Blue Canyon Technologies
XB1 CubeSat Offerings

Offeror: **Blue Canyon Technologies, LLC**
Headquarters Address: **2550 Crescent Drive, Lafayette, CO 80026**
Headquarters CAGE Code: **54BU6**
Headquarters DUNS: **826940673**
Size Certification: **Large Business**
Business Type: **Non-Traditional Defense Contractor**
Facility Clearance Level: **TS Non-Possessing**
Ownership/FOCI Information: **U.S.-owned; not foreign-owned, controlled, or influenced**

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BLUE CANYON
TECHNOLOGIES

ABOUT US

Blue Canyon Technologies is a wholly owned subsidiary of RTX (historic Raytheon), specializing in small satellites, small satellites components, integration and test activities designed for a variety of spacecraft missions and mission operations.

An ISO-9001 certified business, we create high-performance, low-cost systems that leverage state-of-the-art design and manufacturing techniques from across aerospace and non-aerospace markets. These systems include satellites and components for classes of spacecraft ranging from a 3U CubeSat to an ESPA-Grande class minisatellite.

In addition, our customer-driven mission planning and on-orbit tasking allows the customer to focus on the mission while we manage the bus, leveraging our straightforward, agile interfaces. Our Mission Operations team has more than 24 years of cumulative on-orbit heritage and 50,000+ supported contacts.

Our mission is to enable space missions to expand the frontiers of science and defense by creating reliable, flight-proven spacecraft with significantly higher performance, much smaller size and a fraction of the cost of traditional space systems. Blue Canyon hardware has flown on missions from low-Earth orbit to geostationary orbit, the Moon, near-earth asteroids, Mars and more. We have supported more than 70 satellite missions, including multiple missions for NASA across various science regimes and mission objectives.

THE XB1 CUBESATS

Figure 1 – Blue Canyon Deployed Spacecraft

Blue Canyon offers 3, 6, 12 and 16U CubeSat configurations to accommodate customer payload and mission needs. Each configurations utilizes TRL-9 components and subsystems, all of which are designed and manufactured by our team through vertical integration. These industry-trusted platforms are high performing and especially optimized for missions requiring fine pointing, tight control, agility and low jitter dynamics of the spacecraft.

The core of the Blue Canyon's powerful CubeSat is the XB1 system. The XB1 is a 1.5 - 2U packaged system containing all components needed to operate a spacecraft. It combines C&DH, ADCS, RF, Power, GPS and mission software into a single unit. While mission software is customed for every program to properly integrate the payload(s) and adjust to mission CONOPs, the baseline bus software is common across all Blue Canyon spacecraft. The spacecraft GNC code pulls from the onboard star tracker(s), as well as the IMUs, torque rods and sun sensors for maximum coverage and performance. This tightly designed XB1 product allows for maximum payload volume for the customer, as well as a modular spacecraft design allowing for easy upgrades and changes.

Starting at the 3U CubeSat design, payload developers can expect 1.5U of volume, as well as use of the tuna can dispenser when available from dispenser or launch providers. Moving to the 6U, customers can expect 4 - 4.5U of volume. With the 12U CubeSat, customers can expect 10U of space, and the 16U CubeSat can allow 14U+, depending on which 16U dispenser is chosen. The sizing of the XB1 depends largely on the reaction wheel size needed to meet mission requirements, as well as potential options offered by Blue Canyon to enhance the spacecraft's capabilities.

OPTIONS AND ENHANCEMENTS

Blue Canyon's line of spacecraft has several baselined systems. For RF, we baseline an S-band transceiver that acts as both the mission data radio and the TT&C system. This TRL-9 radio has flown on dozens of missions meeting many missions' needs for communications. However, should customers need higher data rates, the spacecraft can be equipped with an internally developed X-band radio as a dedicated mission data radio. To accommodate the need for more data, our team can also add a High-Speed Data Recorder (HSDR) that offers payload storage and additional I/O, like ethernet.

