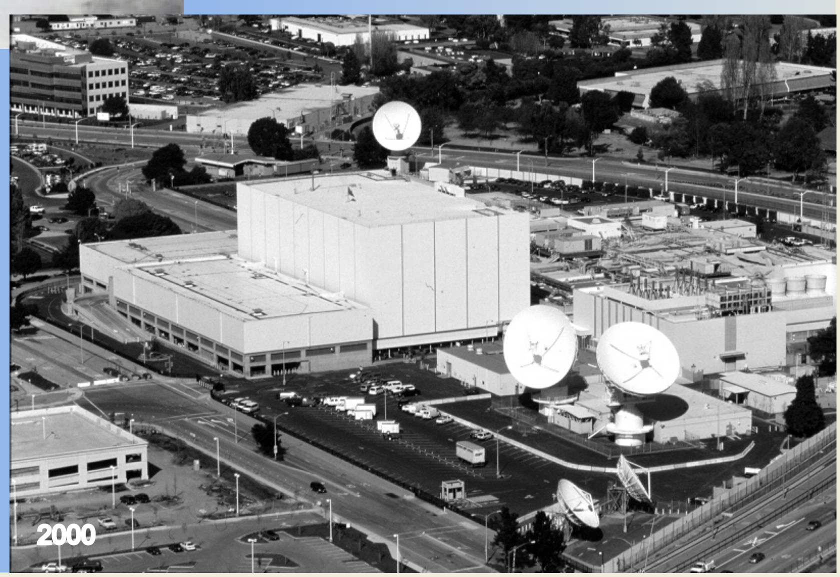
California State Historic Preservation Office
Historic American Buildings Survey
Level II-Type Documentation

U.S. Air Force Satellite Test Center
(Onizuka Air Force Station)
City of Sunnyvale, Santa Clara County, California



Department of the Air Force
Headquarters/Air Force Center for Engineering and the Environment
Lackland Air Force Base, Texas

September 2010

U.S. AIR FORCE SATELLITE TEST CENTER
(Onizuka Air Force Station)
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Log No. USAF041221A

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

PHOTOGRAPHS

California Office of Historic Preservation
1416 9th Street, Room 1442
Sacramento, CA 95814

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U.S. AIR FORCE SATELLITE TEST CENTER
(Onizuka Air Force Station)
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

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SECTION I

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HISTORIC AMERICAN BUILDING SURVEY
LEVEL II-TYPE DOCUMENTATION

U.S. AIR FORCE SATELLITE TEST CENTER
(Onizuka Air Force Station)

Log No. USAF041221A

Location: 1080 Innovation Way
City of Sunnyvale, Santa Clara County, California

USGS *Mountainview, California, Quadrangle*
Universal Transverse Mercator Coordinates:
N: 586033.742; E: 4140232.576

Present Owner: U.S. Air Force

Present Occupant: 21st Space Operations Squadron (SOPS)

Present Use: U.S. Air Force Station

Significance: The National Register-eligible U.S. Air Force Satellite Test Center Historic District consists of six interconnected contributing resources, Buildings 1001, 1002, 1003, 1004, 10031, and 10032, and two non-contributing resources, Buildings 1015 and 1025. The district is significant at a national, state, and local level under Criterion A for its associations with satellite reconnaissance during the Cold War, and Criteria Consideration G, because five of the six buildings are not yet fifty years old, and have exceptional importance for their associations with satellite reconnaissance during the Cold War.

The U.S. Air Force Satellite Test Center Historic District is significant at the national level for its association with satellite reconnaissance during the Cold War. The installation was established in 1959 to serve as the command-and-control center for the first reconnaissance satellite program, the Corona Program. It was developed by the U.S. Air Force and the Central Intelligence Agency (CIA), with assistance from a private contractor, Lockheed Missiles and Space Division. Shortly thereafter, the National Reconnaissance Office (NRO) was established to provide oversight of the program and develop other satellite programs. As new satellite technologies developed, such as communications, early missile warning, meteorology, navigation, and nuclear detonation detection, additional buildings were constructed. These satellite programs provided valuable data throughout the Cold War, and were supported from the U.S. Air Force Satellite Test Center Historic District. Although many of the satellite programs remain classified, it is apparent through the continued presence of the NRO that the installation played a key role in the United States' conduct of the Cold War. The six interconnected buildings form a cohesive unit, and represent the massive investment of the United States to combat the perceived threat posed by the Soviet Union during the Cold War.

The U.S. Air Force Satellite Test Center Historic District is also significant at the state and local levels for its association with the development of California as a leader in technological innovations. California, and specifically the City of Sunnyvale in Silicon Valley, began to emerge as a leading technological center during the Cold War. This was due, in part, to the military's investment in the development of defense technologies in California, such as command and control of reconnaissance satellites at Onizuka Air Force Station (AFS). The presence of Lockheed Missiles and Space Division in Sunnyvale in the mid-1950s, followed by Onizuka AFS in the late 1950s, burnished its reputation as a high-technology center. The district's period of significance extends from 1959, the date of construction of Building 1001, through 1991, the conclusion of the Cold War.

PART I: HISTORICAL INFORMATION

A. Historical Context

1. Introduction

The U.S. Air Force Satellite Test Center (STC), known as Onizuka Air Force Station (AFS), is located in the City of Sunnyvale, Santa Clara County, California. It was established in 1959 to support the Corona Program, a reconnaissance satellite program developed by the U.S. Air Force and Central Intelligence Agency (CIA), and overseen by the National Reconnaissance Office (NRO). The development and expansion of the STC in the subsequent decades illustrates multiple trends in American history – namely the massive investment of the Department of Defense (DoD) during the Cold War, and the role that satellite reconnaissance played. The secrecy surrounding the STC and its satellite programs was illustrated by the presence of the NRO, whose existence remained classified throughout the Cold War. Many of the reconnaissance satellites supported by the STC were also classified, and remain classified today. The development of the STC in Sunnyvale, California, also illustrates the transformation of California's economy from agricultural to industrial, and ultimately to its prominence as a technological center. The historic context in this document explores the development of the STC, its relationship to the surrounding area, and to trends in American history, such as the Cold War.

2. Historical Development of Sunnyvale, 1700s-1945

By the 1770s, the Santa Clara Valley was inhabited by Spanish settlers who established missions and converted much of the Native American population to Christianity. The economy was agricultural and consisted of wheat farms, which later gave way to fruit farms in the late-nineteenth century (Ignoffo, 1994). In 1906, the first non-agrarian industry arrived in Sunnyvale, the Joshua Hendy Iron Works. The iron works was established in 1856 in San Francisco to supply miners during the gold rush, and was destroyed in the 1906 earthquake. Sunnyvale, anxious to attract industry and expand its population, offered thirty-two acres of former fruit orchards to the iron works at no cost to induce industrial development (American Society of Mechanical Engineers [ASME], December 14, 1978). In 1912, Sunnyvale was incorporated (Redevelopment Agency of the City of Sunnyvale, 1964).

Sunnyvale's economy received a boost during World War I (1914-19) when the Joshua Hendy Iron Works began to produce ship engines for the U.S. Navy (ASME, December 14, 1978). Following the war, advances in aviation technology led to an interest in Germany's dirigible airships, two of which were granted to the United States as war reparations. As a result of lobbying efforts led by U.S. Navy Rear Admiral William A. Moffett, the U.S. Navy opted to develop east and west coast dirigible air bases to house two newly constructed air ships, the *Akron* and the *Macon*. A real estate agent, Laura Whipple, based in nearby Alameda County, California recognized the potential of former pasture lands in the Sunnyvale vicinity, and spearheaded a campaign to persuade the U.S. Navy to locate its new air base there (Ignoffo, 1994).

On December 12, 1930, Sunnyvale was selected as the site of the U.S. Navy air base. In April 1933, the *Akron* crashed off the New Jersey coast, killing seventy-three people, among them Admiral Moffett. A week later, on April 12, the U.S. Navy commissioned Naval Air Station Sunnyvale. The following month, it was re-designated Moffett Field, in honor of Admiral Moffett. By the end of 1933, the *Macon* was stationed at Moffett Field. However, the *Macon* was also short lived, and in 1935, was destroyed in a crash. Shortly thereafter, the U.S. Army assumed control of Moffett Field, and renamed it Moffett Field Army Air Corps Base (Ignoffo, 1994).

The establishment of Moffett Field in Sunnyvale provided numerous jobs during the Great Depression (1929-41). Despite this, Sunnyvale's main economy remained farming, and unemployment skyrocketed with an influx of migrant workers fleeing the Midwest as a result of the Dust Bowl (1931-37). In addition, although the Joshua Hendy Iron Works remained open during the Great Depression, the company was forced to lay off workers due to a lack of steady business (Ignoffo, 1994).

In 1940, ownership of the Joshua Hendy Iron Works was assumed by Charles E. Moore, backed by a group of western business men, including Felix Kahn, K.K. Bechtel, and Henry J. Kaiser, among others. The group had teamed together to construct the Hoover Dam in Boulder City, Nevada, and were referred to as the Six Companies. Under their leadership, the iron works expanded and resumed production of ship engines for the U.S. Navy (ASME, December 17, 1978). The combination of the change in ownership, and advent of World War II (1941-45) helped create an increase in economic activity in Sunnyvale. Between 1941-45, the federal government pumped approximately $35 billion into California's economy. In Sunnyvale, Moffett Field and Joshua Hendy Iron Works were the prime beneficiaries, and war-related industry usurped farming as Sunnyvale's main economy (Ignoffo, 1994).

3. Beginning of the Cold War and Post World War II Development in Sunnyvale, 1946-56

With the defeat of Germany and Japan at the conclusion of World War II, international politics and conditions affecting post-war strategy changed radically, and the United States entered the Cold War (1946-91) with the Soviet Union and its allies. During the late 1940s and early 1950s, the Euro-centric order yielded to a world in which the United States and the Soviet Union became two contending blocs representing fundamentally opposed political ideologies, i.e., democracy and communism (Center for Air Force History, 1994).

Following the war, economic growth in Sunnyvale slowed as a result of its heavy dependence on war-related activities. The Joshua Hendy Iron Works reduced its workforce, eliminating 8,000 jobs at the plant, which during the war, operated twenty-four hours per day to keep up with demand. In 1947, Westinghouse Corporation acquired the iron works. During this time, the city embarked on a plan to attract more industry, although it met with considerable opposition from Sunnyvale's remaining farmers.

In 1949, the City of Sunnyvale restructured their local government and established a city executive position, appointed by the City Council. This change essentially marked the end of the agricultural-based economy, and signaled Sunnyvale's transition to a modern, industrial city (Ignoffo, 1994).

In the early 1950s, Sunnyvale annexed land to expand the city's boundaries and provide space for industrial development. Sunnyvale aggressively marketed itself as a prime location for industrial development by advertising in newspapers such as *The Wall Street Journal.* By 1952, ten companies had relocated to Sunnyvale, including: Bowser, Inc.; R.H. Hamilton Company; Duncan Smith Company; Thorton Mills Company; and Kaiser Aluminum and Chemical Company, among others. In 1953, Personal Products Corporation, a subsidiary of Johnson & Johnson, constructed a factory in Sunnyvale. By 1954, twenty-nine residential housing developments were under construction to accommodate the influx of workers to the area (Ignoffo, 1994).

In 1956, Lockheed Missiles and Space Division, a division of Lockheed Aircraft Corporation, acquired an approximately 275-acre tract of land adjacent to Moffett Field that had been annexed by the city in the early 1950s (Ignoffo, 1994). Lockheed Aircraft Corporation, formed in 1926 in Hollywood, California, became one of the major producers of military aircraft for the United States and its allies in World War II. In 1954, Lockheed Aircraft Corporation expanded its mission and services to confront the challenges of the Cold War, and established the Lockheed Missiles and Space Division (*New Horizons*, April 2007).

Lockheed Missiles and Space Division selected Sunnyvale based, in part, on the recommendation of one of the division's directors, Herschel Brown. Sunnyvale was touted as an attractive location because of its climate, and proximity to the airport and Stanford University in nearby Palo Alto, which would provide a steady workforce of recent college graduates (Ignoffo, 1994). Following construction, Lockheed moved into the Sunnyvale facility in 1956. A 1981 *San Jose Mercury News* article celebrating the twenty-fifth anniversary of Lockheed Missiles and Space Division in Sunnyvale, noted that it was "the first postwar, big-time industry in town, and its presence and pool of skilled labor put Sunnyvale on the map," paving the way for future industries to follow (Miller, July 28, 1981). The facility featured a Research & Development Building, Manufacturing Building, Administration Building, Cafeteria, Sentry Building, Gas Plant, and parking areas (Ralph M. Parsons Company/U.S. Air Force Ballistic Missile Division (AFBMD), March 6, 1959a).

4. Early Intelligence Gathering and the Cold War, 1949-58

By 1949, the Soviet Union had acquired nuclear capability, ending the United States' monopoly on nuclear power and raising the stakes for nuclear war. This in turn led the United States to focus on weapons development, as well as intelligence-gathering efforts to gauge the Soviet Union's weapons capabilities. In the mid 1940s, the U.S. Air Force began to research the possibility of providing reconnaissance efforts via satellites and global tracking stations. By 1951, the Air Research and Development Command (ARDC) authorized the RAND Corporation to make recommendations regarding the development of a national reconnaissance satellite system. The RAND Corporation, a non-profit think tank, was established following World War II to provide research and development (R&D) services to the United States military. The RAND Corporation recommended the use of satellites for reconnaissance missions by the U.S. Air Force, indicating that it was of "vital strategic importance" (Arnold, 2005; RAND Corporation, no date [n.d.]).

In July 1954, Western Development Division (WDD) was established by the ARDC, and in the following year, it assumed responsibility for the development of Weapon System 117L (WS-117L). WS-117L was envisioned as a satellite system, under which separate satellite subsystems with diverse functions, such as photo reconnaissance and early warning of missile launches, would be developed. Shortly thereafter, WDD also assumed responsibility for development of the Thor Intermediate Range Ballistic Missile (IRBM) (Rosalanka, n.d.; Jernigan, 1983).

In March 1955, the U.S. Air Force issued a directive which established requirements for development of an advanced reconnaissance satellite system. The system was originally designated Advanced Reconnaissance System (ARS), followed by Sentry, and ultimately became known as the Satellite and Missile Observation System (SAMOS). Under the SAMOS Program, satellites would take photographs, develop the film in orbit, and transmit television scans of the photographs. By 1957, the U.S. Air Force also began to develop feasibility studies for the Missile Detection Alarm System (MIDAS), to provide early warning of missile launches. In 1957, the WDD was re-designated as the U.S. Air Force Ballistic Missile Division (AFBMD) (Jernigan, 1983). Lockheed Missiles and Space Division in Sunnyvale served as the prime contractor to provide a multi-purpose satellite spacecraft for the U.S. Air Force's developing satellite systems (Lockheed Martin Space Systems, n.d.).

Despite the development of the U.S. Air Force's satellite programs, the primary method of reconnaissance technology at the time involved aerial photography taken from long-range bombers, or U-2s (Arnold, 2005). U-2s were manufactured by the Lockheed Aircraft Corporation at its Advanced Development Programs (ADP) facility in Palmdale, California. U-2 reconnaissance missions were initiated in 1956, and yielded photographs of Soviet Union airfields, missile test and training facilities, nuclear weapons, and atomic facilities, among others. These top-secret flights were dangerous, and the U.S. Air Force continued to work on developing satellite reconnaissance systems. However, much of military funding at this time was dedicated to weapons systems, such as Intercontinental Ballistic Missiles (ICBMs), while the satellite reconnaissance efforts lagged behind (Richelson, 2002).

Funding priorities changed with the October 1957 launch of *Sputnik I* by the Soviet Union. *Sputnik I*, the first earth-orbiting satellite, marked a turning point in the Cold War. In an effort to keep pace, the United States revived a dormant program known as Project Orbiter. The goal of the program, initiated by the U.S. Army and U.S. Navy in 1954, was to put a scientific satellite into orbit; however, the program had never been implemented. By January 1958, Explorer I was launched, and became the United States' first satellite in space (Arnold, 2005).

The successful launch of *Sputnik I* also led the U.S. Air Force to fast-track the SAMOS and MIDAS programs in 1957. However, in February 1958, concerns about the lack of progress led President Dwight D. Eisenhower to allow the CIA to develop a reconnaissance satellite program, the Corona Program (Arnold, 2005). Initially, the Corona Program was intended to serve an interim purpose, until programs such as SAMOS, believed to have greater potential, were completed. The U.S. Air Force also continued to develop the SAMOS and MIDAS programs (Rosalanka, n.d.).

5. <u>Development of the Corona Program, 1958</u>

Initiated in 1958, the Corona Program was similar to the SAMOS Program. For example, the Corona Program involved the launch of a low-orbit 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 images to earth in a satellite recovery vehicle (SRV) for development and analysis. The CIA worked in tandem with the U.S. Air Force and private contractors to develop the Corona Program. Numerous contracts were let to produce specialized camera systems and film; spacecraft to house the systems and film; and launch equipment (Arnold, 2005).

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 U.S. Army, U.S. Navy and U.S. Air Force (Fairchild Imaging, n.d.). The third camera system was designed by the Itek Corporation in Lexington, Massachusetts. Itek Corporation was founded in the 1950s by Richard Leghorn, a former U.S. Air Force aerial reconnaissance expert. Leghorn's company's designs for the camera systems offered technological improvements over earlier models. Itek Corporation also held the contract for the U.S. Air Force's SAMOS Program. Film was provided by the Eastman Kodak Company in Rochester, New York (Gruntman, 2004).

Lockheed Missiles and Space Division designed and manufactured the Agena spacecraft powered by a Thor booster, which would house and launch the reconnaissance camera system. Development of the Agena spacecraft was initiated in the mid-1950s in conjunction with WS-117L (Gruntman, 2004). General Electric (GE) Re-entry Systems in Philadelphia, Pennsylvania, designed and manufactured the gold-plated SRV, often referred to as a "bucket." A sub-division of GE, GE Re-entry Systems was established in 1956 to develop re-entry vehicles which could successfully re-enter the earth's atmosphere from space (American Institute of Aeronautics and Astronautics, n.d.).

Concerns about preserving the secrecy of the Corona Program and its objectives led to the designation of the Discoverer Program as a cover program (Richelson, 2002). The publicly-stated goal of the Discoverer Program was scientific research. It consisted of the following activities:

- Development and flight tests of the satellite and subsystems.
- Development of reliable stabilization of the satellite in orbit and response to programmed reorientation controls.
- Development of proven techniques for recovery of capsules ejected from orbiting satellites.
- Performance of space research and engineering tests in support of advanced military reconnaissance satellite programs (6594th Aerospace Test Wing (ATW), n.d.).

However, the scientific pursuits were never fulfilled, and the Discoverer Program simply remained a cover for the Corona Program (Vukotich, n.d.). The cover story was widely reported on by the newspapers. In January 1959, *The New York Times* reported that ultimately, mice and primates would be placed in the capsules to study the effects of space travel on animals. The article indicated that there would be cameras in the capsule, but their purpose, along with other instruments, would be to record the animal's reaction to space flight, rather than to serve reconnaissance purposes (Krieger, January 18, 1959).

6. Interim Control Center and Early Corona Missions, 1959

In January 1959, an interim Satellite Control Center was developed by the U.S. Air Force and Lockheed Missiles and Space Division in Palo Alto, California. The interim Satellite Control Center, in conjunction with tracking stations, supported the launch, orbit, and recovery of the Corona satellites. They were complex low-orbiting satellites that required extensive command and control. Satellites were launched from Vandenberg Air Force Base (AFB), California (Jernigan, 1983). Vandenberg AFB's location on the northern Pacific Ocean made it possible to easily reach polar orbit, and its location relative to the jet stream also rendered it an ideal site to launch reconnaissance satellites (Vandenberg AFB, n.d.). Vandenberg AFB also functioned as a tracking station.

On February 28, 1959, Discoverer I, the first Corona satellite, was launched from Vandenberg AFB and was supported from the interim Satellite Control Center. The first launch was essentially a test of the system, and was not equipped with a camera system or SRV. The interim Satellite Control Center received a total of 514 seconds of telemetry, but the satellite failed to remain in orbit (Jernigan, 1983; *The New York Times,* November 8, 1959).

On April 6, 1959, the 6594th Aerospace Test Wing (ATW) was activated as the first unit to be tasked with military satellite operations. The unit worked closely with Lockheed Missiles and Space Division, as well as with the CIA (Jernigan, 1983; Richelson, 2002). In addition to the interim Satellite Control Center, the 6594th ATW was also assigned to three operating locations:

- Edwards AFB, Mojave, California
- Chiniak Point, Kodiak, Alaska
- Annette Island, Alaska

Tracking stations were also established at the following locations:

- Annette Island, Alaska
- Chiniak Point, Kodiak, Alaska
- Kaena Point, Hawaii
- New Boston, New Hampshire
- Vandenberg AFB, California

In June 1959, the 6594th Launch Squadron, assigned to the 6594th ATW, was activated at Vandenberg AFB to assist with satellite launches. In November, the 6594th Recovery

Control Group was activated at Hickam AFB, in Honolulu Hawaii. The 6594th Recovery Control Group was responsible for retrieval of the SRVs. This was accomplished while flying Fairchild C-119 *Flying Boxcars* (C-119) equipped with grappling hooks to catch the SRV, which was suspended from a parachute. In the event aircraft were unable to catch the SRV, the 6594th Recovery Control Group would attempt to recover it from the ocean. The SRVs were also equipped with salt plugs designed to dissolve and sink within 72 hours if they couldn't be retrieved (Jernigan, 1983; Monmonier, 2002).

In April 1959, Discoverer II, the first Corona satellite to achieve polar orbit, was launched from Vandenberg AFB and supported from the interim Satellite Control Center. However, during ejection of the SRV, control was lost, and the satellite crashed in the vicinity of Spitsbergen, Norway. Subsequent reconnaissance missions indicated that the Soviet Union may have recovered the SRV. Fortunately, the satellite, still in testing phase, was not equipped with reconnaissance cameras (Jernigan, 1983; Arnold, 2005).

Throughout 1959, Discoverer satellites continued to be launched and publicized in local and national newspapers. In keeping with the cover story, the U.S. Air Force supplied newspapers with misinformation about the program, ensuring that the true purpose was not publicly known. For example, a *New York Times* article on the launch of the fifth Discoverer satellite in August 1959 indicated that it was a preliminary step in the creation of a future "snooper satellite," that would also provide data concerning the impact of outer space on humans (*The New York Times,* August 14, 1959).

7. Development of the Satellite Test Center, 1959-60

While satellites were being supported from the interim Satellite Control Center in Palo Alto, the U.S. Air Force made preparations to construct a permanent building on land owned by Lockheed Missiles and Space Division in Sunnyvale, California. The building was located east of the Lockheed Missiles and Space Division facility, on the west side of Mathilda Avenue. Plans for Building 1001 (Development Control Center) were prepared under the auspices of the AFBMD in Englewood, California. It was designed by the Ralph M. Parsons Company, an architecture and engineering firm based in Los Angeles, California (Ralph M. Parsons Company/AFBMD, March 6, 1959a).

The company was established in 1944 by engineer Ralph M. Parsons. Parsons, a New York native, graduated in 1916 with an engineering degree from Pratt Institute in Brooklyn, New York. Following graduation, he enlisted in the U.S. Navy for four years, after which he served as a civilian aeronautical engineer for the U.S. Navy. During World War II, he formed a partnership with Stephen D. Bechtel and John A. McCone, who later headed the CIA from 1961-65 (*The New York Times,* December 21, 1974). Following establishment of the Ralph M. Parsons Company in 1944, they began work for the military as designer of the Canol Pipeline, a 1,200-mile oil pipeline between the United

States and Canada. Their selection for the Sunnyvale project was presumably a result of Parsons' U.S. Navy contacts. By 1948, they had further cemented their reputation on defense-related projects with the 1948 design of the Point Mugu Missile Facility in Point Mugu, California (Parsons, n.d.).

The plans were prepared in two stages over the course of 1959. Plans entitled "Development Control Center, Floor Plan A" and "Development Control Center, Floor Plan B," dated March 6, 1959, depicts a rectangular-plan, single-story building (Ralph M. Parsons Company/AFBMD, March 6, 1959a-b). A plan entitled "Development Control Center Increment Two, Plot, Utility, and Grading Plan," dated August 21, 1959, depicts the building with an L-shaped addition appended to the east and south facades (Ralph M. Parsons Company/AFBMD, August 21, 1959).

In November 1959, 11.423 acres of land was officially transferred to the U.S. Air Force from Lockheed Aircraft Corporation at a cost of one dollar (Kearton, 1959). By the end of 1959, Building 1001 was in its final phase of construction (Forrest McCartney, pers. comm., August 11, 2009). On January 28, 1960, the installation, newly designated as the Satellite Test Center (STC), was dedicated by the U.S. Air Force. Nearly ready for occupancy, construction cost approximately $2,200,000. The single-story, windowless, pre-cast concrete utilitarian building was heralded by *The New York Times* as the "command post of a worldwide network of launching, tracking and recovery bases for artificial satellites" (Davies, 1960). Building 1001, as it appeared during and following construction, is depicted in the graphic documentation section of this report

A few months later, on March 1, 1960, the STC was occupied by the 6594th ATW, Lockheed Missiles and Space Division employees, and likely the CIA. The 6594th ATW provided oversight for Lockheed Missiles and Space Division, which was responsible for satellite operations (6594th ATW, 1961; Jernigan, 1983). However, portions of the building remained under construction, including the state-of-the-art Satellite Control Room within the Satellite Control Room Complex. An interim Satellite Control Room was established, from which Lockheed Missiles and Space Division, monitored by the 6594th ATW, could direct the launch, tracking, data acquisition, command and control, and recovery phase of military satellites to provide satellite tracking and control (6594th ATW, 1961; Jernigan, 1983). The building also housed administrative and planning facilities, a weather forecasting station, an information center, status rooms, offices, conference rooms, and a cafeteria (Jernigan, 1983).

On July 7, 1960, the installation was officially designated as the Satellite Test Annex (STA) under the jurisdiction of the AFBMD. However, it should be noted that it continued to be referred to as the STC, both in U.S. Air Force documents, as well as by the public, likely due in part to a building sign which indicated "U.S. Air Force Satellite Test Center." By the early 1960s, an additional tracking station was established at Fort

Greely in Donnelly Flats, Alaska. By this time, the launch site, the STC, and the tracking stations were collectively referred to as the Satellite Control Facility (SCF), although this was not an official designation (Jernigan, 1983). The relationship between Building 1001, tracking stations, and satellites is depicted in the graphic documentation section of this report.

8. Satellite Control Room Operational, 1961

On February 6, 1961, the Satellite Control Room, became operational, and is depicted in the graphic documentation section of this report. The primary purpose was to support Corona satellites, although additional programs were supported by this time. According to a 1961 6594th ATW Fact Sheet, it featured eight “ultra modern consoles” from which satellites were supported. Each console contained communications and control and display equipment, such as closed-circuit television screens and push-button communications panels. The consoles faced a row of eight projector screens which enabled the controllers to display maps, meteorological conditions, orbital information, telemetry read-outs, and other data (6594th ATW, 1961). The control room featured a balcony from which activity could be observed, and walls of the control room were sheathed in acoustical tile, indicative of the secrecy that surrounded the program (Ralph M. Parsons Company/AFBMD, May 31, 1960). Much of the displayed information was received via tracking stations, and processed and evaluated by computers, such as the Control Data Corporation (CDC) 1604 computer (6594th ATW, 1961).

In addition, four primary areas supported the Satellite Control Room during operations. These included:

- The Operational Support Area which provided plotting, display, and meteorological support.
- The Communications Center which provided communications support.
- The Computer/Programmable Integrated Communications Equipment (PICE) Area which provided high-speed computation and data reduction.
- The Technical Director Room which provided consultative support and oversight.

With the exception of the Technical Director Room, which likely housed upper-level personnel, all areas were operated by the U.S. Air Force and Lockheed Missiles and Space Division personnel (6594th ATW, 1961). In April 1961, the AFBMD was inactivated, and was replaced by the U.S. Air Force Ballistic Systems Division (BSD) and the U.S. Air Force Space Systems Division (SSD). Furthermore, the 6594th ATW assumed total responsibility for satellite operations, supported by Lockheed Missiles and Space Division. Four new tracking stations were also established in 1961, at:

- Fort Dix, New Jersey
- Camp Roberts, California
- Fort Greely, Alaska
- Thule, Greenland (Jernigan, 1983)

9. Establishment of the National Reconnaissance Office, 1961

In September 1961, Secretary of Defense Robert McNamara established the National Reconnaissance Program (NRP), which consisted of development and operation of CIA and U.S. Air Force satellite reconnaissance systems, including the Corona and SAMOS programs, as well as U-2 reconnaissance missions. The National Reconnaissance Office (NRO) was established as a classified agency in DoD, and was tasked with oversight of the NRP (Richelson, 2000). A 1962 memo regarding the organization and function of the NRO indicated that although it was established as an operating agency, the sensitivity of its mission and security required for projects necessitated the concealment of the NRO behind other plausible, overt names, organizations and functions (Charyk, July 23, 1962).

The NRO was overseen by a joint directorship of the CIA and U.S. Air Force, led by Undersecretary of the Air Force, Dr. Joseph V. Charyk and CIA Deputy Director of Plans, Dr. Richard M. Bissell. The following year, the joint-directorship was eliminated and Dr. Charyk became the sole NRO director (NRO, n.d.). The NRO was staffed by DoD and CIA personnel.

As a result of NRO oversight of reconnaissance satellite programs, the organization became a presence at the STC and likely had offices in the Technical Director Room in Building 1001. The establishment of the NRO ended direct U.S. Air Force control of reconnaissance satellite programs. The U.S. Air Force continued to provide launch and tracking support for satellites, as well as military support missions, including communications, missile-early warning, meteorology, navigation, and detection of nuclear detonations (Peebles, 1997).

10. Early Corona Missions Supported from the Satellite Test Center, 1960-61

Three unsuccessful Corona satellites were launched between January and April 1960. On May 1, 1960, U.S. Air Force pilot Francis Gary Powers was shot down while flying a U-2 reconnaissance mission over the Soviet Union, resulting in what became known as the U-2 Incident. The United States attempted to conceal the fact that it was a reconnaissance mission, and stated that Powers had piloted a weather research aircraft which inadvertently strayed into Soviet airspace. However, unbeknownst to the United States, the Soviets had captured Powers, his fairly intact plane and surveillance camera, and developed some of the film. Thus, the Soviets were well aware of the intentions of the mission, and were aware of the high-quality photography the United States had from other surveillance missions. This incident resulted in a marked deterioration in relations between the United States and the Soviet Union, and also led to the acceleration of the Corona Program (Temple, 2005).

In August 1960, the U.S. Air Force accomplished the first successful retrieval of a Discoverer satellite. At 6:00 AM Pacific Daylight Time (PDT), on August 10, countdown for launch of Discoverer XIII commenced. For the next six hours, the launch site at Vandenberg AFB, the tracking stations, and the interim Satellite Control Room at the STC were in communication to perform the necessary activities to launch the satellite. For example, communications checks on voice and data links and periodic weather studies were performed, and equipment status and readiness was checked (6594th ATW, n.d.).

At 1:38 PM PDT, the satellite was launched, achieved polar orbit for a period of ninety-four minutes, and orbited the earth seventeen times (6594th ATW, n.d.). According to the *San Jose Mercury News*, the satellite was "directed at the Air Force's Satellite Test Center in Sunnyvale, which was in constant voice communication with the Hawaii Control Center during the operation" (Lindsey, August 12, 1960). The satellites' orbital characteristics were calculated from the STC to determine when the SRV should be ejected. Upon ejection, the SRV began its descent to earth, and its parachute opened at 50,000'. However, the 6594th Recovery Control Group was unable to capture the satellite in the air. The capsule and parachute's location in the Pacific Ocean was marked utilizing smoke bombs and sonobuoys. It was recovered from the Pacific Ocean on August 11 at 7:22 PM PDT, marking the first successful recovery of an object from space (Arnold, 2005; 6594th ATW, n.d.). The SRV was presented to President Eisenhower to commemorate the occasions, which is depicted in the graphic documentation section of this report. Still in the testing phase, the satellite did not yet contain a camera (Jernigan, 1983).

In keeping with the publicly stated scientific objectives of the Discoverer Program, the *San Jose Mercury News* noted that "Discoverer recovery techniques will be used soon to return monkeys from space," and were vital to "returning a man to earth after orbiting in space." The article further noted that the recovery techniques would be implemented for the successful return of aerial photography associated with the U.S. Air Force SAMOS satellite program (*San Jose Mercury News*, August 12, 1960). Likewise, *The New York Times* reported on the launch of Discoverer XIII, and indicated that after two successful capsule recoveries "a monkey is to be strapped into the capsule" (*The New York Times,* August 11, 1960).

Shortly after this historic event, Discoverer XIV was launched on August 18, 1960 from Vandenberg AFB (Arnold, 2005). Similar to Discoverer XIII, the public was unaware that it was a reconnaissance satellite. *The New York Times* reported that the satellite housed special instruments designed to assist SAMOS and MIDAS satellites in relaying information, and indicated that the next steps for the program "involved chimpanzees in the capsules, firing them into orbit and trying to recover them" (*The New York Times,* August 19, 1960).

Discoverer XIV orbited the earth seventeen times, supported by the STC from the interim Satellite Control Room in Building 1001, and the Kodiak tracking station, before the eject command was relayed to the satellite. Following the command, at 300 miles above the earth, the SRV separated from the spacecraft, and began its descent to earth. The parachute opened at 50,000', which slowed its descent to 1,600' per second (Arnold, 2005). A specially equipped C-119 piloted by U.S. Air Force Captain Harold Mitchell missed the capsule by approximately 6" on its first pass, and approximately 2' on its second pass, before catching it on its third pass, marking the first successful air recovery of an object from space. Captain Mitchell was awarded the Distinguished Flying Cross, and his crew was awarded Air Medals for this feat (*The New York Times,* August 20, 1960).

The Discoverer XIV SRV contained twenty pounds of film which documented over 1,650,000 square miles of the Soviet Union, and provided the first successful satellite reconnaissance photographs of the country. It also resulted in more photographic coverage of the Soviet Union than all previous U-2 flights combined. Furthermore, it 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 ICBMs (Day, 2006). However, despite the historic nature of this event, the crew, who were not cleared for the Corona Program, were unaware of the importance of their mission (Arnold, 2005).

Corona satellites continued to be successfully launched between 1960-61, and Discoverer satellites continued to be covered in the news. For example, on November 12, 1960, *The New York Times* reported on the launch of Discoverer XVII, and noted that it was the first of a series of "new military satellites capable of changing course if threatened." It was described as an approximately 25' satellite, 6' longer and 400 pounds heavier than earlier generations of Discoverer satellites. In keeping with the cover story of the Discoverer program, it was reported that "a future Discoverer satellite is expected to carry a monkey into orbit" (*The New York Times,* November 13, 1960). The satellite was ultimately successfully retrieved.

In April 1961, Discoverer XXIII was launched from Vandenberg AFB, and was the first satellite supported by the STC from the Satellite Control Room in Building 1001. *The*

New York Times reported that the launch occurred at 11:21 AM, Pacific Standard Time (PST). The U.S. Air Force didn't announce the purpose of the satellite, though the newspaper speculated that the satellite was part of the on-going development of MIDAS and SAMOS satellites (*The New York Times,* April 9, 1961). Similarly, in November 1961, *The New York Times* reported on the launch of Discoverer XXXV, and noted that "the thirty-fifth launching in the intensive Air Force research program, was sent aloft in a continuing effort to perfect a way for recovering capsules from military reconnaissance satellites" (*The New York Times,* November 16, 1961). Although the newspapers continued to report on the Discover cover story, the early Corona satellites were actually providing images of the Soviet Union, as well as other communist countries. Building of the Berlin Wall between East and West Germany was documented in these images (Chapman, 2008).

Although it was envisioned as an interim reconnaissance satellite program, the success of the early-1960s launches, coupled with the technical and financial failures of other satellite reconnaissance programs, led the NRO to view the Corona Program as a more effective program than originally thought. Therefore, the Corona Program continued to be developed and improved (Perry, November 1973).

11. Early SAMOS and MIDAS Missions Supported from the Satellite Test Center, 1960-61

By the fall of 1960, the STC also supported SAMOS and MIDAS programs. However, because the Satellite Control Room in Building 1001 was designed to support a single program, it was only capable of supporting one orbiting satellite vehicle at a time. Therefore, the launch and orbiting sequences were carefully scheduled to avoid overlap (Arnold, 2005).

On October 11, 1960, the first SAMOS satellite was launched from Vandenberg AFB, but it failed to reach orbit. The *San Jose Mercury News* reported that it was the first U.S. Air Force spy satellite to be launched, and also indicated that it was the first space system whose mission was "purely military, rather than scientific" (*San Jose Mercury News*, October 12, 1960). This underscores the level of secrecy associated with the Corona Program, and the success of the Discoverer Program cover story. Nonetheless, through information supplied by the U.S. Air Force, a general idea of the United States' satellite reconnaissance capabilities was publicized during this time.

By July 1961, MIDAS satellites were launched from Vandenberg AFB and supported by the STC. By the end of 1961, two MIDAS satellites had reached orbit (6594th ATW, 1961). By 1962, the MIDAS Program was re-designated Program 461 (*Milsat Magazine,* July 2008).

12. Construction of Building 1002, 1962

In 1962, plans for a two-story, L-shaped building, Building 1002 (Addition to the Satellite Test Annex) were prepared for the U.S. Air Force SSD by Kaiser Engineers, a division of the Henry J. Kaiser Company. Kaiser Engineers was a well-known architecture and engineering firm located in Oakland, California (Kaiser Engineers/U.S. Air Force SSD, January 15, 1962a-b); Air Force Satellite Control Facility (AFSCF), 1972).

Henry J. Kaiser founded his eponymous company in 1914. The company quickly grew through its involvement with large-scale public projects, such as the Hoover Dam in Boulder City, Nevada, and the Grand Coulee Dam, in Grand Coulee, Washington. In addition, Kaiser's company was heavily involved with World War II manufacturing efforts, and fabricated munitions, aircraft, and ships. During the war, engineers at Kaiser's company also constructed airfields and other military facilities. These wartime efforts led to the development of Kaiser Engineers as a separate division of the Henry J. Kaiser Company. Furthermore, as one of the Six Companies, Kaiser was a World War II-era backer of the Sunnyvale-based Joshua Hendy Iron Works. As a result, it is likely that the military and Sunnyvale connections Kaiser had cultivated over the years contributed to the selection of Kaiser Engineers for the STC project (Kaiser Engineers, n.d.).

A plan entitled "Plot Plan" depicts the L-shaped footprint of Building 1002. The plan also depicts a future addition, appended to the east façade of the L-shaped Building 1002. The addition resulted in a rectangular-shaped building with two interior courtyards (Kaiser Engineers/U.S. Air Force SSD, January 15, 1962c). Construction on the L-shaped building commenced in April 1962, and was completed by September of that year. The building during construction and an aerial view of the installation following construction is included in the graphic documentation section of this report.

The new building was connected to the north façade of Building 1001 by a hyphen, and provided administrative space. The first story housed offices for technical directors and support staff, security personnel, technical libraries, copy rooms, and conference rooms. The second story housed offices for the commander, intelligence, accounting, maintenance, and engineers, among others. It was constructed of pre-cast concrete panels, and featured fixed-pane ribbon windows (Kaiser Engineers/U.S. Air Force SSD, January 15, 1962a-b).

13. Multiple Satellite Augmentation Program and Upgrades, 1962-63

Although Building 1001 was only completed in 1960, in 1962, Kaiser Engineers prepared plans for modifications to Building 1001, including a single-story addition and room reconfiguration. According to the plans, a single-story 4,200-square foot addition appended to the east façade of Building 1001 housed a new communications center, crypto equipment, and electrical and mechanical rooms. A 1,400-square-foot penthouse was added on the roof of the new addition for heating, ventilating, and air conditioning (HVAC) equipment, necessitated by the installation of new systems (Jernigan, 1983). Kaiser Engineers also prepared plans for interior modifications and upgraded HVAC, plumbing, and electrical systems necessitated by the technological upgrades. Some rooms in the Satellite Control Complex underwent modifications as part of this effort (Kaiser Engineers/U.S. Air Force SSD, October 17, 1962).

The modifications were likely necessitated by the U.S. Air Force's first modernization effort, the Multiple Satellite Augmentation Program (MSAP). MSAP was initiated to provide support for multiple satellite programs. This effort was initiated in part, to standardize and provide updated equipment to the STC and tracking stations. Prior to this time, each tracking station was unique, with outdated equipment that had limited capacity to support operations. In anticipation of future development of new satellite programs, the systems and operations were designed to provide ample growth potential. The standardization of operations also allowed for personnel to provide the same role at any tracking station (Lockheed Missiles and Space Company, 1963).

At the STC, computer capabilities were upgraded from two to six CDC 1604 computers, and from two to six CDC 160A computers. New display and communications equipment were also installed, and connections between the STC and tracking stations were upgraded. This enabled controllers to support multiple satellite operations (Jernigan, 1983). In January 1963, a secure circuit was activated between the STC and DoD headquarters at the Pentagon in Washington, DC. This facilitated the relay of information between agencies, including the NRO. In August 1963, a new tracking station was established on the Seychelles Islands in the Indian Ocean, utilizing standardized systems implemented by MSAP. Later that year, a microwave link between Vandenberg AFB and the STC was placed into service. As a result of MSAP efforts, by mid-1963, six satellite programs were supported by the STC (Jernigan, 1983).

14. Last Discoverer Launch and New DoD Security Directives, 1962

On February 27, 1962, Discoverer XXXVIII was launched and supported from the STC. The following month, the DoD issued a directive that instituted a new security and public information program for all military space projects. The directive classified all military space programs, noting that it was "impractical to selectively protect certain military space programs while continuing an open launch policy for others since to do so would emphasize sensitive projects" (DoD, March 23, 1962). In addition, the directive eliminated project names, and subsequently referred to all projects by randomly selected numbers and letters.

A CIA memo written the following month underscores the necessity of the new security policy. Considerable information on satellite reconnaissance efforts was available in the United States through newspapers and technical journals, and was therefore also available to the Soviet Union. In fact, articles published in the Soviet Union quoted U.S. newspapers which provided information about satellite reconnaissance capabilities. Although much of the information in newspapers was deliberately misleading, it nonetheless presented a relatively clear picture of the United States' capabilities. Furthermore, details on the launch and orbital data made it easier for the Soviet Union to track the satellites (Armory, April 11, 1962).

As a result, Discoverer XXXVIII was the last Discoverer satellite launched. Because information about all military satellite programs was subsequently classified, the Corona Program no longer required a cover-story. Satellite launches continued to be announced by the U.S. Air Force, but only limited information was provided. For example, the U.S. Air Force issued the following statement in conjunction with a satellite launched on April 17, 1962, "[A] satellite employing a Thor Agena B booster combination was launched today by the Air Force from Vandenberg Air Force Base, California" (*The New York Times*, April 18, 1962). In November of that same year, *The New York Times* reported that the U.S. Air Force announced another satellite launch in the same manner. However, the newspaper speculated that it was "believed to be another in the Discoverer series" (*The New York Times,* November 6, 1962). Both satellites launched were Corona satellites (Mission and Spacecraft Library, n.d.).

By this time, the Keyhole (KH) designation was established and applied to photographic reconnaissance satellites, with a number following the KH (e.g. KH-1) to indicate the type of camera system on-board the satellite. KH designations were retroactively applied to the Corona satellites launched between 1960 and 1962. For example, satellites launched in 1960 had utilized the KH-1 camera system, while those launched between 1960 and 1962 had utilized KH-2, -3, -4 and -5 camera systems. The early versions – KH-1, KH-2, KH-3 and KH-6 – carried a single panoramic camera, and the KH-5 carried a single frame camera. Later systems, such as KH-4, KH-4A, and KH-4B carried two panoramic cameras, set 30 degrees apart (Mission and Spacecraft Library, n.d.). Furthermore, the first camera had a ground resolution of approximately 40' feet, while later cameras had a ground resolution of approximately 25' (Broad, September 12, 1995).

15. <u>Satellites Supported from the Satellite Test Center, 1963-64</u>

Between 1962 and 1963, Defense Meteorological Satellite Program (DMSP) satellites were launched, and supported by the STC. DMSP was a DoD meteorological satellite program initiated in 1960 to provide weather and climate data for more effective military operations. After 1963, DMSP utilized ground stations located at surplus Nike missile sites near Loring AFB, Limestone, Maine, and Fairchild AFB, Spokane, Washington (DMSP, n.d.).

On October 16, 1963, the first Vela satellite was launched and supported by the STC. The Vela Program – vela means vigil in Spanish – was a series of satellites designed to detect nuclear detonations. The satellites each weighed approximately 300 pounds, received power from solar cells, and typically functioned for up to five years (Jernigan, 1983; Peebles, 1997). Presumably, Vela satellites provided images of the Lanzhou Diffusion Plant in Lanzhou, China, and the Baotao Nuclear Fuel Component Plant in Baotao, China (Richelson, 2002).

In November 1963, the final SAMOS satellite was launched (Peebles, 1997). Furthermore, 1963 marked the beginning of the KH-7 surveillance system, noted in a 2006 NRO memo as "the Intelligence Community's first high resolution surveillance or 'spotting' satellite." Similar to Corona satellites, the KH-7 was a reconnaissance satellite that returned film to earth in SRVs. It was primarily used to provide surveillance of nuclear facilities and ICBM sites in the Soviet Union and China (NRO, 2006).

In July 1964, two additional Vela satellites were launched, resulting in a total of four orbiting satellites capable of detecting nuclear detonations. In August 1964, Syncom III was launched and supported by the STC. Syncom III was a National Aeronautics and Space Administration (NASA) satellite used for DoD military communications experiments between Saigon, Vietnam, and Hawaii (Jernigan, 1983).

Between 1962-64, the STC supported over fifty Corona satellites. By this time, Corona satellites had accurately mapped all twenty-five of Moscow's long-range missile sites. Furthermore, images taken by Corona satellites indicated that China was readying its nuclear facility in Lop Nur for testing. It was noted in a classified CIA briefing that "[O]n the basis of new overhead photography, we are now convinced that the previously suspect facility at Lop Nur in western China is a nuclear test site which could be ready for use in about two months." Within two months, on October 16, 1964, China tested an atomic bomb at the Lop Nur site (Broad, September 12, 1995). An article in *Time* magazine following the blast reported that the U.S. government had "predicted the blast weeks in advance" and "reported it as soon as it happened," and lauded the Unites States' detection methods. However, the detection methods were not divulged, and the general public was unaware that it was a Corona satellite that provided the United States with visual evidence of the developing test site (*Time,* October 30, 1964).

16. Establishment of the Air Force Satellite Control Facility, 1963-65

On November 20, 1963, the DoD announced that the U.S. Navy Missile Facility at Point Arguello, California, and U.S. Navy tracking stations in the Pacific Ocean would be transferred to the U.S. Air Force. Furthermore, Secretary of Defense Robert McNamara directed that the satellite control be nationalized to serve as the nucleus for development of one satellite control center for all DoD facilities. Thus, the U.S. Air Force became the single manager for ICBM and space-tracking activities. However, development, operation, and management required ongoing high-level interfaces between the U.S. Air Force, DoD, and NASA.

On July 1, 1965, the AFSCF was officially designated. The mission of the AFSCF was to direct launch, tracking, data acquisition, command and control, and recovery of DoD military satellites. AFSCF Headquarters was established at Los Angeles AFS, El Segundo, California. Detachment 1, AFSCF, and the 6594th Support Group were established at the STC, and the 6594th ATW was discontinued. The 6594th Recovery Control Group at Hickam AFB and tracking stations were also included in the AFSCF organization (Jernigan, 1983).

17. Development of the Manned Orbiting Laboratory, 1963-67

In 1963, the Manned Orbiting Laboratory (MOL) Program was initiated. The concept involved a Titan III booster rocket which carried a modified Gemini B capsule attached to a space laboratory, and was intended to serve reconnaissance purposes. By July 1965, the *San Jose Mercury News* reported that the U.S. Air Force confirmed that MOL flights would be supported by the STC (*San Jose Mercury News,* September 10, 1965). The following month, President Lyndon Johnson approved $1.5 billion in plans to develop the MOL Program, and development began in earnest. By June 1967, the STC began to support the testing and development of the MOL Program, which was also designated 632A (AFSCF, July-December 1966; Jernigan, 1983).

18. Construction and Technological Upgrades, 1964

As indicated on the 1962 plan designed by Kaiser Engineers, an addition to Building 1002 was planned during its initial construction. The full extent of the building was never realized. However, in May 1964, plans were prepared for a two-story, L-shaped addition to Building 1002 to provide additional administrative space. It was designed by Maher & Martens, a San Francisco-based architecture firm for the U.S. Army Corps of Engineers (USACE), Sacramento District.

Maher & Martens was founded in 1961 by Edward John Maher and Henry Ernest Martens, both members of the Northern California Chapter of the American Institute of Architects (AIA) (AIA, 1970). Prior to the formation of Maher & Martens, Maher was a principal in the firm Blanchard & Maher, which was hired by the U.S. Forest Service in the 1930s to design buildings in California's national parks (Grosvenor, 1999). Maher & Martens received awards for their design for San Francisco Bay Area Rapid Transit and the U.S. Department of Housing and Urban Design (AIA, 1970). The addition was appended to the east façade of Building 1002, and created an interior courtyard. A hyphen connected the south façade of Building 1002 to the north façade of Building 1001 (Maher & Martens/USACE Sacramento District, May 7, 1964a-b; AFSCF, 1972).

Communications systems were also upgraded that year. Upgrades included the installation of a semi-automatic teletype switch, which provided near real-time capabilities, and the installation of high-frequency, high-power radio station. The switchboard capacity was also increased to 1,000 lines. Univac 1040 computer systems were also installed, at a cost of $42,000, and two CDC 1604 mainframes were purchased for $594,000 (Jernigan, 1983).

19. Interim Expansion Plan and Technological Upgrades, 1965-67

By the mid-1960s, the U.S. Air Force had begun to weigh the benefits of expansion of the STC versus the development of additional satellite control facilities at another location. Following the establishment of the MOL Program in1963 and the official establishment of the AFSCF in July 1965, the decision was made to expand the STC. An Interim Expansion Plan (IEP) was initiated to augment the facility and implement the Mission Control Center (MCC) concept, which focused on the development of mission-oriented control centers over a single control room (Jernigan, 1983).

A test MCC was established at the STC in Building 1001, and plans for additional MCCs as well as other elements of the IEP were prepared by San Francisco-based consulting engineers, Bentley Engineers, and Earl & Wright, Inc., under the auspices of the U.S. Air Force SSD. The plans indicated that the building was reconfigured to accommodate four new MCCs, known as MCCs 1, 2, 3, and 4. In addition, the building also featured two new complex areas, known as Complex Numbers 6 and 7. Although earlier plans do not identify other complex areas, it appears that there were such areas in Building 1001 which likely housed operations of some sort. The plans also indicated that two new communications areas, labeled Communications Area A and B, were added, as well as a new bird buffer area (Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD, December 13, 1965a-d).

The Satellite Control Room Complex remained relatively unchanged, and continued to serve as the control room for the Corona Program. In addition, Bentley Engineers and Earl & Wright also prepared mechanical plans to upgrade HVAC, plumbing, and electrical systems necessitated by the installation of computers and equipment (Onizuka AFS, n.d.).

According to the plans, the construction schedule identified a January 1966 start date and a May 1966 completion date (Bentley Engineers and Earl & Wright, Inc./U.S. Air Force

SSD, December 13, 1965b). Keeping somewhat on track, the majority of construction was completed by December 1966 (AFSCF, January-June 1966). As part of the IEP, new equipment was installed throughout 1967, including CDC 3600 computers, which replaced the CDC 1604 computers (Jernigan, 1983).

In 1970, the AFSCF prepared an unclassified document that served as a guide for military, civilian, and contractor personnel to ensure understanding of operations at the STC. The guide provided a brief description of the MCCs in Building 1001. Although it was produced after the 1966 modifications, it is likely that they functioned in much the same way. As described in the guide MCCs in Building 1001 included:

- MCC 1: supported several satellite programs in conjunction with all tracking stations.

- MCC2: supported several satellite programs involving multiple satellites in conjunction with all but one tracking station.

- MCC 3: supported high-complex, low-orbit satellites that required extensive commanding and analysis of a large volume of telemetry data.

- MCC 4: supported a highly sophisticated low-orbit satellite program (AFSCF, 1970).

The MCC's included a control console with seven twenty-channel television monitors, remote controlled 35 mm projectors, secure and non-secure telephones, and time display units (AFSCF, January-June 1967).

The increase in the number of flight support hours logged by the AFSCF between 1965 and 1966 appears to indicate that at least some of the MCCs may have been operational in 1966. In 1965, the AFSCF logged 20,757 hours of satellite flight support. By 1966, 29,400 hours of flight support were logged. The Satellite Control Room continued to be used to support the Corona Program at that time (Arnold, 2005; Hughes, 1966). The number of satellites supported also increased. In 1965, the STC supported approximately fourteen satellites (AFSCF, 1972). In January 1967, the STC supported thirty-one satellites per day, and by June were supporting forty-four per day, which was expected to increase to forty-seven per day by July (AFSCF January-June 1967).

Additional advances in 1966 included the development of a centralized scheduling program, known as Scheduling Control and Resource Allocation Buffer Link (SCRABL). In addition to scheduling flight and non-flight satellite activity, this new program also took into account station downtime, equipment modifications, and computer operations.

All these factors were incorporated into ninety-day and thirty-day schedules, and a more-detailed seven-day schedule (Jernigan, 1983). This allowed greater efficiency in satellite operations.

In 1967, the U.S. Air Force BSD and SSD were combined to form the U.S. Air Force Space and Missiles System Organization (SAMSO). That year, the STC, under the auspices of SAMSO, underwent a second modernization effort, which involved the establishment of new data handling, display, communications, and support systems. Two key programs were initiated as part of this effort – the Advanced Data System (ADS) and the Expanded Communications Electronics System (EXCELS). ADS involved major computer and software upgrades in order to expand data handling capability. EXCELS replaced the manual communications system with an automated, centrally controlled system fully integrated with the ADS. Ultimately, this effort provided a single operational entity with control over the AFSCF and support for present and future MCCs regardless of location. The systems were installed at the STC and tracking stations (Jernigan, 1983; Fedor, et al., 2006).

20. Development of Buildings 1003 and 1004, 1966-70

In conjunction with the technological upgrades which occurred throughout the mid-to-late 1960s, a real estate estimate was prepared by the USACE Sacramento District in August 1966 that proposed the acquisition of 8.2 acres of land from Lockheed Aircraft Corporation at a cost of $49,000. In 1966, Alhambra, California-based architecture and engineering firm, C.F. Braun & Company prepared site development plans under the auspices of the U.S. Naval Facilities Engineering Command (NAVFAC) Western Division, San Bruno, California, and SAMSO, Los Angeles, California, (C.F. Braun & Company/NAVFAC/SAMSO, December 23, 1966).

C.F. Braun & Company was founded by Carl Braun in 1909, and quickly became well-known for construction of industrial facilities, including oil refineries and chemical plants (*The New York Times*, February 5, 1954). Although Braun died in 1954, the reputation he had established for his company as a builder of industrial facilities likely led to his selection by SAMSO to develop the STC's new buildings. Carl Swenson, Inc. of San Jose, California, and the Powerhouse Oakland Construction Company of Salt Lake City, Utah, served as contractors (*Aerospace Daily,* September 19, 1969).

Site development plans, dated December 30, 1966, included relocation of an existing Lockheed Missiles and Space building; reconfiguration of Lockheed Martin Way (formerly known as East Perimeter Road) west of Building 1001; creation of additional parking space; and installation of underground utilities (C.F. Braun & Company/NAVFAC/SAMSO, December 23, 1966). In addition, C.F. Braun & Company also prepared plans for the development of two new buildings, Building 1003 (STC

Building Addition), and Building 1004 (Power Plant) (C.F. Braun/NAVFAC/SAMSO, November 14, 1967).

By 1968, funds were appropriated for acquisition of land and construction of two buildings. By August 1968, Lockheed Aircraft Corporation transferred the land to the U.S. Air Force (Lockheed Aircraft Corporation, 1968; Jernigan, 1983). That year, the *San Jose Mercury News* reported that the STC would be "updated in a project expected to cost more than $40 million" to support the MOL Program. The article noted that the project was under "tight security wraps" and was "smothered in secrecy" (*San Jose Mercury News*, January 10, 1967 and January 17, 1967). By September, the newspaper reported that the U.S. Air Force announced plans to build a four-story, 150,000-square-foot addition at the STC, Building 1003 (*San Jose Mercury News*, September 16, 1967).

Building 1003 was designed to house the MOL Program, as well as other satellite programs. However, in June 1969, the DoD announced the cancellation of the MOL Program to save money. The cancellation led to a short work stoppage, however construction resumed a few weeks later. *Aerospace Daily* reported that the U.S. Air Force had evaluated requirements for current and future programs, and determined that construction on the building should continue (*Aerospace Daily*, September 19, 1969). The *San Jose Mercury News* reported that "official announcements merely declared that 'other activities' would replace the MOL in the sky-blue building." The article also noted that the new facilities may "become home for a space shuttle command post" (Carey, 1969). Building 1003 during and following construction is depicted in the graphic documentation section of this report.

By the end of 1969, the 164,000-square foot Building 1003, constructed at a cost of $8 million, was nearly complete. A windowless, pre-cast concrete-panel building, it was appended to the west façade of Building 1001. Although the building was technically four stories, it was approximately 104' high, and each story measured approximately 25' high to accommodate mechanical equipment necessary to maintain satellite programs. In addition, the building featured a mezzanine that housed mechanical equipment, including electrical panels and massive air handling units (AHU), among others. A large amount of mechanical equipment was necessary for satellite operations. The building was painted "Air Force blue," resulting in its nickname, the "Blue Cube" (*Aerospace Daily*, September 19, 1969)

Although the original plans do not indicate room names or functions, a 1970 AFSCF document includes a partially labeled floor plan for the building. The first story housed communications and crypto equipment, data distribution center, mechanical equipment and storage, and the second story housed four CDC 3800 computer rooms and a tape library. Three MCCs were located on the third story, MCCs D, F, and M. The fourth story housed offices for field detachment and training. The document also included information on the function of the three MCCs:

- MCC D: Supported several high and low-orbit satellite programs and ballistic test programs. Support was provided to approximately twenty satellites daily, and the duration of support varied from five minutes to two hours.

- MCC F: Supported several high-altitude satellites requiring extensive SCF support in conjunction with using organizations external to the SCF. The MCC was manned continuously throughout the duration of the program.

- MCC M: Supported multiple high-orbit satellites which required that the MCC be manned continuously throughout the duration of the program (AFSCF, 1970).

In addition, the Onizuka AFS Drawing Number Log indicates that MCCs B, C, and D were on the fourth story.

Shortly after construction, the Vela Program office, along with another unidentified satellite program, was relocated from Building 1001 to Building 1003 (AFSCF, July-December 1969). The satellite was supported from MCC M, located on the third story (Jernigan, 1983).

Architectural plans for Building 1004 were developed by C.F. Braun & Company, and mechanical plans were developed by consulting engineers, Pope, Evans & Robbins, on behalf of Solar, a division of International Harvester Company, based in San Diego, California. Solar provided the Saturn gas turbine generator sets that powered the plant, and therefore was responsible for the mechanical layout of the building. In 1927, Solar, originally known as the Prudden-San Diego Airplane Company, was founded to manufacture aircraft. By 1929, the company had only manufactured three aircraft, and opted to begin manufacturing aircraft components for other manufacturers as Solar Aircraft Company. During World War II, they produced exhaust manifolds for military aircraft, and developed high-temperature components for jet engines.

After World War II, the company was awarded multiple contracts to develop engine parts, including one with the U.S. Navy to develop an afterburner for a turbojet engine. Solar became the first U.S. company to develop a practical afterburner. Following this success, the company was awarded a contract by the U.S. Navy to develop gas turbine engines to provide auxiliary power for ships, as well by the U.S. Air Force to develop gas turbines to provide auxiliary power for aircraft (Fleming and Leyes, 1999). In the 1950s, under contract to the U.S. Navy, the company developed the Saturn gas turbine, a 750 kilowatt (kW) engine. In addition to its application on ships, the company also saw the commercial potential in the product, because it was smaller, lighter, more reliable, and easier to maintain than low-speed reciprocating engines traditionally used for industrial applications (Solar Turbines, n.d.)

In 1960, Solar Aircraft Company was acquired by International Harvester Company (Solar Turbines, n.d.). That year, an article about the benefits of gas turbine engines appeared in *Time* magazine, and touted the company as a "major gas turbine maker" (*Time*, October 31, 1960). By 1965, Solar purchased 99 acres in San Diego to construct a "major manufacturing facility for gas turbine engines," indicative of their growth and prominence during this time period (*Gas Turbine,* 1965).

It is likely that Solar's reputation as a gas turbine manufacturer, and their prior work for the military, led the U.S. Air Force to select them to provide Saturn gas turbine generator sets for Building 1004. The two-story power plant cost $5.4 million to construct, and was designed to operate as a "total energy system" for the STC, and provided all the electrical and mechanical power required to support Buildings 1001 and 1003 (*Aerospace Daily*, September 19, 1969). Similar to Building 1003, it was also a windowless building clad in pre-cast concrete panels. Metal louvers pierced the east and west facades to provide ventilation for the mechanical equipment (C.F. Braun & Company/NAVFAC/SAMSO, August 12, 1968c-d).

Building 1004 featured twelve, 750 kW 1,000 horsepower, Solar Saturn gas turbine generator sets, described by *Aerospace Daily* as "state-of-the-art," and cost $3.1 million (*Aerospace Daily*, September 19, 1969). The *San Jose Mercury News* reported that they were "twelve of the largest turbines in the country" (*San Jose Mercury News*, February 20, 1970). The installation of the turbines required the use of cranes. Building 1004 during and following construction is depicted in the graphic documentation section of this report.

The turbines, sparked by wet-cell batteries, were run by natural gas supplied by Pacific Gas & Electric (PG&E) Company, with diesel fuel available as back-up. In the event of a natural gas interruption, the turbines were designed to automatically switch to diesel fuel without any disruption of power. Waste heat generated from the turbines was piped into heat recovery boilers, and converted into steam to run absorption chillers to provide air conditioning, and heat exchangers to provide heat and hot water (Anthony Ruocchio, pers. comm., June 9, 2010).

The first story housed the battery room, chillers, and heat exchangers. The second story housed the turbines, boilers, and the Solar Control Consoles (C.F. Braun & Company/NAVFAC/SAMSO, August 12, 1968a-b). The Solar Control Console is depicted in the graphic documentation section of this report. All systems were designed with redundancies, because the power provided by Building 1004 was critical to ensure continued support of satellite programs controlled from the STC (Anthony Ruocchio, pers. comm., June 9, 2010).

The development of Building 1004 necessitated modifications to the installation's power distribution system. Ties connecting to the PG&E power grid were severed, with the exception of one line which provided power through a Lockheed Missiles and Space Division Substation, and was likely kept active for back-up purposes (AFSCF, 1972). In addition to providing the Saturn gas turbine generator sets, Solar also provided the personnel to run and maintain the plant (Anthony Ruocchio, pers. comm., June 9, 2010). It became operational in February 1970, and provided power to the entire installation, rendering it energy-independent at that time (Jernigan, 1983).

Building 1004 was designed as a prototype power plant intended to be developed at U.S. Air Force facilities across the United States. This plan was never realized, in part due to the 1970s oil crisis (Ruocchio, pers. comm., June 9, 2010). However, it should be noted that the U.S. Air Force continued to utilize Saturn gas turbines at other installations. For example, in 1985, *Turbomachinery International* reported that the U.S. Air Force had acquired twenty-three Saturn-powered generator sets to support remote deployments without facilities (*Turbomachinery International,* January-February 1985).

21. Satellites Supported and Notable Events, 1966-70

Between 1966-70, the STC supported over thirty Corona satellite launches from the Satellite Control Room in Building 1001 (Mission and Spacecraft Library, n.d.). The U.S. Air Force continued to publicize the launch of all of these satellites, but declined to provide any additional information. By 1966, upgrades to the installation had resulted in an increase in involvement in satellite programs. In addition to Corona, Vela, and other programs (many of which likely remained classified) new programs such as NASA's Biosatellite Program were supported. The Biosatellite Program was a series of three satellites designed to assess the effects of spaceflight on living organisms. Support for the program focused on directing satellite recovery by Lockheed C-130 *Hercules* (C-130) aircraft flown by the 6594th Aircraft Recovery Group based at Hickam AFB, Honolulu, Hawaii (Jernigan, 1983).

In June 1967, two scientific satellites, one owned by the U.S. Army, the other by the U.S. Navy, were launched as the first flight in the DoD Space Experiments Program (SESP). SESP was responsible for providing flights for research and experiments undertaken by government agencies (AFSCF, January-June 1968; Jernigan, 1983). That year, the KH-7 surveillance system was terminated, after having flown thirty-eight missions, thirty-four of which successfully returned usable images (NRO, 2006).

In June 1968, the *San Jose Mercury News* reported that satellite reconnaissance, likely supported by the STC, uncovered the Soviet Union's plans for the invasion of Czechoslovakia. The article noted that "[S]atellites spinning over Eastern Europe monitored Soviet radio transmissions which signaled the invasion was imminent, and photographic reconnaissance satellites had monitored unusual military activities on the Czech borders by Soviet, East German, Polish, Hungarian, and Bulgarian troops" (*San Jose Mercury News*, August 27, 1968).

In September 1968, a Lincoln Experimental Satellite (LES) was launched into orbit and supported by the STC and tracking stations. The LES was an experimental satellite used to test communications between aircraft, ships, and ground forces (Jernigan, 1983).

In 1969, support was provided for NASA's manned flights to the moon. The STC supported Apollo missions 9 and 10, and Apollo 11, the first manned lunar landing mission. Program 949 was also supported in 1969 (AFSCF, January-June 1969). Program 949 was designated in November 1966 to supplant Program 461, which had initially supplanted the MIDAS Program in 1963. Program 949 provided a wider range of capabilities, and by the 1970s, was expected to have "progressively enhanced world-wide early-warning, surveillance and detection capabilities" (Piper, 1970).

By the end of 1969, an *Aerospace Daily* article noted that "it is reliably reported that the AFSCF can service in real time more than thirty active satellites representing a variety of different operational and research/development programs simultaneously" (*Aerospace Daily,* September 19, 1969). However, STC operations, and many of the satellites it supported remained shrouded in secrecy. In fact, security was so tight that in 1968, a *San Jose Mercury News* article reported that "when Vice President Hubert Humphrey visited the nearby Lockheed plant recently, he was at first banned from admission to the satellite center." Eventually, Humphrey was allowed in, and became one of the few publicly identified notable visitors to the installation (Lindsey, March 10, 1968).

22. Termination of the Corona Program, 1972

On January 1, 1971, AFSCF re-designated STC as Sunnyvale AFS. On May 25, 1972, Sunnyvale AFS supported the 145th and final launch of the Corona Program, from the original Satellite Control Room in Building 1001. It was terminated as a result of advances in satellite technology. By the time the Corona Program concluded, Corona satellites had provided approximately 800,000 reconnaissance photographs covering approximately 510 million square miles (Chapman, 2008; Vukotich, n.d). Following the termination of the Corona Program, the Satellite Control Room Complex continued to be utilized for control of other satellite programs.

23. Building and Technological Upgrades, 1970s

Technological upgrades continued to be made throughout the 1970s to support the various missions of Sunnyvale AFS. The Onizuka AFS Drawing Number Log reveals that plans were prepared for numerous projects during the 1970s. The scale of these projects ranged from routine maintenance to building additions. A majority of the plans from the early 1970s focused on upgrades to integrate technological and mechanical equipment between Buildings 1001; 1002; 1003; and 1004 (Onizuka AFS, n.d.). For example, in 1971, communications circuits were relocated from Building 1001 to Building 1003, which permitted additional operator space and generally improved working and security conditions. In 1972, a twenty-channel digital television for computer-controlled switching was installed between Building 1001 and Building 1003. A keyboard/light-pen entry system was installed, likely in both buildings. In 1973, a seventh CDC 3800 computer was installed in Building 1003 (Jernigan, 1983).

Throughout the early 1970s, the U.S. Air Force contracted with Solar to staff Building 1004. However, a yearly increase in prices led the U.S. Air Force to directly hire Solar employees in 1974, rather than pay Solar to run the plant (Ruocchio, pers. comm. June 9, 2010).

Numerous plans were prepared for reconfiguration and renovation of interior space, many as a result of changing technology and establishment of new satellite programs. Following the termination of the Corona Program, in 1975, plans were prepared by San Francisco-based architecture and engineering firm Keller & Gannon, under the auspices of U.S. Air Force SAMSO to alter the original Satellite Control Room Complex (Keller & Gannon/SAMSO, September 24, 1975). Keller & Gannon was founded in 1941 by engineers Philip E. Gannon Sr. and George Keller, who had national and international project experience (*The Almanac,* April 27, 2005). Keller & Gannon met during World War II while working for the 12th Naval District, headquartered in San Francisco, strengthening their military ties (*San Francisco Chronicle*, June 5, 2005).

The plans indicate that the eight consoles, which had been "state-of-the-art" when they were installed in 1961, were slated for removal. In addition, walls, raised floors and ceilings were reconfigured (Keller & Gannon/U.S. Air Force, September 24, 1975). MCCs were also modified to incorporate new technology or new satellite programs, including MCC A and MCC B in Building 1003. Building additions were also constructed in the 1970s. In 1975, Keller & Gannon prepared plans for construction of an addition to the east façade of Building 1004 which functioned as a test laboratory (Keller & Gannon/SAMSO, May 5, 1975)

In 1974, Building 1015 was constructed to serve as a recreational facility. It was located between Buildings 1001 and Building 1003. Routine maintenance was also performed, and included exterior paint application; maintenance of interior finishes; and maintenance of and re-roofing the buildings. The critical nature of on-going missions at the STC is reflected in routine maintenance tasks. For example, plans prepared by Keller & Gannon to re-roof Building 1001 in 1977 include notes which indicate that the building "houses costly equipment which is essential to the vital military mission of command control, tracking, data acquisition, and space recovery activities of the Air Force Satellite program." The plans indicate that the building was in continuous operation and its critical function "demands no interruption" (Keller & Gannon, July 29, 1977).

By 1978, a tracking station was established in the United Kingdom in Oakhanger, shared by the United States and the British. In 1979, SAMSO was divided into two separate U.S. Air Force entities – the Space Division (SD) and the Ballistic Missile Office (BMO) (Jernigan, 1983).

24. Satellites Supported and the Origins of the Term "Silicon Valley," 1970s

In the 1970s, Sunnyvale AFS continued to support existing and newly established satellite programs, many of which remained classified, from Buildings 1001 and 1003. In 1970, the AFSCF Satellite Test Operations Historical Reports noted the successful support of two "unique orbital events" from the installation. These events included support of the Apollo 13 mission in April, which was aborted following the explosion of an on-board oxygen tank, and support of the first North Atlantic Treaty Organization (NATO) communications satellite in March (AFSCF, January-June 1970).

In June 1970, the final Vela satellite was launched. Sunnyvale AFS continued to provide support throughout the 1970s for the orbiting satellite (Jernigan, 1983). Program 949 was also re-designated the Defense System Program (DSP) in 1970. Sunnyvale AFS continued to support this program throughout the early 1970s (AFSCF, July-December 1970; 1971; 1972). The DSP satellite weighed 2,000 pounds, was approximately 23' long, 10' wide, and contained a large infrared telescope which scanned the earth for missile launches. In the event a missile was launched, it would be detected by the United States within minutes, which removed the possibility of a surprise attack (Peebles, 1997).

In 1971, the AFSCF, including Sunnyvale AFS, tracking stations, and recovery operations, was awarded for its "exceptionally meritorious service" for satellite control during 1969-70. The citation noted that the AFSCF provided "outstanding support" to the DoD satellite research programs and NASA Apollo lunar missions, and made a "substantial contribution to the current and future capabilities of the U.S. Air Force to conduct operations in space" (Wagner, November 30, 1971).

