What We Have, We Shall Defend:

An Interim History and Preservation Plan for Nike Site SF-88L, Fort Barry, California Part II

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Part I. See PDF file for Historic Resource Study

Part II. PHYSICAL DEVELOPMENT OF NIKE SITE SF-88

A. Overall Site Development

1. Mobile AAA Gun Position, Site No. 81, Fort Barry

As described in the preceding portion of this report, Nike missile sites were not part of a totally new, independent weapons system. Instead, they were another step in the continuing evolution of the Army's classic mission of air defense, a role dating back to the First World War.

Beginning around 1951, Antiaircraft Artillery (AAA) Gun Battalions began manning 40mm, 75mm, 90mm, and 120mm guns at various semi-permanent sites around San Francisco Bay. These batteries existed through the late 1950s and generally consisted of four radar-directed guns, two radars, their accompanying gun director and computer vans, ammunition magazines, repair and maintenance areas, and a barracks compound.

The gun sites included "Olympic" in Daly City near today's Palo Mar Riding Stables; "Fort Funston" next to Fleishacker Pool; "Fort Scott" at Robb Hill in the Presidio; "Golden Gate" in Golden Gate Park behind the Beach Chalet; "Point Richmond;" "Ring Mountain" on the Tiburon Peninsula; "Hunters Point;" "Point San Bruno" north of the International Airport; "Wolf Ridge" at Fort Cronkhite; "Bay Farm Island" in San Leandro; "Emeryville;" and "Fort Barry" at today's Bird Rock Overlook.[1]

The Fort Barry AAA gun site can be considered the geographical (if not lineal) ancestor of Nike Site SF-88. First manned by "A" Battery of the 718th AAA Gun Battalion in early 1952, this site was officially designated "Position No. 81" in the San Francisco Defense Area Plans.[2] Like most antiaircraft batteries of this era, the Fort Barry site was basically a field position consisting of four 90mm radar-directed guns surrounded by circular earthen revetments. Nearby were the associated radar screens and director vans, magazine spaces, a maintenance area, and a crew cantonment.

Unlike many AAA sites, though, where everything had to be constructed on site, Position No. 81 benefited from an abundance of nearby buildings, especially the obsolete coast artillery fortification known as Battery Mendell (built 1905). The new site's personnel quickly adapted the old battery and other structures to serve their purposes. A central ammunition storage magazine was set up within Mendell, and two adjacent "Base End Stations" dating from 1940 became ready ammunition bunkers. The antiaircraft battery's command post and the M-33 radar/gun director vans were set up on top of Mendell's parapets, while the gun computer itself was located inside one of the old fortification's underground rooms. A double row of barbed wire entanglements surrounded the antiaircraft gun positions, radars and service magazines, and Battery Mendell. Access to the area was via a single entry gate with guard post near the Pt. Bonita Coast Guard

Nike Ajax "Launching Group No. 1 in its temporary location just west of Battery Smith-Guthrie, Fort Barry. U.S. Army Photograph, March 15, 1955.
(Golden Gate National Recreation Area, TASC Collection)

housing area. An adjacent cantonment of 1941 Mobilization Buildings served as the battery's headquarters, barracks and repair/maintenance areas. (These same buildings would later be used until 1965 as quarters for personnel assigned to Nike Site SF-88.)[3]

The antiaircraft battery at Bird Rock remained in service until well after the first Nike Ajax were emplaced, although the units manning the guns changed. On 6 May 1953, Battery A of the 718th AAA was redesignated Battery A of the 740th, and in spring 1954 Battery B of the 752nd AAA Gun Bn took control of the site when "A" of the 740th moved to Nike Site SF-59 at Fort Funston. [4] Although no inactivation date for the antiaircraft gun battery has been found, the weapons at Position No. 81 remained in place at least through early 1956.[5]

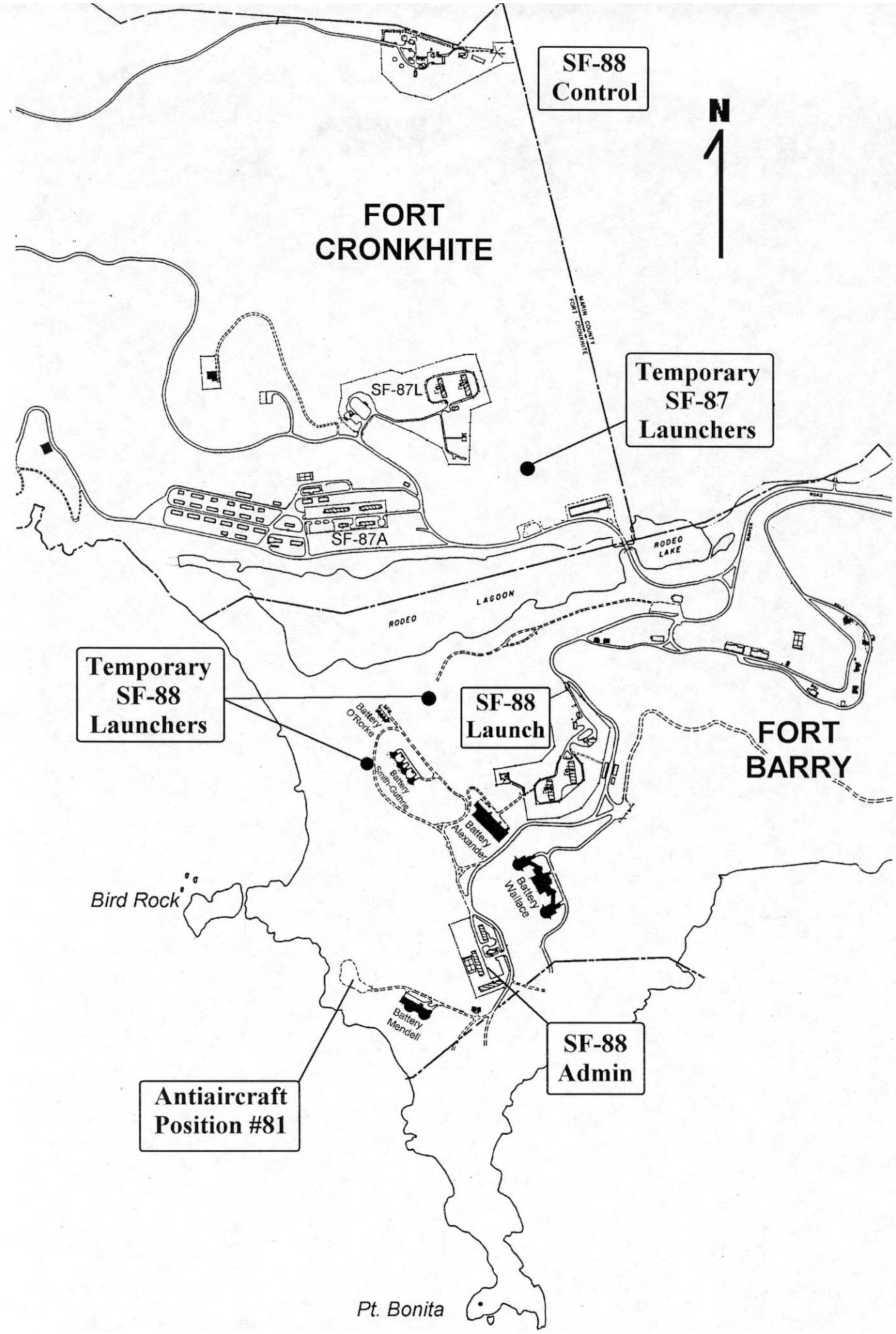
2. Temporary Field Deployment

In FY1953 the first recommendations for permanent Nike launch sites in the San Francisco Defense Area appear in "Estimate of Construction Program as of 30 June 1953." This nationwide program for Nike I construction reveals that work was anticipated to start by early 1954 on three sites around San Francisco, with completion dates no later than September 1954. Until construction could be completed (a task that would take nearly two years), the report called for installing Nikes in field emplacements with the first such temporary site to be completed by March 1954. Unfortunately, the report does not indicate which three sites in the Bay area are being planned for. However, it does specify that one of the temporary sites would be operated by the 9th AAA Battalion, the same unit that would eventually man SF-88.[6]

Beginning in 1952, responsibility for providing support to the existing antiaircraft gun battalions was given to the 359th Engineer Detachment (Utility), headquartered at the Presidio of San Francisco. Once the locations for temporary Nike batteries were chosen, the 359th undertook the construction of these field positions too. Many of the AA gun sites and temporary Nike sites were totally unimproved, so the Engineers had to bring in sewage and electrical service in addition to constructing temporary buildings and missile launchers.[7]

In the Marin Headlands, site work involved using bulldozers to scrape level launcher sites out of the rolling hillsides. By January 1954 the Engineers had begun work on a series of square earth revetments for the Nikes, just north of warehouse Bldg. 1111 in eastern Fort Cronkhite.[8] This was the first physical indication of Nike presence in the Headlands.

Although the authors did not have the opportunity to research the construction history of Site SF-88 in Army records, a detailed account of the site's planning, temporary field configuration and permanent site construction can be gained by searching through the former Presidio Engineer files. In addition, interviews with Army veterans and examination of historic photographs provide additional information on the site's history. By spring of 1953, three locations in the vicinity of Battery Smith-Guthrie at Fort Barry were being evaluated as sites for temporary Nike emplacements. Each of these three proposed sites, or "launching groups," would consist of four launchers arranged either in


SF-88
Control
N
FORT
CRONKHITE
MARIN COUNTY
FORT CRONKHITE
Temporary
SF-87
Launchers
SF-87L
SF-87A
RODEO
LAGOON
RODEO
LAKE
Temporary
SF-88
Launchers
SF-88
Launch
FORT
BARRY
Battery
O'Rorke
Battery
Smith-Guthrie
Battery
Alexander
Battery
Wallace
Bird Rock
Battery
Mendell
SF-88
Admin
Antiaircraft
Position #81
Pt. Bonita

a box formation or in-line emplacements.[9] By January 1954 these preliminary plans had been refined to show two launching groups, each consisting of four launchers in a box form and enclosed by rectangular earthen berms. These plans are also the first to use the site's official designation: "San Francisco Defense Area, Project SAM, SF-88-C&L."[10]

However, it is believed that neither of these two launch groups was constructed as shown. Instead, the completed field sites at Fort Barry comprised only two groups, one consisting of four launchers and the other of two launchers. The battery's "control" area with its radars and computer vans was sited on top of Wolf Ridge in Fort Cronkhite.[11] The larger section, designated Launching Group #1, was constructed directly in front of Battery Smith-Guthrie and consisted of four launchers arranged in an in-line configuration. Each launcher was separated from its neighbor by simple earthen berms or "traverses." The smaller section, located at the foot of the valley directly behind Battery O'Rourke, consisted of two launchers separated by a double set of traverses.[12] Its designation was Launching Group #2. The traverse berms and the access roads constructed for both of these sections are still visible today.[13]

The first of the temporary Nike batteries in the San Francisco Defense Area was completed by mid-1954, and in October the Army released photographs showing Nike I missiles and launchers assigned to the 30th AAA Group. These views of temporary field emplacements, shot by Army photographers with an eye for security, were generally taken from angles revealing little of the surrounding geography. The photos show missiles sitting on bare ground within simple earthen revetments, each launcher assembly consisting of the missile launcher proper flanked by two storage rail "racks" for reload missiles. No support structures are visible anywhere in the vicinity. The intentionally-vague captions on the photographs indicate only that these Nikes were newly emplaced, but offer little clue as to the missiles' location.[14] However, a general familiarity with the Headland's terrain reveals that these first launchers were the ones constructed at Fort Cronkhite between warehouse Bldg. 1111 and the future site SF-87L. In this location, the four launchers and revetments in their box configuration were invisible from many viewing directions. (These revetments can still be found today, although the site is heavily overgrown.)[15]

The early days of Nike deployment were documented in a 1972 *ARGUS* magazine article relating the careers of two veteran warrant officers of the 6th Region:

> [Warrant Officers] Zempel and Thompson vividly recall the early days when Antiaircraft Artillery guns were going out and Air Defense Artillery missiles were coming in. Ajax launcher rails were above ground at first — no pits and no elevators. Liquid propellants were used in Ajax missiles and crewmen wore heavy and cumbersome acid-proof protective outfits and were hosed down after each fueling operation. Early Ajax fueling and war-heading areas were separated and isolated by berms — crude parapets constructed by piled up sand-filled 55 gallon drums. Dirt lanes connected the battery components. There were no neat, hard-top roads and no landscaped and planted sites in the early days.[16]

Nike Ajax "Launching Group No. 1 in its temporary location just west of Battery Smith-Guthrie, Fort Barry. U.S. Army Photograph, March 15, 1955.
(Golden Gate National Recreation Area)

On 1 October 1954, Battery A of the 9th AAA officially became a Nike-I equipped battery. The first commander of Battery A was Captain Henry Paine who had recently completed an in-depth training at Fort Bliss as part of "Nike Package 14," a specially-selected group of officers, warrant and enlisted men chosen to operate the new missile site at Fort Barry. Paine and the men of the battery A shortly began drawing their new missiles.[17] At the same time, the 359th Engineer Detachment began constructing field positions near the location of the future, permanent launch site.[18] The first SF-88L "Temporary" emplacements were complete and ready for inspection by 28 October 1954. A Sixth Army photograph taken that date shows Capt. Paine and a group of dignitaries inspecting a Nike I in a freshly-excavated field emplacement. The topography indicates the missile was located in Launching Group #2 near Rodeo Lagoon[19]

In March 1955 the Army released two photographs showing Nike Is at Launching Group #1 in front of Battery Smith-Guthrie. The views show the same spartan arrangement of launchers and storage racks as at Fort Cronkhite, except the SF-88L missiles had no surrounding revetments. Instead, the missiles sat in an in-line formation and were totally open to view with only small earth traverses separating the launchers. (In one shot, the photographer made artistic use of this exposed location, artfully arranging a sunset to silhouette the missiles.) This time, the photo captions specifically gave the launcher's location as Fort Barry, California.[20]

The control site atop Wolf Ridge went into operation simultaneously with completion of the field launcher emplacements. There, the three radars were arrayed in a north-south line across the summit of the ridge, facing west towards the probable avenue of approach of enemy aircraft. In this arrangement, the acquisition radar (later known as LOPAR) sat in the intersection of a "T"-configured line, flanked by the target tracking radar (TTR) to the north and the missile tracking radar (MTR) to the south. In the rear of the three radars sat a battery control van, a radar control van and a spare parts van, that together formed the center leg of the T. This arrangement conformed as much as possible to US Army Air Defense standard plans for battery control areas.[21]

During this period, the Army apparently adapted other structures around the Marin Headlands to service the Nikes in their field positions. Plans dated 20 June 1953 show the 1920-vintage Balloon hangar at Fort Barry being converted into an "Armament Shop."[22] Another, undated set of plans shows the same hangar after the conversion into an assembly, test and storage area for Nike missiles, its interior filled with radio frequency and electrical test sets, propulsion pumping testers, and acid and fuel servicing areas. The hangar also contained workshops, a latrine, and storage space for a dozen Nike Ajax body sections on their missile dollies.[23]

This adaptation of the balloon hangar was a continuation of the Army's practice of re-using existing structures around the Headlands and updating them for more current needs. Other buildings around Forts Barry and Cronkhite also appear to have briefly contained Nike-related activities. Numerous rooms within Battery Wallace, for example, bear stenciled signs indicating their TNT capacities and other storage uses,[24] while other spaces within the battery may have once been used for storing nitric acid.[25] Inside Battery

Townsley at Fort Cronkhite are two more surviving antiaircraft-related graffiti: a chalked notation reading simply "9th AAA" and a wonderful drawing of an Oozlefinch — the mythical mascot of air defense artillerymen — captioned "Nike Missiles Rule Sausalito!"[26] Additional research may yield more information about Nike-related uses of these buildings.

3. Planning and Construction of SF-88L

At the same time that the field emplacements were being finished, planning for the permanent launching facility at SF-88L was also underway. By summer of 1953, standard Engineer plans were being prepared for permanent buildings at the site. The earliest of these, dated 2 July 1953, tellingly shows fence and gate details for the launcher and control areas.[27] Over the next few months, plans appeared for a generator building, an acid storage building with attached shower, and "Type B" underground missile storage structures.

A December 1953 drawing of Forts Barry and Cronkhite shows for the first time the proposed launching area in its eventual location. (The control area is also shown atop Wolf Ridge in Fort Cronkhite, at the same location as the already-existing radar site that controlled the field positions.) The exact configuration of the permanent launching area was still undecided, though, since this plan shows six launcher sections arranged within a box-like configuration.[28]

Less than three months later, a revised plan showed the launching area arranged in something closer to its eventual configuration. In this version only three launch sections were proposed, arranged in a roughly east-west line directly behind Battery Alexander. A few hundred feet north of the launchers sat the fueling areas and the generator and missile assembly buildings. Oddly, the site's launch control trailer (LCT), then known as "control van," is shown more than a hundred yards northwest of the launchers near the temporary Launching Group #2. Although this plan shows the permanent site reduced to only three launchers, it still included positions for three additional "Future Launchers" immediately north of the permanent site.[29]

The final arrangement for the SF-88L launching area was agreed upon sometime in the spring of 1954, as evidenced by a drawing that bears a large, scrawled "X" across the westernmost of the three proposed launchers with the accompanying notation "See Revised Map 5-3-54 & 5-13-54.[30] Had this third launcher been included in the final project, it would have been located between today's B Section and Battery Alexander's old mortar pits.

Across the valley at Fort Cronkhite, an identical evolutionary process took place during the planning for Site SF-87L. There, initial plans also called for constructing six launcher sections.[31] Eventually this number was reduced to three sections with locations for three "future launchers," then to a final arrangement of only two sections.[32] The reasons for reducing the number of launcher sections at both SF-87L and SF-88L are unclear, but it is probable that the topography of the Headlands was a limiting factor. Also, since the

theory of deploying Nikes was still evolving, the Army may have also decided that placing a dozen sections within a half mile of each other was a bad tactical arrangement.

The site finally chosen for SF-88L was a tapering valley (actually, an oversized drainage ravine) in the rear of Battery Alexander and bordered on the east and south by Field Road. A detailed topographic survey of the future launching area was made in January 1954 preparatory to construction, and revealed a sloping area with elevations ranging from 118 feet to 170 feet above sea level. A mean reference height of 147 feet was decided upon for the site. The permanent reference point chosen was the top edge of the concrete curbing at the future elevator doors.

