.5.6.2.3	GCS Intercom Panel			X							4.4
3.5.6.2.3.a	Pilot Communications			X							4.4
3.5.6.2.3.b	Sensor Operator Communications			X							4.4
3.5.6.2.3.c	CDO Communications			X							4.4
3.5.6.2.3.d	Fourth Position Communications			X							4.4
3.5.7.1	GCS Architecture		X	X							4.4
3.5.7.1.3	Digital Terrain Data		X		X						4.4
3.5.7.2	GCS Data Recording			X							4.4
3.5.7.3	Mission Planning			X							4.4

REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX											
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2 – Demonstration		**C – Acceptance**									
3 – Examination		**D – Special**									
4 – Test											
Section 3		**Verification Method**					**Verification Class**				**Section 4**
Requirement	**Description**	**1**	**2**	**3**	**4**	**N/A**	**A**	**B**	**C**	**D**	**Verification**
( ) = Shall Number											
3.5.7.4	Mission Control			X							4.4
3.5.7.5.1 (1)	GCS Environmental Control	X	X	X							4.4
3.5.7.5.1 (2)	GCS Environmental Control	X									4.4
3.5.7.5.2 (1)	Electrical Power	X	X								4.4
3.5.7.5.2 (2)	Electrical Power	X	X								4.4
3.5.7.5.3	Lightning Protection				X						4.4
3.5.8.1.a	Link Segment	X									4.4
3.5.8.1.b	Command and Control link		X								4.4
3.5.8.1.c	Command and Control link		X								4.4
3.5.8.1.d	Zeroize capability		X								4.4
3.5.8.2.1	Primary Command and Control Link			X							4.4
3.5.8.2.2	Secondary Command and Control Link			X							4.4
3.5.8.3.a	Ground SATCOM Terminal			X							4.4
3.5.8.3.b	SATCOM Terminal Power Requirements		X		X						4.4
3.5.8.3.c (2)	SATCOM Terminal Power Requirements		X		X						4.4
3.5.8.3.d	Airborne SATCOM Performance			X							4.4
3.5.8.3.e	Airborne SATCOM Performance			X							4.4
3.5.8.3.f	Narrowband Channels			X							4.4
3.5.8.4	Lost Link			X							4.4
3.5.8.2.7	Backup Battery			X							4.4
3.5.8.4	Data Link Suite			X							4.4

REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX											
Method of Verification		**Classes of Verification**									
N/A – Not Applicable		**A – Design**									
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3 – Examination		**D – Special**									
4 – Test											
Section 3		**Verification Method**					**Verification Class**				**Section 4**
Requirement	**Description**	**1**	**2**	**3**	**4**	**N/A**	**A**	**B**	**C**	**D**	**Verification**
( ) = Shall Number											
~~3.5.9.1 (1)~~	~~SCT Mission~~	~~X~~		~~X~~							~~4.4~~
~~3.5.9.1 (2)~~	~~SCT Mission~~	~~X~~		~~X~~							~~4.4~~
~~3.5.9.1 (3)~~	~~SCT Mission~~	~~X~~		~~X~~							~~4.4~~
~~3.5.9.1.a~~	~~Receiving Video~~	~~X~~		~~X~~							~~4.4~~
~~3.5.9.1.b (1)~~	~~Steering~~	~~X~~		~~X~~							~~4.4~~
~~3.5.9.1.b (2)~~	~~Steering~~	~~X~~		~~X~~							~~4.4~~
~~3.5.9.1.c~~	~~Display Screen resolution~~	~~X~~		~~X~~							~~4.4~~
~~3.5.9.2~~	~~SCT Configuration~~	~~X~~		~~X~~							~~4.4~~
~~3.5.9.3~~	~~SCT Environment~~			~~X~~							~~4.4~~
~~3.5.9.4~~	~~SCT BIT~~		~~X~~								~~4.4~~
~~3.5.9.5~~	~~Information Interface~~			~~X~~							~~4.4~~
~~3.5.9.6~~	~~Electrical Power Interface~~		~~X~~								~~4.4~~
~~3.5.9.7.a~~	~~Physical Characteristics~~		~~X~~								~~4.4~~
~~3.5.9.7.b~~	~~Physical Characteristics~~		~~X~~								~~4.4~~
3.5.10.1 (1)	RVT Mission	X		X							4.4
3.5.10.1 (2)	RVT Mission	X		X							4.4
3.5.10.1 (3)	RVT Mission	X		X							4.4
3.5.10.1.a	Receiving Video	X		X							4.4
3.5.10.1.b	Screen Resolution	X		X							4.4
3.5.10.2	RVT Configuration	X		X							4.4
3.5.10.3	RVT Environment			X							4.4
3.5.10.4	RVT BIT		X								4.4
3.5.10.5	Information Interface			X							4.4
3.5.10.6	Electrical Power Interface		X								4.4
3.5.10.7 (1)	Physical Characteristics		X								4.4
3.5.10.7 (2)	Physical Characteristics		X								4.4