By November 1971, a pair of Defense Satellite Communications System (DSCS) II advanced communications satellites had been launched to handle voice, teletype, computerized digital data, and video transmissions (Jernigan, 1983). The first KH-9 satellites – code-named HEXAGON, and popularly known as "Big Bird" – were also launched in 1971. The KH-9 satellites were 30,000-pound photographic reconnaissance satellites initially developed in the 1960s. Similar to Corona satellites, they were designed to photograph large areas and return the film to earth via SRV. They carried technologically advanced cameras, additional film capsules, and antennae for other intelligence-gathering purposes (Clark, 2007).

In 1971, a trade magazine, *Electronic News* ran a three-part series, entitled "Silicon Valley, USA" on the history of the semiconductor industry in the Santa Clara Valley. Silicon is a primary material used in the manufacture of semiconductors. As a result, this area, which included Sunnyvale AFS, and continued to be at the forefront of technological advancement, became commonly known as Silicon Valley (Lecuyer, 2006).

In July 1975, the final Apollo flight was launched and supported by Sunnyvale AFS. The final flight was known as the Apollo-Soyuz Test Project, which marked the first joint United States-Soviet Union space mission. The mission was the first time two foreign spacecraft docked together in orbit (NASA, July 14, 2010). In 1976, the first DMSP Block 5D, a meteorological satellite, was launched, and was presumably supported from Sunnyvale AFS. It was an upgraded version of the 1960s-era DMSP, and provided twice-daily, worldwide meteorological, oceanographic, and solar-terrestrial physics measurements (Jernigan, 1983; Wade, n.d.).

In 1976, the KH-11 KENNAN satellite, a reconnaissance satellite, was launched. It was the first successful electronic imaging satellite, and transmitted high-quality images in real time (Vick, 2007). A 1978 *San Jose Mercury News* article noted that some sources indicated that the top-secret "KH-11, from 200 to 300 miles up, can detect a pack of cigarets [sic] on Russian soil," while another source indicated it could only "read the lettering on billboards" (Ingersoll, November 5, 1978). Nonetheless, this top-secret satellite represented significant advances in the development of satellite technology, and was supported from an MCC in Building 1001 or 1003 at Sunnyvale AFS, as well as associated tracking stations.

In February 1978, the first Navigation System for Timing and Ranging (NAVSTAR) Global Positioning Satellite (GPS) was successfully launched into orbit and was supported from Sunnyvale AFS. It was operational by March, and was the first vehicle in a constellation of satellites planned for the GPS program Subsequent NAVSTAR satellites were launched in May, October, and December of that year, and April 1979 (Jernigan, 1983).

25. Development of the Space Transportation System, 1972-76

In January 1972, President Richard Nixon announced the development of the Space Transportation System (STS), or Space Shuttle Program, managed by NASA. Kennedy Space Center in Houston, Texas, and Vandenberg AFB would serve as the operational bases for the Space Shuttle Program. R&D shuttle launches would originate from the Kennedy Space Center, and military launches would originate from Vandenberg AFB (Jernigan, 1983). The shuttle would be responsible for the launch of all commercial, scientific, and military satellites into space. The NRO was involved with the development and design of the shuttle to suit the needs of its satellite reconnaissance missions. For example, the NRO required a larger cargo bay than originally planned by NASA, as well as greater landing maneuverability (Cassutt, August 1, 2009).

The AFSCF, including Sunnyvale AFS and tracking stations, would provide tracking and control for the program. AFSCF would support the following aspects of the Space Shuttle Program:

- Flight planning and resource scheduling.

- On-pad shuttle and payload examination.

- Tracking, telemetry & commanding (TT&C) in altitudes above 400 nautical miles, and during contingency operations.

- Interface with crew during satellite retrieval and deployment.

- Support launches with as little as two hours notice (Jernigan, 1983).

In 1976, concerns over the reliability of the shuttle were articulated by Acting Director of the NRO, Charles W. Cook. Cook indicated that backup booster vehicles were required in the event the shuttle was unable to launch the satellites, and noted that "[S]huttle vulnerability and operational and logistic restrictions will continue indefinitely to influence the need for backup boosters." Furthermore, the backup boosters were also required to "provide a quick reaction capability in a time of crisis," because "the importance of overhead reconnaissance would increase, yet our primary reconnaissance vehicles and launch vehicles (Shuttle) might be neutralized" (Cook, July 8, 1976).

26. Development of the Air Force Satellite Control Network and the Strategic Defense Initiative, 1980s

In the early 1980s, the Soviet Union's military arsenal surpassed the United States. In 1982, the U.S. Air Force Space Command (SPACECOM) was formed, with space operations as its primary mission. Its goal was to ensure that the United States could defend itself from a Soviet attack (SPACECOM, n.d.).

The operations concept for Air Force Satellite Control Network (AFSCN) was also developed in 1982. The goal of the AFSCN was to provide "enduring control capability commensurate with the need for operational space suites throughout the conflict spectrum" (AFSCF, 1983). The AFSCN was not a formal organization, but rather denoted a group of common user resources, assets, and facilities which collectively provided TT&C support for virtually all DoD spacecraft, plus select NASA and foreign government programs (Hane, 1988).

To accomplish this goal, a Data Modernization Program was implemented, and Sunnyvale AFS underwent upgrades. This $500 million upgrade introduced centralized database-driven computer hardware and software to replace outdated systems. The upgraded system was more reliable, cheaper to maintain, and faster than its predecessor, allowing it to support a steadily increasing satellite support workload (Fedor et al., 2006).

In addition, a new satellite control center – the Consolidated Space Operations Center (CSOC) – was constructed at Falcon AFS, Colorado Springs, Colorado (present-day Schriever AFB) (Fedor et al., 2006). The CSOC was constructed partially due to concern about the vulnerability of Sunnyvale AFS to earthquakes and terrorism. In 1982, the U.S. General Accounting office prepared a report which indicated that a loss of the control center in Sunnyvale would result in a major disruption of communications, and of tracking and control of space systems. A *San Jose Mercury News* article three years later indicated that Sunnyvale AFS would be a top priority for Soviet spies, and quoted an unnamed Federal Bureau of Investigation (FBI) agent who indicated that Sunnyvale AFS – and specifically the "Blue Cube" – was "probably number one on their list" (Philp, June 9, 1985).

In 1983, fears that the United States lagged behind the Soviet Union in manned space flights led President Ronald Regan to propose the Strategic Defense Initiative (SDI). SDI, which became known as "Star Wars," would use ground and space-based missile systems to protect the United States from attack by strategic nuclear ballistic missiles. One of the goals of the program was to establish a permanent presence in space for the United States (*Business Week*, June 20, 1983).

26. Construction of Buildings 10031 and 10032, 1980s

Two new buildings were constructed in the 1980s in conjunction with the Data Systems Modernization Program to provide space for satellite control, Buildings 10031 and 10032, referred to on plans as MCCs. In 1981, King/Reif and Associates, an architecture and planning firm, prepared plans for Building 10031 on behalf of NAVFAC Western

Division. Plans were stamped by AIA-registered architect Richard A. Reif, a partner in the firm; however, no further information about the firm, or Mr. Reif was available. The three-story building was appended to the north façades of Buildings 1001 and 1003, and included construction of a new entrance that obscured the original entrance on the west façade of Building 1001. Although the lobby and entrance was constructed as part of Building 10031, they were considered part of Building 1001. The entrance was embellished with a metal sign that read "Sunnyvale Air Force Station" (King/Reif and Associates/NAVFAC, December 18, 1981d; Fola Odafalu, pers. comm., July 26, 2010).

The first two stories housed parking facilities, and the third story included secure space that supported a "high priority" satellite system known as Program 106. In addition to Program 106, the third story housed MCC IX, computer rooms, communications rooms, and offices, and may have also housed other MCCs. The third story was radio frequency interference (RFI)-shielded to protect electronic and communications systems critical to satellite control from electromagnetic interference (EMI) and RFI. Floor plans for the third story indicate that the RFI-penetration protection was provided on the roof, floor, and exterior walls to protect the third story. In addition, several interior spaces were also separated by RFI partitions, likely to protect individual satellite support activities in MCCs. In general, the RFI-shielded areas were accessed via interlock doors, where only one door opened at a time, ensuring that the area remained shielded at all times (King/Reif and Associates/NAVFAC, December 18, 1981a-c). Construction began in March 1982 (U.S. Air Force, 2006).

In 1982, plans were prepared for Building 10032 by Rasmussen Ingle Anderson, a San Francisco-based architecture firm, under the auspices of NAVFAC Western Division. Many of the plans were stamped by AIA-registered architect, John Frederick Ingle, a founder of the firm. Ingle served in the USACE during World War II, and as a partner in Rasmussen Ingle Anderson, was a pioneer in Silicon Valley for his design of industrial clean-air rooms (*The San Francisco Chronicle,* November 15, 2009). The firm was also noted for its expertise in earthquake engineering, which may have helped it be selected to design Building 10032 (*Electronics*, 1980).

The design of Building 10032 was similar to Building 10031. It was a three-story building which provided two stories of parking, and one story of RFI-shielded space for MCCs, computer rooms, communications rooms, and offices. Likewise, the roof, floors, and exterior walls were RFI-shielded to protect the third story. Several interior areas were also RFI-shielded. The floor plans indicate that four groups of rooms were shielded, and it is likely that these four areas housed MCCs. The RFI-shielded areas were accessed via interlock doors (Rasmussen Ingle Anderson/NAVFAC, October 29, 1982a-c). Furthermore, the Onizuka AFS Drawing Number Log indicates that MCCs 4, 7, and 12 were located in Building 10032. MCC 4 was originally located in Building 1001, and presumably was relocated to Building 10032 (Onizuka AFS, n.d.).

Building 10032 was constructed adjacent to the west façade of Building 1003. According to the plans, a north and south bridge were envisioned to provide access to the second story of Building 1003. However, because cables and wiring existed at the proposed location of the north bridge, only the south bridge was constructed (Rasmussen Ingle Anderson/NACFAC October 29, 1982c; Dennis Ralphs, pers. comm., June 9, 2010). The plans also illustrate the top-secret nature of activities within the building, and note that where the two buildings joined, contractors were required to stay within certain work areas under supervision of security (Rasmussen Ingle Anderson/NAVFAC, October 29, 1982c-d). Both Building 10031 and Building 10032 were operational by 1984, and are depicted in the graphic documentation section of this report (Fola Odafalu, pers, comm., July 26, 2010).

27. Other Construction and Technological Upgrades, 1980s

In addition to new construction, according to the Onizuka AFS Drawing Number Log, plans were prepared for hundreds of projects throughout the 1980s to maintain and upgrade the facilities, as well as reconfigure existing MCCs to provide support for new satellite programs, such as the Space Shuttle Program. In September 1981, the U.S. Air Force prepared plans to reconfigure MCC B on the fourth story of Building 1003 to provide support for the Space Shuttle Program. Reconfigured rooms included Rooms 4501, 4502, 4503, 4504, 4505, 4506, 4507, 4302, 4303, 4304, 4305, 4306, and 4307. The plans indicated that some walls and high partitions were removed to create larger spaces, while other partitions were be installed to divide spaces. Rooms were painted and tile and carpeting were installed, including soundproof carpet and tile in select rooms. In addition, plans called for the installation of new locks, key boxes, and alarms, indicative of the change in management of MCC B to support the shuttle (U.S. Air Force, September 1981).

In addition, many 1980s-era plans were prepared in conjunction with the Data Systems Modernization Program, and involved renovations to accommodate new computer systems and satellite programs. In 1987, two major projects presumably related to this effort were undertaken. The Satellite Data Terminal Link (SDTL) area, also known as Complex D, and the Inter-Range Operations (IRO) area in Building 1001, were renovated and RFI-shielded to serve as secure mission areas.

Plans to renovate the SDTL area were prepared by the Stearns-Roger Division of United Engineers and Constructors, an engineering and construction company based in Denver, Colorado, under the auspices of the U.S. Air Force Space Division. The Stearns-Rogers Corporation specialized in construction of industrial facilities. In 1982, they were acquired by United Engineers and Constructor, a Philadelphia-based engineering and construction company, who also specialized in industrial construction (Air Products, May 2007).

The SDTL area originally functioned as the Satellite Control Room Complex for the Corona Program, and had been somewhat reconfigured in the 1970s following its termination. During the 1980s renovations, the entire area was gutted to accommodate the installation of RFI-shielded materials. The concrete-slab floor was removed and a new, presumably RFI-shielded, concrete slab was poured. New RFI-shielded walls, with acoustical insulation, were constructed on the perimeter of the area, which was reconfigured to house four operations rooms, two printer rooms, and one large equipment room, accessed via a long north/south central corridor. A new RFI-shielded ceiling was installed as well. Entry to the area was provided at the northern and southern ends of the corridor, via RFI-shielded interlock doors (Stearns-Rogers Division, United Engineers/U.S. Air Force Space Division, September 18, 1987; December 18, 1987). According to Mr. Dennis Ralphs, 21st Space Operations Squadron (SOPS) employee, the roof of the building was removed to allow for the installation of RFI-shielded components via crane (Dennis Ralphs, pers. comm., June 9, 2010).

In addition, the IRO area, which was a smaller area, was also renovated and shielded during this time. Unlike the SDTL area, the IRO area housed only one operations area. In addition, plans indicate that the IRO also housed offices, including a director's office, equipment rooms, and telecommunications rooms. It was accessed by one set of RFI-shielded interlock doors. Mechanical equipment was also installed, including two AHUs on the roof, necessary to maintain air flow in the sealed areas (Stearns-Rogers Division, United Engineers/U.S. Air Force Space Division, September 22, 1987).

Plans were prepared to alter numerous MCCs throughout the 1980s, also likely in response to the Data Systems Modernization Program. It is likely that all MCCs at the STC underwent some type of renovation during this time. Many of the alterations to the MCCs involved relatively simple room reconfiguration and associated electrical and mechanical work. For example, in 1981, the U.S. Air Force prepared plans to reconfigure MCC B on the fourth story of Building 1003. The plans indicated that some walls and high partitions were removed to create larger spaces, while other partitions were installed to divide spaces. In addition, the plans called for the installation of new locks, key boxes, and alarms, which likely indicated management of the MCC was transitioning to new personnel. Mechanical and electrical upgrades also occurred in conjunction with this project (U.S. Air Force, September 1981).

In 1987, plans were prepared by Holmes and Narver, Inc., under the auspices of the AFSCF Headquarters, Los Angeles, California, to modify a MCC located in the northeast corner on the third story of Building 1003. Holmes and Narver, Inc., a well-known Orange, California-based architecture and engineering firm held prior contracts with the military. In 1950, the company was awarded a joint DoD and Atomic Energy Commission contract to construct atomic testing facilities on the Eniwok Atoll in the Pacific Ocean (*The New York Times,* February 22, 1950). The plans indicate minor alterations, including the removal of multiple interior walls to create larger spaces (Holmes & Narver, Inc./AFSCF, August 14, 1987).

In 1984, Building 1025, located between Buildings 1001 and 1004 was constructed to serve as an armory. In addition, security modifications were undertaken throughout the buildings to meet changing mission needs. Alarms, locks, security cameras, and flashing red lights to alert personnel that non-secure individuals were in classified areas, were installed in various rooms in Buildings 1001, 1003, 10031 and 10032 throughout the 1980s. Plans were also prepared for routine maintenance of the buildings, such as re-roofing, replacing boilers, and restroom upgrades (Onizuka AFS, n.d.).

In 1988, the *San Jose Mercury News* reported that the multimillion-dollar Data Systems Modernization Program was behind schedule and over budget. The article indicated that the original $600 million budget had risen to $1.4 billon, with the potential to increase by another $450 million (*San Jose Mercury News,* August 25, 1988).

28. Satellite and Shuttle Support, 1980s

Sunnyvale AFS continued to support numerous satellite programs throughout the 1980s, although many remained classified. On April 12, 1981, the first mission flown by the Space Shuttle *Columbia* was launched, and successfully returned to earth two days later. The AFSCF provided support for the mission, and five AFSCF mission controllers received U.S. Air Force Commendation Medals (Jernigan, 1983). In addition, most, if not all, of the Space Shuttle Program astronauts visited or trained at Sunnyvale AFS (Dennis Ralphs, pers. comm., August 3, 2009). This was likely because the shuttle was used to launch all satellites, including classified reconnaissance satellites.

In June 1982, the first classified military payload was carried into orbit aboard the fourth *Columbia* shuttle mission (Jernigan, 1983). Throughout the 1980s, classified payloads continued to be launched on dedicated military flights sponsored by the NRO and U.S. Air Force, and as secondary payloads on NASA-sponsored flights (Cassutt, August 1, 2009).

In February 1983, Libyan troops, led by military dictator Colonel Muammar al-Gaddafi, appeared to be planning a surprise invasion of Chad and Sudan. The United States launched a KH-8 reconnaissance satellite to provide photographs of the activity. The top-secret satellite was supported from Sunnyvale AFS. The mission produced photographs that documented massive troop build-ups at the border of Sudan, and the *USS Nimitz* was dispatched to the Gulf of Sidra, thus preventing a Libyan invasion of Sudan (Levien, 1989; Philp, October 30, 1985). In 1984, the twentieth and last KH-9 satellite was launched and supported by the STC (Day, November 8, 2004).

The first dedicated military shuttle flight, aboard the Space Shuttle *Discoverer,* was launched in January 1985, and was supported from Building 1003. *The New York Times* reported on the launch, and noted that "all communication with the astronauts will be hidden in complex codes intelligible only with special unscrambling equipment" (Bamford, January 13, 1985). An article in the August 2009 edition of *Air & Space Magazine* indicated that "according to most accounts, STS-51C's payload was ORION, an eavesdropping satellite for signals intelligence" (Cassutt, August 1, 2009). In October 1985, the second dedicated military flight was launched by the Space Shuttle *Atlantis* (Cassutt, August 1, 2009). *The New York Times* reported that, according to reliable sources, "two $100 million communication satellites" were deployed into orbit, on a mission classified as secret by the Pentagon (Broad, October 5, 1985).

In 1989, a Tracking and Data Relay Satellite System (TDRSS) satellite was launched, supported by Sunnyvale AFS. The TDRSS was a sophisticated data-relay communications satellite developed by NASA (Levien, 1989).

29. <u>Onizuka Air Force Station, 1986-87</u>

In 1986, Sunnyvale AFS was renamed Onizuka AFS in honor of Space Shuttle *Challenger* astronaut Lieutenant Colonel Ellison S. Onizuka. The following year it was re-designated Onizuka AFB, and a memorial to Onizuka was developed in the lobby. Onizuka was born in Kealakekua, Kona, Hawaii in 1946. In 1969, he received Bachelor of Science and Master of Science degrees in Aerospace Engineering from the University of Colorado. He participated in the Reserve Officers' Training Corps (ROTC) Program at the University of Colorado. In 1970, he entered the U.S. Air Force, and served as an aerospace flight test engineer with the Sacramento Air Logistics Center at McClellan AFB, Sacramento California. At McClellan AFB, he participated in numerous flight test programs. In 1975, he was assigned to the Air Force Flight Test Center at Edwards AFB, Mojave, California, where he served on the Air Force Test Pilot School staff as a squadron flight test engineer, and later as a chief of the engineering support section in the training resources branch.

Between 1978 and 1979, Onizuka completed a one-year astronaut training and evaluation program. Afterward, he worked at the Kennedy Space Center to support the first two launches of the Space Shuttle *Columbia*, in 1981. He also worked on the Shuttle Avionics Integration Laboratory (SAIL) software team, as well as on other technical projects. During this period, he often worked at Sunnyvale AFS.

In 1985, Onizuka flew his first space shuttle mission aboard the Space Shuttle *Discovery*, which was also the first DoD-classified mission. In 1986, Onizuka served as the mission specialist on Space Shuttle *Challenger*, which exploded after launch, killing its seven crew members (NASA, January 2007). Following the *Challenger* explosion, the U.S. 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 (Cassutt, August 1, 2009).

30. Deactivation of the AFSCF, 1987

The AFSCF was officially deactivated October 1, 1987, and four new organizations were created:

- Consolidated Space Test Center (CSTC)
- 1004th Space Support Group
- 2nd Satellite Tracking Group
- AFSCN System Program Office (SPO)

The CSTC, 1004th Space Support Group, and the 2nd Satellite Tracking Group remained at Onizuka AFB. The AFSCN SPO was located at Los Angeles AFB, with detachments at Onizuka AFB and Falcon AFS. Furthermore, Onizuka AFB was transferred to SPACECOM in 1987 (Hane, 1988).

31. Dissolution of the Soviet Union and End of the Cold War, 1980s-1991

By the mid-1980s, increased military, diplomatic, and economic pressure by the United States had led to the weakening of the Soviet Union. The cost of war in Afghanistan, coupled with the escalating costs of the space race, resulted in a weakened Soviet economy and dissent amongst its population. This led Soviet President Mikhail Gorbachev to introduce the liberalizing reforms of *perestroika* (Russian for reconstruction), and *glasnost* (Russian for openness). Between 1989 and 1990, the Berlin Wall was removed and by 1991, the Soviet Union had dissolved, signaling the end of the Cold War (Center for Air Force History, 1994).

32. Onizuka Air Force Base, 1990-93

Following the end of the Cold War, the level of secrecy at Onizuka AFB somewhat decreased. Prior to 1990, the *Sunnyvale Times* had reported that the U.S. Air Force had even “rejected street signs identifying Onizuka” (Mead, March 2, 1994). However by the early 1990s, the U.S. Air Force allowed street signs, opened a public affairs office, and established a community program with schools and youth groups. A 1993 *San Jose Mercury News* article reported that the “top-secret facility” was opening its doors for tours. Due to a decrease in military spending, the U.S. Air Force looked toward publicizing its assets, in hopes of gaining more funding. However, tours were limited, and much of the installation remained restricted (Peterson, July 30, 1993). The end of the Cold War also led to the declassification of the NRO in September 1992.

As the Cold War came to a close in the early 1990s, modifications continued to be made at Onizuka AFS, although fewer modifications were made than in previous decades, likely as a result of a decrease in military funding. By the early 1990s, it appears that installation of computer systems associated with the Data Systems Modernization Program initiated in the early 1980s was completed (Carey, February 14, 1990).

In 1989, plans were prepared to construct an addition along the south façade of Building 1004, known as the Emergency Utility Building (EUB). The EUB was constructed in 1992, and enhanced the installation's power distribution system. In addition, the Onizuka AFS Drawing Number Log indicates construction of the EUB also entailed upgrading mechanical systems in Buildings 1003, 10031 and 10032 (Onizuka AFS, n.d.).

In 1990, Building 1002's exterior was rehabilitated, including replacement of fenestration and application of Exterior Insulated Finishing System (EIFS) (Fola Odafalu pers. comm., October 13, 2009). According to the Onizuka AFS Drawing Number Log, interior spaces were also renovated likely in association with the activation of the 21st SOPS in 1991. They assumed the role of operations of the 2nd Satellite Tracking Group. In 1992, the 750th Space Group was activated, and assumed responsibility supporting numerous satellites, and the Space Shuttle (Schriever AFB, n.d.).

During this time, numerous plans were prepared to modify MCCs, many likely in conjunction with the arrival of the 21st SOPS and 750th Space Group at the installation. In 1990, Martin Marietta Space Systems Facilities prepared plans on behalf of Onizuka AFB for modifications to MCC IX in Building 10031 (Martin Marietta Space Systems Facilities, April 30, 1990). Martin Marietta Space Systems Facilities was a division of Bethesda, Maryland-based Martin Marietta Corporation, a major aerospace DoD-contractor. In 1995 Martin Marietta Corporation merged with Lockheed Aircraft Corporation to form Lockheed Martin. In 1992, Keller & Gannon prepared plans to modify MCCs in Buildings 1001 and 1003. Modifications included room reconfiguration, and mechanical and electrical upgrades to accommodate new satellite programs (Onizuka AFS, n.d.).

By the early 1990s, Onizuka AFB and tracking stations provided radio links to over eighty active DoD spacecraft (Mead, March 2, 1994). Satellites supported by Onizuka AFB assisted with the success of Operation Desert Storm (1990-91). For example, weather satellites assisted with United States missile launches, and navigation satellites assisted the troops in maneuvering through the desert. Reconnaissance satellites, such as those in the NRO's KH-11 satellite program, also likely continued to be supported by the installation (Peterson, July 30, 1993).

The early 1990s also represented a key year for satellite scheduling, with the advent of a computerized scheduling system. Prior to this time, scheduling was plotted by hand, using colored tape to represent different spacecraft on approximately 50’ rolls of butcher-paper, as depicted in the graphic documentation section of this report (Mead, March 2, 1994).

33. Onizuka Air Force Station, 1994-2005

In 1994 Onizuka AFB was renamed Onizuka AFS. The installation continued to provide support for Space Shuttle launches throughout the 1990s. In addition, the installation also supported the following NASA space exploration programs:

- *Magellan*, a space probe which mapped and provided high-resolution photographs of Venus.
- *Galileo*, an unmanned spacecraft developed to study Jupiter and its moons.
- *Ulysses*, a space probe designed to reach high solar latitudes to study the sun.
- The Hubble Space Telescope, designed to operate above the earth’s atmosphere to observe celestial objects at ultraviolet, visible, and near-infrared wavelengths.
- The Chandra X-Ray Observatory, the largest, heaviest, and most powerful x-ray telescope ever launched into space.

In the early 1990s, a task force was formed to examine the merits of declassifying the Corona Program. Based on their recommendations, on February 24, 1995, President William Clinton signed an order that declassified the Corona Program. The 800,000 images taken between 1960-72 were made available to the public the following year. Formerly classified documents also became available (NRO, February 24, 1995).

In 1995, the Base Realignment and Closure (BRAC) commission recommended the realignment of Onizuka AFS and the relocation of select functions to CSOC in Falcon AFB, Colorado Springs, Colorado. The recommendations were approved by President Clinton. The 750th Space Group was reassigned to CSOC, and missions of the 21st SOPS at Onizuka AFS were realigned. The realignment resulted in a loss of approximately 1,100 jobs at Onizuka AFS (City of Sunnyvale, 2006). Throughout the end of the 1990s and during the early 2000s, responsibility for controlling the DoD satellite network continued to be transferred to the CSOC, and Onizuka AFS’s responsibilities substantially decreased (Flinn, 1991; Wulff, 1995).

In 1996, a terrorist attack on Khobar Towers, a high-rise apartment complex that housed U.S., British, and French military personnel in Dhahran, Saudi Arabia, led to increased security measures at U.S. military installations. At Onizuka AFS, parking was no longer permitted on the first two stories of Buildings 10031 and 10032. In addition, because the S-curve section of Innovation Way was in close proximity to Buildings 10031 and 10032, the street was closed to vehicular traffic, covered with astro-turf, and landscaped. Jersey barriers and bollards were also installed around the perimeter of the buildings (Dennis Ralphs, pers. comm., August 2, 2010).

In 1994, the installation no longer relied on Building 1004 as the primary energy source, and began to transition to PG&E for its power needs. In 1998, Building 1004 ceased to function as the primary energy provider for the installation, and was relegated to back-up support (Fola Odafalu, pers. comm., October 13, 2009). During this time, the Onizuka AFS Drawing Number Log indicates that fewer plans were prepared than in prior years. The majority of these plans relate to routine maintenance. In addition, some plans prepared in the early 2000s were never fully realized. For example, in 2002, plans were prepared to install an elevator in Building 1002. However, no action was taken to implement these plans (Onizuka AFS, n.d.).

34. <u>Closure of Onizuka Air Force Station, 2005-Present</u>

In 2005, the BRAC commission recommended closure of Onizuka AFS. The recommendations were approved by President George W. Bush. In 2006, the DoD, through the Office of Economic Adjustment, formally recognized the City of Sunnyvale as the Local Redevelopment Authority (LRA) for planning the redevelopment of Onizuka AFS and its conversion to civilian use (City of Sunnyvale, 2006).

In May 2007, the NRO officially departed from Onizuka AFS. A deactivation ceremony and open house were held to commemorate this event, and was attended by over 800 guests, many of them former NRO, U.S. Air Force, CIA, and civilian employees (Munro, 2007). Displays were mounted on the corridor walls of Building 1003, highlighting the history of the NRO and reconnaissance satellite programs supported from the installation between 1961-2007. Following the open house, displays and histories of the programs, many of which remain classified, were moved to the NRO archives in Chantilly, Virginia (Dennis Ralphs, pers. comm., August 3, 2009).

On July 28, 2010, a closing ceremony was presided over by Lieutenant General John Sheridan, commander of the Space and Missile Systems Center, Los Angeles AFB. In attendance were current and former employees, both military and civilian, as well as Lorna Onizuka, Ellison Onizuka's widow. In his remarks, Lieutenant General Sheridan noted that "[T]his facility here in Sunnyvale has supported an amazing 3.4 million satellite operations over the past years. Much of the details of this work are still classified and we cannot talk openly about it, but what I can tell you is that the operations conducted by the NRO from this site have made our nation a tremendously safer place to be" (Bauer, July 29, 2010).

The 21st SOPS relocated to Vandenberg AFB, and on July 30, 2010, a dedication ceremony was held to commemorate the opening of the 21st SOPS Ellison Onizuka Satellite Operations Facility at Vandenberg AFB. Onizuka AFS is scheduled to be transferred out of federal hands in September 2011. It is anticipated that the Department of Veterans Affairs (VA) will occupy Building 1002, and two buildings located outside the U.S. Air Force Satellite Test Center Historic District, Buildings 1018 and 1034. The remainder of the installation will be redeveloped.

PART II: DESCRIPTIVE INFORMATION

A. Physical Character of the Site and its Relationship to the Surrounding Environment

1. Physical Description of the Site: The boundary of the U.S. Air Force Satellite Test Center Historic District encompasses the building footprints of the six interconnected contributing buildings, Buildings 1001, 1002, 1003, 1004, 10031, and 10032 at Onizuka AFS. The six buildings are situated on the central portion of the 23-acre Onizuka AFS. Building 1001 was the first building constructed on the installation in 1959, and as subsequent buildings were constructed, all except Building 10032 were appended to Building 1001.

Building 1002 is appended to the north façade of Building 1001; Building 1004 is appended to its south façade; Buildings 1003 and 10031 are appended to its west façade. Building 10032 is the only building not appended to Building 1001, and is appended to the west façade of Building 1003, and the south façade of Building 10031. Two non-contributing buildings, Buildings 1015 and 1025, are also located in the boundary. Building 1015, Multipurpose Recreation Facility, is located between Buildings 1001 and 1003. Building 1025, Security Police Operations, is located between Buildings 1001 and 1004. Both buildings were determined not eligible for the National Register of Historic Places in conjunction with the Historic Building Inventory and Evaluation (HBIE) prepared in 2004.

2. Surrounding Environment: The U.S. Air Force Satellite Test Center Historic District occupies the central portion of Onizuka AFS. It is bound to the north and south by asphalt-paved parking lots and support buildings and structures, to the east by an asphalt-paved parking lot and support structures and to the west by an asphalt-paved road. The installation itself is bound to the north by Innovation Way and North Mathilda Avenue, the south by West Moffett Park Drive, the east by North Mathilda Avenue, and the west by Innovation Way. Due to security measures, only the northern and southern portions of

Innovation Way are asphalt-paved and function as a roadway. Vehicular traffic is prohibited and the central portion of Innovation Way has been covered with astro-turf and plantings.

B. Physical Description of the Complex

The boundary of the U.S. Air Force Satellite Test Center Historic District encompasses the footprints of the six contributing buildings (Buildings 1001, 1002, 1003, 1004, 10031, and 10032). In general, this section focuses on the contributing buildings. However, the overall installation is also described to provide a better understanding of the U.S. Air Force Satellite Test Center Historic District. In-depth descriptions of the six contributing buildings are featured in individual building reports.

1. According to the Original Plan: In 1959, the Ralph M. Parsons Company prepared site plans for Building 1001, referred to as the Development Control Center. The plans were prepared under the auspices of the AFBMD in Englewood, California. The plan entitled "Development Control Center, Site and Vicinity Plan" depicts the 11.43-acre installation bound to the north and east by Mathilda Avenue, the south by an easement for a storm drainage canal, and the west by East Perimeter Road. Buildings that comprise the Lockheed Space and Missiles Company were situated west of the installation (Ralph M. Parsons Company/AFBMD, March 6, 1959a).

The plan entitled "Development Control Center, Plot and Utility Plan" depicts a more detailed view of the layout of the installation, and is featured in the graphic documentation section of this report. Building 1001 was centrally located along the western edge of the installation, and the plan indicates that it was constructed in two phases. It was a single-story, rectangular-plan, windowless, concrete panel-clad building capped by a flat roof, constructed to provide support for reconnaissance satellites. Space north and south of the building was allocated for future expansion, which indicates that the U.S. Air Force intended to construct additional buildings at the installation from its inception. A parking area for 186 cars and forty-three sports cars was located north of northern area allocated for future expansion. Concrete walkways connected the parking area to the building, and provided access to the entrance, located within the cut-out portion of the west façade. An additional site plan was prepared in conjunction with the second set of Building 1001 plans, entitled "Site and Vicinity Plan" dated August 19, 1959. This plan features an additional parking area located north of the parking area depicted on the "Development Control Center, Plot and Utility Plan" (Ralph M. Parsons Company/AFBMD, March 6, 1959b).

2. Changes Over Time: Only Building 1001 was constructed during the original development of the installation. The remaining five contributing buildings were constructed between 1962-84.

As indicated on the plan entitled “Development Control Center, Plot and Utility Plan,” featured in the graphic documentation section of this report, portions of the installation were earmarked for future development. In 1962, plans were prepared by Kaiser Engineers, under the auspices of the U.S. Air Force SSD, to construct Building 1002 along the north façade of Building 1001, on a portion of the installation set aside for future expansion. Building 1002, a two-story, L-plan, concrete panel-clad building, pierced by ribbon windows and capped by a flat roof, was constructed to provide administrative space. At that time, Kaiser Engineers also prepared plans for an addition to the east façade of Building 1001 (Kaiser Engineers/U.S. Air Force SSD, January 15, 1962c).

In 1964, plans were prepared by Maher & Martens, under the auspices of the USACE, Sacramento District, to construct an addition to Building 1002. The two-story, L-shaped building was appended to the east façade of Building 1002 and the north façade of Building 1001, and occupied a portion of the installation set aside for future expansion. The design of the addition was similar to the original, and it provided administrative space. Its construction resulted in creation of Building 1002’s interior courtyard (Maher & Martens/USACE Sacramento District, May 7, 1964a-b).

In 1967, the U.S. Air Force acquired 8.2 acres of land west of the existing installation from Lockheed Missiles and Space Division. C.F. Braun & Company, under the auspices of NAVFAC Western Division, San Bruno, California, and SAMSO, Los Angeles, California, prepared plans for the STC expansion, including a site plan entitled “STC Building Addition, Plot Plan,” dated November 17, 1967. The plan is featured in the graphic documentation section of the report.

The plan depicts the footprints of two new buildings and additional parking areas. Building 1003, labeled Satellite Test Center Building Addition, was located west of Building 1001, and was appended to the building by a hyphen. The four-story, rectangular-plan, concrete panel-clad building was capped by a flat roof, and constructed to provide additional support for reconnaissance satellites programs (C.F. Braun & Company/NAVFAC/SAMSO, November 14, 1967).

Building 1004, labeled Power Plant, was located south of Building 1001, and was connected to Buildings 1001 and 1003 by a hyphen. The two-story, rectangular-plan, windowless, concrete panel-clad building, pierced by two-story, metal louvered vents, was capped by a flat roof, and was constructed to provide power for the installation (C.F. Braun & Company/NAVFAC/SAMSO, August 12, 1968a-d).

Access to Buildings 1002 and 1003 was provided through Building 1001’s main entrance because they were interconnected. The plans also depict new parking areas located south and west of Building 1003, and at the southern and western boundaries of the installation (C.F. Braun & Company/NAVFAC/SAMSO, November 14, 1967).

Construction of the buildings and parking lots resulted in the in the reconfiguration of Lockheed Martin Way (formerly known as East Perimeter Road) west of Building 1001. The north/south-oriented road was realigned westward to accommodate the installation's expansion. The road was also realigned south along the western boundary of the installation, forming an S-curve. Concrete sidewalks extended around Building 1003 to the north, south, and west (C.F. Braun & Company/NAVFAC/SAMSO, December 23, 1966).

In 1974, Building 1015 was constructed to serve as a recreational facility. It was located between Buildings 1001 and Building 1003.

In 1981, King/Reif and Associates prepared plans for construction of a new building on behalf of NAVFAC Western Division. Building 10031 was a three-story, rectangular-plan building appended to the north facade of Building 1003, and to the recessed portion of the north and west façades of Building 1001. As a result, it obscured the original entrance to Building 1001, and a new entrance and lobby were designed in conjunction with Building 10031. However, it should be noted that the entrance and lobby were technically considered part of Building 1001, rather than Building 10031. The new entrance provided access to Buildings 1001, 1002, 1003, and 1004. The first two stories featured parking spaces, and a concrete ramp appended to the west façade provided access to the second story. The third story housed space to provide satellite support (King/Reif and Associates/NAVFAC, December 18, 1981a-d).

In 1982, Rasmussen Ingle Anderson prepared plans for construction of a new building under the auspices of NAVFAC Western Division. The plan entitled "Alter Satellite Control Facility, Site Plan, Grading, Drainage, and Parking," featured in the graphic documentation section of this report, depicts Building 10032, a three-story, rectangular-plan building, appended to the west façade of Building 1003 by two hyphens, although only one hyphen was ultimately constructed. Similar to Building 10031, Building 10032 also featured two stories of parking space, with the second-story accessible via Building 10031. The third story housed space to provide satellite support. Buildings 10031 and 10032 were operational by 1984 (Rasmussen Ingle Anderson/NAVFAC, October 29, 1982a-c).

In 1984, Building 1025, located between Buildings 1001 and 1004 was constructed to serve as an armory.

In 1992, an addition was appended to the south façade of Building 1004, and the exterior of Building 1002 was renovated. In addition, the interiors of all six buildings have been repeatedly reconfigured times since their original construction.

The two non-contributing resources, Buildings 1015 and 1025, were constructed in 1974 and 1984, respectively. Building 1015 is located between Buildings 1001 and 1003, and Building 1025 is located between Building 1001 and 1004.

In addition, between 1971-97, twenty-two support buildings and structures were constructed outside the National Register boundary of the historic district.

3. Current Features and Appearance

The U.S. Air Force Satellite Test Center Historic District features six interconnected contributing buildings (Buildings 1001, 1002, 1003, 1004, 10031, and 10032) and two non-contributing buildings (Buildings 1015 and 1052) situated on the 23-acre Onizuka AFS installation.

The current appearance of the installation is similar to its appearance following construction of Buildings 10031 and 10032 in 1984. However, Building 1002's exterior was renovated in 1990, including replacement of fenestration and application of EIFS.

PART III: SOURCES OF INFORMATION

A. Architectural Drawings

Original plans on file in Building 1002, Civil Engineering Office, Onizuka AFS, Sunnyvale, California. Where applicable, the numbers following the plans in parentheses correspond to the Onizuka AFS Drawing Number Log.

Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD. December 13, 1965a. "Interim Expansion Partial Floor Plan A." (1412)

Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD. December 13, 1965b. "Interim Expansion Partial Floor Plan B." (1413)

Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD. December 13, 1965c. "Interim Expansion Partial Floor Plan C." (1414)

Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD. December 13, 1965d. "Interim Expansion Partial Floor Plan D." (1415)

C.F. Braun & Company/NAVFAC/SAMSO. December 23, 1966. "Satellite Test Annex, Site Development, STC Area, Limits of Demolition." (976)

C.F. Braun & Company/NAVFAC/SAMSO. 1967. "STC Building Addition, Plot Plan." November 14, 1967. (1505)

C.F. Braun & Company/NAVFAC/SAMSO. August 12, 1968a. "Power Plant First Floor Plan, Interior Elevations, and Reflected Ceiling Plan." (862)

C.F. Braun & Company/NAVFAC/SAMSO. August 12, 1968b. "Power Plant Second Floor Plan, Interior Elevations, and Reflected Ceiling Plan." (863)

C.F. Braun & Company/NAVFAC/SAMSO. August 12, 1968c. "Power Plant Exterior Elevation and Section (South and West)." (865)

C.F. Braun & Company/NAVFAC/SAMSO. August 12, 1968d. "Power Plant Exterior Elevation and Section (North and East)." (866)

Holmes & Narver, Inc. August 14, 1987. "Alter Mission Control Center, Building 1003, 3rd Floor."

Kaiser Engineers/U.S. Air Force SSD. January 15, 1962a. "Addition to Satellite Test Annex: First Floor Plan." (1484)

Kaiser Engineers/U.S. Air Force SSD. January 15, 1962b. "Addition to Satellite Test Annex: Second Floor Plan." (1485)

Kaiser Engineers/U.S. Air Force SSD. January 15, 1962c. "Addition to Satellite Test Annex: Plot Plan." (1482)

Kaiser Engineers/U.S. Air Force SSD. October 17, 1962. "Modification to Satellite Test Annex: Primary Feeder & Power." (1327)

Keller & Gannon/SAMSO. May 5, 1975. "Satellite Test Center, Testing Laboratory, Addition, Building 1004, Elevations."

Keller & Gannon/SAMSO. September 24, 1975. "Satellite Test Center, Building 1001 Alterations Floor Plan & Demolition."

Keller & Gannon/SAMSO. July 29, 1977. "Satellite Test Center, Re-roofing Building 1001, Photos of Existing Conditions."

King/Reif and Associates/NAVFAC. December 18, 1981a. “Mission Control Complex: Ground Parking Plan – Level 1 & Lobby.” (520)

King/Reif and Associates/NAVFAC. December 18, 1981b. “Mission Control Complex: Parking Plan – Level 2.” December 18, 1981. (521)

King/Reif and Associates/NAVFAC. December 18, 1981c. “Mission Control Complex: Computer Floor Plan – Level 3.” (522)

King/Reif and Associates/NAVFAC. December 18, 1981d. “Mission Control Complex: Building Elevations.” (524)

Maher & Martens/USACE Sacramento District. May 7, 1964a. “Addition to Satellite Test Annex First Floor Plan and Miscellaneous Details.” (1857)

Maher & Martens/USACE Sacramento District. May 7, 1964b. “Satellite Test Annex Addition Second Floor and Roof Plans.” (1858)

Martin Marietta Space Systems Facilities. April 30, 1990. “MCC XI Modification Overall Plan.”

Ralph M. Parsons Company/AFBMD. March 6, 1959a. “Development Control Center, Site and Vicinity Plan.” (1095)

Ralph M. Parsons Company/AFBMD. March 6, 1959b. “Development Control Center, Plot and Utility Plan.” (1096)

Ralph M. Parsons Company/AFBMD. August 21, 1959. “Development Control Center Increment Two, Plot, Utility, and Grading Plan, South Area.” (1253)

Ralph M. Parsons Company/AFBMD. May 31, 1960. “Satellite Test Center Modifications, Interior Elevations.” (1301).

Rasmussen Ingle Anderson/NAVFAC. October 29, 1982a. “Alter Satellite Control Facility: First Floor Plan.” (655)

Rasmussen Ingle Anderson/NAVFAC. October 29, 1982b. “Alter Satellite Control Facility: Second Floor Plan.” (656)

Rasmussen Ingle Anderson/NAVFAC. October 29, 1982c. “Alter Satellite Control Facility: Third Floor Plan.” (657)

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B. Historic Views

Recent and historic photographs housed are at Onizuka AFS, and are reproduced in this report. These include:

Building 1001, Aerial View, ca. 1959.

Building 1001, 1968.

Building 1001 Entrance, ca. 1962.

Satellite Test Center, Aerial View, ca. 1962.

Building 1002 During Construction, ca. 1962.

Building 1003 Construction Photos, 1968.

Building 1004 Construction Photos, 1969.

Satellite Test Center, ca. 1975.

Solar Control Consoles, Building 1004, 1970.

Onizuka AFS, Aerial View, ca. 1996.

Satellite Schedulers at Onizuka AFS, ca. 1990.

C. Interviews

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E. Likely Sources Not yet Investigated

This report provides a comprehensive record of the historical development of the U.S. Air Force Satellite Test Center, including Buildings 1001, 1002, 1003, 1004, 10031, and 10032 from the inception of the installation in 1959 through its closing ceremony in 2010. Additional research could be conducted on the history of the buildings, as well as the history of the Corona Program, and other reconnaissance programs associated with the installation. Possible repositories to be consulted include the The National Archives and Records Administration, College Park, Virginia; Maxwell AFB, Montgomery, Alabama; Peterson Air and Space Museum, Peterson AFB, Colorado Springs, Colorado; and Schriever AFB, El Paso County, Colorado.

PART IV. PROJECT INFORMATION

Onizuka AFS is slated for disposal and reuse in accordance with the federal Defense Base Closure and Realignment Act (DBCRA) of 1900, commonly known as Base Realignment and Closure (BRAC). In 2005, the installation was selected for closure through the BRAC process. In 2009, the California State Historic Preservation Office (SHPO) concurred with the U.S. Air Force Center for Engineering and the Environment (AFCEE) that six buildings at the installation (Buildings 1001, 1002, 1003, 1004, 10031, and 10032) contribute to the National Register-eligible U.S. Air Force Satellite Test Center Historic District. The district is significant at a national, state, and local level under Criterion A for its associations with satellite reconnaissance during the Cold War, and Criteria Consideration G, because five of the six buildings are not yet fifty years old, and have exceptional importance for their associations with satellite reconnaissance during the Cold War.

In accordance with Section 106 of the National Historic Preservation Act (NHPA) (36 CFR Part 800), AFCEE and the CA SHPO concur that the transfer of the installation out of federal hands will constitute an adverse effect to the district. To partially mitigate the adverse effect, AFCEE and the CA SHPO have agreed that a Historic American Building Survey (HABS) Level II-type Documentation should be prepared on the U.S. Air Force Satellite Test Center Historic District. This overview report and associated reports on the six contributing resources fulfills this obligation.

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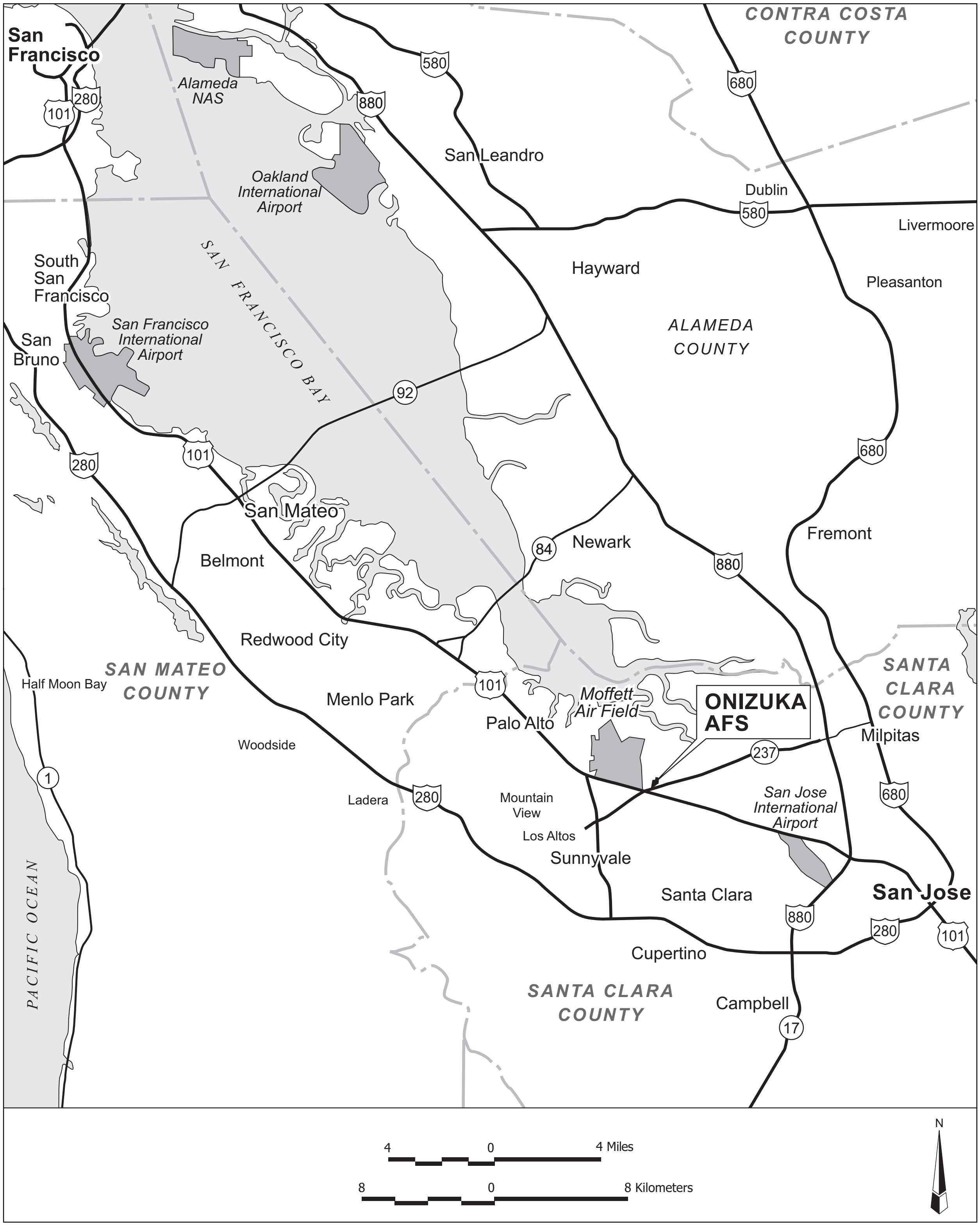
	Allison S. Rachleff
Titles:	Architectural Historian
	Senior Architectural Historian
Affiliation:	AECOM under contract to AFCEE
	Contract Number: FA8903-08-D-8770
Date:	September 2010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San Francisco International Airport
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ONIZUKA AFS
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Milpitas
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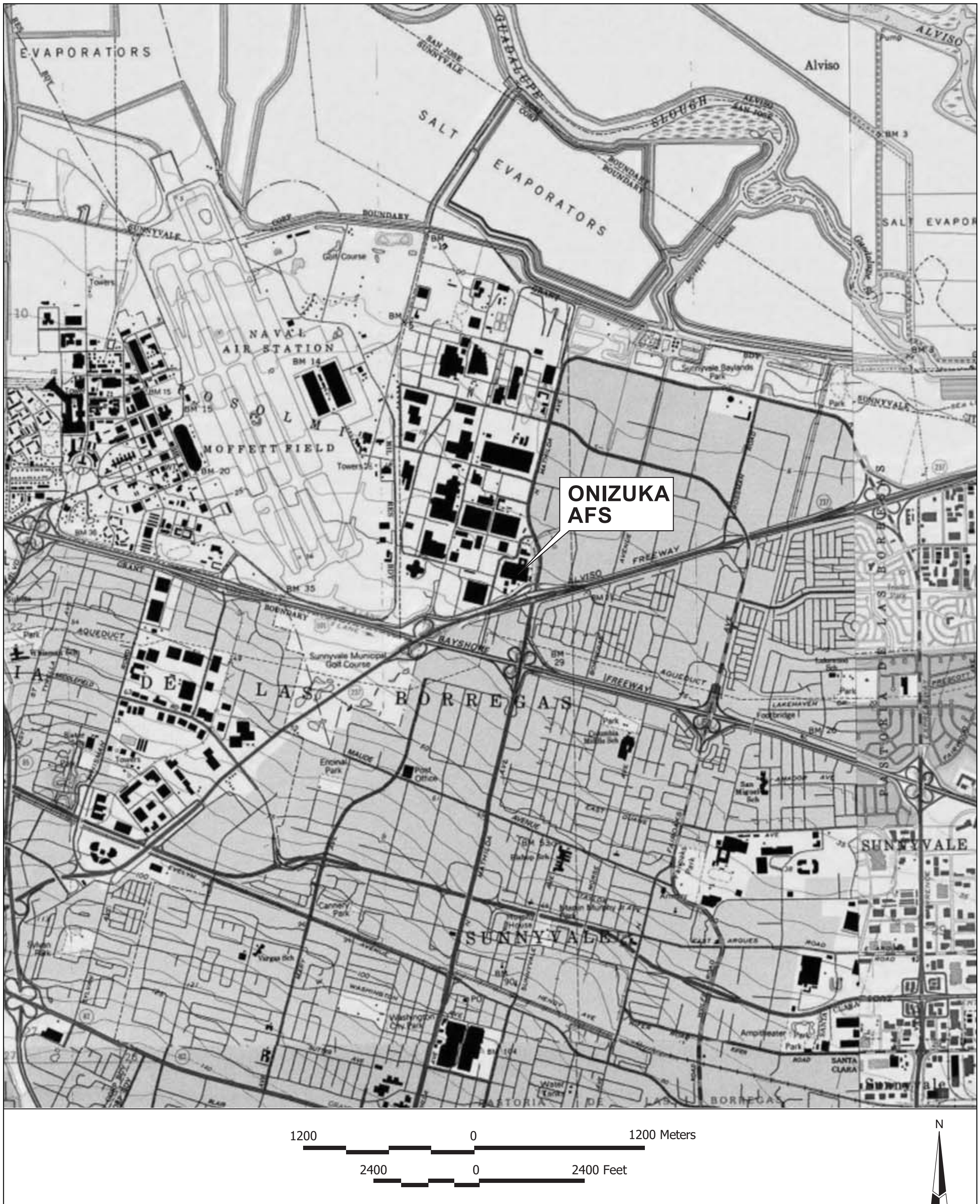
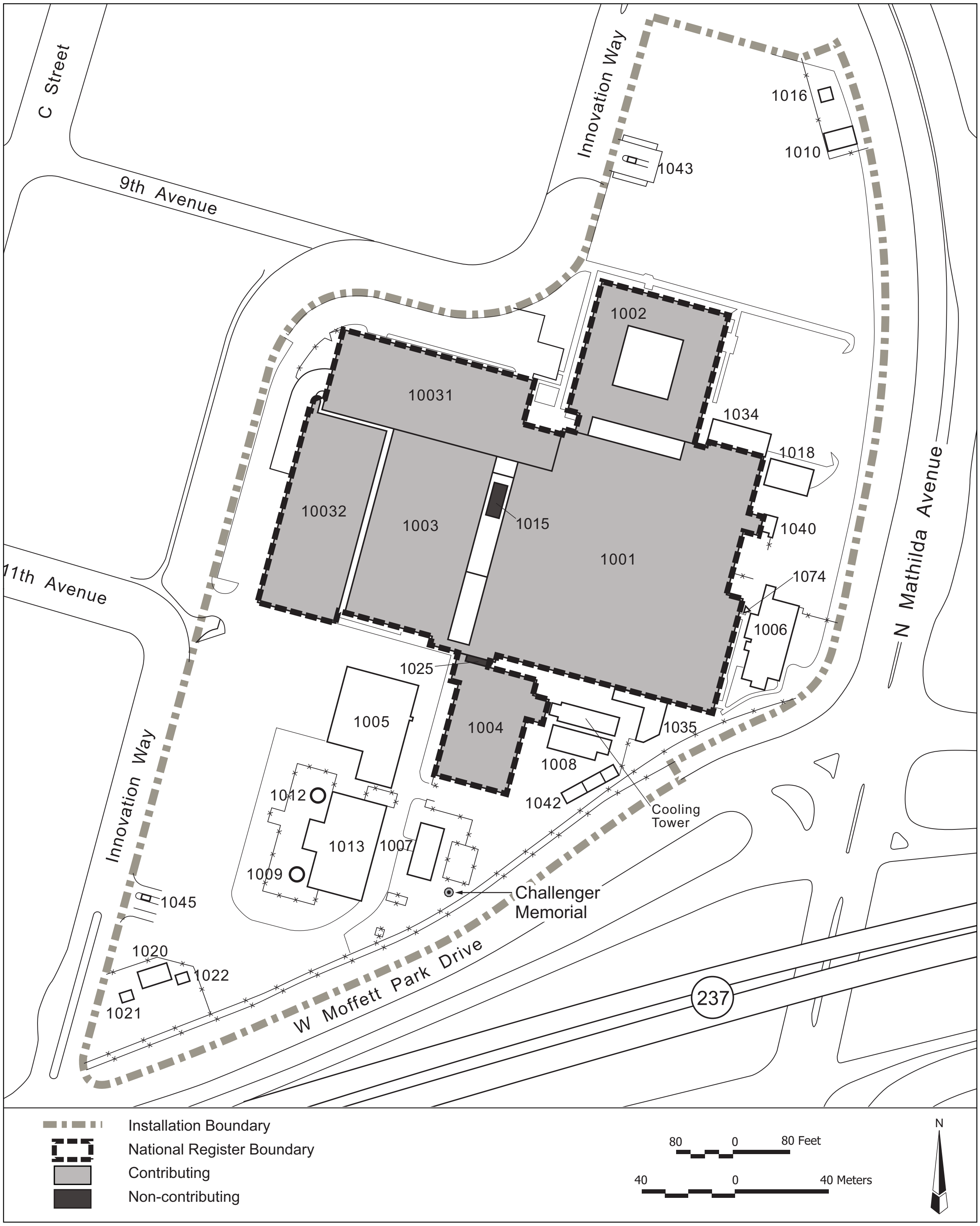


Map Source: USGS Mountain View Quadrangle (1997); USGS Milpitas Quadrangle (1979); USGS Cupertino Quadrangle (1991); USGS San Jose West Quadrangle (1961).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1004
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1008
Cooling Tower
1042
1012
1013
1007
1009
Challenger Memorial
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1020
1022
1021
Installation Boundary
National Register Boundary
Contributing
Non-contributing
80
0
80 Feet
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0
40 Meters
N

Aerial view of Building 1001, ca. 1959.

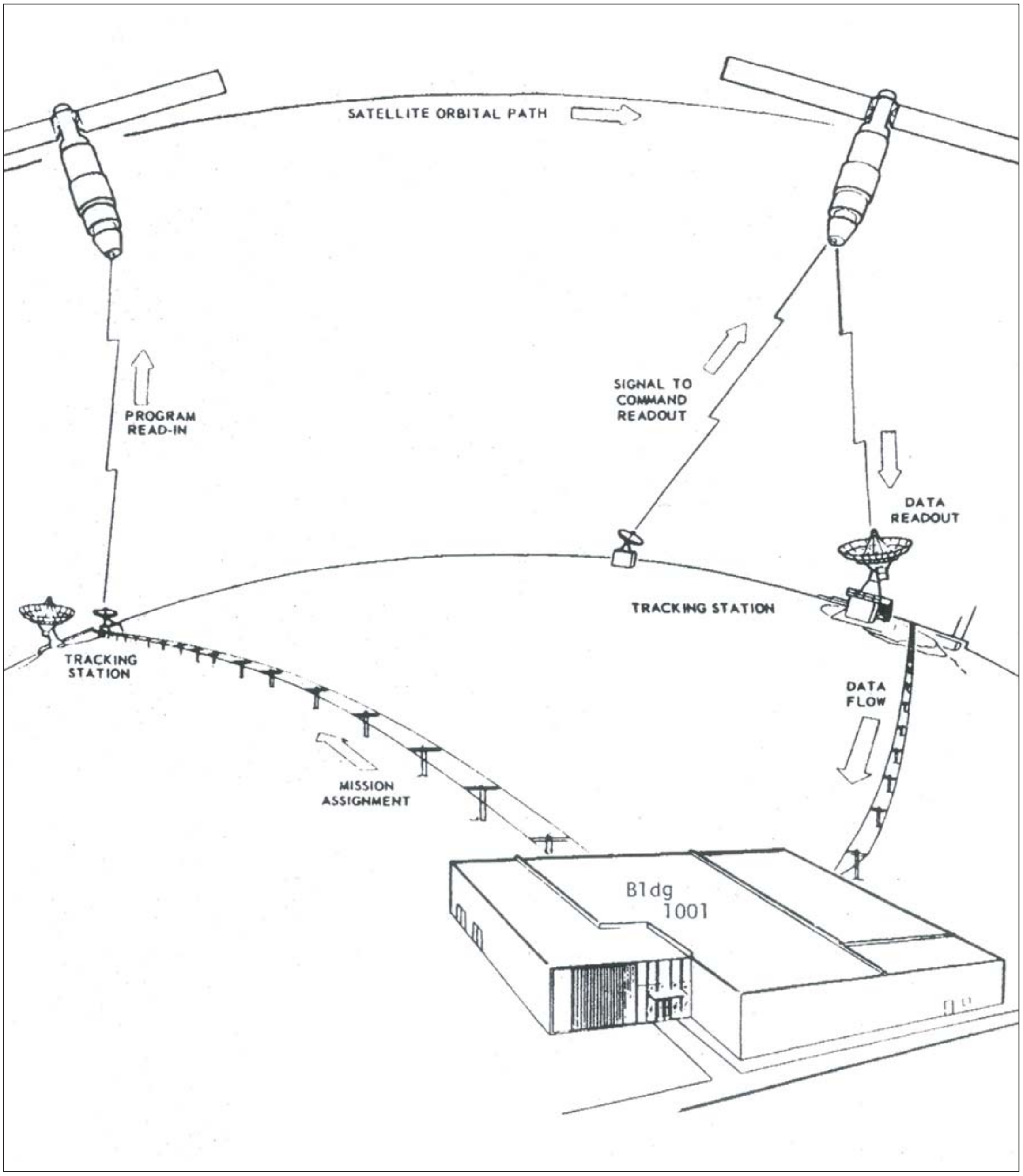
Source: Onizuka AFS.

View looking southeast toward Building 1001 in 1968, prior to construction of Buildings 1003 and 1004.

Source: Onizuka AFS.

View looking east toward original entrance to Building 1001, ca. 1971.

Source: Onizuka AFS.



Relationship between Building 1001, tracking stations, and satellites.

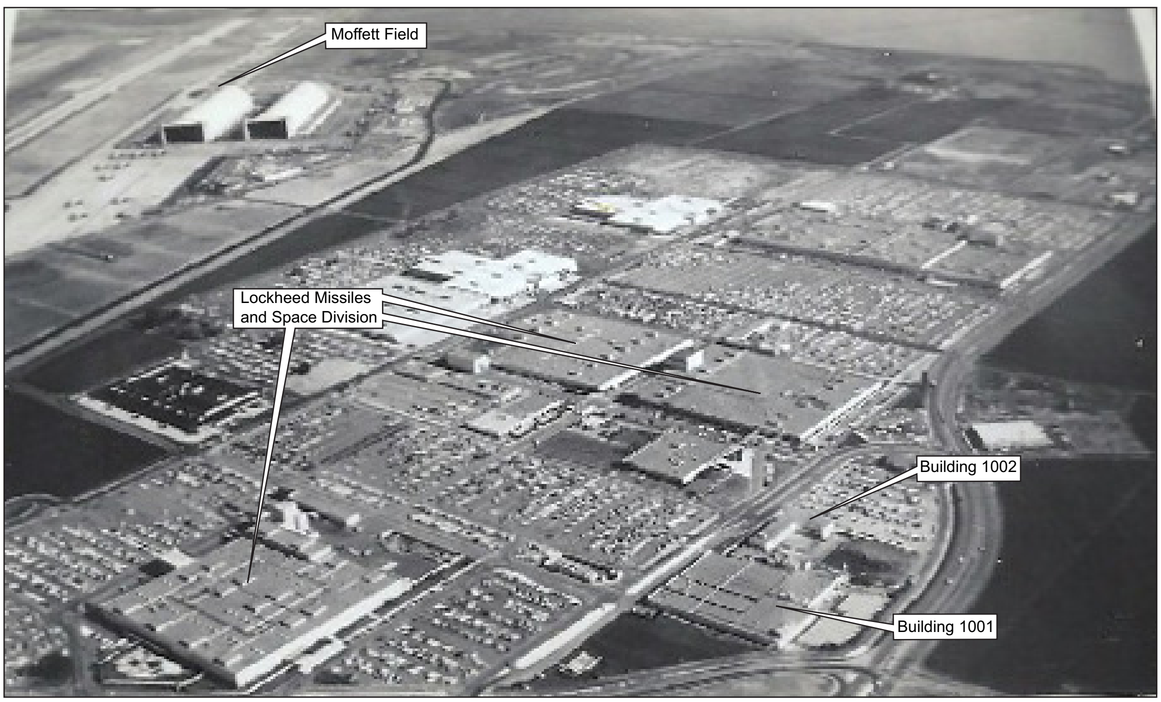
Source: Jernigan, 1983.

View of the Satellite Control Room in Building 1001, ca. 1961.

Source: Fedor, et. al., 2006.

President Eisenhower inspecting Discoverer XIII's Satellite Recovery Vehicle, August 1960.

Source: Dwight D. Eisenhower Presidential Library and Museum Collection, 1960.

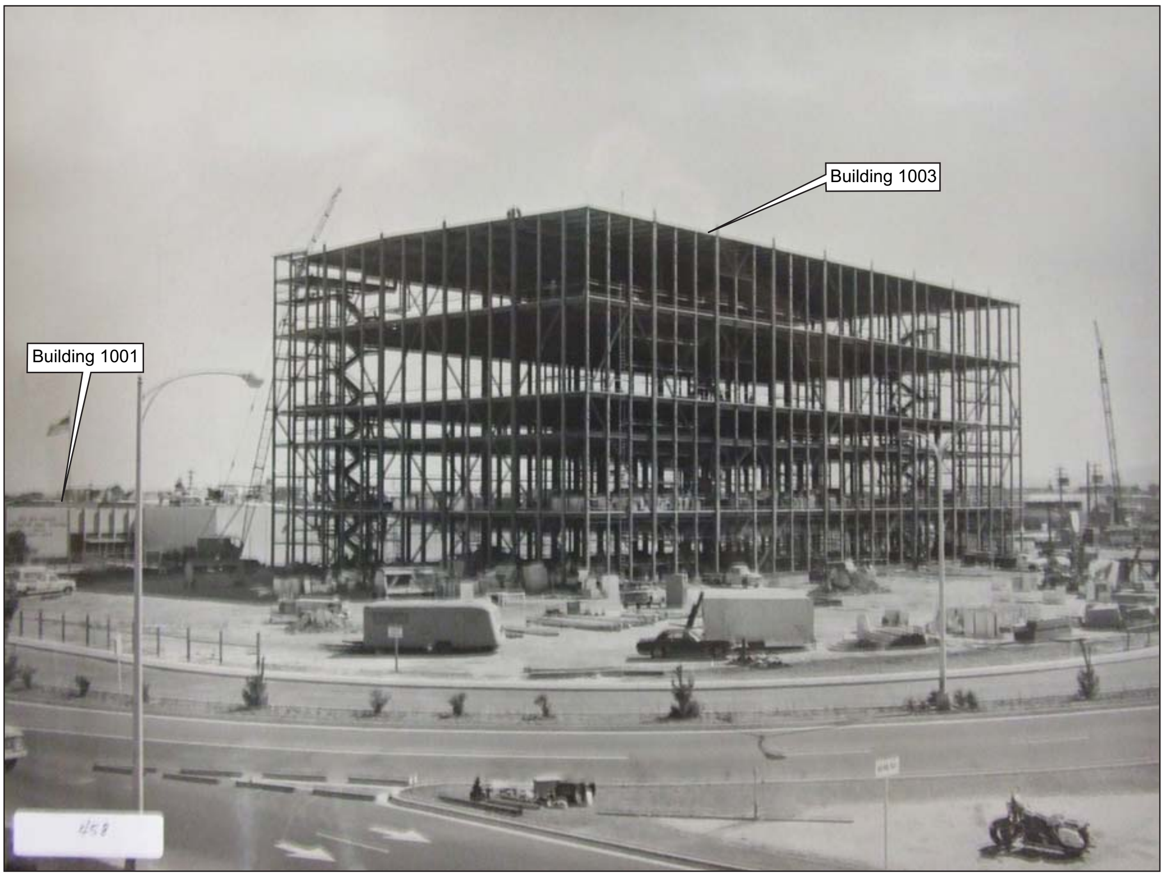


Aerial view of the U.S. Air Force Satellite Test Center, ca. 1962. Note Building 1001 and the original L-plan Building 1002 appended to the north.

Source: Onizuka AFS.

View of Building 1002 during construction, ca. 1962.

Source: Onizuka AFS.

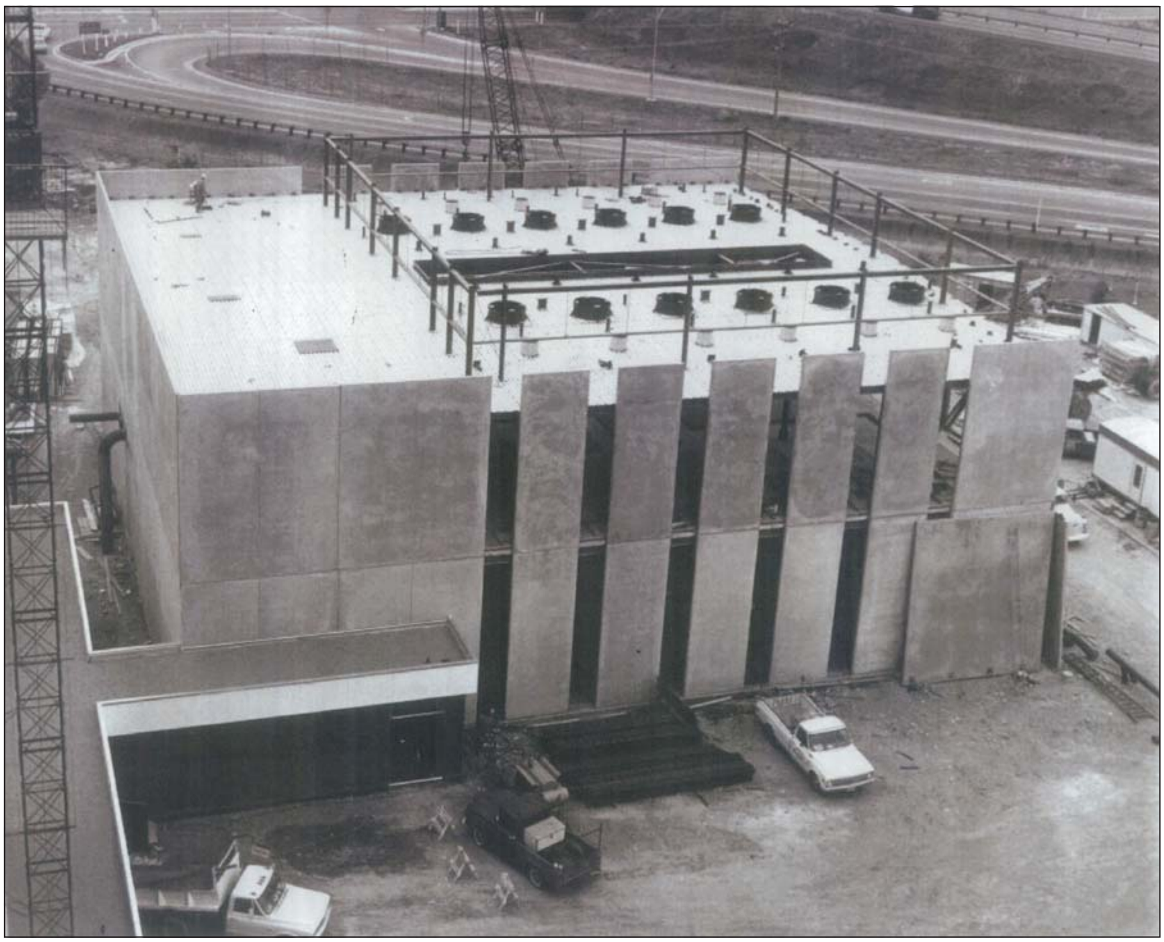


View looking southwest at installation, including Building 1003 under construction, 1968. Note Building 1001 in the background.

Source: Onizuka AFS.

View looking southwest toward Building 1003 during construction, 1968.

Source: Onizuka AFS.