During the course of grading as much as 18 feet of earth was cut away in some locations. Correspondingly, the 'down slope' areas below the launchers were built up as much as 16 feet. All slopes on the newly-created hillsides surrounding the launchers would be kept at a grade not-to-exceed 1:2. Because the area was a natural drainage ravine, extra precautions had to be taken to divert runoff away from the launchers and magazines. An elaborate system of culverts, gutters, headwalls, drop boxes, and drain pipes was specified.[33]

Construction of permanent SF-88L began in the summer of 1954 with preliminary grading and excavations for the two subterranean concrete magazines (still referred to as "underground missile storage structures").[34] The work was carried out by civilian contractors and Army personnel, both under the direction of the 359th Engineer Detachment, while the overall project was managed by the San Francisco office of the Corps of Engineers.[35] Although no specific completion date has been found, site personnel remember that Battery A had begun moving the Ajax missiles from their field positions into the permanent underground magazines by May or June 1955.[36]

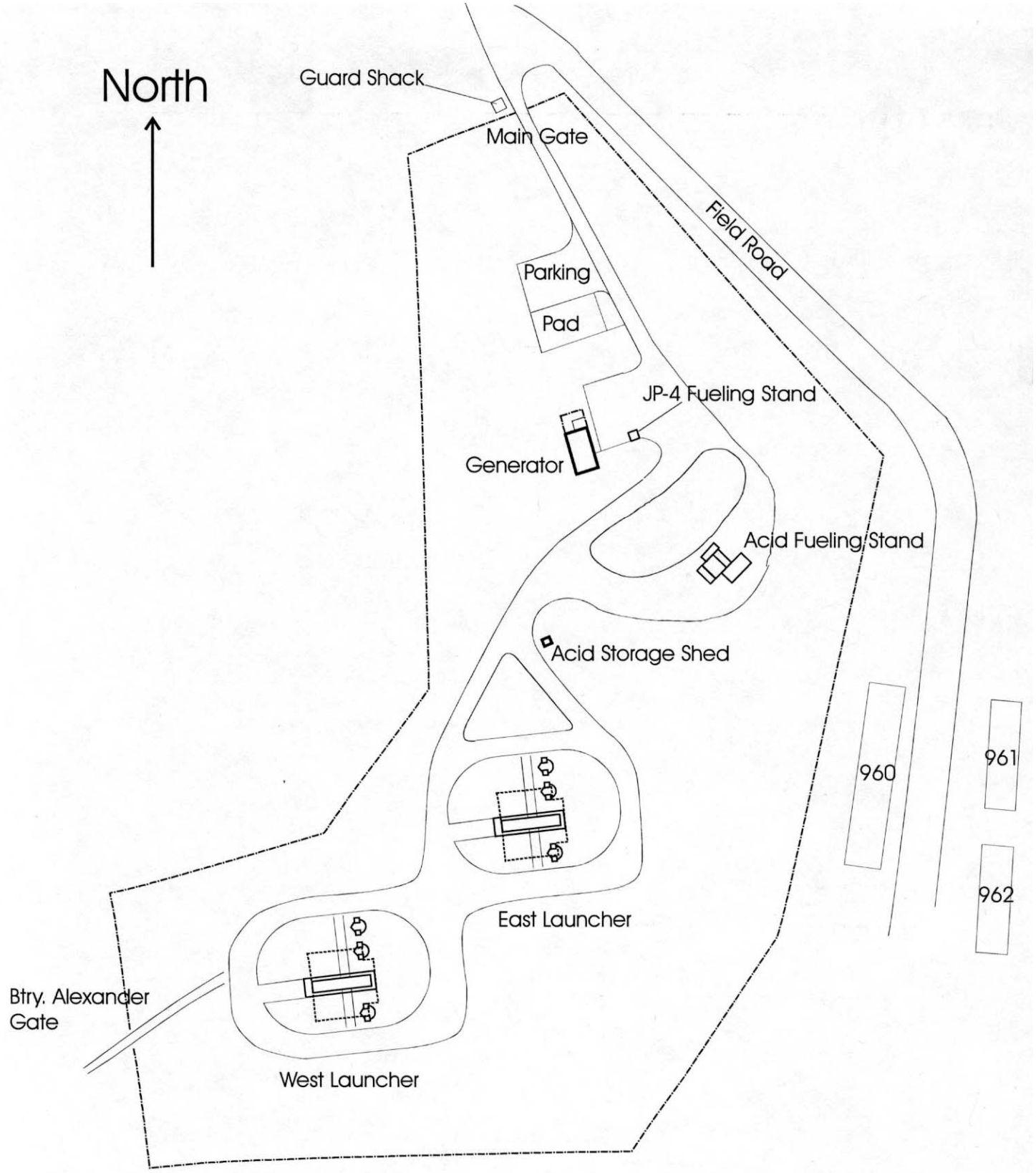
a. Ajax configuration

Nike Site SF-88L in its original configuration bore little resemblance to the site as it is preserved today. Subsequent sections of this report will go into a physical description of each part of the launch site in much greater detail, but a brief description of the launching area's appearance in 1955 may be useful.

The completed launching area initially presented a much more barren appearance than today, with the only permanent structures being the two underground missile storage magazines. Just two semi-permanent buildings stood above ground: a generator building and an acid storage shed with attached emergency shower, both constructed of corrugated steel.[37] A level area had been prepared adjacent to the generator building as the future site of a "Missile Assembly and Test Building," standard plan number ME 35-60-08, but its construction had inexplicably been deferred. (Note: this proposed structure was never built. The present, prefabricated missile assembly building is a different style of structure and was not constructed until 1962.[38])

Helicopter taking off from the west launcher area, circa 1956. Note the use of white-painted concrete sandbags as decorative road curbing, and the general lack of pavement except for the semi-circular concrete blast deflectors under the Nike-Ajax missiles. *(Golden Gate National Recreation Area, Henry E. Paine Collection)*

The original generator shed at SF-88L. This sheet metal structure was demolished in 1965 and replaced with the present generator building. U.S. Army photograph, 1961. *(Golden Gate National Recreation Area, DOD Still Media Records Center Collection)*



Nike Site SF-88L
June 1956

Figure No. 1

A single security fence surrounded the outside perimeter of the compound with vehicle gates located at Field Road and at Battery Alexander.[39] The site's LCT — the communications center for the launching area — was still located outside the compound, although by this time it had been moved from the foot of the valley to a fenced-in enclosure on the site of today's Lower Fisherman's parking lot.

Perhaps the greatest difference between the original site and its later configurations was the layout of the missile launchers. The rectangular concrete curbs surrounding the elevator doors formed the only large areas of paving, with. the rest of the surfaces composed of graded and compacted rock and gravel. Only a few small features such as ventilators, blast deflectors, shower pads and escape hatches broke this expanse of graded rock.

In an effort to landscape the site, crewmen had trimmed road edges with picket fencing and white-painted concrete sandbags presumably scavenged from 1940s antiaircraft sites that dotted the nearby hills.[40] Most strikingly, instead of the fenced-in, high security "Exclusion Area" existing today, the launchers stood totally open to the rest of the compound.

The launcher sections, originally designated "East Launcher" and "West Launcher," were also quite different from their later appearance. Each Ajax launcher sat atop a small, rectangular concrete pad while the connecting storage racks were bolted to circular concrete footings set into the crushed rock. Wedge-shaped concrete blast deflectors sat behind each above-ground launcher, designed to keep missile exhaust blast forces from tearing up the rock paving. (These above-ground launchers, it should be noted, were considered to be satellite positions while Launcher #1 was always the one on the elevator.) In this original configuration, the launch sections were grouped with two launchers to the right of each elevator and one to the left.[41]

Finally, these original launchers and storage racks were designed solely for handling and launching Nike Ajax missiles. They were much smaller in their dimensions and built of lighter-gauge materials than the subsequent "universal" models at the site that could handle either Ajax or Hercules missiles.

Crushed rock surrounded all the site's buildings and launchers. Road surfaces were also rock, composed of four inches of stabilized aggregate atop a base of compacted fill. The only concrete road surface was a six foot wide "missile dolly walk" extending from the proposed assembly building location to the JP fueling stand and then to the acid fueling stand.

The absence of many above-ground buildings considered essential to most Nike sites was striking. SF-88L originally contained no utility buildings, maintenance area, storage sheds, latrine, motor pool, missile assembly building or ready room. Instead, it appears the soldiers of Battery A made liberal use of adjacent coast artillery structures, much as the antiaircraft artillerymen at Position No. 81 had used the World War II buildings near Bird Rock. For example, Battery Alexander adjacent to the launcher area intermittently

served a multitude of uses. For awhile its obsolete plotting room and switchboard room housed offices and workshop spaces, and the battery's bathroom served as an "improved latrine" for crewmen who preferred to hike up from the launchers where only a portable outhouse was available.[42] A cleared area across from the mortar pits served as a parking lot for the site's tiny motor pool. Battery Alexander's deep powder magazine also served briefly as storage space for the site's TNT warheads.[43] Along Field Road above the launchers, two vintage-1907 coast artillery structures were also pressed into service: Bldg. 960, a former Quartermaster warehouse that served as non-ordnance storage for the site, and Bldg. 962, an old bakery that had been converted into a crew ready building.[44]

Atop Wolf Ridge conditions were not much more elegant at the SF-88C control site. There, for the first three years of the site's operation, the IFC radars, vans, and generators sat atop open concrete pads connected by dirt and gravel roads. The only permanent structure on top the hill was a ready building constructed for crew comfort shortly after the site became operational.[45]

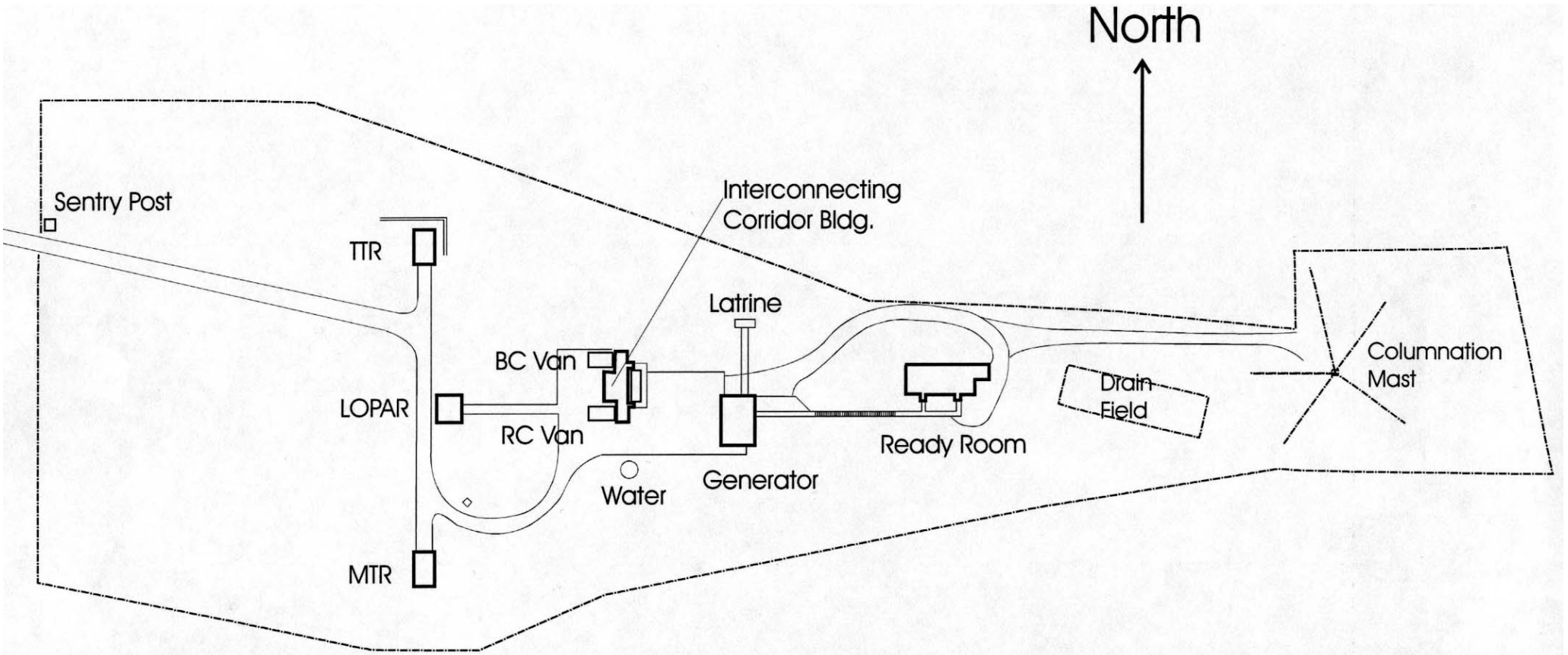
This simple configuration remained until 1956 when, following completion of the SF-88L launching site, the control area was also modernized with the addition of permanent roads and structures. During this upgrade several improvements such as redesigned radar pads and a generator building were made to make the entire facility more durable and livable. Also added were a water tank and a cinderblock "interconnecting corridor building" that stretched between the van bodies to provide additional work space. Aside from these structural improvements, though, no notable changes would be made to the site's radar and computer technologies for several more years.[46]

The IFC site was nearly two miles from the barracks area, and the drive up the switchback road could be treacherous, especially when foggy weather limited viewing conditions to a few feet at best. Only one-way traffic was permitted on the road during these conditions, and soldiers had to telephone ahead and make their intentions known before driving up or down "Hill 88."[47]

Within a year of completion, drainage and erosion problems at the Launching site must have become apparent. Plans were developed in 1957 for installing additional drainage channels around the launchers and for landscaping the still-barren hillsides. These erosion control measures specified planting sprigs of ice plant around much of the site on 12 inch centers, then fertilizing the areas and applying straw mulching. Some slight re-contouring of hillsides was also proposed, along with installation of several hundred yards of asphalt drainage ditches to augment the existing runoff channels. One major addition was a 300 foot long, two foot high earthen berm that would serve as an oversized water diversion bar. Beginning near the Battery Alexander gate, this berm stretched along the top edge of the graded fill northwest of the launchers. In later years it would be extended all the way along this contour line nearly to the main gate.[48]

For the next three years other minor physical changes took place at SF-88L. At some time in late 1956 or early 1957, the LCT van was moved to its present location within the site on the west side of the main access road. Also in 1957, a large ready room structure was

SF-88C in its original configuration, October 2, 1959, before the large HIPAR dome was installed. From left to right are the TTR, the low power acquisition radar (LOPAR), and the MTR Behind the acquisition radar are the battery control and radar control vans, joined by a concrete connecting corridor building, and the generator building.
(Golden Gate National Recreation Area, DOD Still Media Records Center Collection)



Nike Site SF-88C
December 1957

Figure No. 2

proposed for the site. This elaborate 55' x 30' cinderblock building with adjacent six-car parking lot would have been located along the east side of the access road just inside the main gate. The sixteen sheets of plans for this never-constructed structure identify it as a standard plan building designated "Nike Single Control - Launching Area - 24 EM." No work was ever begun on the complex. Instead, sometime in 1959, the existing ready room in Bldg. 962 was remodeled and a gate installed in the launching area fence to provide access for the crewmen. This wood frame building would continue to serve as the ready building until the site closed in 1974.[49]

A precise plan of the site prepared in February 1958 showed numerous small details around the launcher compound that had not previously been mapped: a small, four foot square sentry box on the west side of the main gate; electric cables running above ground and stretched atop wooden support brackets; a gravel road leading from the West Launcher towards Battery Alexander; the LCT labeled as a "communications van;" a gravel parking lot bordered with sandbags on the future site of the assembly building; and two sandbagged enclosures for temporary storage of gasoline and diesel fuel, each measuring about eight feet square, between the generator building and the parking lot.[50]

In spring of 1958, the main gate was rebuilt. This project included moving the entry gates approximately 20 feet north from their original location, adding about 50 feet of additional cyclone fencing, and constructing a small Sentry Post on the east side of the road just inside the new gates. A paint and oil storage building was also constructed north of the generator building, replacing the two sandbag-lined temporary enclosures.[51]

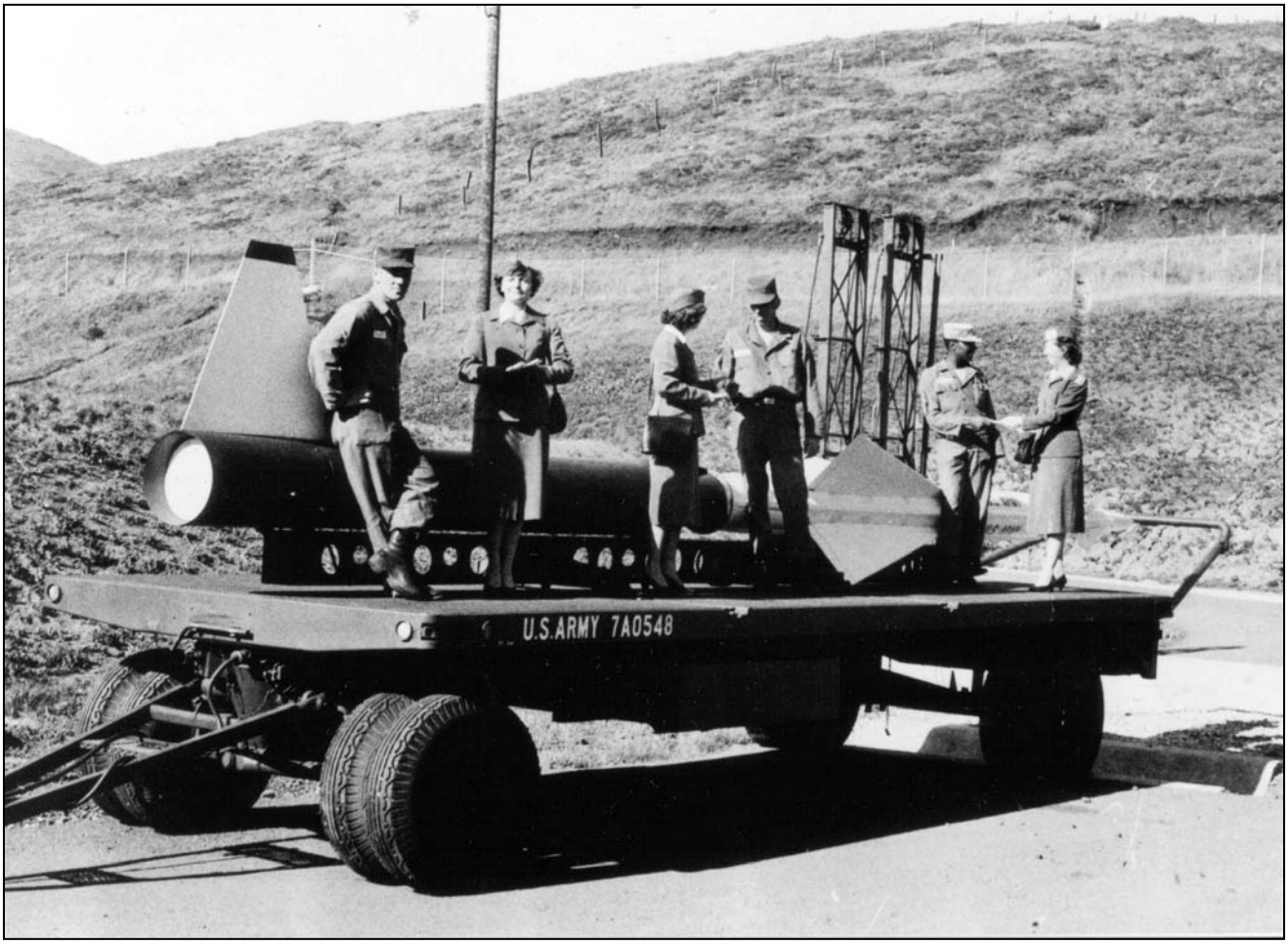
b. Conversion to a Hercules site

In 1958, work began on a total rebuild of the SF-88 launching area preparatory to the changeover to Nike Hercules missiles. Alterations planned for the site would be many and far-reaching, reflecting both the physical differences between the two weapons and the Army's security concerns surrounding the Hercules' nuclear capability.

