

Booz Allen Hamilton, Inc. ("Booz Allen"), is designing a 1U cubesat for planned launch in October 2014 from the International Space Station. Developed during Booz Allen's one hundredth year as a corporation, the "Centennial Cubesat" is an internal company technology demonstration experiment to test small photodetectors and also has a small camera. The Centennial Cubesat will transmit health and scientific data to the ground, and the cubesat will receive commands from earth-based Booz Allen control stations in the US. The specific objectives sought to be accomplished with this experiment are: Collaborating with the Air Force to take scientific measurements from our photodetectors if any or how much light passes through the atmosphere from their Guide Star Ground Laser. This is a joint research and development project under CRADA and not a Government contract.

This application is for downlink transmission from the Centennial Cubesat at 450.015-450.230 MHz and earth station uplink transmission at 143.685 – 143.980 MHz. Booz Allen has also submitted an application for an STA (File Number 0531-EX-ST-2014) for the same cubesat with a downlink of 437.615 MHz and an uplink of 145.930, which will allow it to perform research and experimentation for a period of six months using these different frequencies.

The Centennial Cubesat physical design is consistent with Cubesat and P-POD standards; it will be a single unit with dimensions 10cm x 10cm x 10cm, total mass approximately 1.3 kg. It is being built completely with commercial or industrial grade commercial off the shelf components. The satellite contains the following systems:

EPS – Electrical Power Subsystem: Clyde Space EPS power system and 10W Lithium Ion battery. Power generation by four pairs of solar panels with storage in the Clyde Space Li-ion battery.

Transceiver – An AstroDev Helium 100 transceiver on the cubesat.

Processor Board – The processor board controls the satellite functions during flight. Functions include control of the camera, collection and processing of the optical package data, all onboard housekeeping, data packaging.

Nav/Payload sub-systems – The NAV/payload board contains the GPS, analog and ADC data from the photodetectors.

Attitude Control sub-system - The satellite will have passive magnetic attitude control.

Mechanical structure - The Centennial Cubesat uses a Pumpkin enclosure and Booz Allen designed solar panels.

The two ground stations for cubesat monitoring and control will be located at Booz Allen facilities and controlled by Booz Allen personnel. The ground stations will use Ettus Radio Yagi antennas to communicate with the Astro Dev Helium-100 transceiver on the satellite. The ground stations will have computer controlled azimuth-elevation tracking hardware.

### **Ground Station Locations**

Booz Allen Hamilton Engineering Services LLC, 900 Elkridge Landing Rd, Linthicum, MD 21090 Elevation: 81 meters above mean sea level Anne Arundel County See note A below. N 39° 12' 8.0994", W 76° 41' 15.8526" (N 39.202250, W 76.687737)
5375 15th St SE, Rochester, MN 55904 Elevation: 331 meters above mean sea level Olmsted County See note B below. N 44° 0' 6.0402" , W 92° 22' 17.472" (N 44.001678, W 92.371520)

Location notes:

Note (A):

900 Elkridge Landing Rd, Linthicum, MD 21090 is a 4-story office building surrounded by an office park of two to four story buildings. The building next door located at 890 Elkridge Landing Rd, Linthicum, MD 21090 is a seven story hotel. Within and surrounding the office park are trees ranging in height from 10 to 50 feet.

Note (B):

The area surrounding 5375 15th St SE, Rochester, MN 55904 is primarily one and two story buildings and trees with heights from 10 feet to 50 feet.