KA'ENA POINT SATELLITE TRACKING STATION, BUILDING 39005
(Satellite Control Station)
(Antenna Support Structure/Pedestal with Associated Radome)
Ka'ena Point, Wai'anae Mountains above Keawaula Bay
Waialua
Honolulu County
Hawaii

HAER HI-97-F
HAER HI-97-F

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C Street NW
Washington, DC 20240-0001

HISTORIC AMERICAN ENGINEERING RECORD

KA‘ENA POINT SATELLITE TRACKING STATION
BUILDING NO. 39005
(Satellite Tracking Antenna)
(Antenna support structure/pedestal with associated radome)

Location: Ka‘ena Point, Wai‘anae Mountains above Keawaula Bay
Waialua, Honolulu County, Hawai‘i

United States Geological Survey (USGS) Ka`ena Point,
Hawaii Quadrangle,
Universal Transverse Mercator Coordinates
Building 39005: 2384575.05 m N, 578471.49 m E

Present Owner: Headquarters, Air Force Space Command
150 Vandenberg Street, Suite 1105
Peterson Air Force Base, CO 80914

Present Occupant: United States Air Force
Detachment 3, 21st Space Operations Squadron
50th Space Wing
P.O. Box 868
Waianae, Hawai‘i 96792-0868

Present Use: Satellite Tracking Station

Significance: Ka‘ena Point Satellite Tracking Station (KPSTS) is a radio receiving and transmitting facility that occupies approximately 153 acres of land leased from the State of Hawai`i, including easements and rights-of-way. KPSTS was originally established in 1958 to support the CORONA/Discoverer Satellite Program.

The CORONA/Discoverer Program was a covert surveillance and satellite reconnaissance program run by the United States (U.S.) in the 1950s and 1960s that was instrumental in the development of radar and surveillance technological advancements. The nation’s first satellite reconnaissance program was named Discoverer. Since the program was classified, it became known by its codeword CORONA although CORONA is not an acronym. The antenna equipment and support structures, and command stations, located within KPSTS, then known as “HULA,” supported the CORONA/Discoverer programs with data retrieval, tracking and relay; as well as gathering orbit and trajectory data to aid in the recovery of surveillance film capsules that were ejected from the satellites.

During the Cold War years when suspicions between the U.S. and the Soviet Union were high, concerns over the manufacture of nuclear

weapons by the Union of Soviet Socialist Republics (U.S.S.R.) spurred the innovations in the U.S. reconnaissance missions. Space surveillance satellites captured photographs of suspect weapons storage and manufacturing locations within the Soviet Union at increasingly higher resolution throughout the duration of the CORONA/Discoverer program.[1] Global mapping and terrain imagery became an indispensable part of military intelligence. The last CORONA/Discoverer mission flight was in 1972.

Selected History Timeline of Events that Influenced the CORONA/Discoverer Program [2]

1946 First Post-war nuclear bombs explode in Operation Crossroads
1947 Central Intelligence Agency (CIA) established; Army separates from Air Force (AF)
1954 U-2 Program begins
1957 Soviets launch Sputnik I
1958 National Aeronautic Space Administration (NASA) established; Advanced Research Projects Agency (ARPA) est.; Air Force WS-117-L cancelled (and reconstituted as CORONA secretly)
1959 First series of “Special students” from Air Force Aeronautical Charting and Information Center (ACIC) arrive at Ohio State University (OSU); Army World Geodetic Datum (WGD59) finished
1960 First successful CORONA/Discoverer mission; Francis Gary Powers and U-2 shot down over Soviet Union; RACOMS Program begins
1961 Bay of Pigs invasion; TALENT-KEYHOLE security protocols formalized; National Reconnaissance Office (NRO) established
1962 Cuban Missile crisis; first successful CORONA-ARGON mission; first “Advanced” CORONA/Discoverer KH-4 mission
1965 Escalation of wars in Vietnam and Laos
1966 Secret Department of Defense (DOD) study suggests applications of classified reconnaissance information by nominally civilian federal agencies

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1 USNSSDC 1960: n.p. United States National Space Science Data Center, U. N., 20 August 1960. “Discoverer 14: NSSDC ID: 1960 -010A.” Accessed 21 January 2012. <http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=1960-010A>

2 Cloud 2002: 262. Cloud, J. “American Cartographic Transformations During the Cold War.” In *Cartography and Geographic Information Science*, Vol. 29, No. 3, pp. 261-282, 2002.