Hercules missiles were both larger and heavier than Ajax, necessitating many physical alterations to the elevators, launchers and storage racks installed at the site. More importantly, Hercules could carry either high explosive or nuclear warheads, and both would be assembled and stored on-site. A new "Warheading Building" would be needed for the highly technical (and classified) assembly and installation procedures. Security also became of paramount importance. Additional security measures would appear in the form of new guard posts, sentry dogs and additional fencing.[52]

Some facilities at the site would also become obsolete with the introduction of Nike Hercules. The new missiles used a solid fuel propellant rather than the caustic liquid mixture that fueled Ajax, so the JP-4 and red fuming nitric acid fueling facilities became unnecessary. These were abandoned in place. Elsewhere around the site, some emergency wash showers were removed from the launchers and magazines.

Women from a Red Cross unit join soldiers receiving an orientation at SF-88L, circa 1956. The crushed rock and gravel surface of the original launcher area configuration are visible in this view.
(Golden Gate National Recreation Area, Henry E. Paine Collection)



The same group of soldiers and Red Cross workers atop a Nike-Ajax transport trailer, parked at the fueling area. In the background are the two fueling towers for hoisting barrels of red-fuming nitric acid and oxidizer.
(Golden Gate National Recreation Area, Henry E. Paine Collection)

The Army prepared a set of 29 sheets of plans dated 2 May 1958 that showed the scope and details of this planned work. Following are the major work items:

- Removal of all existing Ajax-pattern launchers and storage racks
- Replace launchers and storage racks with "universal" models for either Ajax or Hercules
- Demolish existing individual concrete launcher pads and blast aprons
- Construct new launcher pads that would hold all four launchers of each section
- Modifications to elevators to support increased weights and launch forces
- Modifications to locking bars beneath elevator launchers
- Miscellaneous elevator improvements such as drains, cable hangers, access panels, power unit modifications, and limit switches
- Construction of canine kennels for sentry dogs
- Installation of fencing around launchers (eventually known as "Exclusion Area")
- Construction of sentry box at launcher area gate
- Miscellaneous electrical details for site electrical service and generator building
- Additional changes and improvements to drainage around reconfigured launcher area.[53]

Later that same month the Army formally revealed that five sites in the San Francisco area would be converted to Nike Hercules installations. In a May 29th article headlined "5 Nike Bases In Area to Get Atom Missile," the *San Francisco Chronicle* reported that a contract had been awarded to Williams & Burroughs Construction Company of Belmont to convert the sites at a total cost of $1,738,753. The article identified the sites as Lake Chabot, Fort Barry, Fort Cronkhite, San Rafael and Fort Funston (the latter site was never converted. Instead SF-51 at Pacifica would become a Hercules site). It was anticipated that work would require 15 months.[54]

Construction proceeded rapidly at SF-88L, which had been identified as the first site in the Bay Area's defenses to be armed with Nike Hercules. According to personnel stationed at the site, "A" section (formerly East Launcher) was converted first, then "B" section (formerly West Launcher) was rebuilt. The site was never out of commission at any time during the rebuild, and by the end of the conversion both launching sections were converted to Hercules configuration.[55]

In November the *Chronicle* reported the Army's installation of the first Hercules missiles in the Bay Area "at a hilltop site at Fort Barry, Marin county." The story went on to describe how 27 men of Battery A, 2nd Bn, 51st Artillery would shortly be returning from Fort Bliss where they had undergone eight weeks of instruction on the new weapon.[56]

Work on the new warheading building lagged slightly behind the other modernization activities at the site. Located in the lee of the earth berm adjacent to the oxidizer and fueling stands, the building was designed so that Hercules missile sections could be towed in one end and out the other. To allow for this 'drive through' feature, roller doors were provided at each end of the building and additional concrete pavement was added around the warheading building and the fueling stand. (Nike crews used this large, flat

area for temporary outside storage for missile and warhead shipping containers.) To make space for the new building and its access roads, a portion of the berm's southwest side had to be carved away, altering its shape from a large oval to its current 'kidney bean' form.[57]

According to retired Chief Warrant Officer Peter Bohan, the first nuclear-armed Nike Hercules in the San Francisco Area Defenses was assembled at SF-88L in early 1959. The new warheading facility was not yet ready, though, so the missile and warhead were assembled in Battery Alexander's old magazines.[58]

In January 1959 the Army hosted a press conference at SF-88L to showcase the new missiles. *Chronicle* writer Orr Kelly reported on the event in a January 21st story headlined "Bay Defense Posts Get Killer Rockets." In this article he reported how "conversion of the five Nike Ajax sites to handle the new missile will cost $1,738,753 — about half a million dollars more than each site cost originally."[59] This figure indicates that SF-88's original cost was in the vicinity $1,250,000.

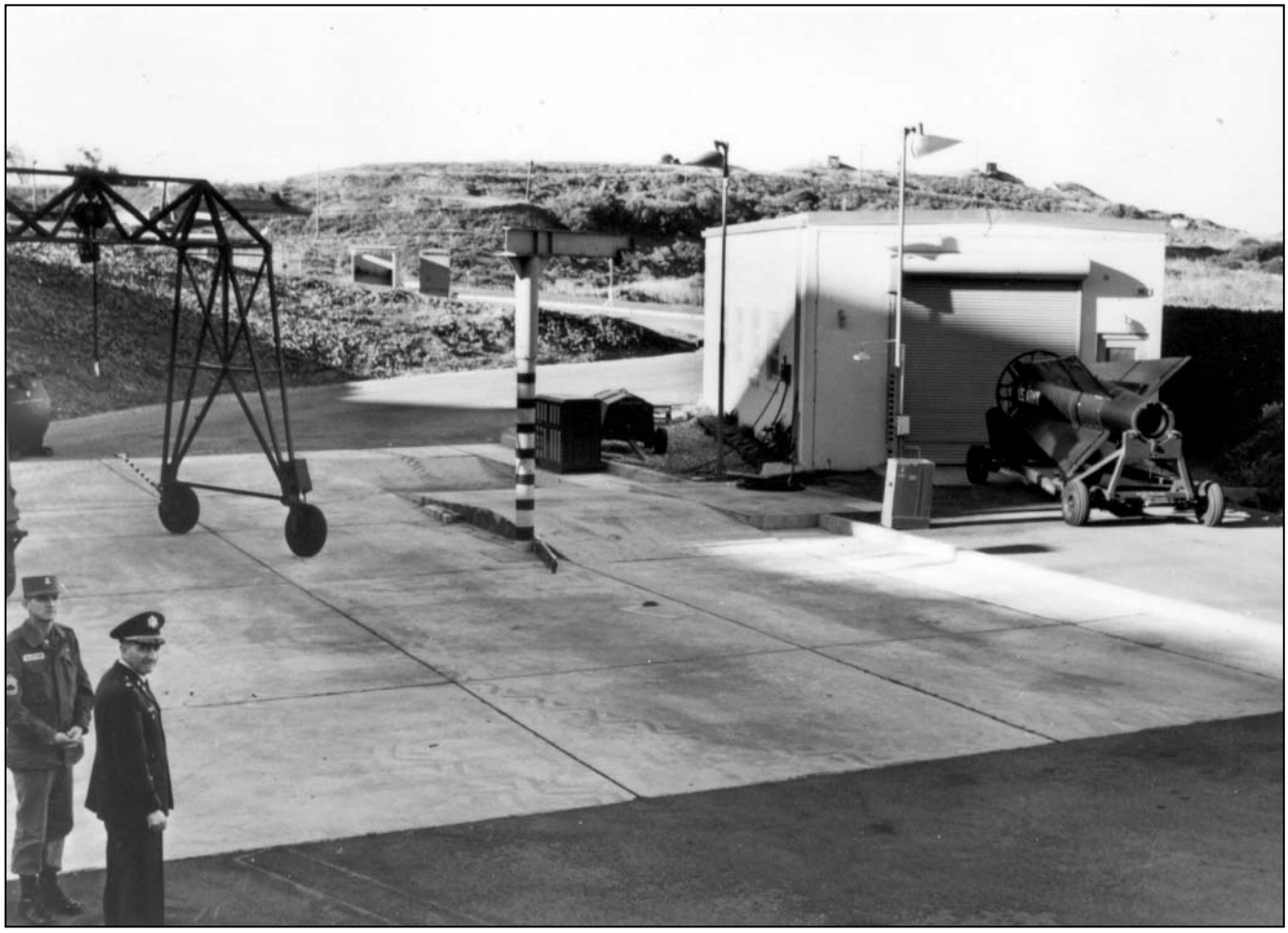
Reporters at the event raised questions about Nike site security and nuclear warheads that the Army was not prepared to answer in detail. "According to a carefully worded Army statement," wrote Kelly, "the nuclear munitions to arm the new missiles 'will be stored in areas immediately adjacent to the operational units.'"[60]

The unveiling ceremony itself was choreographed to heighten the dramatic differences between the Ajax and Hercules. Two Nike Ajax were first erected on "B" section's satellite launchers. After appropriate remarks had been made, the elevator doors opened and a Nike Hercules was brought up from the magazine. Once on the surface it was erected to firing position alongside the now-overshadowed Ajax.[61]

According CWO Bohan, this side-by-side pose of the two missile types was arranged purely as a photo opportunity, since Ajax and Hercules missiles were never kept within the same launcher section. However, it is unclear if all the missiles at SF-88L were replaced simultaneously. Bohan remembers an overlap period when "A" section was equipped with Nike Hercules while "B" still retained Ajax missiles.[62]

By mid-1959 the site had taken on an appearance much closer to today's. The warheading building was complete, as was the additional concrete paving surrounding the building. Inside the launcher area, Hercules storage racks and M36 "universal" launchers sat on top of rectangular concrete slabs that ran the entire length of each launcher section. Crushed rock still surrounded these new launcher pads, but the remodeled area now had a sterile, freshly raked appearance instead of the sandbag and picket fence-lined launcher compound of only two years previous.

A double set of cyclone fences topped with barbed wire now enclosed the site: an outer "Limited Area" fence surrounding the entire compound and a new, inner "Exclusion Area" fence that wrapped around the two launcher sections. The limited area fence was basically the original 1955 security fence for the site, except it had been heightened by



Fueling station in 1961, with "A-frame" portable hoisting unit at left and a Nike Hercules forward body section next to the Warheading Building at the right. In the background are the former Acid Storage Shed, now converted to a flammable materials storage building, and a portable latrine. U.S. Army photograph.
(Golden Gate National Recreation Area, DOD Still Media Records Center Collection)

about a foot along its entire length. It still retained its two gates, although the main entrance at Field Road had been realigned and given a new concrete sentry post building. The exclusion area fence had three gates: two at the north end flanking another guard post, and one at the west end aligning with the Battery Alexander gate in the limited area fence. The sentry dog kennel area and training compound were located just north of the Battery Alexander gate, adjacent to the western edge of the launching area.

Finally, the ready room in old Bldg. 962 on Field Road had been completed. Nike crewmen responding to drills could now access the site via a new personnel gate in the limited area fence behind Bldg. 960. Once through this gate, a wooden staircase and a gravel path led directly to the launcher area gates.[63] In its original alignment, this steep pathway ran straight down the ridge separating the launcher sections from the warheading area. In later years, it would be slightly re-aligned to veer towards the west, necessitating the construction of a small wooden footbridge over the drainage channel adjacent to the old acid storage shed.[64]

c. Late Hercules Configuration

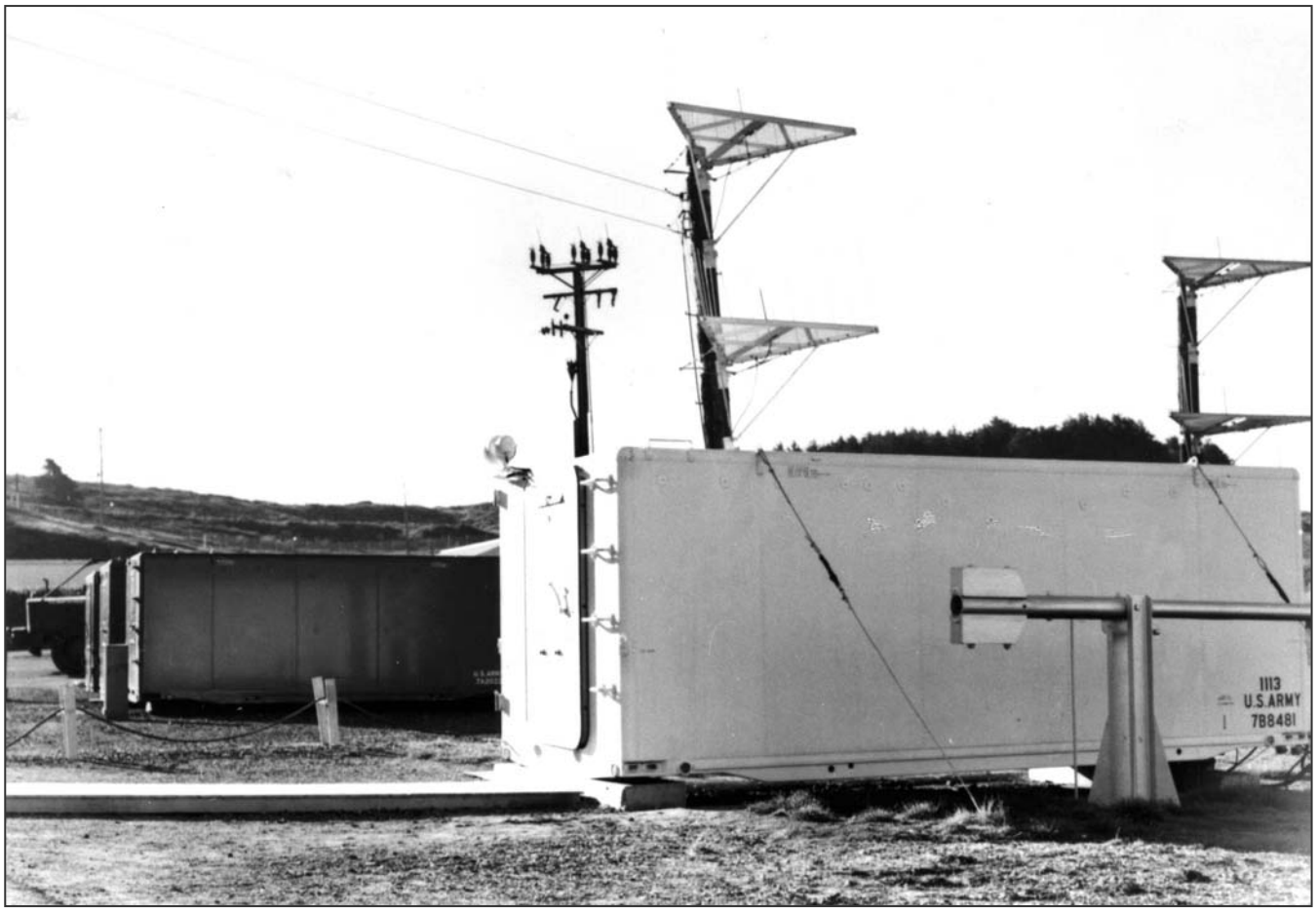
Physical changes also occurred at SF-88C atop Wolf Ridge. Just as the launching area underwent a major overhaul when the Nike Hercules arrived, the control site was totally rebuilt when the Army upgraded the "Basic Nike Hercules" to the "Improved Nike Hercules." This nation-wide program included new radars and electronics at many sites, including SF-88.

The most effective (and costly) single addition to the IFC site was the High Power Acquisition Radar (HIPAR) that was able to detect targets at the longer ranges attainable with Hercules.[65] During the period 1961-1962, the entire appearance of the SF-88C would be changed during HIPAR installation.

