Map 2: US Air Force Satellite Test Center Historic District

The US Air Force Satellite Test Center Historic District is located at Onizuka Air Force Station (AFS) in Sunnyvale, California. The district boundary encompasses eight buildings, six of which are considered to be contributing resources, and two non-contributing resources to the historic district. The district is significant for the role it played supporting reconnaissance satellites throughout the Cold War. According to the National Park Service guidance, a contributing resource to a district is defined as a "building, site, structure, object adding to the historic significance of the property."

Questions for Map 2:

1. Locate the historic district. How many buildings does it include?

2. Why do you think some buildings might not contribute to the district?

Determining the Facts

Reading 1: Beginnings of the Cold War and Development of Satellite Reconnaissance Systems

The mid-1940s started off tense. With the defeat of Germany and Japan at the conclusion of World War II (1939-45), the United States entered the Cold War (1946-91) with the Soviet Union and its allies. The Cold War differed from past wars. Instead of armed combat, the Cold War was a struggle over opposing political ideologies between the United States and the Soviet Union. The United States' ideology was based on democracy, whereas the Soviet Union's ideology was based on communism. Although there was no direct armed combat during the Cold War, the United States and the Soviet Union existed in a state of defensive readiness; each racing to develop more powerful weapons (including nuclear ones), while also being held in check by the threat of the other's weapons.

Although the Soviet Union had a strong military force, the United States was the only country with nuclear weapons capability in the early years of the Cold War. That changed in 1949 when the Soviet Union acquired nuclear weapons. In response, the United States quickly accelerated development of its weapons programs. In addition, by the mid-1950s, the US Air Force began to develop reconnaissance satellite systems, which would provide important intelligence information, including photo reconnaissance and early warnings of missile launches.

Specifically in 1955, the US Air Force began to develop the Satellite and Missile Observation System (SAMOS). Under the SAMOS Program, satellites would take photographs and transmit television scans of them back to earth. By 1957, the US Air Force also began to develop the Missile Detection Alarm System (MIDAS), which would provide early warning of missile launches.

During the development of the US Air Force's satellite programs, the primary method of reconnaissance was aerial photography taken from long-range bombers, or U-2s. U-2 reconnaissance missions began in 1956 and yielded photographs of airfields, missile test and training facilities, nuclear weapons, and atomic facilities in the Soviet Union. These top-secret flights flew at a high altitude over restricted air space. Despite the high altitude, they could be detected by radar and were vulnerable to missile attacks by the Soviets. These flights were very dangerous, and as a result, the US Air Force continued to develop satellite reconnaissance systems. However, most military funding at this time was dedicated to weapons systems, such as Intercontinental Ballistic Missiles (ICBMs), and the satellite reconnaissance efforts lagged behind.

This changed in October 1957 with the launch of *Sputnik I* by the Soviet Union. *Sputnik I*, the first earth-orbiting satellite, marked a turning point in the Cold War. The Soviet Union had beaten the United States in its efforts to launch a satellite into space, and the American public feared that this was only the first step toward the Soviet Union's ability to launch nuclear weapons. To keep pace, the United States revived a dormant program called Project Orbiter. The goal of the program, initiated by the US Army and US Navy in 1954, was to put a scientific satellite into orbit; however, the program was never implemented. By January 1958, Explorer I was launched, and became the United States' first satellite in space.

The successful launch of *Sputnik I* also led the US Air Force to begin to work on a new satellite reconnaissance program in conjunction with the Central Intelligence Agency (CIA), called the Corona Program. The Corona Program was similar to the SAMOS Program. For example, the Corona Program involved the launch of a satellite that would take reconnaissance photographs of the Soviet Union and other communist countries. However, unlike SAMOS, Corona satellites would not transmit the images via television, but would instead return the film to earth in a satellite recovery vehicle (SRV) to be

developed and analyzed. The CIA worked with the US Air Force and private contractors to develop the Corona Program and to produce the following components:

- Specialized camera systems and film.
- Spacecraft to house the systems and film.
- Launch equipment.