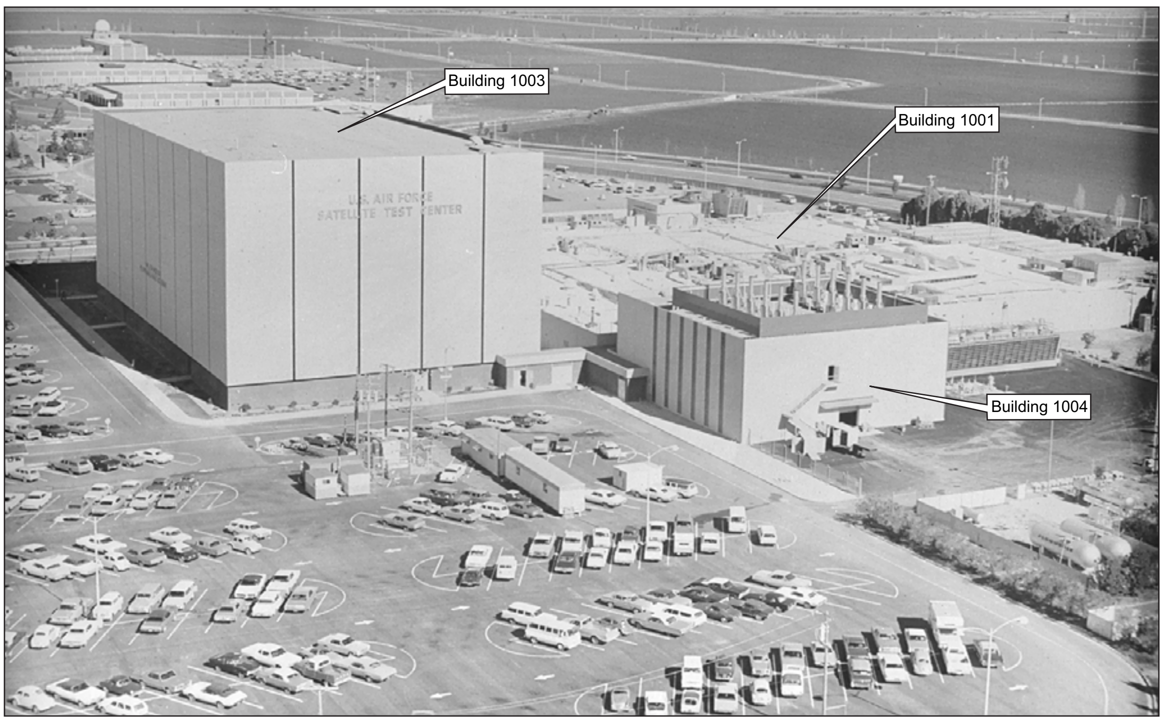


View looking southwest toward Building 1004 during construction, ca. 1969.

Source: Onizuka AFS.

Installation of Solar Saturn gas turbine generator sets in Building 1004, 1969.

Source: Onizuka AFS.

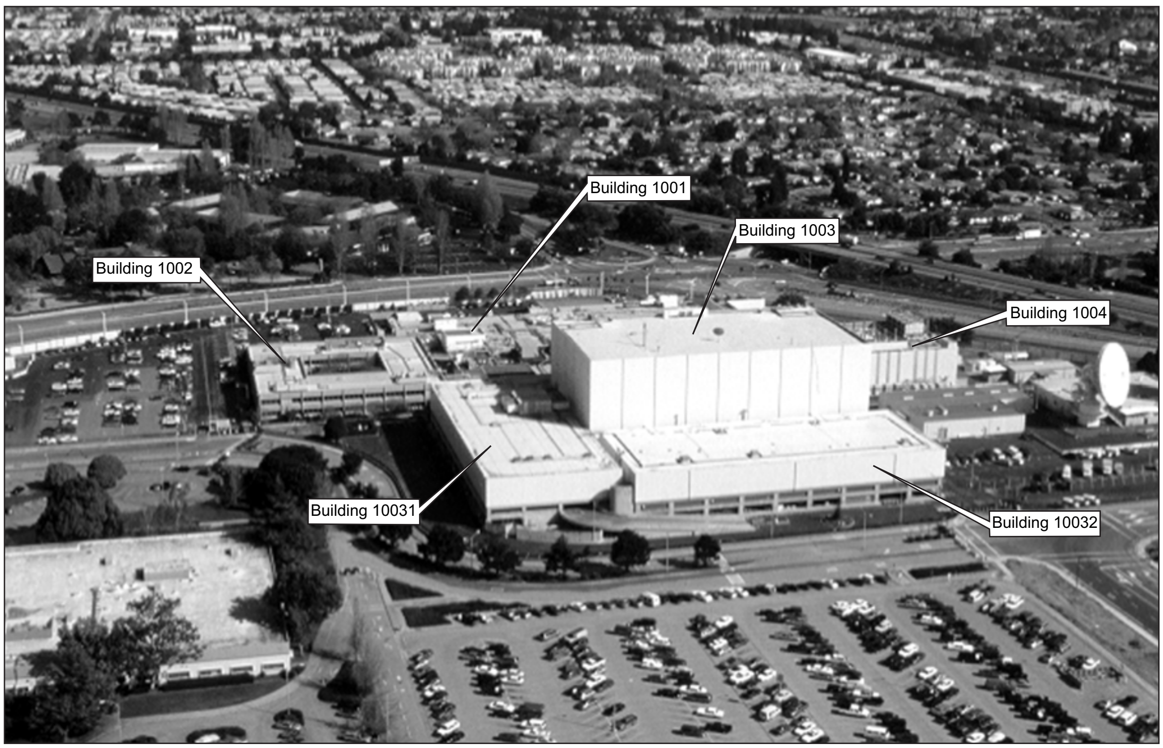


View looking northeast toward U.S. Air Force Satellite Test Center, ca. 1975.

Source: Onizuka AFS.

Solar Control Console in Building 1004 operated by Solar employees, 1970.

Source: Onizuka AFS.

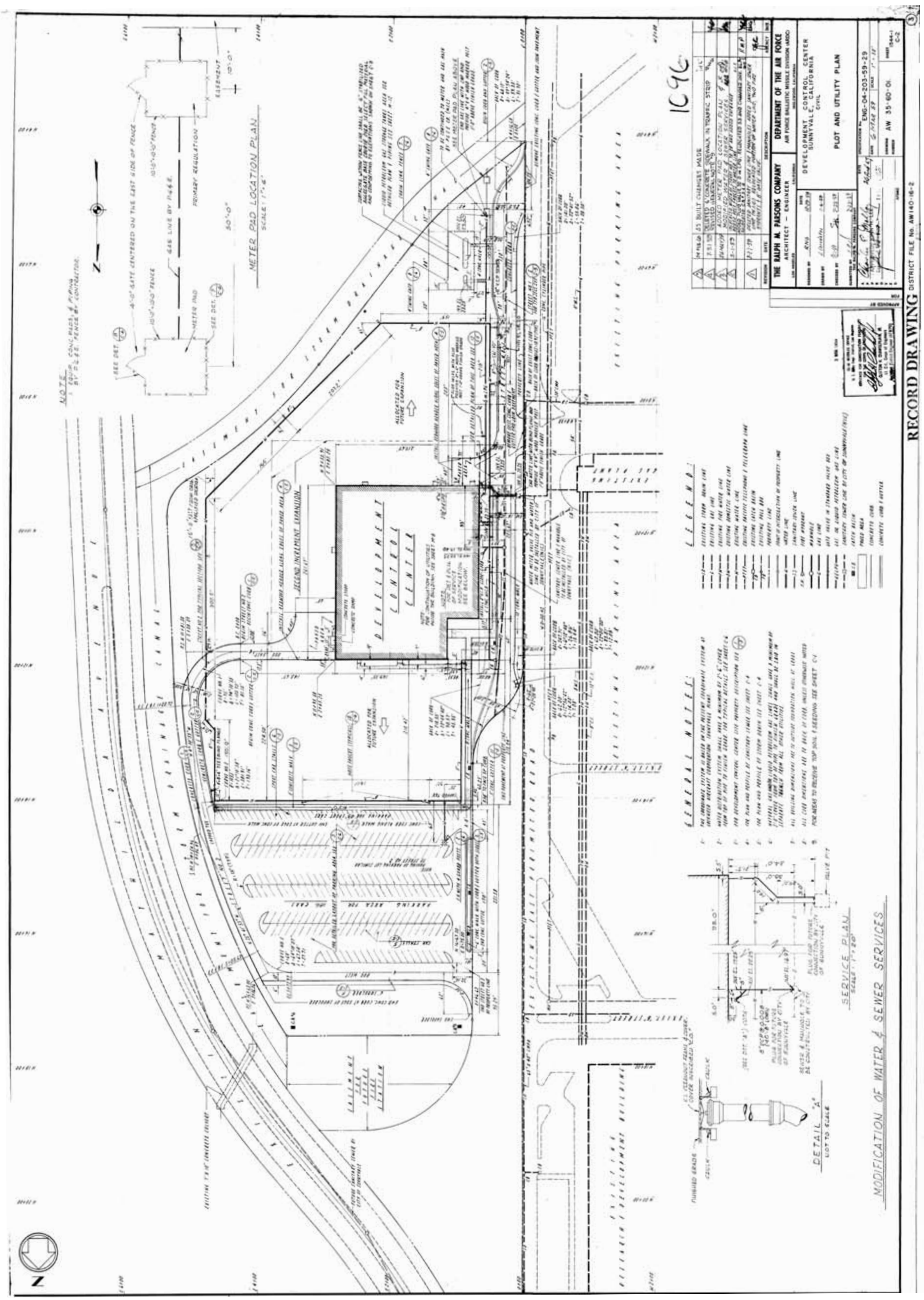


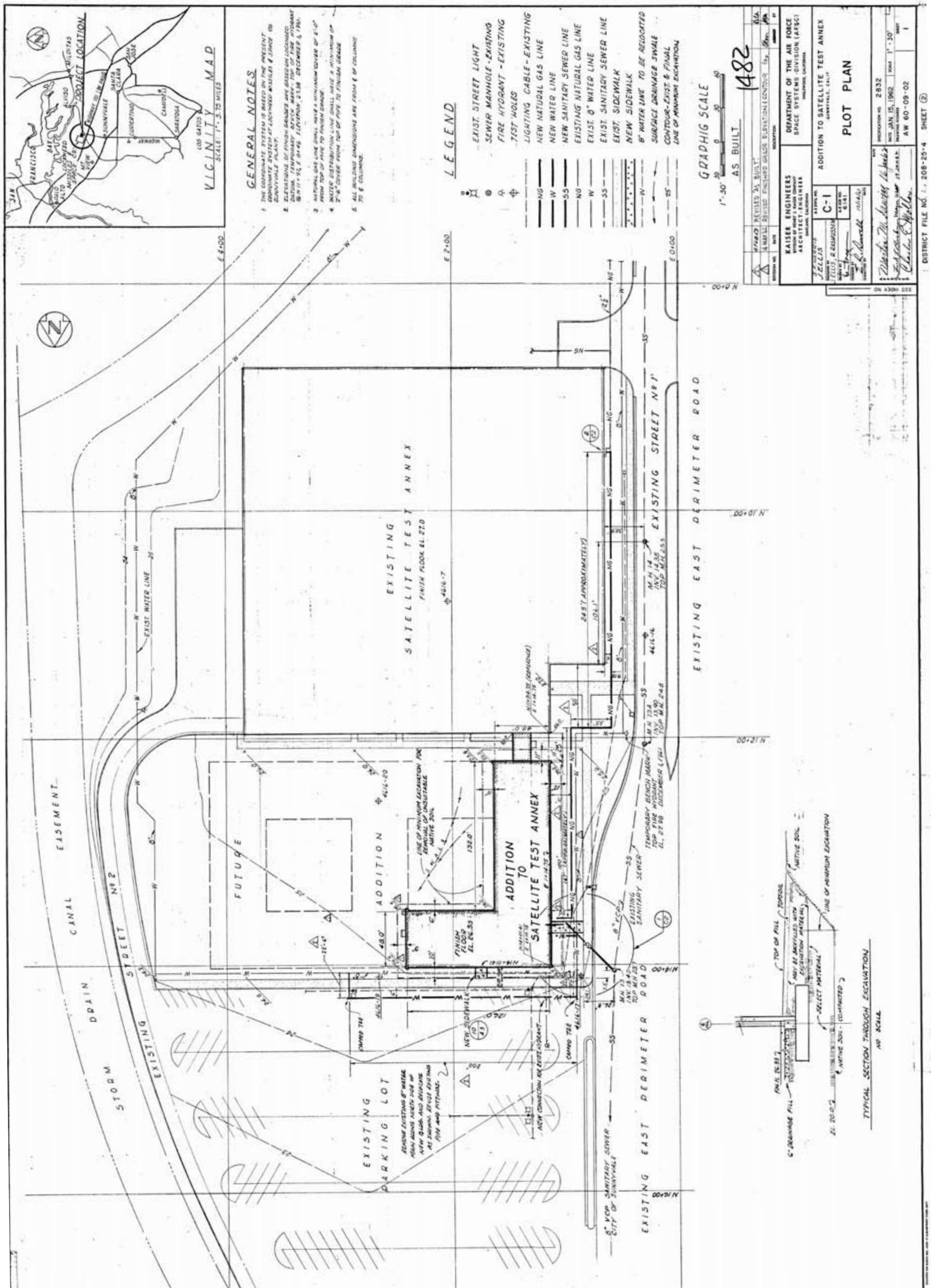
Aerial view of Onizuka AFS, ca. 1996.

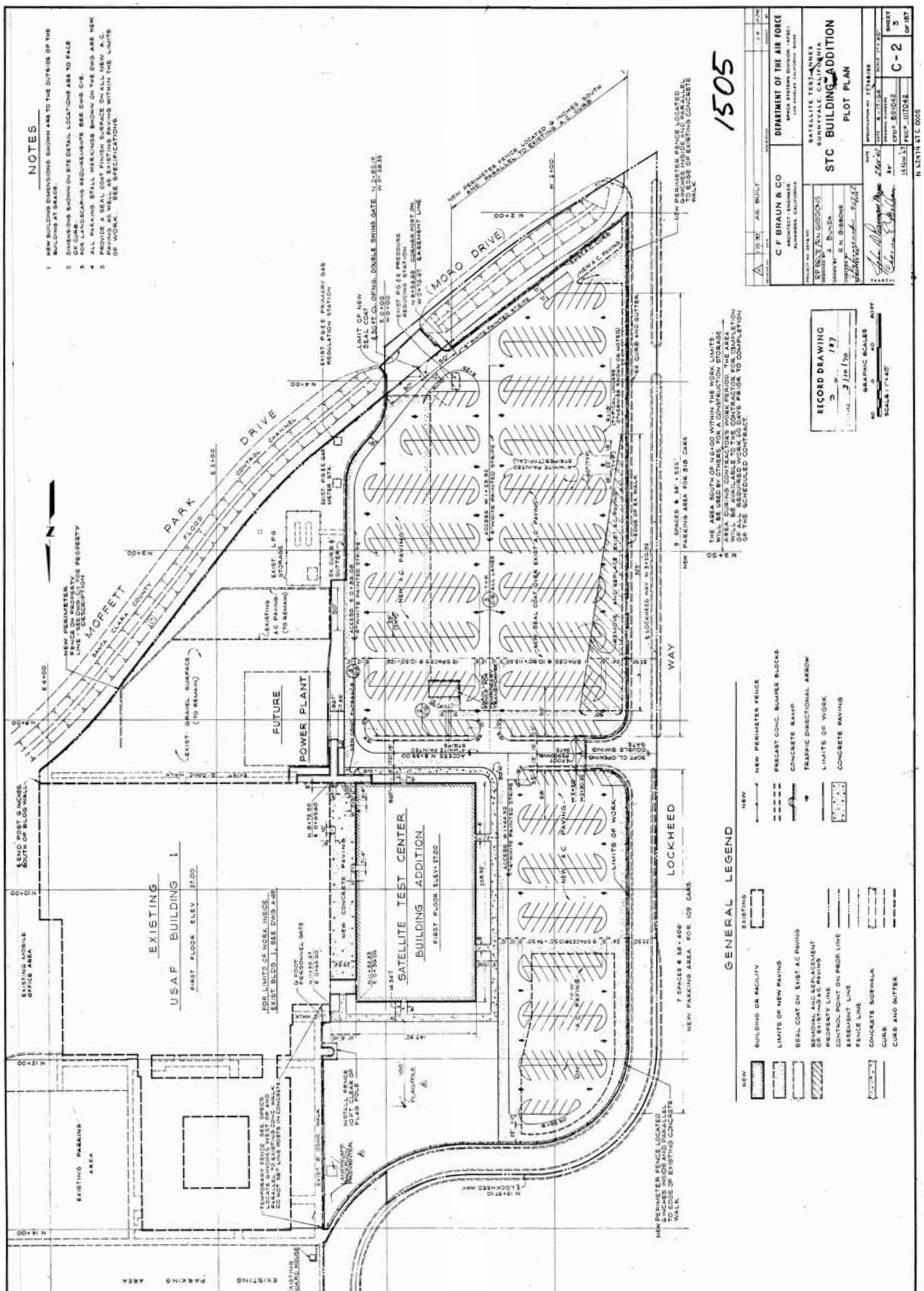
Source: Onizuka AFS.

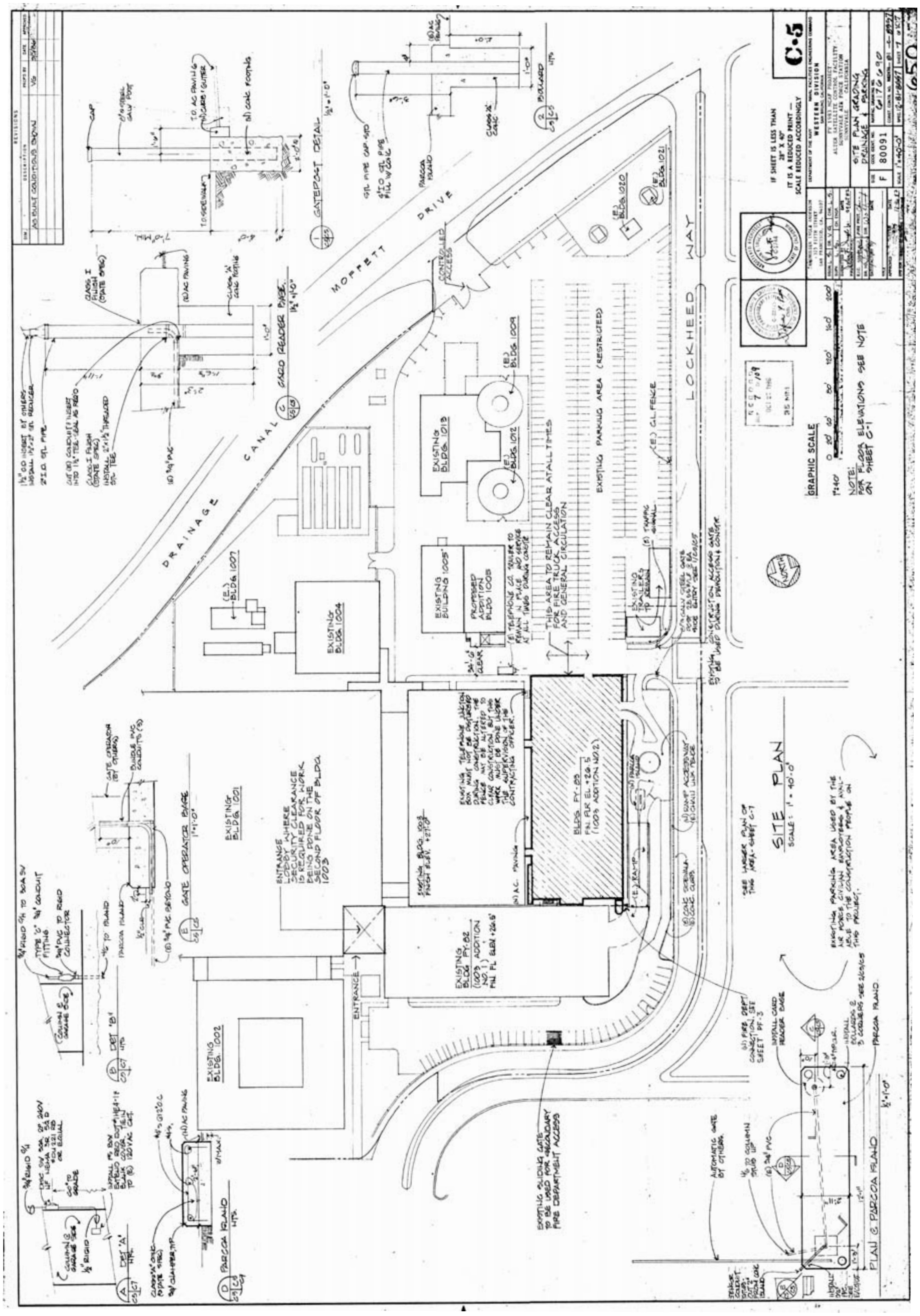
Satellite schedulers at Onizuka AFS, ca. 1990.

Source: Onizuka AFS.


RECORD DRAWING


VICINITY MAP
PROJECT LOCATION
GENERAL NOTES
LEGEND
GRAPHIC SCALE
AS BUILT
482
KAISER ENGINEERS
DEPARTMENT OF THE AIR FORCE
SPACE SYSTEMS DIVISION (AFSC)
ADDITION TO SATELLITE TEST ANNEX
PLOT PLAN
C-1
EXISTING SATELLITE TEST ANNEX
ADDITION TO SATELLITE TEST ANNEX
FUTURE ADDITION
EXISTING PARKING LOT
EXISTING STREET No 2
EXISTING STREET No 1
STORM DRAIN CANAL EASEMENT
EXISTING EAST PERIMETER ROAD
TYPICAL SECTION THROUGH EXCAVATION
NO SCALE


NOTES
MOFFETT PARK DRIVE
MORO DRIVE
LOCKHEED WAY
EXISTING USAF BUILDING 1
SATELLITE TEST CENTER BUILDING ADDITION
FUTURE POWER PLANT
GENERAL LEGEND
RECORD DRAWING
STC BUILDING ADDITION PLOT PLAN
C-2
1505


SITE PLAN
SCALE: 1" = 40'-0"
LOCKHEED WAY
MOFFETT DRIVE
DRAINAGE CANAL
EXISTING BLDG. 1001
EXISTING BLDG. 1002
EXISTING BLDG. 1004
EXISTING BLDG. 1013
EXISTING PARKING AREA (RESTRICTED)
GRAPHIC SCALE
C-5

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U.S. AIR FORCE SATELLITE TEST CENTER
(Onizuka Air Force Station)
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Log No.USAF041221A

SECTION II

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HISTORIC AMERICAN BUILDING SURVEY
LEVEL II-TYPE DOCUMENTATION

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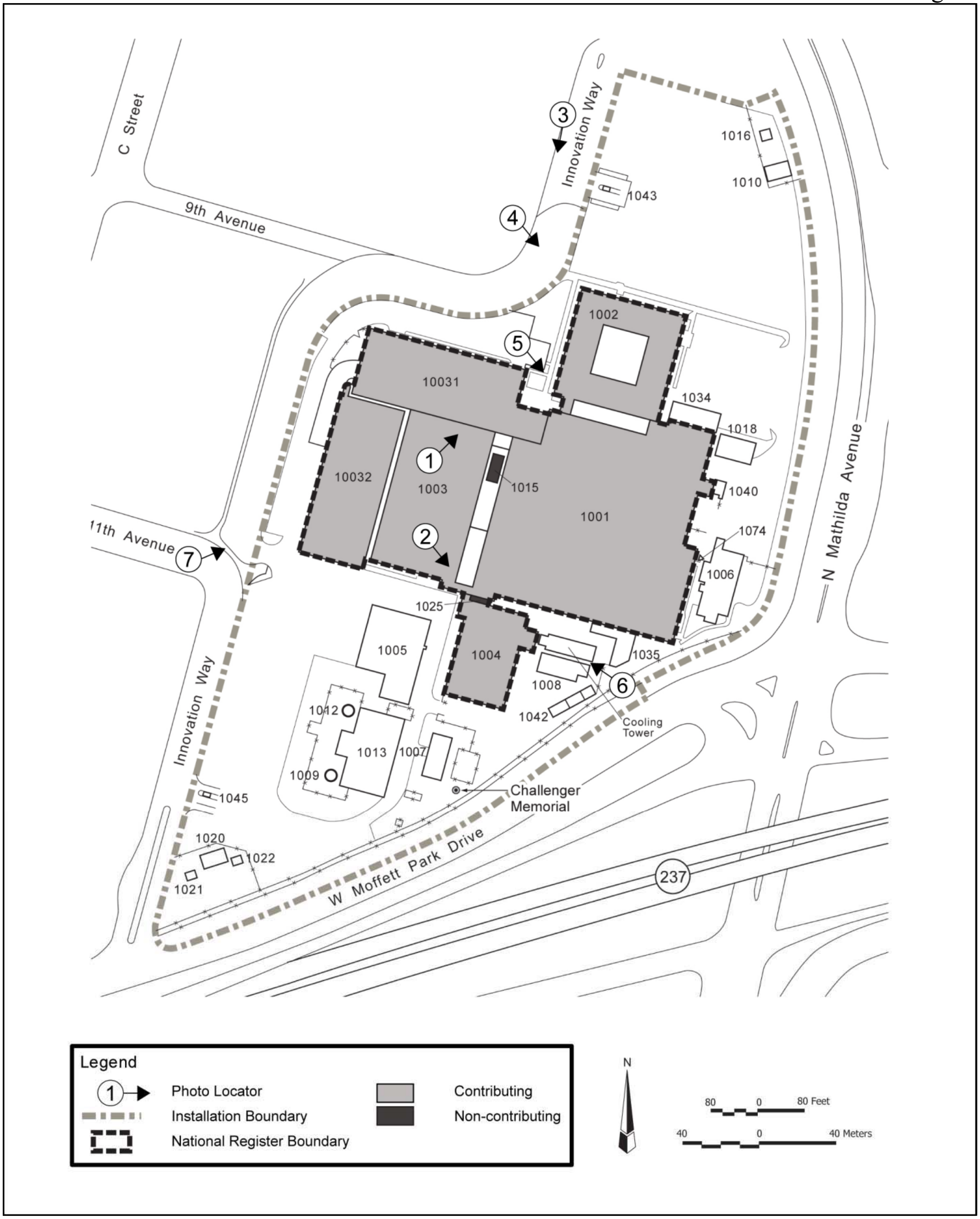
U.S. AIR FORCE SATELLITE TEST CENTER (Onizuka Air Force Station) 1080 Innovation Way City of Sunnyvale Santa Clara County California	Log No. USAF041221A
Anne Jennings, Photographer	Date of Photographs: June 7-14, 2010
Log No. USAF041221A-01	VIEW OF BUILDING 1002 AND AREA SURROUNDING INSTALLATION FROM ROOF OF BUILDUING 1003, LOOKING NORTHEAST.
Log No. USAF041221A-02	VIEW OF BUILDING 1004 AND AREA SURROUNDING INSTALLATION FROM ROOF OF BUILDING 1003, LOOKING SOUTHEAST.
Log No. USAF041221A-03	VIEW OF BUILDING 10031 (FOREGROUND), BUILDING 1003 (BACKGROUND), AND INSTALLATION ENTRANCE (LEFT) FROM INNOVATION WAY, LOOKING SOUTH. NOTE CONCRETE PLANTERS THAT PROHIBIT VEHICULAR TRAFFIC.
Log No. USAF041221A-04	VIEW OF BUILDING 1002 (LEFT) AND INSTALLATION ENTRANCE (RIGHT) FROM INNOVATION WAY, LOOKING SOUTHEAST.
Log No. USAF041221A-05	VIEW OF BUILDING 1001'S MAIN ENTRANCE FROM SECOND STORY OF BUILDING 10031, LOOKING EAST.
Log No. USAF041221A-06	VIEW OF BUILDING 1004 (RIGHT FOREGROUND) AND BUILDING 1003 (LEFT BACKGROUND) LOOKING WEST.

Log No. USAF041221A-07	VIEW OF BUILDING 10032 (FOREGROUND) AND BUILDING 1003 (BACKGROUND) FROM INNOVATION WAY AND 11TH AVENUE, LOOKING NORTHEAST. NOTE CONCRETE PLANTERS WHICH PROHIBIT VEHICULAR TRAFFIC.


C Street
Innovation Way
9th Avenue
11th Avenue
N Mathilda Avenue
W Moffett Park Drive
237
1016
1010
1043
1002
10031
10032
1003
1015
1001
1034
1018
1040
1074
1006
1025
1005
1004
1035
1008
1042
Cooling Tower
1012
1013
1007
1009
Challenger Memorial
1045
1020
1022
1021
Legend
Photo Locator
Installation Boundary
National Register Boundary
Contributing
Non-contributing
N
80 0 80 Feet
40 0 40 Meters


ONIZUKA AIR FORCE STATION


DANGER
FUEL STORAGE
NO SMOKING

U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 1001
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Log No. USAF041221A-A

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

PHOTOGRAPHS

California Office of Historic Preservation
1416 9th Street, Room 1442
Sacramento, CA 95814

FOR OFFICIAL USE ONLY

U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 1001
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Log No.USAF041221A-A

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HISTORIC AMERICAN BUILDING SURVEY
LEVEL II-TYPE DOCUMENTATION

U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 1001

Log No. USAF041221A-A

A. **Location:** Building 1001, Onizuka Air Force Station
1080 Innovation Way, Sunnyvale, Santa Clara County, California

B. **Significance:** Building 1001, constructed in 1959 to support reconnaissance satellites, is a contributing resource to the National Register-eligible U.S. Air Force Satellite Test Center Historic District. The district is significant at a national, state, and local level under Criterion A for its associations with satellite reconnaissance during the Cold War, and Criteria Consideration G, because five of the six buildings, excluding Building 1001, are not yet fifty years old, and have exceptional importance for their associations with satellite reconnaissance during the Cold War.

The U.S. Air Force Satellite Test Center Historic District is significant at the national level for its association with satellite reconnaissance during the Cold War. The installation was established in 1959 to serve as the command-and-control center for the first reconnaissance satellite program, the Corona Program. It was developed by the U.S. Air Force and the Central Intelligence Agency (CIA), with assistance from a private contractor, Lockheed Missiles and Space Division. Shortly thereafter, the National Reconnaissance Office (NRO) was established to provide oversight of the program and develop other satellite programs. As new satellite technologies emerged, such as communications, early missile warning, meteorology, navigation, and nuclear detonation detection, additional buildings were constructed. These satellite programs provided valuable data throughout the Cold War, and were supported from the U.S. Air Force Satellite Test Center Historic District, including Building 1001. Although many of the satellite programs remain classified, it is apparent through the continued presence of the NRO that the installation played a key role in the United States' conduct of the Cold War.

The U.S. Air Force Satellite Test Center Historic District is also significant at the state and local levels for its association with the development of California as a leader in technological innovations. California, and specifically the City of Sunnyvale in Silicon Valley, began to emerge as a leading technological center during the Cold War. This was due, in part, to the military's investment in the development of defense technologies in California, such as command and control of reconnaissance satellites at Onizuka (AFS). The presence of Lockheed Missiles and Space Division in Sunnyvale in the mid-1950s, followed by Onizuka AFS in the late 1950s, burnished its reputation as a high-technology center. The district's period of significance extends from 1959, the date of construction of Building 1001, through 1991, the conclusion of the Cold War.

C. Description:

1. <u>Current Description</u>

Building 1001 was constructed in 1959 to serve as the command-and-control center for reconnaissance satellites. It is a single-story, irregular-plan, windowless, utilitarian steel-frame building sheathed in pre-cast concrete panels. It sits atop a concrete-pile foundation, and is capped by a flat built-up asphalt roof. Multiple mechanical penthouses and exposed mechanical equipment are situated on the roof.

The entry to Building 1001 occurs on the north façade in the west corner. It should be noted that this entry is not original to the building, and was constructed in 1984 as part of Building 10031, a three-story building which provided two stories of parking space and a single-story devoted to satellite operations. However, the entry is considered part of Building 1001, likely because the entrance to the installation historically occurred on the building. Therefore, the entry will be described in this section. It is two-stories high, and provides access to Buildings 1001, 1002, 1003, 1004, 10031, and 10032 through a high-ceiling lobby. The first story is recessed and is supported by four concrete columns. The façade and columns are clad in vertical metal siding. The entry features a double-glass door with wood handles flanked on the top and sides by floor-to-ceiling, glass-and-metal-panel windows. A section of the first-story façade west of the entry is clad in concrete, and is pierced by a single-metal door with no exterior hardware, set within metal surrounds. A metal sign that reads "Onizuka Air Force Station" is appended above the entry.

The majority of the exterior of Building 1001 has been obscured over time by the construction of additional buildings. Moving east from the entry, the central section of the north façade is obscured by Building 1002, and the eastern section is obscured by Building 1034. A small section of Building 1001's north façade is visible between Building 1002 and Building 1034, and is pierced by a metal garage door located behind a chain-link fence with vinyl privacy slats.

Moving from north to south, the east façade is pierced by a metal garage door, set within metal surrounds. It is accessed by a concrete ramp with four metal bollards. South of the garage door, the façade is pierced by a metal door with a metal handle and safety-glass panel window, set within a metal surround. It is accessed by a concrete ramp flanked by metal pipe railings. South of the doors, Building 1034 is appended to the façade. Beyond Building 1034, mechanical equipment partially enclosed behind rusticated concrete block walls obscures the façade. The mechanical equipment includes transformers connected by pipes to the façade. A double-metal-louvered door with no exterior hardware, set within a metal surround pierces the façade south of the mechanical equipment. The door is accessed by two concrete steps. A safety light is situated above the door. A large rectangular metal-louvered vent occurs south of the door.

An addition is appended to the east façade south of the vent. The north façade of the addition is pierced by a double-metal door, with no exterior hardware, set within a metal surround, accessed by two concrete steps. A safety light is situated above the door. The east façade of the addition is pierced by a single-metal door with no exterior hardware, set within a metal surround, accessed by three concrete steps; a rectangular metal-louvered vent; and double-metal-louvered doors with a metal doorknob, set within metal surrounds. The door is situated slightly below street-level, and is accessed by a downward-sloping concrete ramp, flanked by concrete-and-metal-pipe railings. Safety lights are situated above the three doors. Horizontal and vertically-oriented pipes are appended to the east façade.

The south façade is mostly obscured by Building 1035 and Building 1004. Pipes and other mechanical equipment are appended to the south façade.

The west façade is obscured by Building 1003 and Building 1015. The façade is pierced by a metal-louvered vent. A basketball hoop is appended to the façade, and gym wall pads are appended to a portion of the façade.

Building 1001 encompasses approximately 105,000 square feet. A current sketch plan is included in the Index to Photographs. Interior spaces within Building 1001 have been renovated as satellite technology evolved. A comparison of the original floor plans with the current floor plan indicates that the majority of the interior has been reconfigured. Not all areas within the building were accessible during the building survey conducted in June 2010. However, an inspection of select interior spaces, coupled with information included in the Onizuka AFS Drawing Number Log, indicate that most interior spaces, even in cases where they retain their original configuration, no longer retain their original function, features, or finishes.

2. <u>According to Original Plan</u>

Original plans of Building 1001 (Development Control Center) are on file in the Civil Engineering Office, Building 1002, Onizuka AFS, Sunnyvale, Santa Clara County, California. Original building plans were prepared in 1959 in two phases by the Ralph M. Parsons Company based in Los Angeles, California under the auspices of the U.S. Air Force Ballistic Missile Division (AFBMD) in Englewood, California. The following plans are featured in the graphic documentation section of the report:

- "Development Control Center, Floor Plan A" (Ralph M. Parsons Company/AFBMD, March 6, 1959b)

- "Development Control Center, Floor Plan B" (Ralph M. Parsons Company/AFBMD, March 6, 1959c)
- "Satellite Test Center Modification, Site and Vicinity Plan" (Ralph M. Parsons Company/AFBMD, May 31, 1960a)
- "Development Control Center, Elevations" (Ralph M. Parsons Company/AFBMD, March 6, 1959d)

In addition, historic photographs were also consulted to determine the original appearance of the building. A sampling of historic photographs of Building 1001 are reproduced in the graphic documentation section of the overview report entitled California State Historic Preservation Office, Historic American Building Survey Level II-Type Documentation, U.S. Air Force Satellite Test Center, Log No. USAF041221A.

Building 1001, the first building developed on the installation, was centrally located along the western boundary of the 11.43-acre installation. Plans for the building were prepared in two phases in March and August 1959. Plans dated March 6, 1959, entitled "Development Control Center, Plot and Utility Plan" depict the footprint of Building 1001 as a rectangular-plan building with a cut-out northwest corner (Ralph M. Parsons Company/AFBMD, March 6, 1959a). In addition, the plan indicates that two rectangular additions would be appended to the east and south facades to enlarge the building. Plans dated August 21, 1959, entitled "Development Control Center, Site and Vicinity Plan," depict the expansion (Ralph M. Parsons Company/AFBMD, August 21, 1959a).

Original plans indicate that Building 1001 was conceived of as a single-story, windowless, steel-frame building, sheathed in six-foot, tilt-up, pre-cast concrete panels, set atop a concrete-pile foundation, capped by a flat graveled-surface asphalt roof.

As indicated on the original plans, the entrance was located on the west façade of the northwest corner. Plans and historic photographs reveal that this portion of the west façade was clad in a variety of materials. The entry itself consisted of a double-glass door, topped by a flat metal overhang, flanked by heat-absorbing glass panels. Laminated enameled panels were situated above the entry. Moving north from the entry, the façade was clad in 6'-0" thick concrete panels which terminated in laminated enamel panels at the northern corner. South of the entrance, the west façade was also pierced by one metal door and a louvered-metal vent (Ralph M. Parsons Company/AFBMD, March 6, 1959e).

According to the original plans, moving from east to west, the north façade was pierced by a single-metal louvered door and a double-metal louvered door. Moving from north to south, the east façade was pierced by a metal roll-up garage door, a single-metal door, a double-metal door, a single-metal door, a double-metal door topped by a rectangular-shaped metal louvered vent, and a large rectangular-shaped metal-louvered vent. Moving from east to west, the south façade was pierced by a single-metal door, two double-metal doors, and double-metal-louvered doors. The doors were accessed by concrete steps, and it is likely that many of the doors only opened from the interior. Downspouts were also appended to the building (Ralph M. Parsons Company/AFBMD, March 6, 1959d-e).

Heating Ventilation and Air Conditioning (HVAC) equipment was located on the roof. A parking area which could accommodate 186 cars and forty-three sports cars was located north of the building. A concrete path connected the parking lot to the building's entrance (Ralph M. Parsons Company/AFBMD, March 6, 1959a).

Floor plans were prepared in two phases in 1959. These include plans dated March 6, 1959, entitled "Development Control Center, Floor Plan A" and "Development Control Center, Floor Plan B," and plans dated August 21, 1959, entitled "Development Control Center Increment Two, Plan A," "Development Control Center, Increment Two, Plan B," and "Development Control Center, Increment Two, Plan C and Room Finish Schedule" (Ralph M. Parsons Company/AFBMD, August 21, 1959b-d). Although the building was occupied by January 1960, interior work continued in certain areas, including the Satellite Control Room within the Satellite Control Room Complex. The floor plan in its entirety is depicted on the plan entitled "Satellite Test Center Modification, Site and Vicinity Plan," dated May 31, 1960. By February 1961, construction was complete, and the building was fully occupied (Jernigan, 1983).

Although the original plans are not labeled with room functions, documents such as the Chronology prepared by the AFSCF History Office in 1983 provide information pertaining to room function. For example, Room 127 served as the Satellite Control Room, and featured a balcony from which activity could be observed. (Ralph M. Parsons Company/AFBMD, May 31, 1960b). Surrounding rooms (including Rooms 120, 121, 122, 130, 131, 132, and 133) formed part of the Satellite Control Room Complex. In addition, Room 111 functioned as the Telephone Exchange Room; Rooms 138, 139, and 140 housed offices for the Test Director; Room 318 served as the Data Control Center, and housed computers and telemetry equipment. Room 329 functioned as the cafeteria (Jernigan, 1983; Ralph M. Parsons Company/AFBMD, May 31, 1960a).

The plan entitled "Development Control Center Increment Two, Plan C and Room Finish Schedule" provides floor, wall, and ceiling finish information for a portion of the building. Finishes were typical of the time, and floor surfaces included unfinished concrete, typically in mechanical areas; asphalt tiles; vinyl tiles; quarry tile, ceramic tile, and linoleum. Wall surfaces included concrete block; gypsum plaster; cement plaster; gypsum board; glass partitions; and acoustic tiles. Ceiling surfaces included cement plaster; gypsum board; gypsum plaster; concrete; and acoustical tiles (Ralph M. Parsons Company/AFBMD, August 21, 1959d). The control room walls and ceiling were sheathed in acoustical tile, indicative of the secrecy that surrounded the program (Ralph M. Parsons Company/AFBMD, May 31, 1960b).

D. History:

1. Development of the Satellite Test Center, 1959-61

The development of satellite reconnaissance during the Cold War (1946-91) and the specific role of the U.S. Air Force Satellite Test Center (STC) is fully described in the associated overview report, California State Historic Preservation Office Historic American Building Survey Level II-Type Documentation, U.S. Air Force Satellite Test Center, Log No. U.S.AF041121A. The following section provides a brief summary of the role that Building 1001 played at the STC from 1959-91, its period of significance.

Building 1001 was constructed in 1959 to serve as the command-and-control center for the Corona Program to support the launch, orbit, and recovery of Corona satellites. The Corona Program, initiated in 1958, was the first reconnaissance satellite program developed by the U.S. Air Force and the CIA, with assistance from private contractors, such as Lockheed Missiles and Space Division, located in Sunnyvale, California. Concerns about preserving the secrecy of the Corona Program and its objectives led to the designation of the Discoverer Program as a cover program. The publicly-stated goal of the Discoverer Program was scientific research (Richelson, 2002). Prior to the construction of Building 1001, at least eight Corona satellites, described as Discoverer satellites in the press, were launched from Vandenberg Air Force Base (AFB), and were supported from an interim control center in Palo Alto, California. Tracking stations located around the world also provided support.

In 1959, the U.S. Air Force acquired 11.43 acres of land in Sunnyvale from Lockheed Missiles and Space Division located to the west. Plans for the installation were designed by the Ralph M. Parsons Company, an architecture and engineering firm based in Los Angeles, California, under the auspices of the AFBMD in Englewood, California (Ralph M. Parsons Company/AFBMD, March 6, 1959a).

The Ralph M. Parsons Company was established in 1944, by engineer Ralph M. Parsons. Parsons, a New York native, graduated in 1916 with an engineering degree from Pratt Institute in Brooklyn, New York. Following graduation, he enlisted in the U.S. Navy for four years, after which he served as a civilian aeronautical engineer for the U.S. Navy. During World War II (1941-45), he formed a partnership with Stephen D. Bechtel and John A. McCone, who later headed the CIA from 1961-65 (*The New York Times,* December 21, 1974). Following establishment of the Ralph M. Parsons Company in 1944, they began work for the military as designer of the Canol Pipeline, a 1,200-mile oil pipeline between the United States and Canada. Their selection for this project was presumably as a result of Parsons' prior U.S. Navy contacts. By 1948, they had further cemented their reputation on defense-related projects with the 1948 design of the Point Mugu Missile Facility in Point Mugu, California (Parsons, no date [n.d.]).

On January 28, 1960, the installation, newly designated as the STC, was dedicated by the U.S. Air Force (Davies, 1960). A few months later, on March 1, 1960, it was occupied by the 6594th Aerospace Test Wing (ATW), the first unit to be tasked with military satellite operations; Lockheed Missiles and Space Division employees; and likely the CIA. The 6594th ATW provided oversight for Lockheed Missiles and Space Division which was responsible for satellite operations (6594th ATW, 1961; Jernigan, 1983). However, portions of the building remained under construction, including the state-of-the-art Satellite Control Room in the Satellite Control Room Complex. An interim Satellite Control Room was established from which Lockheed Missiles and Space Division, monitored by the 6594th ATW, could direct the launch, tracking, data acquisition, command and control, and recovery phase of military satellites (6594th ATW, 1961; Jernigan, 1983).

On July 7, 1960, the installation was officially designated as the Satellite Test Annex (STA) under the jurisdiction of the AFBMD. However, it should be noted that it continued to be referred to as the STC, both in U.S. Air Force documents, as well as by the public, likely due in part to a building sign which indicated "U.S. Air Force Satellite Test Center" (Jernigan, 1983).

On February 6, 1961, the Satellite Control Room and remainder of the Satellite Control Room Complex became operational. The primary purpose of the complex was to support Corona satellites, although additional programs were supported by this time. According to a 1961 6594th ATW Fact Sheet, the Satellite Control Room featured eight "ultra modern consoles" from which satellites were supported. Each console contained communications and control and display equipment, such as closed-circuit television screens and push-button communications panels. The consoles faced a row of eight projector screens which enabled the controllers to display maps, meteorological conditions, orbital information, telemetry read-outs, and other data. Much of the displayed information was received via worldwide tracking stations, and processed and evaluated by computers, such as the Control Data Corporation (CDC) 1604 computer (6594th ATW, 1961).

In addition, four primary areas supported the Satellite Control Room during operations. These included:

- The Operational Support Area which provided plotting, display, and meteorological support.

- The Communications Center which provided communications support.

- The Computer/Programmable Integrated Communications Equipment (PICE) Area which provided high-speed computation and data reduction.

- The Technical Director Room which provided consultative support and oversight.

With the exception of the Technical Director Room, which likely housed upper-level personnel, all areas were operated by the U.S. Air Force and Lockheed Missiles and Space Division personnel (6594th ATW, 1961).

2. Significant Events and Satellites Supported, 1960-61

In August 1960, the U.S. Air Force accomplished the first successful retrieval of a Discoverer satellite. On August 10, Discoverer XIII was launched from Vandenberg AFB, and was supported by the STC. The satellite achieved polar orbit for a period of ninety-four minutes, during which time it was in contact with worldwide tracking stations, and the interim Satellite Control Room at the STC. During its seventeenth rotation of the earth, the eject command was issued from the STC, and the capsule was ultimately recovered from the Pacific Ocean, marking the first successful retrieval of an object from space (Arnold, 2005; 6594th ATW, n.d.). In-keeping with the publicly stated scientific objectives of the Discoverer Program, the *San Jose Mercury News* noted that "Discoverer recovery techniques will be used soon to return monkeys from space," and were vital to "returning a man to earth after orbiting in space" (Lindsey, August 12, 1960). Still in the testing phase, the satellite did not yet contain a camera (Jernigan, 1983).

Shortly after this historic event, Discoverer XIV was launched on August 18, 1960 from Vandenberg AFB (Arnold, 2005). Discoverer XIV orbited the earth seventeen times, supported by the STC from the interim Satellite Control Room in Building 1001, and the Kodiak tracking station, before the eject command was relayed to the satellite. Following the command, at 300 miles above the earth, the satellite recovery vehicle (SRV) separated from the spacecraft, and began its descent to earth, where it was caught by a specially equipped Fairchild C-119 *Flying Boxcars* (C-119) piloted by U.S. Air Force Captain Harold Mitchell (*The New York Times,* August 20, 1960).

The Discoverer XIV SRV contained 20 pounds of film which documented over 1,650,000 square miles, and provided the first successful satellite reconnaissance photographs of the Soviet Union. It also resulted in more photographic coverage of the Soviet Union than all previous U-2 flights combined. Furthermore, it 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 (ICBM) (Day, 2006). However, despite the historic nature of this event, the crew, who were not cleared for the Corona Program, were unaware of the importance of their mission (Arnold, 2005).

Although the STC was developed to support the Corona Program, by the fall of 1960, it also supported the Satellite and Missile Observation System (SAMOS) and Missile Detection Alarm System (MIDAS). Both programs were initially developed by the U.S. Air Force in the mid-1950s as reconnaissance and missile detection satellites, respectively. On October 11, 1960, the first SAMOS satellite was launched from Vandenberg AFB, and supported from the STC, although it failed to reach orbit (*San Jose Mercury News,* October 12, 1960). By July 1961, MIDAS satellites were launched from Vandenberg AFB and supported by the STC. By the end of 1961, two MIDAS satellites had reached orbit (6594th ATW, 1961).

In April 1961, Discoverer XXIII was launched from Vandenberg AFB, and was the first Corona satellite supported by the STC from the new control room. By this time, Corona satellites were regularly providing images of the Soviet Union, as well as other communist countries. Among these images included evidence of the building of the Berlin Wall between East and West Germany (Chapman, 2008). In September 1961, the NRO was established as a classified agency in the Department of Defense (DoD), and was tasked with oversight of reconnaissance satellite programs, including the Corona Program, and therefore became a presence at the STC (Richelson, 2000).

3. <u>Building 1002 Construction and Upgrades, 1962</u>

In 1962, the STC experienced its first of many expansions, when plans for a two-story, L-shaped administrative building – Building 1002 (Addition to the Satellite Test Annex) - were prepared for the U.S. Air Force Space Systems Division (SSD) by Kaiser Engineers, a division of the Henry J. Kaiser Company. Kaiser Engineers was a well-known architecture and engineering firm located in Oakland, California. Building 1002 was appended north of Building 1001 by a hyphen, the construction of which resulted in modifications to Building 1001's north façade and interior (Kaiser Engineers/U.S. Air Force SSD, January 15, 1962a-b).

During this time, Kaiser Engineers also prepared plans for a single-story addition to Building 1001, and interior modifications to the Satellite Control Room Complex. The 4,200-square foot addition appended to the east façade of Building 1001 housed a new communications center, crypto equipment, electrical and mechanical rooms, and an HVAC penthouse on the roof, necessitated by the installation of new systems (Jernigan, 1983). Minor alterations were also made to rooms within the Satellite Control Room Complex (Kaiser Engineers/U.S. Air Force SSD, October 17, 1962a-b).

The 1962 renovations were likely implemented in conjunction with the U.S. Air Force's first modernization effort, the Multiple Satellite Augmentation Program (MSAP). This effort was initiated in part, to standardize and provide updated equipment to the STC and tracking stations which would enable them to simultaneously support multiple satellite programs (Lockheed Missiles and Space Division, 1963). Computer capabilities were upgraded, new display and communications equipment were installed, and connections between the STC and tracking stations were upgraded (Jernigan, 1983).

4. Significant Events and Satellites Supported, 1962-64

On February 27, 1962, Discoverer XXXVIII was launched and supported from the STC. The following month, the DoD classified all military satellite programs (DoD, March 23, 1962). As a result, Discoverer XXXVIII was the last satellite launched as part of the Discoverer program. Corona satellites continued to be launched and supported by the STC, however, because all satellites were classified, the Corona Program no longer required a cover story.

Between 1962-64, the STC supported over fifty Corona satellites. By this time, Corona satellites had accurately mapped all twenty-five of Moscow's long-range missile sites. Furthermore, images taken by Corona satellites indicated that China was readying its nuclear facility in Lop Nur for testing. It was noted in a classified CIA briefing that "[O]n the basis of new overhead photography, we are now convinced that the previously suspect facility at Lop Nur in western China is a nuclear test site which could be ready for use in about two months." Within two months, on October 16, 1964, China tested an atomic bomb at the Lop Nur site (Broad, September 12, 1995).

In addition to Corona, SAMOS, and MIDAS satellites, the STC supported the Defense Meteorological Satellite Program (DMSP) in 1962 and 1963. DMSP was a meteorological satellite program initiated in 1960 to provide weather and climate data for more effective military operations (DMSP, n.d.). On October 16, 1963, the first Vela satellite was launched and supported by the STC. The Vela Program – vela means vigil in Spanish – was a series of satellites designed to detect nuclear detonations (Jernigan, 1983; Peebles, 1997). Presumably, Vela satellites provided images of the Lanzhou Diffusion Plant in Lanzhou, China and the Baotao Nuclear Fuel Component Plant in Baotao, China (Richelson, 2002).

In November 1963, the final SAMOS satellite was launched (Peebles, 1997). Furthermore, 1963 marked the beginning of the Keyhole (KH)-7 surveillance system, noted in a 2006 NRO memo as "the Intelligence Community's first high resolution surveillance or 'spotting' satellite." Similar to Corona satellites, the KH-7 was a reconnaissance satellite that returned film to earth in SRVs. It was primarily used to provide surveillance of nuclear facilities and Intermediate Range Ballistic Missiles (IRBM) in the Soviet Union and China (NRO, 2006).

In July 1964, two additional Vela satellites were launched, resulting in a total of four orbiting satellites capable of detecting nuclear detonations. In August 1964, Syncom III was launched and supported by the STC. Syncom III was a National Aeronautics and Space Administration (NASA) satellite used for DoD military communications experiments between Saigon, Vietnam, and Hawaii (Jernigan, 1983).

5. Construction, Upgrades, and Designation of the Air Force Satellite Control Facility, 1964-67

In May 1964, plans were prepared for a two-story, L-shaped administrative addition to Building 1002. It was designed by Maher & Martens, a San Francisco-based architecture firm for the U.S. Army Corps of Engineers (USACE), Sacramento District. The addition was appended to the east façade of Building 1002, and created an interior courtyard. A hyphen connected the south façade of Building 1002 to the north façade of Building 1001, which necessitated modifications to Building 1001's north façade and interior (Maher & Martens/USACE Sacramento District, May 7, 1964).

Communications systems were also upgraded that year. Upgrades included the installation of a semi-automatic teletype switch, which provided near real-time capabilities, and the installation of high-frequency, high-power radio station. The switchboard capacity was also increased to 1,000 lines. Univac 1040 computer systems were also installed at a cost of $42,000, and two CDC 1604 mainframes were purchased for $594,000 (Jernigan, 1983).

In 1965, the U.S. Air Force Satellite Control Facility (AFSCF) was officially designated. The mission of the AFSCF was to direct launch, tracking, data acquisition, command and control, and recovery of DoD military satellites. Following the establishment of AFSCF, an Interim Expansion Plan (IEP) was initiated to augment the facility and implement the Mission Control Center (MCC) concept, which focused on the development of mission-oriented control centers rather than a single control room (Jernigan, 1983).

Plans to develop multiple MCCs in Building 1001, as well as other elements of the IEP were prepared by San Francisco-based consulting engineers, Bentley Engineers and Earl & Wright, Inc. under the auspices of the U.S. Air Force SSD. The plans indicate that the building was reconfigured to accommodate four new MCCs, known as MCCs 1, 2, 3, and 4. In addition, the building also featured two new complex areas, known as Complex Numbers 6 and 7. Although prior plans do not indicate other complex areas, it appears that there were such areas in Building 1001 which likely housed operations of some sort. The plans also indicated that two new communications areas, labeled as Communications Area A and B, were developed, as well as a new bird buffer area (Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD, December 13, 1965a-e).

The Satellite Control Room Complex remained relatively unchanged, and continued to support the Corona Program. In addition, Bentley Engineers and Earl & Wright also prepared mechanical plans to upgrade HVAC, plumbing, and electrical systems necessitated by the installation of computers and equipment (Onizuka AFS, n.d.).

The plans identified a January 1966 start date, and May 1966 completion date (Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD, December 13, 1965a). Keeping somewhat on track, the majority of construction was completed by December 1966 (AFSCF, January-June 1966). As part of the IEP, new equipment was installed throughout 1967, including CDC 3600 computers which replaced the CDC 1604 computers (Jernigan, 1983).

In 1970, the AFSCF prepared an unclassified document that served as a guide for military, civilian, and contractor personnel at the STC. It provided a brief description of the MCCs in Building 1001. Although the guide was produced after the 1966 modifications, it is likely that they functioned in much the same way. As described in the guide, MCCs in Building 1001 included:

- MCC 1: supported several satellite programs in conjunction with all tracking stations.
- MCC 2: supported several satellite programs in conjunction with all but one tracking station.
- MCC 3: supported complex, low-orbit satellites that required extensive commanding and analysis of a large volume of telemetry data.
- MCC4: supported a highly sophisticated low-orbit satellite program (AFSCF, 1970).

6. <u>Significant Events and Satellites Supported, 1965-70</u>

The increase in the number of flight support hours logged by the AFSCF between 1965-66 appears to indicate that at least some of the MCCs were operational in 1966. In 1965, the AFSCF logged 20,757 hours of satellite flight support. By 1966, 29,400 hours of flight support were logged. The number of satellites supported also increased. In 1965, the STC supported approximately fourteen satellites (AFSCF, 1972). In January 1967, the STC supported thirty-one satellites per day, and by June were supporting forty-four per day, which was expected to increase to forty-seven per day by July (AFSCF January-June 1967).

Between 1965-70, the STC supported over forty Corona satellite launches (Mission and Spacecraft Library, n.d.). By 1966, upgrades to the installation had resulted in an increase in satellite programs supported. In addition to Corona, Vela, and other programs (many of which likely remained classified) new programs such as NASA's Biosatellite Program were supported. The Biosatellite Program was a series of three satellites designed to assess the effects of spaceflight on living organisms. Support for the program focused on directing operations of the recovery of the satellites by Lockheed C-130 *Hercules* (C-130) aircraft flown by the 6594th Aircraft Recovery Group based at Hickam AFB, Honolulu, Hawaii (Jernigan, 1983).

In June 1967, two scientific satellites, one owned by the U.S. Army, the other by the U.S. Navy, were launched as the first flight in the DoD Space Experiments Program (SESP). SESP was responsible for providing flights for research and experiments undertaken by government agencies (AFSCF, January-June 1968; Jernigan, 1983). In 1967, the KH-7 surveillance system was terminated, after having flown thirty-eight missions, thirty-four of which successfully returned usable images (NRO, 2006).

In June 1968, the *San Jose Mercury News* reported that satellite reconnaissance, likely supported by the STC, uncovered the Soviet Union's plans for the invasion of Czechoslovakia. The article noted that "[S]atellites spinning over Eastern Europe monitored Soviet radio transmissions which signaled the invasion was imminent, and photographic reconnaissance satellites had monitored unusual military activities on the Czech borders by Soviet, East German, Polish, Hungarian, and Bulgarian troops" (*San Jose Mercury News*, August 27, 1968).

In September 1968, a Lincoln Experimental Satellite (LES) was launched into orbit and supported by the STC and tracking stations. The LES was an experimental satellite used to test communications between aircraft, ships, and ground forces (Jernigan, 1983).

In 1969, support was provided for NASA's manned flights to the moon. The STC supported Apollo missions 9 and 10, and Apollo 11, the first manned lunar mission. Program 949 was also supported in 1969 (AFSCF, January-June 1969). Program 949 was designated in November 1966 to supplant Program 461, which had initially supplanted the MIDAS Program in 1963. Program 949 provided a wider range of capabilities, and by the 1970s, was expected to have "progressively enhanced world-wide early-warning, surveillance and detection capabilities" (Piper, 1970).

7. **Development of Buildings 1003 and 1004, 1966-70**

In conjunction with the technological upgrades which occurred throughout the mid-to-late 1960s, in August 1966, a real estate estimate was prepared by the USACE Sacramento District which proposed the acquisition of 8.2 acres of land from Lockheed Aircraft Corporation, at a cost of $49,000. In 1966, C.F. Braun & Company of Alhambra, California, under the auspices of the U.S. Naval Facilities Engineering Command (NAVFAC) Western Division, San Bruno, California, and Space and Missiles System

Organization (SAMSO), Los Angeles, California, prepared site development plans (C.F. Braun/NAVFAC/SAMSO, December 30, 1966). C.F. Braun & Company also prepared plans to develop two new buildings, Building 1003 (STC Building Addition), and Building 1004 (Power Plant) (C.F. Braun/NAVFAC/SAMSO, November 14, 1967; August 12, 1968).

By August 1968, Lockheed Aircraft Corporation transferred the land to the U.S. Air Force (Lockheed Aircraft Corporation, 1968; Jernigan, 1983). By this time site development was underway, and included relocation of an existing Lockheed Missiles and Space building; reconfiguration of Lockheed Martin Way (formerly known as East Perimeter Road) west of Building 1001; creation of additional parking spaces; and installation of underground utilities (C.F. Braun/NAVFAC/SAMSO, December 30, 1966).

Following site development, construction of Buildings 1003 and 1004 commenced. Building 1003 was designed to house the Manned Orbiting Laboratory (MOL) Program, as well as other satellite programs. Initiated in 1963, the concept involved a Titan III booster rocket which carried a modified Gemini B capsule attached to a space laboratory, and was intended to serve reconnaissance purposes (Jernigan, 1983). However, in June 1969, the DoD announced the cancellation of the MOL Program, to save money. The cancellation led to a short work stoppage, however construction resumed a few weeks later. *Aerospace Daily* reported that the U.S. Air Force had evaluated requirements for current and future programs, and determined that construction on the building should continue (*Aerospace Daily*, September 19, 1969).

By the end of 1969, the 164,000-square foot building, constructed at a cost of $8 million was nearly complete. A windowless, pre-cast concrete-panel building, it was appended to the west façade of Building 1001. Although the building was four stories, it was approximately 104’ high, with each story approximately 25’ high to accommodate the mechanical equipment necessary to maintain satellite programs. The building was painted “Air Force blue,” resulting in its nickname, the “Blue Cube” (*Aerospace Daily*, September 19, 1969).

Building 1003 housed multiple MCCs, communications and crypto equipment, a data distribution center, mechanical equipment, CDC 3800 computers, and a tape library (AFSCF, 1970). In addition, shortly after it was constructed, the Vela Program office along with another unidentified satellite program, were relocated from Building 1001 to Building 1003 (AFSCF, July-December 1969).

Building 1004 was also designed by C.F. Braun & Company. Solar, a division of International Harvester Company provided the Saturn gas turbine generator sets that powered the plant. The development of Building 1004 necessitated modifications to the installation's power distribution system. Ties to the electric power provided by Pacific Gas and Electric (PG&E) were severed, with the exception of one power line which provided power through a Lockheed Missiles and Space Substation, and was likely kept active to provide back-up power (AFSCF, 1972). The plant, staffed by Solar contractors, was operational in February 1970, and provided power to the entire installation, rendering it energy-independent at that time (Jernigan, 1983).

8. Termination of the Corona Program and Upgrades, 1970s

Construction of Buildings 1003 and 1004 resulted in renovations to Building 1001. Walls were removed and rooms reconfigured where the two buildings joined. In addition, the Onizuka AFS Drawing Number Log indicates that Building 1001 underwent numerous HVAC, electrical, and plumbing upgrades in the 1970s. During that time, it also indicates that multiple rooms were refurbished, including: Rooms 212, 318, 319, 320, 321, 465, 467, 468, 469, and 495 (Onizuka AFS, n.d.).

In addition, equipment was relocated from Building 1001 to 1003. For example, in 1971, communications circuits were relocated from Building 1001 to Building 1003, which permitted additional operator space and generally improved working and security conditions. Equipment was also installed to link the two buildings, including a twenty-channel digital television for computer-controlled switching between Building 1001 and Building 1003 in 1973. A keyboard/light-pen entry system was installed, likely in both buildings (Jernigan, 1983).

On January 1, 1971, AFSCF re-designated STC as Sunnyvale AFS. On May 25, 1972, Sunnyvale AFS supported the 145th and final launch of the Corona Program from the Satellite Control Room in Building 1001. It was terminated as a result of advances in satellite technology. By the time the Corona Program concluded, Corona satellites had provided approximately 800,000 reconnaissance photographs covering approximately 510 million square miles (Chapman, 2008; Vukotich, n.d.). Following its termination, the Satellite Control Room Complex likely continued to be utilized for control of other satellite programs.

In 1974, Building 1015 was constructed to serve as a recreational facility. It was located between Buildings 1001 and Building 1003. In 1975, plans were prepared by Keller & Gannon, and architecture and engineering firm based in San Francisco to alter the original Satellite Control Room Complex (Keller & Gannon/U.S. Air Force, September 24, 1975). The plans indicate that the eight consoles, which had been "state of the art" when they were installed in 1961, were slated for removal. In addition, walls, raised floors, and ceilings were reconfigured (Keller & Gannon/SAMSO, September 24, 1975).

In 1977, Keller & Gannon prepared plans to re-roof Building 1001 (Keller & Gannon/SAMSO, July 29, 1977). In addition, the Onizuka AFS Drawing Number Log indicates that maintenance and paint shops were constructed in Building 1001. In 1979, plans were prepared to renovate the following areas: MCC C; MCC 4; Rooms 112, 329, 318, 435; and Complex 7. Renovations appear to have included reconfiguration of rooms, such as installation and removal of partitions, and associated electrical and HVAC upgrades (Onizuka AFS, n.d.).

9. Significant Events and Satellites Supported, 1970s

In the 1970s, Sunnyvale AFS continued to support existing and newly established satellite programs, although many of them remained classified. By this time, MCCs were established in both Building 1001 and 1003. The Corona Program continued to be supported from Building 1001 until its final launch in 1972, and the Vela Program was supported from Building 1003 throughout the 1970s. However, in general, specific information is not available concerning the programs supported in the buildings. However, Building 1001 continued to be upgraded to support new missions, and therefore, likely supported multiple satellite programs.

In 1970, the AFSCF Satellite Test Operations Historical Reports noted the successful support of two “unique orbital events” from the installation. These events included support of the Apollo 13 mission in April, which was aborted following the explosion of an on-board oxygen tank, and support of the first North Atlantic Treaty Organization (NATO) communications satellite in March (AFSCF, January-June 1970).

In June 1970, the final Vela satellite was launched. Sunnyvale AFS continued to provide support throughout the 1970s for the orbiting satellite (Jernigan, 1983). Program 949 was also re-designated the Defense System Program (DSP) in 1970. Sunnyvale AFS continued to support this program throughout the early 1970s (AFSCF, July-December 1970; 1971; 1972). The DSP satellite weighed 2,000 pounds, was approximately 23’ long, 10’ wide, and contained a large infrared telescope which scanned the earth for missile launches. In the event a missile was launched, it would be detected by the United States within minutes, which removed the possibility of a surprise attack (Peebles, 1997).

By November 1971, a pair of Defense Satellite Communications System (DSCS) II advanced communications satellites had been launched to handle voice, teletype, computerized digital data, and video transmissions (Jernigan, 1983). The first KH-9 satellites – code-named HEXAGON, and popularly known as “Big Bird” – were also launched in 1971. The KH-9 satellites were 30,000-pound photographic reconnaissance satellites initially developed in the 1960s. Similar to Corona satellites, they were designed to photograph large areas, and return the film to earth via SRV. They carried

technologically advanced cameras, additional film capsules, and antennae for other intelligence-gathering purposes (Clark, 2007).
In January 1972, President Richard Nixon announced the development of the Space Transportation System (STS), or Space Shuttle Program, managed by NASA. Kennedy Space Center in Houston, Texas, and Vandenberg AFB would serve as the operational bases for the program. Research and development (R&D) shuttle launches would originate from the Kennedy Space Center, and military launches would originate from Vandenberg AFB. The shuttle would be responsible for the launch of all commercial, scientific, and military satellites into space. The AFSCF, including Sunnyvale AFS and tracking stations, would provide tracking and control for the program (Jernigan, 1983).

In July 1975, the final Apollo flight was launched and supported by Sunnyvale AFS. The final flight was known as the Apollo-Soyuz Test Project, which marked the first joint United States-Soviet Union space mission. The mission was the first time two foreign spacecraft docked together in orbit (NASA, July 14, 2010). In 1976, the first DMSP Block 5D, a meteorological satellite, was launched, and was presumably supported from Sunnyvale AFS. It was an upgraded version of the 1960s-era DMSP, and provided twice-daily, world-wide meteorological, oceanographic, and solar-terrestrial physics measurements (Jernigan, 1983; Wade, n.d.).

In 1976, the KH-11 KENNAN satellite, a reconnaissance satellite, was launched. It was the first successful electronic imaging satellite, and transmitted high-quality images in real time (Vick, 2007). A 1978 *San Jose Mercury News* article noted that some sources indicated that the top-secret "KH-11, from 200 to 300 miles up, can detect a pack of cigarets [sic] on Russian soil," while another source indicated it could only "read the lettering on billboards" (Ingersoll, November 5, 1978). Nonetheless, this top-secret satellite represented significant advances in the development of satellite technology, and was supported from Sunnyvale AFS, as well as associated tracking stations.

10. Development of the Air Force Satellite Control Network, Expansion, and Upgrades, 1980s

In 1982, the Air Force Satellite Control Network (AFSCN) was organized. The AFSCN was not a formal organization, but rather denoted a group of common user resources, assets, and facilities which collectively provided tracking, telemetry & commanding (TT&C) support for virtually all DoD spacecraft, and select NASA and foreign government programs (Hane, 1988). The goal of the AFSCN was to provide "enduring control capability commensurate with the need for operational space suites throughout the conflict spectrum" (AFSCF, 1983). To accomplish this goal, Sunnyvale AFS was upgraded as part of the Data Systems Modernization Program. This $500 million upgrade introduced centralized database-driven computer hardware and software to replace outdated systems. The upgraded system was more reliable, cheaper to maintain, and faster than its predecessor, allowing it to support a steadily increasing satellite support workload (Fedor et al., 2006).

A new satellite control center – the Consolidated Space Operations Center (CSOC) – was constructed at Falcon AFS, Colorado Springs, Colorado (present-day Schriever AFB) in conjunction with the Data Systems Modernization Program (Fedor et al., 2006). The CSOC was constructed partially due to concern about the vulnerability of Sunnyvale AFS to earthquakes and terrorism (Philp, June 9, 1985).

In addition, two new buildings, Buildings 10031 and 10032 were constructed at the STC to provide additional space for satellite control in conjunction with the Data Systems Modernization Program. In 1981, plans were prepared by King/Reif and Associates on behalf of NAVFAC Western Division to construct Building 10031. The three-story building was appended to the north façade of Building 1003, and to the north and west façades of Building 1001. As a result, it obscured the original entrance to Building 1001, and a new entrance and lobby were designed in conjunction with Building 10031. However, it should be noted that the entrance and lobby were technically considered part of Building 1001, rather than Building 10031, likely because the installation had been historically entered via Building 1001. The new entrance was sheathed in metal siding and was embellished with a metal sign that read “Sunnyvale Air Force Station.” The first two stories housed parking, and the radio frequency interference (RFI)-shielded third story had secure space for MCCs, computer rooms, communications rooms, and offices that supported satellite programs (King/Reif and Associates/NAVFAC, December 18, 1981).

In 1982, plans were prepared to construct Building 10032 by Rasmussen Ingle Anderson of San Francisco under the auspices of NAVFAC Western Division. The three-story building was appended to the west façade of Building 1003, and also featured two stories of parking and a RFI-shielded third story for MCCs (Rasmussen Ingle Anderson/NAVFAC, October 29, 1982). It does not appear that any modifications to Building 1001 were undertaken in conjunction with construction of Building 10032. Buildings 10031 and 10032 were operational by 1984 (Fola Odafalu, pers. comm., July 26, 2010).

Building 1001 also underwent numerous upgrades during the 1980s, likely in conjunction with the Data Systems Modernization Program. For example, in 1987, two major projects related to this effort were undertaken. The Satellite Data Terminal Link (SDTL) area, also known as Complex D, and the Inter-Range Operations (IRO) area were renovated and RFI-shielded to serve as secure mission areas.

Plans to renovate the SDTL area were prepared by the Stearns-Roger Division of United Engineers and Contractors, based in Denver, Colorado, under the auspices of the U.S. Air

Force Space Division. This area originally functioned as the Main Satellite Control Room Complex for the Corona Program, and had been somewhat reconfigured in the 1970s following termination of the program. During the 1980s, the area was gutted to accommodate the installation of RFI-shielded materials. The concrete-slab floor was removed and a new, presumably RFI-shielded, concrete slab was poured. New RFI-shielded walls with acoustical insulation were constructed on the perimeter of the area which was reconfigured to house four operations rooms, two printer rooms, and one large equipment room, accessed via a long north/south-oriented corridor. A new RFI-shielded ceiling was installed as well. Entry to the area was provided at the northern and southern ends of the corridor, via RFI-shielded interlock doors (Stearns-Rogers Division, United Engineers/U.S. Air Force Space Division, December 18, 1987a-b). According to Mr. Dennis Ralphs, a 21st Space Operations Squadron (SOPS) employee, the roof of the building was removed to allow for the installation of RFI-shielded components via crane (Ralphs, pers. comm., June 9, 2010).