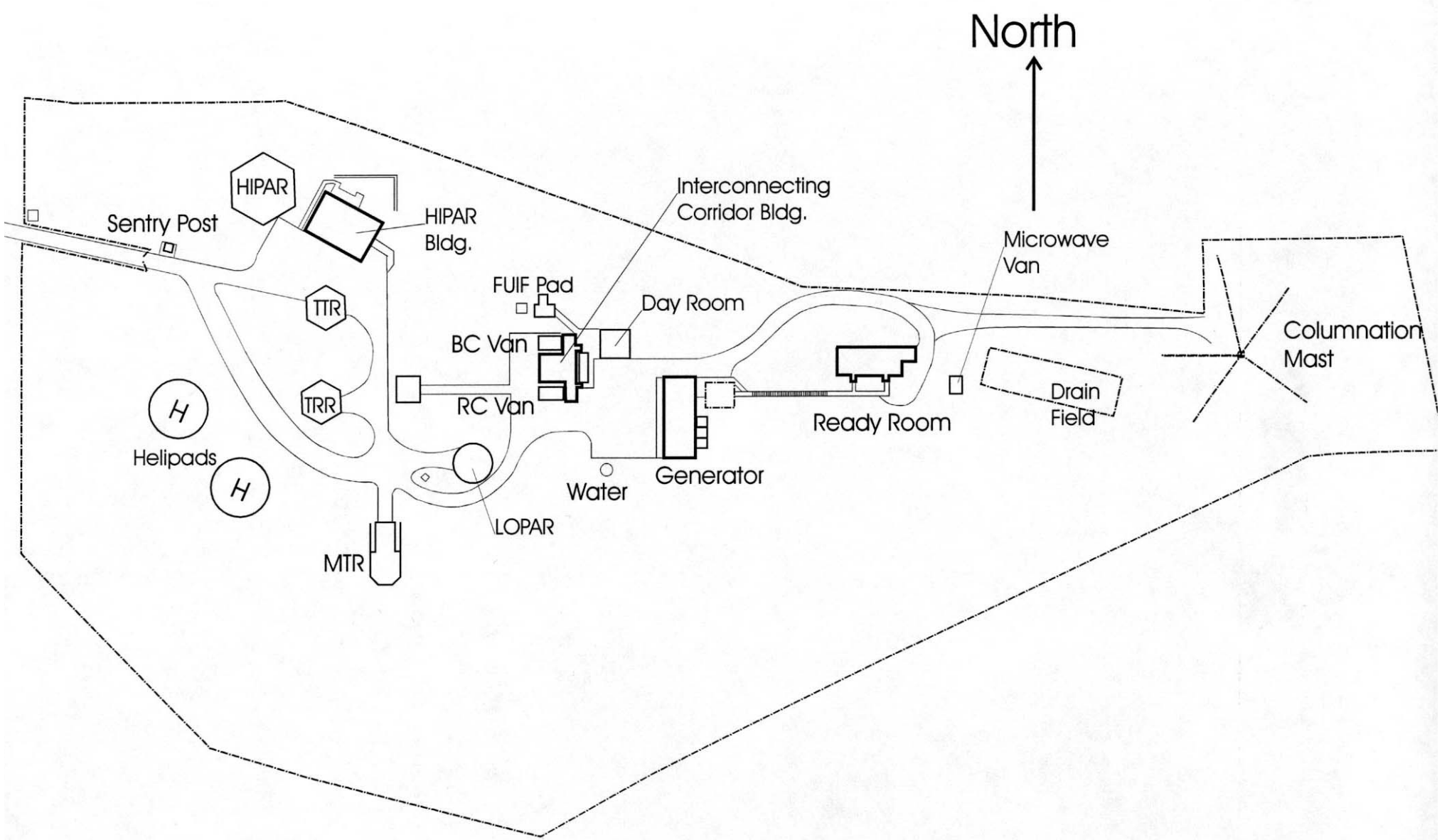
The most striking feature of the Improved Nike Hercules system was an immense, 30 foot diameter, radar antennae encased in a geodesic dome. The antennae and dome assemblies in turn sat atop a 20 foot steel tower, giving an overall height of nearly 50 feet to the HIPAR radar assembly. In addition, a separate HIPAR operating building was constructed adjacent to the tower to hold the new radar's operating equipment, and the existing IFC generator building had to be enlarged to handle the increased power load.

During the course of this rebuild, various other additions and improvements took place at the IFC. These included new, relocated concrete pads and pedestals for the already existing radars, a new ready building, and an enlarged connecting corridor building between the battery control (BC) and radar control (RC) vans.[66]

The Army also continued to make minor alterations and improvements at the launching area following the conversion to Nike Hercules, but never again on a scale as overwhelming as the 1958 "improvement" project. With the exception of constructing a long-awaited assembly building in 1962, the Army added no further structures to the site. The primary visible changes to the area up through 1974 would be the replacement of the



(original caption) “Fort Barry, Calif... Site 88, launcher area, Btry. A... Look southeast shows LCT van and antennae and assembly vans.” The antennae masts provided communications links with the IFC area. The three assembly vans in the background sit on the future location missile assembly and test building. U.S. Army photograph. *(Golden Gate National Recreation Area, DOD Still Media Records Center Collection)*



Nike Site SF-88C
1962

Figure No. 4

metal generator building with a permanent cinderblock structure, the realignment of some fence lines and gates, the ever-increasing spread of asphalt within the exclusion area (a process that continued until the entire area was paved except for a tiny pocket on the south edge), and the evolving paint schemes on the above-ground buildings.

In 1961 Army photographers made an extensive photographic documentation of SF-88. These photographs, now in the Department of Defense's Still Media Records Center, show all major structures in the administrative, control and launching areas. In these photos the launching area appears very much as it does today, with the notable exception of the yet-to-be-constructed missile assembly and test building. Instead, the assembly building's place is occupied by three magnesium van bodies similar to the ones used as control vans at the IFC. It is believed that launcher crewmen somehow acquired these empty bodies and pressed them into use as storage and workshop space.[67]

This series of photos also gives an indication of color schemes used at the site early in the Nike Hercules era. Although all the photos are black and white, it is obvious that buildings at the launch and control areas were painted in a uniform, light color without any contrasting accents around windows, doors or eaves. Even the all-metal generator building and old nitric acid shed at SF-88L were painted this color. The only exceptions within the launching area were the three magnesium vans, which were painted olive drab, and the white launch control trailer.

In 1962 the long-deferred "Missile Assembly and Test Building" was finally added to the site on the location previously occupied by the three van bodies. However, once again SF-88L would deviate from standard Nike sites. The assembly building originally specified on 1953 plans for the site was a standard 30' x 40' concrete building with attached boiler room and latrine. (An example of this type of structure remains at SF-87L).

What was finally constructed at SF-88L, though, was an Army "Butler Building."[68] This type of structure was a prefabricated building made up of interlocking metal and plywood panels that could be quickly erected in semi-permanent situations. No other Butler buildings are known to have been used for missile assembly and test structures at any other permanent Nike launch sites.

The completed assembly building measured only 21' x 40.' Its interior was divided into two large rooms, one for assembly and testing of missiles and the other for workshop space. It sat on a north-south axis with a pair of sliding doors on the south side for bringing forward missile body sections into the building. A small personnel door on the east side of the structure also opened directly into the test area.[69]

The MP dog handlers received a new kennel storage building in early 1964 when a prefabricated metal shed with a pitched roof was constructed adjacent to the kennel area. This new building contained a single room for storing equipment for the sentry dog operation, and replaced a wooden storage building that had stood on nearly the same

location apparently since early 1959. The new building was completed by February 1964.[70]

Also in 1964, personnel staircases with weather proof enclosures were added to each of the two magazines. These stairs augmented the two emergency hatches that had previously served as the only access to the below ground magazine and panel rooms. They quickly became the preferred way for crewmen to enter the spaces during alerts and drills.[71]

The sheet metal generator building was demolished in 1965 and replaced with a permanent concrete structure. This new building duplicated nearly exactly the size and floor plan of the original, and is believed to have incorporated the earlier structure's generator mounts, motor mounts, transformer pad, utility hook ups and other features. This generator building would be the last structure added to the site.

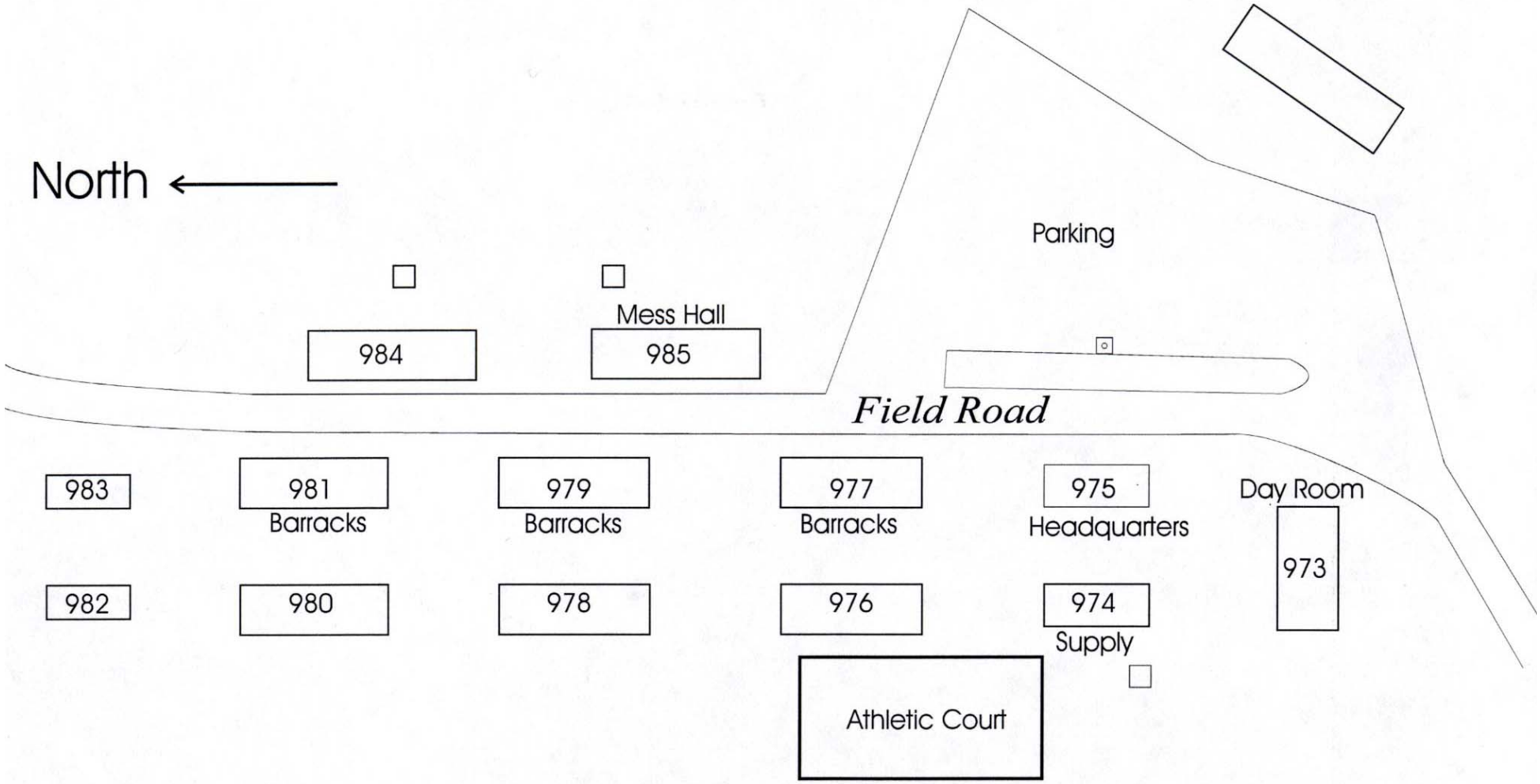
Another key component of SF-88 was its Administrative Area, formally designated SF-88A. This group of buildings, sometimes referred to as "Battery Headquarters," was located in the barracks area previously occupied by the AA personnel manning the 90mm guns above Bird Rock. Sometime around 1957 this cluster of seven World War II-era buildings was taken over by SF-88, probably in conjunction with the phasing-out of the antiaircraft guns. The buildings were still serviceable, although aging.

As part of a nation-wide program to upgrade Nike living quarters, the entire SF-88A complex was torn down and rebuilt during 1964-1965. The new administrative area contained two barracks buildings, a mess hall, an administration/day room building, and several parking lots. One of the new barracks building was assigned to the launching area crewmen, while the IFC soldiers lived in the other barracks. When the project was complete, only a multi-use recreation court would survive from the previous complex. These structures served as the site's administrative area until site inactivation.[72]

In 1970 a planting plan was prepared for all of SF-88 that gives a good illustration of vegetation at the height of the launching area's development. The main groundcover at that time was Carpobrotus Edulis ("Hottentot Fig" or ice plant) that covered the hillsides and slopes west and south of the launcher sections. Interspersed with the ice plant were scattered bunches of Baccharis Pilularis (prostrate coyote brush) that had probably germinated naturally. Ice plant also covered the earth berm next to the warheading building, as well as all slopes downhill of the launcher area and the hillside below Field Road. Flat areas within the site were paved with either asphalt or concrete, or remained as bare earth. Rough grass surrounded the dog kennels and main gate's sentry post. The only manicured landscaping was a patch of mown grass within the dog exercise area.[73]

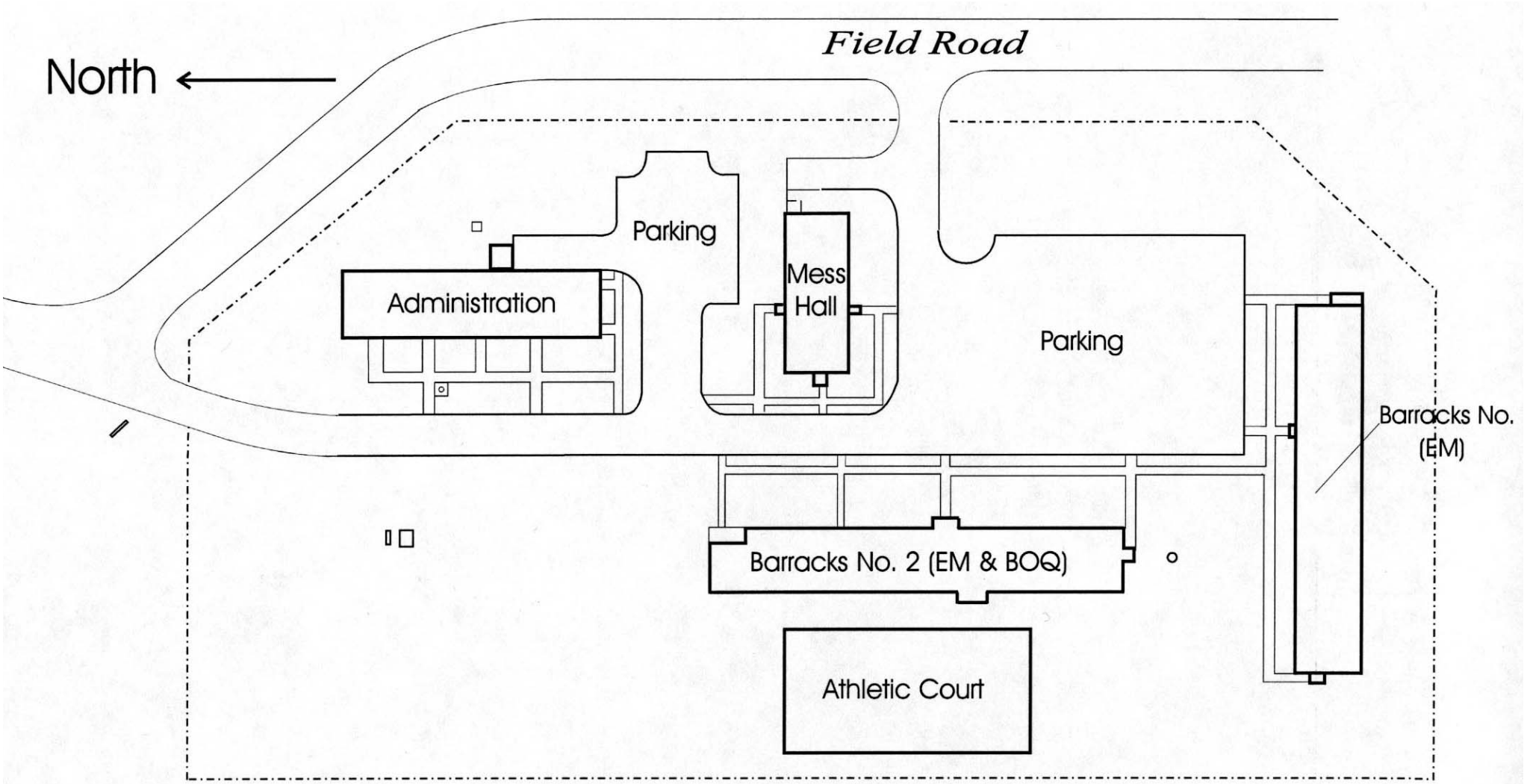
At some unknown time after 1970, the limited area fence along the site's northwest border was repositioned. Previously, this fence line had followed the toe of the slope below the launchers that had been created during site grading. It actually ran down into the valley below the site, paralleled the slope for several hundred feet, then climbed the hill again at the main entry gate. Following reconstruction, the fence sat on top of the

The original administration and barracks area at SF-88A, taken from atop Battery Mendell in August 1962. This cantonment of World War II buildings, sometimes known as “Mendell area” because of its proximity to the abandoned battery, was demolished in 1964.
(Robert Baker Collection, Golden Gate National Recreation Area)



Nike Site SF-88A
1961

Figure No. 5



Nike Site SF-88A
July 1974

Figure No. 6

small earthen berm constructed in 1957 at the crest of the slope as a water diversion dam. An annotated 1970 base map of the site has been found showing the original fence line crossed out with the large notation "Removed," and a new fence line sketched in following the current alignment.[74] The site's fences retained this basic configuration up through inactivation.

The last base map for SF-88 prepared prior to inactivation is dated 21 April 1972, and includes a proposal for yet another Ready building for the launcher crews. This structure, measuring 30' x 55', would have been located midway between the generator building and the exclusion area gate on the west side of the road. Had it been built, this ready building would have extended 15 feet beyond the top of the slope and necessitated extensive filling and regrading of the area.[75] No detailed drawings of the building have been located and no work on it was ever begun.

Site Inactivation

Less than two years after this last map was completed, the Army decided to cease all Nike operations in the San Francisco-Travis Defense Area. At that time in late 1973, only four Defense Area sites were still active: SF-88 at Fort Barry, SF-51 at Pacifica, SF-31 at Lake Chabot and T-10 at Travis.

