

SOURCE:

Pacific Missile Range Facility (PMRF) Cultural Landscape Report Final

August 2011

Chapter 3 Historic Context

Introduction

To the extent that it is relevant to archaeological and historical investigations at PMRF, the cultural and historical setting is reviewed as six topics: (1) traditional cultural geography; (2) traditional land use; (3) early historic land use; (4) commercial agriculture era; (5) early twentieth century prior to World War II, and (6) **World War II and Cold War to 1990s**.

World War II and Cold War

The World War II and Cold War eras brought considerable changes to Barking Sands and the surrounding ridges. At the time of the Japanese attack on Pearl Harbor, Barking Sands was an unpaved landing strip with a small number of support structures. The wartime expansion was primarily focused around the north and south runways, which were paved in 1942. By the close of the war, the base had grown to include a main base area that was located on the eastern side of where the south and north runways met. Other support structures, including revetments, defensive bunkers, antiaircraft gun positions, fueling areas, and a taxi apron, were located on the eastern and northeastern side of the north runway. The only substantial military development away from the runways of Barking Sands, yet related to airbase operations, was the Kamokala Ridge munitions storage, built in 1943, and Port Allen. During the Cold War, the various missions of the base brought redevelopment of the World War-era areas as well as the development of two new facilities atop Kokee Ridge and Makaha Ridge. The story of Barking Sands in the World War II and Cold War periods is told here.

WHAT FOLLOWS IS EDITED FROM “WORLD WAR II AND COLD WAR”:

SUBSECTION: ‘BARKING SANDS IN THE LATE COLD WAR PERIOD, 1966-1990s

Barking Sands in the Late Cold War, 1966–1990s

Simultaneously with the Navy's Regulus training mission, PMRF received other important assignments during the late 1950s and early 1960s. In addition to expanding the basic range support facilities needed at ALF Bonham for the nascent over-water range, the Air Force also established a meteorological mission and hosted meteorological and communications tenant missions of the Navy, Army, and NASA at selected locations on base. These tenant missions were short-lived, only in place during the transitional years before ALF Bonham transferred from the Air Force to the Navy in 1966. Thereafter, missions at PMRF were predominantly Navy, although the Atomic Energy Commission (AEC)/Department of Energy would establish a major tenant mission on base in the early 1960s, operated by the agency's contractor, Sandia National Laboratories (**Figure 3.59**). Among the earliest augmentations at ALF Bonham was the 1959–1960 erection of 40-foot steel-web antenna mast for NASA near the site of the future Facility 105. Guy wires on a radius of 60 feet stabilized the antenna mast; with a telemetry van positioned adjacent (MAI 2007–2008). The antenna was a discontinuous component of NASA's Hawaiian Tracking Station, the twelfth station in an 18-station string erected around the world to support the agency's manned Mercury capsule spaceflight program. The primary location of the Hawaiian Tracking Station was on Kokee Ridge (**Figures 3.60–3.63**), a site that featured telemetry, communications, control-operations facilities, and support infrastructure. Augmenting NASA, the Navy also maintained radar and communications facilities on the ridge as a fixed tracking station supporting the PMR (Busekrus 1960) (**Figures 3.64–3.68**). The District Public Works Office for the Fourteenth Naval District (DPWO) selected the Kokee Ridge site in late 1959. The DPWO designed and



Figure 3.59. Atomic Energy Commission Complex, Barking Sands, 25 September 1967. Courtesy of the National Archives and Records Administration.



Figure 3.60. Antenna site under construction (completed by November 1960) at Kokee Ridge. The structure was used along with the VERLORT radar to track the Mercury vehicle. Source: Busekrus 1960.

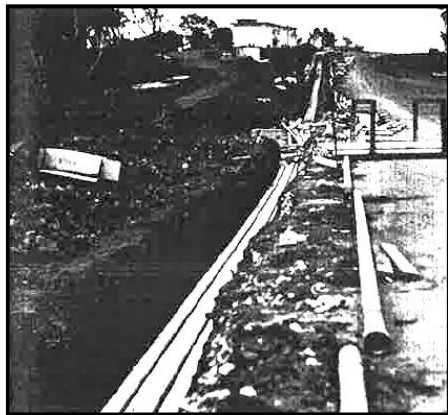


Figure 3.61. Early construction view of ducts for power and communications cables to the Kokee Ridge site. Source: Busekrus 1960.



Figure 3.62. Early construction view of pedestal for VERLORT radar at the Kokee Ridge site. Source: Busekrus 1960.



Figure 3.63. Early construction photograph of the Telemetry and Control Building. This site included operation, acquisition, telemetry, ground/air voice, command control, communications, and data-handling functions. The two towers were pedestals for receiving antennas. Source: Busekrus 1960.

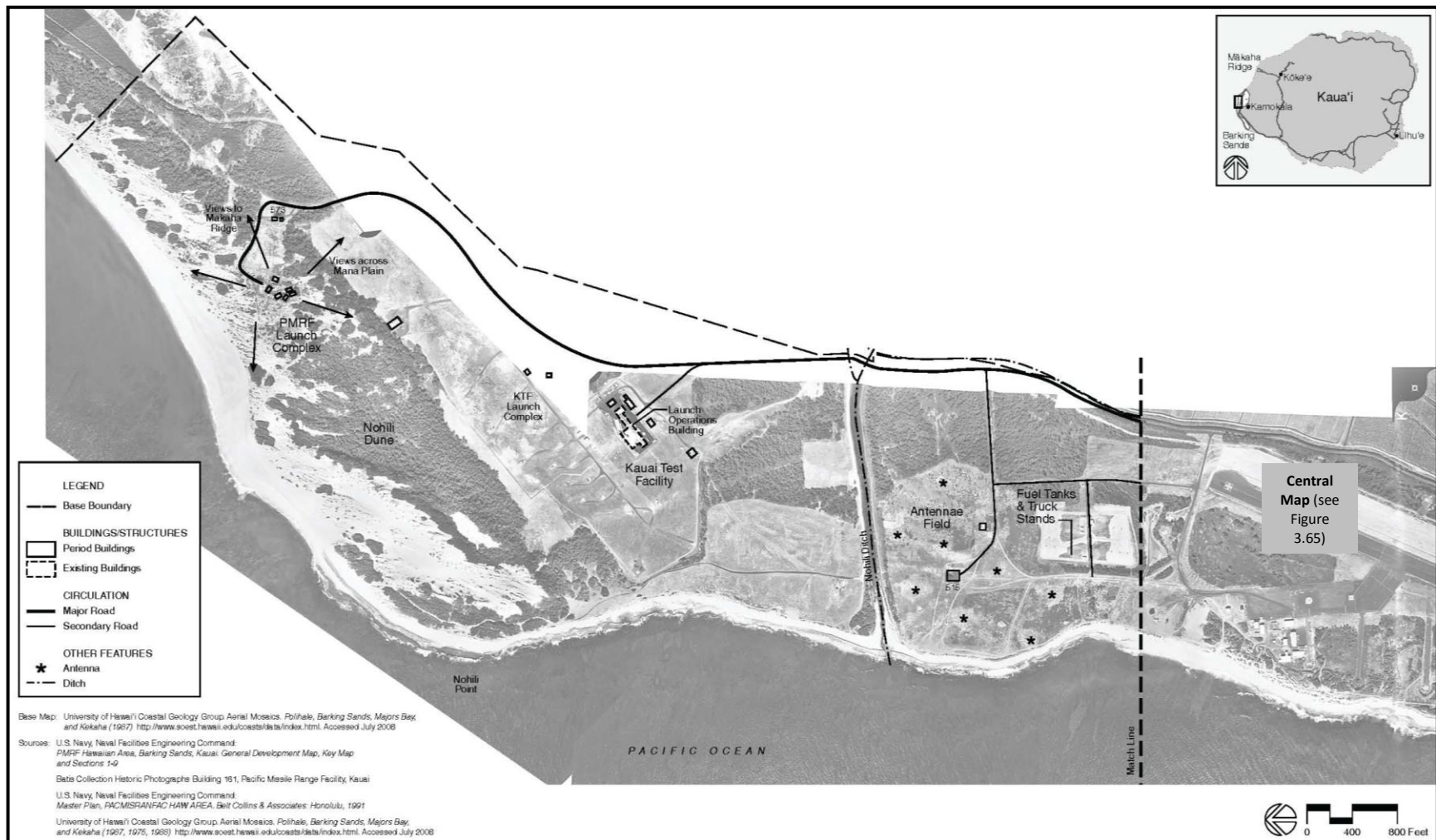


Figure 3.64. Representative map of the northern portion of Barking Sands, 1966–1991. Adapted from TEC Inc.–JV 2011a.