In addition, the IRO, which was a smaller area, was also renovated and shielded during this time. Unlike the SDTL area, the IRO area housed only one operations area. In addition, plans indicate that the IRO also housed offices, including a director's office, equipment rooms, and telecommunications rooms. The IRO was accessed by one set of RFI-shielded interlock doors (Stearns-Rogers Division, United Engineers/U.S. Air Force Space Division, September 22, 1987). Mechanical equipment was also installed, including two air handling units (AHUs) on the roof necessary to maintain air flow in the sealed areas. Plans were prepared to alter a number of MCCs throughout the 1980s, also likely in response to the Data Systems Modernization Program (Onizuka AFS, n.d.).

In addition, the Onizuka AFS Drawing Number Log indicates that Building 1001 also underwent smaller-scale modifications during the 1980s. Projects included plans prepared in 1981 to renovate Rooms 150, 154, and 155 to support MCC F in Building 1003. In 1984, Building 1025, located between Buildings 1001 and 1004 was constructed to serve as an armory, likely resulting in minor alterations to Building 1001. In 1986, plans were prepared to relocate MCC 1 to Room 201, as well as plans for new construction and furniture installation in Room 106. In addition, security modifications were undertaken throughout the buildings to meet changing mission needs and personnel. Alarms, locks, security cameras, and flashing red lights were installed in various rooms throughout the 1980s. Plans were also prepared for routine maintenance of the buildings, such as re-roofing, replacing boilers, and restroom upgrades (Onizuka AFS, n.d.).

11. Significant Events and Satellites Supported, 1980s

Sunnyvale AFS continued to support numerous satellites programs throughout the 1980s, although many remained classified. On April 12, 1981, the first mission flown by the Space Shuttle *Columbia* was launched, and successfully returned to earth on April 14.

Following their successful support of the first shuttle mission, five AFSCF mission controllers received U.S. Air Force Commendation Medals. In June 1982, the first classified military payload was carried into orbit aboard the fourth shuttle mission flown by *Columbia* (Jernigan, 1983).

In February 1983, Libyan troops, led by military dictator Colonel Muammar al-Gaddafi, appeared to be planning a surprise invasion of Chad and Sudan. The United States launched a KH-8 reconnaissance satellite to provide photographs of the activity. The top-secret satellite was supported by Sunnyvale AFS. The mission produced photographs that documented massive troop build-ups at the border of Sudan, and the *U.S.S Nimitz* was dispatched to the Gulf of Sidra, thus preventing a Libyan invasion of Sudan (Levien, 1989; Philp, October 30, 1985). In 1984, the twentieth and last KH-9 satellite was launched and supported from Sunnyvale AFS (Day, November 8, 2004).

The first dedicated military shuttle flight, aboard the Space Shuttle *Discoverer,* was launched in January 1985, and was supported from Sunnyvale AFS. *The New York Times* reported on the launch, and noted that "all communication with the astronauts will be hidden in complex codes intelligible only with special unscrambling equipment" (Bamford, January 13, 1985). An article in the August 2009 edition of *Air & Space Magazine* indicated that "according to most accounts, STS-51C's payload was ORION, an eavesdropping satellite for signals intelligence." In October 1985, the second dedicated military flight was launched by the Space Shuttle *Atlantis* (Cassutt, August 1, 2009). *The New York Times* reported that, according to reliable sources, "two $100 million communication satellites" were deployed into orbit, on a mission classified as secret by the Pentagon (Broad, October 5, 1985).

In 1986, the Space Shuttle *Challenger* exploded after launch, killing its seven crew members, including the shuttle's mission specialist, Lieutenant Colonel Ellison S. Onizuka, who had trained at Sunnyvale AFS (NASA, January 2007). That same year, Sunnyvale AFS was renamed Onizuka AFB in honor of Onizuka, and a memorial was installed in the lobby. Following the *Challenger* explosion, the U.S. Air Force returned 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 (Cassutt, August 1, 2009).

In 1989, a Tracking and Data Relay Satellite System (TDRSS) satellite was launched, supported by Sunnyvale AFS. The TDRSS was a sophisticated data-relay communications satellite developed by NASA (Levien, 1989).

12. Onizuka Air Force Station, 1990s-Present

By 1991, the Soviet Union had dissolved, signaling the end of the Cold War (Center for Air Force History, 1994). The end of the Cold War led, in part, to the declassification of the NRO in September 1992. The end of the Cold War also led to a decrease in military spending. However, modifications continued to be undertaken at Onizuka AFB, although less than in prior decades. According to the Onizuka AFS Drawing Number Log, the majority of alterations involved room reconfiguration and associated mechanical and security upgrades to accommodate new mission needs. For example, some of the smaller-scale room reconfiguration projects include modification of Rooms 158, 408, 490, and 493 in 1991; renovation of Rooms 138, 139, 316, 346, and 347 in 1992; and modification of Rooms 30-44, 324, 326, 327, and 405 in 1993 (Onizuka AS, n.d.).

In 1992, some larger-scale projects were also undertaken such as replacement of the equipment, and renovation of rooms in many of Building 1001's MCCs. Keller & Gannon prepared plans under the auspices of the U.S. Air Force for this project, which included alterations of Rooms 107, 167, 169, 301, 328, and 426, among others (Onizuka AFS, n.d.).

In 1992, an addition was appended to the south façade of Building 1004, known as the Emergency Utility Building (EUB), and enhanced the installation's power distribution system. The Onizuka AFS Drawing Number Log indicates construction of the EUB also entailed upgrading mechanical systems in Buildings 1003, 10031, and 10032 (Onizuka AFS, n.d.). Although it does not specify upgrades to Building 1001, it is likely that such upgrades were also undertaken at Building 1001 in conjunction with EUB construction.

By the early 1990s, Onizuka AFB and tracking stations provided radio links to over eighty active DoD spacecraft (Mead, March 2, 1994). Satellites supported from Onizuka AFB assisted with the success of Operation Desert Storm (1990-91). For example, weather satellites assisted with U.S. missile launches, and navigation satellites assisted the troops in maneuvering through the desert. Reconnaissance satellites, such as those in the NRO's KH-11 satellite program, also likely continued to be supported by the installation (Peterson, July 30, 1993). The early 1990s also represented a key year for satellite scheduling, with the advent of a computerized scheduling system. Prior to this time, scheduling was plotted by hand, using colored tape to represent different spacecraft on approximately 50' rolls of butcher-paper (Mead, March 2, 1994).

In 1991, the 21st SOPS were activated at Onizuka AFB; and in 1992, the 750th Space Group was activated and assumed responsibility for launch and early orbit of numerous satellites, including the space shuttles (Schriever AFB, n.d.). In addition, the installation also supported numerous NASA space exploration programs. In 1994, Onizuka AFB was renamed Onizuka AFS.

In 1995, the Corona Program was declassified, and the following year, 800,000 images taken between 1960-72 were made available to the public. Formerly classified documents also became available (NRO, February 24, 1995). In addition, Onizuka AFS was realigned in accordance with the Base Realignment and Closure (BRAC) Act, and select functions were relocated to CSOC at Falcon AFB, Colorado Springs, Colorado. The realignment resulted in a loss of approximately 1,100 jobs at Onizuka AFS (City of Sunnyvale, 2006). By the end of the 1990s and during the early 2000s, responsibility for controlling the DoD satellite network continued to be transferred to the CSOC, and Onizuka AFS's responsibilities substantially decreased (Flinn, December 1, 1991; Wulff, November 29, 1995).

In 1996, a terrorist attack on Khobar Towers, a high-rise apartment complex that housed U.S., British, and French military personnel in Dhahran, Saudi Arabia led to increased security measures at U.S. military installations. At Onizuka AFS, parking was no longer permitted on the first two stories of Buildings 10031 and 10032. In addition, because Innovation Way was in close proximity to Buildings 10031 and 10032, the street was closed to vehicular traffic, covered with astro-turf, and landscaped. Jersey barriers and bollards were also installed around the perimeter of the buildings (Dennis Ralphs, pers. comm., August 2, 2010).

Very few plans were prepared in the 2000s for Building 1001. Among them were plans to renovate the Commanders Office and Rooms 155 and 159 (Onizuka AFS, n.d.). In 2005, the BRAC commission recommended closure of Onizuka AFS. The recommendations were approved by President George W. Bush. In 2006, the DoD, through the Office of Economic Adjustment, formally recognized the City of Sunnyvale as the Local Redevelopment Authority (LRA) for planning the redevelopment of Onizuka AFS and its conversion to civilian use (City of Sunnyvale, 2006).

In May 2007, the NRO officially departed from Onizuka AFS. A deactivation ceremony and open house were held to commemorate this event, and were attended by over 800 guests, many of them former NRO, U.S. Air Force, CIA, and civilian employees (Munro, 2007). Displays were mounted on the corridor walls of Building 1003, highlighting the history of the NRO and reconnaissance satellite programs supported from the installation between through 2007. Following the open house, displays and histories of the programs, many of which remain classified, were relocated to the NRO archives in Chantilly, Virginia (Dennis Ralphs, pers. comm., August 3, 2009).

On July 28, 2010, a closing ceremony was presided over by Lieutenant General John Sheridan, commander of the Space and Missile Systems Center, Los Angeles AFB. In attendance were current and former employees, both military and civilian, as well as Lorna Onizuka, Ellison Onizuka's widow. In his remarks, Lieutenant General Sheridan noted that "[T]his facility here in Sunnyvale has supported an amazing 3.4 million satellite operations over the past years. Much of the details of this work are still classified and we cannot talk openly about it, but what I can tell you is that the operations conducted by the NRO from this site have made our nation a tremendously safer place to be" (Bauer, July 29, 2010).

The 21st SOPS relocated to Vandenberg AFB, and on July 30, 2010, a dedication ceremony was held to commemorate the opening of the 21st SOPS Ellison Onizuka Satellite Operations Facility at Vandenberg AFB. Onizuka AFS is scheduled to be transferred out of federal hands in September 2011. It is anticipated that the Department of Veterans Affairs (VA) will occupy Building 1002, and two buildings located outside the U.S. Air Force Satellite Test Center Historic District, Buildings 1018 and 1034. The remainder of the installation will be redeveloped.

D. Sources:

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Ralph M. Parsons Company/AFBMD. March 6, 1959c. "Development Control Center, Floor Plan B." (1205)

Ralph M. Parsons Company/AFBMD. March 6, 1959d. "Development Control Center, Elevations." (1206)

Ralph M. Parsons Company/AFBMD. March 6, 1959e. "Development Control Center, Window Schedule and Details." (1212)

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Ralph M. Parsons Company/AFBMD. August 21, 1959c. "Development Control Center Increment Two, Plan B." (1257)

Ralph M. Parsons Company/AFBMD. August 21, 1959d. "Development Control Center Increment Two, Plan C and Room Finish Schedule." (1258)

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Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD. December 13, 1965c. "Interim Expansion Partial Floor Plan B." (1413)

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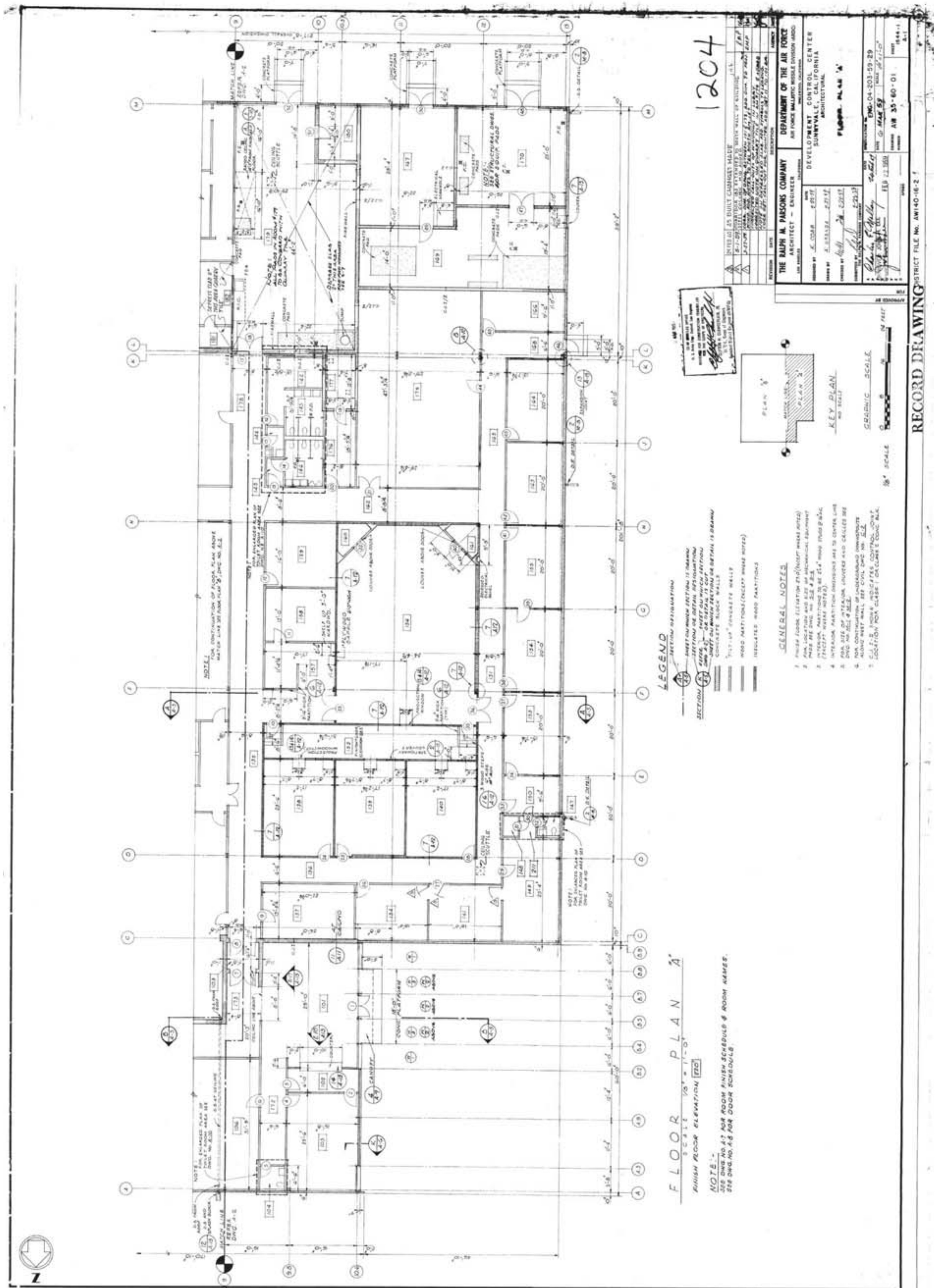
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SUNNYVALE, CALIFORNIA
LEGEND
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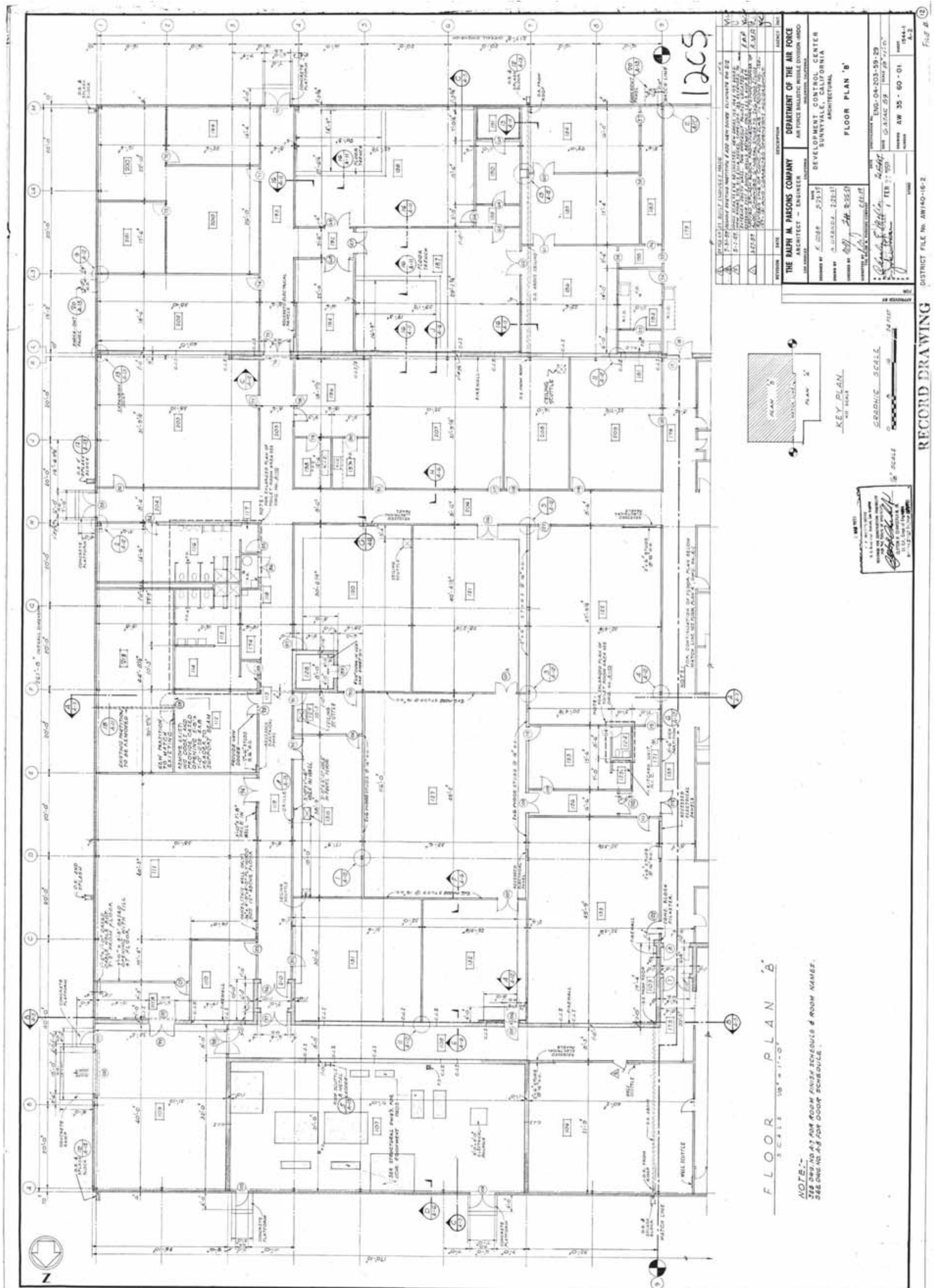
KEY PLAN
FLOOR PLAN 'A'
RECORD DRAWING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THE RALPH M. PARSONS COMPANY
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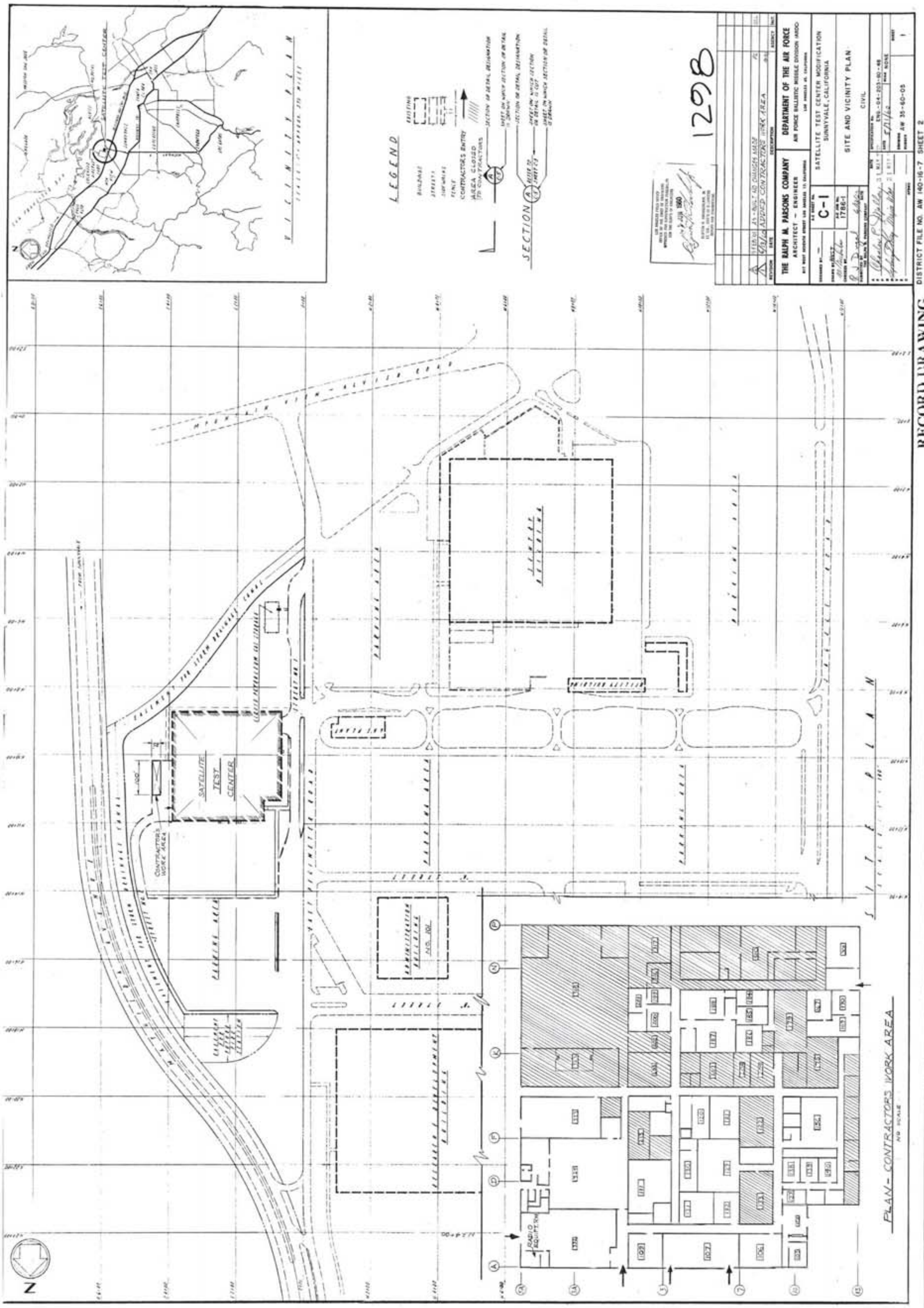
RECORD DRAWING
F L O O R P L A N 'B'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VICINITY PLAN
LEGEND
SITE PLAN
SATELLITE TEST CENTER
CONTRACTORS WORK AREA
PLAN - CONTRACTORS WORK AREA
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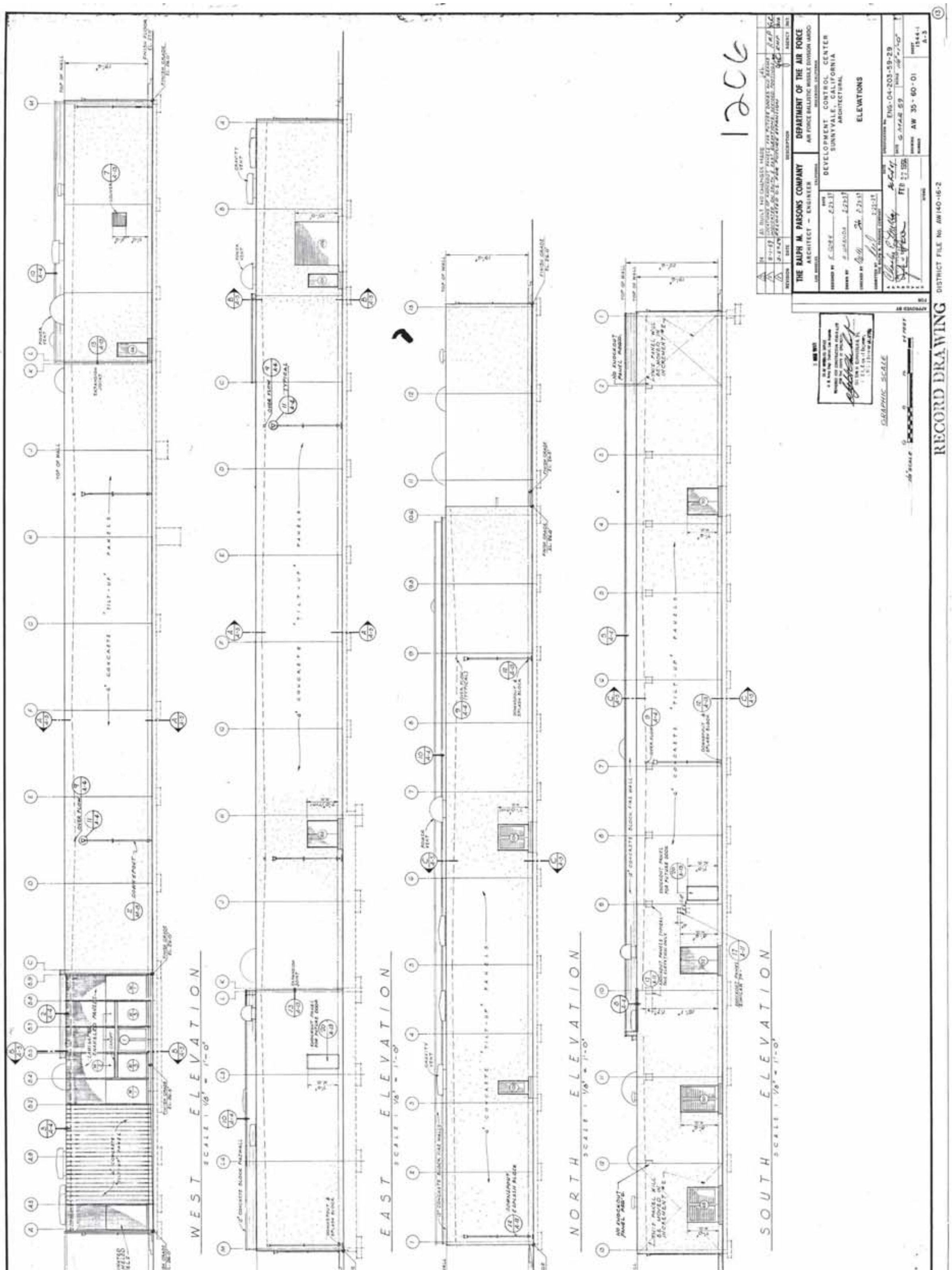
DEPARTMENT OF THE AIR FORCE
SITE AND VICINITY PLAN
DISTRICT FILE NO. AW 140-16-7 SHEET 2


WEST ELEVATION
EAST ELEVATION
NORTH ELEVATION
SOUTH ELEVATION
RECORD DRAWING
1206

SECTION II

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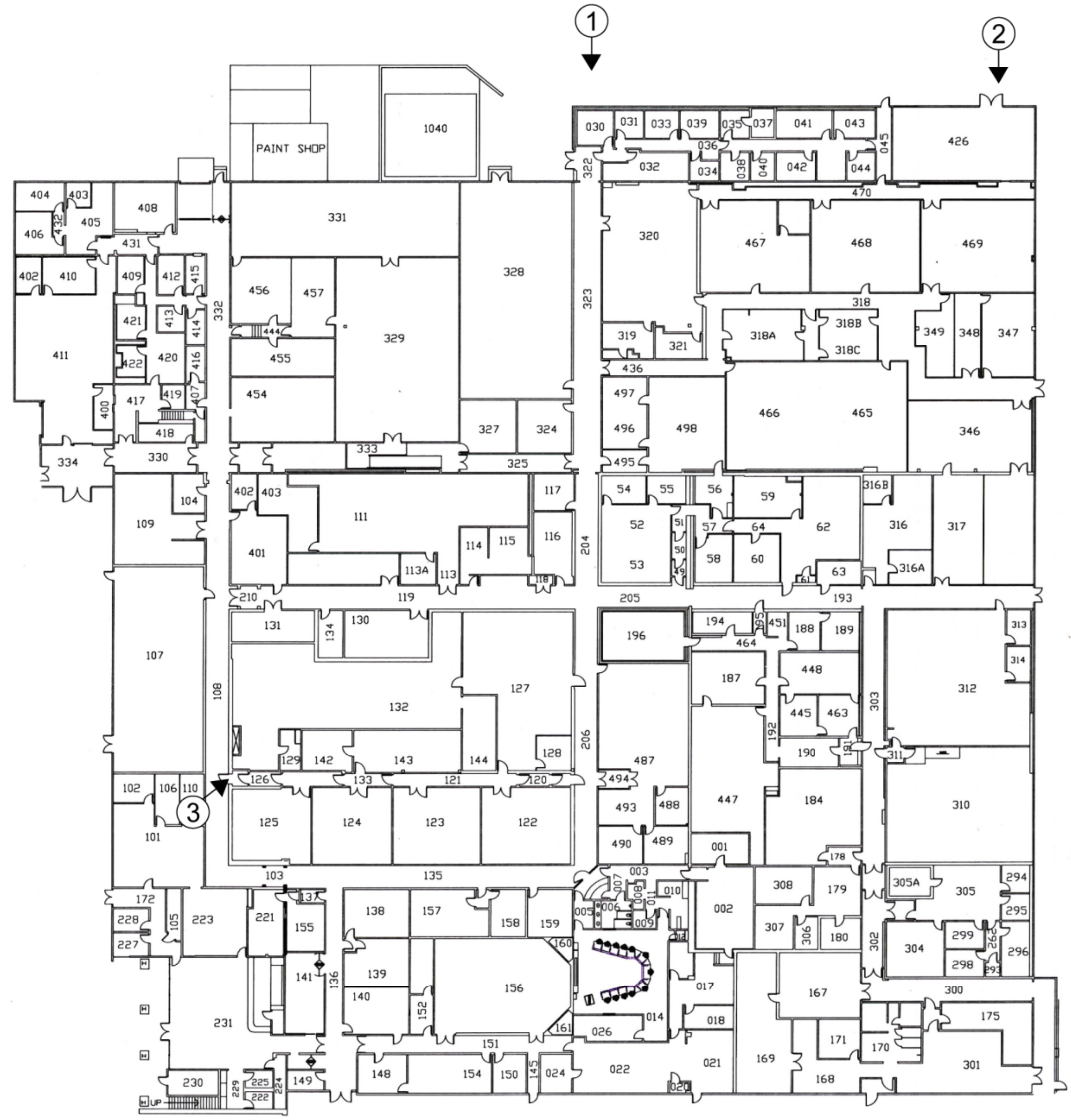
HISTORIC AMERICAN BUILDING SURVEY
LEVEL II-TYPE DOCUMENTATION

INDEX TO PHOTOGRAPHS

U.S. AIR FORCE SATELLITE TEST CENTER — Log No. USAF041221A-A
BUILDING 1001
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Anne Jennings, Photographer — Date of Photographs: June 7-14, 2010

Log No. USAF041221A-A-01	VIEW OF EAST FAÇADE, LOOKING SOUTHWEST.
Log No. USAF041221A-A-02	DETAILED VIEW OF SOUTHEAST CORNER OF EAST FAÇADE, LOOKING WEST.
Log No. USAF041221A-A-03	VIEW OF INTERLOCKING DOORS WHICH PROVIDED ACCESS TO RADIO FREQUENCY INTERFERENCE (RFI)-SHIELDED SATELLITE DATA TERMINAL (SDTL) AREA, LOOKING SOUTH.



Legend

① → Photo Locator

NOT TO SCALE

1 Building 1001


1001


4
MAKE SURE THAT THE DOOR LATCHES BEHIND YOU!
CAUTION
WATCH YOUR STEP
Room Cleared

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U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 1002
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Log No. USAF041221A-B

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

PHOTOGRAPHS

California Office of Historic Preservation
1416 9th Street, Room 1442
Sacramento, CA 95814

FOR OFFICIAL USE ONLY

U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 1002
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Log No.USAF041221A-B

SECTION I

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SECTION II

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HISTORIC AMERICAN BUILDING SURVEY
LEVEL II-TYPE DOCUMENTATION

U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 1002

Log No. USAF041221A-B

A. Location: Building 1002, Onizuka Air Force Station
1080 Innovation Way, Sunnyvale, Santa Clara County, California

B. Significance: Building 1002, constructed between 1962-64 to provide administrative space, is a contributing resource to the National Register-eligible U.S. Air Force Satellite Test Center Historic District. The district is significant at a national, state, and local level under Criterion A for its associations with satellite reconnaissance during the Cold War, and Criteria Consideration G, because five of the six buildings, including Building 1002, are not yet fifty years old, and have exceptional importance for their associations with satellite reconnaissance during the Cold War.

The U.S. Air Force Satellite Test Center Historic District is significant at the national level for its association with satellite reconnaissance during the Cold War. The installation was established in 1959 to serve as the command-and-control center for the first reconnaissance satellite program, the Corona Program. It was developed by the U.S. Air Force and the Central Intelligence Agency (CIA), with assistance from a private contractor, Lockheed Missiles and Space Division. Shortly thereafter, the National Reconnaissance Office (NRO) was established to provide oversight of the program as well as develop other satellite programs. As new satellite technologies developed, such as communications, early missile warning, meteorology, navigation, and nuclear detonation detection, Building 1002 was constructed to provide administrative support. These satellite programs also provided valuable data throughout the Cold War, and were supported from the U.S. Air Force Satellite Test Center Historic District. Although many of the satellite programs remain classified, it is apparent through the continued presence of the NRO that the installation played a key role in the United States' conduct of the Cold War.

The U.S. Air Force Satellite Test Center Historic District is also significant at the state and local levels for its association with the development of California as a leader in technological innovations. California, and specifically the City of Sunnyvale in Silicon Valley, began to emerge as a leading technological center during the Cold War. This was due, in part, to the military's investment in the development of defense technologies in California, such as command and control of reconnaissance satellites at Onizuka Air Force Station (AFS). The presence of Lockheed Missiles and Space Division in Sunnyvale California in the mid-1950s, followed by Onizuka AFS in the late 1950s, laid the groundwork for the development of this area as a high-technology center. The district's period of significance extends from 1959, the date of development of the installation, through 1991, the conclusion of the Cold War.

C. Description:

1. Current Description

Building 1002 is a square-plan, two-story, steel-frame building, sheathed in Exterior Insulation Finishing System (EIFS). It sits atop a concrete-pile foundation, and is capped by a flat, asphalt-clad roof with a rounded parapet. Mechanical equipment is located on the roof behind metal screens.

The north façade is divided into eight uniform sections punctuated by rounded pilasters. Six sets of four tinted ribbon windows are located on the first and second stories of the six central sections. Metal vents pierce the façade between the first and second story windows. An aluminum-and-plate-glass double-door, set within an aluminum surround, flanked by a transom and side-lights is located on the first story of the third section from the west. The entry is topped by an overhang, also clad in EIFS, and is accessed by two concrete steps, flanked by a metal-pipe railing. Two tinted ribbon windows flank the entry to the west, and the two windows above the entry are blocked.

The south façade is mostly obscured by Building 1001. It is divided into seven non-uniform sections punctuated by rounded pilasters. Five sets of four tinted ribbon windows are located on the first and second stories of the five central sections. Metal vents pierce the façade between the first and second story windows. Two single-story hyphens connect the south façade of Building 1002 to the north façade of Building 1001. A rooftop catwalk connects the two buildings, and pipes are appended to the façade.

The east façade is divided into eight non-uniform sections punctuated by rounded pilasters. The northernmost section projects from the building to shelter an exterior metal stairway with metal pipe railings. A metal-and-plate-glass door, with a metal handle, set within a metal surround is located on the first story. It is accessed by three concrete steps flanked by a metal pipe railing to the north. A double-metal-and-plate-glass door, with no exterior hardware, set within a metal surround is located on the second story. Moving south from the entry, a single tinted window is located in one section, and seven sets of four tinted ribbon windows pierce the first and second stories of the seven remaining sections. Metal vents pierce the façade between the first and second story windows.

The west façade is divided into nine uniform sections punctuated by rounded pilasters. Moving from north to south, the first section features four tinted ribbon windows; the following section features two tinted ribbon windows, and two blocked-in windows; the following three sections all feature four tinted ribbon windows; the sixth section features a double-metal-louvered door, with metal handles, set within a metal surround on the first story, and a set of four tinted ribbon windows on the second story; the following two sections feature four tinted ribbon windows, and the remaining section features two blocked-in windows, and two tinted windows. The west façade of the single-story hyphen between Building 1002 and 1001 is clad in vertical metal siding. A recessed entry pierces the hyphen, and features a double-plate-glass door, set within a metal surround, flanked by a transom, and floor-to-ceiling window panels.

The first story of Building 1002 encompasses 25,664 square feet and the second story encompasses 25,271 square feet. The building also features an interior courtyard. The concrete-paved courtyard is landscaped with mature trees and shrubbery, and furnished with wood picnic tables. A current sketch plan is included in the Index to Photographs. A comparison of the original floor plan with the current floor plan indicates that the majority of the interior has been reconfigured. An inspection of select interior spaces, coupled with information included in the Onizuka AFS Drawing Number Log, indicate that most interior spaces, even in cases where they retain their original configuration, no longer retain their original function, features, or finishes. However, the building retains its function as an administrative building.

2. According to Original Plan

Original plans of Building 1002 are on file in the Civil Engineering Office, Building 1002, Onizuka AFS, Sunnyvale, Santa Clara County, California. Building 1002 was constructed in two sections. In 1962, building plans for the first section were prepared by Kaiser Engineers, a division of the Henry J. Kaiser Company in Oakland, California, under the auspices of the U.S. Air Force Space Systems Division (SSD). In 1964, building plans for the second section were prepared by Maher & Martens in San Francisco, California, under the auspices of the U.S. Army Corps of Engineers (USACE) Sacramento District. The 1964 addition will be described in this section because it was envisioned as part of the original plans, and was constructed shortly thereafter. The following plans are featured in the graphic documentation section of the report:

- "Addition to the Satellite Test Annex First Floor Plan" (Kaiser Engineers/U.S. Air Force SSD, January 15, 1962a)
- "Addition to the Satellite Test Annex Second Floor Plan" (Kaiser Engineers/U.S. Air Force SSD. January 15, 1962b)
- "Satellite test Annex Addition First Floor Plans and Miscellaneous Details" (Maher & Martens/USACE Sacramento District, May 7, 1964a)
- "Satellite Test Annex Addition Second Floor and Roof Plans" (Maher & Martens/USACE Sacramento District, May 7, 1964b)

In addition, historic photographs were also consulted to determine the original appearance of the building. A sampling of historic photographs are reproduced in the graphic documentation section of the overview report entitled California State Historic

Preservation Office, Historic American Building Survey Level II-Type Documentation, U.S. Air Force Satellite Test Center, Log No. USAF041221A.

Kaiser Engineers developed site plans for Building 1002 entitled “Addition to the Satellite Test Annex Plot Plan,” dated January 15, 1962. The plan indicated that an L-plan administrative building, now known as Building 1002, was appended to the north façade of Building 1001 by a single-story hyphen. The plan also included provision for a future addition which would be appended to the east façade of Building 1002, resulting in the creation of a rectangular-plan building with two interior courtyards (Kaiser Engineers/U.S. Air Force SSD, January 15, 1962d).

Original plans indicate that as constructed in 1962, Building 1002 was a two-story, steel-frame, L-plan building that sat atop a concrete-pile foundation, and was capped by a flat, built-up, asphalt-clad roof. According to plans and historic photographs, it was clad in pre-cast concrete panels, and featured tinted ribbon windows on the first and second stories, interspersed with solid panels, separated by two-story metal pilasters. An entry was located on both the north façade and the west façade of the hyphen which connected Building 1002 to Building 1001. Mechanical equipment was located on the roof (Kaiser Engineers/U.S. Air Force SSD, January 15, 1962a-c).

According to the plans, the first story of Building 1002 housed offices for technical directors and their support staff, field training and detachment, and security. It also housed a conference room, telephone equipment room, technical library, publications, and reproduction rooms (Kaiser Engineers/U.S. Air Force SSD, January 15, 1962a). The second story housed maintenance, engineering, administration, financial, personnel, and intelligence offices, possibly occupied by the NRO (Kaiser Engineers/U.S. Air Force SSD, January 15, 1962b).

The full extent of the building as it was envisioned in 1962 was never realized. However, in 1964, plans were prepared for a two-story, L-plan addition appended to the east façade of Building 1002. The addition resulted in a square-plan building with an interior courtyard. Plans and historic photographs indicate that the appearance of the 1964 addition was identical to the 1962 building, and provided additional administrative space. The northern end of the east façade featured two entries on the first and second stories. The second-story entry was accessed via metal stairway with metal-pipe railings. The western end of the south façade was pierced by a double-door entry. The eastern end of the south façade featured a hyphen that connected the building to Building 1001 (Maher & Martens/USACE Sacramento District, May 7, 1964a-c).

According to the original plans, finishes were typical of the time period. Floors were clad in asphalt tiles, walls were clad in gypsum wall board or cement, and ceilings were clad in acoustical tiles (Maher & Martens/USACE Sacramento District, May 7, 1964d).

D. History:

1. Development of the Satellite Test Center, 1959-61

The development of satellite reconnaissance during the Cold War (1946-91) and the specific role of the U.S. Air Force Satellite Test Center (STC) is fully described in the associated overview report, California State Historic Preservation Office Historic American Building Survey Level II-Type Documentation, U.S. Air Force Satellite Test Center, Log No. USAF041121A. The following section provides a brief summary of the role that Building 1002 played at the STC from 1959-91, its period of significance.

The installation was established in 1959 when Building 1001 was constructed to serve as the command-and-control center for the Corona Program to support the launch, orbit, and recovery of Corona satellites. The Corona Program, initiated in 1958, was the first reconnaissance satellite program developed by the U.S. Air Force and the CIA, with assistance from private contractors, such as Lockheed Missiles and Space Division, located in Sunnyvale, California. Concerns about preserving the secrecy of the Corona Program and its objectives led to the designation of the Discoverer Program as a cover program. The publicly-stated goal of the Discoverer Program was scientific research (Richelson, 2002). Prior to the construction of Building 1001, at least eight Corona satellites, described as Discoverer satellites in the press, were launched from Vandenberg Air Force Base (AFB), and were supported from an interim control center in Palo Alto, California. Tracking stations located around the world also provided support.

In 1959, the U.S. Air Force acquired 11.43 acres of land in Sunnyvale from Lockheed Missiles and Space Division located to the west. Plans for the installation were designed by the Ralph M. Parsons Company, an architecture and engineering firm based in Los Angeles, California, under the auspices of the U.S. Air Force Ballistic Missile Division (AFBMD) in Englewood, California (Ralph M. Parsons Company/AFBMD, March 6, 1959).

On January 28, 1960, the installation, newly designated as the STC, was dedicated by the U.S. Air Force (Davies, 1960). A few months later, on March 1, 1960, it was occupied by the 6594th Aerospace Test Wing (ATW), the first unit to be tasked with military satellite operations; Lockheed Missiles and Space Division employees; and likely the CIA. The 6594th ATW provided oversight for Lockheed Missiles and Space Division which was responsible for satellite operations (6594th ATW, 1961; Jernigan, 1983). However, portions of the building remained under construction, including the state-of-the-art Satellite Control Room in the Satellite Control Room Complex. An interim Satellite Control Room was established from which Lockheed Missiles and Space Division, monitored by the 6594th ATW, could direct the launch, tracking, data acquisition, command and control, and recovery phase of military satellites (6594th ATW, 1961; Jernigan, 1983).

On July 7, 1960, the installation was officially designated as the Satellite Test Annex (STA) under the jurisdiction of the AFBMD. However, it should be noted that it continued to be referred to as the STC, both in U.S. Air Force documents, as well as by the public, likely due in part to a building sign which indicated "US Air Force Satellite Test Center." On February 6, 1961, the Satellite Control Room and remainder of the Satellite Control Room Complex became operational. The primary purpose of the complex was to support Corona satellites, although additional programs were supported by this time (Jernigan, 1983).

2. <u>Significant Events and Satellites Supported, 1960-61</u>

In August 1960, the U.S. Air Force accomplished the first successful retrieval of a Discoverer satellite. On August 10, Discoverer XIII was launched from Vandenberg AFB, and was supported by the STC. The satellite achieved polar orbit for a period of ninety-four minutes, during which time it was in contact with worldwide tracking stations, and the interim Satellite Control Room at the STC. During its seventeenth rotation of the earth, the eject command was issued from the STC, and the capsule was ultimately recovered from the Pacific Ocean, marking the first successful retrieval of an object from space (Arnold, 2005; 6594th ATW, no date [n.d.]). In keeping with the publicly stated scientific objectives of the Discoverer Program, the *San Jose Mercury News* noted that "Discoverer recovery techniques will be used soon to return monkeys from space," and were vital to "returning a man to earth after orbiting in space" (Lindsey, August 12, 1960). Still in the testing phase, the satellite did not yet contain a camera (Jernigan, 1983).

Shortly after this historic event, Discoverer XIV was launched on August 18, 1960 from Vandenberg AFB (Arnold, 2005). Discoverer XIV orbited the earth seventeen times, supported by the STC from the interim Satellite Control Room in Building 1001, and the Kodiak tracking station, before the eject command was relayed to the satellite. Following the command, at 300 miles above the earth, the satellite recovery vehicle (SRV) separated from the spacecraft, and began its descent to earth, where it was caught by a specially equipped Fairchild C-119 *Flying Boxcars* (C-119) piloted by U.S. Air Force Captain Harold Mitchell (*The New York Times,* August 20, 1960).

The Discoverer XIV SRV contained 20 pounds of film which documented over 1,650,000 square miles, and provided the first successful satellite reconnaissance photographs of the Soviet Union. It also resulted in more photographic coverage of the Soviet Union than all previous U-2 flights combined. Furthermore, it 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 (ICBM) (Day, 2006). However, despite the historic nature of this event, the crew, who were not cleared for the Corona Program, were unaware of the importance of their mission (Arnold, 2005).

Although the STC was developed to support the Corona Program, by the fall of 1960, it also supported the Satellite and Missile Observation System (SAMOS) and Missile Detection Alarm System (MIDAS). Both programs were initially developed by the U.S. Air Force in the mid-1950s as reconnaissance and missile detection satellites, respectively (Jernigan, 1983). On October 11, 1960, the first SAMOS satellite was launched from Vandenberg AFB, and supported from the STC, although it failed to reach orbit (*San Jose Mercury News*, October 12, 1960). By July 1961, MIDAS satellites were launched from Vandenberg AFB and supported by the STC. By the end of 1961, two MIDAS satellites had reached orbit (6594th ATW, 1961).

In April 1961, Discoverer XXIII was launched from Vandenberg AFB, and was the first Corona satellite supported by the STC from the new control room. By this time, Corona satellites were regularly providing images of the Soviet Union, as well as other communist countries. Among these images included evidence of the building of the Berlin Wall between East and West Germany (Chapman, 2008). In September 1961, the NRO was established as a classified agency in the Department of Defense (DoD), and was tasked with oversight of reconnaissance satellite programs, including the Corona Program, and therefore became a presence at the STC (Richelson, 2000).

3. Building 1002 Construction and Upgrades, 1962

In 1962, plans for a two-story, L-plan building – Building 1002 (Addition to the Satellite Test Annex) - were prepared for the U.S. Air Force SSD by Kaiser Engineers, a division of the Henry J. Kaiser Company. Kaiser Engineers was a well-known architecture and engineering firm located in Oakland, California (Kaiser Engineers/U.S. Air Force SSD, January 15, 1962a-b; Air Force Satellite Control Facility (AFSCF), 1972).

Henry J. Kaiser founded his eponymous company in 1914. The company quickly grew through its involvement with large-scale public projects, such as the Hoover Dam in Boulder City, Nevada, and the Grand Coulee Dam, in Grand Coulee, Washington. In addition, Kaiser's company was heavily involved with World War II (1941-45) manufacturing efforts, and fabricated munitions, aircraft, and ships. During the war, engineers at Kaiser's company also constructed airfields and other military facilities. These wartime efforts led to the development of Kaiser Engineers as a separate division of the Henry J. Kaiser Company. Furthermore, Kaiser was a World War II-era backer of the Sunnyvale-based Joshua Hendy Iron Works. As a result, it is likely that the military and Sunnyvale connections Kaiser had cultivated over the years contributed to the selection of Kaiser Engineers for the STC project (Kaiser Engineers, n.d.).

Original plans indicated that an L-plan administrative building, now known as Building 1002, was appended to the north façade of Building 1001 by a hyphen. Furthermore, the plan included provision for a future addition which would be appended to the east façade of Building 1002, resulting in the creation of a rectangular-plan building with two interior courtyards (Kaiser Engineers/U.S. Air Force SSD, January 15, 1962d). Construction on the L-plan building commenced in April 1962 and was completed by September of that year. The new building was connected to the north façade of Building 1001 by a hyphen, and provided administrative space (Kaiser Engineers/U.S. Air Force SSD, January 15, 1962a-b). During this time, Kaiser Engineers also prepared plans for a single-story addition to Building 1001 to house a new communications center, and interior modifications for the Satellite Control Room Complex (Kaiser Engineers/U.S. Air Force SSD, October 17, 1962; Jernigan, 1983).

The 1962 renovations were likely implemented in conjunction with the U.S. Air Force's first modernization effort, the Multiple Satellite Augmentation Program (MSAP). This effort was initiated in part, to standardize and provide updated equipment to the STC and tracking stations which would enable them to simultaneously support multiple satellite programs (Lockheed Missiles and Space Division, 1963). Computer capabilities were upgraded, new display and communications equipment were also installed, and connections between the STC and tracking stations were upgraded (Jernigan, 1983).

4. <u>Significant Events and Satellites Supported, 1962-64</u>

On February 27, 1962, Discoverer XXXVIII was launched and supported from the STC. The following month, the DoD classified all military satellite programs (DoD, March 23, 1962). As a result, Discoverer XXXVIII was the last satellite launched as part of the Discoverer program. Corona satellites continued to be launched and supported by the STC, however, because all satellites were classified, the Corona Program no longer required a cover story.

Between 1962-64, the STC supported over fifty Corona satellites. By this time, Corona satellites had accurately mapped all twenty-five of Moscow's long-range missile sites. Furthermore, images taken by Corona satellites indicated that China was readying its nuclear facility in Lop Nur for testing. It was noted in a classified CIA briefing that "[O]n the basis of new overhead photography, we are now convinced that the previously suspect facility at Lop Nur in western China is a nuclear test site which could be ready for use in about two months." Within two months, on October 16, 1964, China tested an atomic bomb at the Lop Nur site (Broad, September 12, 1995).

In addition to Corona, SAMOS, and MIDAS satellites, the STC supported the Defense Meteorological Satellite Program (DMSP) in 1962 and 1963. DMSP was a meteorological satellite program initiated in 1960 to provide weather and climate data for more effective military operations (DMSP, n.d.). On October 16, 1963, the first Vela satellite was launched and supported by the STC. The Vela Program – vela means vigil in Spanish – was a series of satellites designed to detect nuclear detonations (Jernigan, 1983; Peebles, 1997). Presumably, Vela satellites provided images of the Lanzhou Diffusion Plant in Lanzhou, China and the Baotao Nuclear Fuel Component Plant in Baotao, China (Richelson, 2002).

In November 1963, the final SAMOS satellite was launched (Peebles, 1997). Furthermore, 1963 marked the beginning of the Keyhole (KH)-7 surveillance system, noted in a 2006 NRO memo as "the Intelligence Community's first high resolution surveillance or 'spotting' satellite." Similar to Corona satellites, the KH-7 was a reconnaissance satellite that returned film to earth in SRVs. It was primarily used to provide surveillance of nuclear facilities and Intermediate Range Ballistic Missiles (IRBM) in the Soviet Union and China (NRO, 2006).

In July 1964, two additional Vela satellites were launched, resulting in a total of four orbiting satellites capable of detecting nuclear detonations. In August 1964, Syncom III was launched and supported by the STC. Syncom III was a National Aeronautics and Space Administration (NASA) satellite used for DoD military communications experiments between Saigon, Vietnam, and Hawaii (Jernigan, 1983).

5. Construction, Upgrades, and Designation of the Air Force Satellite Control Facility, 1964-67

As indicated on the 1962 plan entitled "Satellite Test Annex Plot Plan," an addition to Building 1002 was planned during its initial construction. The full extent of the building was never realized. However, in May 1964, plans were prepared for a two-story, L-plan addition to Building 1002 to provide additional administrative space. The addition was designed by Maher & Martens, a San Francisco-based architecture firm for the USACE, Sacramento District.

Maher & Martens was founded in 1961 by Edward John Maher and Henry Ernest Martens, both members of the Northern California Chapter of the American Institute of Architects (AIA) (AIA, 1970). Prior to the formation of Maher & Martens, Maher was a principal in the firm Blanchard & Maher, which was hired by the U.S. Forest Service in the 1930s to design buildings in California's national parks (Grosvenor, 1999). Maher & Martens received awards for their design for San Francisco Bay Area Rapid Transit and the U.S. Department of Housing and Urban Design (AIA, 1970). The addition was appended to the east façade of Building 1002, and created an interior courtyard. A hyphen connected the south façade of Building 1002 to the north façade of Building 1001 (Maher & Martens/USACE Sacramento District, May 7, 1964a-b; AFSCF, 1972).

In 1965, the U.S. Air Force Satellite Control Facility (AFSCF) was officially designated. The mission of the AFSCF was to direct launch, tracking, data acquisition, command and control, and recovery of DoD military satellites. Following the establishment of AFSCF, an Interim Expansion Plan (IEP) was initiated to augment the facility and implement the Mission Control Center (MCC) concept, which focused on the development of mission-oriented control centers rather than a single control room (Jernigan, 1983).

Plans were prepared by San Francisco-based consulting engineers, Bentley Engineers and Earl & Wright, Inc., under the auspices of the U.S. Air Force SSD to develop multiple MCCs in Building 1001. The plans indicate that the building was reconfigured to accommodate four new MCCs, known as MCCs 1, 2, 3, and 4. In addition, the building featured two new complex areas, known as Complex Numbers 6 and 7. The plans also indicated that two new communications areas, labeled as Communications Area A and B, were also added, as well as a new bird buffer area (Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD, December 13, 1965a-e). The majority of the work was completed by December 1966 (AFSCF, January-June 1966).

6. Significant Events and Satellites Supported, 1965-70

The increase in the number of flight support hours logged by the AFSCF between 1965-66 appears to indicate that at least some of the MCCs were operational in 1966. In 1965, the AFSCF logged 20,757 hours of satellite flight support. By 1966, 29,400 hours of flight support were logged. The number of satellites supported also increased. In 1965, the STC supported approximately fourteen satellites (AFSCF, 1972). In January 1967, the STC supported thirty-one satellites per day, and by June were supporting forty-four per day, which was expected to increase to forty-seven per day by July (AFSCF, January-June 1967).

Between 1965-70, the STC supported over forty Corona satellite launches (Mission and Spacecraft Library, n.d.). By 1966, upgrades to the installation had resulted in an increase in satellite programs involvement. In addition to Corona, Vela, and other programs (many of which likely remained classified) new programs such as NASA's Biosatellite Program were supported. The Biosatellite Program was a series of three satellites designed to assess the effects of spaceflight on living organisms. Support for the program focused on directing operations of the recovery of the satellites by Lockheed C-130 *Hercules* (C-130) aircraft flown by the 6594th Aircraft Recovery Group based at Hickam AFB, Honolulu, Hawaii (Jernigan, 1983).

In June 1967, two scientific satellites, one owned by the U.S. Army, the other by the U.S. Navy, were launched as the first flight in the DoD Space Experiments Program (SESP). SESP was responsible for providing flights for research and experiments undertaken by government agencies (AFSCF, January-June 1968; Jernigan, 1983). In 1967, the KH-7 surveillance system was terminated, after having flown thirty-eight missions, thirty-four of which successfully returned usable images (NRO, 2006).

In June 1968, the *San Jose Mercury News* reported that satellite reconnaissance, likely supported by the STC, uncovered the Soviet Union's plans for the invasion of Czechoslovakia. The article noted that "[S]atellites spinning over Eastern Europe monitored Soviet radio transmissions which signaled the invasion was imminent, and photographic reconnaissance satellites had monitored unusual military activities on the Czech borders by Soviet, East German, Polish, Hungarian, and Bulgarian troops" (*San Jose Mercury News*, August 27, 1968).

In September 1968, a Lincoln Experimental Satellite (LES) was launched into orbit and supported by the STC and tracking stations. The LES was an experimental satellite used to test communications between aircraft, ships, and ground forces (Jernigan, 1983).

In 1969, support was provided for NASA's manned flights to the moon. The STC supported Apollo missions 9 and 10, and Apollo 11, the first manned lunar landing mission. Program 949 was also supported in 1969 (AFSCF, January-June 1969). Program 949 was designated in November 1966 to supplant Program 461, which had initially supplanted the MIDAS Program in 1963. Program 949 provided a wider range of capabilities, and by the 1970s, was expected to have "progressively enhanced world-wide early-warning, surveillance and detection capabilities" (Piper, 1970).

7. <u>Development of Buildings 1003 and 1004, 1966-70</u>

In conjunction with the technological upgrades which occurred throughout the mid-to-late 1960s, in August 1966, a real estate estimate was prepared by the USACE Sacramento District which proposed the acquisition of 8.2 acres of land from Lockheed Aircraft Corporation, at a cost of $49,000. In 1966, C.F. Braun & Company of Alhambra, California, under the auspices of the U.S. Naval Facilities Engineering Command (NAVFAC) Western Division, San Bruno, California, and Space and Missiles System Organization (SAMSO), Los Angeles, California, prepared site development plans (C.F. Braun/NAVFAC/SAMSO, December 30, 1966). C.F. Braun & Company also prepared plans to develop two new buildings, Building 1003 (STC Building Addition), and Building 1004 (Power Plant) (C.F. Braun/NAVFAC/SAMSO, November 14, 1967; August 12, 1968).

By August 1968, Lockheed Aircraft Corporation transferred the land to the U.S. Air Force (Lockheed Aircraft Corporation, 1968; Jernigan, 1983). By this time site development was underway, and included relocation of an existing Lockheed Missiles and Space building; reconfiguration of Lockheed Martin Way (formerly known as East Perimeter Road) west of Building 1001; creation of additional parking space; and installation of underground utilities (C.F. Braun/NAVFAC/SAMSO, December 30, 1966).

Following site development, construction of Buildings 1003 and 1004 commenced. Building 1003 was designed to house the Manned Orbiting Laboratory (MOL) Program, as well as other satellite programs. The MOL Program was initiated in 1963. The concept involved a Titan III booster rocket which carried a modified Gemini B capsule attached to a space laboratory, and was intended to serve reconnaissance purposes (Jernigan, 1983). However, in June 1969, the DoD announced the cancellation of the MOL Program to save money. The cancellation led to a short work stoppage, however construction resumed a few weeks later. *Aerospace Daily* reported that the U.S. Air Force had evaluated requirements for current and future programs, and determined that construction on the building should continue (*Aerospace Daily*, September 19, 1969).

By the end of 1969, the 164,000-square foot building, constructed at a cost of $8 million was nearly complete. The building was painted "Air Force blue," resulting in its nickname, the "Blue Cube" (*Aerospace Daily*, September 19, 1969). Building 1003 housed multiple MCCs, communications and crypto equipment, a data distribution center, mechanical equipment, CDC 3800 computers, and a tape library (AFSCF, 1970). In addition, shortly after it was constructed, the Vela Program office, along with another unidentified satellite program, was relocated from Building 1001 to Building 1003 (AFSCF, July-December 1969).

Building 1004 was also designed by C.F. Braun & Company. Solar, a division of International Harvester Company, provided the Saturn gas turbine generator sets that powered the plant. The development of Building 1004 necessitated modifications to the installation's power distribution system. Ties to the electric power provided by Pacific Gas and Electric (PG&E) were severed, with the exception of one power line which provided power through a Lockheed Missiles and Space Substation, and was likely kept active to provide back-up power (AFSCF, 1972). The plant, staffed by Solar contractors, was operational in February 1970, and provided power to the entire installation, rendering it energy-independent at that time (Jernigan, 1983).

8. Upgrades, Significant Events and Satellites Supported, 1970s

On January 1, 1971, AFSCF re-designated STC as Sunnyvale AFS. In the 1970s, Sunnyvale AFS continued to support existing and newly established satellite programs, although many of them remained classified. By this time, MCCs were established in both Building 1001 and 1003. Administrative support continued to be housed in Building 1002. The Onizuka AFS Drawing Number Log indicates that there were few plans prepared for Building 1002 during the 1970s, likely because it was constructed in 1962 and 1964, and because it provided administrative, rather than technical support, for satellite programs. However, it is likely that alterations to Building 1002's electrical system were undertaken following construction of Building 1004 in 1970s.

In 1970, the AFSCF Satellite Test Operations Historical Reports noted the successful support of two "unique orbital events" from the installation. These events included support of the Apollo 13 mission in April, which was aborted following the explosion of an on-board oxygen tank, and support of the first North Atlantic Treaty Organization (NATO) communications satellite in March (AFSCF, January-June 1970).

In June 1970, the final Vela satellite was launched. Sunnyvale AFS continued to provide support from Building 1003 throughout the 1970s for the orbiting satellite (Jernigan, 1983). Program 949 was also re-designated the Defense System Program (DSP) in 1970. Sunnyvale AFS continued to support this program throughout the early 1970s (AFSCF, July-December 1970; 1971; 1972). The DSP satellite weighed 2,000 pounds, was approximately 23' long, 10' wide, and contained a large infrared telescope which scanned the earth for missile launches. In the event a missile was launched, it would be detected by the United States within minutes, which removed the possibility of a surprise attack (Peebles, 1997).

By November 1971, a pair of Defense Satellite Communications System (DSCS) II advanced communications satellites had been launched to handle voice, teletype, computerized digital data, and video transmissions (Jernigan, 1983). The first KH-9 satellites – code-named HEXAGON, and popularly known as "Big Bird" – were also launched in 1971. The KH-9 satellites were 30,000-pound photographic reconnaissance satellites initially developed in the 1960s. Similar to Corona satellites, they were designed to photograph large areas, and return the film to earth via SRV. They carried technologically advanced cameras, additional film capsules, and antennae for other intelligence-gathering purposes (Clark, 2007).

In January 1972, President Richard Nixon announced the development of the Space Transportation System (STS), or Space Shuttle Program, managed by NASA. Kennedy Space Center in Houston, Texas, and Vandenberg AFB would serve as the operational bases for the program. Research and development (R&D) shuttle launches would originate from the Kennedy Space Center, and military launches would originate from Vandenberg AFB. The shuttle would be responsible for the launch of all commercial, scientific, and military satellites into space. The AFSCF, including Sunnyvale AFS and tracking stations, would provide tracking and control for the program (Jernigan, 1983).

On May 25, 1972, Sunnyvale AFS supported the 145th and final launch of the Corona Program from the original Satellite Control Room in Building 1001. It was terminated as a result of advances in satellite technology. By the time the Corona Program concluded, Corona satellites had provided approximately 800,000 reconnaissance photographs covering approximately 510 million square miles (Chapman, 2008; Vukotich, n.d.). Following its termination the Satellite Control Room Complex likely continued to be utilized for control of other satellite programs.

In 1976, the first DMSP Block 5D, a meteorological satellite, was launched, and was presumably supported from Sunnyvale AFS. It was an upgraded version of the 1960s-era DMSP, and provided twice-daily, world-wide meteorological, oceanographic, and solar-terrestrial physics measurements. The satellites continued to be launched throughout the 1970s (Jernigan, 1983; Wade, n.d.).

In 1976, the KH-11 KENNAN satellite, a reconnaissance satellite, was launched. It was the first successful electronic imaging satellite, and transmitted high-quality images in real time (Vick, 2007). A 1978 *San Jose Mercury News* article noted that some sources indicated that the top-secret "KH-11, from 200 to 300 miles up, can detect a pack of cigarets [sic] on Russian soil," while another source indicated it could only "read the lettering on billboards" (Ingersoll, 1978). Nonetheless, this top-secret satellite represented significant advances in the development of satellite technology, and was supported from Sunnyvale AFS, as well as associated tracking stations.

9. **Development of the Air Force Satellite Control Network, Expansion, and Upgrades, 1980s**

According to the Onizuka AFS Drawing Number Log, numerous plans were prepared to modify and maintain all buildings throughout the 1980s, to keep up with evolving satellite technologies. Although more plans were prepared to modify Buildings 1001, 1003, and 1004, a significant number of plans were also prepared for Building 1002 throughout the 1980s. These plans typically involved room reconfiguration, likely in response to changing personnel associated with new satellite programs, as well as general administrative requirements. For example, in 1980, plans were prepared to upgrade administration areas on the first and second stories, including Rooms 689, 690, 693, 694, 695, 696, 689, and 690. Plans were also prepared to modify the finance area, soundproof Room 628, and modify Room 631. Throughout the 1980s, similar plans were prepared to modify the majority of rooms in the building (Onizuka AFS, n.d.).

In 1982, the Air Force Satellite Control Network (AFSCN) was organized. The AFSCN was not a formal organization, but rather denoted a group of common user resources, assets, and facilities which collectively provided tracking, telemetry & commanding (TT&C) support for virtually all DoD spacecraft, and select NASA and foreign government programs (Hane, 1988). The goal of the AFSCN was to provide "enduring control capability commensurate with the need for operational space suites throughout the conflict spectrum" (AFSCF, 1983).

To accomplish this goal, Sunnyvale AFS was upgraded as part of the Data Systems Modernization Program. This $500 million upgrade introduced centralized database-driven computer hardware and software to replace outdated systems. The upgraded system was more reliable, cheaper to maintain, and faster than its predecessor, allowing it to support a steadily increasing satellite support workload (Fedor et al., 2006).

A new satellite control center – the Consolidated Space Operations Center (CSOC) – was constructed at Falcon AFS, Colorado Springs, Colorado (present-day Schriever AFB) in conjunction with the Data Systems Modernization Program (Fedor et al., 2006). The CSOC was constructed partially due to concern about the vulnerability of Sunnyvale AFS to earthquakes and terrorism (Philp, June 9, 1985).

Buildings 10031 and 10032 were constructed at the STC in the 1980s in conjunction with the Data Systems Modernization Program to provide additional space for satellite control. In 1981, King/Reif and Associates, an architectural and planning firm, prepared plans for Building 10031 on behalf of NAVFAC Western Division (King/Reif and Associates/NAVFAC, December 18, 1981). In 1982, plans were prepared for Building 10032 by Rasmussen Ingle Anderson, a San Francisco-based architecture firm, under the auspices of NAVFAC Western Division. Both three-story buildings housed two stories of parking space, and had radio frequency interference (RFI)-shielded third stories with secure space for MCCs, computer rooms, communications rooms, and offices that supported satellite programs (King/Reif and Associates/NAVFAC, December 18, 1981; Rasmussen Ingle Anderson/NAVFAC, October 29, 1982). Both buildings were operational by 1984 (Fola Odafalu, pers. comm., July 26, 2010).

10. Significant Events and Satellites Supported, 1980s

Sunnyvale AFS continued to support numerous satellite programs throughout the 1980s, although many remained classified. On April 12, 1981, the first mission flown by the Space Shuttle *Columbia* was launched, and successfully returned to earth on April 14. The AFSC provided support for the mission, and five AFSCF mission controllers received U.S. Air Force Commendation Medals. In June 1982, the first classified military payload was carried into orbit aboard the fourth shuttle mission flown by *Columbia,* and was supported from MCC B in Building 1003 (Jernigan, 1983).

In February 1983, Libyan troops, led by military dictator Colonel Muammar al-Gaddafi, appeared to be planning a surprise invasion of Chad and Sudan. The United States launched a KH-8 reconnaissance satellite to provide photographs of the activity. The top-secret satellite was supported by Sunnyvale AFS. The mission produced photographs that documented massive troop build-ups at the border of Sudan, and the *USS Nimitz* was dispatched to the Gulf of Sidra, thus preventing a Libyan invasion of Sudan (Levien, 1989; Philp, October 30, 1985). In 1984, the twentieth and last KH-9 satellite was launched and supported from Sunnyvale AFS (Day, November 8, 2004).

The first dedicated military flight, aboard the Space Shuttle *Discoverer,* was launched in January 1985, and an article in the August 2009 edition of *Air & Space Magazine* indicated that "according to most accounts, STS-51C's payload was ORION, an eavesdropping satellite for signals intelligence" (Cassutt, August 1, 2009). In October 1985, the second dedicated military flight was launched by the Space Shuttle *Atlantis* (Cassutt, August 1, 2009). *The New York Times* reported that, according to reliable sources, "two $100 million communication satellites" were deployed into orbit on a mission classified as secret by the Pentagon (Broad, October 5, 1985).

In 1986, the Space Shuttle *Challenger* exploded after launch, killing its seven crew members, including the shuttle's mission specialist, Lieutenant Colonel Ellison S. Onizuka, who had trained at Onizuka AFS (NASA, 2007). That same year, Sunnyvale AFS was renamed Onizuka AFB in honor of Onizuka. Following the *Challenger* explosion, the U.S. Air Force returned 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 (Cassutt, August 1, 2009).

In 1989, a Tracking and Data Relay Satellite System (TDRSS) satellite was launched, supported by Sunnyvale AFS. The TDRSS was a sophisticated data-relay communications satellite developed by NASA (Levien, 1989).

11. <u>Onizuka Air Force Station, 1990s-Present</u>

By 1991, the Soviet Union had dissolved, signaling the end of the Cold War (Center for Air Force History, 1994). The end of the Cold War led, in part, to the declassification of the NRO in September 1992. The end of the Cold War also led to a decrease in military spending. However, modifications continued to be undertaken at Onizuka AFS, although less than in prior decades. In the early 1990s, an addition appended to the south façade of Building 1004, known as the Emergency Utility Building (EUB), and enhanced the installation's power distribution system. The Onizuka AFS Drawing Number Log indicates construction of the EUB also entailed upgrading mechanical systems in Buildings 1003, 10031, and 10032, and likely also Building 1002 (Onizuka AFS, n.d.).

In 1990, Building 1002's exterior was rehabilitated, including replacement of fenestration and application of EIFS (Fola Odafalu, pers. comm., October 13, 2009). In 1991, the 21st Space Operations Squadron (SOPS) were activated at Onizuka AFB, and assumed the role of operations of the 2nd Satellite Tracking Group. In 1992, the 750th Space Group was activated and assumed responsibility for launch and early orbit of numerous satellites, including the Space Shuttle (Schriever AFB, n.d.).

By the early 1990s, Onizuka AFB and tracking stations provided radio links to over eighty active DoD spacecraft (Mead, March 2, 1994). Satellites supported from Onizuka AFB assisted with the success of Operation Desert Storm (1990-91). For example, weather satellites assisted with U.S. missile launches, and navigation satellites assisted the troops in maneuvering through the desert. Reconnaissance satellites, such as those in the NRO's KH-11 satellite program, also likely continued to be supported by the installation (Peterson, July 30, 1993). The early 1990s also represented a key year for satellite scheduling, with the advent of a computerized scheduling system. Prior to this time, scheduling was plotted by hand, using colored tape to represent different spacecraft on approximately 50' rolls of butcher-paper (Mead, March 2, 1994). In addition, the installation also supported numerous NASA space exploration programs.

In 1994, Onizuka AFB was renamed Onizuka AFS. In 1995, the Corona Program was declassified, and the following year 800,000 images taken between 1960-72 were made available to the public. Formerly classified documents also became available (NRO, February 24, 1995).

In 1995, Onizuka AFS was realigned in accordance with the Base Realignment and Closure (BRAC) Act, and select functions were relocated to CSOC at Falcon AFB, Colorado Springs, Colorado. The realignment resulted in a loss of approximately 1,100 jobs at Onizuka AFS (City of Sunnyvale, 2006). By the end of the 1990s and during the early 2000s, responsibility for controlling the DoD satellite network continued to be transferred to the CSOC, and Onizuka AFS's responsibilities substantially decreased (Flinn, December 1, 1991; Wulff, November 29, 1995).

In 1996, a terrorist attack on Khobar Towers, a high-rise apartment complex that housed U.S., British, and French military personnel in Dhahran, Saudi Arabia led to increased security measures at U.S. military installations. At Onizuka AFS, parking was no longer permitted on the first two stories of Buildings 10031 and 10032. In addition, because Innovation Way was in close proximity to Buildings 10031 and 10032, the street was closed to vehicular traffic, covered with astro-turf, and landscaped. Jersey barriers and bollards were also installed around the perimeter of the buildings (Dennis Ralphs, pers. comm., August 2, 2010).