APPENDIX B: Objective Requirements

OBJECTIVE REQUIREMENT	Specification Paragraph
The UAS design should (O) be of a modular nature that will facilitate reconfigurations to include or remove subsystem components, depending on the resources available to the parent unit and the operating environment.	3.2
This maritime modification should (O) have the capability to add extra internal or external fuel systems to extend the range of the aircraft.	3.2.1.1
The UAS should (O) be deployed in one configuration.	3.2.3
The UAS shall (T) support existing DHS system interfaces and should (O) implement an open systems architecture.	3.2.4
(b) (7)(A), (b) (7)(E)	3.2.6.1
	3.2.6.3
As the technology advances, the UAS should be able to launch and recover using onboard sensors and navigation equipment (O) without the pilot manually flying the aircraft.	3.2.6.5.1
The aircrew training functions should (O) have add-on interactive training, with self-paced instruction, duplicating UAS flight performance characteristics, capabilities, and limitations.	3.2.6.6
The UAS should meet all FAA requirements for conducting flight in unrestricted U.S. airspace (excluding Class B and C terminal airspace) without (O) a Certificate of Waiver or Authorization (COA) by providing an equivalent level of safety to that of FAA-certified manned aircraft.	3.2.7.1.1
The UAS should be compatible with pressure (O) fueling systems.	3.2.7.2.2
The UAS should (O) minimize any adverse impact on the environment	3.2.7.2.6
The UAV should (O) have a backup generator capable of supporting full functionality of all aircraft systems except the payload sensors for the duration of the flight.	3.2.7.2.7.b
(b) (7)(A), (b) (7)(E)	3.2.7.3.1.b
	3.2.7.3.2
	3.2.7.3.4.a
	3.2.7.3.5.b
	3.2.7.3.11
	3.2.7.3.15
	3.2.7.4.2.a
	3.2.7.4.2.b

OBJECTIVE REQUIREMENT	Specification Paragraph
(b) (7)(A), (b) (7)(E)	3.2.7.4.2.c
	3.2.7.4.3.a
The UAS should (O) be capable of withstanding rail impacts at speeds of up to [redacted] mph.	3.2.7.5.2
Materials should (O) resist degradation when exposed to the service life environments.	3.3.1
Recycled, recovered, or environmentally preferable materials should (O) be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.	3.3.1.2
The UAS should (O) contain non-proprietary software and follow an Open Systems Architecture, including open specifications for interfaces, services, and formats	3.3.2
Techniques, such as bank switching, used to address memory requirements should (O) not degrade the computer system performance during operational missions.	3.3.2.3
Firmware should (O) be compatible with existing and planned hardware configurations and allow for system enhancements.	3.3.2.5
Contractor developed / controlled computer programs that are stored in Read-Only-Memory (ROM), Programmable ROM (PROM), or other similar memory will (O) be considered firmware.	3.3.2.7
The messages should (O) include a textual description of the condition, time of occurrence, required operator actions, and data processor and software execution status when applicable.	3.3.2.10 (1)
Errors detected in the processing of a command or function should (O) result in an alert to the operator and the erroneous command or function ignored.	3.3.2.10 (2)
The UAS should (O) have fail-safe features with adequate redundancy, and be capable of being rendered safe during emergency or abnormal situations.	3.3.4.2 (1)
The UAS should (O) minimize the probability and severity of injury to personnel during all activities including set-up, operation, maintenance, and tear-down throughout the life cycle of the equipment	3.3.4.2 (2)
The UAS should (O) use Support Equipment (SE) that is common to DHS/CBP aviation.	3.4.1
(b) (7)(A), (b) (7)(E)	3.5.1.2.1
	3.5.1.2.2
	3.5.1.2.3
The aircraft should (O) be capable of operating in level flight at the altitude allowing maximum line of sight reception by the communication relay and signals interception payload specifications.	3.5.1.2.3.b