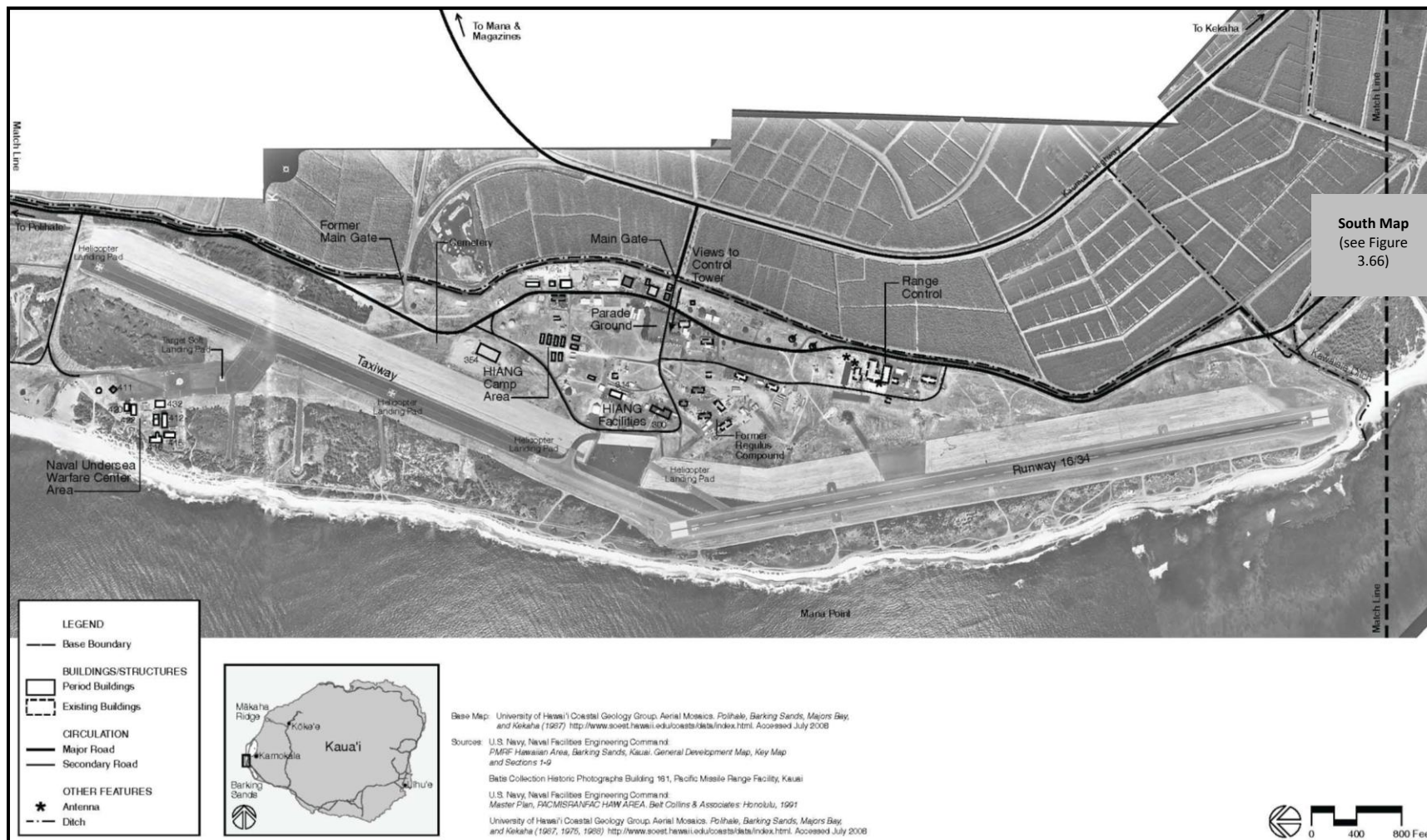


Figure 3.65. Representative map of the central portion of Barking Sands, 1966–1991. Adapted from TEC Inc.–JV 2011a.