The first two camera systems for the Corona Program were manufactured by Fairchild Camera Company, which was based on the east coast of the United States. Fairchild manufactured aerial cameras for military and commercial use, and held multiple contracts with the US Army, US Navy, and US Air Force. The third camera system was designed by the Itek Corporation of Lexington, Massachusetts. Itek Corporation was founded in the 1950s by Richard Leghorn, a former US Air Force aerial reconnaissance expert. Film was provided by the Eastman Kodak Company of Rochester, New York.

Sunnyvale-based Lockheed Missiles and Space Division designed and manufactured the Agena spacecraft powered by a Thor booster, which would hold and launch the reconnaissance camera system. General Electric (GE) Re-entry Systems of Philadelphia, Pennsylvania designed and manufactured the gold-plated SRV, which housed the camera and film systems. It was designed to safely re-enter the earth's atmosphere from space, to allow the film to be developed and analyzed. The SRV was equipped with salt plugs that would dissolve and sink the SRV within 72 hours if it was not retrieved to ensure that the information would not fall into enemy hands.

Preserving the secrecy of the Corona Program and its objectives became a major concern. As a result, the US Air Force created a cover program called Discoverer. The publicly-stated goal of the Discoverer Program was scientific research. The goals were said to be to:

- Develop and conduct flight tests of the satellite and subsystems.
- Stabilize the satellite in orbit and respond to programmed reorientation controls.
- Develop proven techniques to recover capsules ejected from orbiting satellites.
- Perform space research and engineering tests to support advanced military reconnaissance satellite programs.

Articles about the program appeared in newspapers, such as the *San Jose Mercury News* and *The New York Times*. The articles captured the public's attention with reports that the US Air Force planned to send monkeys into space, as the first step to sending human beings into space. Of course, these scientific pursuits were never fulfilled, as the Discoverer Program was only a cover for the Corona Program.

Questions for Reading 1:

1. Why do you think U-2 reconnaissance missions were dangerous? What are the advantages to having un-manned satellite reconnaissance missions?

2. Why did the launch of *Sputnik I* change the way the US Air Force viewed its own satellite programs?

3. Why do you think it might have been better to send film back down to earth to be developed and analyzed, rather than transmit from space via television scans, during the time the Corona Program was developed in the 1960s?

4. What kinds of private contractors were involved with development of the Corona Program? Why do you think the military used private contractors rather than government employees to assist in the development of these programs?

5. What was the Corona Program's cover story? Why do you think the decision was made to classify the Corona Program? Do you think such a cover story would be effective?

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Reading 2: Development of the US Air Force Satellite Test Center and the First Successful Corona Missions

In 1959, the US Air Force prepared to construct a satellite command and control center for the Corona Program in Sunnyvale, California. It would be used to support Corona satellites in conjunction with the satellite launch site at Vandenberg Air Force Base (AFB) in Lompoc, California, and a growing number of tracking stations located in Alaska, Hawaii, and New Hampshire, among others.

In November of that year, the US Air Force acquired about 11 acres of land from Lockheed Aircraft Corporation for $1. The land was located on the west side of Mathilda Avenue, east of the Lockheed Missiles and Space Division facility. Lockheed Missiles and Space Division, a subsidiary of Lockheed Aircraft Corporation, was established in the mid-1950s and was the prime contractor to the US Air Force to provide satellite spacecraft, including those used for the Corona Program. By the end of 1959, construction of Building 1001, also known as the US Air Force Satellite Test Center (STC), was nearly complete. The single-story, windowless, utilitarian pre-cast concrete building, cost approximately $2,200,000.

Building 1001 was occupied in March 1960 by the 6594th Aerospace Test Wing (ATW), the first unit tasked with military satellite operations in the United States. They worked closely with Lockheed Missiles and Space Division on the adjacent property, as well as with the CIA, which was also present in the building. Portions of Building 1001 were still being constructed in 1960 when the 6594th ATW arrived, including a state-of-the-art Satellite Control Room in the Satellite Control Room Complex. This room was created for military and civilian personnel to engage in command and control of Corona satellites. While the room was under construction, an interim satellite control room was established. The building also housed the following:

- Administrative facilities
- Weather forecasting station
- Information center
- Status rooms
- Offices
- Conference rooms
- Cafeteria

A few months later, on August 18, 1960, the US Air Force accomplished the first successful in-air retrieval of a Corona satellite that provided the first satellite reconnaissance photographs of the Soviet Union taken from space. The satellite was publicly known as Discoverer XIV. It was launched from Vandenberg AFB, and orbited the earth 17 times, supported from the interim Satellite Control Room in Building 1001, and a tracking station in Alaska, before the eject command was relayed to the satellite. Following the command, at 300 miles above the earth, the 84-pound satellite recovery vehicle (SRV) separated from the spacecraft, and began its descent to earth. The parachute opened at 50,000 feet, which slowed its descent to 1,600 feet per second.