OBJECTIVE REQUIREMENT	Specification Paragraph
The aircraft should (O) not be detectable as a UAS at night to the unaided human eye on the ground directly below it at its operating altitude.	3.5.1.3
Should (O) provide a see-and-avoid (S&A) sensor, separate and independent of the specified Electro-optical Payload subsystem, capable of detecting non-cooperative airborne traffic that conforms to ASTM 2411.	3.5.1.4.3
A mission ready aircraft should be capable of being emplaced by no more than two (O) people to support and perform the movement of the aircraft from its mover/storage site to the launch/recovery site and then back to the mover/storage site.	3.5.1.4.7.a (1)
The aircraft weight should (O) have a positive margin between mission weight and gross vehicle weight.	3.5.1.4.7.a (2)
Weight changes to components and subsystems should (O) not adversely affect required flying qualities and performance	3.5.1.4.7.b
[redacted]	3.5.1.5.8
	3.5.1.4.9.a
	3.5.1.4.10.a
The aircraft should be capable of operating in and meeting CBP mission objectives when exposed to precipitation measuring 25 (O) millimeters (mm) per hour for one hour with a 2.25mm mean droplet size, with a Standard Deviation of 0.77mm.	3.5.1.4.10.b
The aircraft should have icing rate detection capability (O).	3.5.1.4.10.c (1)
The aircraft should be capable of transiting (30 minutes duration) through moderate rime icing conditions (O).	3.5.1.4.10.c (2)
The aircraft should have anti-ice and/or de-ice equipment (O).	3.5.1.4.10.c (3)
The aircraft should (O) have the onboard, in-flight, self contained ability to detect traffic that may be a conflict, evaluate flight paths, determine traffic right-of-way, and maneuver well clear (or as required); this is known as "sense and avoid" capability	3.5.1.4.13
Options should (O) exist to add additional communication equipment to include one HF transceiver (ARC HF-9087D)	3.5.1.5.2
The aircraft should have an Identification Friend or Foe (IFF) Mode I, II, III, IIIC, and IV identification system capability, and should have Mode S and a Precision Locator Information (PLI) transponder capability (O).	3.5.1.5.3 (1)
IFF should also conform with FAA regulations for altitude encoding transponders specified via 14 CFR Section 91.215.	3.5.1.5.3 (2)
The UAS should (O) contain anti-collision lighting having an operator-selectable capability for Night Vision Device (NVD) or for visible light range.	3.5.1.5.6
Loss of GPS or INS source/functionality should (O) not result in a loss of navigation solution or flight safety.	3.5.1.6.7
Sense-and-avoid systems should (O) provide a minimum traffic detection capability as described in ASTM-2411.	3.5.1.5.8

OBJECTIVE REQUIREMENT	Specification Paragraph
Provide a total payload weight capacity of at least (b) (7)(A), (b) (7)(E)	3.5.1.5.9.b
Possess an embedded pressure (O) fuel and de-fuel capability	3.5.1.5.10.a
Use reasonably available commercial fuel such as diesel (O) fuels	3.5.1.5.10.d
All aircraft components should (O) be capable of being operated to accomplish system maintenance, training, and / or system preparation by either an external Auxiliary Power Unit or from deck-edge power for at least 30 minutes under worse case thermal and environmental conditions without external cooling.	3.5.1.5.10.f
Tracking accuracy should (O) be sufficient to allow target designation at the specified ranges.	3.5.2.3.1
In conjunction with the air vehicle's automatic loiter capability, the payload should (O) be able to maintain constant surveillance and track on a designated geographic point.	3.5.2.3.2
(b) (7)(A), (b) (7)(E)	3.5.2.3.4
	3.5.3.1.a
	3.5.6.1.b (1)
	3.5.6.1.b (2)
Automatic DF should (O) be able to separate out individual communication links.	3.5.6.1.c
There should (O) be an option of adding additional radio units to the aircraft based on the mission of the aircraft.	3.5.7.1.4
The radios should (O) be integrated into the internal voice communication suite of the GCS.	3.5.7.2.2
Communication equipment should (O) have an additional tap for use of payload data by external imagery systems.	3.5.7.2.3.f
The ground components of the UAS should (O) continue to operate and be capable of meeting CBP mission objectives in a rain shower of 2 inches per hour for one hour in winds up to 35 knots steady-state.	3.5.8.1.1.a
(b) (7)(A), (b) (7)(E)	3.5.8.1.1.b
The UAS GCS should (O) remain operational and be capable of meeting CBP mission objectives when subject to icing conditions defined in Sec. 3.2.5.3.5.	3.5.8.1.1.c
The UAS mission objectives should (O) continue to be achievable after restoration of electrical power.	3.5.8.5.2 (1)
The UAS should (O) have electrical/electronic equipment protection devices to prevent power surge/power failure damage.	3.5.8.5.2 (2)
Indirect lightning effects for UAS ground equipment should (O) be considered and mitigated.	3.5.8.5.3
The UAS should (O) allow operator selection of data links.	3.5.9.1.c (1)