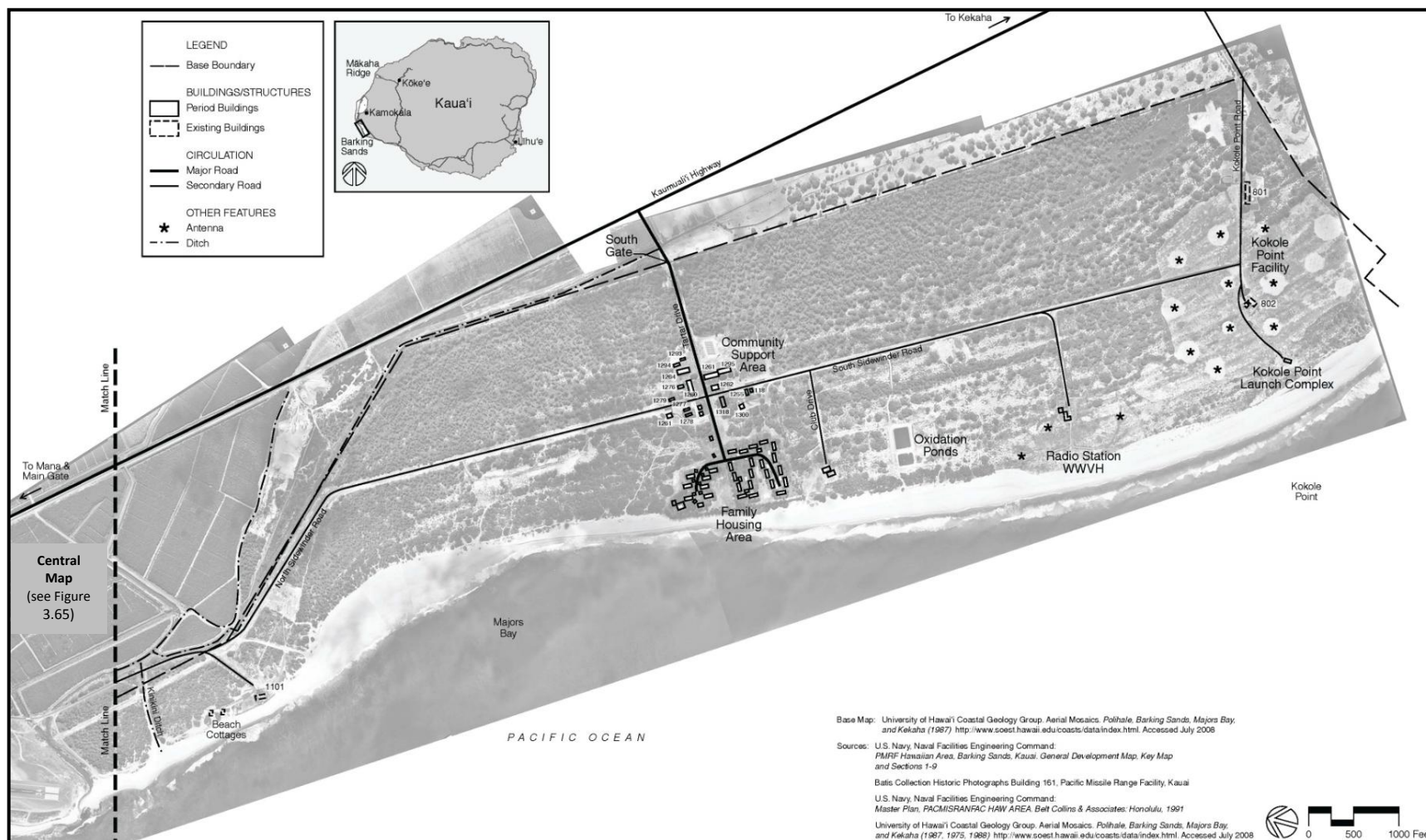


Figure 3.66. Representative map of the southern portion of Barking Sands, 1966–1991. Adapted from TEC Inc.–JV 2011a.

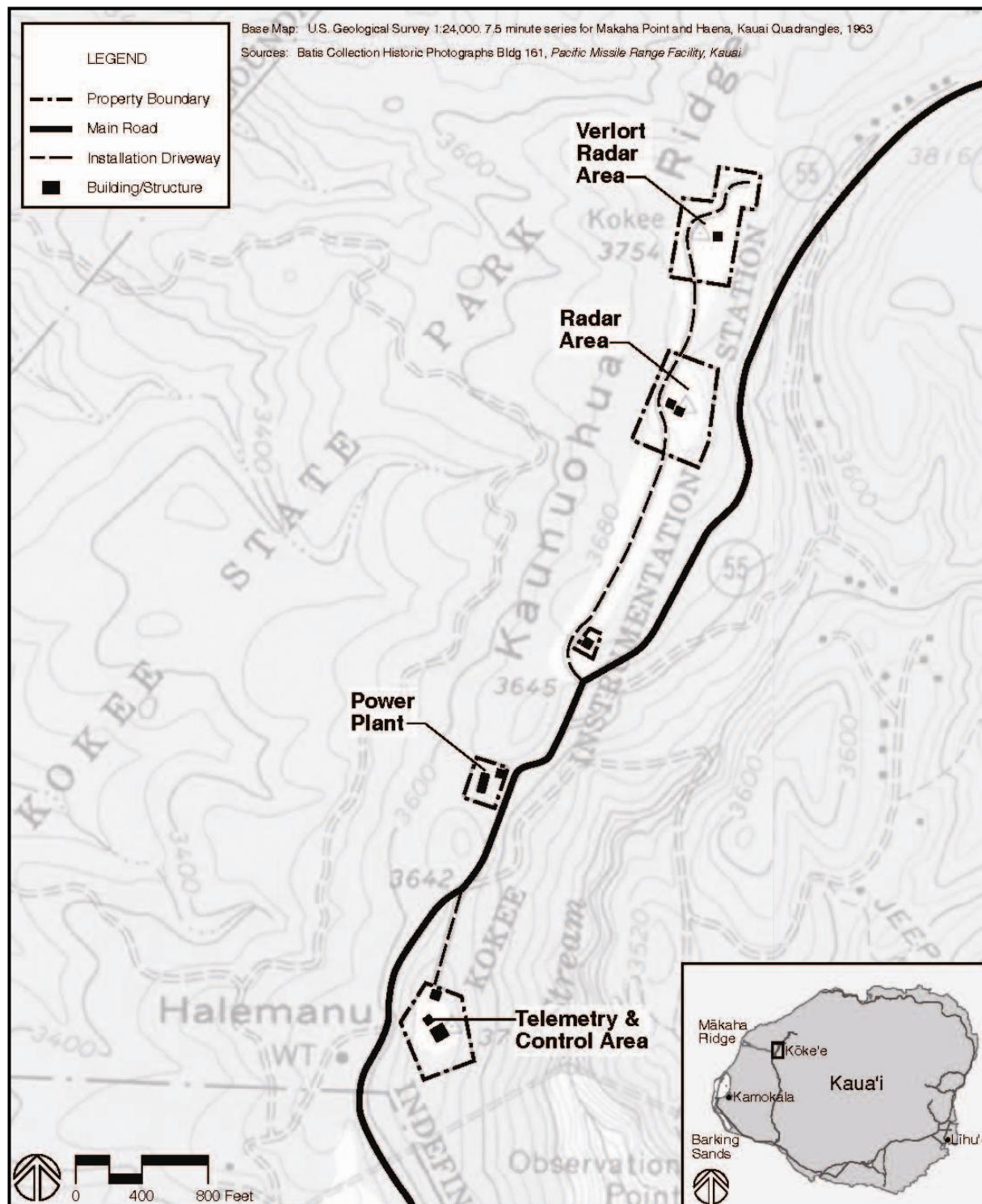


Figure 3.67. Kokee as it appeared in the 1946–1965 period. Adapted from TEC Inc.–JV 2011a.