Selected History Timeline of Events that Influenced the CORONA/Discoverer Program (continued)

1966 U.S. Geological Survey (USGS) begins Building E-1 at new National Mapping Division (NMD) center in Virginia

1967 Six-Day War, Soviet invasion of Czechoslovakia, first CORONA/Discoverer KH-4B mission; Outer Space Treaty signed
1968 First color films flown in CORONA/Discoverer missions; Civilian Applications Committee (CAC) formed
1969 Strategic Arms Limitations Talks (SALT) begin in Finland; Apollo 11Astronauts reach the Moon; Military Geographic Information Systems (MGIS) Program begins
1971 First HEXAGON satellite reconnaissance mission
1972 Last CORONA/Discoverer Mission; SALT Treaty signed; World Geodetic System of 1972 (WGS72) completed; Most DOD and IC service-level mapping and geodesy service agencies consolidated into the Defense Mapping Agency (DMA)
1973 Office of Management and Budget Mapping Agency Task Force recommends consolidation
1975 Vietnam War ends
1978 President Carter publicly acknowledges the U.S. employs satellite reconnaissance
1992 NRO is officially recognized to exist; President Clinton elected
1995 Authorization for the declassification of CORONA; the CAC is acknowledged to exist

As a result of the contributions of the CORONA/Discoverer program, KPSTS is significant for its contributions to America’s history in the science and space exploration advances during the Cold War. KPSTS was a vital part of the U.S. military reconnaissance mission during the early development of our nation’s Satellite Command and Control Network.

PART I. ARCHITECTURAL STATEMENT

A. General Statement:

1. History: Building 39005 is an antenna support structure/pedestal with associated radome that was designed by Clarence Fong, architect, for the Department of the Air Force and erected in 1968 as a Satellite Control Station for the CORONA/Discoverer Project. It contains the most intact radome interior on the Ka‘ena Point Satellite Tracking Station premises, including a period crane and other equipment. The radome was designed by Geometrics Inc. in 1978. The radome structure and shell underwent repairs in 1984

following damage incurred during Hurricane Iwa in 1982. Subsequently, the exterior of the radome shell was repaired following Hurricane Iniki in 1992.

2. Architectural Character: The antenna support structure/pedestal is a two-story concrete building with a two-story antenna pedestal structure with associated radome, and two one-story additions. It has an entrance that is located on the southeast facade. (See photographic documentation for HAER HI-97-F-01 through HAER HI-97-F-12).

B. Description of the Exterior:

1. Overall Dimensions: In plan, the outside diameter of the radome ringwall is 76 feet – 6 inches while the outside diameter of the radome is 105 feet – 0 inches. The height of the exterior walls of the antenna support structure measure approximately 20 feet – 6 inches vertically above grade to the intersection of the radome.

2. Foundations: The foundations of the radome base and the antenna support structure are two independent systems. The radome base has cast-in-place foundation walls which are supported on concrete piers that have been poured to a depth of 5 feet – 2 inches beneath finished floor. The footings are 5 feet – 0 inches in width and 1 feet – 6 inches in depth The antenna support structure’s foundation is a floating, octagonal concrete slab that is 60 feet – 0 inches in width, 2 feet – 6 inches in depth, and is located 2 feet – 4 inches beneath finished grade. The floor slabs are typically 6 inches in thickness.

3. Wall Construction: The building base has walls of reinforced cast-in-place concrete, the walls of the additions are of reinforced concrete masonry unit construction with a plaster coating, and the radome is of steel frame construction and has been covered with a membrane.

4. Wall System, Framing: The walls of the radome base are reinforced concrete and are 1 feet – 2 inches in thickness.

5. Vestibules: There is a portico which is of concrete masonry unit construction, located on the southeast side of the building, and provides shelter for the pedestrian entry.

6. Openings:

a. Doorways and Doors: The exterior door of the pedestrian entry is solid core metal while the maintenance entrance is enclosed by a metal overhead door. There is a personnel hatch that is located at the top of the radome.

b. Windows: There are no windows in the walls of the radome base but there are tower boresight and star boresight windows located in the radome.

7. Roof:

a. Shape and Covering: The roof of the radome is a sphere with inside and outside radii of 51 feet – 8 inches and 52 feet – 6 inches, respectively, as well as an overall height of 88 feet – 11 inches. Its structure is that of a geodesic dome and it is composed of a self-bracing framework of extruded metal frames and struts which form triangles to which are attached a membrane.

b. Cornice: The building does not have a cornice but features a battered concrete cap that measures 6 feet – 6 inches in width, has minimum and maximum depths of 2 feet – 6 inches and 4 feet – 8 inches, and provides support for a steel wide flange I-beam (W 10) to which is anchored the steel framed radome above.