On 17 April 1974, Col. Clarence A. Miller, Air Defense, sent a memorandum to the Commander, Presidio of San Francisco. Referencing USARADCOM Nike Hercules Site Inactivation Plan VI of 8 November 1973, the memorandum gave target dates for closing the remaining sites in San Francisco-Travis Defense Area: 1 July 1974 for sites SF-88 and T-10, and 31 August 1974 for sites SF-51 and SF-31.[76]

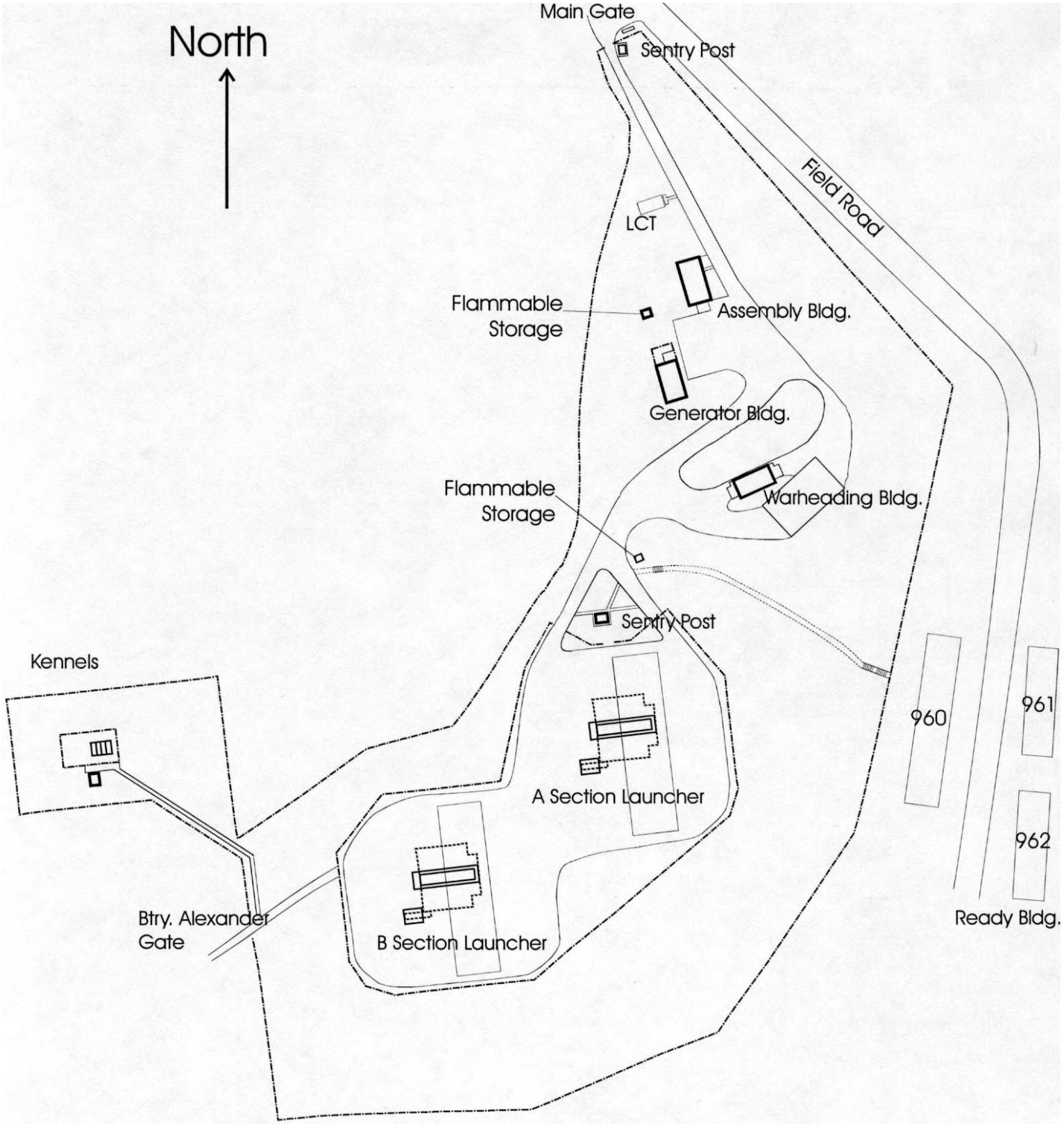
A subsequent memorandum from ARADCOM to the Presidio commander altered the inactivation date slightly to 2 August 1974: "On this date, all equipment and real property will have been turned in and the Battery's records, to include submission of the final morning report, will have been closed."[77]

For all intents and purposes, 2 August 1974 can be considered the official closing date for SF-88. The Nike site had been active for nineteen years and ten months.

Simultaneously with Nike site inactivation, the Army was preparing to transfer much of the Marin Headlands, including Fort Barry, to the newly-legislated Golden Gate National Recreation Area. A request was made by local Sixth Army personnel to transfer SF-88 to the National Park Service as a historic property. This request was sent up the Army chain of command via "back channel" communications route under authority of Lt. Gen. Richard G. Stilwell, Commander, Sixth US Army.

Eventually, orders came down via back channel from Gen. Creighton Abrams, Chief of Staff, US Army, authorizing the transfer of SF-88 to the National Park Service. The only stipulation was that no explosives or classified materials be transferred. Gen. Abram's directive superseded ARADCOM orders for inactivation of the site.[78]

A particularly good aerial view of SF-88L, taken sometime between 1965 and 1970, clearly illustrating the lack of vegetation within the outer “Limited Area” fence, the mowing strip just outside the fence, and the private vehicles parked adjacent to the ready building at the right.
(Golden Gate National Recreation Area, Interpretation Collection)



Nike Site SF-88L
July 1974

Figure No. 7

On 25 February 1974 a 'Memorandum for Record' was written by the Chief, Real Estate Branch, Presidio of San Francisco. This document, prepared at the direction of Col. John Kern, the Sixth Army's "National Park Service Liaison" officer, concerned many items pertaining to closure of the remaining Nike sites and included a special directive for the Fort Barry site: "The following NIKE Site will be inactivated but retained as a memorial to Army Air Defense - NIKE Hercules: Nike SF-88 - Ft. Barry/Cronkhite." Later, under "Sequence of Real Estate Actions," the document states: "Initiate transfer of all Site related facilities to the National Park Service to be retained as an Historic Memorial to Air Defense - NIKE Hercules. Plans are for Army technicians to remain on site to explain and demonstrate NIKE operation until replaced by GGNRA personnel." [79]

Col. Kern elaborated on these plans during a 1998 interview with the authors. Not only did the Army plan to transfer SF-88L intact to the NPS, stated Kern, but also SF-88A and SF-88C. The only items that would be removed were munitions and classified items, and even the classified materials would be held at Ft. Bliss for the NPS until such time as they were declassified. However, the vast majority of property at all three areas would have been turned over to the National Park Service including almost all the IFC equipment. In addition, the Army offered to send NPS personnel to Fort Bliss where they could have participated in selected training programs to orient them to the Nike Hercules system.

Although the NPS was interested in acquiring all three areas of SF-88, it declined much of the Army's offer of equipment. The NPS only expressed interest in taking control of property at the Launching and Administrative Areas, not the IFC. Also, the departure of the park's Chief of Interpretation at a crucial point in the transfer process further complicated the transition. The vacancy created by his departure was not immediately filled and resulted in the park's losing the opportunity to interview remaining site personnel as well as sending NPS staff to training at Ft. Bliss. [80]

William Whalen, the first Superintendent Golden Gate National Recreation Area, corroborated these discussions between the NPS and Army. In an interview concerning the early years of the park, Whalen informed the authors that the Army had indeed offered to transfer much of SF-88C to the park but he had declined the offer. His reasoning was that the park was too new and its staff too small to take on responsibility for preserving the IFC equipment. Whalen felt that the remote location of SF-88C, the inclement weather conditions at the site, and the complex nature of the equipment would put a tremendous strain on his resources. The park's main interests at the time were the administrative area, which Whalen felt could easily be turned into a conference center, and the launching area, which he saw as the most dramatic part of the Site.[81]

Whalen agreed to accept transfer of all three areas minus the IFC equipment, and to allow the Army to retain temporary control of the administrative area. On 16 August the Presidio's Real Estate officer reported on the status of Nike Site SF-88: "IFC (Control) Area ... Transferred to Golden Gate National Recreation Area. No further requirements." "Launcher Area[sic]... ... Transferred to Golden Gate National Recreation Area. No further requirements." "Administrative Area... Assigned for Army use by Memorandum of Understanding with GGNRA. No further requirements."[82]

Final transfer of all three areas did not occur until early 1976 when the Army informed the NPS that it no longer required use of the administrative area. This formal document, titled "Discontinuance of Army Use and Release of Real Property," was acknowledged by then-Superintendent Jerry S. Schober on 12 February 1976.[83]

At the time of transfer in late 1974, SF-88L contained little equipment aside from the buildings and launcher sections themselves. Items relating to Nike Hercules missiles included two inert training missiles on handling rails, a forward missile body dolly, a sustainer motor, two plywood shipping containers (one for a booster cluster and the other for control surfaces) and a missile body shipping container.[84] The historic value of the site, however, was its relatively intact state. Unlike all other Nike launch sites around the country, SF-88L had been transferred with all utility systems operational, all structures intact, all elevators and doors in working condition, and all the original storage racks and launchers in place.

The challenge would be to preserve the site for future generations.

B. Area Development

1. Launching area: SF-88L

Originally, the Army intended Nike to be a mobile weapon system with above-ground control and launching facilities. This fulfilled the Army's requirement that the new missile system be as mobile as anti-aircraft guns. However, the Army also had to meet safety regulations that governed surface storage of explosives. If strictly followed, each above ground site would require at least 119 acres of land. As a result, in an effort to reduce the amount of land required at permanent sites, the Army developed underground missile storage structures, or magazines, for the safe storage of explosives.

A prototype magazine and launcher structure was designed, tested and adopted at White Sands Missile Range during 1953. The adoption of magazine structures and subsequent reduction in site acreage also reduced considerably the funds required for purchasing real estate, especially in urban areas.[85] These underground magazine spaces provided the additional benefits of providing covered storage for the missiles as well as an extra degree of security at the permanent sites.

Although each Nike installation included essentially the same facilities, the configuration varied from site to site. Preliminary siting plans were sent to ARAACOM Headquarters at Colorado Springs, then forwarded on to the Pentagon for final approval. A typical Nike launching area contained between two and six sections, each section to include an underground magazine and four missile launchers. (A "normal" Nike site held three launch sections.) In addition, each site generally had a number of above-ground support structures. At a Nike Ajax site these included a missile assembly and test building; a generator building; a ready room structure; an acid storage shed; guard posts; and a flammable materials storage building. With the advent of Nike Hercules, additional buildings were added to most sites that reflected increased concerns with security for nuclear weapons. These included an additional guard post, sentry dog kennels, kennel storage shed, and a special warheading building for assembling and testing both high explosive and nuclear warheads.

SF-88L differs from a standard Nike launch site in several respects. As mentioned previously, the convoluted topography is believed to have limited the number of launcher sections to two. Also, fewer above-ground buildings were initially needed at SF-88L because of the abundance of empty buildings and fortifications in the immediate vicinity. For many years, the launching area contained no missile assembly building since assembly and testing of Ajax missiles was accomplished at a central facility in the Fort Barry Balloon Hangar. Also, the site never had its own ready room structure despite two proposals (one in 1958 and another in 1972) to construct special buildings for this use. Instead, Bldg. 962 on Field Road, originally built as a bakery, was remodeled for use as a ready building.

By June 1970, the Army had assigned 35 building numbers to the launching area. This represents the largest number of structures associated with SF-88L, since some structures

were dropped from subsequent inventories due to changes in what the Army classified as a "structure." These numbers included all above and below ground structures, regardless of size or whether or not they were currently in use.[86] Following is the complete list of building numbers assigned to SF-88L in 1970, with notations shown in brackets[ ].

S-880 Gate, Exclusion Area [west side of sentry station)]

S-881 Gate, Exclusion Area [east side of sentry station]]

S-882 Gate, Limited Area Personnel [on Field Road]

S-883 Gate, Limited Area Rear Entrance [at Battery Alexander]

S-884 Gate, Kennel Area

S-885 Gate, Exclusion Area Rear Entrance [at Battery Alexander]

S-886 Gate, Main Entrance

S-895 Launcher Control Indicator Pad [B section]

S-896 Launcher Control Indicator Pad [A section]

S-897 Underground Storage [sump]

S-898 Underground Storage [sump]

S-899 Communication Van Pad [Launch Control Trailer site]

S-908 Cable Vault

S-931 Shower Pad [B section; not in use]

S-947 Shower Pad [A section; not in use]

S-949 Frequency Converter[B section]

S-953 Frequency Converter [A section]

S-963 Missile Assembly and Test Building

S-964 Facility Entrance Sign and Planter

S-965 Cable Vault

S-966 Standby Generator Plant

S-967 Missile Warhead Building

S-968 Liquid Propellant Storage

S-969 Missile Launch and Storage Shelter [A section]

S-970 Sentry Station [main gate]

S-971 Missile Launch and Storage Shelter [B section]

S-972 Flammable Storage (Paint)

S-973 Septic Tank

S-974 Kennel Storage Building

S-975 Kennels

S-976 Sentry Station [Exclusion Area gates]

S-977 Fuel Oil Storage Tank (Underground - 3,000 Gal.)

S-978 Distribution Transformer

S-979 Lightning Pole

S-992 Propellant Fuel Facility (Not Used)

From the above list it can be seen that the Army gave numbers to nearly every fixture within the site, including unused service pads dating back to the Ajax era. Many of these we would classify today as "site features." Therefore, this report will limit itself to major structures in the sections that follow.

a. Missile Assembly & Test Building (Bldg. S-963) (LCS FA-0963)

Constructed: 1962 Size: 1,011 sq. ft. Original Cost: $7,200

The Missile Assembly & Test Building at SF-88L is a prefabricated Army "Butler building" structure, measuring 20.8' x 48.6'. It is constructed with a reinforced concrete foundation; steel exterior walls; wood roof and interior wall. Its interior originally consisted of three rooms separated by wooden partition walls: a large, open work area where missiles were assembled and tested, a break room that also served as a "smoking room" for the site, and a small tool room. The original interior partitions were removed before the NPS assumed control of the site.

Missiles arrived at Nike sites unassembled and unarmed, as peacetime Interstate Commerce Commission restrictions prevented the transporting of ready missiles from a central assembly site.[87] Nike missile bodies, guidance sections and warheads were delivered in pressurized, re-usable steel shipping containers while rocket motors, booster clusters and detachable control surfaces such as fins and wings arrived in reusable plywood boxes.

In the Missile Assembly and Test Building and adjacent paved hardstand, Nike crewmen uncrated, assembled, and tested the missiles. "Assembly" referred primarily to the installation of the missile control fins, main fins, elevons and fairings. The missile's hydraulic and propulsion systems were also checked. The crew visually inspected the various components and lines of both systems for correct assembly and serviceable condition. Crewmen also ran leak tests on the missiles' hydraulic lines and components.[88]

Following the system tests, the crew performed a complete missile test. In preparation for this test, crewmen connected the missile to an external source of hydraulic power and to the radio frequency and electrical test sets. The missile was then operated from these external sources. In effect, the missile was made to perform as it would in flight and its performance was carefully observed. After this test, the crew connected the missile to a compressed air source, and both the hydraulic air tank and the propulsion air tank were pressurized. The crew installed a charged battery in the missile guidance section, and conducted a pressure test to assure that it was properly sealed.[89]

Adjoining the building on its east side is an ornamental gravel bed. Inside the bed are a concrete profile of the second stage of a Nike Hercules missile, a concrete shield originally emblazoned with the unit's designation, and two small square tablets that were repainted annually with the current year and the unit's proficiency score.[90]

Colors: The earliest photo of the Missile Assembly and Test Building dates from c. 1965 and shows the building painted overall light green with dark tarpaper roof (probably green or red.) In 1967, the structure had been repainted in a medium green color with dark green trim detail around windows. By inactivation, structure had returned to overall light green color, including doors and trim.

Furnishings/Equipment:

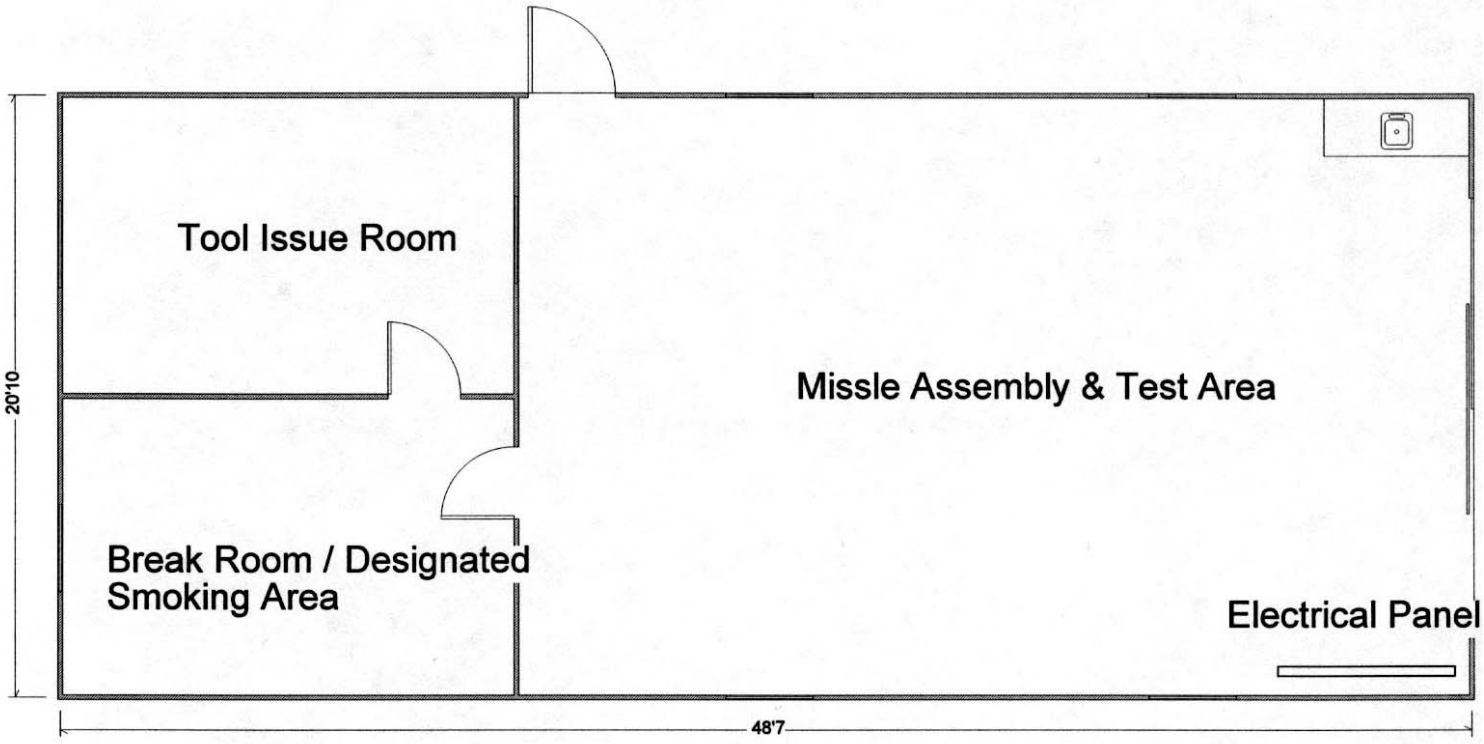
- (Large area) Missile test stands, hydraulics and electrical test sets, missile tester, etc.
- (Tool room) Tool boxes, tools on racks, small test sets, etc.

Major post-1974 Modifications:

1994 Interior partition walls reconstructed by VIPs for use as office and break room. The new walls and rooms incorporated minor alterations to meet present needs such as oversized doorways for wheelchair access and plywood subfloors and carpeting over the original concrete floor. Also, the connecting door between the two rooms was repositioned to better suit visitor and staff needs.