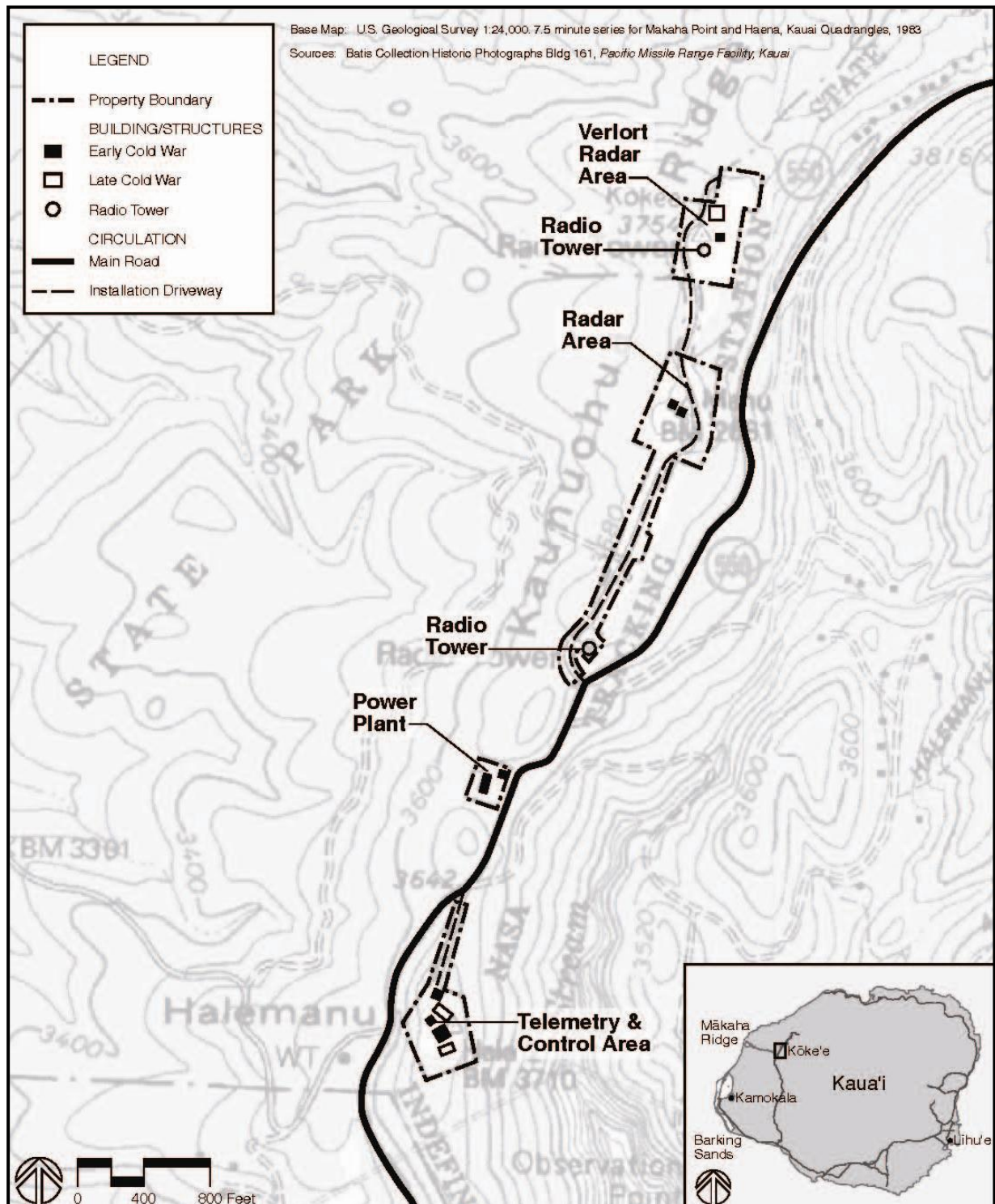


Figure 3.68. Kokee as it appeared in the 1966–1991 period. Adapted from TEC Inc.–JV 2011a.

constructed all of the structures except the two radars, three boresight towers, and a generator plant. The radar used by the PMR was an AN/FPS-16 radar that was designed and constructed by the Radio Corporation of America. NASA's radar was a Very Long Range Tracking (VERLORT) radar that was designed and constructed by Western Electric (Busekrus 1960). The Hawaiian Tracking Station (alternatively known as the Kokee Instrumentation Station) was operational in May 1960, monitoring its first (unmanned) Mercury mission (MA-4) on 13 September 1961 and its initial manned orbital mission (*Friendship 7*) on 20 February 1962 (Binder 1995:8). In 1962, operations and supply facilities (Facility 105, Section A, and Facility 106) for the "Hawaiian Tracking Station" at ALF Bonham were under construction, adjacent to the existing NASA site. NASA's Hawaiian Tracking Station and the Navy's PMR Tracking Station at Barking Sands both may have been housed in Facility 105, at the completion of its construction in 1963. The dual NASA/Navy tracking station at the PMRF paralleled the shared site on Kokee Ridge. As of 1964, the PMR Fleet Training Facility at Barking Sands was composed of mobile instrumentation vans, clustered immediately adjacent to Facility 105 but not clearly indicated as affiliated with the permanent tracking station (*The Military Engineer* 1964:124; Miller 2008). The equipment included two van-mounted SCR-584 radars, and it is likely that the PMR Fleet Training Facility was a relocation of the Regulus telemetry vans from their nearby position on the runway. The PMR Fleet Training Facility (multipurpose vans and mobile equipment) evolved into permanent range control. With the addition of Section B in 1965 and Section C in 1967, Facility 105 transitioned to the Navy's Range Operations Center for the PMRF (as of 1966) (MAI 2007–2008; PMRF Historic Photographs n.d.) (**Figures 3.69–3.71**).

Concurrently with the erection of the Hawaiian Tracking Station facilities at the site of Facility 105 (the NASA tower antenna and telemetry van), the Army established a long-range communications facility at the southern end of ALF Bonham in 1960. The Army set up its operations on about 230 acres, constructing a transceiver station (Facility 802), an ancillary power station (Facility 803), and a barracks and mess hall (Facility 801). Communications equipment included three Mk II antennas, each in a three-part guyed footprint; six Mk IV antennas, positioned in pairs in three splayed-H, guyed footprints; and two 19-foot dish antennas. The Army communications facility operated as a Pacific scatter site. The Mk IV antenna began replacing the Mk II during 1965. The three Mk II masts stood 600 feet high, positioned in a northeast-southwest line on 10-by-10-foot concrete pads. The masts of the Mk IV were 280 feet high, with each pair bracketing an earlier Mk II mast. Heavy anchors for the elongated guy wires remained on site into the middle 1990s. The Mk II and its follow-on, the Mk IV, were ionospheric scatter communications, connecting the Army's installation at ALF Bonham/PMRF to Midway Island in the Pacific (where another Army communications facility picked up the transmission and forwarded it to Okinawa). The two successive large antenna fields were laid out west of Facilities 802 and 803, although guy wires extended east of the communications facility. The Mk II and Mk IV antenna fields transmitted and received toward/from the northwest. Two 19-foot dish antennas, located immediately east of Facilities 802 and 803, provided tropospheric scatter communications between Facility 802 and Mauna Kapu on Oahu. The dish antennas transmitted and received toward/from the southeast. The Army's Pacific scatter site was active until 1967, where after the land reverted to the Navy and the antennas were removed. Ionospheric communications bounced radio signals off irregularities in the ionosphere to connect remote locations to one another. The technology dates to the early 1950s and generally supported military needs into the 1960s (Preben-Hansen 2002). Tropospheric communications similarly used the troposphere to bounce radio signals up to 100 miles. The White Alice network in Alaska of the middle 1950s was an early troposcatter network of billboard and dish antennas developed to sustain uninterrupted military communications. The Navy continued to operate Facility 802 as a transceiver station to support the PMRF (Binder 1995:10; MAI 2007–2008).



Figure 3.69. Kokee Alpha Telemetry area, 1964. Courtesy of PMRF.



Figure 3.70. Kokee Echo VERLORT radar area, 1964. Courtesy of PMRF.



Figure 3.71. Kokee radar area, 1964. Courtesy of PMRF.

The Air Force and Navy also launched a series of meteorological test vehicles at the PMRF in the early 1960s (US Navy 1962:13), configuring initial sites on the aircraft parking apron south of the circular Regulus launch pad and along the apron's western edge. For the small apron site, the Navy used a 5-inch gun barrel to vertically launch the High Altitude Sounding Projectile (HASP). The HASP was a variation of the Loki-WASP (Weather-Atmospheric Sounding Projectile), which in turn derived from the conversion of the Army's Loki anti-aircraft rocket to a low-cost sounding rocket (the Loki-Dart). The Air Force was a prominent user of the Loki-Dart, firing it from simple tube launchers at selected installations (**Figure 3.72**). In contrast, the Navy devised a rail-launcher mounted on a 5-inch gun barrel to fire the Loki-WASP. A Loki solid-rocket motor (booster) carried a chaff-filled dart to altitudes of 100,000 to 150,000 feet to facilitate near-space wind measurements. The chaff replaced the explosive warhead of the anti-aircraft Loki. The Loki booster was just under 9 feet long and 3 inches in diameter, weighing 3,000 pounds; its dart, 40 inches long and under 1.5 inches in diameter. The HASP was a very similar Loki-Dart, with a different launcher. The Navy personnel tracked the chaff with radar as it fell back to earth to chronicle high-altitude wind speed and direction (Parsch 2008a, 2008b). PMRF personnel from the 1960s recall that the Navy stored the HASP boosters in the hard-rock munitions igloos at Kamokala Ridge (Burley 2008). At the edge of the aircraft parking apron, a pair of Arcas launchers supported Air Force meteorological data gathering. The Atlantic Research Corporation developed the Arcas for the Air Force Cambridge Research Center at Hanscom AFB near Boston. While the earliest Loki sounding rockets dated to the middle 1950s, the Arcas first flew in 1958 and was in steady use by 1960. Air Force personnel fired the Arcas from a closed-breech tube launcher, adjustable in azimuth and elevation. Powered by a solid-rocket motor, the single-stage Arcas could attain an altitude of 150,000 feet. The Arcas was a small sounding rocket, just under 8 feet long and only 4.5 inches in diameter. As designed, the Arcas was capable of measuring winds after nuclear weapons tests, used to calculate the spread of radioactive fallout. The Navy also conducted meteorological tests with modified, boosted-Arcas sounding rockets, supporting NASA's Gemini space program with firings at Point Mugu in California

during the mid-1960s (Parsch 2008c). Today, no remnants of the foundations for the paired Arcas launchers remain at the apron's edge, although a circular cracked outline in the asphalted aircraft parking apron correlates with the approximate site of the 5-inch gun-barrel HASP launcher.