For missions requiring extremely fine pointing, the spacecraft can be outfitted with a secondary nano star tracker (NST) of various baffle extensions, as well as fine-balanced reaction wheels for tighter agility.

While Blue Canyon does not produce propulsion, the XB1 systems have successfully interfaced with several different propulsion products and can be assessed on a case-by-case basis as to the feasibility of use and integration.

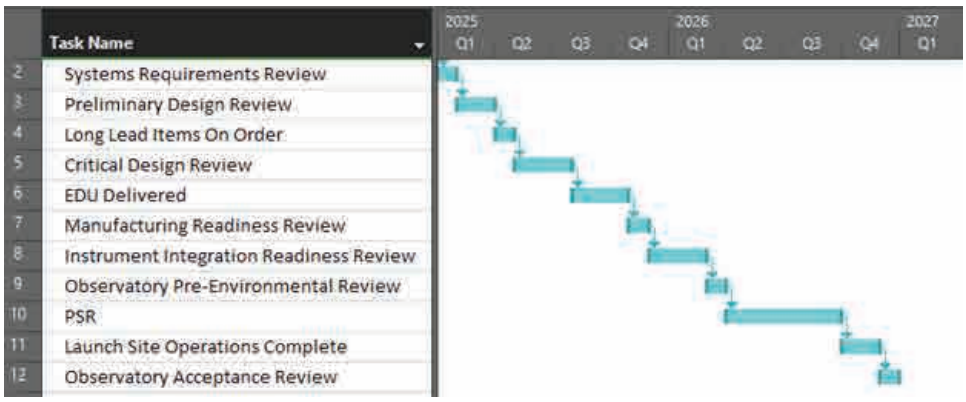
BLUE CANYON TECHNOLOGIES FACILITIES

Blue Canyon prides itself in a vertically- integrated business approach to reduce costs and risk to the customer while also maximizing control over technology and program execution. Therefore, in addition to designing and developing all our spacecraft technology in-house, our state-of-the-art facilities are also equipped with the necessary laboratory, manufacturing and testing equipment and space to accommodate dozens of space mission at any given time.

Figure 2 – Blue Canyon's Lafayette Facility

Utilizing three separate facilities in Boulder and Lafayette, Colorado, Blue Canyon has two vibration test facilities, one shock tower, multiple thermal vacuum chambers that can accommodate two ESPA-Grande spacecraft at once, multiple thermal chambers for ambient pressure testing and more than 80,000 square feet of manufacturing space equipped with the necessary ground support equipment to test spacecraft.

BASELINE SPACECRAFT DELIVERY SCHEDULE



MISSION OPERATIONS

All Mission Operations development, commissioning and on-orbit testing takes place in the Blue Canyon Operations Center (MOC) in our Lafayette, Colorado facility.

Figure 4 – Blue Canyon Technologies Mission Operations Center (MOC)

Although we maintain a dedicated, access-restricted MOC facility, our operations platform is accessible to mission operators from anywhere with a connection to the Blue Canyon corporate network, allowing remote access over VPN and eliminating the dependency on physical facilities.

Our Mission Operations utilizes and maintains a cloud-based, service-oriented architecture hosted in AWS that provides a robust and scalable solution for satellite command and control, telemetry processing, mission management, payload tasking, data delivery and more for a wide variety of missions. A common backend platform offers consolidated access for all supported missions and is designed with an “Add-a-Sat” philosophy for easy addition and configuration of new missions.