1995 Hot water heater replaced.

1996 Electric heaters rebuilt and replaced.



SF-88L Bldg. S-963
Missile Assemby & Test Building
c1972

b. Facility Sign (S-964) (LCS FA0964)

Constructed: 1959 Size: n/a Original cost: $200

Structure is a 2x4 wood frame with plywood entrance sign, located on top of concrete retaining wall that probably also served as a planter box adjacent to main gate. The original framework and plywood sign existed until at least 1975 and were photographed by NPS personnel, but were destroyed sometime prior to 1986. The current sign is a replica.

Nike crewmen had tremendous esprit de corps, and this pride manifested itself at SF-88 in the form of specially-produced entrance signs at the control, administrative and launching areas. At SF-88L, the entrance sign was a 4'x8' plywood sheet painted with the unit's designation. A variety of entrance signs existed at this entrance gate, reflecting changes due to cyclical repaintings and the site's unit redesignation following the departure of the 51st ADA Regiment and arrival of the 61st ADA Regiment.

Major post-1974 Modifications:

1992 Replica 2x4 supporting framework constructed by NPS maintenance, and a replica of the 1974 plywood sign for Battery B, 2nd Bn, 61st ADA was painted by VIPs.

1997 Replica sign for Battery A, 1st Bn, 51st ADA painted by NPS Maintenance.

c. Generator Building (S-966) (LCS FA0966)

Constructed: 1965 Size: 822 sq. ft. Original cost: $25,800

The structure has a reinforced concrete foundation and floors; steel joist and deck; wood roof. Structure measures 20' x 41.1'. The building originally contained three 150 KW diesel generators when SF-88L was Nike Ajax site. Following the 1965 reconstruction, building was equipped with four 250 KW General Electric diesel generators. A small, sound-proofed operator's office measuring 5' x 8' extends out from the east facade. A cyclone fence-enclosed transformer compound is attached to the north side of the building. It is believed that this generator building sits directly on the footprint of the original 1955 generator building, and that it incorporates the earlier structure's generator mounts, conduit leads, commercial power feeds, underground oil storage tank, and other utilities.

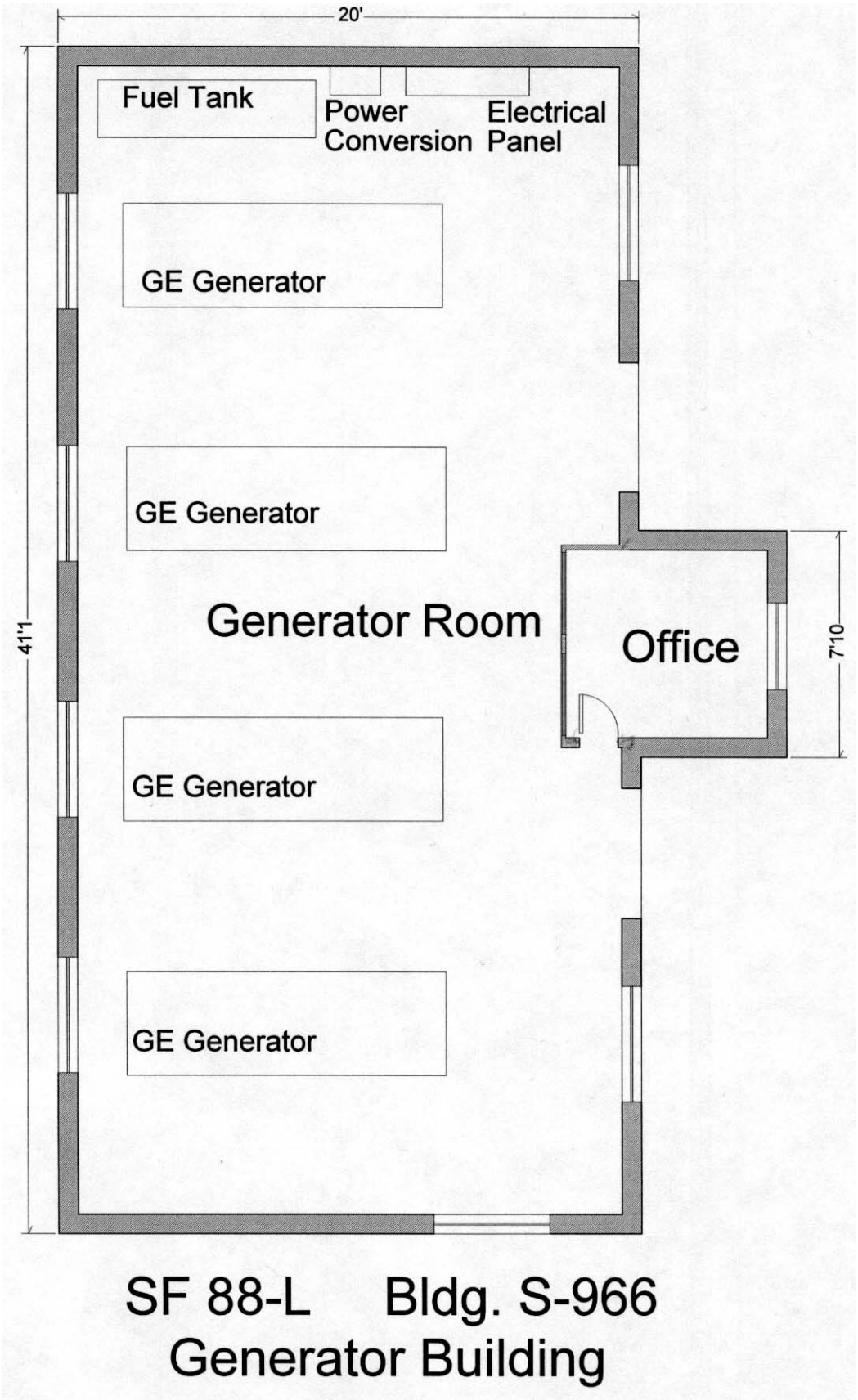
Also known as "Standby Generator Plant," the generator building housed diesel-driven generators for power to operate the area during periods when commercial power was not available. Transformers were mounted outside the building for utilization of commercial power. Commercial power, with electrical converters to change 60-cycle power to 440-cycle power, was utilized where available. Power source switching control also was provided at this point.[91] At SF-88L, the generator building also provided power to the Administrative Area in case of commercial power failure.

Major post-1974 Modifications:

1994 Broken windows re-glazed with Plexiglas

1996 Two power converters installed on old generator pads to provide 400 cycle power.

1996 Step down transformer added to building to provide 110 volt operation



SF 88-L Bldg. S-966
Generator Building

d. Warheading Building (S-967) (LCS FA0967)

Constructed: 1959 Size: 784 sq. ft. Original cost: $25,500

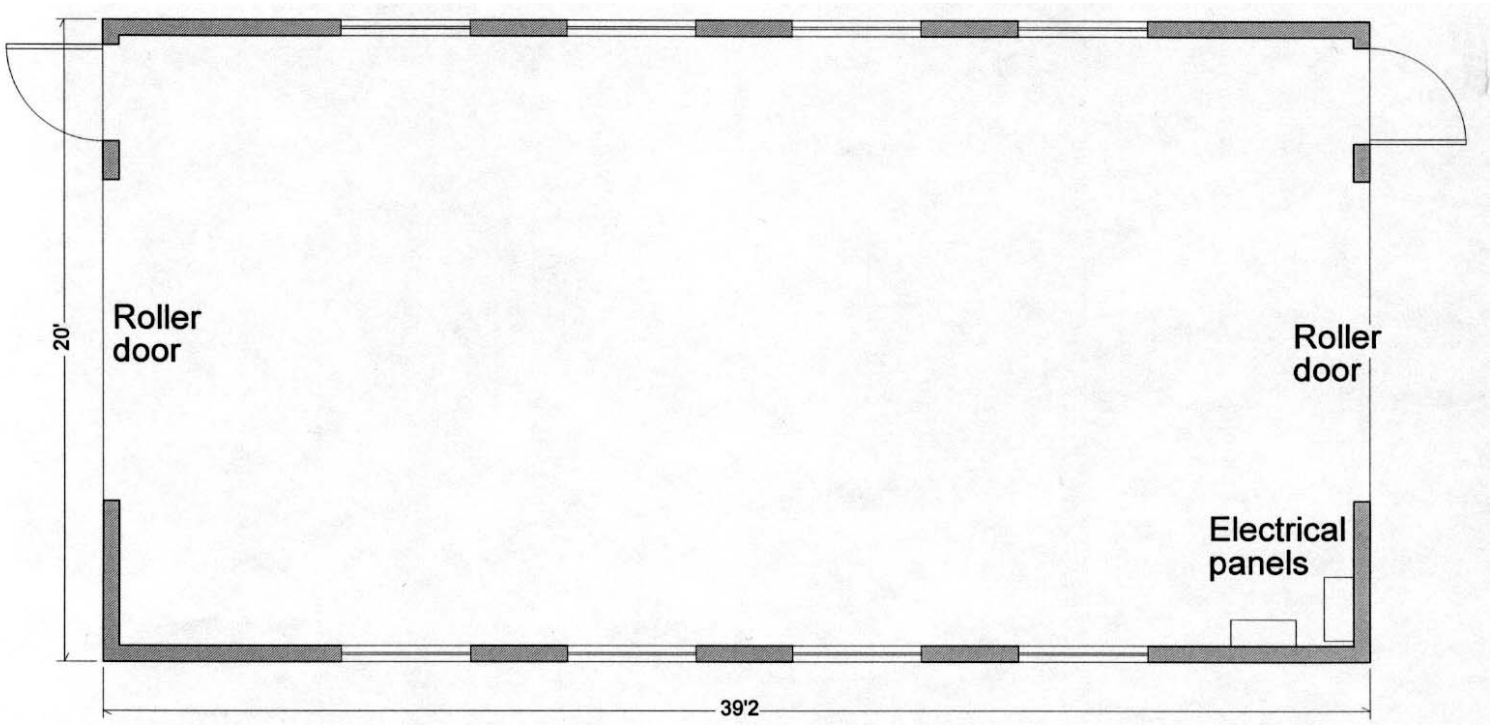
Also known as "Missile Warheading Building." Reinforced concrete foundation and floor; concrete cinderblock walls; tongue & groove wood roof over metal rafters. Structure measures 20' x 39.2'. Building contains a single room used for the assembly and testing of high explosive and nuclear warheads for Nike Hercules missiles.

Interior furnishings were sparse, consisting of a pair of tool racks on the south wall and a work bench on the north wall. A variety of oversized lifting collars and beams necessary for lifting warhead and missile body sections were stowed on the walls. All other special assembly and testing paraphernalia was brought in as mobile equipment.

In 1966 the Army produced a training film at SF-88L "Nike Hercules Missile: Part IV: Preparation of Warhead and Forward Body Sections." There are several exterior views of the Warhead Building in this film. Interior shots, though, are believed to have been shot at another location due to inconsistencies with actual interior of Bldg. S-967 (e.g. single light instead of solid doors).[92]

Colors:
1961 Overall light green including doors and windows and eaves
1966 Same
1974 Light green with dark green trim and doors

Major post-1974 Modifications:
1995 Interior repainted by VIPs
1996 Windows replaced by NPS maintenance.
1997 Personnel doors replaced by NPS maintenance.
1997 Portions of west and east roller doors replaced by contractor (1996 storm damage repairs).



SF 88-L Bldg. S-967

Missile Warheading Building

e. Flammable Material Storage Shed. (S-968) (LCS FA0968)

Constructed: 1955 Size: 42 sq. ft. Original cost: $500

Also known as "Acid Storage Shed" and "Nitric Acid Storage Building." Reinforced concrete foundation; corrugated steel walls attached to 3" pipe columns; corrugated steel roof. Structure measures 6.5' x 6.5'. A three-sided shed, open on the east side, originally used as storage building for containers of inhibited red fuming nitric acid (IRFNA). An "Emergency Wash Station" shower was originally affixed to one corner in case of acid spills. When first constructed, the open side of the shed faced west towards the main road, and metal acid barrels were stacked two high inside the building.

The shed became a "flammable storage building" after the need for liquid fuel ended with the changeover to Nike Hercules missiles in 1959. The building was also reconstructed at about this same time and reoriented with its open side facing away from the roadway.

According to former CWO Terry Abel "At one time, especially in Ajax, they used to store the fuming red nitric acid in there and it was far enough away from explosive handling personnel that in case something happened, in theory, it would dissipate into the air. But it eventually became petroleum products [storage]. We used to keep hydraulic oil in it. We kept grease in it... so it kind of served two purposes. One: early days, fuel and acid. Later days: hydraulic oil and fuel oil products."[93]

Major post-1974 Modifications:

1996 Structure began to collapse and was removed by VIPs as a safety hazard.

f. Underground Missile Storage Structures, Type B
(S-969) (LCS FA0969) and (S-971) (LCS FA0971)

Constructed: 1955 Size: 3,976 sq. ft. each Original cost: $44,400 each

"B" section (above) and "A" section magazine (below)

Each structure measures 56.6' x 60' with attached panel rooms and staircases.

Unlike many Nike launch sites, Site SF-88L had only two underground sections. Originally labeled "East Launcher" and "West Launcher", they were eventually designated "A" and "B" sections respectively. Each section had its own associated launchers, access areas, and underground electrical and hydraulic pumping units. Each magazine pad has a set of double elevator doors that swing down to open. Access to the magazines was originally via two spring-loaded armored "escape hatches," one of which led to the panel room and the other to the magazine proper. Staircases, added in 1964, lead down to main entrances to the magazines, replacing the panel room hatch as the primary place of entry.[94] (Many Nike sites such as SF-89 in the Presidio never received these staircases.)

The magazines at SF-88L are officially designated "CONUS Type B (modified)" and "Missile Launch & Storage Shelter." Informal designations included "A" and "B' Magazines and "A" and "B" Pits. Each magazine is capable of holding ten Nike Ajax missiles (with fins removed) or six Nike Hercules missiles.

Each structure contains a room for storing the missiles (the magazine), an elevator to carry the missiles to the surface for firing, a panel room where the crewmen could take shelter during a launch, and four M36 launcher assemblies - one attached to the elevator and three satellite launchers mounted on the surface. When the elevator was in its lowered position, a two-man crew pushed a missile and booster "round" from the storage racks onto the launcher on the elevator. When the elevator was raised, the missile and booster on the elevator could be pushed from the elevator launcher (designated Number 1) along above-ground racks to any of the three satellite launchers.

Crewmen could operate the elevator, which could be raised, lowered or stopped, either from a master panel in the magazine room or from controls on the elevator. Hydraulic power operates the elevators as well as the steel elevator doors.

Once the specified number of missiles were brought to the surface and positioned on their launchers the six crewmen retreated to a blast-proof "panel room" located just off the magazine. There, via a section control group panel, the missiles could be selected for launch and erected to firing position. If a launch order came, the missiles could be launched either from the control area atop Wolf Ridge or, in an emergency, from this panel.

When first constructed in 1954-55, the magazines contained special handling and safety equipment for use with Nike Ajax missiles. These features included launchers and storage racks designed only to handle Nike Ajax; four "emergency wash station" showers inside each magazine; heavy-duty air ventilation and ducting systems for evacuating nitric acid or hydrazine fumes; a fin rack for detached booster fins; and an overhead "I" beams and chain hoists for servicing Ajax missiles.

In 1958 both structures were extensively remodeled for storing and firing Nike Hercules missiles. Modifications included replacing all launchers and storage racks with "universal" launchers and racks capable of handling both Nike Ajax and Nike Hercules missiles; alterations and reinforcement of the elevators to withstand the increased weights of the universal launchers and Hercules missiles; addition of drains to elevator doors; removal of safety showers; and removal of overhead chain hoists.

Furnishings/Equipment:

When first completed as a Nike Ajax magazine, this pit would have contained ten Ajax rounds, five on each side of the elevator. Rails and launchers were Ajax pattern rather than the existing Universal style. Four emergency showers with pull chains were attached to the walls at the four "fire points". The showers were removed as part of the Hercules "improvement" program of 1958. The stub ends of the pipe "T"s for these showers are still visible. A traveling chain hoist for servicing the Ajax would have been affixed to the I-beam to the left of the elevator. A fin rack for disassembled fins would have also been located here, along with three launch control indicator (LCI) panels.

Terry Abel described the pits appearance during his tour of duty: "We'd have six [Hercules] missiles down here. You'd have cables laid up on the floor between the test stations. Each missile was kept warm, and that launch control indicator [LCI], we used to have three of them down here. In the main magazine as you could tell there is enough warnings, cautions, you don't need anything else distracting your eye. When you walk in it should be neat and clean, like this one is, with the appropriate cautions and warnings because, like any profession, you stand a chance of getting hurt. You need to know where all the warning points are."

Colors:

"A" Section's magazine walls are currently painted overall light green to height of approximately 6 feet above the floor, then white to the ceiling. Ceiling is also white. A black trim approx. 4" high follows the entire baseboard. Red and yellow safety warnings and "fire Points" appear on all walls, along with black stenciled instructions for "First Aid for Electric Shock." The coming around elevator opening is Safety Yellow, as are handling rack feet and other protruding areas. Racks, launcher, PA speaker are all painted olive drab.

The elevator itself is currently all yellow. Color slides taken in 1975 show that it was once overall "equipment gray" color with yellow safety trim approx. 6" wide. Personnel doors are all painted dark blue.