OBJECTIVE REQUIREMENT	Specification Paragraph
The Link Segment should (O) provide the capability for encrypting the primary and secondary command and data links.	3.5.9.1.c (2)
(b) (7)(E)	3.5.9.1.e
The Link Segment should (O) provide data distribution (imagery and system data) from the aircraft to the GCS, SCT, and RVT, via discrete and selectable frequencies and also provide imagery to CBP agents in vehicles or on foot.	3.5.9.1.f
Handoff from the GCS to another should (O) occur within the design radius.	3.5.9.2.2
The UAS mission objectives should (O) continue to be achievable after restoration of electrical power.	3.5.9.2.3.e (1)
The GST should (O) have electrical / electronic equipment protection devices to prevent power surge / power failure damage.	3.5.9.2.3.e (2)
The Data Link Suite should allow for future growth to a wideband SATCOM data link.	3.5.9.3
(b) (7)(A), (b) (7)(E)	3.5.10.1
	3.5.10.1.a
	3.5.10.1.b
	3.5.11.1
	3.5.11.1.a
Each RVT should be portable by a handheld device (O) and be capable of being setup and placed into operation by one person within 10 minutes.	3.5.11.7
The UAS when in its field configurations should (O) be verified to meet the requirements of section 3.3.3 of this specification.	4.5.1.1

APPENDIX C: Acronym and Abbreviation List

AC ..... Alternating Current

ADDS..... Aviation Digital Data Services

AES ..... Advanced Encryption Standard

AGL ..... Above Ground Level

Ai..... Inherent Availability

AMOC..... Air and Marine Operations Center

ANSI ..... American National Standards Institute

Ao..... Operational Availability

ASL ..... Above Sea Level

AST ..... Airborne SATCOM Terminal

ATC..... Air Traffic Control

BEAM ..... Bandwidth Efficient Advanced Modulation

BIT ..... Built-in-Test

BLOS ..... Beyond-Line-of-Sight

C^2..... Command and Control

C^3..... Command, Control and Communication

CADRG..... Compressed Arc Digitized Raster Graphic

CBP ..... Customs and Border Protection

CBP A&M ..... Customs and Border Protection Air and Marine

CEP ..... Circular Error of Probability

CDO ..... Command Duty Officer

CFR ..... Code of Federal Regulation

CLS ..... Contractor Logistics Support

COA ..... Certificate of Waiver or Authorization (FAA)