In 2005, the BRAC commission recommended closure of Onizuka AFS. The recommendations were approved by President George W. Bush. In 2006, the DoD, through the Office of Economic Adjustment, formally recognized the City of Sunnyvale as the Local Redevelopment Authority (LRA) for planning the redevelopment of Onizuka AFS and its conversion to civilian use (City of Sunnyvale, 2006).

In May 2007, the NRO officially departed from Onizuka AFS. A deactivation ceremony and open house were held to commemorate this event, and were attended by over 800 guests, many of them former NRO, U.S. Air Force, CIA, and civilian employees (Munro, 2007). Displays were mounted on the corridor walls of Building 1003, highlighting the history of the NRO and reconnaissance satellite programs supported from the installation between through 2007. Following the open house, displays and histories of the programs, many of which remain classified, were relocated to the NRO archives in Chantilly, Virginia (Dennis Ralphs, pers. comm., August 3, 2009).

On July 28, 2010, a closing ceremony was presided over by Lieutenant General John Sheridan, commander of the Space and Missile Systems Center, Los Angeles AFB. In attendance were current and former employees, both military and civilian, as well as Lorna Onizuka, Ellison Onizuka's widow. In his remarks, Lieutenant General Sheridan noted that "[T]his facility here in Sunnyvale has supported an amazing 3.4 million satellite operations over the past years. Much of the details of this work are still classified and we cannot talk openly about it, but what I can tell you is that the operations conducted by the NRO from this site have made our nation a tremendously safer place to be" (Bauer, July 29, 2010).

The 21st SOPS relocated to Vandenberg AFB, and on July 30, 2010, a dedication ceremony was held to commemorate the opening of the 21st SOPS Ellison Onizuka Satellite Operations Facility at Vandenberg AFB. Onizuka AFS is scheduled to be transferred out of federal hands in September 2011. It is anticipated that the Department of Veterans Affairs (VA) will occupy Building 1002, and two buildings located outside the U.S. Air Force Satellite Test Center Historic District, Buildings 1018 and 1034. The remainder of the installation will be redeveloped.

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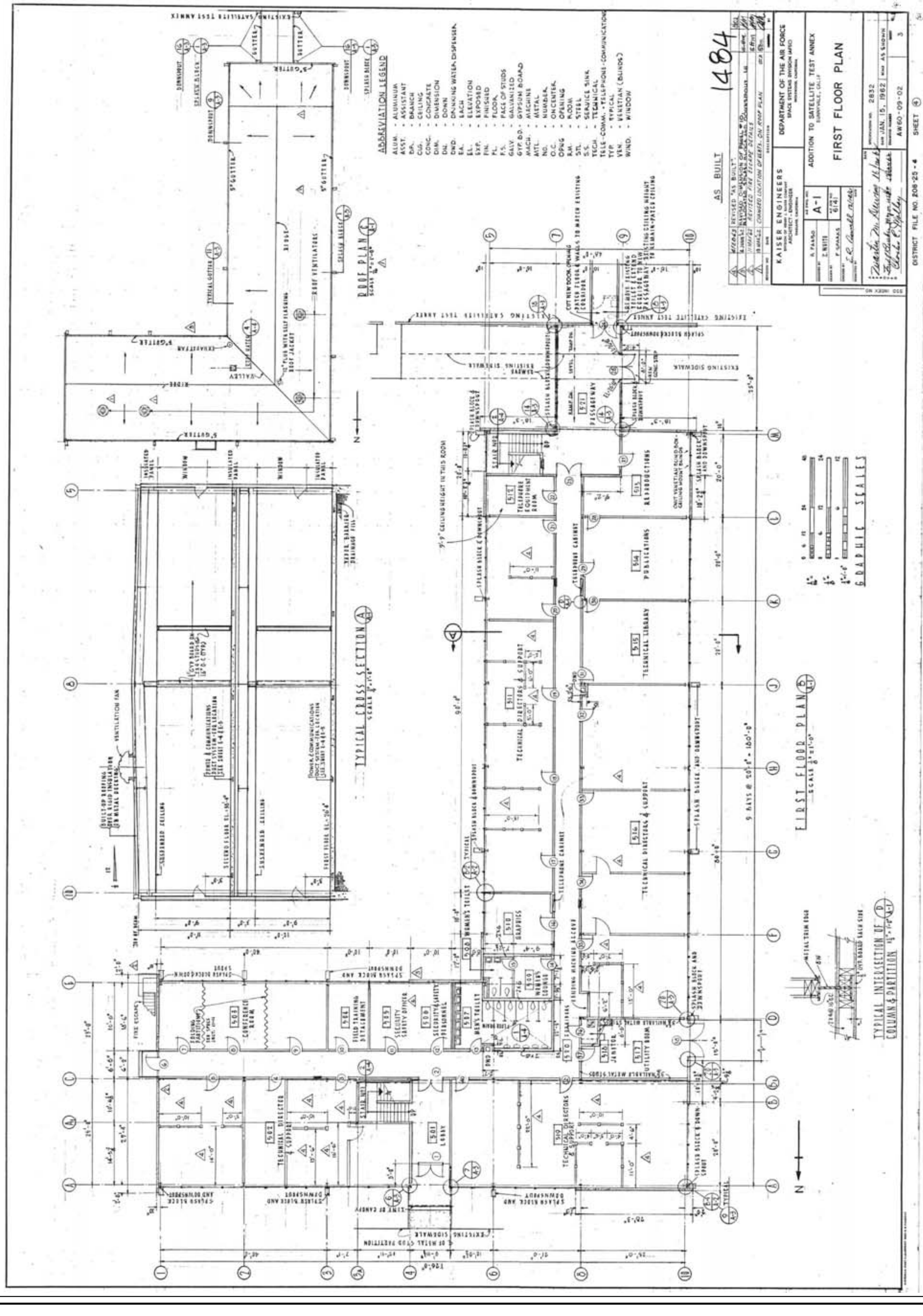
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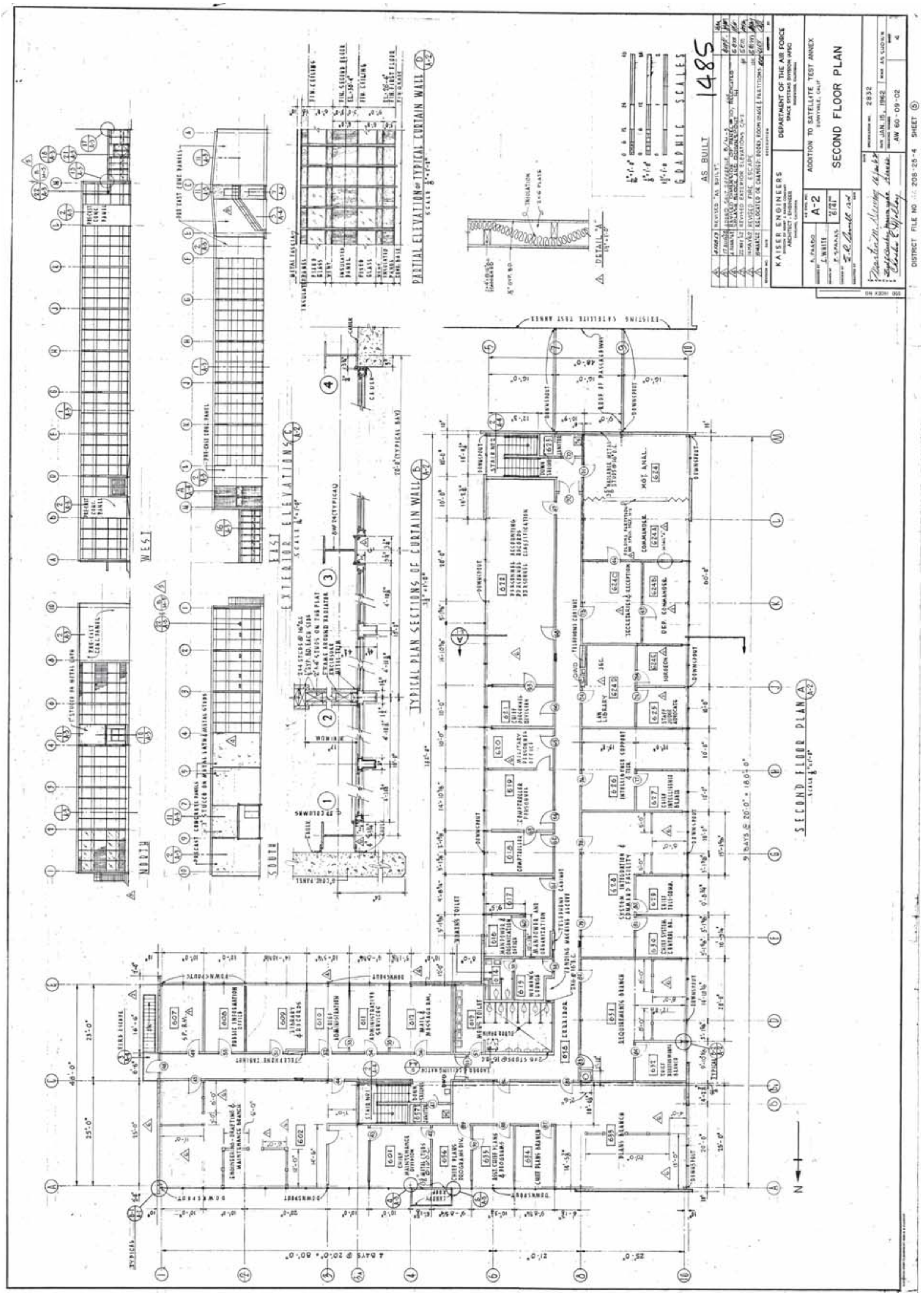
FIRST FLOOR PLAN
GRAPHIC SCALES
TYPICAL INTERSECTION OF COLUMN & PARTITION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PARTIAL ELEVATION OF TYPICAL CURTAIN WALL
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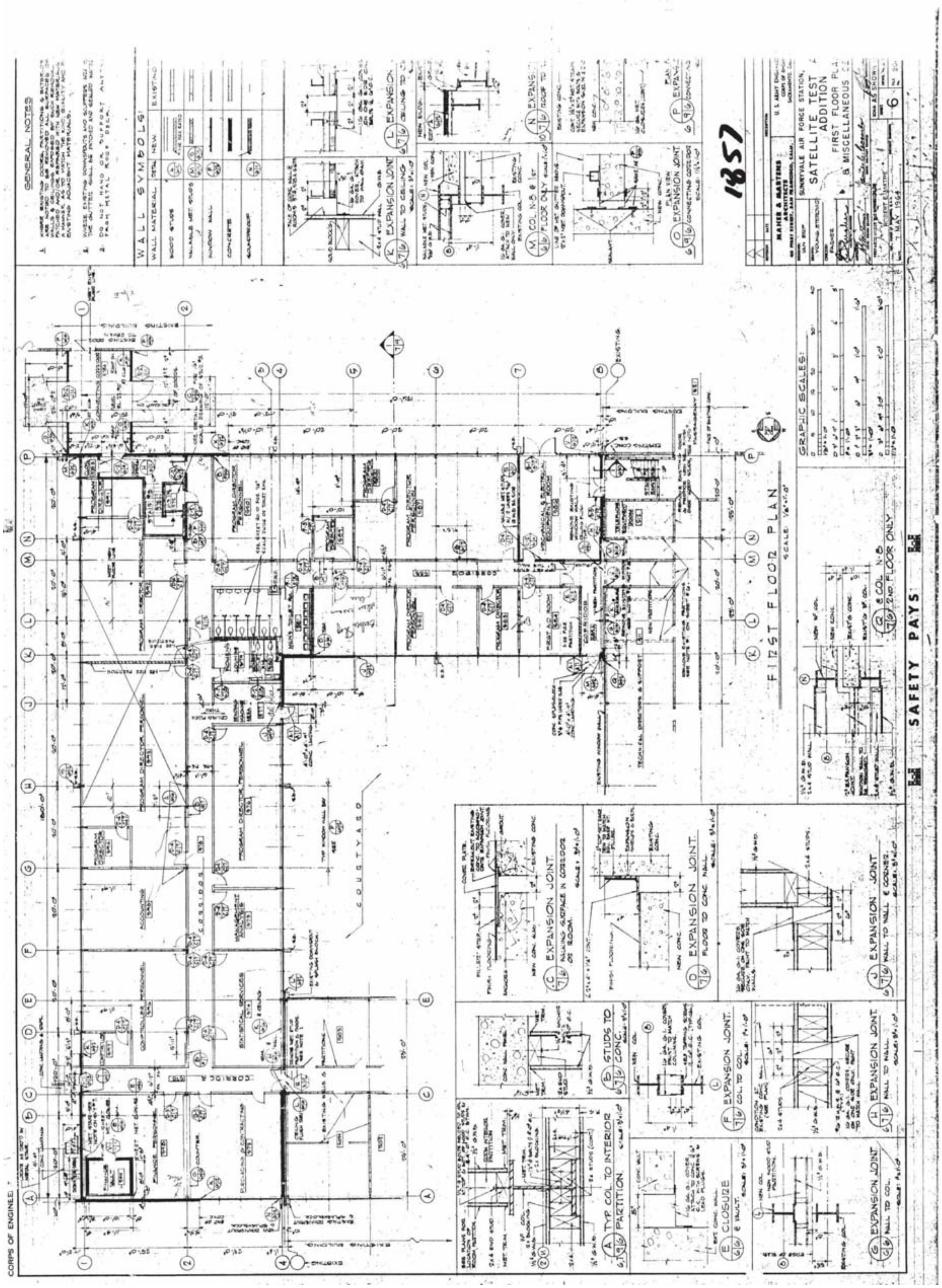
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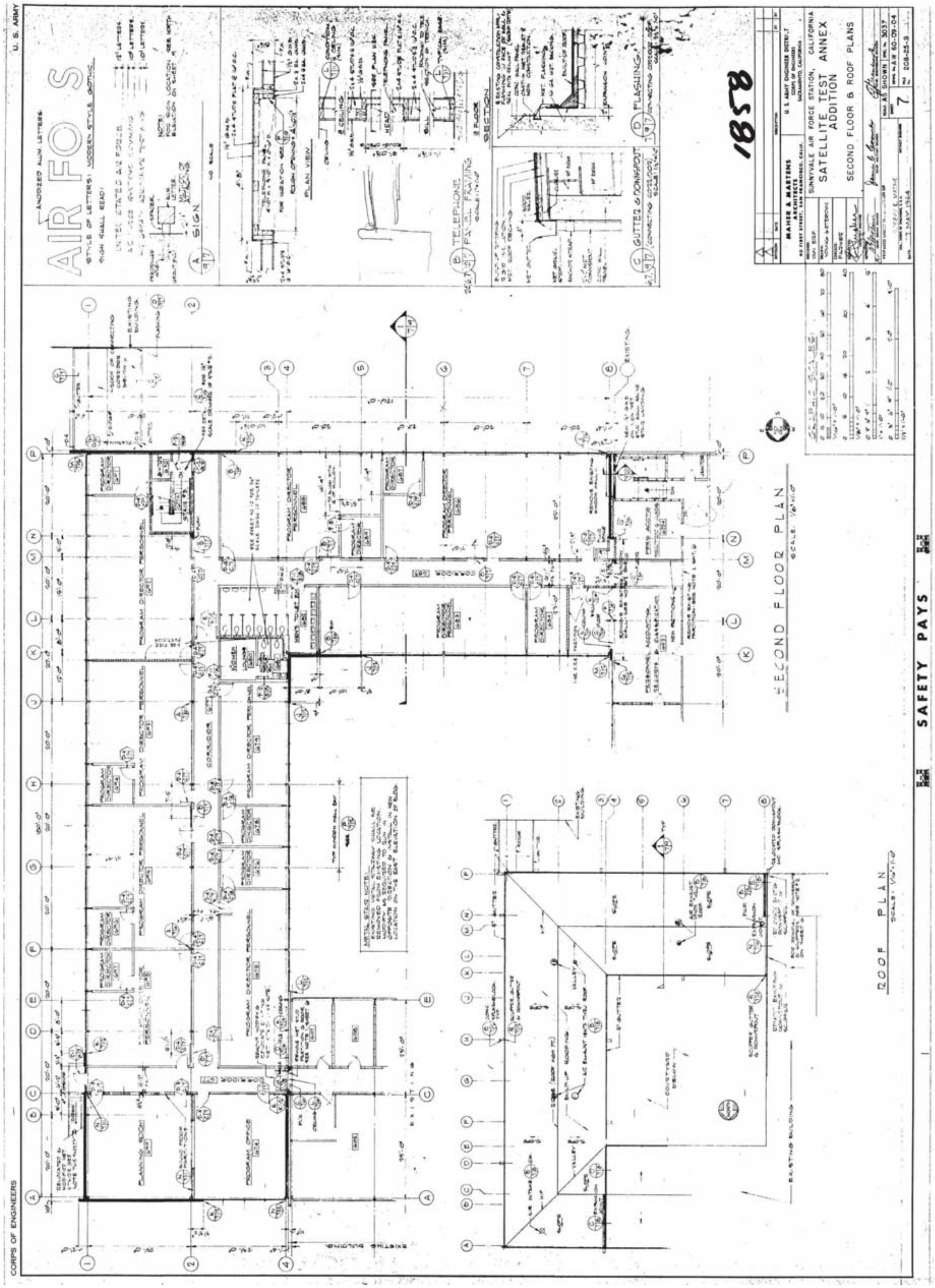
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CORPS OF ENGINEERS
AIR FO S
SECOND FLOOR PLAN
ROOF PLAN
SAFETY PAYS
MAHER & MARTENS
SUNNYVALE AIR FORCE STATION, CALIFORNIA
SATELLITE TEST ANNEX
ADDITION
SECOND FLOOR & ROOF PLANS
1858

U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 1002
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Log No.USAF041221A-B

SECTION II

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HISTORIC AMERICAN BUILDING SURVEY
LEVEL II-TYPE DOCUMENTATION

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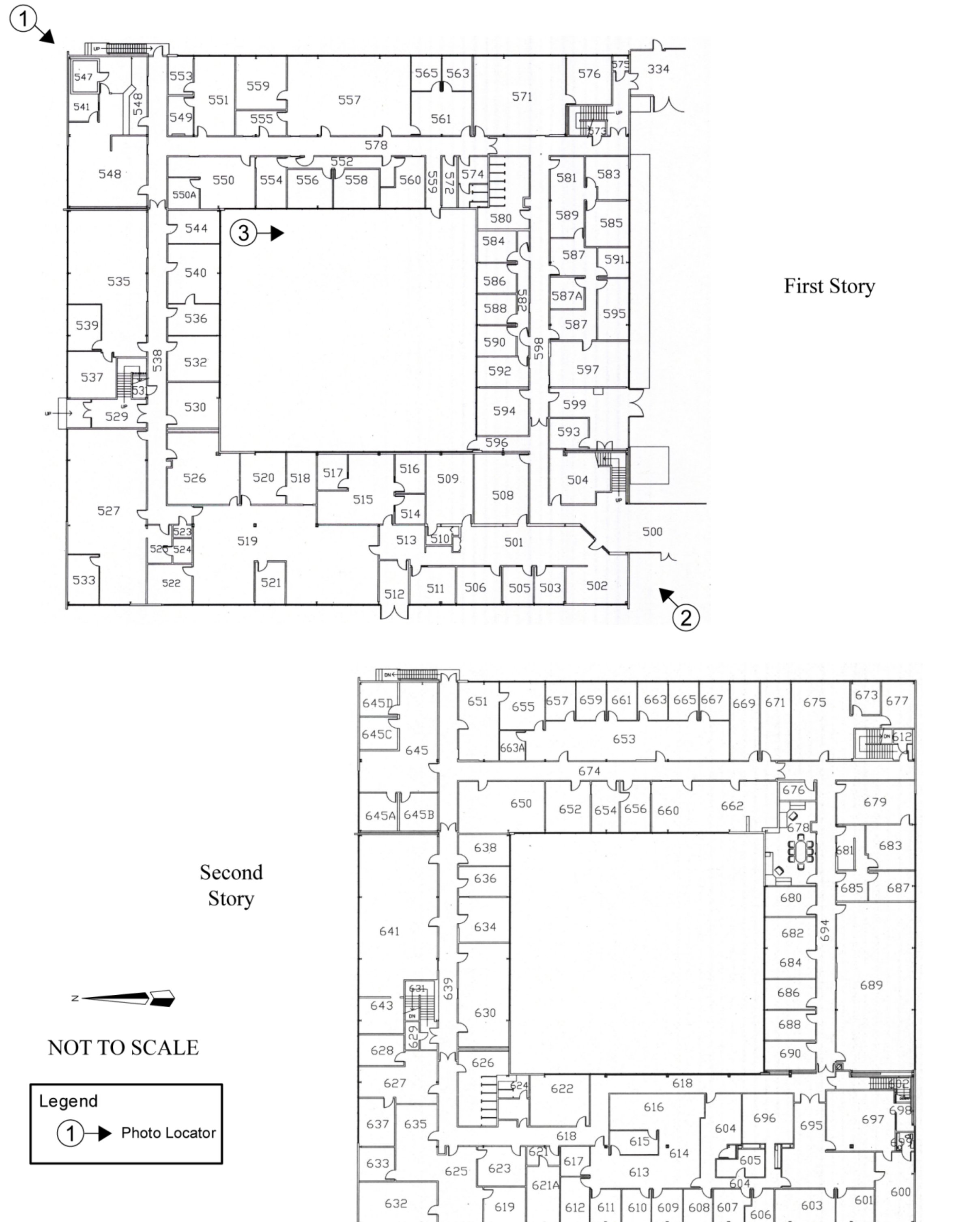
BUILDING 1002
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Anne Jennings, Photographer — Date of Photographs: June 7-14, 2010

Log No. USAF041221A-B-01	VIEW OF NORTH AND EAST FAÇADES, LOOKING SOUTHWEST.
Log No. USAF041221A-B-02	VIEW OF ROOF, WEST, AND SOUTH FAÇADES FROM ROOF OF BUILDING 1003, LOOKING NORTHEAST. NOTE HYPHENS THAT CONNECT SOUTH FAÇADE OF BUILDING 1002 TO NORTH FAÇADE OF BUILDING 1001.
Log No. USAF041221A-B-03	VIEW OF INTERIOR COURTYARD, LOOKING SOUTH. NOTE CONCRETE PATIO AND LANDSCAPING.



1 Building 1002

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U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 1003
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Log No. USAF041221A-C

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

PHOTOGRAPHS

California Office of Historic Preservation
1416 9th Street, Room 1442
Sacramento, CA 95814

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U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 1003
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Log No.USAF041221A-C

SECTION I

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SECTION II

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HISTORIC AMERICAN BUILDING SURVEY
LEVEL II-TYPE DOCUMENTATION

U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 1003

Log No. USAF041221A-C

A. **Location:** Building 1003, Onizuka Air Force Station
1080 Innovation Way, Sunnyvale, Santa Clara County, California

B. **Significance:** Building 1003, constructed in 1969 to support reconnaissance satellites, is a contributing resource to the National Register-eligible U.S. Air Force Satellite Test Center Historic District. The district is significant at a national, state, and local level under Criterion A for its associations with satellite reconnaissance during the Cold War, and Criteria Consideration G, because five of the six buildings, including Building 1003, are not yet fifty years old, and have exceptional importance for their associations with satellite reconnaissance during the Cold War.

The U.S. Air Force Satellite Test Center Historic District is significant at the national level for its association with satellite reconnaissance during the Cold War. The installation was established in 1959 to serve as the command-and-control center for the first reconnaissance satellite program, the Corona Program. It was developed by the U.S. Air Force and the Central Intelligence Agency (CIA), with assistance from a private contractor, Lockheed Missiles and Space Division. Shortly thereafter, the National Reconnaissance Office (NRO) was established to provide oversight of the program and develop other satellite programs. As new satellite technologies emerged, such as communications, early missile warning, meteorology, navigation, and nuclear detonation detection, Building 1003 was constructed for satellite support. These satellite programs provided valuable data throughout the Cold War, and were supported from the U.S. Air Force Satellite Test Center Historic District. Although many of the satellite programs remain classified, it is apparent through the continued presence of the NRO that the installation played a key role in the United States' conduct of the Cold War.

The U.S. Air Force Satellite Test Center Historic District is also significant at the state and local levels for its association with the development of California as a leader in technological innovations. California, and specifically the City of Sunnyvale in Silicon Valley, began to emerge as a leading technological center during the Cold War. This was due, in part, to the military's investment in the development of defense technologies in California, such as command and control of reconnaissance satellites at Onizuka Air Force Station (AFS). The presence of Lockheed Missiles and Space Division in Sunnyvale in the mid-1950s, followed by Onizuka AFS in the late 1950s, burnished its reputation as a high-technology center. The district's period of significance extends from 1959, the date of development of the installation, through 1991, the conclusion of the Cold War.

C. Description:

1. Current Description

Building 1003 was constructed in 1969 to provide satellite support in conjunction with Building 1001. It is a four-story, rectangular-plan, windowless, utilitarian steel-frame building. It is approximately 104’ high, and measures approximately 25’ per story, with a mezzanine between the second and third stories. The first story is clad in marblecrete with stucco, topped by a horizontal dark blue metal reveal. The remainder of the building is clad in pale blue tilt-up, pre-cast, concrete panels punctuated by vertical dark blue metal reveals. In general, the majority of the building is clad in panels that measure approximately 11’ x 9’.

The building is set atop a concrete-pile foundation and is capped by a flat built-up asphalt roof and parapet. Metal hatches are located in the northeast and southeast corners, and a metal railing is appended to the roof along the north, east, and south facades.

The north facade features five three-panel sections punctuated by dark blue metal reveals. Building 10031 is appended to the north façade, and obscures the lower portion of the building.

The south façade also features five three-panel sections, and is the only façade that is not obscured by other buildings. The first story is clad in marblecrete with stucco. It is pierced by two double-metal doors with metal handles set within metal surrounds. A metal overhang supported by metal posts is appended above the first story, and screens pipes along the façade.

A single-story, T-plan hyphen, referred to on the original plans as Building Connector Number 2, is appended to the south façade of Buildings 1001 and 1003, and the west façade of Building 1004. It is clad in marblecrete with stucco, is set atop a concrete foundation, and is capped by a stucco-clad parapet articulated with blue-painted galvanized steel. Two entries occur on the section appended to Building 1003. The west façade is pierced by a double-metal-and-glass-panel door with metal handles set within metal surrounds. A concrete ramp flanked by one metal pipe railing to the south provides access. The south façade is pierced by a double-metal door with no exterior hardware, set within metal surrounds. Four metal bollards are located south of the door. One entry occurs on the section that is appended to Building 1004, and includes a double-metal door with no exterior hardware, set within a metal surround. A concrete step provides access to the entry, set behind three metal bollards. Mechanical equipment is located on the roof behind metal screens.

The east and west façades feature nine three-panel panel sections punctuated by dark blue metal reveals. The east façade is partially obscured by Building 1001. However, a small portion of the façade is visible between the two buildings. Moving from north to south, the first story is pierced by three metal-louvered vents and a double-metal door with metal doorknob, set within a metal surround. Five metal vents pierce pre-cast concrete panels on the second story. Gym wall pads are appended to the first story. The majority of the west façade is obstructed by Building 10032.

The first story of Building 1003 encompasses 37,262 square feet, the second story 36,328 square feet, the mezzanine 14,194 square feet, the third story 36,328, and the fourth story 36,328 square feet. A current sketch plan is included in the Index to Photographs. A comparison of the original floor plan with the current floor plan indicates that the majority of the interior has been reconfigured, with the exception of the mezzanine which houses mechanical equipment and has likely remained relatively intact.

Not all areas within the building were accessible during the building survey conducted in June 2010. Visual evidence of interior spaces, coupled with information included in the Onizuka AFS Drawing Number Log, indicate that most interior spaces, even in cases where they retain their original configuration, no longer retain their original function, features, or finishes. However, certain features remain which are evocative of its function, including concrete floors and mechanical equipment in the mezzanine, and raised floors and acoustical ceiling tiles in select rooms.

2. According to Original Plan

Original plans of Building 1003 are on file in the Civil Engineering Office, Building 1002, Onizuka AFS, Sunnyvale, Santa Clara County, California. Original building plans were prepared in 1967 by Alhambra, California-based architecture and engineering firm, C.F. Braun & Company, under the auspices of the U.S. Naval Facilities Engineering Command (NAVFAC) Western Division, San Bruno, California, and SAMSO, Los Angeles, California. The following plans are featured in the graphic documentation section of the report:

- "STC Building Addition First Floor Plan" (C.F. Braun & Company/NAVFAC/SAMSO, November 14, 1967a) - 1514
- "STC Building Addition Second Floor Plan" (C.F. Braun & Company/NAVFAC/SAMSO, November 14, 1967b)
- "STC Building Addition Third Floor Plan" (C.F. Braun & Company/NAVFAC/SAMSO, November 14, 1967c)
- "STC Building Addition Fourth Floor Plan" (C.F. Braun & Company/NAVFAC/SAMSO, November 14, 1967d)

- “STC Building Addition South Elevation” (C.F. Braun & Company/NAVFAC/SAMSO, November 14, 1967f)

In addition, historic photographs were also consulted to determine the original appearance of the building. A sampling of historic photographs are reproduced in the graphic documentation section of the overview report entitled California State Historic Preservation Office, Historic American Building Survey Level II-Type Documentation, U.S. Air Force Satellite Test Center, Log No. USAF041221A.

Original plans indicate that Building 1003’s exterior was similar to its current appearance. However, the construction of Buildings 10031 and 10032 in the 1980s obscured the north and west facades, respectively, and the east façade was partially obscured by the construction of Building 1015.

As conceived on the original plans, the north and south façades were pierced by a centrally located double-metal door. The east façade was pierced by two double-metal doors, and three metal-louvered vents, and the west façade was pierced by two double-metal doors. Historic photos indicate that stainless steel signs that read “U.S. Air Force Satellite Test Center” were appended to the south and west facades (C.F. Braun & Company/NAVFAC/SAMSO, November 14, 1967e-h).

In addition, plans were prepared for the two single-story hyphens, known as Building Connector 1 and Building Connector 2. Both were stucco-and-marblecrete-clad, sat atop concrete foundations, and were capped by flat roofs. Building Connector Number 1 was appended to the east façade of Building 1003 and provided access to Building 1001. According to the plans, the north façade was pierced by a double-metal door. Building Connector Number 2 was appended to the south façade and provided access to Buildings 1001 and 1004. The original appearance of Building Connector Number 2 was similar to its current appearance.

Although the original plans do not indicate room names or functions, a 1970 Air Force Satellite Control Facility (AFSCF) document provides some information. The first story housed communications and crypto equipment, data distribution center, mechanical equipment, storage, and the second story housed four Control Data Corporation (CDC) 3800 computer rooms and a tape library. Three Mission Control Centers (MCCs) were located on the third story, MCCs D, F, and M. The fourth story housed rooms for field detachment and training (AFSCF, 1970). The Onizuka AFS Drawing Number Log indicates that the fourth story also housed MCCs B, C, and D (Onizuka AFS, no date [n.d.]).

Plans indicate that walls were clad in gypsum board, floor surfaces were typically raised and clad in vinyl tiles, and ceilings featured acoustical tiles. In addition, many rooms featured soundproofing material installed within the walls (C.F. Braun & Company/NAVFAC/SAMSO, November 14, 1967i).

D. History:

1. Development of the Satellite Test Center, 1959-61

The development of satellite reconnaissance during the Cold War (1946-91) and the specific role of the U.S. Air Force Satellite Test Center (STC) is fully described in the associated overview report, California State Historic Preservation Office Historic American Building Survey Level II-Type Documentation, U.S. Air Force Satellite Test Center, Log No. USAF041121A. The following section provides a brief summary of the role that Building 1003 played at the STC from 1959-91, its period of significance.

The installation was established in 1959 when Building 1001 was constructed to serve as the command-and-control center for the Corona Program to support the launch, orbit, and recovery of Corona satellites. The Corona Program, initiated in 1958, was the first reconnaissance satellite program developed by the U.S. Air Force and the CIA, with assistance from private contractors, such as Lockheed Missiles and Space Division, located in Sunnyvale, California. Concerns about preserving the secrecy of the Corona Program and its objectives led to the designation of the Discoverer Program as a cover program. The publicly-stated goal of the Discoverer Program was scientific research (Richelson, 2002). Prior to the construction of Building 1001, at least eight Corona satellites, described as Discoverer satellites in the press, were launched from Vandenberg Air Force Base (AFB), and were supported from an interim control center in Palo Alto, California. Tracking stations located around the world also provided support.

In 1959, the U.S. Air Force acquired 11.43 acres of land in Sunnyvale from Lockheed Missiles and Space Division located to the west. Plans for the installation were designed by the Ralph M. Parsons Company, an architecture and engineering firm based in Los Angeles, California, under the auspices of the U.S. Air Force Ballistic Missile Division (AFBMD) in Englewood, California (Ralph M. Parsons Company/AFBMD, March 6, 1959).

On January 28, 1960, the installation, newly designated as the STC, was dedicated by the U.S. Air Force (Davies, 1960). A few months later, on March 1, 1960, it was occupied by the 6594th Aerospace Test Wing (ATW), the first unit to be tasked with military satellite operations; Lockheed Missiles and Space Division employees; and likely the CIA. The 6594th ATW provided oversight for Lockheed Missiles and Space Division which was responsible for satellite operations. However, portions of the building remained under construction, including the state-of-the-art Satellite Control Room in the Satellite Control Room Complex. An interim Satellite Control Room was established from which

Lockheed Missiles and Space Division, monitored by the 6594th ATW, could direct the launch, tracking, data acquisition, command and control, and recovery phase of military satellites (6594th ATW, 1961; Jernigan, 1983).

On July 7, 1960, the installation was officially designated as the Satellite Test Annex (STA) under the jurisdiction of the AFBMD. However, it should be noted that it continued to be referred to as the STC, both in U.S. Air Force documents, as well as by the public, likely due in part to a building sign which indicated "U.S. Air Force Satellite Test Center." On February 6, 1961, the Satellite Control Room and remainder of the Satellite Control Room Complex became operational. The primary purpose of the complex was to support Corona satellites, although additional programs were supported by this time (Jernigan, 1983).

2. Significant Events and Satellites Supported, 1960-61

In August 1960, the U.S. Air Force accomplished the first successful retrieval of a Discoverer satellite. On August 10, Discoverer XIII was launched from Vandenberg AFB, and was supported by the STC. The satellite achieved polar orbit for a period of ninety-four minutes, during which time it was in contact with worldwide tracking stations, and the interim Satellite Control Room at the STC. During its seventeenth rotation of the earth, the eject command was issued from the STC, and the capsule was ultimately recovered from the Pacific Ocean, marking the first successful retrieval of an object from space (Arnold, 2005; 6594th ATW, n.d.). In-keeping with the publicly stated scientific objectives of the Discoverer Program, the *San Jose Mercury News* noted that "Discoverer recovery techniques will be used soon to return monkeys from space," and were vital to "returning a man to earth after orbiting in space" (Lindsey, August 12, 1960). Still in the testing phase, the satellite did not yet contain a camera (Jernigan, 1983).

Shortly after this historic event, Discoverer XIV was launched on August 18, 1960 from Vandenberg AFB (Arnold, 2005). Discoverer XIV orbited the earth seventeen times, supported by the STC from the interim Satellite Control Room in Building 1001, and the Kodiak tracking station, before the eject command was relayed to the satellite. Following the command, at 300 miles above the earth, the satellite recovery vehicle (SRV) separated from the spacecraft, and began its descent to earth, where it was caught by a specially equipped Fairchild C-119 *Flying Boxcars* (C-119) piloted by U.S. Air Force Captain Harold Mitchell (*The New York Times,* August 20, 1960).

The Discoverer XIV SRV contained 20 pounds of film which documented over 1,650,000 square miles, and provided the first successful satellite reconnaissance photographs of the Soviet Union. It also resulted in more photographic coverage of the Soviet Union than all previous U-2 flights combined. Furthermore, it 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) (Day, 2006). However, despite the historic nature of this event, the crew, who were not cleared for the Corona Program, were unaware of the importance of their mission (Arnold, 2005).

Although the STC was developed to support the Corona Program, by the fall of 1960, it also supported the Satellite and Missile Observation System (SAMOS) and Missile Detection Alarm System (MIDAS). Both programs were initially developed by the U.S. Air Force in the mid-1950s as reconnaissance and missile detection satellites, respectively (Jernigan, 1983). On October 11, 1960, the first SAMOS satellite was launched from Vandenberg AFB, and supported from the STC, although it failed to reach orbit (*San Jose Mercury News*, October 12, 1960). By July 1961, MIDAS satellites were launched from Vandenberg AFB and supported by the STC. By the end of 1961, two MIDAS satellites had reached orbit (6594th ATW, 1961).

In April 1961, Discoverer XXIII was launched from Vandenberg AFB, and was the first Corona satellite supported by the STC from the new control room. By this time, Corona satellites were regularly providing images of the Soviet Union, as well as other communist countries. Among these images included evidence of the building of the Berlin Wall between East and West Germany (Chapman, 2008). In September 1961, the NRO was established as a classified agency in the Department of Defense (DoD), and was tasked with oversight of reconnaissance satellite programs, including the Corona Program, and therefore became a presence at the STC (Richelson, 2000).

3. Building 1002 Construction and Upgrades, 1962

In 1962, the STC experienced its first of many expansions, when plans for a two-story, L-shaped administrative building – Building 1002 (Addition to the Satellite Test Annex) - were prepared for the U.S. Air Force Space Systems Division (SSD) by Kaiser Engineers, a division of the Henry J. Kaiser Company. Kaiser Engineers was a well-known architecture and engineering firm located in Oakland, California (Kaiser Engineers/U.S. Air Force SSD, January 15, 1962a-b; AFSCF, 1972).

During this time, Kaiser Engineers also prepared plans for a single-story addition to Building 1001 to house new a new communications center, and interior modifications to the Satellite Control Room Complex (Kaiser Engineers/U.S. Air Force SSD, October 17, 1962a-b; Jernigan, 1983).

The 1962 renovations were likely implemented in conjunction with the U.S. Air Force’s first modernization effort, the Multiple Satellite Augmentation Program (MSAP). This effort was initiated in part, to standardize and provide updated equipment to the STC and tracking stations which enabled them to simultaneously support multiple satellite programs (Lockheed Missiles and Space Division, 1963). Computer capabilities were upgraded, new display and communications equipment were also installed, and connections between the STC and tracking stations were upgraded (Jernigan, 1983).

4. Significant Events and Satellites Supported, 1962-64

On February 27, 1962, Discoverer XXXVIII was launched and supported from the STC. The following month, the DoD classified all military satellite programs (DoD, March 23, 1962). As a result, Discoverer XXXVIII was the last satellite launched as part of the Discoverer program. Corona satellites continued to be launched and supported by the STC, however, because all satellites were classified, the Corona Program no longer required a cover story.

Between 1962-64, the STC supported over fifty Corona satellites. By this time, Corona satellites had accurately mapped all twenty-five of Moscow's long-range missile sites. Furthermore, images taken by Corona satellites indicated that China was readying its nuclear facility in Lop Nur for testing. It was noted in a classified CIA briefing that "[O]n the basis of new overhead photography, we are now convinced that the previously suspect facility at Lop Nur in western China is a nuclear test site which could be ready for use in about two months." Within two months, on October 16, 1964, China tested an atomic bomb at the Lop Nur site (Broad, September 12, 1995).

In addition to Corona, SAMOS, and MIDAS satellites, the STC supported the Defense Meteorological Satellite Program (DMSP) in 1962 and 1963. DMSP was a meteorological satellite program initiated in 1960 to provide weather and climate data for more effective military operations (DMSP, n.d.). On October 16, 1963, the first Vela satellite was launched and supported by the STC. The Vela Program – vela means vigil in Spanish – was a series of satellites designed to detect nuclear detonations (Jernigan, 1983; Peebles, 1997). Presumably, Vela satellites provided images of the Lanzhou Diffusion Plant in Lanzhou, China and the Baotao Nuclear Fuel Component Plant in Baotao, China (Richelson, 2002).

In November 1963, the final SAMOS satellite was launched (Peebles, 1997). Furthermore, 1963 marked the beginning of the Keyhole (KH)-7 surveillance system, noted in a 2006 NRO memo as "the Intelligence Community's first high resolution surveillance or 'spotting' satellite." Similar to Corona satellites, the KH-7 was a reconnaissance satellite that returned film to earth in SRVs. It was primarily used to provide surveillance of nuclear facilities and Intermediate Range Ballistic Missiles (IRBM) in the Soviet Union and China (NRO, 2006).

In July 1964, two additional Vela satellites were launched, resulting in a total of four orbiting satellites capable of detecting nuclear detonations. In August 1964, Syncom III was launched and supported by the STC. Syncom III was a National Aeronautics and Space Administration (NASA) satellite used for DoD military communications experiments between Saigon, Vietnam, and Hawaii (Jernigan, 1983).

5. Construction, Upgrades, and Designation of the Air Force Satellite Control Facility, 1964-67

In May 1964, plans were prepared for a two-story, L-plan addition to Building 1002 to provide additional administrative space. The addition was designed by Maher & Martens, a San Francisco-based architecture firm for the U.S. Army Corps of Engineers (USACE), Sacramento District (Maher & Martens/USACE Sacramento District, May 7, 1964).

In 1965, the AFSCF was officially designated. Its mission was to direct launch, tracking, data acquisition, command and control, and recovery of DoD military satellites. Following the establishment of AFSCF, an Interim Expansion Plan (IEP) was initiated to augment the facility and implement the MCC concept, which focused on the development of mission-oriented control centers rather than a single control room (Jernigan, 1983).

Plans were prepared by San Francisco-based consulting engineers, Bentley Engineers and Earl & Wright, Inc., under the auspices of the U.S. Air Force SSD to develop multiple MCCs in Building 1001. The plans indicate that the building was reconfigured to accommodate four new MCCs, known as MCCs 1, 2, 3, and 4. In addition, the building also featured two new complex areas, known as Complex Numbers 6 and 7. The plans also indicated that two new communications areas, labeled as Communications Area A and B, were added, as well as a new bird buffer area (Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD, December 13, 1965a-e). The majority of the work was completed by December 1966 (AFSCF, January-June 1966).

6. Significant Events and Satellites Supported, 1965-70

The increase in the number of flight support hours logged by the AFSCF between 1965-66 appears to indicate that at least some of the MCCs were operational in 1966. In 1965, the AFSCF logged 20,757 hours of satellite flight support. By 1966, 29,400 hours of flight support were logged. The number of satellites supported also increased. In 1965, the STC supported approximately fourteen satellites (AFSCF, 1972). In January 1967, the STC supported thirty-one satellites per day, and by June were supporting forty-four per day, which was expected to increase to forty-seven per day by July (AFSCF January-June 1967).

Between 1965-70, the STC supported over forty Corona satellite launches (Mission and Spacecraft Library, n.d.). By 1966, upgrades to the installation had resulted in an increase in involvement in satellite programs. In addition to Corona, Vela, and other programs (many of which likely remained classified) new programs such as NASA's Biosatellite Program were supported. The Biosatellite Program was a series of three satellites designed to assess the effects of spaceflight on living organisms. Support for the program focused on directing operations of the recovery of the satellites by Lockheed C-130 *Hercules* (C-130) aircraft flown by the 6594th Aircraft Recovery Group based at Hickam AFB, Honolulu, Hawaii (Jernigan, 1983).

In June 1967, two scientific satellites, one owned by the U.S. Army, the other by the U.S. Navy, were launched as the first flight in the DoD Space Experiments Program (SESP). SESP was responsible for providing flights for research and experiments undertaken by government agencies (AFSCF, January-June 1968; Jernigan, 1983). In 1967, the KH-7 surveillance system was terminated, after having flown thirty-eight missions, thirty-four of which successfully returned usable images (NRO, 2006).

In June 1968, the *San Jose Mercury News* reported that satellite reconnaissance, likely supported by the STC, uncovered the Soviet Union's plans for the invasion of Czechoslovakia. The article noted that "[S]atellites spinning over Eastern Europe monitored Soviet radio transmissions which signaled the invasion was imminent, and photographic reconnaissance satellites had monitored unusual military activities on the Czech borders by Soviet, East German, Polish, Hungarian, and Bulgarian troops" (*San Jose Mercury News*, August 27, 1968).

In September 1968, a Lincoln Experimental Satellite (LES) was launched into orbit and supported by the STC and tracking stations. The LES was an experimental satellite used to test communications between aircraft, ships, and ground forces (Jernigan, 1983).

In 1969, support was provided for NASA's manned flights to the moon. The STC supported Apollo missions 9 and 10, and Apollo 11, the first manned lunar landing. Program 949 was also supported in 1969 (AFSCF, January-June 1969). Program 949 was designated in November 1966 to supplant Program 461, which had initially supplanted the MIDAS Program in 1963. Program 949 provided a wider range of capabilities, and by the 1970s, was expected to have "progressively enhanced world-wide early-warning, surveillance and detection capabilities" (Piper, 1970).

7. Development of Buildings 1003 and 1004, 1966-70

In conjunction with the technological upgrades which occurred throughout the mid-to-late 1960s, a real estate estimate was prepared by the USACE Sacramento District in August 1966 that proposed the acquisition of 8.2 acres of land from Lockheed Aircraft

Corporation at a cost of $49,000. In 1966, Alhambra, California-based architecture and engineering firm, C.F. Braun & Company, under the auspices of NAVFAC Western Division, San Bruno, California, and SAMSO, Los Angeles, California, prepared site development plans (C.F. Braun & Company/NAVFAC/SAMSO, December 30, 1966).

C.F. Braun & Company was founded by Carl Braun in 1909, and quickly became well-known for construction of industrial facilities, including oil refineries and chemical plants (*The New York Times*, February 5, 1954). Although Braun died in 1954, the reputation he had established for his company as a builder of industrial facilities likely led to his selection by SAMSO to develop the STC's new buildings. Carl Swenson, Inc. of San Jose, California and the Powerhouse Oakland Construction Company of Salt Lake City, Utah, served as contractors (*Aerospace Daily,* September 19, 1969).

Site development plans, dated December 30, 1966, included relocation of an existing Lockheed Missiles and Space building; realignment of Lockheed Martin Way (formerly known as East Perimeter Road) west of Building 1001; creation of additional parking space; and installation of underground utilities (C.F. Braun & Company/NAVFAC/SAMSO, December 30, 1966). In addition, C.F. Braun & Company also prepared plans to develop two new buildings, Building 1003 (STC Building Addition), and Building 1004 (Power Plant) (C.F. Braun/NAVFAC/SAMSO, November 14, 1967a; August 12, 1968).

By 1968, funds were appropriated for acquisition of the land and construction of the two buildings, and in August, Lockheed Aircraft Corporation transferred the land to the U.S. Air Force (Lockheed Aircraft Corporation, 1968; Jernigan, 1983). That year, the *San Jose Mercury News* reported that the STC would be "updated in a project expected to cost more than $40 million" to support the Manned Orbiting Laboratory (MOL) Program (*San Jose Mercury News*, January 10, 1967 & January 17, 1967). The MOL Program was initiated in 1963, and involved a Titan III booster rocket which carried a modified Gemini B capsule attached to a space laboratory, and was intended to serve reconnaissance purposes.

In September 1967, the U.S. Air Force announced plans to build a four-story, 150,000-square-foot addition at the STC (*San Jose Mercury News*, September 16, 1967). As noted in the January 1967 *San Jose Mercury News* articles, Building 1003 was designed to house the MOL Program as well as other satellite programs. However, in June 1969, the DoD announced the cancellation of the MOL Program to save money. The cancellation led to a short work stoppage, however construction resumed a few weeks later. *Aerospace Daily* reported that the U.S. Air Force had evaluated requirements for current and future programs, and determined that construction on the building should continue (*Aerospace Daily*, September 19, 1969). The *San Jose Mercury News* reported that "official announcements merely declared that 'other activities' would replace the MOL in the sky-blue building." The article also noted that the new facilities may "become home for a space shuttle command post" (Carey, 1969).

By the end of 1969, the 164,000-square foot Building 1003, constructed at a cost of $8 million, was nearly complete. A windowless, pre-cast concrete-panel building, it was appended to the west façade of Building 1001. Although the building was four stories, it was approximately 104' high, with each story approximately 25' high to accommodate the mechanical equipment necessary to maintain satellite programs. The building was painted "Air Force blue," resulting in its nickname, the "Blue Cube" (*Aerospace Daily*, September 19, 1969).

Although the original floor plans do not indicate room names or functions, a 1970 AFSCF document includes a partially labeled floor plan for the building. The first story housed communications and crypto equipment, data distribution center, mechanical equipment and storage, and the second story housed four CDC 3800 computer rooms and a tape library. Three MCCs were located on the third story, MCCs D, F, and M. The fourth story housed offices for field detachment and training. The document also included information on the function of the three MCCs:

- MCC D: Supported several high and low-orbit multi-satellite programs and ballistic test programs. Support was provided to approximately twenty satellites daily, and the duration of support varied from five minutes to two hours.

- MCC F: Supported several high-altitude satellites requiring extensive support in conjunction with using external organizations. The MCC was required to be manned continuously throughout the duration of the program.

- MCC M: Supported multiple high-orbit satellites which required that the MCC be manned continuously throughout the duration of the program (AFSCF, 1970).

In addition, the Onizuka AFS Drawing Number Log indicates that MCCs B, C, and D were on the fourth story (Onizuka AFS, n.d.).

Shortly after construction, the Vela Program office, along with another unidentified satellite program was relocated from Building 1001 to Building 1003 (AFSCF, July-December 1969). The satellite was supported from MCC M, located on the third story (Jernigan, 1983).

Building 1004 was also designed by C.F. Braun & Company. Solar, a division of International Harvester Company, provided the Saturn gas turbine generator sets that powered the plant. The development of Building 1004 necessitated modifications to the installation's power distribution system. Ties to the electric power provided by Pacific Gas and Electric (PG&E) were severed, with the exception of one power line which provided power through a Lockheed Missiles and Space Substation, and was likely kept active to provide back-up power (AFSCF, 1972). The plant, staffed by Solar contractors, was operational in February 1970, and provided power to the entire installation, rendering it energy-independent at that time (Jernigan, 1983).

8. Upgrades, 1970s

On January 1, 1971, AFSCF re-designated STC as Sunnyvale AFS. Technological upgrades continued to be made throughout the 1970s to support the various missions at Sunnyvale AFS. In 1971, communications circuits were relocated from Building 1001 to Building 1003, which permitted additional operator space and generally improved working and security conditions. In 1972, a twenty-channel digital television for computer-controlled switching was installed between Building 1001 and Building 1003. A keyboard/light-pen entry system was installed, likely in both buildings. In 1973, a seventh CDC 3800 computer was installed in Building 1003 (Jernigan, 1983).

A small number of plans were prepared in the 1970s for Building 1003, and mainly consisted of room reconfigurations and/or renovations. For example, in 1974, plans were prepared to alter Room 2302 and modify MCC A. In 1974, Building 1015, located between Buildings 1001 and 1003, was constructed to serve as a recreational facility. In 1976, plans were prepared to modify MCC B, and in 1977 plans were prepared to alter Room 1601 (Onizuka AFS, n.d.). Presumably, there were fewer repairs and alterations in the 1970s because the building was completed in 1969.

By 1979, the Onizuka AFS Drawing Number Log indicates that plans were prepared to modify MCCs A, D, and C. Rooms were reconfigured and renovated, and security systems installed, presumably to enable new missions to be supported from the MCCs. Plans were also prepared for routine maintenance, and included exterior and interior painting (Onizuka AFS, n.d.).

9. Significant Events and Satellites Supported, 1970s

In the 1970s, Sunnyvale AFS continued to support existing and newly established satellite programs, although many of them remained classified. By this time, MCCs were established in both Building 1001 and 1003. The Corona Program continued to be supported from Building 1001, and the Vela Program was supported from Building 1003. However, in general, specific information is not available concerning the programs supported in the buildings. However, due to its size and number of MCCs, it is likely that following its construction, Building 1003 supported the majority of satellite programs.

In 1970, the AFSCF Satellite Test Operations Historical Reports noted the successful support of two "unique orbital events" from the installation. These events included support of the Apollo 13 mission in April, which was aborted following the explosion of an on-board oxygen tank, and support of the first North Atlantic Treaty Organization (NATO) communications satellite in March (AFSCF, January-June 1970).

In June 1970, the final Vela satellite was launched. Sunnyvale AFS continued to provide support from Building 1003 throughout the 1970s for the orbiting satellite (Jernigan, 1983). Program 949 was also re-designated the Defense System Program (DSP) in 1970. Sunnyvale AFS continued to support this program throughout the early 1970s (AFSCF, July-December 1970; 1971; 1972). The DSP satellite weighed 2,000 pounds, was approximately 23' long, 10' wide, and contained a large infrared telescope which scanned the earth for missile launches. In the event a missile was launched, it would be detected by the United States within minutes, which removed the possibility of a surprise attack (Peebles, 1997).

By November 1971, a pair of Defense Satellite Communications System (DSCS) II advanced communications satellites had been launched to handle voice, teletype, computerized digital data, and video transmissions (Jernigan, 1983). The first KH-9 satellites – code-named HEXAGON, and popularly known as "Big Bird" – were also launched in 1971. The KH-9 satellites were 30,000-pound photographic reconnaissance satellites initially developed in the 1960s. Similar to Corona satellites, they were designed to photograph large areas, and return the film to earth via SRV. They carried technologically advanced cameras, additional film capsules, and antennae for other intelligence-gathering purposes (Clark, 2007).

In January 1972, President Richard Nixon announced the development of the Space Transportation System (STS), or Space Shuttle Program, managed by NASA. Kennedy Space Center in Houston, Texas, and Vandenberg AFB would serve as the operational bases for the program. Research and development (R&D) shuttle launches would originate from the Kennedy Space Center, and military launches would originate from Vandenberg AFB. The shuttle would be responsible for the launch of all commercial, scientific, and military satellites into space. The AFSCF, including Sunnyvale AFS and tracking stations, would provide tracking and control for the program (Jernigan, 1983).

On May 25, 1972, Sunnyvale AFS supported the 145th and final launch of the Corona Program from the original Satellite Control Room in Building 1001. It was terminated as a result of advances in satellite technology. By the time the Corona Program concluded, Corona satellites had provided approximately 800,000 reconnaissance photographs covering approximately 510 million square miles (Chapman, 2008; Vukotich, n.d.). Following its termination, the Satellite Control Room Complex likely continued to be utilized for control of other satellite programs.

In July 1975, the final Apollo flight was launched and supported by Sunnyvale AFS. The final flight was known as the Apollo-Soyuz Test Project, which marked the first joint United States-Soviet Union space mission. The mission was the first time two foreign spacecraft docked together in orbit (NASA, July 14, 2010). In 1976, the first DMSP Block 5D, a meteorological satellite, was launched, and was presumably supported from Sunnyvale AFS. It was an upgraded version of the 1960s-era DMSP, and provided twice-daily, worldwide meteorological, oceanographic, and solar-terrestrial physics measurements (Jernigan, 1983; Wade, n.d.).
In 1976, the KH-11 KENNAN satellite, a reconnaissance satellite, was launched. It was the first successful electronic imaging satellite, and transmitted high-quality images in real time (Vick, 2007). A 1978 *San Jose Mercury News* article noted that some sources indicated that the top-secret "KH-11, from 200 to 300 miles up, can detect a pack of cigarets [sic] on Russian soil," while another source indicated it could only "read the lettering on billboards" (Ingersoll, 1978). Nonetheless, this top-secret satellite represented significant advances in the development of satellite technology, and was supported from Sunnyvale AFS, as well as associated tracking stations.

10. Development of the Air Force Satellite Control Network, Expansion, and Upgrades, 1980s

According to the Onizuka AFS Drawing Number Log, numerous plans were prepared concerning Building 1003 throughout the 1980s. In November 1980, the U.S. Air Force prepared plans to expand communications rooms on the first story including Rooms 1031, 1501, and 1502. Rooms were reconfigured and new cable ducts and conduits were installed (U.S. Air Force, November 6, 1980). Also that year, plans were prepared to expand MCC F on the third story (Onizuka AFS, n.d.).

In September 1981, the U.S. Air Force prepared plans to reconfigure MCC B on the fourth story of Building 1003 to provide support for the Space Shuttle Program. Reconfigured rooms included Rooms 4501, 4502, 4503, 4504, 4505, 4506, 4507, 4302, 4303, 4304, 4305, 4306, and 4307. The plans indicated that some walls and partitions were removed to create larger spaces, 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, clearly illustrating the change MCC B's role in the Space Shuttle Program (U.S. Air Force, September 1981). Plans were also prepared to modify and expand MCCs C and F in 1981. Additional plans for modifications to MCCs B, C, and F continued to be prepared from 1982-85 (Onizuka AFS, n.d.).

In 1982, the Air Force Satellite Control Network (AFSCN) was organized. The AFSCN was not a formal organization, but rather denoted a group of common user resources, assets, and facilities which collectively provided tracking, telemetry & commanding (TT&C) support for virtually all DoD spacecraft, and select NASA and foreign government programs (Hane, 1988). The goal of the AFSCN was to provide "enduring control capability commensurate with the need for operational space suites throughout the conflict spectrum" (AFSCF, 1983).

To accomplish this goal, Sunnyvale AFS was upgraded as part of the Data Systems Modernization Program. This $500 million upgrade introduced centralized database-driven computer hardware and software to replace outdated systems. The upgraded system was more reliable, cheaper to maintain, and faster than its predecessor, allowing it to support a steadily increasing satellite support workload (Fedor et al., 2006).

A new satellite control center – the Consolidated Space Operations Center (CSOC) – was constructed at Falcon AFS, Colorado Springs, Colorado (present-day Schriever AFB) in conjunction with the Data Systems Modernization Program (Fedor et al., 2006). The CSOC was constructed partially due to concern about the vulnerability of Sunnyvale AFS to earthquakes and terrorism (Philp, June 9, 1985).

Buildings 10031 and 10032 were constructed at the STC in the 1980s in conjunction with the Data Systems Modernization Program to provide additional space for satellite control. In 1981, King/Reif and Associates, an architectural and planning firm, prepared plans for Building 10031 on behalf of NAVFAC Western Division (King/Reif and Associates/NAVFAC, December 18, 1981). In 1982, plans were prepared for Building 10032 by Rasmussen Ingle Anderson, a San Francisco-based architecture firm, under the auspices of NAVFAC Western Division.

Both three-story buildings housed parking facilities, and had radio frequency interference (RFI)-shielded third stories with secure space for MCCs, computer rooms, communications rooms, and offices that supported satellite programs (King/Reif and Associates/NAVFAC, December 18, 1981; Rasmussen Ingle Anderson/NAVFAC, October 29, 1982). Construction of Buildings 10031 and 10032 resulted in modifications to the north and west facades of Building 1003. Both buildings were operational by 1984 (Fola Odafalu, pers. comm., July 26, 2010).

In 1985, the Onizuka AFS Drawing Number Log indicates that Rooms 1401 and 1402 on the first story of Building 1003 were modified. These two rooms housed communications and crpyto equpiment. In 1986, plans were prepared to construct a mezzanine in Room 1201. In 1987, plans were prepared to upgrade the security in these rooms, including installation of red strobe lights and a door alarm system with a buzzer. Plans were also prepared in 1987 by Orange, California-based architecture and engineering firm Holmes

& Narver Inc., under the auspices of AFSCF Headquarters, Los Angeles, California, to modify a MCC at the northeast corner of the third story. The plans indcate that minor alterations, such as the removal of interior walls to create larger spaces, were undertaken (Holmes & Narver, Inc./AFSCF, August 14, 1987). In addition, the Onizuka AFS Drawing Number Log indicates that plans were prepared to renovate rooms that housed CDC 3800 computers and other areas on the second story to accommodate a new mission (Onizuka AFS, n.d.).

In 1988, plans were prepared to reconfigure Rooms 4401, 4402, 4403, 4409, 4412 on the fourth story, and to install alarms in Rooms 1801-1805 on the first story. In 1989, plans were prepared to expand communications areas on the first story of Building 1003 (Onizuka AFS, n.d.).

11. <u>Significant Events and Satellites Supported, 1980s</u>

Sunnyvale AFS continued to support numerous satellites programs throughout the 1980s, although many remained classified. On April 12, 1981, the first mission flown by the Space Shuttle *Columbia* was launched, and successfully returned to earth two days later. The AFSC provided support for the first shuttle mission, and five AFSCF mission controllers received U.S. Air Force Commendation Medals. In June 1982, the first classified military payload was carried into orbit aboard the fourth shuttle mission flown by *Columbia,* and was supported from MCC B in Building 1003 (Jernigan, 1983).

In February 1983, Libyan troops, led by military dictator Colonel Muammar al-Gaddafi, appeared to be planning a surprise invasion of Chad and Sudan. The United States launched a KH-8 reconnaissance satellite to provide photographs of the activity. The top-secret satellite was supported by Sunnyvale AFS. The mission produced photographs that documented massive troop build-ups at the border of Sudan, and the *USS Nimitz* was dispatched to the Gulf of Sidra, thus preventing a Libyan invasion of Sudan (Levien, 1989; Philp, October 30, 1985). In 1984, the twentieth and last KH-9 satellite was launched and supported from Sunnyvale AFS (Day, November 8, 2004).

The first dedicated military shuttle flight, aboard the Space Shuttle *Discoverer,* was launched in January 1985, and was supported from Building 1003. *The New York Times* reported on the launch, and noted that "all communication with the astronauts will be hidden in complex codes intelligible only with special unscrambling equipment" (Bamford, January 13, 1985). An article in the August 2009 edition of *Air & Space Magazine* indicated that "according to most accounts, STS-51C's payload was ORION, an eavesdropping satellite for signals intelligence" (Cassutt, August 1, 2009).

In October 1985, the second dedicated military flight was launched by the Space Shuttle *Atlantis* (Cassutt, August 1, 2009). *The New York Times* reported that, according to reliable sources, "two $100 million communication satellites" were deployed into orbit, on a mission classified as secret by the Pentagon (Broad, October 5, 1985).

In 1986, the Space Shuttle *Challenger* exploded after launch, killing its seven crew members, including the shuttle's mission specialist, Lieutenant Colonel Ellison S. Onizuka, who had trained at Sunnyvale AFS (NASA, 2007). That same year, Sunnyvale AFS was renamed Onizuka AFB in honor of Onizuka. Following the *Challenger* explosion, the U.S. Air Force returned 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 (Cassutt, August 1, 2009).

In 1989, a Tracking and Data Relay Satellite System (TDRSS) satellite was launched, supported by Sunnyvale AFS. The TDRSS was a sophisticated data-relay communications satellite developed by NASA (Levien, 1989).

12. Onizuka Air Force Station, 1990s-Present

By 1991, the Soviet Union had dissolved, signaling the end of the Cold War (Center for Air Force History, 1994). The end of the Cold War led, in part, to the declassification of the NRO in September 1992. The end of the Cold War also led to a decrease in military spending. However, modifications continued to be undertaken at Onizuka AFB, although less than in prior decades. In 1992, an addition was appended to the south façade of Building 1004, known as the Emergency Utility Building (EUB), and enhanced the installation's power distribution system. The Onizuka AFS Drawing Number Log indicates construction of the EUB also entailed upgrading mechanical systems in Buildings 1003, 10031, and 10032 (Onizuka AFS, n.d.).

In general, the majority of the plans prepared in the 1990s for Building 1003 were for routine maintenance, and included mechanical system upgrades, painting, and corridor renovation. However, in 1992, Keller & Gannon, a San Francisco-based architecture and engineering firm, prepared plans on behalf of the U.S. Air Force to repair and alter multiple MCCs on the third and fourth stories on behalf of the U.S. Air Force. Modifications included room reconfiguration, and mechanical, and electrial upgrades, likely to accommodate new satellite programs (Keller & Gannon/U.S. Air Force, July 16, 1992). In 1997, plans were prepared to remodel a portion of the third story (Onizuka AFS, n.d.).

By the early 1990s, Onizuka AFB and tracking stations provided radio links to over eighty active DoD spacecraft (Mead, March 2, 1994). Satellites supported from Onizuka AFB assisted with the success of Operation Desert Storm (1990-91). For example, weather satellites assisted with U.S. missile launches, and navigation satellites assisted the troops in maneuvering through the desert. Reconnaissance satellites, such as those in the NRO's KH-11 satellite program, also likely continued to be supported by the installation (Peterson, July 30, 1993). The early 1990s also represented a key year for satellite scheduling, with the advent of a computerized scheduling system. Prior to this time, scheduling was plotted by hand, using colored tape to represent different spacecraft on approximately 50' rolls of butcher-paper (Mead, March 2, 1994).

In 1991, the 21st Space Operations Squadron (SOPS) were activated at Onizuka AFB; and in 1992, the 750th Space Group was activated and assumed responsibility for launch and early orbit of numerous satellites, including the space shuttles (Schriever AFB, n.d.). In addition, the installation also supported numerous NASA space exploration programs. In 1994, Onizuka AFB was renamed Onizuka AFS.

In 1995, the Corona Program was declassified, and the following year, 800,000 images taken between 1960 and 1972 were made available to the public. Formerly classified documents also became available (NRO, February 24, 1995). In addition, Onizuka AFS was realigned in accordance with the Base Realignment and Closure (BRAC) Act, and select functions were relocated to CSOC at Falcon AFB, Colorado Springs, Colorado. The realignment resulted in a loss of approximately 1,100 jobs at Onizuka AFS (City of Sunnyvale, 2006). By the end of the 1990s and during the early 2000s, responsibility for controlling the DoD satellite network continued to be transferred to the CSOC, and Onizuka AFS's responsibilities substantially decreased (Flinn, December 1, 1991; Wulff, November 29, 1995).

In 1996, a terrorist attack on Khobar Towers, a high-rise apartment complex that housed U.S., British, and French military personnel in Dhahran, Saudi Arabia led to increased security measures at U.S. military installations. At Onizuka AFS, parking was no longer permitted on the first two stories of Buildings 10031 and 10032. In addition, because Innovation Way was in close proximity to Buildings 10031 and 10032, the street was closed to vehicular traffic, covered with astro-turf, and landscaped. Jersey barriers and bollards were also installed around the perimeter of the buildings (Dennis Ralphs, pers. comm., August 2, 2010).

In 2005, the BRAC commission recommended closure of Onizuka AFS. The recommendations were approved by President George W. Bush. In 2006, the DoD, through the Office of Economic Adjustment, formally recognized the City of Sunnyvale as the Local Redevelopment Authority (LRA) for planning the redevelopment of Onizuka AFS and its conversion to civilian use (City of Sunnyvale, 2006).

In May 2007, the NRO officially departed from Onizuka AFS. A deactivation ceremony and open house were held to commemorate this event, and were attended by over 800 guests, many of them former NRO, U.S. Air Force, CIA, and civilian employees (Munro, 2007). Displays were mounted on the corridor walls of Building 1003, highlighting the history of the NRO and reconnaissance satellite programs supported from the installation between through 2007. Following the open house, displays and histories of the programs, many of which remain classified, were relocated to the NRO archives in Chantilly, Virginia (Dennis Ralphs, pers. comm., August 3, 2009).

On July 28, 2010, a closing ceremony was presided over by Lieutenant General John Sheridan, commander of the Space and Missile Systems Center, Los Angeles AFB. In attendance were current and former employees, both military and civilian, as well as Lorna Onizuka, Ellison Onizuka's widow. In his remarks, Lieutenant General Sheridan noted that "[T]his facility here in Sunnyvale has supported an amazing 3.4 million satellite operations over the past years. Much of the details of this work are still classified and we cannot talk openly about it, but what I can tell you is that the operations conducted by the NRO from this site have made our nation a tremendously safer place to be" (Bauer, July 29, 2010).

The 21st SOPS relocated to Vandenberg AFB, and on July 30, 2010, a dedication ceremony was held to commemorate the opening of the 21st SOPS Ellison Onizuka Satellite Operations Facility at Vandenberg AFB. Onizuka AFS is scheduled to be transferred out of federal hands in September 2011. It is anticipated that the Department of Veterans Affairs (VA) will occupy Building 1002, and two buildings located outside the U.S. Air Force Satellite Test Center Historic District, Buildings 1018 and 1034. The remainder of the installation will be redeveloped.