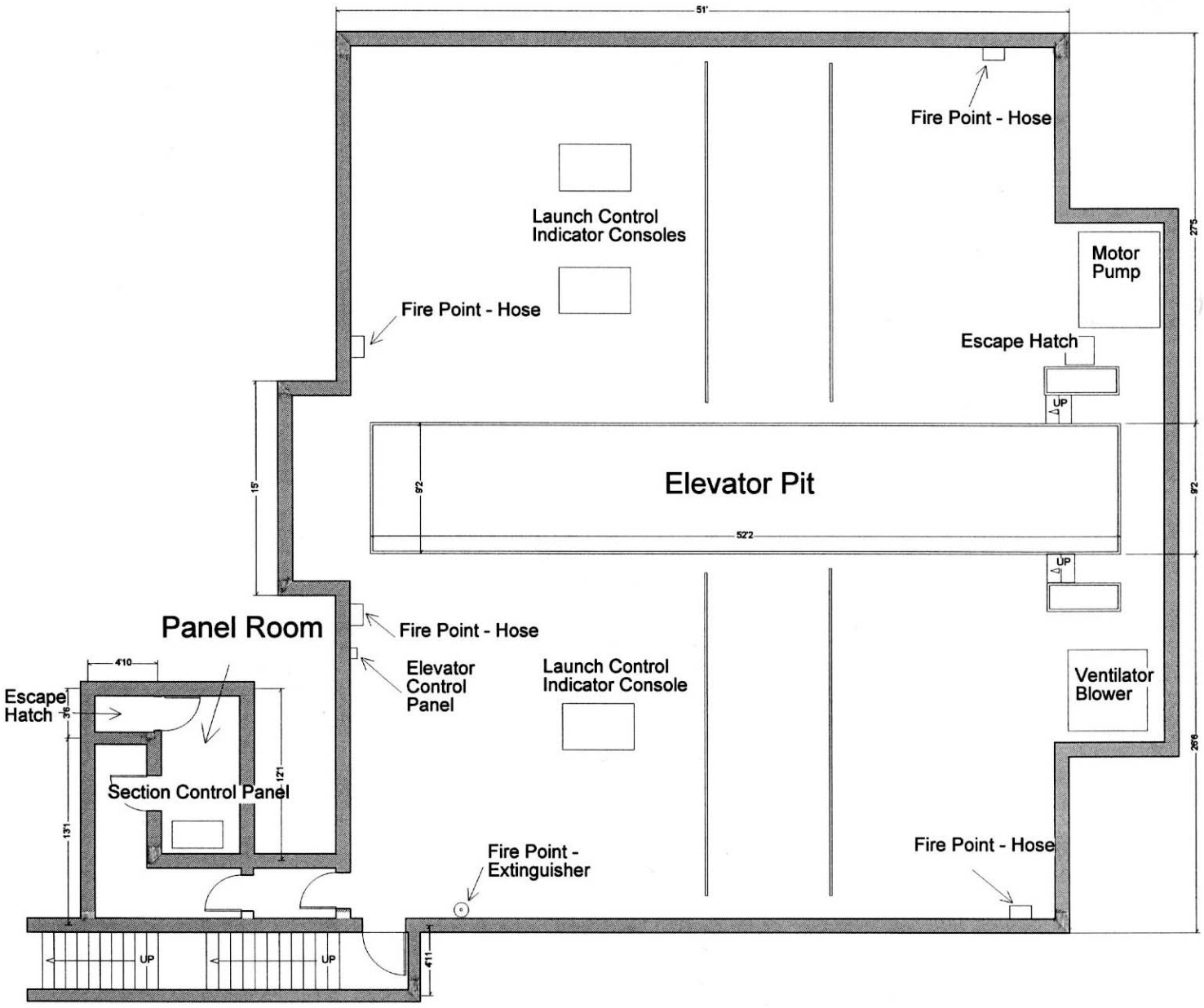
Panel room colors repeat the magazine, except that the light green color only reaches a height of about four feet. Originally, the entrance hall to the panel room was covered with asbestos cement acoustic tile. These were alternately painted white and light blue in a checkerboard pattern. Selected panels were customized by crewmen with three repeating images: a Snoopy dog, a cocktail glass, and the Playboy "bunny" logo. These were removed

in 1992 during an asbestos abatement project, but representative panels of each design were saved for the park museum collection.

Terry Abel continued with his memories of color schemes: "The Army in those days was into the two basic colors: eggshell green, which is this green color and you can get it by the ton, and white. The ever popular hospital white, which makes you feel like you are in a hospital. Every now and then, we did allow some of the crews to kind of personalize their pit for *esprit de corps*. You had a group of hotshots that were real good and they passed all of their inspections and they were good, and they knew they were good, yeah, we would let them sometimes paint an appropriate mural on the wall or something like that. But for the most part, pits were all white, or half green and half white. ...

"Every now and then, it seems like you always have the resident artist in a section and they used to personalize it a little bit. They would spend a lot of time down here, and within good taste and Army regulations we let them do a little personalization down there. Like I said, it was good for morale. My attitude on it, quite frankly, was it didn't hurt anything. As long as it was done in good taste. ..."

"B" Magazine differs greatly in color. The walls are dark green-gray higher up towards the ceiling than found in "A" pit, and there are minor differences in stenciling patterns. The personnel entrance staircase walls are medium blue with stenciled "psychedelic" white stars. The Panel Room hall acoustic tile panels were painted alternating yellow green and dark green in a checkerboard pattern. These were also removed in an asbestos abatement project. The Panel Room itself was dark green and yellow green**.** These were also removed in the 1991 asbestos abatement project. A unique feature of A magazine is a Confederate "stars and bars" battle flag painted on the overhead in the magazine room.



SF 88-L Bldg. S-969 ("A" Magazine)
Missile Launcher & Storage

(Typical of both sections)

g. Sentry Station - Main Gate (S-970) (LCS FA0970)

Constructed: 1959 Size: 39 sq. ft. Original cost: $2,000

Also known as "Guard Station" or "Sentry Post." Reinforced concrete foundation and floor; cinderblock walls; flat wood roof. Structure measures 5.4' x 7.4'. This station was manned by MPs during daylight hours. All arriving personnel checked-in at this station where they provided identification and received blue-colored colored security badges allowing access to the "Limited" area, i.e. that portion of the compound between inner and outer security fences. All flame producing devices had to be deposited here, even non-functioning ones.

Ron Parshall remembers the tight security surrounding smoking: "Smoking was death. I imagine you could smoke, but once you got towards the guardhouse, you had to put anything that would light a fire in a bucket that they had there right next to the gate and then you could walk in. But, if you ever got caught with a Zippo [lighter] or anything like that, that is just as about as bad as being AWOL. You're gonna serve some time doing something. They would KP you. Whatever they got for you. Plus it would go on your record."[95]

Furnishings and Equipment

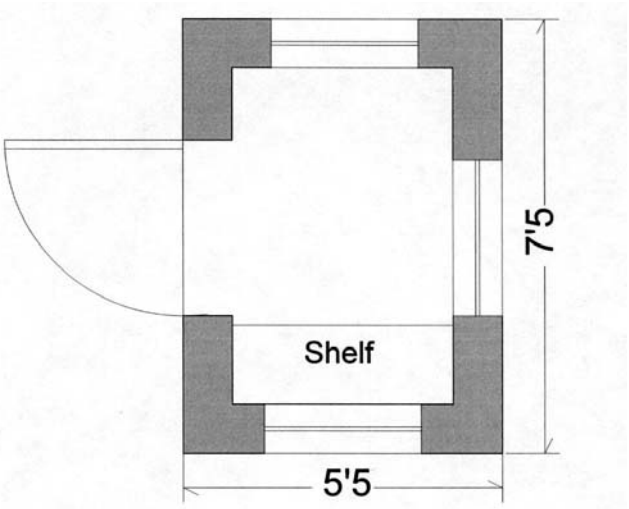
As near as can be determined from interviews with MP personnel, this guard station contained only a chair, a built-in plywood shelf desk, a rotary phone and hooks where clipboards could be hung.

Colors:

1963 Overall light green
1967 Medium green walls with light green trim
1974 Light green walls with dark green window trim and light green eaves

Major Alterations since 1974:

1990 New door installed by NPS Maintenance.
1991 Re-roofed.



SF 88-L Bldg. S-970

Sentry Post -
Main Gate

h. Flammable Storage Building (S-972) (LCS FA0972)

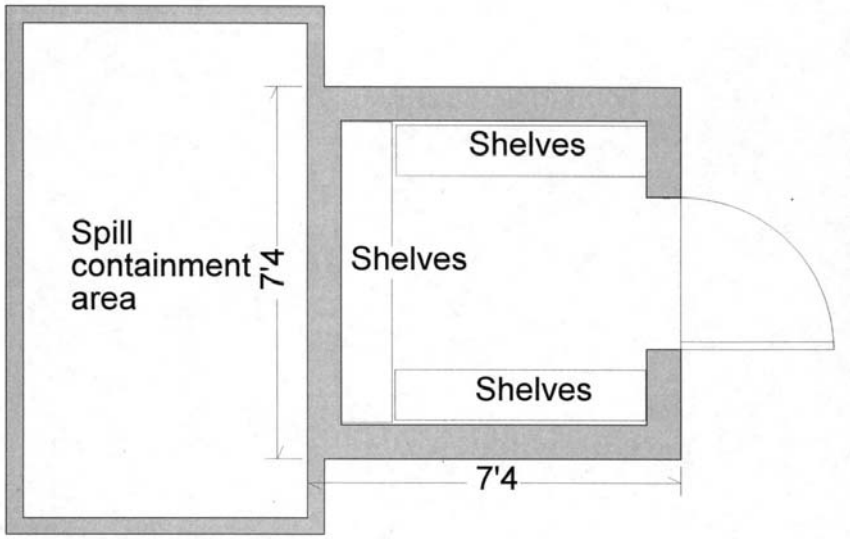
Constructed: 1959 Size: 54 sq. ft. Original cost: $1,800

Concrete block foundation and walls; wood line walls; wood roof. Structure measures 7.3'x7.3'. Structure contains wood shelves on three sides.

In 1961, a concrete "spill containment enclosure" with beds for three 55-gallon drums was constructed on the west side.

Building is unaltered since 1974.

Colors:
1961 Overall light green
1965 Overall light green
1967 Medium green walls with dark green doors and trim
1974 Light green walls with dark green door and light green trim.



SF 88-L Bldg. S-972

Flammable Materials Storehouse

i. Dog Kennel Storage Shed (S-974) (LCS FA0974)

Constructed: 1964 Size: 128 sq. ft. Original cost: $5,000

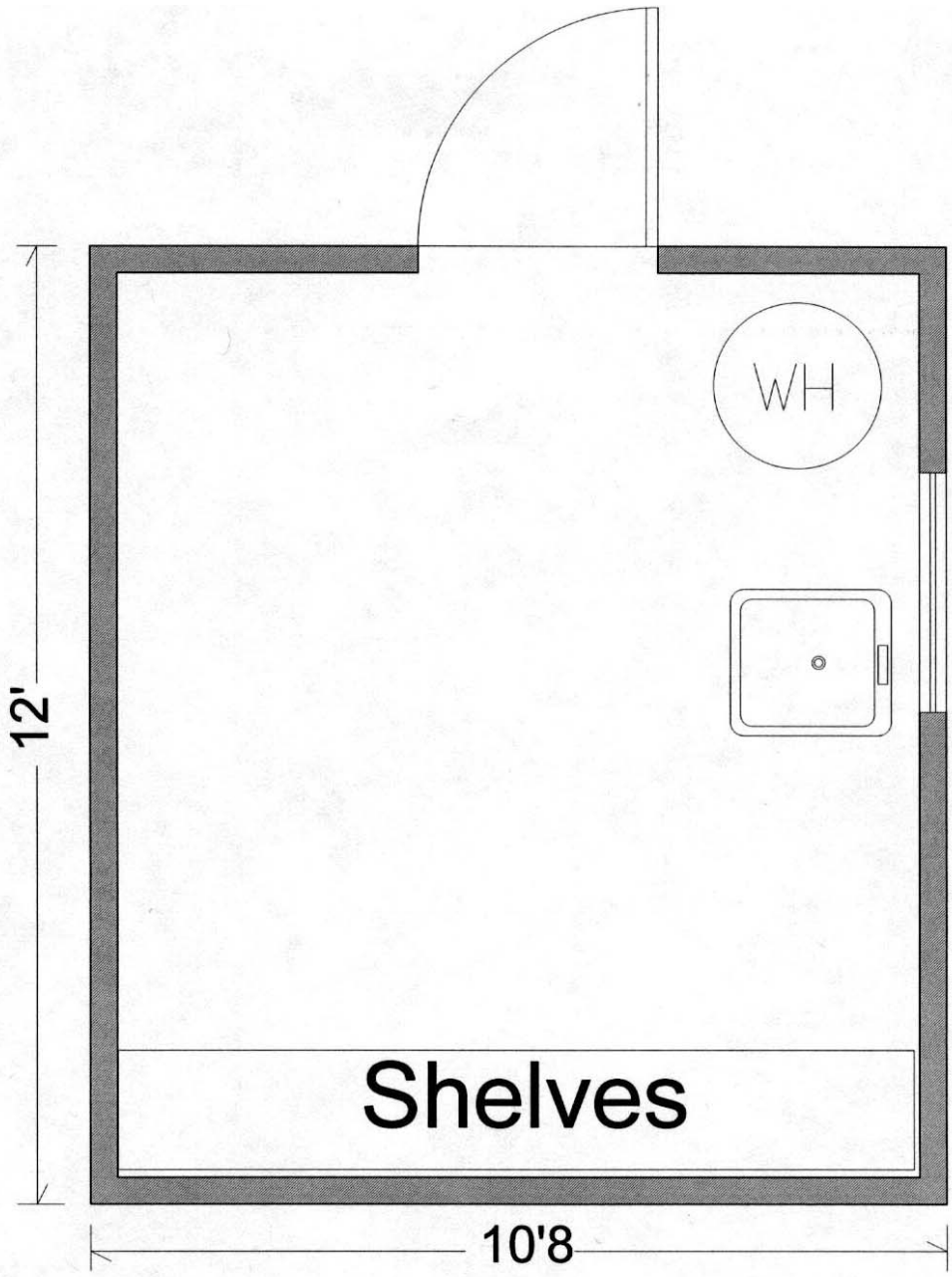
The Storage shed is a prefabricated metal building measuring 10.7' x 12' on a reinforced concrete foundation and floor. It is in same general location as a temporary plywood storage shed constructed circa 1959 for same purpose. Military Police dog handlers used the shed for storing dog food, grooming supplies, leashes, choke chains, training aids and other materials associated with the sentry dog program. Structure contains a single room with shelving on one side. Originally contained a hot water heater and wash sink (now removed.)

Guard dogs were an important part of a Nike missile site's security system. MPs and dogs constantly patrolled the launching area. At SF-88L, the kennel was a small, four-cage compound surrounded by inner and outer perimeter fences. A small Storage building nearby contained dog training supplies, equipment, food and grooming supplies. Adjacent to the kennels, handlers built a dog training area equipped with jumps and obstacles.

One interior wall has a large sign painted on its wall for "Sentry Dog Equipment" with hooks for hanging leashes, chains, food pans, muzzles, collars, combs and brushes. The opposite wall has the outline of four Snoopy dogs labeled with the names of the dogs last assigned to SF-88L: Ring, Baron, Prince and _____.

Major post-1974 Modifications:

1995 VIPs preserved the structure by repairing rusted wall surfaces and foundation skirts with Penetrol and “Bondo” patching material. New concrete foundation skirt was also poured to encapsulate treated bottom edges of wall panels.



SF-88L Bldg. S-974

Dog Kennel Storage Shed

j. Dog Kennels (S-975) (LCS FA0975)

Constructed: 1959 Size: 218 sq. ft. Original cost: $3,400

Concrete foundation and floors; cyclone fence walls; aluminum roof (later replaced with translucent corrugated fiberglass); plywood dog houses. Structure measures 12’ x 20’. Complex consists of four adjacent sentry dog kennels, each with its own attached dog house, separated from each other by cyclone fencing and wire mesh screens. Kennels are surrounded by an exterior cyclone fence measuring 50’ x 60’.

When first completed in 1959, the kennels were unroofed. Within a couple of years, though, a roof was added composed of corrugated plexiglas panels on a wooden frame. The perimeter kennel fence has black-painted corrugated metal panels attached with wire ties on all four sides. These panels were probably installed to prevent dogs from being distracted or agitated by adjacent training exercises.

Major post-1974 Modifications:

1994: Corrugated fiberglass roof panels replaced. Dog houses re-roofed. Cyclone fence panels treated with Penetrol.

1994-1995: New dog jumps, hurdles, obstacles, etc. constructed by VIPs.

1996: All corrugated fence panels repainted by Boy Scouts.

k. Sentry Station - Exclusion Area Gate (S-976) (FA 0976)

Constructed: 1959 Size: 95 sq. ft. Original cost: $3,600

Reinforced concrete foundation; wood floor; wood framing and walls; tongue & groove wood roof. Structure measures 8.3' x 11.4'. This guard post was manned 24 hours / day by MPs. Personnel desiring to enter the exclusion area checked in here and exchanged their blue colored ID tags for red ones before entering the launcher area. MPs controlled electric gate locks, perimeter locks and ADT system from this building. Dog handlers frequently stayed in this building at night, letting their sentry dogs run loose within the limited area despite a standing rule the animals would be kept on leads at all times.[96]

Former CWO Terry Abel describes the interior of the building: "Two MPs on duty in here. This is where one of two ADT panels would have been. There is normally a matching duplicate control in the ready building. Everything had a backup in here as far as security. We had a two-badge system, we had two ADT panels, we had dual switches. In case one failed and did not go off, the other one would. We had a backup for everything and that would vary and correctly so that if something happened we would know about it one way or another and it worked. And [this building] was an authorized smoking area. See the kind of funny looking wired box above by the door? That would have been a[n electric] lighter, the switch is here."

"And you notice the building's 'Dutch door.' If the Platoon Leader was down and had something he wanted to put it out without coming inside and disturbing operations, they would have just passed it through here. But normally we were to have given out badges through this window and they have the little shelf for visitors to sign and the ADT panel

wiring is right down in here. [Indicates a rack of five small pipes about 2.5" diameter.] A back-up power supply would have been here because the ADT system had its own power supply. So, if we lost power on site, we still had security down here and that pretty much looks like it.

On telephone communications: "There were phones in each room in the pits and you could call up here. The exclusion area had temporary field phones. They were hooked up in here. The Ready building had security phones hooked up in here."

On entry into the exclusion area: "[This is the] personnel access gate. This is the way that you would have gotten into the launch area and normally if you notice we used to have a buzzer. This would have been hooked to an electrical switch, you got your badge and it would be closed. Either one of two things would have happened. If it was working, they would simply hit a buzzer and the gate would open, or they would unlock it, you'd enter, you pull it closed and it would be secured. If you wanted to get out and they were doing something else, you would be going [Mr. Abel waves his arms] trying to get out.

"In the other system they actually, physically, kept it locked. One of the MPs would come out, walk up here, open up the gate and let you in. I don't think security was ever lax on any site where it was just left open. It just didn't happen. I mean, they might as well have sent the MPs home if you are going to do that."