US Air Force Captain Harold E. Mitchell and his crew from the 6594th Recovery Control Group, a unit established to recover Corona satellites, were dispatched to recover the SRV. The 6594th Recovery Control Group was stationed at Hickam AFB, in Honolulu Hawaii. Captain Mitchell piloted a Fairchild C-119 *Flying Boxcar* (C-119), known as the *Pelican 9*, which was specially equipped with grappling hooks to catch the SRV suspended by a parachute.

In addition to the pilot, the crew included a co-pilot, navigator, winch operator, flight engineer, load master, and additional airmen. They missed the SRV by approximately 6 inches on the first pass, and

approximately 2 feet on the second pass, before catching it on the third pass. This marked the first successful air recovery of an object from space for the United States. Captain Mitchell was awarded the Distinguished Flying Cross, and his crew was awarded Air Medals for this feat.

The Discoverer XIV SRV contained 20 pounds of film which documented over 1,650,000 square miles of the Soviet Union. This was more photographic coverage of the Soviet Union than all previous U-2 reconnaissance flights combined. Photo interpreters analyzed the film, and produced approximately 130 pages of text explaining the images. These photographs provided evidence that the missile gap, feared since the 1957 launch of *Sputnik I* by the Soviet Union, did not exist, and that the Soviets did not have an immense stockpile of Intercontinental Ballistic Missiles (ICBMs). However, despite the historic nature of this event, the crew members, who were not cleared for the Corona Program, were not aware of the importance of their mission.

In 1962, the Department of Defense (DoD) classified all military space programs, including the Discoverer Program cover-story for the already-classified Corona Program. The US Air Force and CIA feared that the scientific cover-story would eventually wear thin, given the number of satellites launched per year. In addition, although the Discoverer Program was a cover-story, the fact that so much information was published about it highlighted other programs that were not as well publicized. Furthermore, newspapers published in the Soviet Union quoted US newspapers concerning general satellite reconnaissance capabilities. Although much of the information in newspapers was deliberately misleading, it did present a relatively clear picture of the United States' capabilities. The US Air Force continued to announce satellite launches, however, only limited information was provided.

By 1965, an average of three to four recoveries of Corona satellites, which contained photographic images documenting conditions in the Soviet Union and other communist counties, were made each month. By this time, Corona satellites had accurately mapped all 25 of Moscow's long-range missile sites. Images taken by Corona satellites also indicated that China was readying its nuclear facility in Lop Nur for testing. In addition, upgrades were made to the satellites as technology advanced. For example, image resolution was originally from a distance of 25 feet, but improved to a distance of 6 feet. By the time the program was terminated in 1972, the US Air Force successfully recovered 167 Corona satellites which provided more than 800,000 images on 2.1 million feet of film.

Questions for Reading 2:

1. Who did the US Air Force acquire the land from to construct the STC, and how much did land acquisition cost? Why do you think it cost what it did?

2. Why do you think the US Air Force designed Building 1001 without windows?

3. Describe the steps taken to launch and retrieve the Corona satellites.

4. Explain the perceived missile gap, and how images taken by Corona satellites changed perceptions regarding it.

5. Why do you think the crew was unaware of the true nature of what they recovered?

6. Explain why the DoD classified all military space launches in 1962.

Reading 3: Development of Building 1003 and its Role in the Space Shuttle Program

By the mid-1960s, the US Air Force Satellite Test Center (STC) supported multiple satellite programs from Building 1001, including the Corona Program. Although a separate administrative building (Building 1002) was constructed in 1962-64 and such functions were moved to it from Building 1001, additional space was needed to support existing and newly developed satellite programs. One such new program was the Manned Orbiting Laboratory (MOL) Program, which was initiated in the early 1960s. The concept involved a Titan III booster rocket which carried a modified Gemini B capsule attached to a space laboratory. Astronauts would conduct military reconnaissance and scientific experiments, and also assess the adaptability of humans to space environments. In 1965, it was determined that the MOL Program would be supported from the STC.