By mid-1966, the Navy was preparing to field a smaller high-altitude probe, the Judi-Dart. The Judi could reach an altitude of 220,000 feet and, similar to the HASP, jettisoned chaff for radar tracking of wind movements in space (*Honolulu Star-Bulletin*, 16 May 1966). The location of this activity remains undetermined but may have been in the 500-series launch area developed in the late 1960s for firing target drones. The Navy mapped an "existing meteorological launch complex" at the site in May 1969. By the late 1960s, the 500-series complex included two concrete pads abutting one another at right angles (the site of the former Facility 570, a launch pad), supplemented by a small igniter chamber, a storage shed, and a "launch control shed" (blockhouse) (MAI 2007–2008). PMRF personnel recall

that the Navy moved an Arcas launcher to this location, followed by a relocation of the HASP launcher, and finally the addition of a rail-gun launcher for the Super Loki (Costello 2008). The Air Force used the Super Loki to replace the Arcas as of about 1970. The Super Loki was an instrumented vehicle featuring a larger dart and more powerful booster. Weighing over 5,500 pounds, the booster carried the Super Loki to a ceiling of 230,000 feet at 3,600 miles per hour (Parsch 2008d).

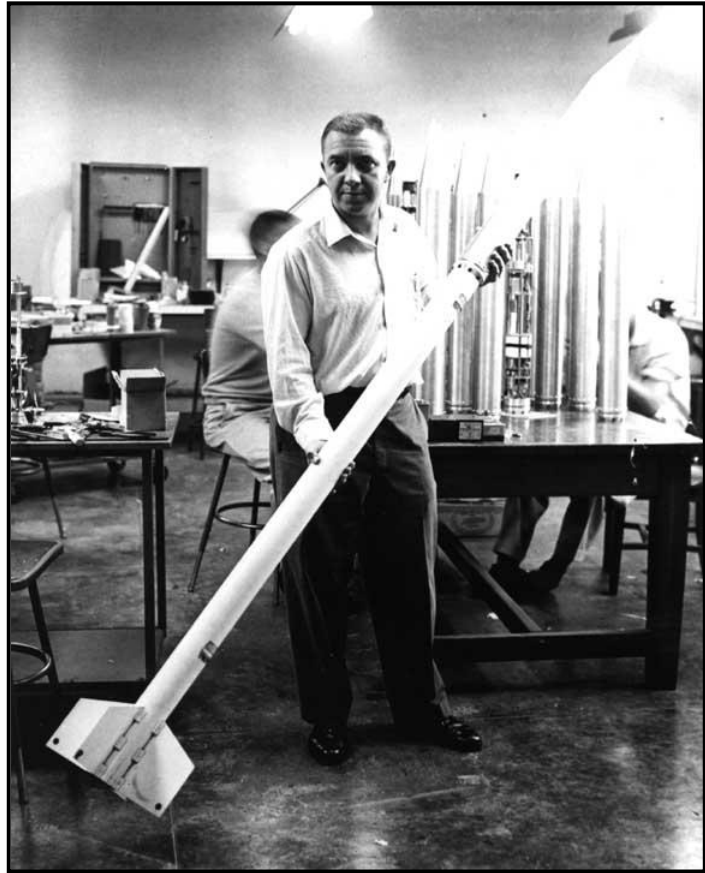


Figure 3.72. An employee of the US Army's Redstone Arsenal holding a Loki-Dart prototype. Courtesy of Redstone Arsenal.

Another major tenant mission inaugurated on the PMRF during 1961–1962 was the Kauai Test Facility (KTF). Operated by Sandia National Laboratories for the AEC, the KTF first functioned as a rocket-launching site supporting high-altitude atmospheric sampling during nuclear weapons testing in the Pacific. Sited south of the 500-series target-drone launch complex and north of the PMRF runways, the KTF also included a measurement antenna field when initially configured. Activities at the KTF coordinated with nuclear weapons testing were short-lived, ending with cessation of atmospheric nuclear tests following the Limited Nuclear Test Ban Treaty of 1963. However, the treaty language included a stipulation that the United States could maintain its capability to resume atmospheric testing (on Johnston Island) and monitoring (at the KTF). Sandia operated the KTF for the remaining 30 years of the Cold War under this funded mandate. During these decades, other users had access to the KTF facilities for a variety of scientific studies, including the Los Alamos National Laboratory (Binder 1995:1112). In one example of these activities, Sandia fired 24 high-altitude rockets at the KTF for AEC wind studies in 1963. Holmes & Narver, an architectural-engineering firm from Los Angeles known for

its work supporting nuclear weapons and effects testing, was to “reactivate” a launch complex for the project (*Honolulu Star-Bulletin*, 26 March 1963). Sandia also set up a launcher at Kokole Point, at the southern end of the PMRF near the Army’s transceiver station (Facility 802) (Binder 1995: II). A subsequent rail launcher went in at this location in the 1980s, a launcher anticipated for extension to 60 feet to fire a large test vehicle in the future (Burley 2008). The KTF additionally supported the Strategic Defense Initiative (SDI), popularly known as the Star Wars program, with launches beginning in 1988. The follow-on Strategic Targeting System (STARS) became a KTF mission immediately post-Cold War, in 1993. STARS required a dedicated launch pad (Facility 642) for its three-stage test vehicle, a vehicle based on the Polaris ballistic missile (Binder 1995:13).

As of 1966, when ALF Bonham officially transferred from the Air Force to the Navy, plans moved forward rapidly to expand the infrastructure and facilities of PMRF. The lineage of installation name changes and who reported to who had been especially complex during the previous decade. As the Navy grew more dominant at ALF Bonham, and certainly while negotiations with the Air Force were in progress, the PMRF looked toward its future. Tiered operationally to the PMR at Point Mugu, PMRF had been designated an official range activity as of late 1958. The Navy had established an office representing the PMR at the Kaneohe Marine Corps Air Station (MCAS) on Oahu simultaneously. The PMR managed a chain of permanent stations to support launches from southern California (Vandenberg AFB and the Navy’s Point Arguello and Point Mugu) toward the Marshall Islands (Kwajalein). American military agencies and NASA used the PMR to track, test, and evaluate long-range missiles, satellites, and space vehicles. Minimal operations at ALF Bonham (some use of Section A, Facility 105), as well as a 16-acre station on Kokee Ridge, went in place during 1960–1965. After the transfer to the Navy, the PMR moved its operations fully to PMRF, integrating its representative office from the Kaneohe MCAS within the installation on Kauai in 1970. During 1966–1970, the Navy initiated multiple new construction projects, including radar and telemetry facilities on Makaha Ridge, and the mounting of a field of hydrophones on the ocean floor between Kauai and Ni’ihau as an instrumented underwater range (Global Security 2007). On the PMRF, the Navy undertook associated range control and support structures: expanded radar and communications facilities (such as the receiver facility, Facility 515, and its associated antenna field) and a launch area for target drones (the 500-series area). The five-year period of 1966 through 1970 was especially intense. The Navy initiated test, training, and war-gaming operations using the underwater range in about 1969, refining and expanding activities throughout the remainder of the Cold War and into the present.