COTS ..... Commercial Off the Shelf

CTCSS ..... Continuous Tone Coded Squelch System

DC ..... Direct Current

DCS ..... Digital Coded Squelch

DES ..... Data Encryption Standard

DF ..... Direction Finding

DFAD ..... Digital Feature Analysis Data

DHS ..... Department of Homeland Security

DOD ..... Department of Defense

DTED ..... Digital Terrain Elevation Data

DVD ..... Digital Video Disk

E3 ..... Electromagnetic Environmental Effect

EA ..... Environmental Assessment

EMC ..... Electromagnetic Compatibility

EME ..... Electromagnetic Environment

EMI ..... Electromagnetic Interference

EMV ..... Electromagnetic Vulnerability

EO/IR ..... Electro-optical / Infrared

EPA ..... Environmental Protection Agency

ESD ..... Electrostatic Discharge

FAA ..... Federal Aviation Administration

FCC ..... Federal Communications Commission

FDet ..... Fault Detection Rate

FGCS ..... Fixed Ground Control Station

FI ..... Fault Isolation Rate

FMC ..... Full Mission Capable

FOL ..... Forward Operating Location

FOR ..... Field of Regard

FOV ..... Field of View

GCS ..... Ground Control Station

GST ..... Ground SATCOM Terminal

GIC ..... Gabarit International de-Chargement

GMTI ..... Ground Moving Target Indicator

GPS ..... Global Positioning System

HD ..... High Definition

HDD ..... Hard Drive Disk

HERF ..... Hazards of Electromagnetic Radiation to Fuel

HERO ..... Hazards of Electromagnetic Radiation to Ordnance

HERP ..... Hazards of Electromagnetic Radiation to Personnel

HOL ..... High Order Languages

HQ ..... Headquarters

HSI ..... Hyper-Spectral Imaging

I/O ..... Input/Output

IAW ..... In Accordance With

ICD ..... Interface Control Documents

ICE ..... Immigration and Customs Enforcement

ICS ..... Intercom Station

IEEE ..... Institute of Electrical and Electronics Engineers

IFF ..... Identification, Friend or Foe

INFOSEC ..... Information Systems Security

INS ..... Inertial Navigation System

IPR ..... Impulse Resolution

IR..... Infra-red

IRAC ..... Interdepartmental Radio Advisory Committee

ISA ..... International Standard Atmosphere

ISO ..... International Organization of Standards

KM ..... Kilometer

KPP ..... Key Performance Parameter

KT ..... Knot; (Nautical Miles per Hour)

KTAS ..... Knots True Airspeed

LOS ..... Line Of Sight

LRGCS..... Launch and Recovery Ground Control Station

LRU..... Line Replaceable Unit

M ..... Meter

MA ..... Mission Availability

MC ..... Mission Capable

MCC..... Mission Control Center

MDV ..... Mission Detectable Velocity

MIL-STD ..... Military Standard

MM ..... Millimeter

MOB ..... Main Operating Base

MPH..... Statute Miles Per Hour

MSL ..... Mean Sea Level

MTBF..... Mean Time Between Failures

MTBMA ..... Mean Time Between Mission Aborts

MTBSA..... Mean Time Between System Aborts

MTI..... Moving Target Indicator

MTTR..... Mean Time to Repair

NATO..... North Atlantic Treaty Organization

NDI..... Non-Developmental Items

NEPA..... National Environmental Protection Act

NFOV..... Narrow Field of View

NGA..... National Geospatial-Intelligence Agency

NIIRS..... National Imagery Interpretability Rating Scale

nmi..... nautical mile

NRIIS..... National Radar Imagery Interpretation Scale

NSA..... National Security Agency

NTSC..... National Television Standards Committee

NVD..... Night Vision Device

NVLAP..... National Voluntary Laboratory Accreditation Program

(O)..... Organizational; Objective

OAM..... Office of Air and Marine

OC..... Operations Center

ODC..... Ozone Depleting Chemicals

OFP..... Operational Flight Control Program

OTAR..... Over-the-Air-Rekey

PLI..... Precision Location Information

PMC..... Partially Mission Capable

PROM..... Programmable Read Only Memory

RAM..... Reliability, Availability, Maintainability

RF ..... Radio Frequency

RMS ..... Root Mean Square

ROM ..... Read Only Memory

RVT ..... Remote Video Terminal

S&A ..... Sense and Avoid

SAR ..... Synthetic Aperture Radar

SATCOM ..... Satellite Communication

SCT ..... Sensor Control Terminal

SE ..... Support Equipment

SRA ..... Systems Replaceable Assembly

STANAG ..... Standardization Agreement (NATO)

(T) ..... Threshold

TLE ..... Target Location Error

TOC ..... Total Ownership Costs

TOS ..... Time on Station

UA ..... Unmanned Aircraft

UAS ..... Unmanned Aircraft System

UASOC ..... Unmanned Aircraft System Operations Center

UASNOC ..... Unmanned Aircraft System National Operations Center

UAV ..... Unmanned Aerial Vehicle

UCS ..... Unmanned Control System

UHF ..... Ultra-High Frequency

USCG ..... United States Coast Guard

VHF ..... Very High Frequency

WFOV ..... Wide Field of View