In 1966, the US Air Force acquired approximately 8 acres of land from Lockheed Aircraft Corporation at a cost of $49,000. The US Air Force planned to construct two new buildings: Building 1003 which would house the MOL Program and Building 1004 which would provide power to the installation. Prior to the development of Building 1004, the STC relied on power provided by Pacific Gas & Electric (PG&E) Company. However, due to the technological requirements and critical nature of satellite programs supported from the STC, the US Air Force required an independent energy source in case of a power outage to ensure that communication with the satellites in space was not lost.

In 1968, construction started on Building 1003. However, in June 1969, the MOL program was cancelled to save money. After a short work stoppage, construction on Building 1003 resumed, and construction of Building 1004 began. Despite the cancellation of the MOL Program, there remained a substantial number of existing and newly developed satellite programs which would be supported in Building 1003.

By the end of 1969, the 164,000-square foot Building 1003, constructed at a cost of $8 million, was nearly complete. It was a windowless, pre-cast concrete-panel building, and although the building was technically four stories, it was 104 feet high, and each story measured approximately 25 feet high. Typically, stories are about 10 to 12 feet high. Building 1003's stories were much higher to accommodate mechanical equipment for the multiple satellite programs. In addition, the building featured a mezzanine in between the second and third stories that housed mechanical equipment, including electrical panels and massive air handling units (AHU), among others. The building was painted "Air Force blue," resulting in its nickname, the "Blue Cube."

The first story housed communications and crypto equipment, a data distribution center, mechanical equipment and storage, and the second story housed four Control Data Corporation (CDC) 3800 computer rooms and a tape library. At least four Mission Control Centers (MCCs) were housed in the building, known as MCCs B, D, F, and M. These supplemented MCCs located in Building 1001. MCCs were areas where satellite programs were supported, and it is likely that there were additional MCCs located in Building 1003. However, due to the classified nature of many of the satellite programs supported at the STC, a great deal of information about the MCCs and programs supported is not available.

Although many programs supported from Building 1003 remain classified, it is known that the Space Shuttle Program was supported from the building. The Space Shuttle Program, managed by the National Aeronautics and Space Administration (NASA), was initiated in January 1972. Research and Development (R&D) shuttle missions were launched from the Kennedy Space Center in Houston, Texas, and military shuttle missions were intended to be launched from Vandenberg Air Force Base (AFB) in Lompoc, California. By this time, the STC had been renamed Sunnyvale Air Force Station (AFS). Sunnyvale AFS would provide support for all shuttle missions.

To keep pace with evolving technology and new satellite programs, the MCCs in both Buildings 1001 and 1003 were altered from time to time. In 1981, plans were prepared to reconfigure MCC B on the fourth story of Building 1003 to provide support for the Space Shuttle Program. Plans indicated that some walls and partitions were removed to create larger spaces in MCC B, while other partitions were installed to divide spaces. Rooms were painted, and tile and carpeting was installed, including soundproof carpet and tile in select rooms. In addition, the plans called for the installation of new locks, key boxes, and alarms. Each satellite program had varying levels of secrecy, and to ensure that only the appropriate personnel were provided access, security measures such as these were often made.

Among the shuttle missions supported at Onizuka AFS was the first mission flown by the Space Shuttle *Columbia* in April 1981. The following year, the fourth *Columbia* shuttle mission was supported from Building 1003. The shuttle housed the first military payload, which was likely a classified communications satellite. The first dedicated military shuttle flight was supported from Building 1003 in January 1985. Newspaper accounts at the time of the launch noted that communication between the astronauts and control center was hidden in complex codes. It was also reported in the press that the shuttle mission was enacted to deploy top-secret communications satellites.

The ill-fated Space Shuttle *Challenger*, which exploded after launch killing its seven crew members in 1986, was also supported from Building 1003. Following the explosion, Sunnyvale AFS was renamed Onizuka AFS in honor of Space Shuttle *Challenger* astronaut Lieutenant Colonel Ellison S. Onizuka, who had trained there. Onizuka served in the US Air Force since 1970, and was the mission specialist aboard the fourth *Columbia* mission, which was the first dedicated military flight. In 1987, a memorial to Lieutenant Colonel Onizuka was placed in the lobby.