Prior to the buildup during 1966–1970, Navy activities at PMRF had focused on Regulus training missions, tracking efforts coordinated with NASA and the PMR, and fleet training exercises in the Hawaiian area. The PMR at Point Mugu had called for an “undersea test range” as early as 1962, noting that “the growing importance given to undersea warfare may result in such a requirement being placed on PMR in the future” (US Navy 1962:10). With the development of the instrumented underwater range, named the Barking Sands Tactical Underwater Range (BARSTUR), the Navy initiated a new era in sophisticated testing, evaluation, and training appropriate to its mission. When completed, the BARSTUR featured a dense field of 42 hydrophones, mounted on the ocean floor over a 100-square-mile area (Global Security 2007). Augmenting the BARSTUR was the Makaha Ridge complex (**Figures 3.73–3.76**). Makaha Ridge required massive manipulation of the existing landscape, including its basic access. Among the first buildings on Makaha Ridge, completed in 1966, were a communications facility (Facility 708), power station (Facility 711), tracking radar (Facility 713), and surveillance radar (Facility 715). A cluster of instrumentation vans also supported the complex. Beginning in 1967, and completed in 1968–1969, were additional facilities, including a telemetry facility (Facility 725) and its associated telemetry towers (Facilities 726, 727, and 728) (MAI 2007–2008). Another important

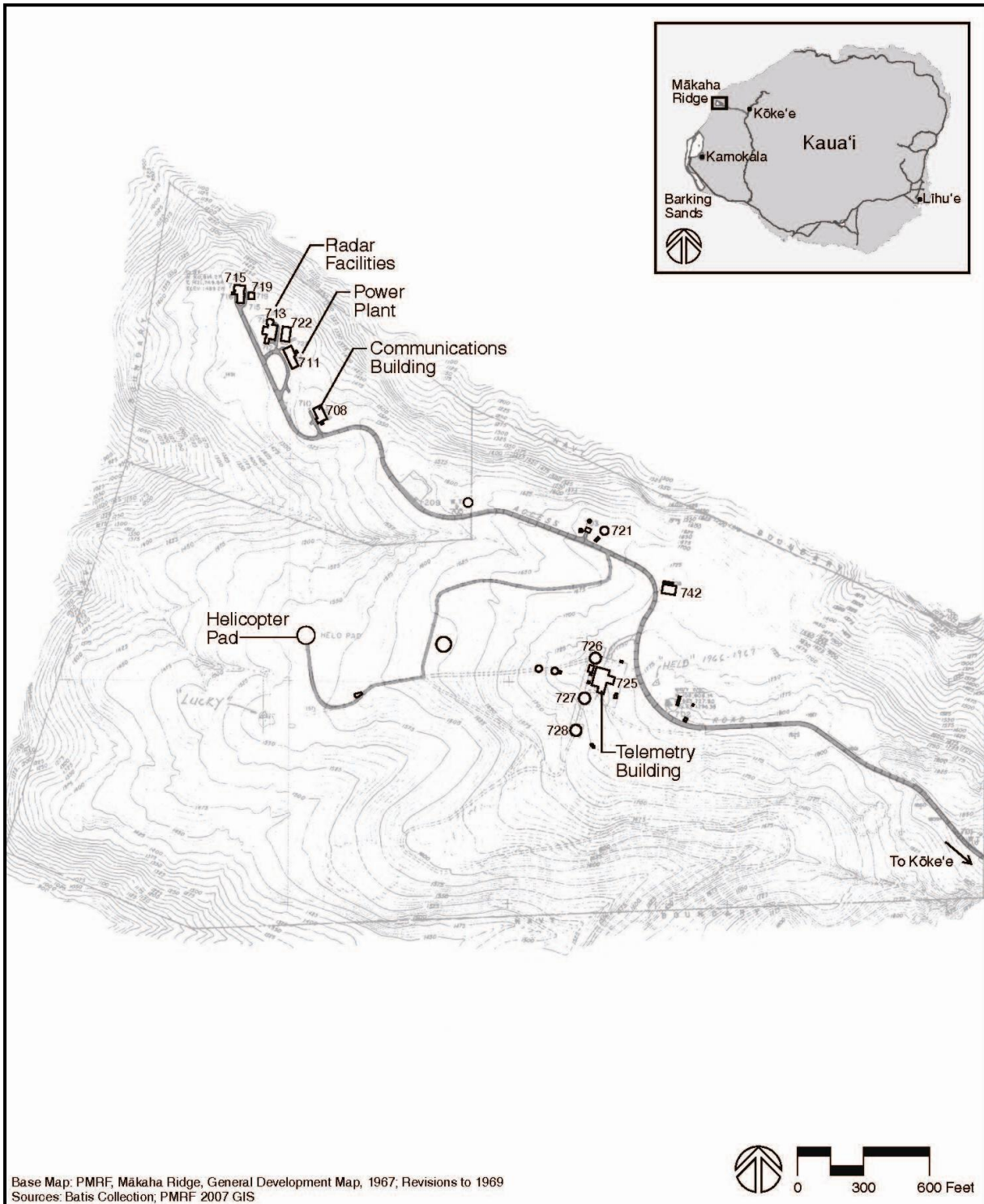


Figure 3.73. Makaha Ridge as it appeared in the 1966–1991 period. Adapted from TEC Inc.—JV 2011a.



Figure 3.74. Makaha Ridge, 1966. Courtesy of PMRF.

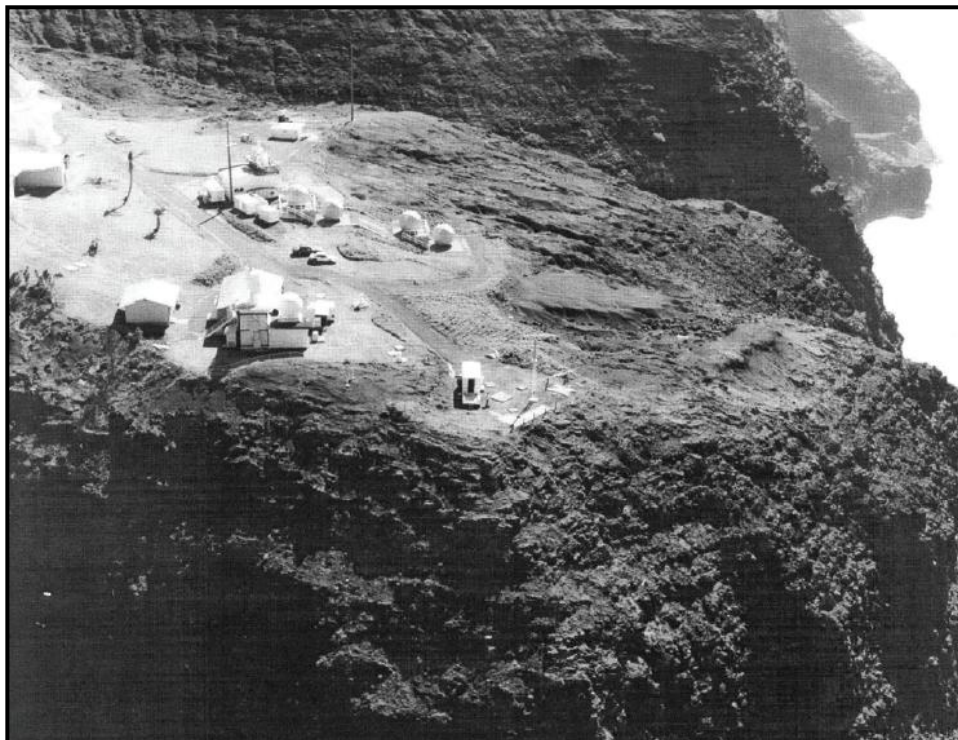


Figure 3.75. Makaha Ridge, 1960s. Courtesy of PMRF.