E. Sources:

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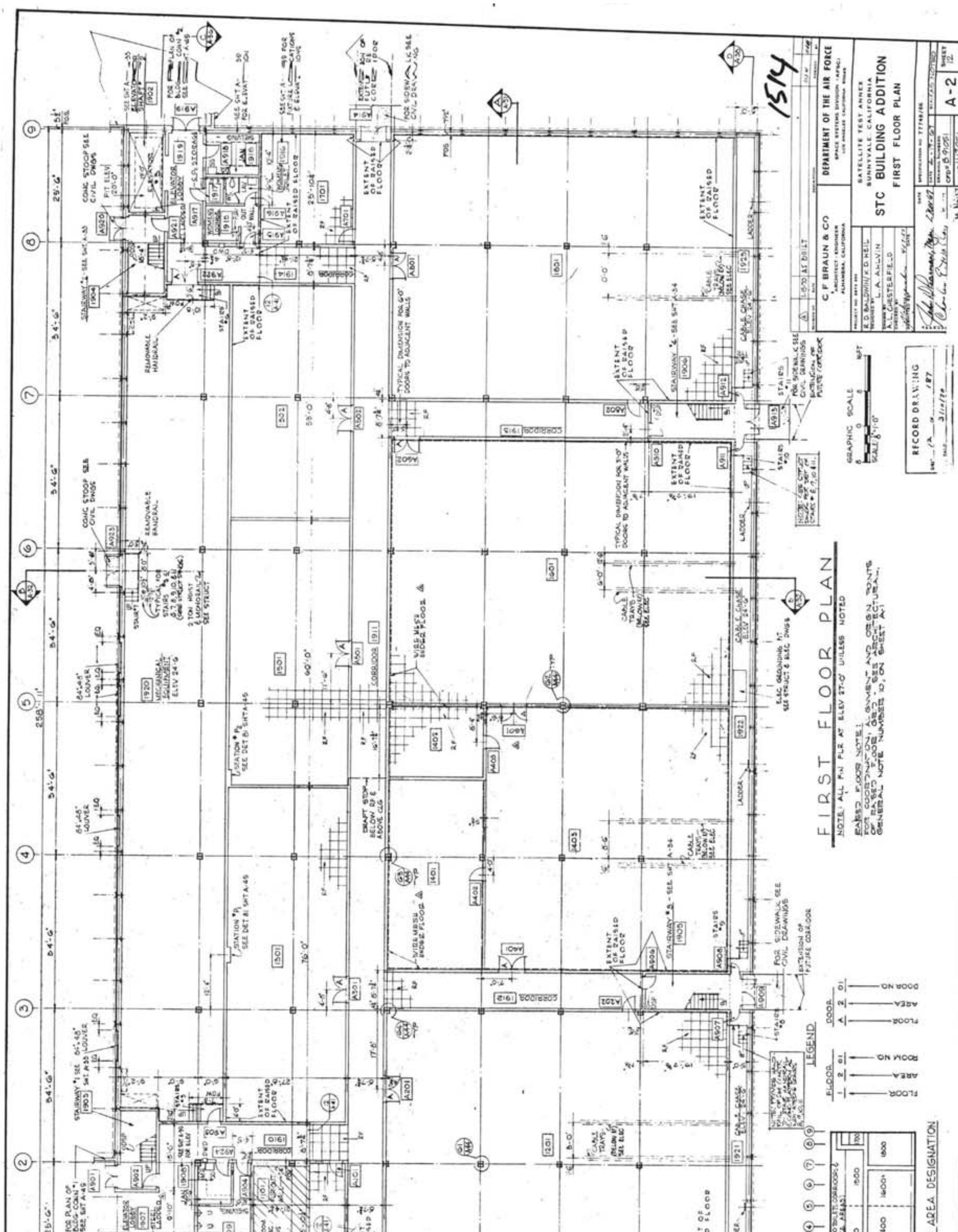
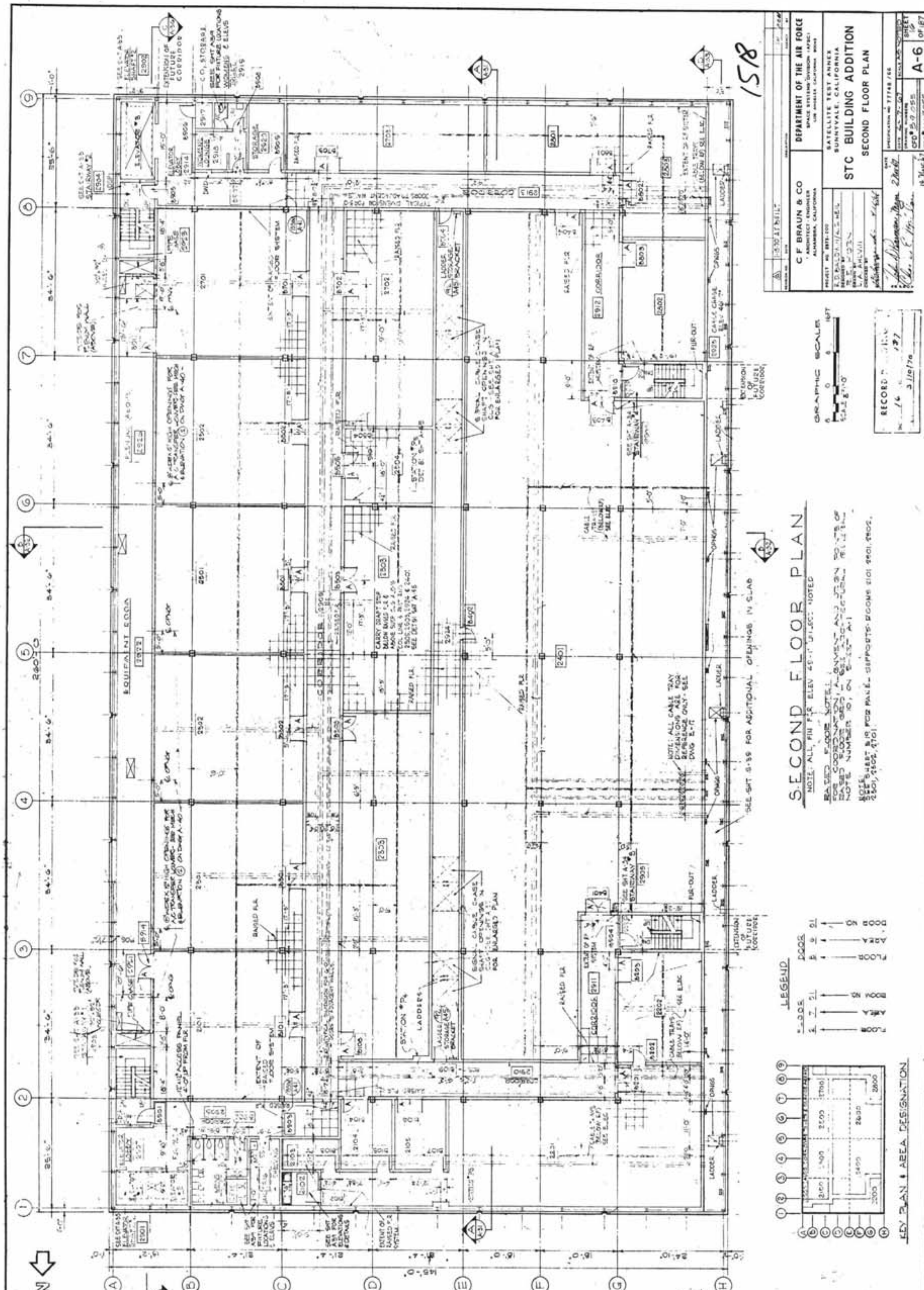
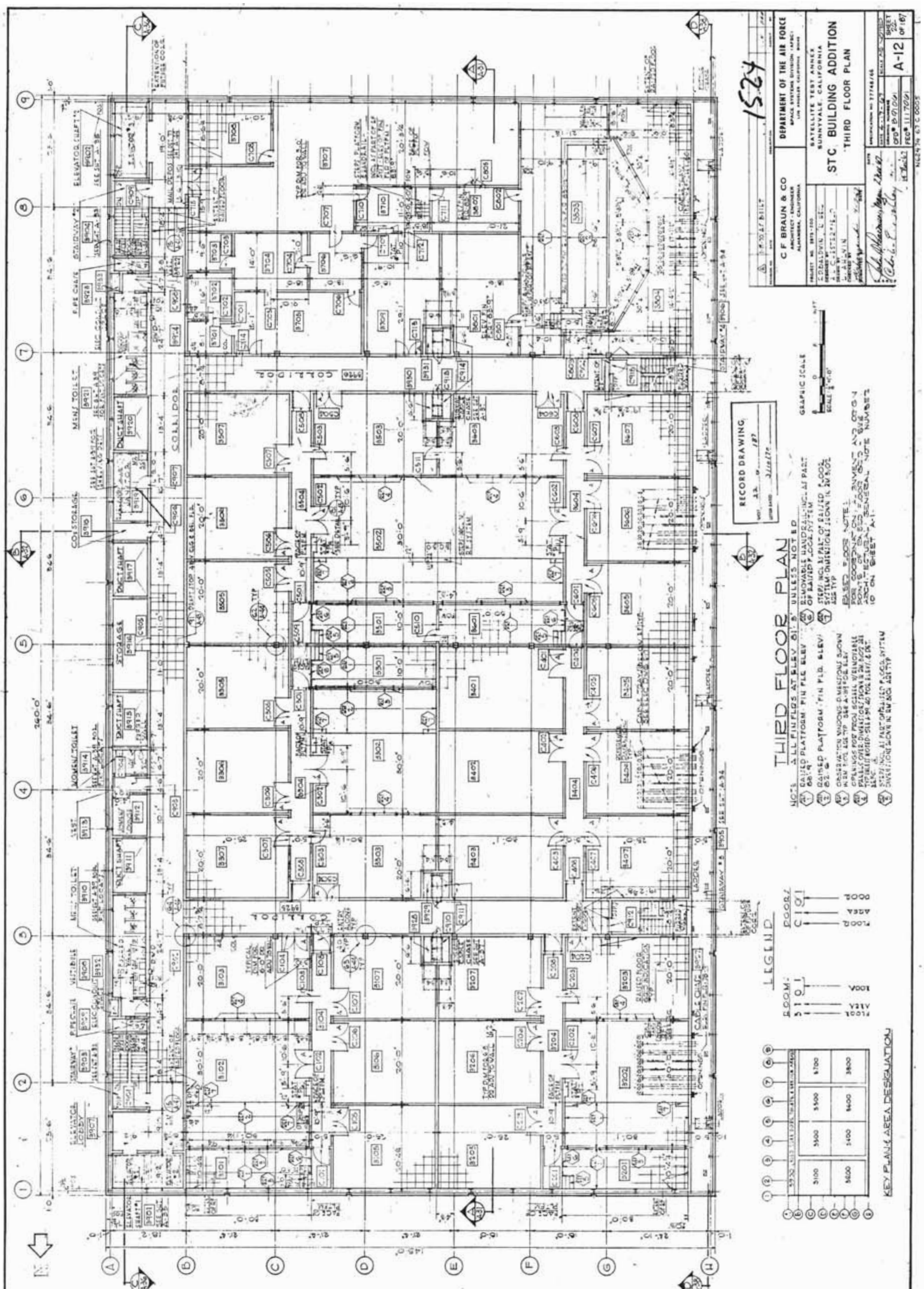
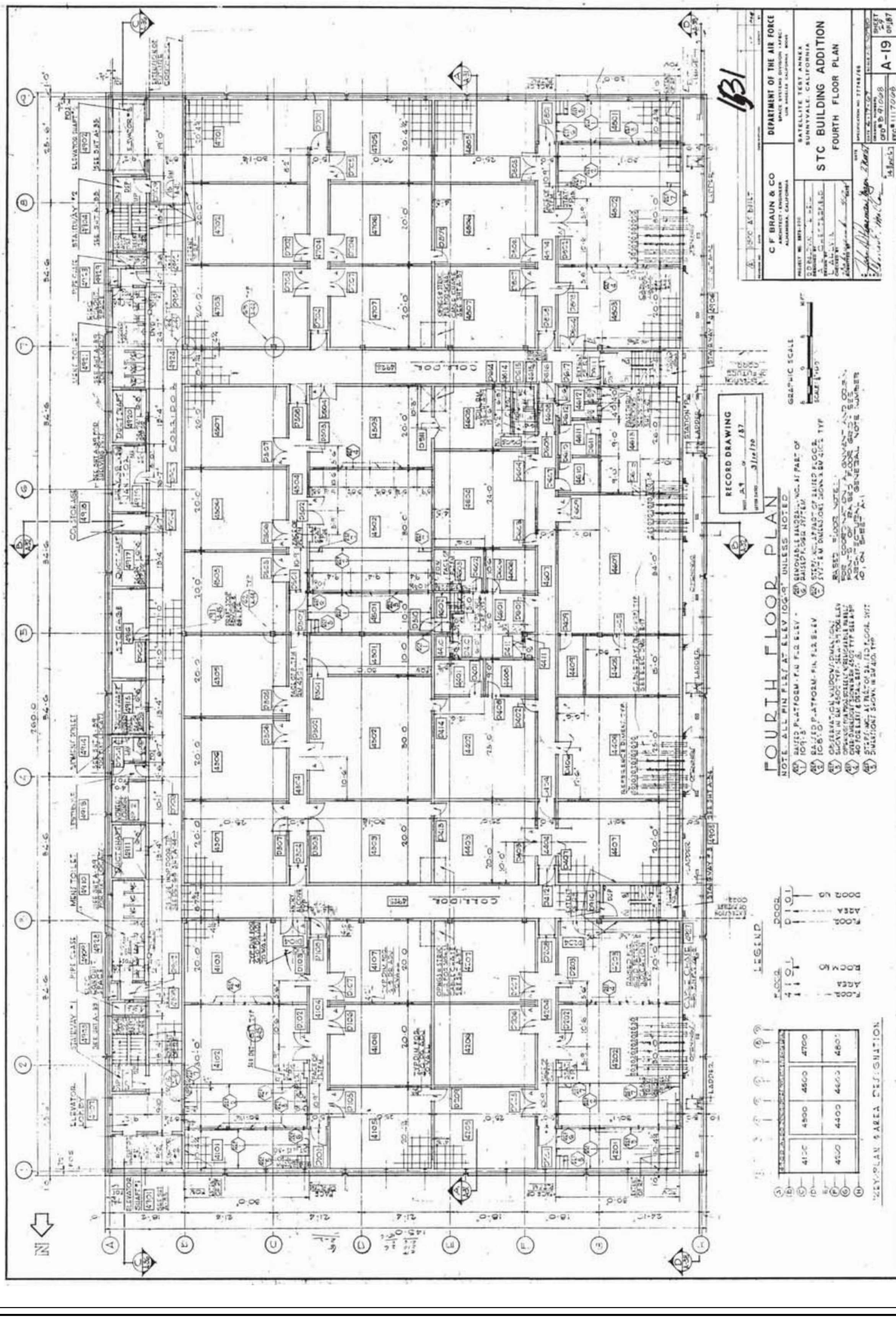
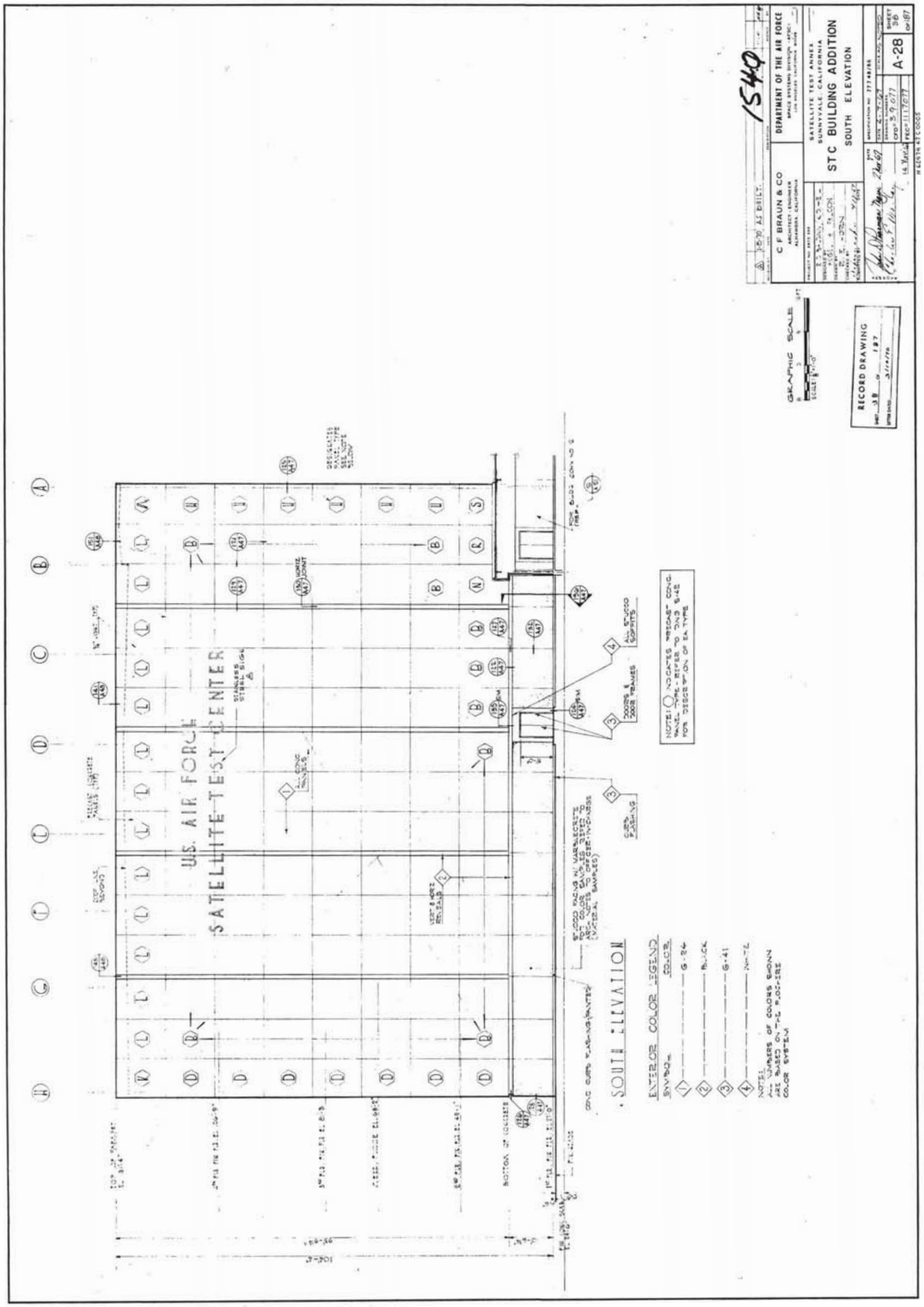

DEPARTMENT OF THE AIR FORCE
STC BUILDING ADDITION
FIRST FLOOR PLAN
A-2
FIRST FLOOR PLAN
LEGEND
KEY PLAN & AREA DESIGNATION
RECORD DRAWING


SECOND FLOOR PLAN
DEPARTMENT OF THE AIR FORCE
C F BRAUN & CO
SATELLITE TEST ANNEX
SUNNYVALE, CALIFORNIA
STC BUILDING ADDITION
SECOND FLOOR PLAN
A-6
EQUIPMENT ROOM
CORRIDOR
LEGEND
GRAPHIC SCALES
KEY PLAN & AREA DESIGNATION


THIRD FLOOR PLAN
DEPARTMENT OF THE AIR FORCE
STC BUILDING ADDITION
THIRD FLOOR PLAN
C F BRAUN & CO
A-12
RECORD DRAWING
LEGEND
KEY PLAN & AREA DESIGNATION
CORRIDOR


DEPARTMENT OF THE AIR FORCE
C F BRAUN & CO
SATELLITE TEST ANNEX
SUNNYVALE, CALIFORNIA
STC BUILDING ADDITION
FOURTH FLOOR PLAN
A-19
RECORD DRAWING
FOURTH FLOOR PLAN
CORRIDOR
LEGEND
GRAPHIC SCALE


U.S. AIR FORCE
SATELLITE TEST CENTER
SOUTH ELEVATION
EXTERIOR COLOR LEGEND
C F BRAUN & CO
DEPARTMENT OF THE AIR FORCE
STC BUILDING ADDITION
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1540

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HISTORIC AMERICAN BUILDING SURVEY
LEVEL II-TYPE DOCUMENTATION

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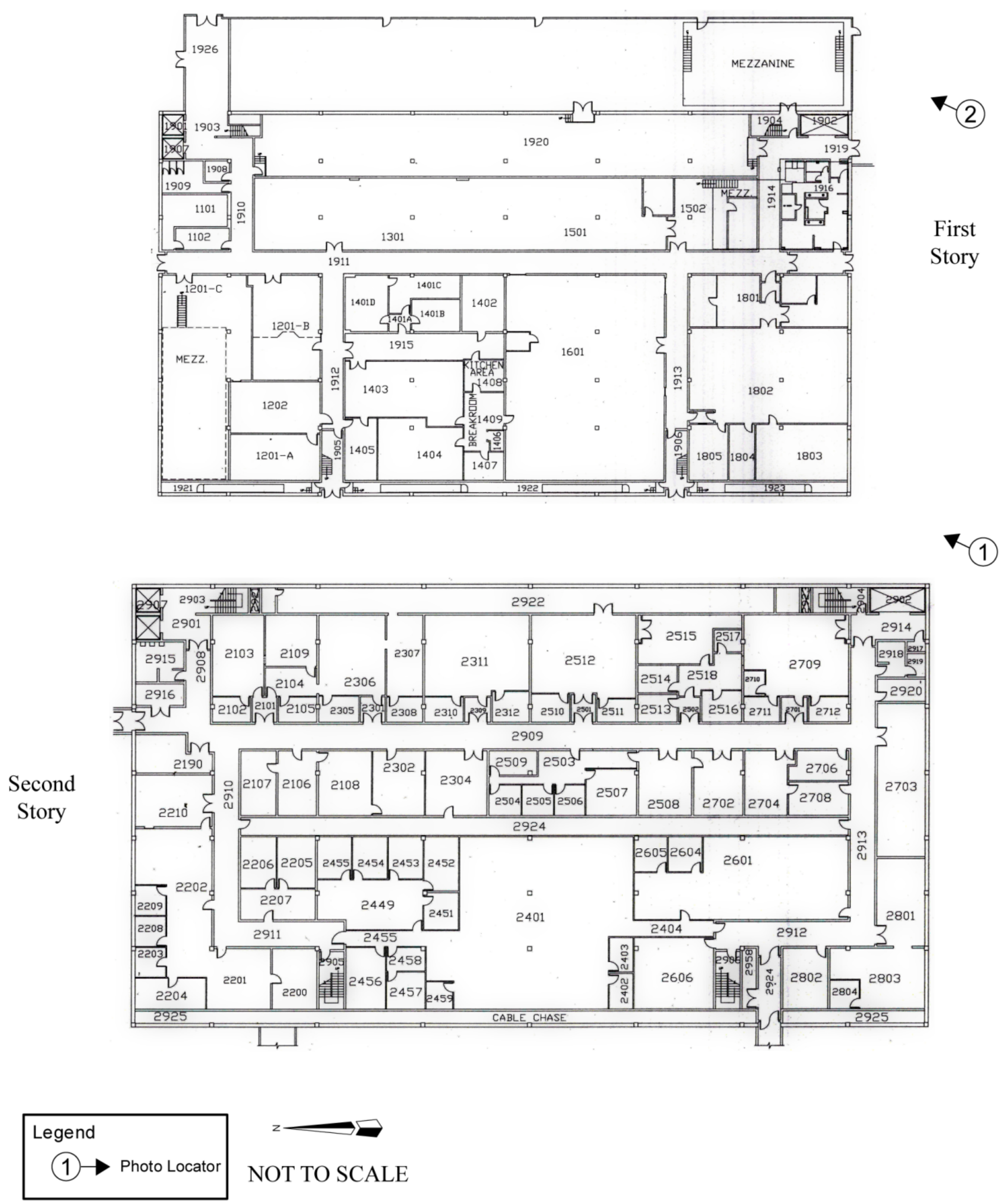
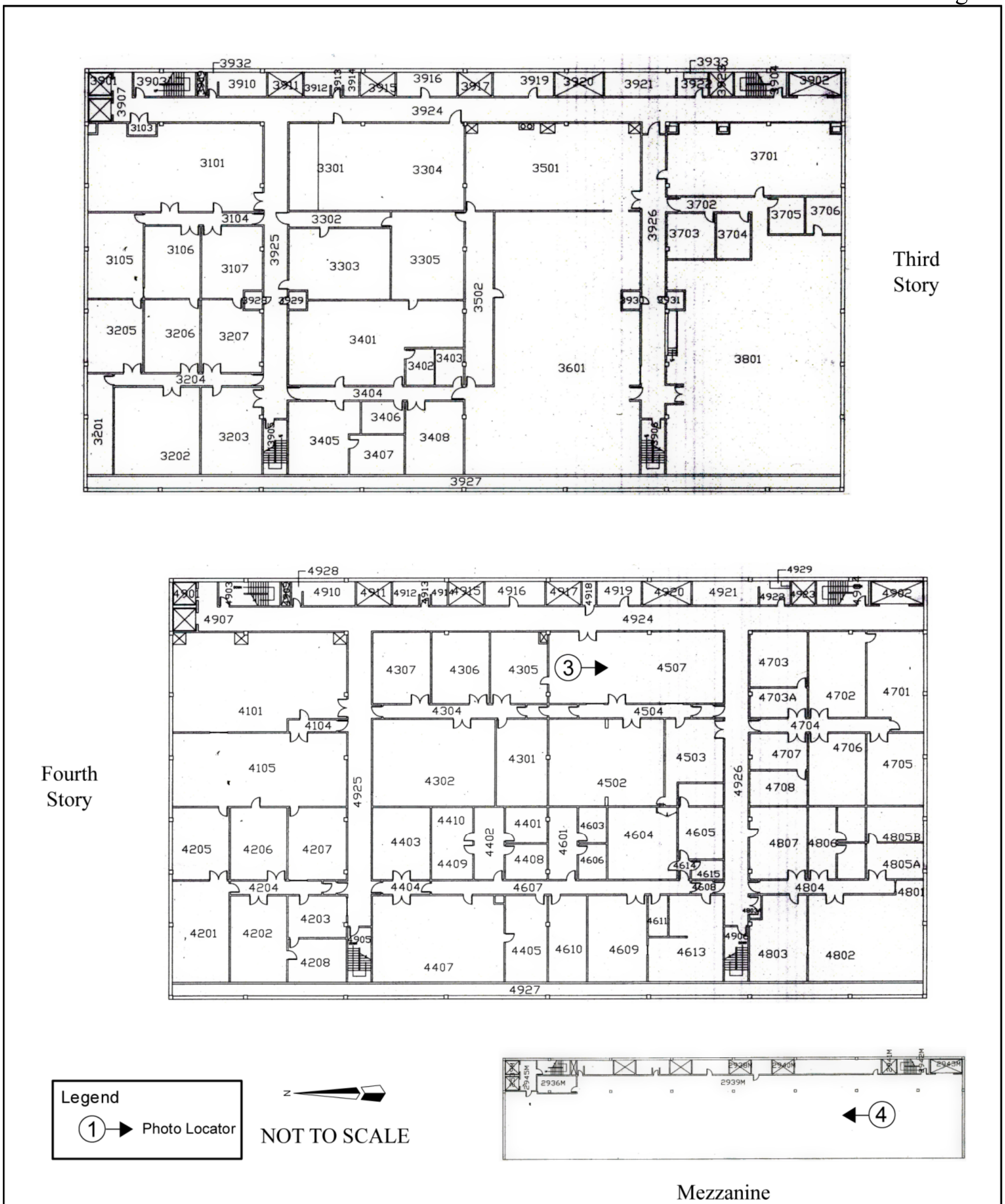
U.S. AIR FORCE SATELLITE TEST CENTER — Log No. USAF041221A-C
BUILDING 1003
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Anne Jennings, Photographer — Date of Photographs: June 7-14, 2010

Log No. USAF041221A-C-01	VIEW OF SOUTH AND WEST FAÇADES, LOOKING NORTHEAST. NOTE FIVE SETS OF THREE CONCRETE PANELS, PUNCTUATED BY METAL REVEALS.
Log No. USAF041221A-C-02	VIEW OF SINGLE-STORY, T-PLAN HYPHEN APPENDED TO SOUTH FAÇADE OF BUILDING 1003 AND WEST FAÇADE OF BUILDING 1004, LOOKING NORTHEAST. NOTE MARBLECRETE WITH STUCCO-CLAD SURFACE.
Log No. USAF041221A-C-03	VIEW OF ROOM 4507 ON FOURTH STORY, LOOKING SOUTH. NOTE RAISED FLOOR AND ACOUSTICAL TILE-CLAD CEILING INDICATIVE OF ITS FORMER FUNCTION AS A COMPUTER ROOM.
Log No. USAF041221A-C-04	VIEW OF MEZZANINE BETWEEN SECOND AND THIRD STORIES, LOOKING NORTH. NOTE MECHANICAL EQUIPMENT, INCLUDING LARGE AIR HANDLING UNITS (AHU) NECESSARY TO MAINTAIN SATELLITE OPERATIONS.



1 Building 1003, First and Second Stories



Building 1003; Third and Fourth Stories, and Mezzanine


CONDENSATE
AHU-303
WARNING HOT PIPES INSIDE

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U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 1004
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Log No. USAF041221A-D

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

PHOTOGRAPHS

California Office of Historic Preservation
1416 9th Street, Room 1442
Sacramento, CA 95814

FOR OFFICIAL USE ONLY

U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 1004
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Log No.USAF041221A-D

SECTION I

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HISTORIC AMERICAN BUILDING SURVEY
LEVEL II-TYPE DOCUMENTATION

U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 1004

Log No. USAF041221A-D

A. **Location:** Building 1004, Onizuka Air Force Station
1080 Innovation Way, Sunnyvale, Santa Clara County, California

B. **Significance:** Building 1004, constructed in 1970 to serve as the installation's power plant, is a contributing resource to the National Register-eligible U.S. Air Force Satellite Test Center Historic District. The district is significant at a national, state, and local level under Criterion A for its associations with satellite reconnaissance during the Cold War, and Criteria Consideration G, because five of the six buildings, including Building 1004, are not yet fifty years old, and have exceptional importance for their associations with satellite reconnaissance during the Cold War.

The U.S. Air Force Satellite Test Center Historic District is significant at the national level for its association with satellite reconnaissance during the Cold War. The installation was established in 1959 to serve as the command-and-control center for the first reconnaissance satellite program, the Corona Program. It was developed by the U.S. Air Force and the Central Intelligence Agency (CIA), with assistance from a private contractor, Lockheed Missiles and Space Division. Shortly thereafter, the National Reconnaissance Office (NRO) was established to provide oversight of the program and develop other satellite programs. As new satellite technologies emerged, such as communications, early missile warning, meteorology, navigation, and nuclear detonation detection, Building 1004 was constructed to provide a reliable source of electrical and mechanical power to the installation. Upon its completion in 1970, it served as the sole source of power, and ensured that critical, and often classified, satellite programs were overseen at the installation. These programs provided valuable data throughout the Cold War, and were supported from the U.S. Air Force Satellite Test Center Historic District. Although many of the satellite programs remain classified, it is apparent through the continued presence of the NRO that the installation played a key role in the United States' conduct of the Cold War.

The U.S. Air Force Satellite Test Center Historic District is also significant at the state and local levels for its association with the development of California as a leader in technological innovations. California, and specifically the City of Sunnyvale in Silicon Valley, began to emerge as a leading technological center during the Cold War. This was due, in part, to the military's investment in the development of defense technologies in California, such as command and control of reconnaissance satellites at Onizuka Air Force Station (AFS). The presence of Lockheed Missiles and Space Division in

Sunnyvale in the mid-1950s, followed by Onizuka AFS in the late 1950s, burnished its reputation as a high-technology center. The district's period of significance extends from 1959, the date of development of the installation, through 1991, the conclusion of the Cold War.

C. Description:

1. Current Description

Building 1004 was completed in 1970 to serve as the installation's power plant. It is a two-story, rectangular-plan, windowless, utilitarian steel-frame building sheathed in pre-cast concrete panels that measure approximately 21'x 8'. It is set atop a concrete-pile foundation and is capped by a flat, built-up, asphalt-clad roof and parapet articulated with blue-painted galvanized steel.

The north façade is ten panels wide and two panels high, and is appended to the south façade of Building 1001. It is mostly obscured by Building 1001. Numerous pipes pierce the north façade associated with Building 1001's mechanical equipment.

The south façade is also ten panels high and two panels wide. It forms part of the 1992 addition, known as the Emergency Utility Building (EUB). The addition was designed in a context sensitive manner to the original building. The south façade is pierced by a central metal roll-up garage door, set within a metal surround. A metal door with a metal handle pierces the garage door. The garage door is topped with a flat aluminum-clad overhang, and a metal-louvered vent pierces the façade above the overhang.

The east façade is pierced by nine two-story metal-louvered vents. Moving from north to south, metal fire stairs with metal pipe railings are appended to the east façade, and provide access to a metal door with metal hardware, set within a metal surround on the second story. The door is topped by an aluminum overhang and safety light. South of the stairs, the façade is pierced by a metal door, with metal handles, set within a metal surround. The door is topped by an aluminum overhang and safety light. Thousand gallon and 300 gallon gas tanks are appended south of the door and six air intake chambers are appended south of the gas tanks. An addition clad in vertical metal siding, supported by steel beams, is appended to the second story of the east façade, located above the two southernmost air intake chambers. The southernmost portion of the façade forms part of the 1992 EUB addition. Multiple pipes are appended to the east façade.

The west façade is pierced by nine two-story, metal-louvered vents. Moving from north to south, a single-story hyphen is appended to the northernmost portion of the west façade. It connects Building 1004 to Buildings 1001 and 1003. The section appended to Building 1003 is set atop a concrete foundation, capped by a stucco-clad parapet articulated with blue-painted galvanized steel. A double-metal door with no exterior hardware, set within a metal surround, pierces the west façade. A concrete step provides access to the entry, set behind three metal bollards. Six air intake chambers are located south of the hyphen. A metal-roof shed, supported by metal posts, is appended to the façade south of the air intake chambers. It is open on the north and west facades, clad in concrete panels on the south façade, and enclosed by a chain-link fence, topped with barbed-wire. It shelters transformers and other mechanical equipment. A metal roll-up garage door set within a metal surround, topped by an aluminum overhang pierces the façade south of the shed. A safety light is located south of the door. The southernmost portion of the façade forms part of the 1992 EUB addition.

Mechanical equipment is located on the roof, including turbine stacks that are behind metal screens. A mechanical penthouse, clad in concrete, and capped by a flat roof, is situated on the southwest corner of the roof. Additional mechanical equipment is located on the northern section of the roof.

The first story of Building 1004 encompasses 15,033 square feet and the second story encompasses 15,300 square feet. A current sketch plan is included in the Index to Photographs. Although an addition was appended to the south façade in the early-1990s, a comparison of the original floor plan with the current floor plan indicates that the majority of interior spaces have retained their original configuration, and in some cases, finishes and mechanical equipment as well.

The first story houses small rooms along the north side, including the Battery Room (Room 103), the defunct Pump Room (Room 101), the Turbine Start Rectifier Room (Room 102), and the Locker Room/Restrooms (Room 105). The Equipment Room (Room 100) encompasses the remainder of the first story and houses mechanical equipment. Major mechanical equipment includes twelve original American Air Filter Company air inlet structures located along the east and west walls; absorption chillers, including York centrifugal chillers and defunct Trane absorption chillers; electric panels; and circuit breakers. Select electric panels and circuit breakers are original to the building.

The second story also houses small rooms along the north side, including the Control Room (Room 201) which houses the original Solar Console; a Kitchen (Room 210) and Office (Room 202), as well as a restroom. The south wall of the Control Room is pierced by a sound control window that enables personnel to oversee the Equipment Room. The Equipment Room (Room 200) encompasses the remainder of the second story and houses mechanical equipment, including twelve original Solar gas turbine generator sets and original Besler heat recovery boilers.

Finishes are in keeping with the building's industrial function, and typically include plaster walls, concrete floors, and exposed ceilings in equipment areas, and plaster walls, vinyl tiles, and dropped ceilings in smaller rooms.

2. According to Original Plan

Original plans of Building 1004 are on file in the Civil Engineering Office, Building 1002, Onizuka AFS, Sunnyvale, Santa Clara County, California. Original building plans were prepared in 1969 by C.F. Braun & Company under the auspices of the U.S. Naval Facilities Engineering Command (NAVFAC) Western Division, San Bruno, California, and U.S. Air Force Space and Missiles System Organization (SAMSO), Los Angeles, California. Mechanical plans were developed by consulting engineers, Pope, Evans & Robbins, on behalf of Solar, a division of International Harvester Company, based in San Diego, California. The following plans are reproduced in the graphic documentation section of the report:

- "Power Plant, First Floor Plan, Interior Elevations and Reflected Ceiling Plan" (C.F. Braun & Company/NAVFAC/SAMSO, August 12, 1968a)
- "Power Plant, Second Floor Plan, Interior Elevations and Reflected Ceiling Plan" (C.F. Braun & Company/NAVFAC/SAMSO, August 12, 1968b)
- "Power Plant, Exterior Elevations and Sections" (C.F. Braun & Company/NAVFAC/SAMSO, August 12, 1968c)

In addition, historic photographs were also consulted to determine the original appearance of the building. A sampling of historic photographs are reproduced in the graphic documentation section of the overview report entitled California State Historic Preservation Office, Historic American Building Survey Level II-Type Documentation, U.S. Air Force Satellite Test Center, Log No. USAF041221A.

According to the original plans, Building 1004's original exterior appearance was similar to its current appearance, in terms of cladding, foundation, and roof. The north façade had no fenestration. The east façade was pierced by six two-story metal-louvered vents, and by two doors towards the southern end of the façade. The south façade was pierced by one central steel roll-up steel door on the first story, flanked by metal panels to the east and west, topped by a metal canopy. Steel fire stairs were appended to the south façade, and provided access to a second-story door. The west façade was pierced by two-story metal-louvered vents (C.F. Braun/NAVFAC/SAMSO, August 12, 1968c-d).

According to the original plans, the original configuration of the first and second stories was similar to the current configuration. Room functions were also similar, with the exception of Room 102 which originally served as the Maintenance Shop. Original finishes were similar to the current finishes, and were in keeping with the building's industrial function. Select non-extant original mechanical equipment included Carrier absorption chillers.

D. History:

1. Development of the Satellite Test Center, 1959-61

The development of satellite reconnaissance during the Cold War (1946-91) and the specific role of the STC is fully described in the associated overview report, California State Historic Preservation Office Historic American Building Survey Level II-Type Documentation, U.S. Air Force Satellite Test Center, Log No. USAF041121A. The following section provides a brief summary of the role that Building 1003 played at the STC from 1959-91, its period of significance.

The installation was established in 1959 when Building 1001 was constructed to serve as the command-and-control center for the Corona Program to support the launch, orbit, and recovery of Corona satellites. The Corona Program, initiated in 1958, was the first reconnaissance satellite program developed by the U.S. Air Force and the CIA, with assistance from private contractors, such as Lockheed Missiles and Space Division, located in Sunnyvale, California. Concerns about preserving the secrecy of the Corona Program and its objectives led to the designation of the Discoverer Program as a cover program. The publicly-stated goal of the Discoverer Program was scientific research (Richelson, 2002). Prior to the construction of Building 1001, at least eight Corona satellites, described as Discoverer satellites in the press, were launched from Vandenberg Air Force Base (AFB), and were supported from an interim control center in Palo Alto, California. Tracking stations located around the world also provided support.

In 1959, the U.S. Air Force acquired 11.43 acres of land in Sunnyvale from Lockheed Missiles and Space Division located to the west. Plans for the installation were designed by the Ralph M. Parsons Company, an architecture and engineering firm based in Los Angeles, California, under the auspices of the U.S. Air Force Ballistic Missile Division (AFBMD) in Englewood, California (Ralph M. Parsons Company/AFBMD, March 6, 1959).

On January 28, 1960, the installation, newly designated as the STC, was dedicated by the U.S. Air Force (Davies, 1960). A few months later, on March 1, 1960, it was occupied by the 6594th Aerospace Test Wing (ATW), the first unit to be tasked with military satellite operations; Lockheed Missiles and Space Division employees; and likely the CIA. The 6594th ATW provided oversight for Lockheed Missiles and Space Division which was responsible for satellite operations (6594th ATW, 1961; Jernigan, 1983). However, portions of the building remained under construction, including the state-of-the-art

Satellite Control Room in the Satellite Control Room Complex. An interim Satellite Control Room was established from which Lockheed Missiles and Space Division, monitored by the 6594th ATW, could direct the launch, tracking, data acquisition, command and control, and recovery phase of military satellites (6594th ATW, 1961; Jernigan, 1983).

On July 7, 1960, the installation was officially designated as the Satellite Test Annex (STA) under the jurisdiction of the AFBMD. However, it should be noted that it continued to be referred to as the STC, both in U.S. Air Force documents, as well as by the public, likely due in part to a building sign which indicated "U.S. Air Force Satellite Test Center." On February 6, 1961, the Satellite Control Room and remainder of the Satellite Control Room Complex became operational. The primary purpose of the complex was to support Corona satellites, although additional programs were supported by this time (Jernigan, 1983).

2. Significant Events and Satellites Supported, 1960-61

In August 1960, the U.S. Air Force accomplished the first successful retrieval of a Discoverer satellite. On August 10, Discoverer XIII was launched from Vandenberg AFB, and was supported by the STC. The satellite achieved polar orbit for a period of ninety-four minutes, during which time it was in contact with worldwide tracking stations, and the interim Satellite Control Room at the STC. During its seventeenth rotation of the earth, the eject command was issued from the STC, and the capsule was ultimately recovered from the Pacific Ocean, marking the first successful retrieval of an object from space (Arnold, 2005; 6594th ATW, no date [n.d.]). In-keeping with the publicly stated scientific objectives of the Discoverer Program, the *San Jose Mercury News* noted that "Discoverer recovery techniques will be used soon to return monkeys from space," and were vital to "returning a man to earth after orbiting in space" (Lindsey, August 12, 1960). Still in the testing phase, the satellite did not yet contain a camera (Jernigan, 1983).

Shortly after this historic event, Discoverer XIV was launched on August 18, 1960 from Vandenberg AFB (Arnold, 2005). Discoverer XIV orbited the earth seventeen times, supported by the STC from the interim Satellite Control Room in Building 1001, and the Kodiak tracking station, before the eject command was relayed to the satellite. Following the command, at 300 miles above the earth, the satellite recovery vehicle (SRV) separated from the spacecraft, and began its descent to earth, where it was caught by a specially equipped Fairchild C-119 *Flying Boxcars* (C-119) piloted by U.S. Air Force Captain Harold Mitchell (*The New York Times,* August 20, 1960).

The Discoverer XIV SRV contained 20 pounds of film which documented over 1,650,000 square miles, and provided the first successful satellite reconnaissance photographs of the Soviet Union. It also resulted in more photographic coverage of the Soviet Union than all previous U-2 flights combined. Furthermore, it 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) (Day, 2006). However, despite the historic nature of this event, the crew, who were not cleared for the Corona Program, were unaware of the importance of their mission (Arnold, 2005).

Although the STC was developed to support the Corona Program, by the fall of 1960, it also supported the Satellite and Missile Observation System (SAMOS) and Missile Detection Alarm System (MIDAS). Both programs were initially developed by the U.S. Air Force in the mid-1950s as reconnaissance and missile detection satellites, respectively (Jernigan, 1983). On October 11, 1960, the first SAMOS satellite was launched from Vandenberg AFB, and supported from the STC, although it failed to reach orbit (*San Jose Mercury News*, October 12, 1960). By July 1961, MIDAS satellites were launched from Vandenberg AFB and supported by the STC. By the end of 1961, two MIDAS satellites had reached orbit (6594^{th} ATW, 1961).

In April 1961, Discoverer XXIII was launched from Vandenberg AFB, and was the first Corona satellite supported by the STC from the new control room. By this time, Corona satellites were regularly providing images of the Soviet Union, as well as other communist countries. Among these images included evidence of the building of the Berlin Wall between East and West Germany (Chapman, 2008). In September 1961, the NRO was established as a classified agency in the Department of Defense (DoD), and was tasked with oversight of reconnaissance satellite programs, including the Corona Program, and therefore became a presence at the STC (Richelson, 2000).

3. <u>Building 1002 Construction and Upgrades, 1962</u>

In 1962, the STC experienced its first of many expansions when plans for a two-story, L-shaped administrative building – Building 1002 (Addition to the Satellite Test Annex) - were prepared for the U.S. Air Force Space Systems Division (SSD) by Kaiser Engineers, a division of the Henry J. Kaiser Company. Kaiser Engineers was a well-known architecture and engineering firm located in Oakland, California (Kaiser Engineers/U.S. Air Force SSD, January 15, 1962a-b; Air Force Satellite Control Facility (AFSCF), 1972).

During this time, Kaiser Engineers also prepared plans for a single-story addition to Building 1001 to house new a new communications center, and interior modifications to the Satellite Control Room Complex (Kaiser Engineers/U.S. Air Force SSD, October 17, 1962a-b - 1325; Jernigan, 1983).

The 1962 renovations were likely implemented in conjunction with the U.S. Air Force's first modernization effort, the Multiple Satellite Augmentation Program (MSAP). This effort was initiated in part, to standardize and provide updated equipment to the STC and tracking stations which enabled them to simultaneously support multiple satellite programs (Lockheed Missiles and Space Division, 1963). Computer capabilities were upgraded, new display and communications equipment were also installed, and connections between the STC and tracking stations were upgraded (Jernigan, 1983).

4. Significant Events and Satellites Supported, 1962-64

On February 27, 1962, Discoverer XXXVIII was launched and supported from the STC. The following month, the DoD classified all military satellite programs (DoD, March 23, 1962). As a result, Discoverer XXXVIII was the last satellite launched as part of the Discoverer program. Corona satellites continued to be launched and supported by the STC, however, because all satellites were classified, the Corona Program no longer required a cover story.

Between 1962-64, the STC supported over fifty Corona satellites. By this time, Corona satellites had accurately mapped all twenty-five of Moscow's long-range missile sites. Furthermore, images taken by Corona satellites indicated that China was readying its nuclear facility in Lop Nur for testing. It was noted in a classified CIA briefing that "[O]n the basis of new overhead photography, we are now convinced that the previously suspect facility at Lop Nur in western China is a nuclear test site which could be ready for use in about two months." Within two months, on October 16, 1964, China tested an atomic bomb at the Lop Nur site (Broad, September 12, 1995).

In addition to Corona, SAMOS, and MIDAS satellites, the STC supported the Defense Meteorological Satellite Program (DMSP) in 1962 and 1963. DMSP was a meteorological satellite program initiated in 1960 to provide weather and climate data for more effective military operations (DMSP, n.d.). On October 16, 1963, the first Vela satellite was launched and supported by the STC. The Vela Program – vela means vigil in Spanish – was a series of satellites designed to detect nuclear detonations (Jernigan, 1983; Peebles, 1997). Presumably, Vela satellites provided images of the Lanzhou Diffusion Plant in Lanzhou, China and the Baotao Nuclear Fuel Component Plant in Baotao, China (Richelson, 2002).

In November 1963, the final SAMOS satellite was launched (Peebles, 1997). Furthermore, 1963 marked the beginning of the Keyhole (KH)-7 surveillance system, noted in a 2006 NRO memo as "the Intelligence Community's first high resolution surveillance or 'spotting' satellite." Similar to Corona satellites, the KH-7 was a reconnaissance satellite that returned film to earth in SRVs. It was primarily used to provide surveillance of nuclear facilities and Intermediate Range Ballistic Missiles (IRBM) in the Soviet Union and China (NRO, 2006).

In July 1964, two additional Vela satellites were launched, resulting in a total of four orbiting satellites capable of detecting nuclear detonations. In August 1964, Syncom III was launched and was supported by the STC. Syncom III was a National Aeronautics and Space Administration (NASA) satellite used for DoD military communications experiments between Saigon, Vietnam, and Hawaii (Jernigan, 1983).

5. Construction, Upgrades, and Designation of the Air Force Satellite Control Facility, 1964-67

In May 1964, plans were prepared for a two-story, L-shaped administrative addition to Building 1002. It was designed by Maher & Martens, a San Francisco-based architecture firm for the U.S. Army Corps of Engineers (USACE), Sacramento District. The addition was appended to the east façade of Building 1002, and created an interior courtyard. A hyphen connected the south façade of Building 1002 to the north façade of Building 1001 (Maher & Martens/USACE Sacramento District, May 7, 1964; AFSCF, 1972).

In 1965, the U.S. Air Force Satellite Control Facility (AFSCF) was officially designated. The mission of the AFSCF was to direct launch, tracking, data acquisition, command and control, and recovery of DoD military satellites. Following the establishment of AFSCF, an Interim Expansion Plan (IEP) was initiated to augment the facility and implement the Mission Control Center (MCC) concept. The concept focused on the development of mission-oriented control centers rather than a single control room (Jernigan, 1983).

Plans were prepared by San Francisco-based consulting engineers, Bentley Engineers and Earl & Wright, Inc., under the auspices of the U.S. Air Force SSD to develop multiple MCCs in Building 1001. The plans indicate that the building was reconfigured to accommodate four new MCCs, known as MCCs 1, 2, 3, and 4. In addition, the building also featured two new complex areas, known as Complex Numbers 6 and 7. The plans also indicated that two new communications areas, labeled as Communications Area A and B, were added, as well as a new bird buffer area (Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD, December 13, 1965a-d). The majority of the work was completed by December 1966 (AFSCF, January-June 1966).

6. Significant Events and Satellites Supported, 1965-70

The increase in the number of flight support hours logged by the AFSCF between 1965-66 appears to indicate that at least some of the MCCs were operational in 1966. In 1965, the AFSCF logged 20,757 hours of satellite flight support. By 1966, 29,400 hours of flight support were logged. The number of satellites supported also increased. In 1965, the STC supported approximately fourteen satellites (AFSCF, 1972). In January 1967, the STC supported thirty-one satellites per day, and by June were supporting forty-four per day, which was expected to increase to forty-seven per day by July (AFSCF January-June 1967).

Between 1965-70, the STC supported over forty Corona satellite launches (Mission and Spacecraft Library, n.d.). By 1966, upgrades to the installation had resulted in an increase in involvement in satellite programs. In addition to Corona, Vela, and other programs (many of which likely remained classified) new programs such as NASA's Biosatellite Program were supported. The Biosatellite Program was a series of three satellites designed to assess the effects of spaceflight on living organisms. Support for the program focused on directing operations of the recovery of the satellites by Lockheed C-130 *Hercules* (C-130) aircraft flown by the 6594th Aircraft Recovery Group based at Hickam AFB, Honolulu, Hawaii (Jernigan, 1983).

In June 1967, two scientific satellites, one owned by the U.S. Army, the other by the U.S. Navy, were launched as the first flight in the DoD Space Experiments Program (SESP). SESP was responsible for providing flights for research and experiments undertaken by government agencies (AFSCF, January-June 1968; Jernigan, 1983). In 1967, the KH-7 surveillance system was terminated, after having flown thirty-eight missions, thirty-four of which successfully returned usable images (NRO, 2006).

In June 1968, the *San Jose Mercury News* reported that satellite reconnaissance, likely supported by the STC, uncovered the Soviet Union's plans for the invasion of Czechoslovakia. The article noted that "[S]atellites spinning over Eastern Europe monitored Soviet radio transmissions which signaled the invasion was imminent, and photographic reconnaissance satellites had monitored unusual military activities on the Czech borders by Soviet, East German, Polish, Hungarian, and Bulgarian troops" (*San Jose Mercury News*, August 27, 1968).

In September 1968, a Lincoln Experimental Satellite (LES) was launched into orbit and supported by the STC and tracking stations. The LES was an experimental satellite used to test communications between aircraft, ships, and ground forces (Jernigan, 1983).

In 1969, support was provided for NASA's manned flights to the moon. The STC supported Apollo missions 9 and 10, and Apollo 11, the first manned lunar landing. Program 949 was also supported in 1969 (AFSCF, January-June 1969). Program 949 was designated in November 1966 to supplant Program 461, which had initially supplanted the MIDAS Program in 1963. Program 949 provided a wider range of capabilities, and by the 1970s, was expected to have "progressively enhanced world-wide early-warning, surveillance and detection capabilities" (Piper, 1970).

7. Development of Buildings 1003 and 1004, 1966-70

In conjunction with the technological upgrades which occurred throughout the mid-to-late 1960s, a real estate estimate was prepared by the USACE Sacramento District in August 1966 that proposed the acquisition of 8.2 acres of land from Lockheed Aircraft Corporation at a cost of $49,000. In 1966, Alhambra, California-based architecture and engineering firm, C.F. Braun & Company, under the auspices of the U.S. Naval Facilities Engineering Command (NAVFAC) Western Division, San Bruno, California, and SAMSO, Los Angeles, California, prepared site development plans (C.F. Braun & Company/NAVFAC/SAMSO, December 30, 1966).

C.F. Braun & Company was founded by Carl Braun in 1909, and quickly became well-known for construction of industrial facilities, including oil refineries and chemical plants (*The New York Times*, February 5, 1954). Although Braun died in 1954, the reputation he had established for his company as a builder of industrial facilities likely led to his selection by SAMSO to develop the STC's new buildings. Carl Swenson, Inc. of San Jose, California, and the Powerhouse Oakland Construction Company of Salt Lake City, Utah, served as contractors (*Aerospace Daily,* September 19, 1969).

Site development plans, dated December 30, 1966, included relocation of an existing Lockheed Missiles and Space building, realignment of Lockheed Martin Way (formerly known as East Perimeter Road) west of Building 1001, creation of additional parking space, and installation of underground utilities (C.F. Braun & Company/NAVFAC/SAMSO, December 30, 1966). In addition, C.F. Braun & Company also prepared plans for the development of two new buildings, Building 1003 (STC Building Addition), and Building 1004 (Power Plant) (C.F. Braun/NAVFAC /SAMSO, November 14, 1967; August 12, 1968a).

By 1968, funds were appropriated for acquisition of the land and construction of the two buildings, and in August, Lockheed Aircraft Corporation transferred the land to the U.S. Air Force (Lockheed Aircraft Corporation, 1968; Jernigan, 1983). That year, the *San Jose Mercury News* reported that the STC would be "updated in a project expected to cost more than $40 million" to support the Manned Orbiting Laboratory (MOL) Program (*San Jose Mercury News*, January 10, 1967 & January 17, 1967). The MOL Program was initiated in 1963, and involved a Titan III booster rocket which carried a modified Gemini B capsule attached to a space laboratory, and was intended to serve reconnaissance purposes.

In September 1967, the U.S. Air Force announced plans to build a four-story, 150,000-square-foot addition at the STC (*San Jose Mercury News*, September 16, 1967). As noted in the January 1967 *San Jose Mercury News* articles, Building 1003 was designed to house the MOL Program as well as other satellite programs. However, in June 1969, the

DoD announced the cancellation of the MOL Program to save money. The cancellation led to a short work stoppage, however construction resumed a few weeks later. *Aerospace Daily* reported that the U.S. Air Force had evaluated requirements for current and future programs, and determined that construction on the building should continue (*Aerospace Daily*, September 19, 1969). The *San Jose Mercury News* reported that "official announcements merely declared that 'other activities' would replace the MOL in the sky-blue building." The article also noted that the new facilities may "become home for a space shuttle command post" (Carey, 1969).

By the end of 1969, the 164,000-square foot Building 1003, constructed at a cost of $8 million, was nearly complete. A windowless, pre-cast concrete-panel building, it was appended to the west façade of Building 1001. The building was painted "Air Force blue," resulting in its nickname, the "Blue Cube" (*Aerospace Daily*, September 19, 1969).

Architectural plans for Building 1004 were also developed by C.F. Braun & Company and mechanical plans were developed by consulting engineers, Pope, Evans & Robbins, on behalf of Solar, a division of International Harvester Company, based in San Diego, California. Solar provided the Saturn gas turbine generator sets that powered the plant, and therefore were responsible for the mechanical layout of the building. In 1927, Solar, originally known as the Prudden-San Diego Airplane Company, was founded to manufacture aircraft. By 1929, the company had only manufactured three aircraft, and opted to begin manufacturing aircraft components for other manufacturers under the name Solar Aircraft Company. During World War II, they provided exhaust manifolds for military aircraft, and developed high-temperature components for jet engines.

After World War II, the company was awarded multiple contracts to develop engine parts, including one with the U.S. Navy to develop an afterburner for a turbojet engine. Solar became the first U.S. company to develop a practical afterburner. Following this success, the company was awarded a contract by the U.S. Navy to develop gas turbine engines to provide auxiliary power for ships, as well by the U.S. Air Force to develop gas turbines to provide auxiliary power for aircraft (Fleming and Leyes, 1999). In the 1950s, under contract to the U.S. Navy, the company developed the Saturn gas turbine, a 750 kilowatt (kW) engine. In addition to its application on ships, the company also saw the commercial potential in the product, because it was smaller, lighter, more reliable, and easier to maintain than low-speed reciprocating engines traditionally used for industrial applications (Solar Turbines, n.d.).

In 1960, Solar Aircraft Company was acquired by International Harvester Company (Solar Turbines, n.d.). That year, an article about the benefits of gas turbine engines appeared in *Time* magazine, and touted the company as a "major gas turbine maker" (*Time*, October 31, 1960). By 1965, Solar had purchased 99 acres in San Diego to construct a "major manufacturing facility for gas turbine engines," indicative of their growth and prominence during this time period (*Gas Turbine,* 1965).

It is likely that Solar's reputation as a gas turbine manufacturer, and their prior work for the military, led the U.S. Air Force to select them to provide Saturn gas turbine generator sets for Building 1004. The two-story power plant cost $5.4 million to construct, and was designed to operate as a "total energy system" for the STC, and provided all the electrical and mechanical power required to support Buildings 1001 and 1003 (*Aerospace Daily*, September 19, 1969).

Similar to Building 1003, it was also a windowless building clad in pre-cast concrete panels. Metal louvers pierced the east and west facades to provide ventilation for the mechanical equipment (C.F. Braun & Company/NAVFAC/SAMSO, August 12, 1968c-d). It featured twelve, 750 kW 1,000 horsepower, Solar Saturn gas turbine generator sets, described by *Aerospace Daily* as "state-of-the-art," and cost $3.1 million (*Aerospace Daily*, September 19, 1969). The *San Jose Mercury News* reported that they were "twelve of the largest turbines in the country" (*San Jose Mercury News*, February 20, 1970). The installation of the turbines required the use of cranes.

The turbines, sparked by wet-cell batteries, were run by natural gas supplied by Pacific Gas & Electric (PG&E) Company, with diesel fuel available for back-up. In the event of a natural gas interruption, the turbines were designed to automatically switch to diesel fuel without any disruption of power. Waste heat generated from the turbines was piped into recovery boilers, and converted into steam to run absorption chillers to provide air conditioning, and to heat exchangers to provide heat and hot water. All functions were monitored from Solar Control Consoles. All systems were designed with redundancies, because the power provided by Building 1004 was critical to ensure continued support of satellite programs controlled from the STC (Ruocchio, pers comm., June 9, 2010).

The development of Building 1004 necessitated modifications to the installation's power distribution system. Ties connecting to the PG&E power grid were severed, with the exception of one line which provided power through a Lockheed Missiles and Space Substation, and was likely kept active for back-up purposes (AFSCF, 1972). In addition to providing the Saturn gas turbine generator sets, Solar also provided the personnel to run and maintain the plant. It became operational in February 1970, and provided power to the entire installation, rendering it energy-independent at that time (Jernigan, 1983).

Building 1004 was designed as a prototype power plant intended to be developed at U.S. Air Force facilities across the United States. This plan was never realized, in part due to the 1970s oil crisis (Ruocchio, pers. comm., June 9, 2010). However, it should be noted that the U.S. Air Force continued to utilize Saturn gas turbines at other installations. For example, in 1985, *Turbomachinery International* reported that the U.S. Air Force had acquired twenty-three Saturn-powered generator sets to support remote deployments without facilities (*Turbomachinery International,* January-February 1985).

8. Upgrades, 1970s

On January 1, 1971, AFSCF re-designated STC as Sunnyvale AFS. In 1975, San Francisco-based architecture and engineering firm Keller & Gannon, under the auspices of SAMSO, prepared plans to construct an addition to the east façade of Building 1004 which functioned as a Test Laboratory (Keller & Gannon/SAMSO, May 5, 1975). The majority of other plans prepared in the 1970s concerned equipment maintenance and upgrades. For example, in 1977, plans were prepared to install soot blowers (Onizuka AFS, n.d.). In addition, that same year, the original Carrier absorption chillers were replaced by Trane absorption chillers (Anthony Ruocchio, pers. comm., July 31, 2010). In 1979, plans were prepared to repair the steam condensate system and turbine exhaust system insulation, and paint the exterior of the building (Onizuka AFS, n.d.).

9. Significant Events and Satellites Supported, 1970s

In the 1970s, Sunnyvale AFS continued to support existing and newly established satellite programs from Buildings 1001 and 1003, although many of them remained classified. Building 1004 provided a reliable source of electrical and mechanical power necessary to support the programs. In 1970, the AFSCF Satellite Test Operations Historical Reports noted the successful support of two "unique orbital events" from the installation. These events included support of the Apollo 13 mission in April, which was aborted following the explosion of an on-board oxygen tank, and support of the first North Atlantic Treaty Organization (NATO) communications satellite in March (AFSCF, January-June 1970).

In June 1970, the final Vela satellite was launched. Sunnyvale AFS continued to provide support from Building 1003 throughout the 1970s for the orbiting satellite (Jernigan, 1983). Program 949 was also re-designated the Defense System Program (DSP) in 1970. Sunnyvale AFS continued to support this program throughout the early 1970s (AFSCF, July-December 1970; 1971; 1972). The DSP satellite weighed 2,000 pounds, was approximately 23' long, 10' wide, and contained a large infrared telescope which scanned the earth for missile launches. In the event a missile was launched, it would be detected by the United States within minutes, which removed the possibility of a surprise attack (Peebles, 1997).

By November 1971, a pair of Defense Satellite Communications System (DSCS) II advanced communications satellites had been launched to handle voice, teletype, computerized digital data, and video transmissions (Jernigan, 1983). The first KH-9 satellites – code-named HEXAGON, and popularly known as "Big Bird" – were also launched in 1971. The KH-9 satellites were 30,000-pound photographic reconnaissance satellites initially developed in the 1960s. Similar to Corona satellites, they were designed to photograph large areas, and return the film to earth via SRV. They carried technologically advanced cameras, additional film capsules, and antennae for other intelligence-gathering purposes (Clark, 2007).

In January 1972, President Richard Nixon announced the development of the Space Transportation System (STS), or Space Shuttle Program, managed by NASA. Kennedy Space Center in Houston, Texas, and Vandenberg AFB would serve as the operational bases for the program. Research and development (R&D) shuttle launches would originate from the Kennedy Space Center, and military launches would originate from Vandenberg AFB. The shuttle would be responsible for the launch of all commercial, scientific, and military satellites into space. The AFSCF, including Sunnyvale AFS and tracking stations, would provide tracking and control for the program (Jernigan, 1983).

On May 25, 1972, Sunnyvale AFS supported the 145th and final launch of the Corona Program from the original Satellite Control Room in Building 1001. It was terminated as a result of advances in satellite technology. By the time the Corona Program concluded, Corona satellites had provided approximately 800,000 reconnaissance photographs covering approximately 510 million square miles (Chapman, 2008; Vukotich, n.d.). Following its termination, the Satellite Control Room Complex likely continued to be utilized for control of other satellite programs.

In July 1975, the final Apollo flight was launched and supported by Sunnyvale AFS. The final flight was known as the Apollo-Soyuz Test Project, which marked the first joint United States-Soviet Union space mission. The mission was the first time two foreign spacecraft docked together in orbit (NASA, July 14, 2010). In 1976, the first DMSP Block 5D, a meteorological satellite, was launched, and presumably supported from Sunnyvale AFS. It was an upgraded version of the 1960s-era DMSP, and provided twice-daily, worldwide meteorological, oceanographic, and solar-terrestrial physics measurements (Jernigan, 1983; Wade, n.d.).

In 1976, the KH-11 KENNAN satellite, a reconnaissance satellite, was launched. It was the first successful electronic imaging satellite, and transmitted high-quality images in real time (Vick, 2007). A 1978 *San Jose Mercury News* article noted that some sources indicated that the top-secret "KH-11, from 200 to 300 miles up, can detect a pack of cigarets [sic] on Russian soil," while another source indicated it could only "read the lettering on billboards" (Ingersoll, November 5, 1978). Nonetheless, this top-secret satellite represented significant advances in the development of satellite technology, and was supported from Sunnyvale AFS, as well as associated tracking stations.

10. Development of the Air Force Satellite Control Network, Expansion, and Upgrades, 1980s

In 1982, the Air Force Satellite Control Network (AFSCN) was organized. The AFSCN was not a formal organization, but rather denoted a group of common user resources, assets, and facilities which collectively provided tracking, telemetry & commanding (TT&C) support for virtually all DoD spacecraft, and select NASA and foreign government programs (Hane, 1988). The goal of the AFSCN was to provide "enduring control capability commensurate with the need for operational space suites throughout the conflict spectrum" (AFSCF, 1983).

To accomplish this goal, Sunnyvale AFS was upgraded as part of the Data Systems Modernization Program. This $500 million upgrade introduced centralized database-driven computer hardware and software to replace outdated systems. The upgraded system was more reliable, cheaper to maintain, and faster than its predecessor, allowing it to support a steadily increasing satellite support workload (Fedor et al., 2006).

A new satellite control center – the Consolidated Space Operations Center (CSOC) – was constructed at Falcon AFS, Colorado Springs, Colorado (present-day Schriever AFB) in conjunction with the Data Systems Modernization Program (Fedor et al., 2006). The CSOC was constructed partially due to concerns about the vulnerability of Sunnyvale AFS to earthquakes and terrorism (Philp, June 9, 1985).

Buildings 10031 and 10032 were constructed at the STC in the 1980s in conjunction with the Data Systems Modernization Program to provide additional space for satellite control. In 1981, King/Reif and Associates, an architectural and planning firm, prepared plans for Building 10031 on behalf of NAVFAC Western Division (King/Reif and Associates/NAVFAC, December 18, 1981). In 1982, plans were prepared for Building 10032 by Rasmussen Ingle Anderson, a San Francisco-based architecture firm, under the auspices of NAVFAC Western Division. Both three-story buildings housed parking facilities, and had radio frequency interference (RFI)-shielded third stories with secure space for MCCs, computer rooms, communications rooms, and offices that supported satellite programs (King/Reif and Associates/NAVFAC, December 18, 1981; Rasmussen Ingle Anderson/NAVFAC, October 29, 1982). Both buildings were operational by 1984 (Fola Odafalu, pers. comm., July 26, 2010).

As in prior decades, the majority of plans prepared in the 1980s for Building 1004 concerned equipment maintenance and upgrades. For example, between 1982-88, plans were prepared for the installation of a fire protection system for gas turbine generators, piping for emergency water supply, and monitoring system for gas turbine generators. Gas turbine cleaning and cooling systems were refurbished and repaired, and polychlorinated biphenyls (PCB) were removed from the building (Onizuka AFS, n.d.).

In addition, during the 1980s, computers were installed in the Control Room to control equipment in conjunction with the Solar Control Console, including the gas turbine generators (Ruocchio, pers. comm., June 9, 2010). Plans were also prepared to upgrade security, including installation of closed-circuit televisions and a remote-control door lock for the control room (Onizuka AFS, n.d.).

11. Significant Events and Satellites Supported, 1980s

Sunnyvale AFS continued to support numerous satellites programs throughout the 1980s, although many remained classified. On April 12, 1981, the first mission flown by the Space Shuttle *Columbia* was launched, and successfully returned to earth two days later. The AFSC provided support for the first shuttle mission, and five AFSCF mission controllers received U.S. Air Force Commendation Medals. In June 1982, the first classified military payload was carried into orbit aboard the fourth shuttle mission flown by *Columbia,* and was supported from MCC B in Building 1003 (Jernigan, 1983).

In February 1983, Libyan troops, led by military dictator Colonel Muammar al-Gaddafi, appeared to be planning a surprise invasion of Chad and Sudan. The United States launched a KH-8 reconnaissance satellite to provide photographs of the activity. The top-secret satellite was supported from Sunnyvale AFS. The mission produced photographs that documented massive troop build-ups at the border of Sudan, and the *USS Nimitz* was dispatched to the Gulf of Sidra, thus preventing a Libyan invasion of Sudan (Levien, 1989; Philp, October 30, 1985). In 1984, the twentieth and last KH-9 satellite was launched and supported from Sunnyvale AFS (Day, November 8, 2004).

The first dedicated military flight, aboard the Space Shuttle *Discoverer,* was launched in January 1985, and an article in the August 2009 edition of *Air & Space Magazine* indicated that "according to most accounts, STS-51C's payload was ORION, an eavesdropping satellite for signals intelligence." In October 1985, the second dedicated military flight was launched by the Space Shuttle *Atlantis* (Cassutt, August 1, 2009). *The New York Times* reported that, according to reliable sources, "two $100 million communication satellites" were deployed into orbit on a mission classified as secret by the Pentagon (Broad, October 5, 1985).

In 1986, the Space Shuttle *Challenger* exploded after launch, killing its seven crew members, including the shuttle's mission specialist, Lieutenant Colonel Ellison S. Onizuka, who had trained at Sunnyvale AFS (NASA, 2007). That same year, Sunnyvale AFS was renamed Onizuka AFB in honor of Onizuka. Following the *Challenger* explosion, the U.S. Air Force returned 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 (Cassutt, August 1, 2009).

In 1989, a Tracking and Data Relay Satellite System (TDRSS) satellite was launched, supported by Sunnyvale AFS. The TDRSS was a sophisticated data-relay communications satellite developed by NASA (Levien, 1989).

12. Onizuka Air Force Station, 1990s-Present

By 1991, the Soviet Union had dissolved, signaling the end of the Cold War (Center for Air Force History, 1994). The end of the Cold War led, in part, to the declassification of the NRO in September 1992. The end of the Cold War also led to a decrease in military spending. However, modifications continued to be undertaken at Onizuka AFB, although less than in prior decades

By the early 1990s, Onizuka AFB and tracking stations provided radio links to over eighty active DoD spacecraft (Mead, March 2, 1994). Satellites supported from Onizuka AFB assisted with the success of Operation Desert Storm (1990-91). For example, weather satellites assisted with U.S. missile launches, and navigation satellites assisted the troops in maneuvering through the desert. Reconnaissance satellites, such as those in the NRO's KH-11 satellite program, also likely continued to be supported from the installation (Peterson, July 30, 1993). The early 1990s also represented a key year for satellite scheduling, with the advent of a computerized scheduling system. Prior to this time, scheduling was plotted by hand, using colored tape to represent different spacecraft on approximately 50' rolls of butcher-paper (Mead, March 2, 1994).

In 1991, the 21st Space Operations Squadron (SOPS) were activated at Onizuka AFB; and in 1992, the 750th Space Group was activated and assumed responsibility for launch and early orbit of numerous satellites, including the space shuttles (Schriever AFB, n.d.). In addition, the installation also supported numerous NASA space exploration programs. In 1994, Onizuka AFB was renamed Onizuka AFS.

In 1992, the EUB was appended to the south façade of Building 1004. It was constructed to supplement power distribution to the installation. Between 1993-94, the original Besler heat recovery boilers were retired in favor of Cleaver Brooks gas-fired boilers installed in the EUB (Anthony Ruocchio, pers. comm., August 12, 2010).

In addition, numerous plans were also prepared for mechanical maintenance and upgrades, including improvements to the electrical and fire alarm systems. Plans were also prepared to construct a mezzanine over Rooms 102, 103, and 105 that would be accessible from the northwest stairway, and installation of high intensity dischrage (HID) lights (Onizuka AFS, n.d.). In 1993, Trane absorption chillers were replaced with York centrifugal chillers (Anthony Ruocchio, pers. comm., July 31, 2010).

In 1994, the installation no longer relied on Building 1004 as the primary energy source, and began to transition to PG&E for its power needs. In 1998, Building 1004 ceased to function as the primary energy provider for the installation, and was relegated to back-up support (Fola Odafalu, pers. comm., October 13, 2009).

In 1995, the Corona Program was declassified, and following year, 800,000 images taken between 1960 and 1972 were made available to the public. Formerly classified documents also became available (NRO, February 24, 1995). In addition, Onizuka AFS was realigned in accordance with the Base Realignment and Closure (BRAC) Act, and select functions were relocated to CSOC at Falcon AFB, Colorado Springs, Colorado. The realignment resulted in a loss of approximately 1,100 jobs at Onizuka AFS (City of Sunnyvale, 2006). By the end of the 1990s and during the early 2000s, responsibility for controlling the DoD satellite network continued to be transferred to the CSOC, and Onizuka AFS's responsibilities substantially decreased (Flinn, December 1, 1991; Wulff, November 29, 1995).

In 1996, a terrorist attack on Khobar Towers, a high-rise apartment complex that housed U.S., British, and French military personnel in Dhahran, Saudi Arabia, led to increased security measures at U.S. military installations. At Onizuka AFS, parking was no longer permitted on the first two stories of Buildings 10031 and 10032. In addition, because Innovation Way was in close proximity to Buildings 10031 and 10032, the street was closed to vehicular traffic, covered with astro-turf, and landscaped. Jersey barriers and bollards were also installed around the perimeter of the buildings (Dennis Ralphs, pers. comm., August 2, 2010).

The Onizuka AFS Drawing Number Log indicates that at least one plan was prepared in the 2000s, and was related to maintenance of the gas turbine generators. In addition, it is likely that the facility also underwent routine maintenance throughout the decade (Onizuka AFS, n.d.).

In 2005, the BRAC commission recommended closure of Onizuka AFS. The recommendations were approved by President George W. Bush. In 2006, the DoD, through the Office of Economic Adjustment, formally recognized the City of Sunnyvale as the Local Redevelopment Authority (LRA) to plan the redevelopment of Onizuka AFS and its conversion to civilian use (City of Sunnyvale, 2006).

In May 2007, the NRO officially departed from Onizuka AFS. A deactivation ceremony and open house were held to commemorate this event, and were attended by over 800 guests, many of them former NRO, U.S. Air Force, CIA, and civilian employees (Munro, 2007). Displays were mounted on the corridor walls of Building 1003, highlighting the history of the NRO and reconnaissance satellite programs supported from the installation between through 2007. Following the open house, displays and histories of the programs, many of which remain classified, were relocated to the NRO archives in Chantilly, Virginia (Dennis Ralphs, pers. comm., August 3, 2009).

On July 28, 2010, a closing ceremony was presided over by Lieutenant General John Sheridan, commander of the Space and Missile Systems Center, Los Angeles AFB. In attendance were current and former employees, both military and civilian, as well as Lorna Onizuka, Ellison Onizuka's widow. In his remarks, Lieutenant General Sheridan noted that "[T]his facility here in Sunnyvale has supported an amazing 3.4 million satellite operations over the past years. Much of the details of this work are still classified and we cannot talk openly about it, but what I can tell you is that the operations conducted by the NRO from this site have made our nation a tremendously safer place to be" (Bauer, July 29, 2010).

The 21st SOPS relocated to Vandenberg AFB, and on July 30, 2010, a dedication ceremony was held to commemorate the opening of the 21st SOPS Ellison Onizuka Satellite Operations Facility at Vandenberg AFB. Onizuka AFS is scheduled to be transferred out of federal hands in September 2011. It is anticipated that the Department of Veterans Affairs (VA) will occupy Building 1002, and two buildings located outside the U.S. Air Force Satellite Test Center Historic District, Buildings 1018 and 1034. The remainder of the installation will be redeveloped.

E. Sources:

1. <u>Architectural Drawings</u>

Original plans are on file in Building 1002, Civil Engineering Office, Onizuka AFS, Sunnyvale, California, and include the following. Where applicable, the numbers following the plans in parentheses correspond to the Onizuka AFS Drawing Number Log.

Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD. December 13, 1965a. "Interim Expansion Partial Floor Plan A." (1412)

Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD. December 13, 1965b. "Interim Expansion Partial Floor Plan B." (1413)

Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD. December 13, 1965c. "Interim Expansion Partial Floor Plan C." (1414)

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C.F. Braun & Company/NAVFAC/SAMSO. December 30, 1966. "Site Development STC Building Area Limits of Development." (976)

C.F. Braun & Company/NAVFAC/SAMSO. August 12, 1968a. "Power Plant First Floor Plan, Interior Elevations, and Reflected Ceiling Plan." (862)

C.F. Braun & Company/NAVFAC/SAMSO. August 12, 1968b. "Power Plant Second Floor Plan, Interior Elevations, and Reflected Ceiling Plan." (863)

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C.F. Braun & Company/NAVFAC/SAMSO. August 12, 1968d. "Power Exterior Elevations and Section (North and East)." (866)

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Ralph M. Parsons Company/AFBMD. March 6, 1959. "Development Control Center, Site and Vicinity Plan." (1095)

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2. Primary Materials and Unpublished Reports

The following documents form part of the Joseph D. Cusick Papers relating to Lockheed Missiles and Space Company and the U.S. Air Force (M1003). The papers are housed in the Department of Special Collections, Stanford University Libraries, Stanford, California:

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AFSCF. January-June 1966; January-June 1967; January-June 1968; January-June 1969; January-June 1970; July-December 1970; July-December 1971; January-June 1972 and July-December 1972. Satellite Test Operations Historical Reports.

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3. Interviews

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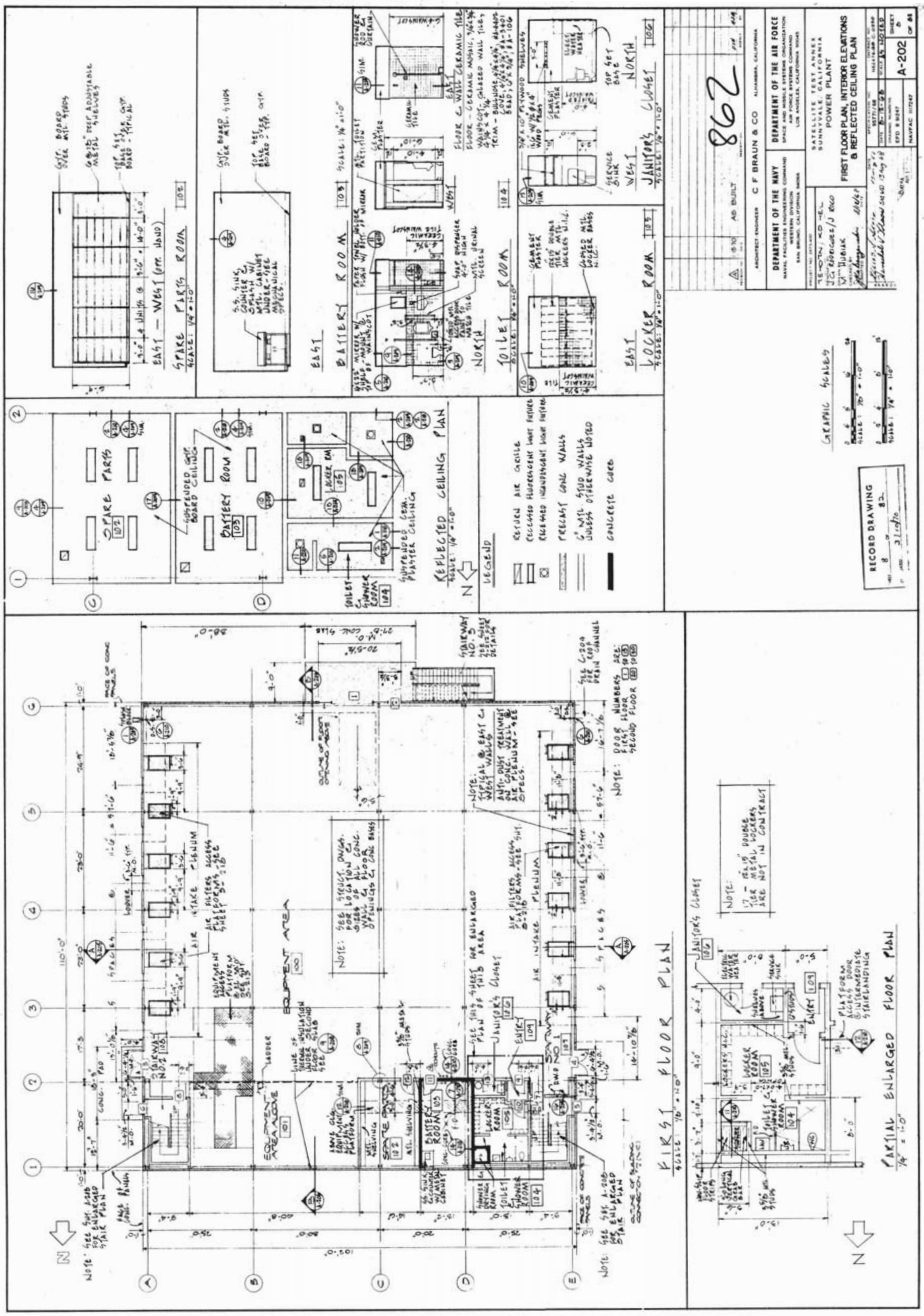
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DEPARTMENT OF THE AIR FORCE
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SUNNYVALE, CALIFORNIA
POWER PLANT
FIRST FLOOR PLAN, INTERIOR ELEVATIONS & REFLECTED CEILING PLAN
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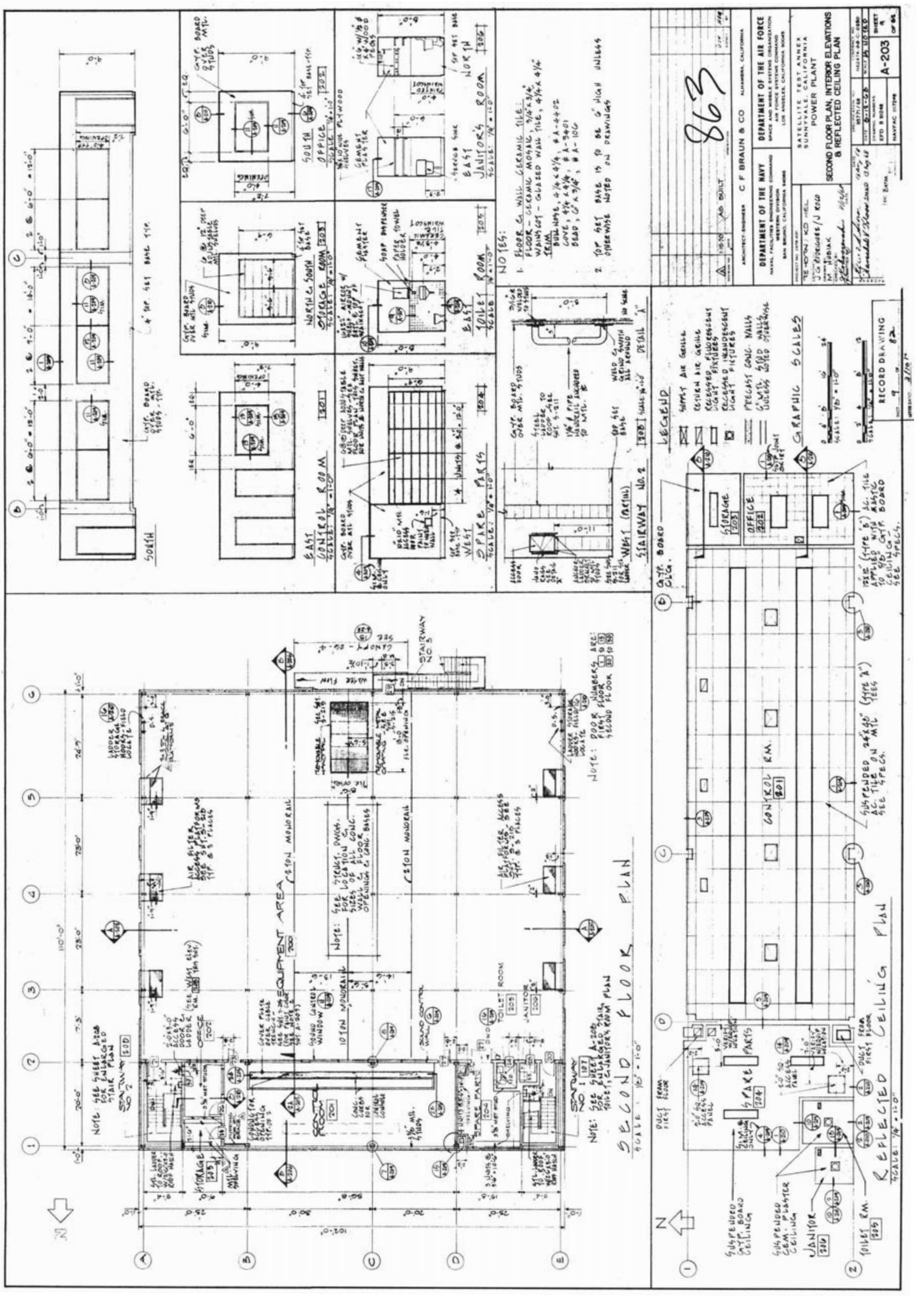

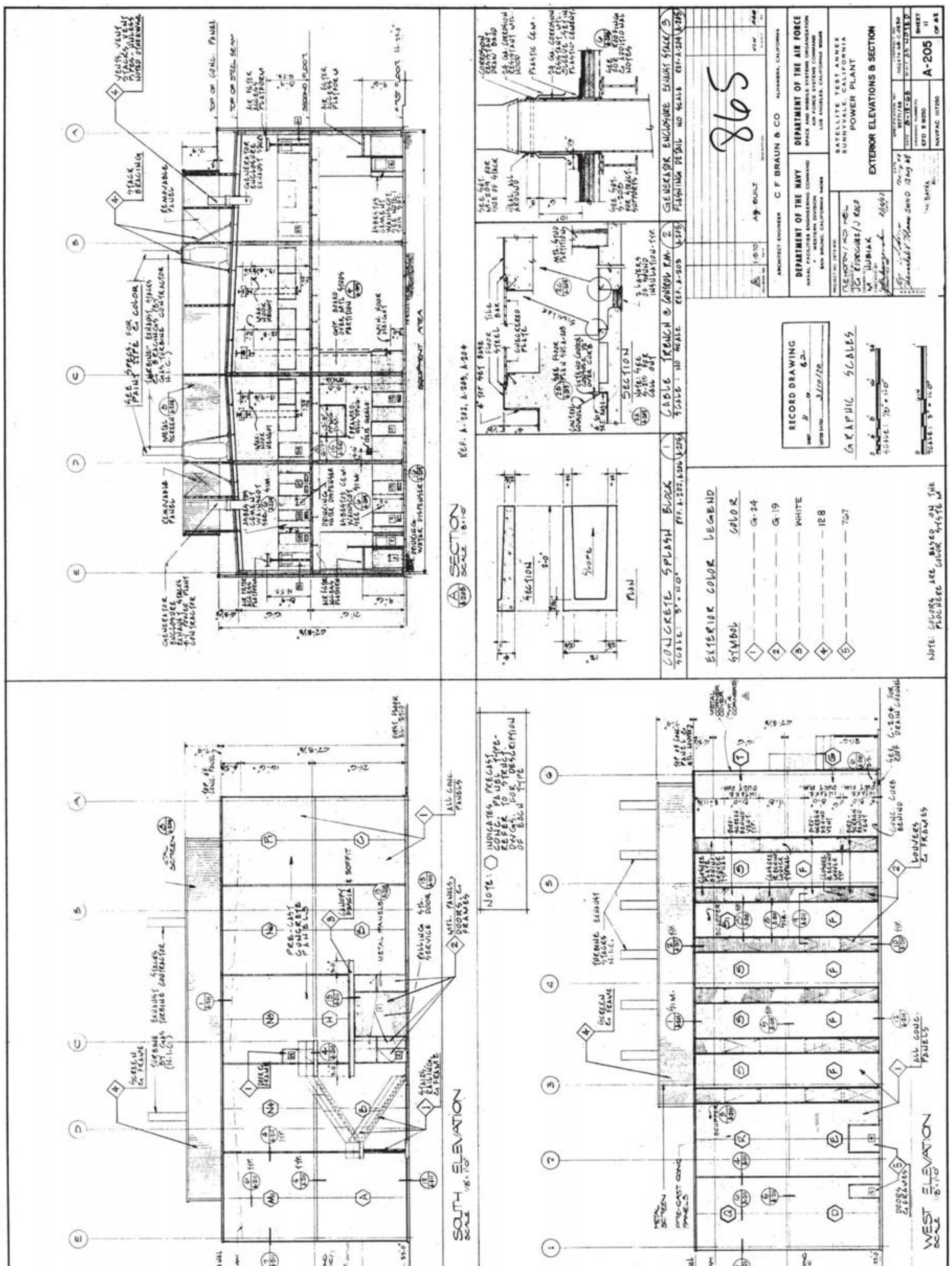
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DEPARTMENT OF THE AIR FORCE
SATELLITE TEST ANNEX
SUNNYVALE, CALIFORNIA
POWER PLANT
EXTERIOR ELEVATIONS & SECTION
A-205

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U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 1004
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Log No.USAF041221A-D

SECTION II

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HISTORIC AMERICAN BUILDING SURVEY
LEVEL II-TYPE DOCUMENTATION

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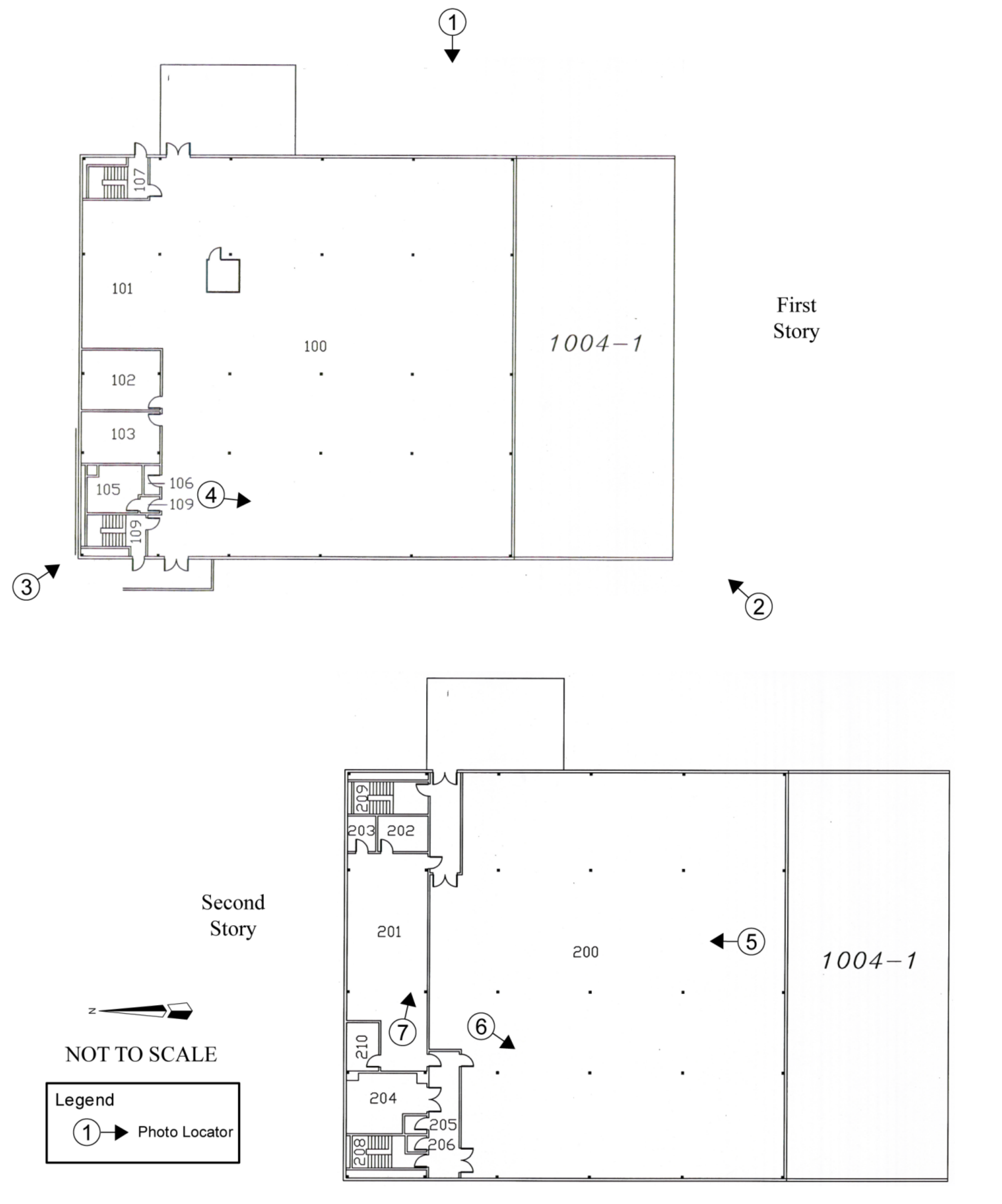
U.S. AIR FORCE SATELLITE TEST CENTER — Log No. USAF041221A-D
BUILDING 1004
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Anne Jennings, Photographer — Date of Photographs: June 7-14, 2010

Log No. USAF041221A-D-01	VIEW OF WEST FAÇADE, LOOKING EAST. NOTE TWO-STORY METAL VENTS AND SECOND-STORY ADDITION CLAD IN METAL SIDING.
Log No. USAF041221A-D-02	VIEW OF SOUTH AND WEST FAÇADES, LOOKING NORTHEAST. NOTE CONTEXTUALLY SENSITIVE DESIGN OF SOUTH FAÇADE, WHICH FORMS PART OF THE 1992 EMERGENCY UTILITY BUILDING (EUB) ADDITION.
Log No. USAF041221A-D-03	VIEW OF ROOF, NORTH, AND WEST FAÇADES FROM ROOF OF BUILDING 1003, LOOKING SOUTHEAST. NOTE TURBINE STACKS ENCLOSED BEHIND METAL SCREENS ON ROOF.
Log No. USAF041221A-D-04	VIEW OF ORIGINAL AIR INLET STRUCTURES IN EQUIPMENT ROOM (ROOM 100) ON FIRST STORY, LOOKING SOUTHWEST.
Log No. USAF041221A-D-05	VIEW OF EQUIPMENT ROOM (ROOM 200) ON SECOND STORY, LOOKING NORTH. NOTE ORIGINAL BESLER HEAT RECOVERY BOILERS ON LEFT AND RIGHT.
Log No. USAF041221A-D-06	VIEW OF ORIGINAL SOLAR SATURN GAS TURBINE GENERATOR SET, LOOKING SOUTHWEST.

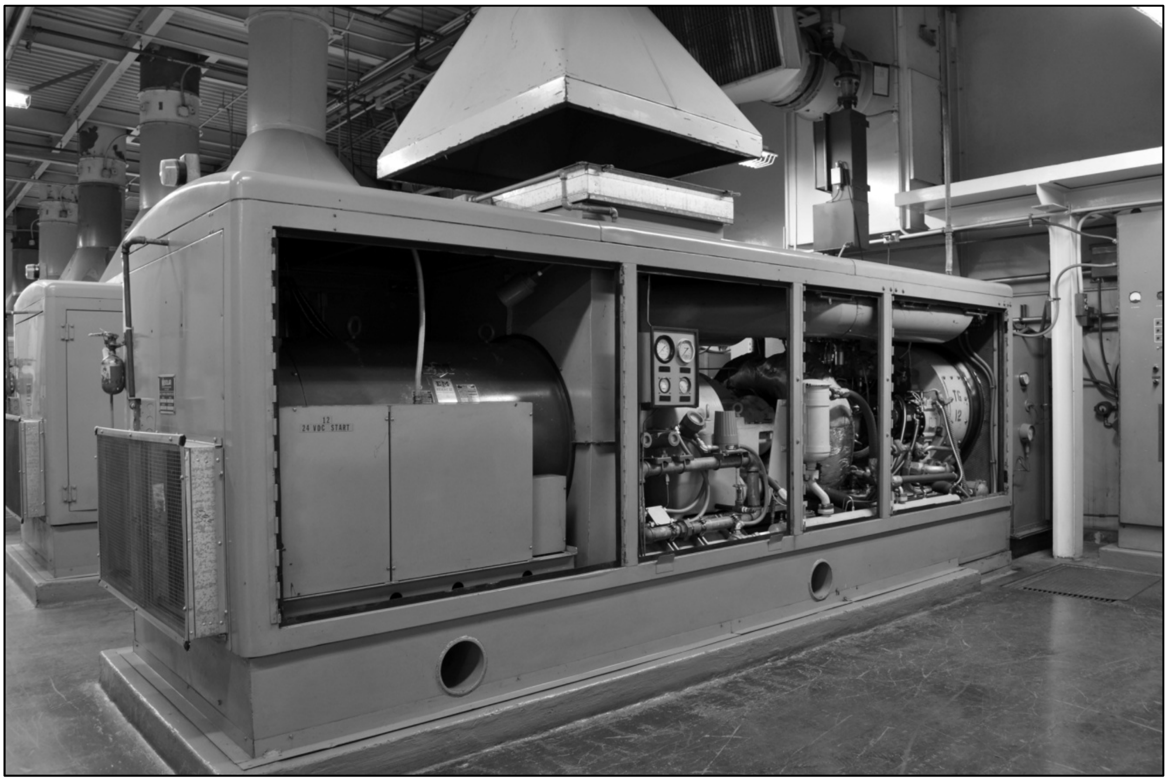
Log No. USAF041221A-D-07

VIEW OF ORIGINAL SOLAR CONTROL CONSOLE IN CONTROL ROOM (ROOM 201), LOOKING EAST. NOTE SOLAR CONSOLE, AND WINDOW ON SOUTH WALL OVERLOOKING EQUIPMENT ROOM (ROOM 200).



Building 1004


NO. 12
TURBINE AIR
FILTERATION
INLET BULKHEAD
N.T.5076
FIRE AUTO SPRINKLERS
DRAIN
MAIN DRAIN
KEEP OPEN
18
17
16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U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 10031
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Log No. USAF041221A-E

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

PHOTOGRAPHS

California Office of Historic Preservation
1416 9th Street, Room 1442
Sacramento, CA 95814

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BUILDING 10031
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California

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HISTORIC AMERICAN BUILDING SURVEY
LEVEL II-TYPE DOCUMENTATION

U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 10031

Log No. USAF041221A-E

A. Location: Building 10031, Onizuka Air Force Station
1080 Innovation Way, Sunnyvale, Santa Clara County, California

B. Significance: Building 10031, constructed in 1984 to support reconnaissance satellites, is a contributing resource to the National Register-eligible U.S. Air Force Satellite Test Center Historic District. The district is significant at a national, state, and local level under Criterion A for its associations with satellite reconnaissance during the Cold War, and Criteria Consideration G, because five of the six buildings, including Building 10031, are not yet fifty years old, and have exceptional importance for their associations with satellite reconnaissance during the Cold War.

The U.S. Air Force Satellite Test Center Historic District is significant at the national level for its association with satellite reconnaissance during the Cold War. The installation was established in 1959 to serve as the command-and-control center for the first reconnaissance satellite program, the Corona Program. It was developed by the U.S. Air Force and the Central Intelligence Agency (CIA), with assistance from a private contractor, Lockheed Missiles and Space Division. Shortly thereafter, the National Reconnaissance Office (NRO) was established to provide oversight of the program and other developing satellite programs. As new satellite technologies developed, such as communications, early missile warning, meteorology, navigation, and nuclear detonation detection, Building 10031 was constructed for satellite support. These satellite programs also provided valuable data throughout the Cold War, and were supported from the U.S. Air Force Satellite Test Center Historic District. Although many of the satellite programs remain classified, it is apparent through the continued presence of the NRO that the installation played a key role in the United States' conduct of the Cold War.

The U.S. Air Force Satellite Test Center Historic District is also significant at the state and local levels for its association with the development of California as a leader in technological innovations. California, and specifically the City of Sunnyvale in Silicon Valley, began to emerge as a leading technological center during the Cold War. This was due, in part, to the military's investment in the development of defense technologies in California, such as command and control of reconnaissance satellites at Onizuka Air Force Station (AFS). The presence of Lockheed Missiles and Space Division in Sunnyvale in the mid-1950s, followed by Onizuka AFS in the late 1950s, burnished its reputation as a high-technology center. The district's period of significance extends from 1959, the date of development of the installation, through 1991, the conclusion of the Cold War.

C. Description:

1. Current Description

Building 10031 was constructed in 1984 to provide satellite support in conjunction with Buildings 1001 and 1003. It is a three-story, windowless, rectangular-plan building, with a recessed northwest corner. The northwest portion of the building is appended to Building 1001. The entrance to the building is located on the west façade of the northwest corner, and is considered part of Building 1001. Therefore, the entrance is described in the individual building report for Building 1001.

Building 10031 is set atop a concrete-pile foundation, augmented by two-story concrete columns. There are ten columns along the north and south facades, five along the east and west facades, and twenty-four interior columns. The first and second stories are open, and metal-pipe railings are located between the columns on the second story. A two-lane concrete ramp flanked to the east and west by metal pipe railings is appended to the south façade and provides access to the second story. The steel-frame, radio frequency interference (RFI)-shielded third story is clad in vertical metal siding, and is capped by a flat corrugated metal-clad roof. Building 10031 is appended to north façade of Building 1003, and has no fenestration.

The first story of Building 10031 encompasses 27,500 square feet, the second story 28,368 square feet, and the third story 29,307 square feet. A comparison of the original floor plan with the current floor plan indicates that the first story, which originally functioned as a parking area, has retained its configuration. However it no longer accommodates parking. The majority of the second and third stories have been reconfigured. An inspection of select interior spaces in June 2010, coupled with information included in the Onizuka AFS Drawing Number Log, indicate that most interior spaces, even in cases where they retain their original configuration, no longer retain their original function, features, or finishes. However, the first story retains some original features and finishes, such as concrete walls and asphalt-paved surfaces, and select areas on the third story retain RFI-partitions and are accessed via interlock doors.

2. According to Original Plan

Original plans of Building 10031 are on file in the Civil Engineering Office, Building 1002, Onizuka AFS, Sunnyvale, Santa Clara County, California. Original building plans were prepared in 1981 by King/Reif and Associates, an architecture and planning firm on behalf of NAVFAC Western Division. The following plans are featured in the graphic documentation section of the report:

- "Mission Control Complex: Ground Floor Parking Plan, Level 1 and Lobby" (King/Reif and Associates/NAVAFC, December 18, 1981a)
- "Mission Control Complex: Parking Plan, Level 2" (King/Reif and Associates/NAVAFC, December 18, 1981b)
- "Mission Control Complex: Computer Floor Plan, Level 3" (King/Reif and Associates/NAVAFC, December 18, 1981c)
- "Mission Control Complex: Building Elevations" (King/Reif and Associates/NAVAFC, December 18, 1981d)

The historic appearance of Building 10031's exterior is similar to its current appearance. According to the original floor plans, the first two stories housed parking, and the third story housed computer rooms, communications rooms, and Mission Control Centers (MCC). Although the plans do not include room functions, the Onizuka AFS Drawing Number Log indicates that MCC IX and MCC T were housed on the third story, likely in areas that were separated by RFI-shielded partitions, and accessed by interlock doors.

D. History:

1. <u>Development of the Satellite Test Center, 1959-61</u>

The development of satellite reconnaissance during the Cold War (1946-91) and the specific role of the U.S. Air Force Satellite Test Center (STC) is fully described in the associated overview report, California State Historic Preservation Office Historic American Building Survey Level II-Type Documentation, U.S. Air Force Satellite Test Center, Log No. USAF041121A. The following section provides a brief summary of the role that Building 10031 played at the STC from 1959-91, its period of significance.

The installation was established in 1959 when Building 1001 was constructed to serve as the command-and-control center for the Corona Program to support the launch, orbit, and recovery of Corona satellites. The Corona Program, initiated in 1958, was the first reconnaissance satellite program developed by the U.S. Air Force and the Central Intelligence Agency (CIA), with assistance from private contractors, such as Lockheed Missiles and Space Division, located in Sunnyvale, California. Concerns about preserving the secrecy of the Corona Program and its objectives led to the designation of the Discoverer Program as a cover program. The publicly-stated goal of the Discoverer Program was scientific research (Richelson, 2002). Prior to the construction of Building 1001, at least eight Corona satellites, described as Discoverer satellites in the press, were launched from Vandenberg Air Force Base (AFB), and were supported from an interim control center in Palo Alto, California. Tracking stations located around the world also provided support.

In 1959, the U.S. Air Force acquired 11.43 acres of land in Sunnyvale from Lockheed Missiles and Space Division located to the west. Plans for the installation were designed by the Ralph M. Parsons Company, an architecture and engineering firm based in Los Angeles, California, under the auspices of the U.S. Air Force Ballistic Missile Division (AFBMD) in Englewood, California (Ralph M. Parsons Company/AFBMD, March 6, 1959).

On January 28, 1960, the installation, newly designated as the STC, was dedicated by the U.S. Air Force (Davies, 1960). A few months later, on March 1, 1960, it was occupied by the 6594th Aerospace Test Wing (ATW), the first unit to be tasked with military satellite operations; Lockheed Missiles and Space Division employees; and likely the CIA. The 6594th ATW provided oversight for Lockheed Missiles and Space Division which was responsible for satellite operations (6594th ATW, 1961; Jernigan, 1983). However, portions of the building remained under construction, including the state-of-the-art Satellite Control Room in the Satellite Control Room Complex. An interim Satellite Control Room was established from which the Lockheed Missiles and Space Division, monitored by the 6594th ATW, could direct the launch, tracking, data acquisition, command and control, and recovery phase of military satellites (6594th ATW, 1961; Jernigan, 1983).

On July 7, 1960, the installation was officially designated as the Satellite Test Annex (STA) under the jurisdiction of the AFBMD. However, it should be noted that it continued to be referred to as the STC, both in U.S. Air Force documents, as well as by the public, likely due in part to a building sign which indicated "U.S. Air Force Satellite Test Center." On February 6, 1961, the Satellite Control Room and remainder of the Satellite Control Room Complex became operational. The primary purpose of the complex was to support Corona satellites, although additional programs were supported by this time (Jernigan, 1983).

2. <u>Significant Events and Satellites Supported, 1960-61</u>

In August 1960, the U.S. Air Force accomplished the first successful retrieval of a Discoverer satellite. On August 10, Discoverer XIII was launched from Vandenberg AFB, and was supported by the STC. The satellite achieved polar orbit for a period of ninety-four minutes, during which time it was in contact with worldwide tracking stations, and the interim Satellite Control Room at the STC. During its seventeenth rotation of the earth, the eject command was issued from the STC, and the capsule was ultimately recovered from the Pacific Ocean, marking the first successful retrieval of an object from space (Arnold, 2005; 6594th ATW, no date [n.d.]). In keeping with the publicly stated scientific objectives of the Discoverer Program, the *San Jose Mercury News* noted that "Discoverer recovery techniques will be used soon to return monkeys from space," and were vital to "returning a man to earth after orbiting in space" (Lindsey, August 12, 1960). Still in the testing phase, the satellite did not yet contain a camera (Jernigan, 1983).

Shortly after this historic event, Discoverer XIV was launched on August 18, 1960 from Vandenberg AFB (Arnold, 2005). Discoverer XIV orbited the earth seventeen times, supported by the STC from the interim Satellite Control Room in Building 1001, and the Kodiak tracking station, before the eject command was relayed to the satellite. Following the command, at 300 miles above the earth, the satellite recovery vehicle (SRV) separated from the spacecraft, and began its descent to earth, where it was caught by a specially equipped Fairchild C-119 *Flying Boxcars* (C-119) piloted by U.S. Air Force Captain Harold Mitchell (*The New York Times,* August 20, 1960).

The Discoverer XIV SRV contained 20 pounds of film which documented over 1,650,000 square miles, and provided the first successful satellite reconnaissance photographs of the Soviet Union. It also resulted in more photographic coverage of the Soviet Union than all previous U-2 flights combined. Furthermore, it 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 (ICBM) (Day, 2006). However, despite the historic nature of this event, the crew, who were not cleared for the Corona Program, were unaware of the importance of their mission (Arnold, 2005).

Although the STC was developed to support the Corona Program, by the fall of 1960, it also supported the Satellite and Missile Observation System (SAMOS) and Missile Detection Alarm System (MIDAS). Both programs were initially developed by the U.S. Air Force in the mid-1950s as reconnaissance and missile detection satellites, respectively (Jernigan, 1983). On October 11, 1960, the first SAMOS satellite was launched from Vandenberg AFB, and supported from the STC, although it failed to reach orbit (*San Jose Mercury News*, October 12, 1960). By July 1961, MIDAS satellites were launched from Vandenberg AFB and supported by the STC. By the end of 1961, two MIDAS satellites had reached orbit (6594th ATW, 1961).

In April 1961, Discoverer XXIII was launched from Vandenberg AFB, and was the first Corona satellite supported by the STC from the new control room. By this time, Corona satellites were regularly providing images of the Soviet Union, as well as other communist countries. Among these images included evidence of the building of the Berlin Wall between East and West Germany (Chapman, 2008). In September 1961, the NRO was established as a classified agency in the Department of Defense (DoD), and was tasked with oversight of reconnaissance satellite programs, including the Corona Program, and therefore became a presence at the STC (Richelson, 2000).

3. Building 1002 Construction and Upgrades, 1962

In 1962, the STC experienced its first of many expansions when plans for a two-story, L-shaped administrative building – Building 1002 (Addition to the Satellite Test Annex) - were prepared for the U.S. Air Force Space Systems Division (SSD) by Kaiser Engineers, a division of the Henry J. Kaiser Company. Kaiser Engineers was a well-known architecture and engineering firm located in Oakland, California (Kaiser Engineers/U.S. Air Force SSD, January 15, 1962a-b; Air Force Satellite Control Facility (AFSCF), 1972).

During this time, Kaiser Engineers also prepared plans for a single-story addition to Building 1001 to house new a new communications center, and interior modifications to the Satellite Control Room Complex (Kaiser Engineers/U.S. Air Force SSD, October 17, 1962a-b; Jernigan, 1983).

The 1962 renovations were likely implemented in conjunction with the U.S. Air Force's first modernization effort, the Multiple Satellite Augmentation Program (MSAP). This effort was initiated in part, to standardize and provide updated equipment to the STC and tracking stations which enabled them to simultaneously support multiple satellite programs (Lockheed Missiles and Space Division, 1963). Computer capabilities were upgraded, new display and communications equipment were also installed, and connections between the STC and tracking stations were upgraded (Jernigan, 1983).

4. Significant Events and Satellites Supported, 1962-64

On February 27, 1962, Discoverer XXXVIII was launched and supported from the STC. The following month, the DoD classified all military satellite programs (DoD, March 23, 1962). As a result, Discoverer XXXVIII was the last satellite launched as part of the Discoverer program. Corona satellites continued to be launched and supported by the STC, however, because all satellites were classified, the Corona Program no longer required a cover story.

Between 1962-64, the STC supported over fifty Corona satellites. By this time, Corona satellites had accurately mapped all twenty-five of Moscow's long-range missile sites. Furthermore, images taken by Corona satellites indicated that China was readying its nuclear facility in Lop Nur for testing. It was noted in a classified CIA briefing that "[O]n the basis of new overhead photography, we are now convinced that the previously suspect facility at Lop Nur in western China is a nuclear test site which could be ready for use in about two months." Within two months, on October 16, 1964, China tested an atomic bomb at the Lop Nur site (Broad, September 12, 1995).

In addition to Corona, SAMOS, and MIDAS satellites, the STC supported the Defense Meteorological Satellite Program (DMSP) in 1962 and 1963. DMSP was a meteorological satellite program initiated in 1960 to provide weather and climate data for more effective military operations (DMSP, n.d.). On October 16, 1963, the first Vela satellite was launched and supported by the STC. The Vela Program – vela means vigil in Spanish – was a series of satellites designed to detect nuclear detonations (Jernigan, 1983; Peebles, 1997). Presumably, Vela satellites provided images of the Lanzhou Diffusion Plant in Lanzhou, China and the Baotao Nuclear Fuel Component Plant in Baotao, China (Richelson, 2002).

In November 1963, the final SAMOS satellite was launched (Peebles, 1997). Furthermore, 1963 marked the beginning of the Keyhole (KH)-7 surveillance system, noted in a 2006 NRO memo as "the Intelligence Community's first high resolution surveillance or 'spotting' satellite." Similar to Corona satellites, the KH-7 was a reconnaissance satellite that returned film to earth in SRVs. It was primarily used to provide surveillance of nuclear facilities and Intermediate Range Ballistic Missiles (IRBM) in the Soviet Union and China (NRO, 2006).

In July 1964, two additional Vela satellites were launched, resulting in a total of four orbiting satellites capable of detecting nuclear detonations. In August 1964, Syncom III was launched and supported by the STC. Syncom III was a National Aeronautics and Space Administration (NASA) satellite used for DoD military communications experiments between Saigon, Vietnam, and Hawaii (Jernigan, 1983).

5. Construction, Upgrades, and Establishment of the Air Force Satellite Control Facility, 1964-67

In May 1964, plans were prepared for a two-story, L-plan addition to Building 1002 to provide additional administrative space. The addition was designed by Maher & Martens, a San Francisco-based architecture firm for the U.S. Army Corps of Engineers (USACE), Sacramento District (Maher & Martens/USACE Sacramento District, May 7, 1964).

In 1965, the AFSCF was officially designated. Its mission was to direct launch, tracking, data acquisition, command and control, and recovery of DoD military satellites. Following the establishment of AFSCF, an Interim Expansion Plan (IEP) was initiated to augment the facility and implement the newly developed MCC concept, which focused on the development of mission-oriented control centers rather than a single control room (Jernigan, 1983).

Plans were prepared by San Francisco-based consulting engineers, Bentley Engineers and Earl & Wright, Inc., under the auspices of the U.S. Air Force SSD to develop multiple MCCs in Building 1001. The plans indicate that the building was reconfigured to accommodate four new MCCs, two new complex areas, two new communications areas, and a new bird buffer area (Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD, December 13, 1965a-e). The majority of the work was completed by December 1966 (AFSCF, January-June 1966).

6. Significant Events and Satellites Supported, 1965-70

The increase in the number of flight support hours logged by the AFSCF between 1965-66 appears to indicate that at least some of the MCCs were operational in 1966. In 1965, the AFSCF logged 20,757 hours of satellite flight support. By 1966, 29,400 hours of flight support were logged. The number of satellites supported also increased. In 1965, the STC supported approximately fourteen satellites (AFSCF, 1972). In January 1967, the STC supported thirty-one satellites per day, and by June were supporting forty-four per day, which was expected to increase to forty-seven per day by July (AFSCF January-June 1967).

Between 1965-70, the STC supported over forty Corona satellite launches (Mission and Spacecraft Library, n.d.). By 1966, upgrades to the installation had resulted in an increase in satellite programs supported. In addition to Corona, Vela, and other programs (many of which likely remained classified) new programs such as NASA's Biosatellite Program were supported. The Biosatellite Program was a series of three satellites designed to assess the effects of spaceflight on living organisms. Support for the program focused on directing operations of the recovery of the satellites by Lockheed C-130 *Hercules* (C-130) aircraft flown by the 6594th Aircraft Recovery Group based at Hickam AFB, Honolulu, Hawaii (Jernigan, 1983).

In June 1967, two scientific satellites, one owned by the U.S. Army, the other by the U.S. Navy, were launched as the first flight in the DoD Space Experiments Program (SESP). SESP was responsible for providing flights for research and experiments undertaken by government agencies (AFSCF, January-June 1968; Jernigan, 1983). In 1967, the KH-7 surveillance system was terminated, after having flown thirty-eight missions, thirty-four of which successfully returned usable images (NRO, 2006).

In June 1968, the *San Jose Mercury News* reported that satellite reconnaissance, likely supported by the STC, uncovered the Soviet Union's plans for the invasion of Czechoslovakia. The article noted that "[S]atellites spinning over Eastern Europe monitored Soviet radio transmissions which signaled the invasion was imminent, and photographic reconnaissance satellites had monitored unusual military activities on the Czech borders by Soviet, East German, Polish, Hungarian, and Bulgarian troops" (*San Jose Mercury News*, August 27, 1968).

In September 1968, a Lincoln Experimental Satellite (LES) was launched into orbit and supported by the STC and tracking stations. The LES was an experimental satellite used to test communications between aircraft, ships, and ground forces (Jernigan, 1983).

In 1969, support was provided for NASA's manned flights to the moon. The STC supported Apollo missions 9 and 10, and Apollo 11, the first manned lunar landing mission. Program 949 was also supported in 1969 (AFSCF, January-June 1969). Program 949 was designated in November 1966 to supplant Program 461, which had initially supplanted the MIDAS Program in 1963. Program 949 provided a wider range of capabilities, and by the 1970s, was expected to have "progressively enhanced world-wide early-warning, surveillance and detection capabilities" (Piper, 1970).

7. Development of Buildings 1003 and 1004, 1966-70

In conjunction with the technological upgrades which occurred throughout the mid-to-late 1960s, in August 1966, a real estate estimate was prepared by the USACE Sacramento District which proposed the acquisition of 8.2 acres of land from Lockheed Aircraft Corporation, at a cost of $49,000. In 1966, C.F. Braun & Company of Alhambra, California, under the auspices of the U.S. Naval Facilities Engineering Command (NAVFAC) Western Division, San Bruno, California, and SAMSO, Los Angeles, California, prepared site development plans (C.F. Braun/NAVFAC/SAMSO, December 30, 1966). C.F. Braun & Company also prepared plans for the development of two new buildings, Building 1003 (STC Building Addition), and Building 1004 (Power Plant) (C.F. Braun/NAVFAC/SAMSO, November 14, 1967; August 12, 1968).

By August 1968, Lockheed Aircraft Corporation transferred the land to the U.S. Air Force (Lockheed Aircraft Corporation, 1968; Jernigan, 1983). By this time site development was underway, and included relocation of an existing Lockheed Missiles and Space building; reconfiguration of Lockheed Martin Way (formerly known as East Perimeter Road) west of Building 1001; creation of additional parking spaces; and installation of underground utilities (C.F. Braun/NAVFAC/SAMSO, December 30, 1966).

Following site development, construction of Buildings 1003 and 1004 commenced. Building 1003 was designed to house the Manned Orbiting Laboratory (MOL) Program, as well as other satellite programs. Initiated in 1963, the concept involved a Titan III booster rocket which carried a modified Gemini B capsule attached to a space laboratory, and was intended to serve reconnaissance purposes (Jernigan, 1983). However, in June 1969, the DoD announced the cancellation of the MOL Program, to save money. The cancellation led to a short work stoppage, however construction resumed a few weeks later. *Aerospace Daily* reported that the U.S. Air Force had evaluated requirements for current and future programs, and determined that construction on the building should continue (*Aerospace Daily*, September 19, 1969).

By the end of 1969, the 164,000-square foot building, constructed at a cost of $8 million was nearly complete. The building was painted “Air Force blue,” resulting in its nickname, the “Blue Cube” (*Aerospace Daily*, September 19, 1969). Building 1003 housed multiple MCCs, communications and crypto equipment, a data distribution center, mechanical equipment, Control Data Corporation (CDC) 3800 computers, and a tape library (AFSCF, 1970). In addition, shortly after it was constructed, the Vela Program office and another unidentified satellite program were relocated from Building 1001 to Building 1003 (AFSCF, July-December 1969).

Building 1004 was also designed by C.F. Braun & Company. Solar, a division of International Harvester Company, provided the Saturn gas turbine generator sets that powered the plant. The development of Building 1004 necessitated modifications to the installation’s power distribution system. Ties to the electric power provided by Pacific Gas and Electric (PG&E) were severed, with the exception of one power line which provided power through a Lockheed Missiles and Space Substation, and was likely kept active to provide back-up power (AFSCF, 1972). The plant, staffed by Solar contractors, was operational in February 1970, and provided power to the entire installation, rendering it energy-independent at that time (Jernigan, 1983).

8. Significant Events and Satellites Supported, 1970s

On January 1, 1971, AFSCF re-designated STC as Sunnyvale AFS. In the 1970s, Sunnyvale AFS continued to support existing and newly established satellite programs, although many of them remained classified. In 1970, the AFSCF Satellite Test Operations Historical Reports noted the successful support of two “unique orbital events” from the installation. These events included support of the Apollo 13 mission in April, which was aborted following the explosion of an on-board oxygen tank, and support of the first North Atlantic Treaty Organization (NATO) communications satellite in March (AFSCF, January-June 1970).

In June 1970, the final Vela satellite was launched. Sunnyvale AFS continued to provide support from Building 1003 throughout the 1970s for the orbiting satellite (Jernigan, 1983). Program 949 was also re-designated the Defense System Program (DSP) in 1970. Sunnyvale AFS continued to support this program throughout the early 1970s (AFSCF, July-December 1970; 1971; 1972). The DSP satellite weighed 2,000 pounds, was approximately 23’ long, 10’ wide, and contained a large infrared telescope which scanned the earth for missile launches. In the event a missile was launched, it would be detected by the United States within minutes, which removed the possibility of a surprise attack (Peebles, 1997).

By November 1971, a pair of Defense Satellite Communications System (DSCS) II advanced communications satellites had been launched to handle voice, teletype, computerized digital data, and video transmissions (Jernigan, 1983). The first KH-9 satellites – code-named HEXAGON, and popularly known as "Big Bird" – were also launched in 1971. The KH-9 satellites were 30,000-pound photographic reconnaissance satellites initially developed in the 1960s. Similar to Corona satellites, they were designed to photograph large areas, and return the film to earth via SRV. They carried technologically advanced cameras, additional film capsules, and antennae for other intelligence-gathering purposes (Clark, 2007).

In January 1972, President Richard Nixon announced the development of the Space Transportation System (STS), or Space Shuttle Program, managed by NASA. Kennedy Space Center in Houston, Texas, and Vandenberg AFB would serve as the operational bases for the program. Research and development (R&D) shuttle launches would originate from the Kennedy Space Center, and military launches would originate from Vandenberg AFB. The shuttle would be responsible for the launch of all commercial, scientific, and military satellites into space. The AFSCF, including Sunnyvale AFS and tracking stations, would provide tracking and control for the program (Jernigan, 1983).

On May 25, 1972, Sunnyvale AFS supported the 145th and final launch of the Corona Program from the original Satellite Control Room in Building 1001. It was terminated as a result of advances in satellite technology. By the time the Corona Program concluded, Corona satellites had provided approximately 800,000 reconnaissance photographs covering approximately 510 million square miles (Chapman, 2008; Vukotich, n.d.). Following its termination the Satellite Control Room Complex likely continued to be utilized for control of other satellite programs.

In July 1975, the final Apollo flight was launched and supported by Sunnyvale AFS. The final flight was known as the Apollo-Soyuz Test Project, which marked the first joint United States-Soviet Union space mission. The mission was the first time two foreign spacecraft docked together in orbit (NASA, July 14, 2010). In 1976, the first DMSP Block 5D, a meteorological satellite, was launched, and was presumably supported from Sunnyvale AFS. It was an upgraded version of the 1960s-era DMSP, and provided twice-daily, worldwide meteorological, oceanographic, and solar-terrestrial physics measurements (Jernigan, 1983; Wade, n.d.).

In 1976, the KH-11 KENNAN satellite, a reconnaissance satellite, was launched. It was the first successful electronic imaging satellite, and transmitted high-quality images in real time (Vick, 2007). A 1978 *San Jose Mercury News* article noted that some sources indicated that the top-secret "KH-11, from 200 to 300 miles up, can detect a pack of cigarets [sic] on Russian soil," while another source indicated it could only "read the lettering on billboards" (Ingersoll, 1978). Nonetheless, this top-secret satellite represented significant advances in the development of satellite technology, and was supported from Sunnyvale AFS, as well as associated tracking stations.

9. Development of the Air Force Satellite Control Network, Expansion, and Upgrades, 1980s

In 1982, the Air Force Satellite Control Network (AFSCN) was organized. The AFSCN was not a formal organization, but rather denoted a group of common user resources, assets, and facilities which collectively provided tracking, telemetry & commanding (TT&C) support for virtually all DoD spacecraft, and select NASA and foreign government programs (Hane, 1988). The goal of the AFSCN was to provide "enduring control capability commensurate with the need for operational space suites throughout the conflict spectrum" (AFSCF, 1983).

To accomplish this goal, Sunnyvale AFS was upgraded as part of the Data Systems Modernization Program. This $500 million upgrade introduced centralized database-driven computer hardware and software to replace outdated systems. The upgraded system was more reliable, cheaper to maintain, and faster than its predecessor, allowing it to support a steadily increasing satellite support workload (Fedor et al., 2006).

In 1981, King/Reif and Associates, an architecture and planning firm, prepared plans for Building 10031 on behalf of NAVFAC Western Division. The building was constructed to provide support for a "high priority" satellite system known as Program 106. Referred to on plans as an MCC, Building 10031 was constructed in conjunction with the Data Systems Modernization Program. Plans were stamped by AIA-registered architect Richard A. Reif, a partner in the firm; however, no further information about the firm, or Mr. Reif is available. The three-story building was appended to the north façades of Buildings 1001 and 1003, and required construction of a new entrance that obscured the original entrance on the west façade of Building 1001. Although the lobby and entrance was constructed as part of Building 10031, they were considered part of Building 1001. The entrance was embellished with a metal sign that read "Sunnyvale Air Force Station" (King/Reif and Associates/NAVAFC, December 18, 1981d; Fola Odafalu, pers. comm., July 26, 2010).

The first two stories of Building 10031 housed parking areas, and the third story included secure space to support Program 106. In addition, the third story housed MCC IX, computer rooms, communications rooms, and likely other MCCs. The third story was RFI-shielded to protect electronic and communications systems critical to satellite control from electromagnetic interference (EMI) and RFI. Floor plans for the third story indicate that the RFI-penetration protection was provided on the roof, floor, and exterior walls to protect the third story. In addition, several interior spaces were also separated by RFI partitions, likely to protect individual satellite support activities in MCCs. In general, the

RFI-shielded areas were accessed via interlock doors, where only one door opened at a time, ensuring that the area remained shielded at all times (King/Reif and Associates/NAVAFC, December 18, 1981a-c). Construction began in March 1982 (U.S. Air Force, 2006).

In 1982, plans were prepared for Building 10032 by Rasmussen Ingle Anderson, a San Francisco-based architecture firm, under the auspices of NAVFAC Western Division. Building 10032 was also designed as part of the Data Systems Modernization Program, and was similar to Building 10031. It was a three-story building which provided two stories of parking, and one story of RFI-shielded space for MCCs, computer rooms, communications rooms, and offices (Rasmussen Ingle Anderson/NACFAC, October 29, 1982a-c). Buildings 10031 and 10032 were operational by 1984 (Fola Odafalu, pers, comm., July 26, 2010).

In addition, a new satellite control center – the Consolidated Space Operations Center (CSOC) – was constructed at Falcon AFS, Colorado Springs, Colorado (present-day Schriever AFB) in conjunction with the Data Systems Modernization Program (Fedor et al., 2006). The CSOC was constructed partially due to concern about the vulnerability of Sunnyvale AFS to earthquakes and terrorism (Philp, June 9, 1985).

According to the Onizuka AFS Drawing Number Log, in 1985, plans were prepared for minor modifications to Building 10031. These included plans to install a back-up air handling unit (AHU) on the roof; additional electrical outlets; and a door between Rooms 2158 and 2160. In 1989, plans were prepared to reconfigure and enlarge Room 2164. The room functioned as the communications area, and plans indicate the expansion was undertaken to provide support for the expansion of MCC T (Onizuka AFS, n.d.).

10. Significant Events and Satellites Supported, 1980s

Sunnyvale AFS continued to support numerous satellite programs throughout the 1980s, although many remained classified. On April 12, 1981, the first mission flown by the Space Shuttle *Columbia* was launched, and successfully returned to earth on April 14. The AFSC provided support for the first shuttle mission, and five AFSCF mission controllers received U.S. Air Force Commendation Medals. In June 1982, the first classified military payload was carried into orbit aboard the fourth shuttle mission flown by *Columbia,* and was supported from MCC B in Building 1003 (Jernigan, 1983).

In February 1983, Libyan troops, led by military dictator Colonel Muammar al-Gaddafi, appeared to be planning a surprise invasion of Chad and Sudan. The United States launched a KH-8 reconnaissance satellite to provide photographs of the activity. The top-secret satellite was supported from Sunnyvale AFS. The mission produced photographs that documented massive troop build-ups at the border of Sudan, and the *USS Nimitz* was dispatched to the Gulf of Sidra, thus preventing a Libyan invasion of Sudan (Levien, 1989; Philp, October 30, 1985). In 1984, the twentieth and final KH-9 satellite was launched and supported from Sunnyvale AFS (Day, November 8, 2004).

The first dedicated military flight, aboard the Space Shuttle *Discoverer,* was launched in January 1985, and an article in the August 2009 edition of *Air & Space Magazine* indicated that "according to most accounts, STS-51C's payload was ORION, an eavesdropping satellite for signals intelligence" (Cassutt, August 1, 2009). In October 1985, the second dedicated military flight was launched by the Space Shuttle *Atlantis* (Cassutt, August 1, 2009). *The New York Times* reported that, according to reliable sources, "two $100 million communication satellites" were deployed into orbit on a mission classified as secret by the Pentagon (Broad, October 5, 1985).

In 1986, the Space Shuttle *Challenger* exploded after launch, killing its seven crew members, including the shuttle's mission specialist, Lieutenant Colonel Ellison S. Onizuka, who had trained at Onizuka AFS (NASA, January 2007). That same year, Sunnyvale AFS was renamed Onizuka AFB in honor of Onizuka. Following the *Challenger* explosion, the U.S. Air Force returned 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 (Cassutt, August 1, 2009).

In 1989, a Tracking and Data Relay Satellite System (TDRSS) satellite was launched, supported by Sunnyvale AFS. The TDRSS was a sophisticated data-relay communications satellite developed by NASA (Levien, 1989).

11. Onizuka Air Force Station, 1990s-Present

By 1991, the Soviet Union had dissolved, signaling the end of the Cold War (Center for Air Force History, 1994). The end of the Cold War led, in part, to the declassification of the NRO in September 1992. The end of the Cold War also led to a decrease in military spending. However, modifications continued to be undertaken at Onizuka AFS, although less than in prior decades. In 1990, Martin Marietta Space Systems Facilities prepared plans on behalf of Onizuka AFB for modifications to MCC IX in Building 10031 (Martin Marietta Space Systems Facilities, April 30, 1990). In 1992, Keller & Gannon prepared plans to modify MCCs in Buildings 1001 and 1003. Modifications included room reconfiguration, and mechanical and electrical upgrades to accommodate new satellite programs (Onizuka AFS, n.d.).

In 1992, an addition, known as the Emergency Utility Building (EUB) was appended to the south façade of Building 1004. The EUB was constructed to supplement power distribution to the installation, and as a result of its construction, Building 10031 underwent mechanical upgrades (Onizuka AFS, n.d.).

In 1991, the 21st Space Operations Squadron (SOPS) were activated at Onizuka AFB, and assumed the role of operations of the 2nd Satellite Tracking Group. In 1992, the 750th Space Group was activated and assumed responsibility for launch and early orbit of numerous satellites, including the Space Shuttle (Schriever AFB, n.d.).

By the early 1990s, Onizuka AFB and tracking stations provided radio links to over eighty active DoD spacecraft (Mead, March 2, 1994). Satellites supported by Onizuka AFB assisted with the success of Operation Desert Storm (1990-91). For example, weather satellites assisted with U.S. missile launches, and navigation satellites assisted the troops in maneuvering through the desert. Reconnaissance satellites, such as those in the NRO's KH-11 satellite program, also likely continued to be supported by the installation (Peterson, July 30, 1993). The early 1990s also represented a key year for satellite scheduling, with the advent of a computerized scheduling system. Prior to this time, scheduling was plotted by hand, using colored tape to represent different spacecraft on approximately 50' rolls of butcher-paper (Mead, March 2, 1994). In addition, the installation also supported numerous NASA space exploration programs.

In 1994, Onizuka AFB was renamed Onizuka AFS. In 1995, the Corona Program was declassified, and the following year, 800,000 images taken between 1960-72 were made available to the public. Formerly classified documents also became available (NRO, February 24, 1995). In addition, Onizuka AFS was realigned in accordance with the Base Realignment and Closure (BRAC) Act, and select functions were relocated to CSOC at Falcon AFB, Colorado Springs, Colorado. The realignment resulted in a loss of approximately 1,100 jobs at Onizuka AFS (City of Sunnyvale, 2006). By the end of the 1990s and during the early 2000s, responsibility for controlling the DoD satellite network continued to be transferred to the CSOC, and Onizuka AFS's responsibilities substantially decreased (Flinn, December 1, 1991; Wulff, November 29, 1995).

In 1996, a terrorist attack on Khobar Towers, a high-rise apartment complex that housed U.S., British, and French military personnel in Dhahran, Saudi Arabia, led to increased security measures at U.S. military installations. At Onizuka AFS, parking was no longer permitted on the first two stories of Buildings 10031 and 10032. In addition, because Innovation Way was in close proximity to Buildings 10031 and 10032, the street was closed to vehicular traffic, covered with astro-turf, and landscaped. Jersey barriers and bollards were also installed around the perimeter of the buildings (Dennis Ralphs, pers. comm., August 2, 2010).

In addition, following the closure of the first two stories to vehicles, portions were reconfigured to provide storage. Additional security apparatus was installed in Building 10031 in the early 2000s, such as horns and flashing strobe lights that indicated the presence of unathorized personnel in classified areas (Onizuka AFS, n.d.).

In 2005, the BRAC commission recommended closure of Onizuka AFS. The recommendations were approved by President George W. Bush. In 2006, the DoD, through the Office of Economic Adjustment, formally recognized the City of Sunnyvale as the Local Redevelopment Authority (LRA) to plan the redevelopment of Onizuka AFS and its conversion to civilian use (City of Sunnyvale, 2006).

In May 2007, the NRO officially departed from Onizuka AFS. A deactivation ceremony and open house were held to commemorate this event, and were attended by over 800 guests, many of them former NRO, U.S. Air Force, CIA, and civilian employees (Munro, 2007). Displays were mounted on the corridor walls of Building 1003, highlighting the history of the NRO and reconnaissance satellite programs supported from the installation between through 2007. Following the open house, displays and histories of the programs, many of which remain classified, were relocated to the NRO archives in Chantilly, Virginia (Dennis Ralphs, pers. comm., August 3, 2009).

On July 28, 2010, a closing ceremony was presided over by Lieutenant General John Sheridan, commander of the Space and Missile Systems Center, Los Angeles AFB. In attendance were current and former employees, both military and civilian, as well as Lorna Onizuka, Ellison Onizuka's widow. In his remarks, Lieutenant General Sheridan noted that "[T]his facility here in Sunnyvale has supported an amazing 3.4 million satellite operations over the past years. Much of the details of this work are still classified and we cannot talk openly about it, but what I can tell you is that the operations conducted by the NRO from this site have made our nation a tremendously safer place to be" (Bauer, July 29, 2010).

The 21st SOPS relocated to Vandenberg AFB, and on July 30, 2010, a dedication ceremony was held to commemorate the opening of the 21st SOPS Ellison Onizuka Satellite Operations Facility at Vandenberg AFB. Onizuka AFS is scheduled to be transferred out of federal hands in September 2011. It is anticipated that the Department of Veterans Affairs (VA) will occupy Building 1002, and two buildings located outside the U.S. Air Force Satellite Test Center Historic District, Buildings 1018 and 1034. The remainder of the installation will be redeveloped.

E. Sources:

1. <u>Architectural Drawings</u>

Original plans are on file in Building 1002, Civil Engineering Office, Onizuka AFS, Sunnyvale, California, and include the following. Where applicable, the numbers following the plans in parentheses correspond to the Onizuka AFS Drawing Number Log.

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Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD. December 13, 1965c. “Interim Expansion Partial Floor Plan B.” (1413)

Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD. December 13, 1965d. “Interim Expansion Partial Floor Plan C.” (1414)

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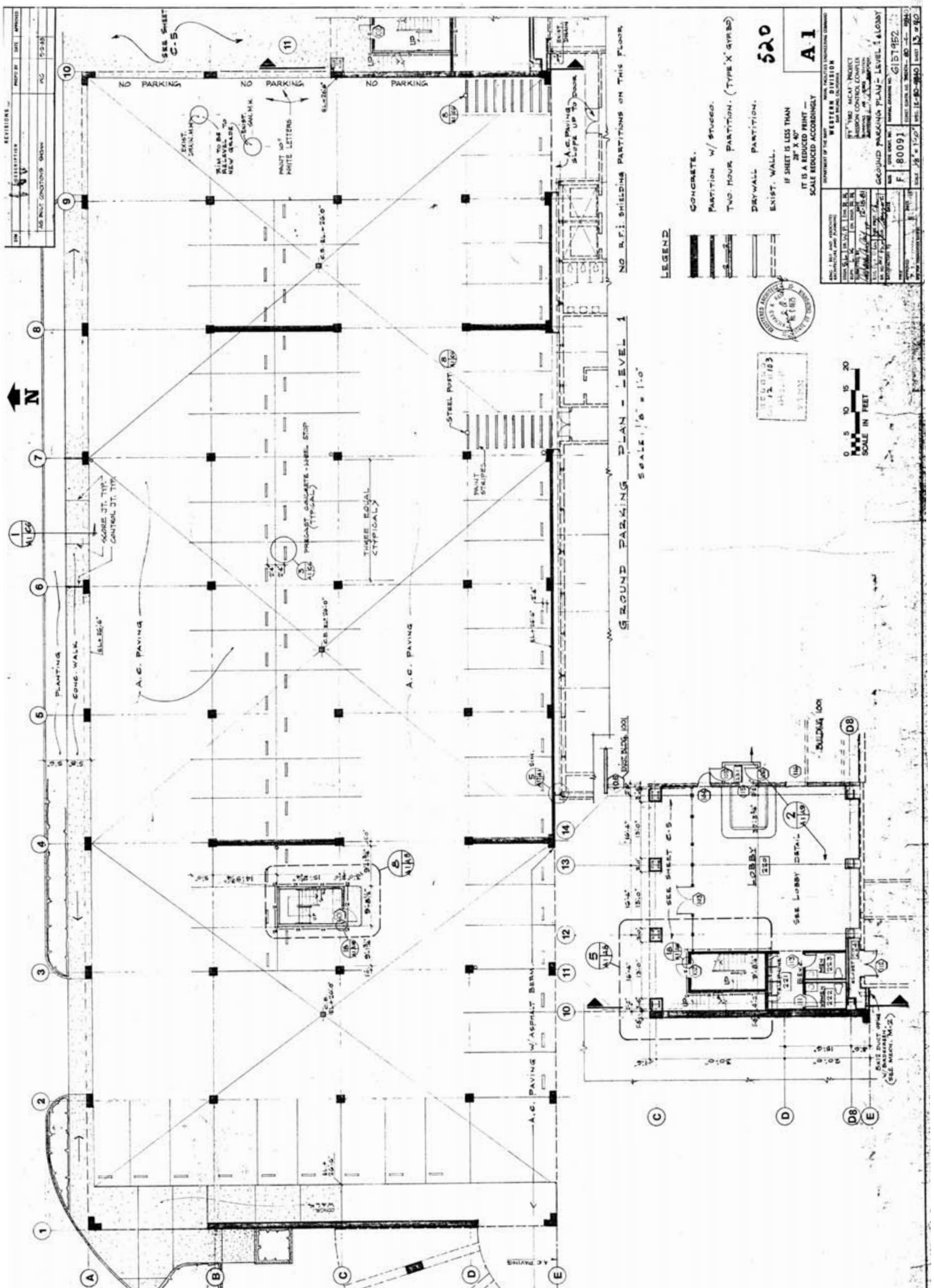
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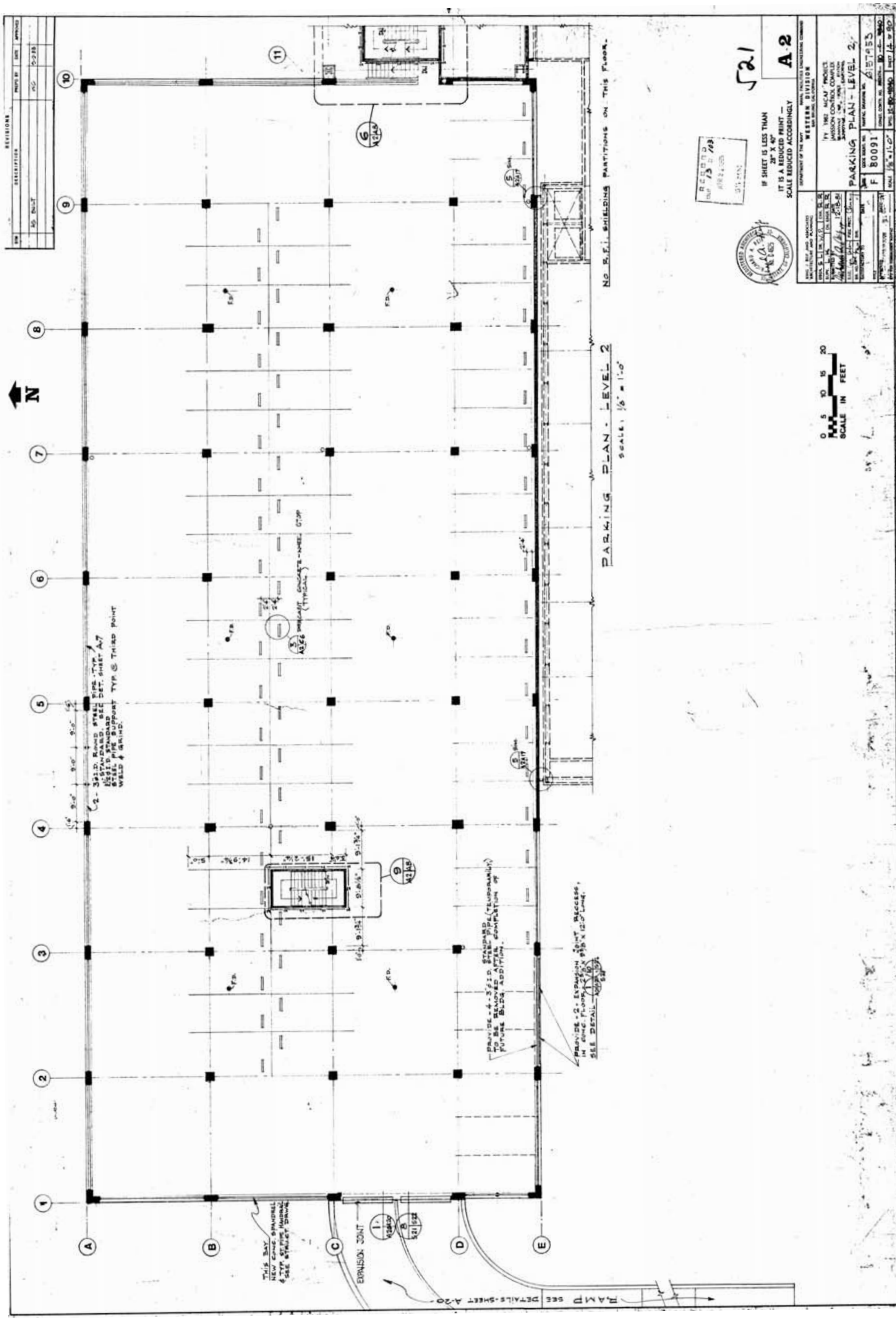
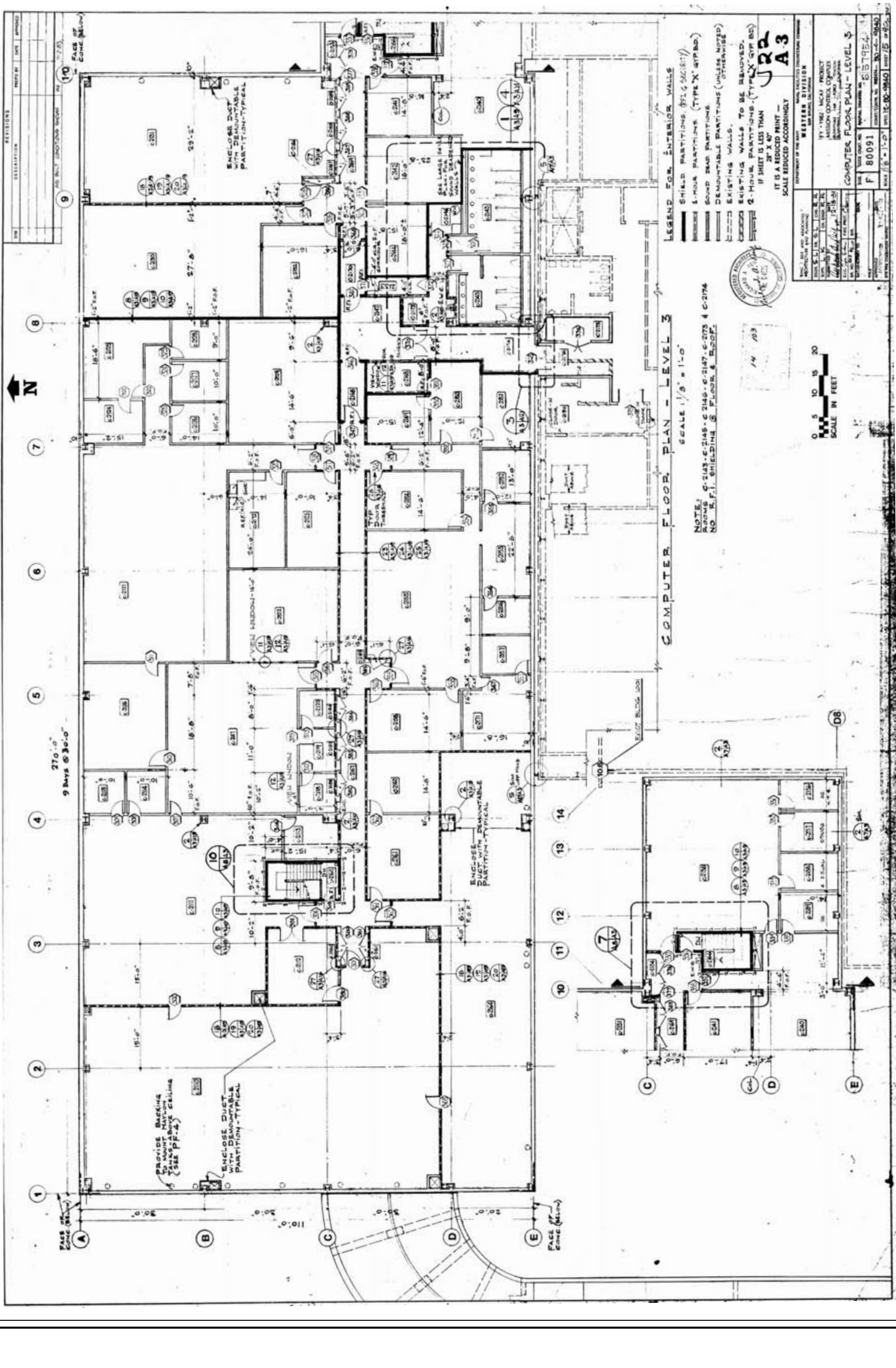
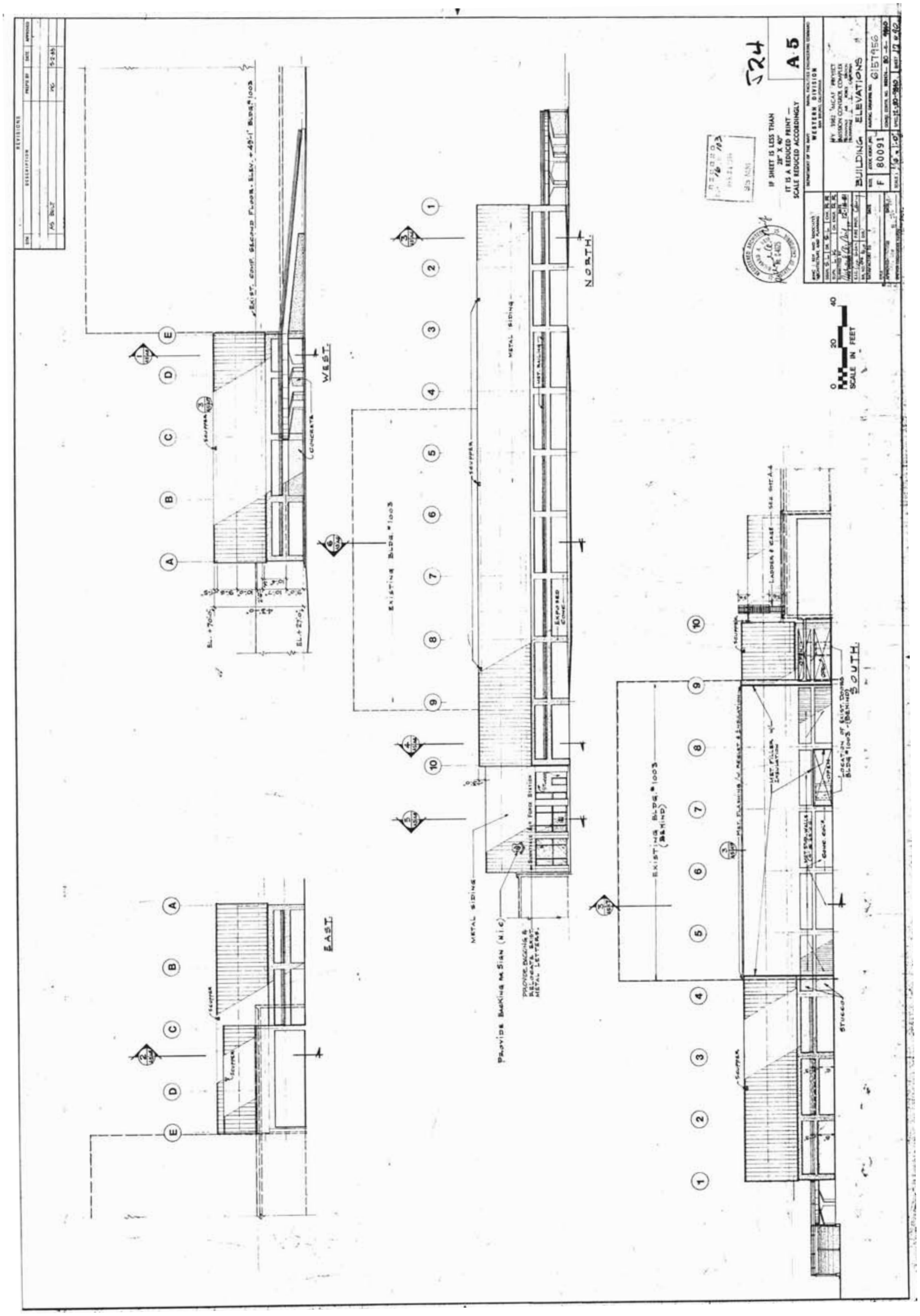
NO PARKING
A.C. PAVING
LEGEND
CONCRETE
LOBBY
A1