C. Description of the Interior:

1. Floor Plan: Entry is made from the southeast side of the building base, through a covered pedestrian entry which contains an airlock into Room No. 2. The room is open, contains a crane, and provides access to Room No. 3 which is centrally located within the building and serves as the base of the antenna, as well as the control room. Room No. 1 is located on the north side of the building and contains transmitter, air conditioning, and other mechanical equipment. A second entrance which permits access and egress for oversize equipment and maintenance is located on the southeast side of the building base. A steel stair provides access to a concrete catwalk for the maintenance of the antenna and the interior of the radome.

2. Flooring: The floor finish is concrete throughout.

3. Wall Finishes: Interior wall finishes are painted concrete and painted concrete masonry unit.

4. Doorways and Doors: Interior doors are metal throughout.

5. Light Fixtures: Period light fixtures include mid- and late-twentieth century fluorescent and incandescent fixtures.

6. Heating: Constant temperature, humidity, and air pressure is provided by mechanical systems which have been upgraded since the building's initial construction.

PART II. SOURCES OF INFORMATION

A. Original Architectural/Engineering Drawings:

Burns & Roe, Inc. "[Building 39005] T&D Antenna/ Radome Support Building, Floor Plan, Second Floor Plan, Antenna Platform Plan, Building Section," Drawing No. KP-11, AW 70-03-01, Sheet 12, Los Angeles, California, 26 April 1967.

Fong, Clarence, Architects. “[Building 39005] Structural General Notes[,] Sections & Anchor Bolt Details,” AW 195-16-10, Sheet 13, Honolulu, Hawaii, 7 June 1967.

_____. “[Building 39005] Satellite Antenna Support Facilities, Plans,” AW 199-16-10, Sheet 6, Honolulu, Hawai`i, 7 June 1967.

_____. “[Building 39005] Satellite Antenna Support Facilities, Exterior Elevations, Cross Section & Schedules,” AW 199-16-10, Sheet 7, Honolulu, Hawai`i, 7 June 1967.

_____. “[Building 39005] Satellite Antenna Support Facilities, Site Plan,” AW 199-16-10, Unidentified Sheet, Honolulu, Hawai`i, 7 June 1967

Geometrics, Inc. “Drawing List & Symbol Key[,]105M75.5 Radome,” Drawing No. 105M75.5-1, Sheet 1 of 15. Cambridge, Massachusetts, 1978.

_____. “Assembly Drawing, 105M75.5 Radome.” Drawing No. 105M75.5-2, Sheet 2 of 15.

_____.“Base Layout and Assembly Details [for] Radome 2[,] 105M75.5 Radome,” Drawing No. 105M75.5-4, Sheet 4 of 15.

PART III. BIBLIOGRAPHY

Cloud, J. “American Cartographic Transformations During the Cold War.” In *Cartography and Geographic Information Science*, Vol. 29, No. 3, pp. 261-282, 2002.

United States National Space Science Data Center, U. N., 20 August 1960. “Discoverer 14: NSSDC ID: 1960 -010A.” Accessed 21 January 2012. <http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=1960-010A>

PART IV. HISTORIANS

Historical research was conducted and the historical narrative was prepared by Kathryn Ladoulis Urban, AIA, K Design Group, Honolulu, while the architectural descriptions were prepared by Stanley Solamillo, also of K Design Group, and completed on July 16, 2012.

PART V. PROJECT INFORMATION

This Historic American Engineering Record (HAER) recording project was undertaken and funded by the United States Air Force Center for Environmental Excellence, Department of Defense as part of an agreed mitigation with the Architecture Branch, State Historic Preservation Division (SHPD) of the Hawai‘i Department of Land and Natural Resources. The recording team consisted of preservation architect Kathryn Ladoulis Urban, AIA, architectural historian Stanley Solamillo, as well as architectural photographers Steve Brinkman and Tony Martie.

Research for this project was conducted at the University of Hawai‘i Government Documents collection; the Joint Base Pearl Harbor Hickam 15 Airlift Wing Base historian office archive

collection, at KPSTS Administration Building 10 archive drawing collection; the National Electronics Museum archives in Linthicum Heights, Maryland; the University of Notre Dame Hersburgh Library, South Bend, Indiana, in the General collection and Government documents collection; the Declassified Files section of the National Reconnaissance Office; as well as on-line sources from December 2, 2011 through July 12, 2012.

Initial site visits were performed from December 13 through 15, 2011 at KPSTS. A two day site visit and photographic fieldwork for HAER documentation as well as photography of archival construction and as-built drawings of KPSTS buildings No. 11, 35, 39005, and 39006 was performed from April 18-19, 2012. Additional HAER photography of existing measured drawings was performed on June 28, 2012.