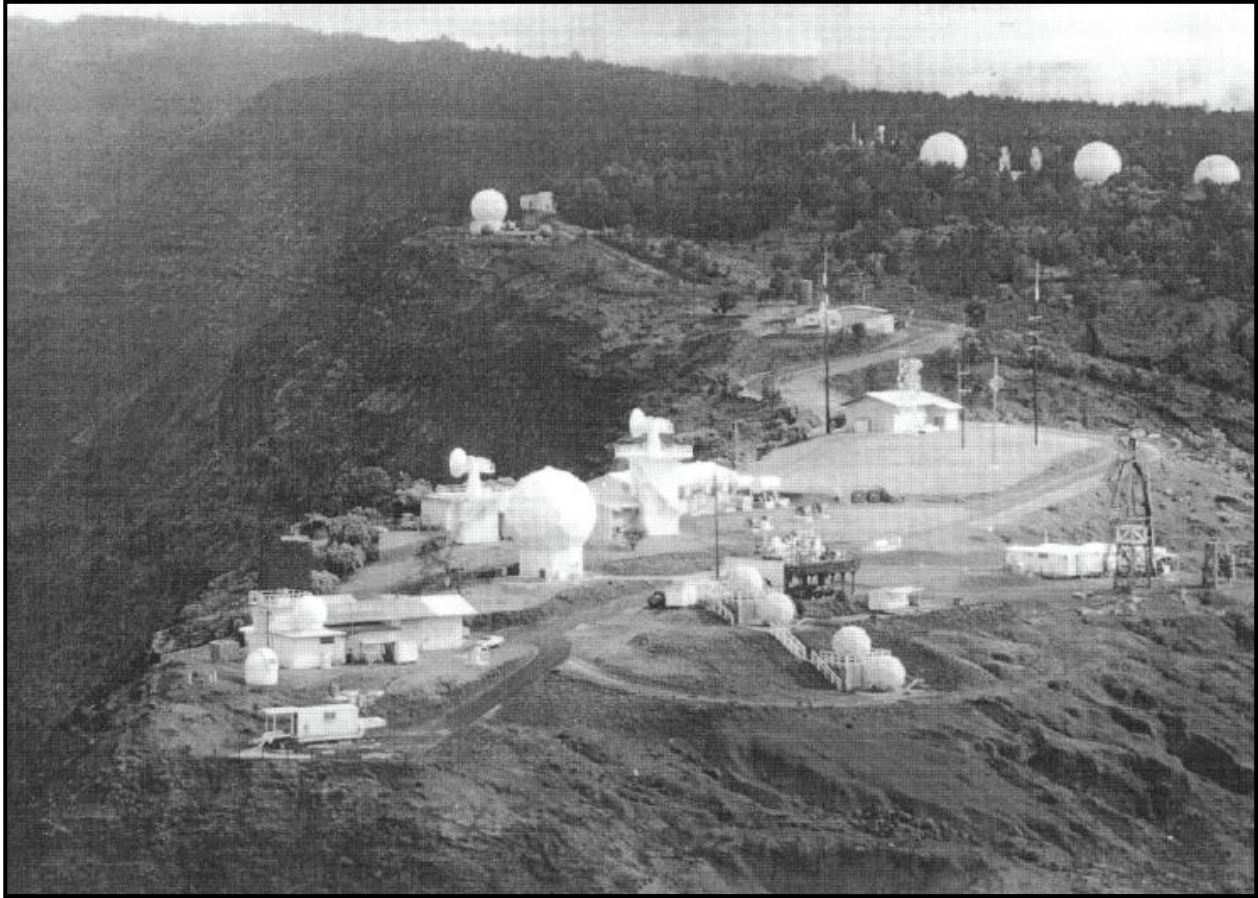


Figure 3.76. Makaha Ridge, 1970s. Courtesy of PMRF.

in addition to PMRF was a launch complex, today's 500-series area, for target drones. The Navy fired drones over the BARSTUR with real-time support from the facilities on Makaha Ridge during weapons tests and evaluations as well as during large-scale Navy fleet exercises.

Following the expenditure of the former operational Regulus missiles as drones during 1964–1966, a hiatus in the use of target drones may have occurred for several years while the BARSTUR, Makaha Ridge, and multiple support facilities on PMRF were under construction. By 1969, the first facilities in the 500-series area were operational, erected adjacent to, or in the near vicinity of, the existing meteorological launch pad and its remnant ancillary structures. These facilities included a combination blockhouse and missile assembly building (MAB) (Facility 573), a cable terminal house (Facility 566), a reconfiguration of the preexisting meteorological launch pad (the former Facility 570, gone today), and two launch pads for the BQM-34A target drones (Facility 571 and the former Facility 572), overlaid by the current Facility 583 (the Vandal launcher). Facility 573's viewing ports faced the launch window, as did viewing ports in Facility 566. A segregated and fenced area, the site for Facility 573, included several small support facilities. By 1970, the Navy expanded the drone launch area, adding a launcher on a heavy steel octagonal base (Facility 567) and two launch pads for the MQM-74 and MQM-74A target drones (Facilities 568 and 569). The BQM drones could be surface- or air-launched, while the MQM drones were surface-launch only. Personnel from the PMRF recall Facility 567 as the "first big launcher" placed at the site, identifying it as a Terrier launcher (Costello 2008). By 1980, drawings label Facility 567 as the "HAD" launch pad, interpreted as the High Altitude Drone launch pad. Today, Facility 567

appears on Navy real-property records as a Loki launcher (presumably, a Super Loki launcher). The Loki, as discussed above, was a high-altitude meteorological probe. Today, only the base rim of the launch stand of 1970 still remains on site, with the upper portion of the stand encased in a plywood box. The Navy also added generic maintenance and repair support facilities for the 500-series launch area, clustering these buildings near the aircraft parking apron to the west of the north runway.

Over time, many changes have occurred at the drone launch site. The two meteorological launch pads, the former Facility 570 (existing before 1969, identified as used for Arcas and HASP), and Facility 567 (the Loki launcher) are located at the northern end of the cluster of launch pads. As originally laid out, stabilized coral separated these two launchers from the pair of BQM-34A launch pads (Facility 571 and the former Facility 572) at the southern end of the cluster (MAI 2007–2008). The BQM-34A launch pads were large, rectangular pads, angled at about 330 degrees (an angle identical to the launch window used for the Regulus training missile and target drone). An overhead crane articulated each of the pads, embedded on the sides of the pads in concrete piers. The next additions, launch pads for the MQM-74 (Facility 568) and MQM-74A (Facility 569), were much smaller pads, configured for a launch window of 300 degrees. With the addition of Facilities 568 and 569, the target drone launch area became complicated, with the footprint of Facility 569 abutting that of Facility 571 to create a single odd-shaped set of concrete pads. A final layer of changes occurred during 1986–1987. The Navy laid out a launch pad for the MQM-74C (Facility 580) to the immediate north of the former Facility 572, maintaining the launch window of 330 degrees for this pad. The three MQM-74-series launch pads, Facilities 568, 569, and 580, were of similar size (all much smaller than the original BQM-34A pads). Simultaneously, the Navy prepared to add a launcher for the Vandal target drone (Facility 583). To devise a Vandal launcher in the 500-series launch area at the PMRF, the Navy removed one of the BQM-34A launch pads (Facility 572), patching the area to match and enlarging the concrete pad. During the renovations to accommodate Vandal, the Navy also expanded the remaining BQM-341A launch pad (Facility 571), renumbering the larger pad as Facilities 571 and 572. The “new” Facility 572 sat to the east of Facility 571 (rather than to the west, as originally constructed). The Navy continued to program the new Facility 572 as a BQM-34A launch pad (in 1986), retaining a pair of BQM-34A pads with the launch angle of 330 degrees. Final additions during 1986–1987 were a launch pad for the BQM-74E (Facility 584), overlaying the former Facility 570 (the meteorological pad of pre-1969), and a launch pad for a supersonic MQM (Facility 582). The additions and pad reconfigurations of 1986–1987 filled in original open space within the 500-series launch complex (MAI 2007–2008).