COMPATIBILITY

SPECIFICATION	UNITS	BLUE CANYON TECHNOLOGIES XB6	XB12	XB16
Orbit Average Payload Power (EOL)	W (EOL)	39	39	39
Maximum Payload Mass	kg	6	20	23
Bus Dry mass (w/o Payload)	kg	10	12	13
Science Data Downlink	kbps	2000	2000	2000
Science Data Storage (Capacity)	Mbit	32000	32000	32000
Pointing Knowledge	arcsec	8, 1-sigma	4, 1-sigma	4, 1-sigma
Pointing Control	arcsec	7.2 arcsec	7.2 arcsec	7.2 arcsec
Pointing Stability (Jitter)	arcsec/sec	1 asec/1 sec, with respect to star tracker frame at zero body rate	1 asec/1 sec, with respect to star tracker frame at zero body rate	1 asec/1 sec, with respect to star tracker frame at zero body rate
Slew Rate	deg/min	360	360	360
Mission Design Life	years	5	5	5
Compatible LVs	(names)	Rocket Lab Electron, ISRO PSLV, ULA Atlas V, ULA Delta II, ULA Delta IV, ULA Vulcan, SpaceX Falcon Heavy, Firefly Alpha, Astra Rocket 3, ABL RS1, Space Launch System	Rocket Lab Electron, ISRO PSLV, ULA Atlas V, ULA Delta II, ULA Delta IV, ULA Vulcan, SpaceX Falcon Heavy, Firefly Alpha, Astra Rocket 3, ABL RS1, Space Launch System	Rocket Lab Electron, ISRO PSLV, ULA Atlas V, ULA Delta II, ULA Delta IV, ULA Vulcan, SpaceX Falcon Heavy, Firefly Alpha, Astra Rocket 3, ABL RS1, Space Launch System
Nominal Orbit	Altitude, Inclination, Type, Other	500 km, 98 deg, Sun Synch	500 km, 98 deg, Sun Synch	500 km, 98 deg, Sun Synch
Types of Orbits Available	as needed	LEO, GEO, Lunar, CisLunar	LEO, GEO, Lunar, CisLunar	LEO, GEO, Lunar, CisLunar
External Payload Volume	meters	mission dependent	mission dependent	mission dependent
Internal Payload Volume	U	4U	8U	12U

DESCRIPTION

ACS	type	3-axis reaction wheel control	3-axis reaction wheel control	3-axis reaction wheel control
Star Trackers	number of STs	1	1	1
GPS	number of receivers	1	1	1
Batteries	cell type / capacity (Ah)	Li-ion/6.8	Li-ion/6.8	Li-ion/6.8
Solar Arrays	cell type / Area (m)	Triple Junction Cells / 0.24-0.36	Triple Junction Cells / 0.24-0.36	Triple Junction Cells / 0.24-0.36
Main Bus Voltage Range	volts	12 V	12 V	12 V
C&DH Bus Architecture	description	Linux OS - Base	Linux OS - Base	Linux OS - Base
Downlink Formats	CCSDS, STDN, etc	CCSDS	CCSDS	CCSDS
Comm Up\Downlink Band	S, X, UHF, Ka, Ku, etc.	S-Band	S-Band	S-Band
Structure	description	Al Panel	Al Panel	Al Panel
Propulsion	type, fuel	-	-	-
Propellant Capacity	kg	-	-	-
Max delta V	m/s	-	-	-

PROGRAMMATIC & OTHER

Heritage mission(s)	name(s)	AMS, HaloSat, TEMPEST-D, CSIM, CubeRRT, CIRiS, DeMI, CUTE, Starling1-4	ASCENT, Slingshot-1	Redacted at request of customer
Nominal schedule	months (ATP to ready for payload I&T)	15	15	15
Nominal schedule	months (ATP to launch)	23	23	23

OPTIONS

Contract Option #1	Mission Driven CubeSat Propulsion	Mission Driven CubeSat Propulsion	Mission Driven CubeSat Propulsion
Contract Option #2	Additional Payload Storage and I/O via HSDR Addition	Additional Payload Storage and I/O via HSDR Addition	Additional Payload Storage and I/O via HSDR Addition
Contract Option #3	Enhanced ADCS with secondary star tracker	Enhanced ADCS with secondary star tracker	Enhanced ADCS with secondary star tracker
Contract Option #4	Greater downlink with X-Band Radio	Greater downlink with X-Band Radio	Greater downlink with X-Band Radio
Contract Option #5	Aditional power via extra batteries	Aditional power via extra batteries	Aditional power via extra batteries