Following the *Challenger* explosion, the US Air Force reverted to sending satellites into orbit via unmanned launches. It was not until December 1988 that the Space Shuttle *Atlantis* was launched with a top-secret military payload. Shuttle launches continued to be supported from Onizuka AFS throughout the 2000s.

Questions for Reading 3:

1. What are some features that made Building 1003 unique?

2. Why was Building 1003 originally constructed, and what purpose did it serve?

3. The Space Shuttle first carried a military payload in 1982, and the first dedicated military shuttle flight occurred in 1985. What was the difference between these two shuttle flights?

4. Why was Building 1004 constructed, and why was its function so important to the installation?

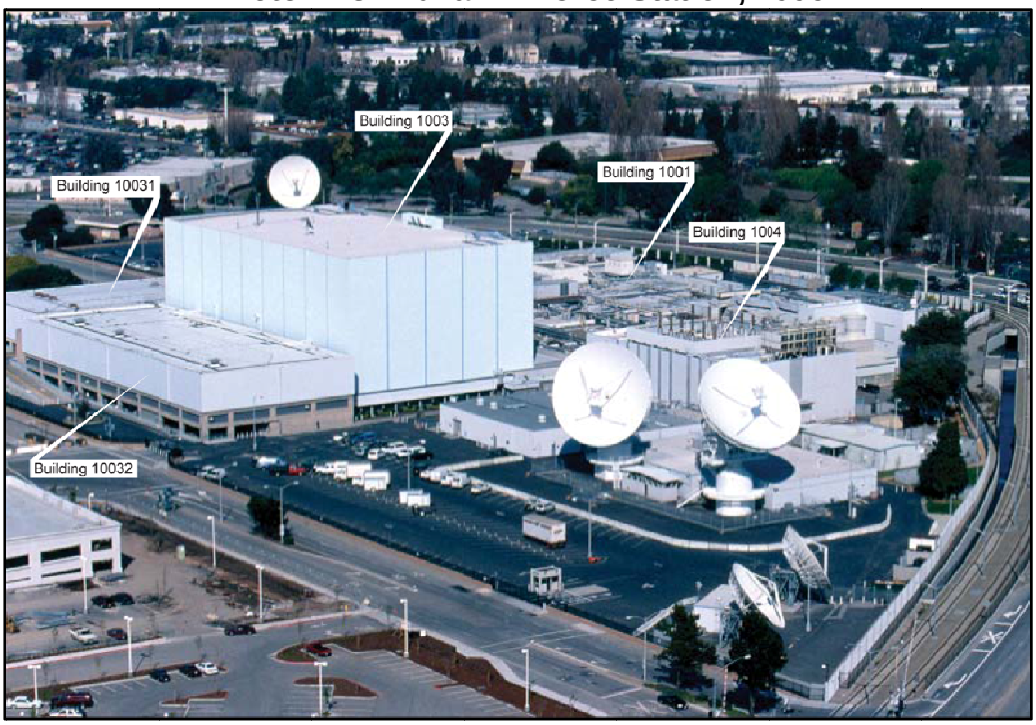
5. Why was the installation re-named Onizuka AFS in the 1980s?

Visual Evidence

Photo 1: Building 1001, 1959

(Onizuka AFS)

Photo 2: Onizuka Air Force Station, 2006



(Onizuka AFS)

Questions for Photos 1 and 2:

1. How would you describe the original appearance of Building 1001 and the surrounding area?

2. Based on Readings 1 and 2, what activities happened in Building 1001?

3. How would you feel working in a windowless building like this? Why would you feel this way?

4. What are some of the changes that have taken place between the original 1959 photo and the 2006 photo?

Photo 3: US Air Force Fairchild C-119 *Flying Boxcar*, 1960

(NRO, http://www.nro.gov/corona/imagery.html)

Questions for Photo 3:

1. Describe what is happening in this photograph. If necessary, refer back to Reading 2.

2. How many people would likely have been on board the C-119 *Flying Boxcar*, and what were their roles? If necessary, refer back to Reading 2.