Of these changes of the late Cold War, the addition of the Vandal launcher (Facility 583) made the most substantial visual impact to the existing landscape. The Vandal was a very large and sophisticated target drone, created by reusing (and somewhat upgrading) the former Talos cruise missile developed during the late 1940s and early 1950s. Becoming fully operational in 1958–1959, the Talos had both conventional and nuclear-warhead capabilities. The Navy fired the final Talos in 1979 but did not remove the last Talos launcher from its heavy cruiser (the *Long Beach*) until the early 1980s. During the Vietnam War, the *Long Beach* had successfully shot down a MiG at very long range using Talos missiles (Parsch 2008e). To support its conversion of the Talos to the Vandal target drone, the Navy removed the four twin-arm Talos Mk 12 launchers from the heavy Baltimore-class cruisers *Oklahoma City*, *Galveston*, *Little Rock*, and *Long Beach*, reinstalling the launchers on San Nicolas Island at Point Mugu; at the White Sands Missile Range in southern New Mexico; at NASA’s launch complex on Wallops Island, Virginia; and at PMRF. After the installation of a former Talos launcher at PMRF (possibly from the last cruiser so equipped, the *Long Beach*), the reconfigured launch pad became “the Vandal launcher” (Facility 583). Vandal was a very sophisticated target missile, fired to simulate enemy anti-ship missiles. Vandal was considered a “legacy” Supersonic Sea-Skimming Target (SSST), in deference to its conversion

from the Talos. The Navy used Vandal while the next generation of super-sophisticated target missile (Coyote) was in development, firing the last Vandal in July 2005 (*Space Daily* 2004). The Vandal accelerated with a speed record set in excess of 1,500 miles per hour, sustained at less than 9 feet above the ocean's surface. The drone was able of flying 40 to 50 nautical miles and had an altitude window of wide range (from low over the water to a height of 60,000 to 80,000 feet). The total number of Vandal target missiles was 644 (all upgraded from the Talos) (Parsch 2008e).

The development of the BARSTUR not only required the establishment of a tracking complex on Makaha Ridge and the addition of a permanent target-drone launch area at the PMRF, but also necessitated other service augmentations to facilitate an instrumented underwater test environment. The Naval Undersea Warfare Center (NUWC), a fenced compound at the northern edge of the aircraft parking apron west of the north runway, initiated its services to the range during the late 1960s. NUWC operates as a tenant mission at PMRF and has had sustained responsibility for target torpedoes, as well as related exercise and war-gaming services. Immediately adjacent to NUWC, a group of ordnance facilities supports torpedo operations. One of the additions to the NUWC landscape was a 4-foot-deep “waterbed” (Facility 430), a soft-placement pad for torpedoes en route to the maintenance and repair facilities. The Navy expanded the BARSTUR to accommodate larger fleet exercises with the addition of a second instrumented underwater range, the Barking Sands Underwater Range Expansion (BSURE). The BSURE hydrophones were more sparsely positioned, laid out along two 65-mile cables to create an instrumented area of 880 square miles. The combined BARSTUR and BSURE test areas provided nearly 1,000 square miles of instrumented environment. The Navy began its installation of the BSURE hydrophones in 1976 (Binder 1995:7; Global Security 2007). Multiple buildings on PMRF directly support the BARSTUR and BSURE test areas, with facilities added not only in the middle and late 1960s, but also during the 1970s and 1980s.

The HANG, which had trained at the PMRF in 1951 and 1952 when the base was still known as Barking Sands AFB, returned in the mid-1960s to maintain a final major large-tenant mission at the PMRF that lasted through the Cold War (**Figure 3.78**). In mid-1966, the HANG set up a summer camp, and subsequently quarterly weekend deployments, from Hickam AFB on Oahu to the PMRF on Kauai. The 199th Fighter Interceptor Squadron (FIS) rotated to the PMRF for training exercises. The PMRF was also a dispersal location for the squadron. The 199th FIS had established permanent air-defense alert on Hickam AFB during 1958–1959, sustaining the mission into the early 1990s. HANG activities at the PMRF included mock alerts, with scramble operations coordinated from two generic airfield facilities of 1970–1971 (Facilities 300 and 314). Of these buildings, Facility 314 functioned as the squadron's primary station, connected to both the air-defense radar unit on Kokee Ridge (the 150th Aircraft Control and Warning Squadron) and the 199th FIS on Hickam AFB. The control tower in Facility 300, the crash-and-rescue fire station, monitored the takeoff of the aircraft parked on runway alert. No permanent FIS alert facilities paralleling those at Hickam AFB existed at the PMRF. The 199th FIS billeted in makeshift

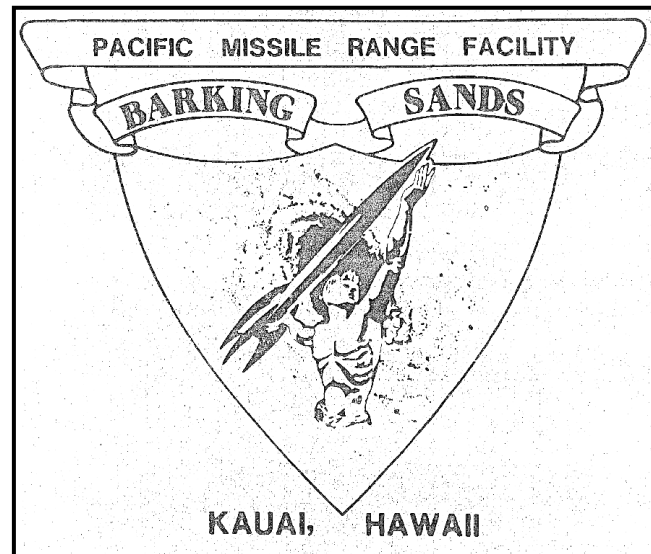


Figure 3.77. Ca. 1985 emblem of the Pacific Missile Range Facility. Courtesy of PMRF.



Figure 3.78. Mid-1960s photograph of Hawaii Air National Guard (HANG) planes at the PMRF. Photograph from *HANG 25: History of the Hawaii Air National Guard* (Hawaii Air National Guard 1971).

hutments during 1966–1982, with replacement facilities constructed in the middle 1980s. During the late Cold War, the 199th FIS billeted in tents while stationed at the PMRF (with messing in a permanent building). Facilities of the middle 1960s and the middle 1980s used and/or utilized by HANG during its tenure at the PMRF are interspersed with other buildings in the cantonment area. The 199th FIS also acquired one of the 10 hard-rock, World War II munitions magazines, tunneled into Kamokala Ridge, for storage of squadron weapons and ordnance. The HANG mission at the PMRF ended in 1992 (Binder 1995:12-13, 15-17).