PARKING PLAN - LEVEL 2
SCALE: 1/8" = 1'-0"
NO R.F.I. SHIELDING PARTITIONS ON THIS FLOOR.
SCALE IN FEET
IF SHEET IS LESS THAN 28" X 40" IT IS A REDUCED PRINT — SCALE REDUCED ACCORDINGLY
WESTERN DIVISION
PARKING PLAN - LEVEL 2
A2
EXPANSION JOINT
RAMP SEE DETAILS-SHEET A-20


COMPUTER FLOOR PLAN - LEVEL 3
LEGEND FOR INTERIOR WALLS
SCALE IN FEET
COMPUTER FLOOR PLAN - LEVEL 3
80091


WEST
EAST
NORTH
SOUTH
EXISTING BLDG. #1003
A 5
BUILDING ELEVATIONS
SCALE IN FEET

SECTION II

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HISTORIC AMERICAN BUILDING SURVEY
LEVEL II-TYPE DOCUMENTATION

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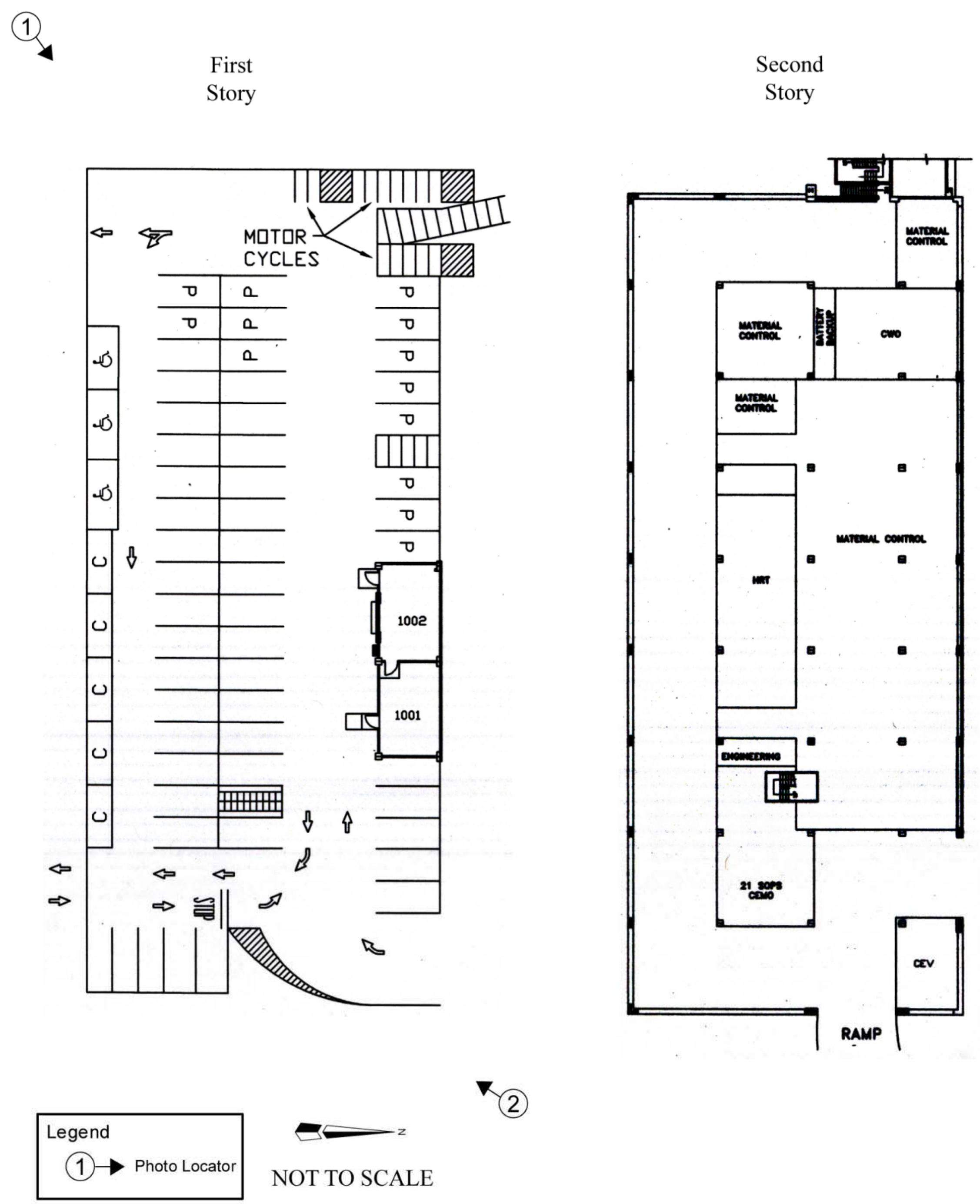
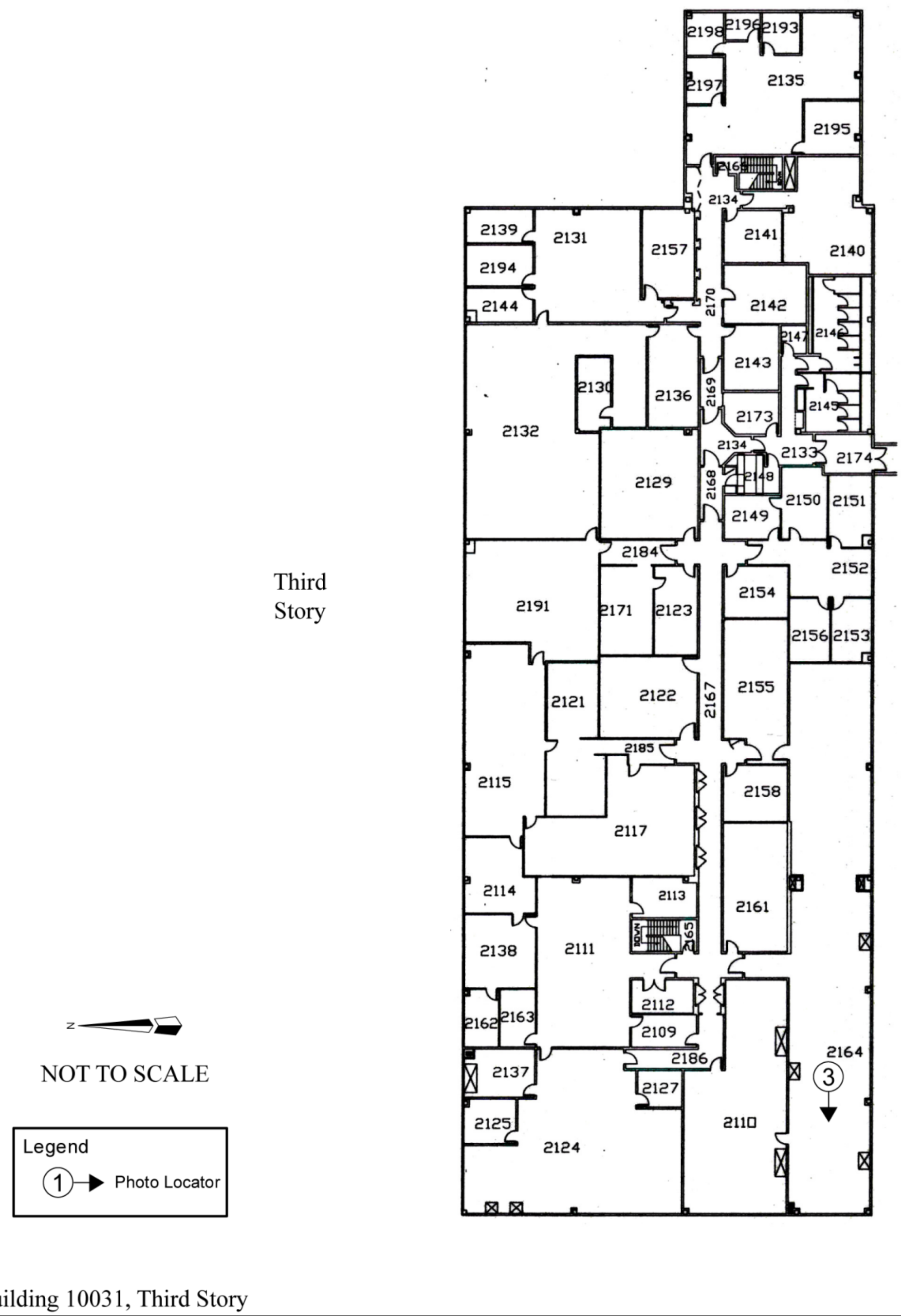
U.S. AIR FORCE SATELLITE TEST CENTER — Log No. USAF041221A-E
BUILDING 10031
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Anne Jennings, Photographer — Date of Photographs: June 7-14, 2010

Log No. USAF041221A-E-01	VIEW OF NORTH AND EAST FAÇADES, LOOKING SOUTHWEST. NOTE OPEN FIRST AND SECOND STORIES WHICH ORIGINALLY HOUSED PARKING AREAS.
Log No. USAF041221A-E-02	VIEW OF CONCRETE RAMP APPENDED TO WEST FAÇADE, LOOKING NORTH. RAMP PROVIDED ACCESS TO SECOND STORIES OF BUILDINGS 10031 (BACKGROUND) AND 10032 (FOREGROUND).
Log No. USAF041221A-E-03	VIEW OF ROOM 2164, A FORMER COMMUNICATIONS AREA ON THIRD STORY, LOOKING WEST.



1 Building 10031, First and Second Stories



Building 10031, Third Story


10031

U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 10032
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Log No. USAF041221A-F

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

PHOTOGRAPHS

California Office of Historic Preservation
1416 9th Street, Room 1442
Sacramento, CA 95814

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U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 10032
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Log No.USAF041221A-F

SECTION I

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SECTION II

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HISTORIC AMERICAN BUILDING SURVEY
LEVEL II-TYPE DOCUMENTATION

U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 10032

Log No. USAF041221A-F

A. Location: Building 10032, Onizuka Air Force Station
1080 Innovation Way, Sunnyvale, Santa Clara County, California

B. Significance: Building 10032, constructed in 1984 to support reconnaissance satellites, is a contributing resource to the National Register-eligible U.S. Air Force Satellite Test Center Historic District. The district is significant at a national, state, and local level under Criterion A for its associations with satellite reconnaissance during the Cold War, and Criteria Consideration G, because five of the six buildings, including Building 10032, are not yet fifty years old, and have exceptional importance for their associations with satellite reconnaissance during the Cold War.

The U.S. Air Force Satellite Test Center Historic District is significant at the national level for its association with satellite reconnaissance during the Cold War. The installation was established in 1959 to serve as the command-and-control center for the first reconnaissance satellite program, the Corona Program. It was developed by the U.S. Air Force and the Central Intelligence Agency (CIA), with assistance from a private contractor, Lockheed Missiles and Space Division. Shortly thereafter, the National Reconnaissance Office (NRO) was established to provide oversight of the program and develop other satellite programs. As new satellite technologies emerged, such as communications, early missile warning, meteorology, navigation, and nuclear detonation detection, Building 10032 was constructed for satellite support. These satellite programs also provided valuable data throughout the Cold War, and were supported from the U.S. Air Force Satellite Test Center Historic District. Although many of the satellite programs remain classified, it is apparent through the continued presence of the NRO that the installation played a key role in the United States' conduct of the Cold War.

The U.S. Air Force Satellite Test Center Historic District is also significant at the state and local levels for its association with the development of California as a leader in technological innovations. California, and specifically the City of Sunnyvale in Silicon Valley, began to emerge as a leading technological center during the Cold War. This was due, in part, to the military's investment in the development of defense technologies in California, such as command and control of reconnaissance satellites at Onizuka Air Force Station (AFS). The presence of Lockheed Missiles and Space Division in Sunnyvale in the mid-1950s, followed by Onizuka AFS in the late 1950s, burnished its reputation as a high-technology center. The district's period of significance extends from 1959, the date of development of the installation, through 1991, the conclusion of the Cold War.

C. Description:

1. Current Description

Building 10032 was constructed in 1984 to provide satellite support in conjunction with Buildings 1001, 1003, and 10031. It is a three-story, rectangular-plan, windowless, steel-frame, utilitarian building. It sits atop a concrete-pile foundation, and is augmented by two-story concrete columns, ten along the north and south facades, five along the east and west facades, and twenty-four interior columns. The first story is open, and the second story features concrete panels between the columns. The steel-frame, radio frequency interference (RFI)-shielded third story is clad in vertical metal siding and capped by a flat corrugated metal-clad roof. Building 10032 is appended to the south façade of Building 10031 and the west façade of Building 1003. A concrete ramp appended to the west façade of Building 10031 also provides access to the second story of Building 10032. An enclosed cylindrical concrete stairwell is appended to the west corner of the north façade. The building has no fenestration.

The first story of Building 10032 encompasses 30,373 square feet, the second story 27,817 square feet, and the third story 29,307 square feet. A current sketch plan is included in the Index to Photographs. A comparison of the original floor plan with the current floor plan indicates that the majority of Building 10032 has been reconfigured. An inspection of select interior spaces, coupled with information included in the Onizuka AFS Drawing Number Log, indicate that most interior spaces, even in cases where they retain their original configuration, no longer retain their original function, features, or finishes. However select areas on the third story retain RFI-shielded walls and are accessed via interlock doors.

2. According to Original Plan

Original plans of Building 10032 are on file in the Civil Engineering Office, Building 1002, Onizuka AFS, Sunnyvale, Santa Clara County, California. Original building plans were prepared in 1982 by Rasmussen Ingle Anderson, a San Francisco-based architecture firm, on behalf of NAVFAC, Western Division. The following plans are featured in the graphic documentation section of the report:

- “Alter Satellite Control Facility, First Floor Plan” (Rasmussen Ingle Anderson/NAVFAC, October 29, 1982a)
- “Alter Satellite Control Facility, Second Floor Plan” (Rasmussen Ingle Anderson/NAVFAC, October 29, 1982b)
- “Alter Satellite Control facility, Third Floor Plan” (Rasmussen Ingle Anderson/NAVFAC, October 29, 1982c)

- "Alter Satellite Control Facility, Elevations" (Rasmussen Ingle Anderson/NAVFAC, October 29, 1982d)

The historic appearance of Building 10031's exterior is similar to its current appearance. However, as originally conceived, the second story was open, and featured metal-pipe railings between the concrete columns.

According to the original plans, the first and second stories housed parking, and the second story also housed a mechanical room located along the east side. The RFI-shielded third story was arranged in four distinct areas, which likely housed four Mission Control Centers (MCCs) accessed via interlock doors Although the plans do not indicate room functions, the Onizuka AFS Drawing Number Log indicates that Building 10032 housed MCCs 4 and 7 (Rasmussen Ingle Anderson/NAVFAC, October 29, 1982a-d).

According to the plans, north and south bridges were envisioned to provide access from the second story of Building 1003 to Building 10032 (Rasmussen Ingle Anderson/NAVFAC, October 29, 1982c). However, because cables and wiring existed at the proposed location of the north bridge, only the south bridge was constructed (Dennis Ralphs, pers. comm., June 9, 2010).

D. History:

1. <u>Development of the Satellite Test Center, 1959-61</u>

The development of satellite reconnaissance during the Cold War (1946-91) and the specific role of the U.S. Air Force Satellite Test Center (STC) is fully described in the associated overview report, California State Historic Preservation Office Historic American Building Survey Level II-Type Documentation, U.S. Air Force Satellite Test Center, Log No. USAF041121A. The following section provides a brief summary of the role that Building 10031 played at the STC from 1959-91, its period of significance.

The installation was established in 1959 when Building 1001 was constructed to serve as the command-and-control center for the Corona Program to support the launch, orbit, and recovery of Corona satellites. The Corona Program, initiated in 1958, was the first satellite reconnaissance program developed by the U.S. Air Force and the Central Intelligence Agency (CIA), with assistance from private contractors, such as Lockheed Missiles and Space Division, located in Sunnyvale, California. Concerns about preserving the secrecy of the Corona Program and its objectives led to the designation of the Discoverer Program as a cover program. The publicly-stated goal of the Discoverer Program was scientific research (Richelson, 2002). Prior to the construction of Building 1001, at least eight Corona satellites, described as Discoverer satellites in the press, were launched from Vandenberg Air Force Base (AFB), and were supported from an interim control center in Palo Alto, California. Tracking stations located around the world also provided support.

In 1959, the U.S. Air Force acquired 11.43 acres of land in Sunnyvale from Lockheed Missiles and Space Division located to the west. Plans for the installation were designed by the Ralph M. Parsons Company, an architecture and engineering firm based in Los Angeles, California, under the auspices of the U.S. Air Force Ballistic Missile Division (AFBMD) in Englewood, California (Ralph M. Parsons Company/AFBMD, March 6, 1959).

On January 28, 1960, the installation, newly designated as the STC, was dedicated by the U.S. Air Force (Davies, 1960). A few months later, on March 1, 1960, it was occupied by the 6594th Aerospace Test Wing (ATW), the first unit to be tasked with military satellite operations; Lockheed Missiles and Space Division employees; and likely the CIA. The 6594th ATW provided oversight for Lockheed Missiles and Space Division which was responsible for satellite operations (6594th ATW, 1961; Jernigan, 1983). However, portions of the building remained under construction, including the state-of-the-art Satellite Control Room in the Satellite Control Room Complex. An interim Satellite Control Room was established from which Lockheed Missiles and Space Division, monitored by the 6594th ATW, could direct the launch, tracking, data acquisition, command and control, and recovery phase of military satellites (6594th ATW, 1961; Jernigan, 1983).

On July 7, 1960, the installation was officially designated as the Satellite Test Annex (STA) under the jurisdiction of the AFBMD. However, it should be noted that it continued to be referred to as the STC, both in U.S. Air Force documents, as well as by the public, likely due in part to a building sign which indicated “U.S. Air Force Satellite Test Center.” On February 6, 1961, the Satellite Control Room and remainder of the Satellite Control Room Complex became operational. The primary purpose of the complex was to support Corona satellites, although additional programs were supported by this time (Jernigan, 1983).

2. Significant Events and Satellites Supported, 1960-61

In August 1960, the U.S. Air Force accomplished the first successful retrieval of a Discoverer satellite. On August 10, Discoverer XIII was launched from Vandenberg AFB, and was supported by the STC. The satellite achieved polar orbit for a period of ninety-four minutes, during which time it was in contact with worldwide tracking stations, and the interim Satellite Control Room at the STC. During its seventeenth rotation of the earth, the eject command was issued from the STC, and the capsule was ultimately recovered from the Pacific Ocean, marking the first successful retrieval of an object from space (Arnold, 2005; 6594th ATW, no date [n.d.]). In-keeping with the publicly stated scientific objectives of the Discoverer Program, the *San Jose Mercury News* noted that "Discoverer recovery techniques will be used soon to return monkeys from space," and were vital to "returning a man to earth after orbiting in space" (Lindsey, August 12, 1960). Still in the testing phase, the satellite did not yet contain a camera (Jernigan, 1983).

Shortly after this historic event, Discoverer XIV was launched on August 18, 1960 from Vandenberg AFB (Arnold, 2005). Discoverer XIV orbited the earth seventeen times, supported by the STC from the interim Satellite Control Room in Building 1001, and the Kodiak tracking station, before the eject command was relayed to the satellite. Following the command, at 300 miles above the earth, the satellite recovery vehicle (SRV) separated from the spacecraft, and began its descent to earth, where it was caught by a specially equipped Fairchild C-119 *Flying Boxcars* (C-119) piloted by U.S. Air Force Captain Harold Mitchell (*The New York Times,* August 20, 1960).

The Discoverer XIV SRV contained 20 pounds of film which documented over 1,650,000 square miles, and provided the first successful satellite reconnaissance photographs of the Soviet Union. It also resulted in more photographic coverage of the Soviet Union than all previous U-2 flights combined. Furthermore, it 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 (ICBM) (Day, 2006). However, despite the historic nature of this event, the crew, who were not cleared for the Corona Program, were unaware of the importance of their mission (Arnold, 2005).

Although the STC was developed to support the Corona Program, by the fall of 1960, it also supported the Satellite and Missile Observation System (SAMOS) and Missile Detection Alarm System (MIDAS). Both programs were initially developed by the U.S. Air Force in the mid-1950s as reconnaissance and missile detection satellites, respectively (Jernigan, 1983). On October 11, 1960, the first SAMOS satellite was launched from Vandenberg AFB, and supported from the STC, although it failed to reach orbit (*San Jose Mercury News*, October 12, 1960). By July 1961, MIDAS satellites were launched from Vandenberg AFB and supported by the STC. By the end of 1961, two MIDAS satellites had reached orbit (6594th ATW, 1961).

In April 1961, Discoverer XXIII was launched from Vandenberg AFB, and was the first Corona satellite supported by the STC from the new control room. By this time, Corona satellites were regularly providing images of the Soviet Union, as well as other communist countries. Among these images included evidence of the building of the Berlin Wall between East and West Germany (Chapman, 2008). In September 1961, the NRO was established as a classified agency in the Department of Defense (DoD), and was tasked with oversight of satellite reconnaissance programs, including the Corona Program, and therefore became a presence at the STC (Richelson, 2000).

3. Building 1002 Construction and Upgrades, 1962

In 1962, the STC experienced its first of many expansions when plans for a two-story, L-shaped administrative building – Building 1002 (Addition to the Satellite Test Annex) - were prepared for the U.S. Air Force Space Systems Division (SSD) by Kaiser Engineers, a division of the Henry J. Kaiser Company. Kaiser Engineers was a well-known architecture and engineering firm located in Oakland, California (Kaiser Engineers/U.S. Air Force SSD, January 15, 1962; Air Force Satellite Control Facility (AFSCF), 1972).

During this time, Kaiser Engineers also prepared plans for a single-story addition to Building 1001 to house new a new communications center, and interior modifications to the Satellite Control Room Complex (Kaiser Engineers/U.S. Air Force SSD, October 17, 1962a-b; Jernigan, 1983).

The 1962 renovations were likely implemented in conjunction with the U.S. Air Force's first modernization effort, the Multiple Satellite Augmentation Program (MSAP). This effort was initiated, in part, to standardize and provide updated equipment to the STC and tracking stations which enabled them to simultaneously support multiple satellite programs (Lockheed Missiles and Space Division, 1963). Computer capabilities were upgraded, new display and communications equipment were also installed, and connections between the STC and tracking stations were upgraded (Jernigan, 1983).

4. Significant Events and Satellites Supported, 1962-64

On February 27, 1962, Discoverer XXXVIII was launched and supported from the STC. The following month, the DoD classified all military satellite programs (DoD, March 23, 1962). As a result, Discoverer XXXVIII was the last satellite launched as part of the Discoverer program. Corona satellites continued to be launched and supported by the STC, however, because all satellites were classified, the Corona Program no longer required a cover story.

Between 1962-64, the STC supported over fifty Corona satellites. By this time, Corona satellites had accurately mapped all twenty-five of Moscow's long-range missile sites. Furthermore, images taken by Corona satellites indicated that China was readying its nuclear facility in Lop Nur for testing. It was noted in a classified CIA briefing that "[O]n the basis of new overhead photography, we are now convinced that the previously suspect facility at Lop Nur in western China is a nuclear test site which could be ready for use in about two months." Within two months, on October 16, 1964, China tested an atomic bomb at the Lop Nur site (Broad, September 12, 1995).

In addition to Corona, SAMOS, and MIDAS satellites the STC supported the Defense Meteorological Satellite Program (DMSP) in 1962 and 1963.DMSP was a meteorological satellite program initiated in 1960 to provide weather and climate data for more effective military operations (DMSP, n.d.). On October 16, 1963, the first Vela satellite was launched and supported by the STC. The Vela Program – vela means vigil in Spanish – was a series of satellites designed to detect nuclear detonations (Jernigan, 1983; Peebles, 1997). Presumably, Vela satellites provided images of the Lanzhou Diffusion Plant in Lanzhou, China and the Baotao Nuclear Fuel Component Plant in Baotao, China (Richelson, 2002).

In November 1963, the final SAMOS satellite was launched (Peebles, 1997). Furthermore, 1963 marked the beginning of the Keyhole (KH)-7 surveillance system, noted in a 2006 NRO memo as "the Intelligence Community's first high resolution surveillance or 'spotting' satellite." Similar to Corona satellites, the KH-7 was a reconnaissance satellite that returned film to earth in SRVs. It was primarily used to provide surveillance of nuclear facilities and Intermediate Range Ballistic Missiles (IRBM) in the Soviet Union and China (NRO, 2006).

In July 1964, two additional Vela satellites were launched, resulting in a total of four orbiting satellites capable of detecting nuclear detonations. In August 1964, Syncom III was launched and supported by the STC. Syncom III was a National Aeronautics and Space Administration (NASA) satellite used for DoD military communications experiments between Saigon, Vietnam, and Hawaii (Jernigan, 1983).

5. Construction, Upgrades, and Designation of the Air Force Satellite Control Facility, 1964-67

As indicated on the 1962 plan entitled "Satellite Test Annex Plot Plan," an addition to Building 1002 was planned during its initial construction. The full extent of the building was never realized, however, in May 1964, plans were prepared for a two-story, L-plan addition to Building 1002 to provide additional administrative space. The addition was designed by Maher & Martens, a San Francisco-based architecture firm for the U.S. Army Corps of Engineers (USACE), Sacramento District (Maher & Martens/USACE Sacramento District, May 7, 1964).

In 1965, the U.S. Air Force Satellite Control Facility (AFSCF) was officially designated. The mission of the AFSCF was to direct launch, tracking, data acquisition, command and control, and recovery of DoD military satellites. Following the establishment of AFSCF, an Interim Expansion Plan (IEP) was initiated to augment the facility and implement the newly developed MCC concept, which focused on the development of mission-oriented control centers rather than a single control room (Jernigan, 1983).

Plans were prepared by San Francisco-based consulting engineers, Bentley Engineers and Earl & Wright, Inc., under the auspices of the U.S. Air Force SSD to develop multiple MCCs in Building 1001. The plans indicate that the building was reconfigured to accommodate four new MCCs, two new complex areas, two new communications areas, and a new bird buffer area (Bentley Engineers and Earl & Wright, Inc./U.S. Air Force SSD, December 13, 1965a-e). The majority of the work was completed by December 1966 (AFSCF, January-June 1966).

6. Significant Events and Satellites Supported, 1965-70

The increase in the number of flight support hours logged by the AFSCF between 1965-66 appears to indicate that at least some of the MCCs were operational in 1966. In 1965, the AFSCF logged 20,757 hours of satellite flight support. By 1966, 29,400 hours of flight support were logged. The number of satellites supported also increased. In 1965, the STC supported approximately fourteen satellites (AFSCF, 1972). In January 1967, the STC supported thirty-one satellites per day, and by June were supporting forty-four per day, which was expected to increase to forty-seven per day by July (AFSCF January-June 1967).

Between 1965-70, the STC supported over forty Corona satellite launches (Mission and Spacecraft Library, n.d.). By 1966, upgrades to the installation had resulted in an increase in involvement in satellite programs. In addition to Corona, Vela, and other programs (many of which likely remained classified) new programs such as NASA's Biosatellite Program were supported. The Biosatellite Program was a series of three satellites designed to assess the effects of spaceflight on living organisms. Support for the program focused on directing operations of the recovery of the satellites by Lockheed C-130 *Hercules* (C-130) aircraft flown by the 6594th Aircraft Recovery Group based at Hickam AFB, Honolulu, Hawaii (Jernigan, 1983).

In June 1967, two scientific satellites, one owned by the U.S. Army, the other by the U.S. Navy, were launched as the first flight in the DoD Space Experiments Program (SESP). SESP was responsible for providing flights for research and experiments undertaken by government agencies (AFSCF, January-June 1968; Jernigan, 1983). In 1967, the KH-7 surveillance system was terminated, after having flown thirty-eight missions, thirty-four of which successfully returned usable images (NRO, 2006).

In June 1968, the *San Jose Mercury News* reported that satellite reconnaissance, likely supported by the STC, uncovered the Soviet Union's plans for the invasion of Czechoslovakia. The article noted that "[S]atellites spinning over Eastern Europe monitored Soviet radio transmissions which signaled the invasion was imminent, and photographic reconnaissance satellites had monitored unusual military activities on the

Czech borders by Soviet, East German, Polish, Hungarian, and Bulgarian troops" (*San Jose Mercury News*, August 27, 1968).

In September 1968, a Lincoln Experimental Satellite (LES) was launched into orbit and supported by the STC and tracking stations. The LES was an experimental satellite used to test communications between aircraft, ships, and ground forces (Jernigan, 1983).

In 1969, support was provided for NASA's manned flights to the moon. The STC supported Apollo missions 9 and 10, and Apollo 11, the first manned lunar landing mission. Program 949 was also supported in 1969 (AFSCF, January-June 1969). Program 949 was designated in November 1966 to supplant Program 461, which had initially supplanted the MIDAS Program in 1963. Program 949 provided a wider range of capabilities, and by the 1970s, was expected to have "progressively enhanced world-wide early-warning, surveillance and detection capabilities" (Piper, 1970).

7. Development of Buildings 1003 and 1004, 1966-70

In conjunction with the technological upgrades which occurred throughout the mid-to-late 1960s, in August 1966, a real estate estimate was prepared by the USACE Sacramento District which proposed the acquisition of 8.2 acres of land from Lockheed Aircraft Corporation, at a cost of $49,000. In 1966, C.F. Braun & Company of Alhambra, California, under the auspices of the U.S. Naval Facilities Engineering Command (NAVFAC), Western Division, San Bruno, California, and SAMSO, Los Angeles, California, prepared site development plans (C.F. Braun/NAVFAC/SAMSO, December 30, 1966). C.F. Braun & Company also prepared plans for the development of two new buildings, Building 1003 (STC Building Addition), and Building 1004 (Power Plant) (C.F. Braun/NAVFAC/SAMSO; November 14, 1967; August 12, 1968).

By August 1968, Lockheed Aircraft Corporation transferred the land to the U.S. Air Force (Lockheed Aircraft Corporation, 1968; Jernigan, 1983). By this time site development was underway, and included relocation of an existing Lockheed Missiles and Space building; reconfiguration of Lockheed Martin Way (formerly known as East Perimeter Road) west of Building 1001; creation of additional parking spaces; and installation of underground utilities (C.F. Braun/NAVFAC/SAMSO, December 30, 1966).

Following site development, construction of Buildings 1003 and 1004 commenced. Building 1003 was designed to house the Manned Orbiting Laboratory (MOL) Program, as well as other satellite programs. Initiated in 1963, the concept involved a Titan III booster rocket which carried a modified Gemini B capsule attached to a space laboratory, and was intended to serve reconnaissance purposes (Jernigan, 1983). However, in June 1969, the DoD announced the cancellation of the MOL Program, to save money. The cancellation led to a short work stoppage, however construction resumed a few weeks later. *Aerospace Daily* reported that the U.S. Air Force had evaluated requirements for current and future programs, and determined that construction on the building should continue (*Aerospace Daily*, September 19, 1969).

By the end of 1969, the 164,000-square foot building, constructed at a cost of $8 million was nearly complete. The building was painted "Air Force blue," resulting in its nickname, the "Blue Cube" (*Aerospace Daily*, September 19, 1969). Building 1003 housed multiple MCCs, communications and crypto equipment, a data distribution center, mechanical equipment, Control Data Corporation (CDC) 3800 computers, and a tape library (AFSCF, 1970). In addition, shortly after it was constructed the Vela Program office, along with another unidentified satellite program was relocated from Building 1001 to Building 1003 (AFSCF, July-December 1969).

Building 1004 was also designed by C.F. Braun & Company. Solar, a division of International Harvester Company, provided the Saturn gas turbine generator sets that powered the plant. The development of Building 1004 necessitated modifications to the installation's power distribution system. Ties to the electric power provided by Pacific Gas and Electric (PG&E) were severed, with the exception of one power line which provided power through a Lockheed Missiles and Space Substation, and was likely kept active to provide back-up power (AFSCF, 1972). The plant, staffed by Solar contractors, was operational in February 1970, and provided power to the entire installation, rendering it energy-independent at that time (Jernigan, 1983).

8. Significant Events and Satellites Supported, 1970s

On January 1, 1971, AFSCF re-designated STC as Sunnyvale AFS. In the 1970s, Sunnyvale AFS continued to support existing and newly established satellite programs, although many of them remained classified. In 1970, the AFSCF Satellite Test Operations Historical Reports noted the successful support of two "unique orbital events" from the installation. These events included support of the Apollo 13 mission in April, which was aborted following the explosion of an on-board oxygen tank, and support of the first North Atlantic Treaty Organization (NATO) communications satellite in March (AFSCF, January-June 1970).

In June 1970, the final Vela satellite was launched. Sunnyvale AFS continued to provide support from Building 1003 throughout the 1970s for the orbiting satellite (Jernigan, 1983). Program 949 was also re-designated the Defense System Program (DSP) in 1970. Sunnyvale AFS continued to support this program throughout the early 1970s (AFSCF, July-December 1970; 1971; 1972). The DSP satellite weighed 2,000 pounds, was approximately 23' long, 10' wide, and contained a large infrared telescope which scanned the earth for missile launches. In the event a missile was launched, it would be detected by the United States within minutes, which removed the possibility of a surprise attack (Peebles, 1997).

By November 1971, a pair of Defense Satellite Communications System (DSCS) II advanced communications satellites had been launched to handle voice, teletype, computerized digital data, and video transmissions (Jernigan, 1983). The first KH-9 satellites – code-named HEXAGON, and popularly known as “Big Bird” – were also launched in 1971. The KH-9 satellites were 30,000-pound photographic reconnaissance satellites initially developed in the 1960s. Similar to Corona satellites, they were designed to photograph large areas, and return the film to earth via SRV. They carried technologically advanced cameras, additional film capsules, and antennae for other intelligence-gathering purposes (Clark, 2007).

In January 1972, President Richard Nixon announced the development of the Space Transportation System (STS), or Space Shuttle Program, managed by NASA. Kennedy Space Center in Houston, Texas, and Vandenberg AFB would serve as the operational bases for the program. Research and development (R&D) shuttle launches would originate from the Kennedy Space Center, and military launches would originate from Vandenberg AFB. The shuttle would be responsible for the launch of all commercial, scientific, and military satellites into space. The AFSCF, including Sunnyvale AFS and tracking stations, would provide tracking and control for the program (Jernigan, 1983).

On May 25, 1972, Sunnyvale AFS supported the 145th and final launch of the Corona Program from the original Satellite Control Room in Building 1001. It was terminated as a result of advances in satellite technology. By the time the Corona Program concluded, Corona satellites had provided approximately 800,000 reconnaissance photographs covering approximately 510 million square miles (Chapman, 2008; Vukotich, n.d.). Following its termination, the Satellite Control Room Complex likely continued to be utilized for control of other satellite programs.

In July 1975, the final Apollo flight was launched and supported by Sunnyvale AFS. The final flight was known as the Apollo-Soyuz Test Project, which marked the first joint United States-Soviet Union space mission. The mission was the first time two foreign spacecraft docked together in orbit (NASA, July 14, 2010). In 1976, the first DMSP Block 5D, a meteorological satellite, was launched, and was presumably supported from Sunnyvale AFS. It was an upgraded version of the 1960s-era DMSP, and provided twice-daily, worldwide meteorological, oceanographic, and solar-terrestrial physics measurements (Jernigan, 1983; Wade, n.d.).

In 1976, the KH-11 KENNAN satellite, a reconnaissance satellite, was launched. It was the first successful electronic imaging satellite, and transmitted high-quality images in real time (Vick, 2007). A 1978 *San Jose Mercury News* article noted that some sources indicated that the top-secret “KH-11, from 200 to 300 miles up, can detect a pack of cigarets [sic] on Russian soil,” while another source indicated it could only “read the lettering on billboards” (Ingersoll, November 5, 1978). Nonetheless, this top-secret satellite represented significant advances in the development of satellite technology, and was supported from Sunnyvale AFS, as well as associated tracking stations.

9. Development of the Air Force Satellite Control Network, Expansion, and Upgrades, 1980s

In 1982, the Air Force Satellite Control Network (AFSCN) was organized. The AFSCN was not a formal organization, but rather denoted a group of common user resources, assets, and facilities which collectively provided tracking, telemetry & commanding (TT&C) support for virtually all DoD spacecraft, and select NASA and foreign government programs (Hane, 1988). The goal of the AFSCN was to provide “enduring control capability commensurate with the need for operational space suites throughout the conflict spectrum” (AFSCF, 1983).

To accomplish this goal, Sunnyvale AFS was upgraded as part of the Data Systems Modernization Program. This $500 million upgrade introduced centralized database-driven computer hardware and software to replace outdated systems. The upgraded system was more reliable, cheaper to maintain, and faster than its predecessor, allowing it to support a steadily increasing satellite support workload (Fedor et al., 2006).

Buildings 10031 and 10032 were constructed in the 1980s. They were built in conjunction with the Data Systems Modernization Program and were referred to on plans as MCCs. In 1981, King/Reif and Associates, an architecture and planning firm, prepared plans for Building 10031 on behalf of NAVFAC Western Division. The first and second stories housed parking, and the RFI-shielded third story housed MCCs. It was RFI-shielded to protect electronic and communications systems critical to satellite control from electromagnetic interference (EMI) and RFI (King/Reif and Associates/NAVFAC, December 18, 1981a-c).

In 1982, Rasmussen Ingle Anderson, a San Francisco-based architecture firm, prepared plans for Building 10032 under the auspices of NAVFAC Western Division. Many of the plans were stamped by AIA-registered architect, John Frederick Ingle, a founder of the firm. Ingle served in the USACE during World War II (1941-45), and as a partner in Rasmussen Ingle Anderson, was a pioneer in Silicon Valley for his design of industrial clean-air rooms (*The San Francisco Chronicle,* November 15, 2009). The firm was also noted for its expertise in earthquake engineering, which may have helped them be selected to design Building 10032 (*Electronics*, 1980).

Similar to Building 10031, the first two stories of Building 10032 housed parking areas, and the RFI-shielded third story housed MCCs, including MCC 4 and MCC 7, computer rooms, communications rooms, and offices. In general, the RFI-shielded areas were accessed via interlock doors, where only one door opened at a time, ensuring that the area remained shielded at all times (Rasmussen Ingle Anderson/NAVFAC, October 29, 1982c). Buildings 10031 and 10032 were operational by 1984 (Fola Odafalu, pers. comm., July 26, 2010). According to the Onizuka AFS Drawing Number Log, shortly after Building 10032 was completed in 1985, plans were prepared to modify the parking area on the second story. In 1989, some RFI doors were replaced (Onizuka AFS, n.d.).

10. Significant Events and Satellites Supported, 1980s

Sunnyvale AFS continued to support numerous satellite programs throughout the 1980s, although many remained classified. On April 12, 1981, the first mission flown by the Space Shuttle *Columbia* was launched, and successfully returned to earth on April 14. The AFSC provided support for the first shuttle mission, and five AFSCF mission controllers received U.S. Air Force Commendation Medals. In June 1982, the first classified military payload was carried into orbit aboard the fourth shuttle mission flown by *Columbia,* and was supported from MCC B in Building 1003 (Jernigan, 1983).

In February 1983, Libyan troops, led by military dictator Colonel Muammar al-Gaddafi, appeared to be planning a surprise invasion of Chad and Sudan. The United States launched a KH-8 reconnaissance satellite to provide photographs of the activity. The top-secret satellite was supported from Sunnyvale AFS. The mission produced photographs that documented massive troop build-ups at the border of Sudan, and the *USS Nimitz* was dispatched to the Gulf of Sidra, thus preventing a Libyan invasion of Sudan (Levien, 1989; Philp, October 30, 1985). In 1984, the twentieth and final KH-9 satellite was launched and supported from Sunnyvale AFS (Day, November 8, 2004).

The first dedicated military flight, aboard the Space Shuttle *Discoverer,* was launched in January 1985, and an article in the August 2009 edition of *Air & Space Magazine* indicated that “according to most accounts, STS-51C’s payload was ORION, an eavesdropping satellite for signals intelligence.” In October 1985, the second dedicated military flight was launched by the Space Shuttle *Atlantis* (Cassutt, August 1, 2009). *The New York Times* reported that, according to reliable sources, “two $100 million communication satellites” were deployed into orbit on a mission classified as secret by the Pentagon (Broad, October 5, 1985).

In 1986, the Space Shuttle *Challenger* exploded after launch, killing its seven crew members, including the shuttle’s mission specialist, Lieutenant Colonel Ellison S. Onizuka, who had trained at Onizuka AFS (NASA, January 2007). That same year, Sunnyvale AFS was renamed Onizuka AFB in honor of Onizuka. Following the

Challenger explosion, the U.S. Air Force returned 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 (Cassutt, August 1, 2009).

In 1989, a Tracking and Data Relay Satellite System (TDRSS) satellite was launched, supported by Sunnyvale AFS. The TDRSS was a sophisticated data-relay communications satellite developed by NASA (Levien, 1989).

11. Onizuka Air Force Station, 1990s-Present

By 1991, the Soviet Union had dissolved, signaling the end of the Cold War (Center for Air Force History, 1994). The end of the Cold War led, in part, to the declassification of the NRO in September 1992. The end of the Cold War also led to a decrease in military spending. However, modifications continued to be undertaken at Onizuka AFS, although less than in prior decades.

In 1991, the 21st Space Operations Squadron (SOPS) were activated at Onizuka AFB, and assumed the role of operations of the 2nd Satellite Tracking Group. In 1992, the 750th Space Group was activated and assumed responsibility for launch and early orbit of numerous satellites, including the Space Shuttle (Schriever AFB, n.d.).

In 1992, mechanical upgrades were undertaken in conjunction with the construction of the Emergency Utility Building (EUB). The EUB was appended to Building 1004 to supplement eletrical power to the installation, and as a result of its construction, Building 10032 underwent mechanical upgrades. In addition, MCC 7 underwent upgrades to its network and electrical systems, and a signal conveyance was installed between Buildings 10032 and 1002 (Onizuka AFS, n.d.).

By the early 1990s, Onizuka AFB and tracking stations provided radio links to over eighty active DoD spacecraft (Mead, March 2, 1994). Satellites supported from Onizuka AFB assisted with the success of Operation Desert Storm (1990-91). For example, weather satellites assisted with U.S. missile launches, and navigation satellites assisted the troops in maneuvering through the desert. Reconnaissance satellites, such as those in the NRO's KH-11 satellite program, also likely continued to be supported by the installation (Peterson, July 30, 1993). The early 1990s also represented a key year for satellite scheduling, with the advent of a computerized scheduling system. Prior to this time, scheduling was plotted by hand, using colored tape to represent different spacecraft on approximately 50' rolls of butcher-paper (Mead, March 2, 1994). In addition, the installation also supported numerous NASA space exploration programs.

In 1994, Onizuka AFB was renamed Onizuka AFS. The Onizuka AFS Drawing Number Log indicates that MCC 7 in Building 10032 underwent upgrades during this time

(Onizuka AFS, n.d.) In 1995, the Corona Program was declassified, and the following year, 800,000 images taken between 1960-72 were made available to the public. Formerly classified documents also became available (NRO, February 24, 1995). In addition, Onizuka AFS was realigned in accordance with the Base Realignment and Closure (BRAC) Act, and select functions were relocated to CSOC at Falcon AFB, Colorado Springs, Colorado. The realignment resulted in a loss of approximately 1,100 jobs at Onizuka AFS (City of Sunnyvale, 2006). By the end of the 1990s and during the early 2000s, responsibility for controlling the DoD satellite network continued to be transferred to the CSOC, and Onizuka AFS's responsibilities substantially decreased (Flinn, December 1, 1991; Wulff, November 29, 1995).

In 1996, a terrorist attack on Khobar Towers, a high-rise apartment complex that housed U.S., British, and French military personnel in Dhahran, Saudi Arabia, led to increased security measures at U.S. military installations. At Onizuka AFS, parking was no longer permitted on the first two stories of Buildings 10031 and 10032. In addition, because Innovation Way was in close proximity to Buildings 10031 and 10032, the street was closed to vehicular traffic, covered with astro-turf, and landscaped. Jersey barriers and bollards were also installed around the perimeter of the buildings (Dennis Ralphs, pers. comm., August 2, 2010). In addition, portions of the first two stories were reconfigured to provide storage. Additional security measures were installed in Building 10032 in the early 2000s such as horns and flashing strobe lights that indicated the presence of unathorized personnel in classified areas (Onizuka AFS, n.d.).

In 2005, the BRAC commission recommended closure of Onizuka AFS. The recommendations were approved by President George W. Bush. In 2006, the DoD, through the Office of Economic Adjustment, formally recognized the City of Sunnyvale as the Local Redevelopment Authority (LRA) for planning the redevelopment of Onizuka AFS and its conversion to civilian use (City of Sunnyvale, 2006).

In May 2007, the NRO officially departed from Onizuka AFS. A deactivation ceremony and open house were held to commemorate this event, and were attended by over 800 guests, many of them former NRO, U.S. Air Force, CIA, and civilian employees (Munro, 2007). Displays were mounted on the corridor walls of Building 1003, highlighting the history of the NRO and reconnaissance satellite programs supported from the installation between through 2007. Following the open house, displays and histories of the programs, many of which remain classified, were relocated to the NRO archives in Chantilly, Virginia (Dennis Ralphs, pers. comm., August 3, 2009).

On July 28, 2010, a closing ceremony was presided over by Lieutenant General John Sheridan, commander of the Space and Missile Systems Center, Los Angeles AFB. In attendance were current and former employees, both military and civilian, as well as Lorna Onizuka, Ellison Onizuka's widow. In his remarks, Lieutenant General Sheridan noted that "[T]his facility here in Sunnyvale has supported an amazing 3.4 million satellite operations over the past years. Much of the details of this work are still classified and we cannot talk openly about it, but what I can tell you is that the operations conducted by the NRO from this site have made our nation a tremendously safer place to be" (Bauer, July 29, 2010).

The 21st SOPS relocated to Vandenberg AFB, and on July 30, 2010, a dedication ceremony was held to commemorate the opening of the 21st SOPS Ellison Onizuka Satellite Operations Facility at Vandenberg AFB. Onizuka AFS is scheduled to be transferred out of federal hands in September 2011. It is anticipated that the Department of Veterans Affairs (VA) will occupy Building 1002, and two buildings located outside the U.S. Air Force Satellite Test Center Historic District, Buildings 1018 and 1034. The remainder of the installation will be redeveloped.

E. Sources:

1. Architectural Drawings

Original plans are on file in Building 1002, Civil Engineering Office, Onizuka AFS, Sunnyvale, California, and include the following. Where applicable, the numbers following the plans in parentheses correspond to the Onizuka AFS Drawing Number Log.

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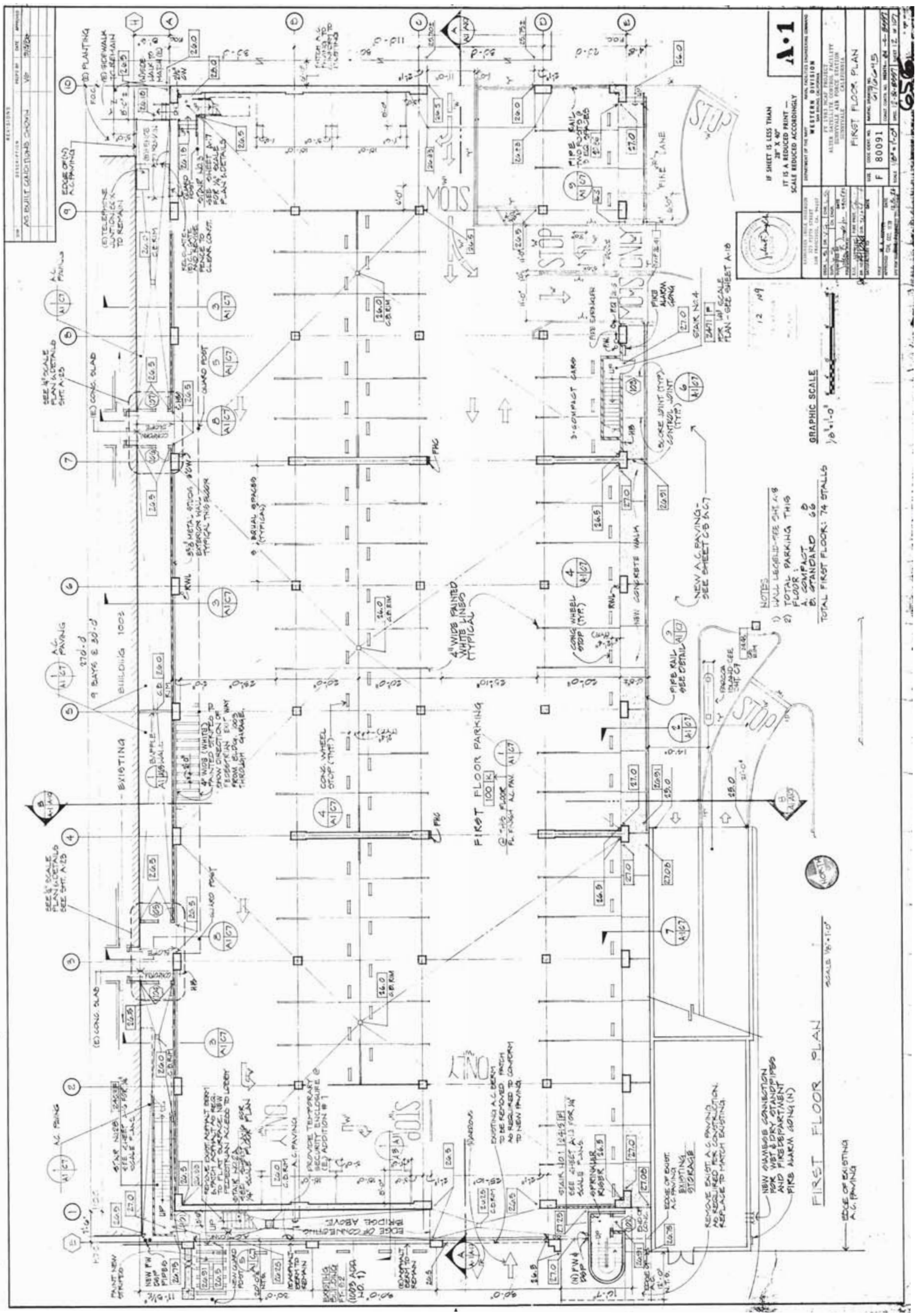
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FIRST FLOOR PARKING
A-1
80091
GRAPHIC SCALE
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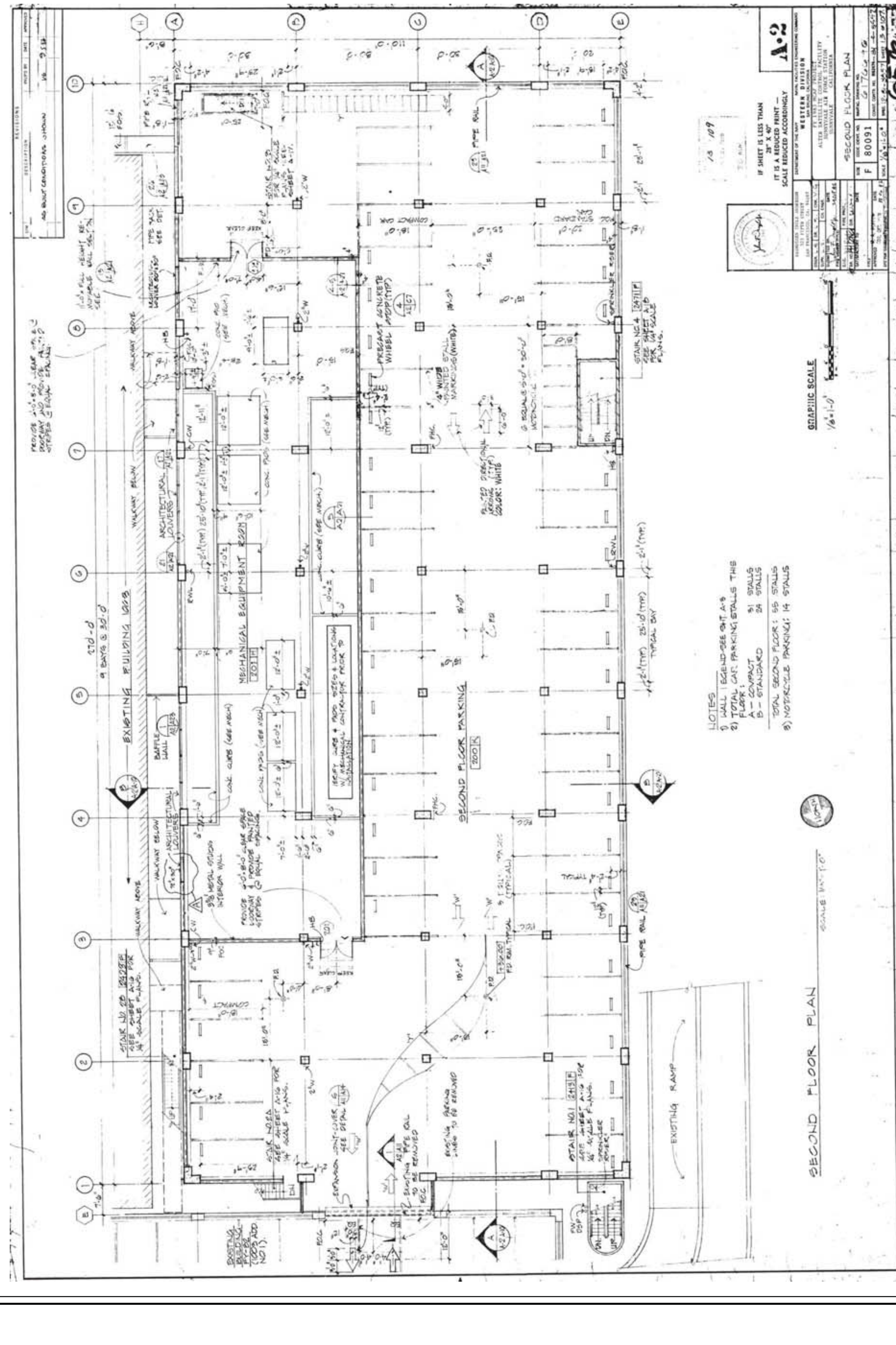
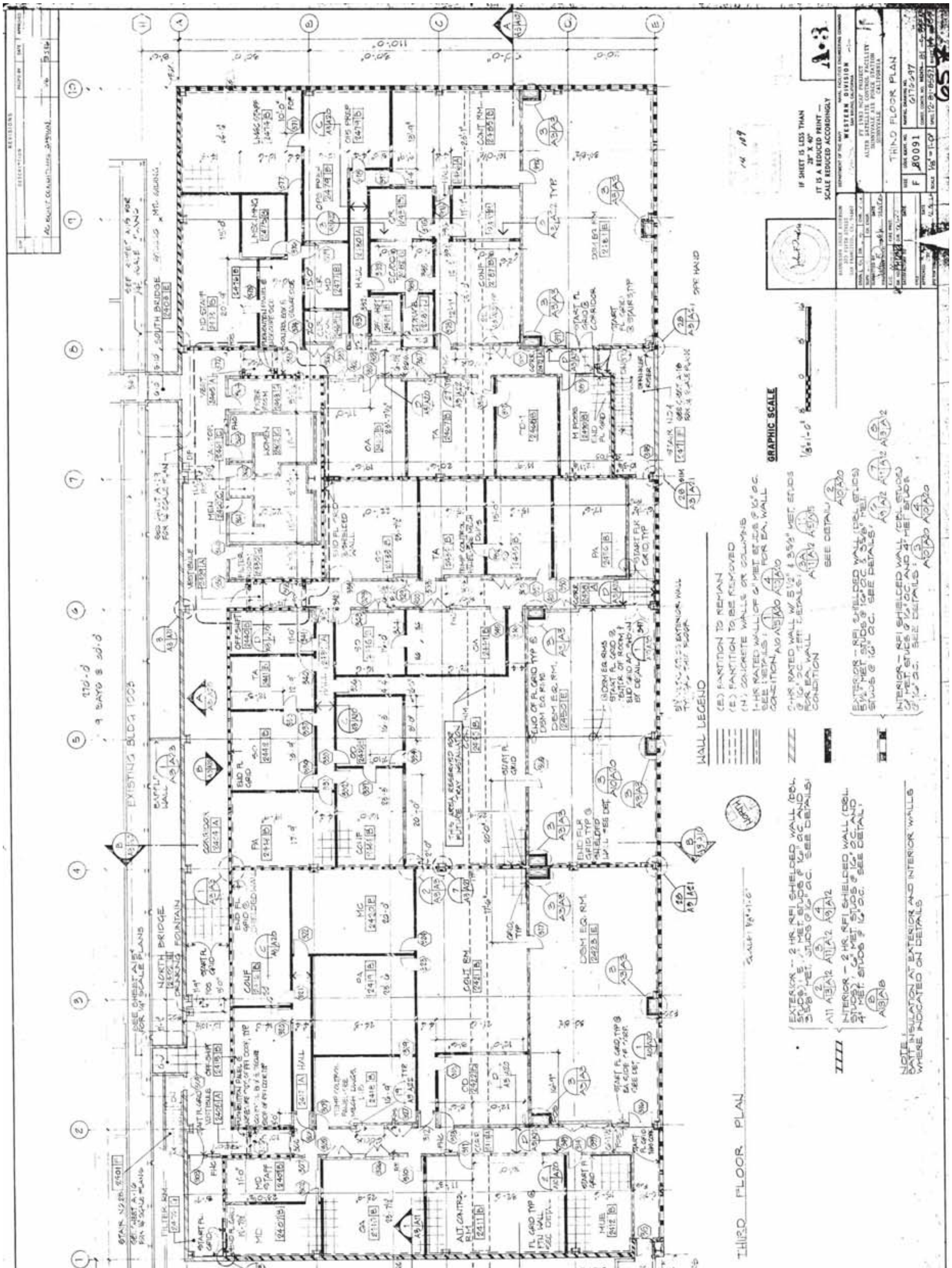
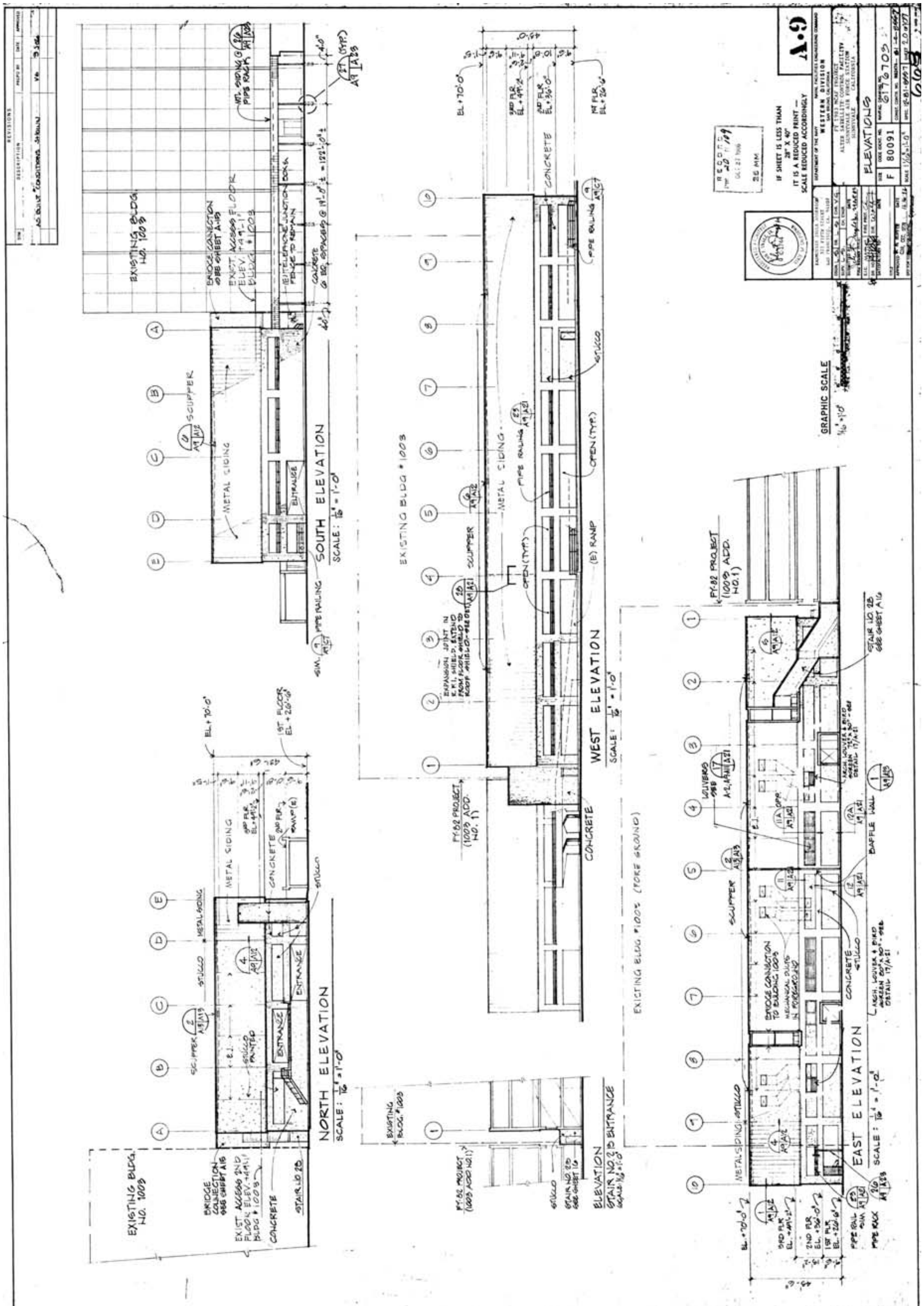

SECOND FLOOR PLAN
EXISTING BUILDING 1003
MECHANICAL EQUIPMENT ROOM
SECOND FLOOR PARKING
EXISTING RAMP
GRAPHIC SCALE
NOTES
A-2
80091


THIRD FLOOR PLAN
WALL LEGEND
GRAPHIC SCALE
EXISTING BLDG 1003


SOUTH ELEVATION
SCALE: 1/16" = 1'-0"
WEST ELEVATION
SCALE: 1/16" = 1'-0"
NORTH ELEVATION
SCALE: 1/16" = 1'-0"
EAST ELEVATION
SCALE: 1/16" = 1'-0"
EXISTING BLDG. NO. 1003
GRAPHIC SCALE
ELEVATIONS
A-9

U.S. AIR FORCE SATELLITE TEST CENTER
BUILDING 10032
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

SECTION II

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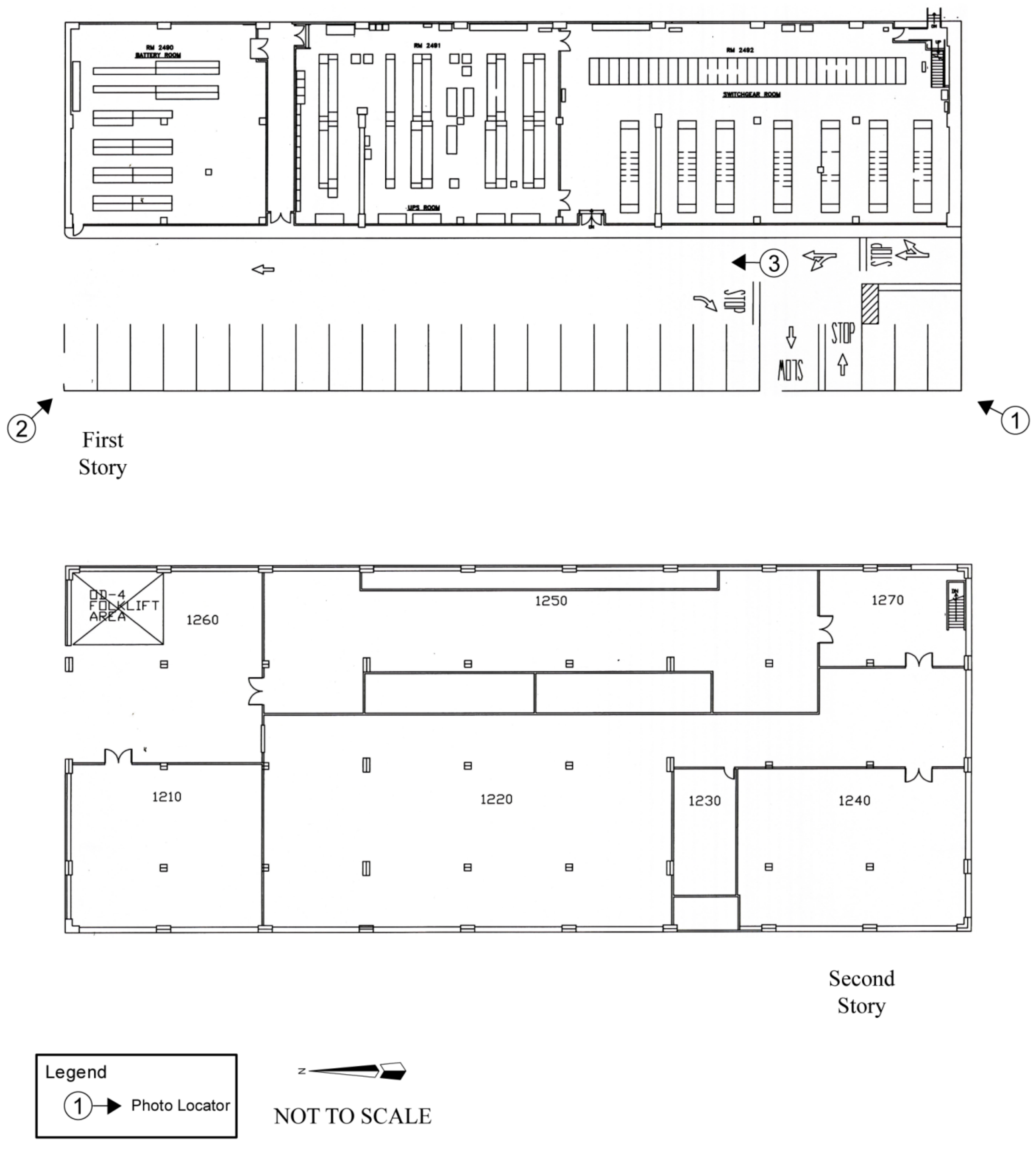
HISTORIC AMERICAN BUILDING SURVEY
LEVEL II-TYPE DOCUMENTATION

INDEX TO PHOTOGRAPHS

U.S. AIR FORCE SATELLITE TEST CENTER — Log No. USAF041221A-F
BUILDING 10032
Onizuka Air Force Station
1080 Innovation Way
City of Sunnyvale
Santa Clara County
California

Anne Jennings, Photographer — Date of Photographs: June 7-14, 2010

Log No. USAF041221A-F-01	VIEW OF SOUTH AND WEST FAÇADES, LOOKING NORTHEAST. NOTE SECOND CONCRETE PANEL-CLAD SECOND STORY.
Log No. USAF041221A-F-02	VIEW OF NORTH AND WEST FAÇADES, LOOKING SOUTH. NOTE ENCLOSED CYNDRICAL CONCRETE STAIRWELL APPENDED TO NORTH FAÇADE.
Log No. USAF041221A-F-03	VIEW OF FORMER PARKING AREA ON FIRST STORY, LOOKING NORTH.



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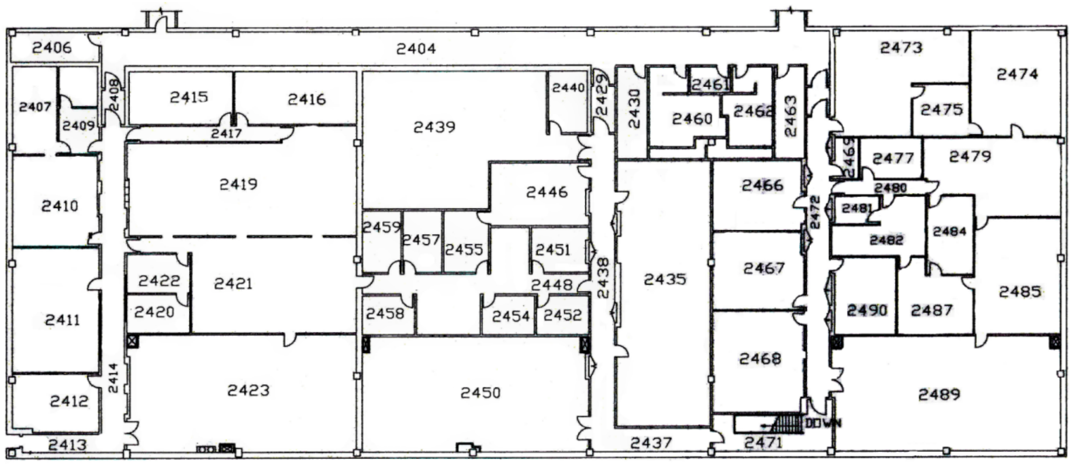

Third
Story

Legend
1 Photo Locator

NOT TO SCALE

Building 10032, Third Story