One memorable feature long-associated with this post was a tiny drone airplane mounted atop its roof. The plane, officially known as a Remote Control Aerial Target (RCAT) drone, had been unofficially awarded to A Battery for outstanding performance during an annual firing practice at McGreggor Range. The unusual trophy stayed at the site until the unit departed in 1972.[97]

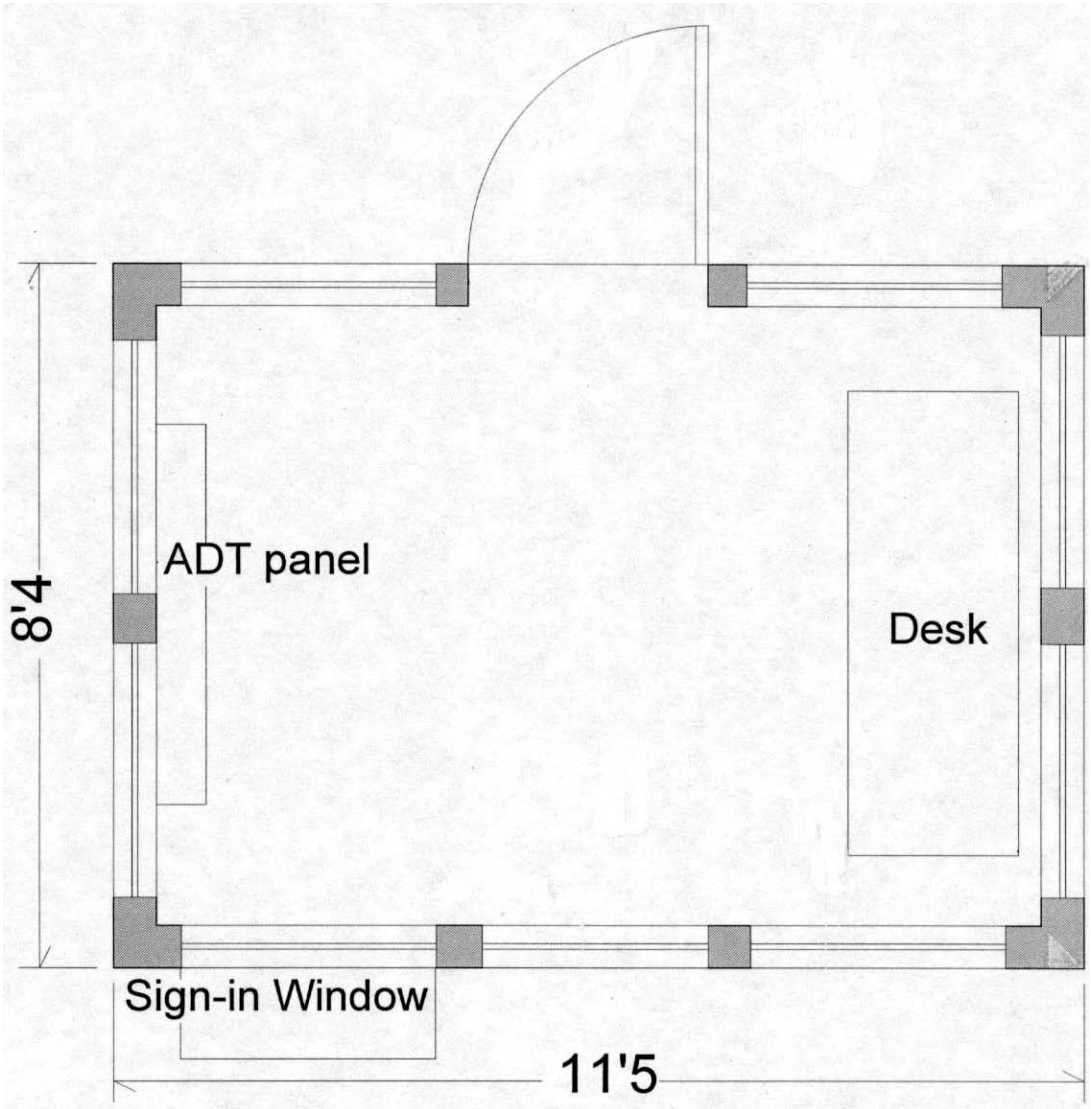
Furnishings:

Major post-1974 Modifications:

1986: Building repainted by SWAP (Sheriff's Work Alternative Program) offenders
1992: Windows re-glazed with plexiglas and door replaced by NPS Maintenance.

Colors:

1959 Overall light green
1965 Overall light green with dark green contrasting trim. RCAT mounted on roof
1974 Medium green walls with dark green doors, windows, trim and eaves.



SF 88-L Bldg. S-976

Sentry Post

Exclusion Area Gate

l. LCT van

A Launch Control Trailer (LCT) served as the central communications facility at each Nike missile launching area. During alerts and launch drills, communications between the launching area and the IFC passed through this small magnesium van. LCTs were provided with wheeled truck assemblies, but these wheels were removed when the vans were installed at permanent Nike sites.

The LCT at SF-88L has been in three different locations. In 1954, when the first field emplacements were constructed, the van sat near Rodeo Lagoon adjacent to Launch Section No. 2. During construction of the permanent launching area, the van was briefly moved to location on Field Road just south of the new launchers. (Today this area is known as Lower Fisherman's Parking lot.) It remained there until shortly after the permanent launchers were completed, at which time it was moved into the launching area to a site just inside the gate.

The LCT at SF-88L sat upon a concrete "van pad" designated Bldg. S899. This pad, approached by a short asphalt walkway, was constructed in 1962 at a cost of $200.

When the Army transferred SF-88L to the National Park Service in late 1974 they left behind a 'cannibalized' LCT body on the van pad. This van, stripped of all storage cabinets and communications gear, is not believed to be the actual LCT used at the site but an excess one chosen by the Army for display purposes.

All that remained inside the LCT body at the time NPS assumed control of the site were an empty heater cabinet and the worktable with attached stool. At the time of this writing,

this van is still located on pad S899. It is not considered to have any historic significance to SF-88L.

Interior furnishings and equipment:

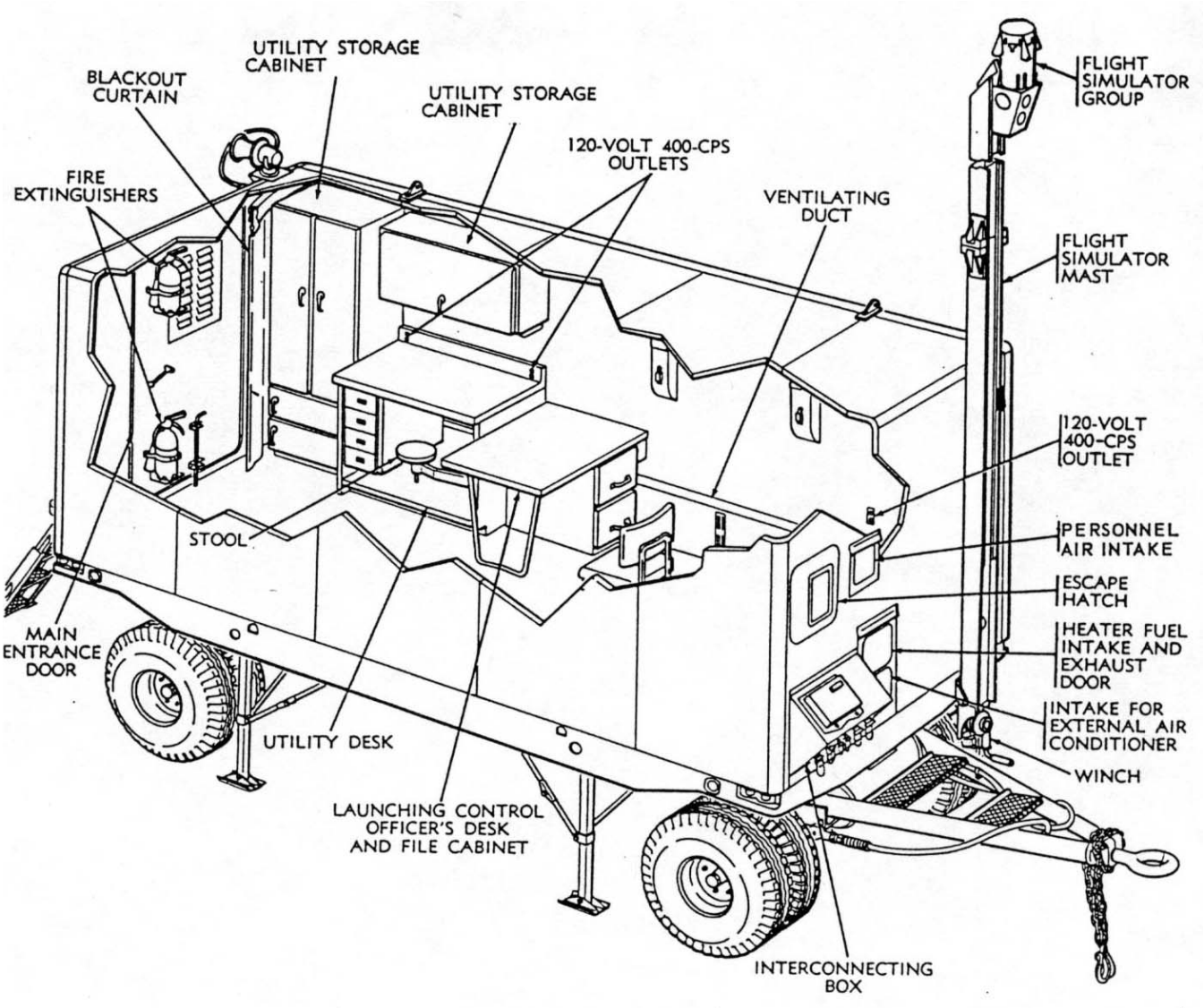
Telephone switchboard, launch control panel, heater/air conditioner cabinets, storage cabinets, flight simulator, simulator mast assembly, warning siren, and a small work space consisting of a table and swing-out stool. (See attached drawing)

Colors:

1959 White
1961 White
1965 White
1967 OD Green
1974 OD Green

Major post-1974 Modifications:

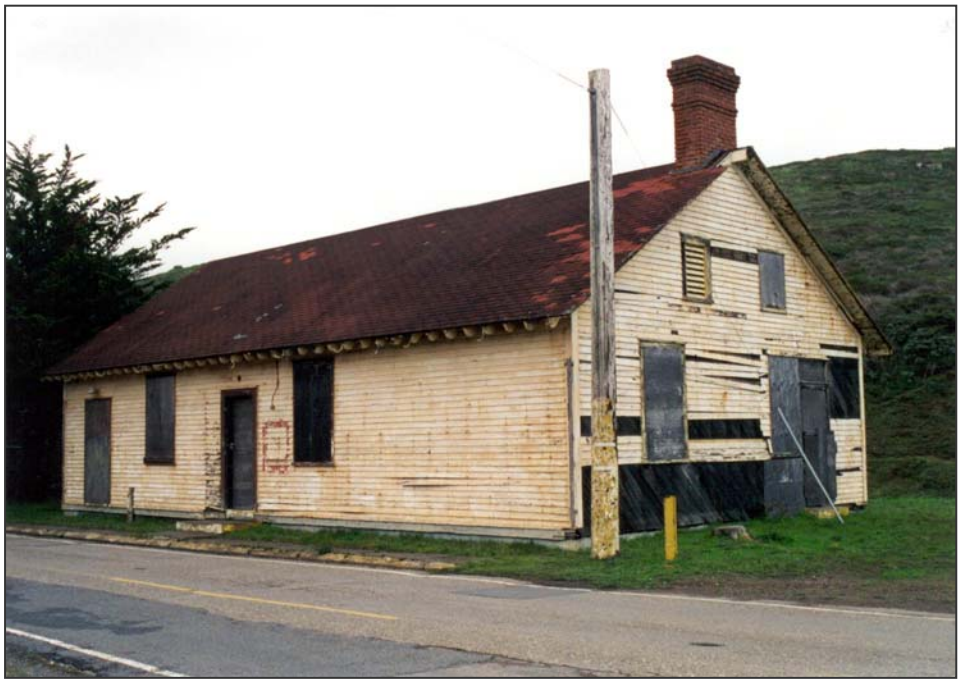
1990. Van repainted in non-historic “faded olive drab” color by NPS contractor.
1994 Roof treated with waterproofing sealer by VIPs.
1997 Roof treated again and body repainted white by VIPs.



Cutaway view of a Launch Control Trailer (LCT). Wheels were removed from LCT vans at permanent Nike launching areas such as SF-88L.

m. "Ready Building"

Constructed: 1907 Remodeled: 1958-59 Size: 1,412 sq. ft. Cost: unk.



Every Nike site provided a space or building where missile crewmen waited to be called for drills or alerts. These ready buildings, sometimes called ready rooms, were especially needed during 'hot' status when crewmen had to respond immediately to the magazines and be ready for launch within 15 minutes. At most Nike sites the ready building was a vernacular, one-story structure with cinderblock walls. It usually included a squad room, a dining area, a day room, latrine and utility room.

Crewmen at SF-88L never enjoyed the luxury of a specially-designed ready building, although just such a structure was supposed to have been provided for the site in 1957 and again in 1972. Neither building was constructed, though. Instead, the old Fort Barry bakery on Field Road (Bldg. 962) was converted into the launching area's ready building. This wood frame structure, constructed in 1907, measured 28' x 51' with an attached utility room.

Plans for the building's conversion specified that its interior be divided into four spaces: an office for the Duty Officer, a latrine, a ready room and a squad room. The last room was to be provided with a dozen bunks and lockers, affording each soldier in both of the six-man crews his own place to sleep and stow his gear.[98]

Ron Parshall, who served as an ADA missileman at SF-88L in 1961, remembers the ready room: "We would be here all the time until we were off duty. It would be a full crew. Both sections would be ready, and that was a problem too because at night we would have to be close enough to the missiles so we slept in that little building above the launching area

[Bldg. 962] and when you have two crews in there and you only got five beds there's not enough room. So, everybody else sleeps on the couch. And the MPs from the Presidio used to patrol out here all the time so they would be in there, too, half the time because we had coffee and doughnuts. We had a very good cook when I was here and when we were on 'hot' he would always arrange, you know, about eleven, twelve o'clock to take [us] some cake, cookies or something like that, plus coffee. It was very nice. He didn't have to, you know. (Chuckles)."[99]

Unlike many ready rooms, though, the 1958 remodeling plans for the building fail to show any cooking facilities. This was probably due to the close proximity to the mess hall at the administrative area, and the willingness of the battery cook to bring chow to the launcher crews.

Terry Abel described the building in the early 1970s: "Normally, [the ready room] had a pool table, we almost had like a little game room, had a TV actually, some of them had Coke machines... As close, as comfortable as we could make it, we made it. For the simple reason that we didn't always have our full complement of troops and a lot of guys worked a lot of twenty-four on, twenty-four off and when you are spending fifty percent of your life in one of those buildings you want as many comforts as you can provide. It is good for morale. Ping-Pong table, pool table, almost for sure a pool table, and a TV for sure, and probably a radio, and that is about as much as we could afford out of health and welfare."

The squad room would have been initially furnished with folding end bunks or the World War II pattern, double-tiered with pipe metal "bunk extenders." Following 1967 it is likely these beds were exchanged for the new, wider, rigid bunk style adopted that year. Lockers would have been stand-up, free standing metal wall lockers with single doors. The ready room itself was generally furnished with a pool table, water cooler, coffee maker, ping pong table, television, couch, chairs, and various tables. These furnishings were generally a mixture of "issue items" and civilian equipment; crews were notable for creatively decorating their environments. The Duty Officer's office, by contrast, was an austere room furnished with government issue desk, chairs, filing cabinet and a few chairs.[100]

One important detail included on the plans are the paint schemes specified for the ready room. Although it is not proposed to preserve or interpret the interior of this structure, the color specifications and their corresponding Federal Standard Numbers (FSN) may be useful in other preservation projects at the site:

"Color numbers refer to Federal Standard No. 595B, March 1, 1956.
14491 - Light green blue, gloss
27855 - Eggshell white, semi-gloss
26555 - Light gray-brown, semi-gloss
36555 - Light gray-brown, flat
37855 - Eggshell white, flat
23727 - Light cream, semi-gloss
24491 - Light green blue, semi-gloss"[101]

n. Fences and Gates

Gate in "Limited Area" fence leading to Battery Alexander

The launching area was provided with a perimeter security fence from its earliest days. In fact, the first plans located for the permanent SF-88 site provide specifications for fence and gate details to be used at the control and launching areas. Originally, the launching area fence was a 6' high cyclone fence topped with three strands of four-point galvanized barbed wire on stretchers angling 12 inches outwards from the fence, and conforming to type FE-6 on those plans.[102]

Two gates were initially provided in this perimeter fence. The main gate (Bldg. S886) was located on Field Road at the north end of the area. The other was at the southwest corner of the site on the road leading to Battery Alexander (Bldg. S885). Both were 10' wide double swing gates with center plunger bars.[103]

During the "Nike Improvement Program" of 1958, the fence at the main gate was slightly lengthened and reconfigured, and the existing double gates reinstalled about 20 feet north of their original location. (This new fencing can be distinguished from the original by its supporting poles. The original 1955 fences and gates used tubular steel poles, while the newer fence in this area is attached to steel "H" columns.[104]) During this rebuild project, the existing sentry building was constructed.

Also during 1958, a personnel gate was added to the perimeter fence behind Bldg. 960 on Field Road. This gate (Bldg. S882) led to a wooden staircase and path leading downhill to the launchers, and was designed for use by crewmen responding from their ready room at Bldg. 962.[105]

The Army constructed an additional, inner security fence during the 1958 project. This cyclone fence, known as the exclusion area fence, was similar to the existing fencing around the perimeter, or what was now known as the Limited Area Fence. The new inner fence had three gates: two at the north end of the exclusion area (Bldgs. S880 and S881) and one at the southwest corner that aligned with the Battery Alexander Gate (Bldg. S885). The two gates at the northern end were 12' wide roller gates that flanked the new Sentry Post building, one gate for each of the two access road leading to the launcher sections, while the Alexander gate was apparently a simple 10' double swing gate. In 1959, the 12' gates were replaced by 14' gates.[106]

A dog kennel area and adjacent exercise compound were also constructed during the 1958 improvement program. This new compound was also enclosed by cyclone fence, similar to the rest of the limited area fence design. The kennel area measured 125' x 250', and formed a rectangular addition to the southwestern corner of the launching area. Within this enclosure, a separate inner fence measuring 50' x 60' surrounded the dog kennel building. This inner fence had its own personnel gate (S884)[107]

The Army decided that the original 6' fence height was too short to provide adequate security, and most fence posts on the limited area and exclusion area fences were lengthened by welding on 1' extender sections. Although no documentation has yet been located, it is believed that this occurred sometime after 1961 since photographs taken that year still appear to show the fences at their original 6' height.[108]

The limited area fence line remained relatively unchanged until the early 1970s when the western portion of the fence was realigned. The fence originally dipped down into the valley below the launching area, but during its rebuild it was moved to the top of the small berm constructed along the top of the slope as a water diversion dam.[109]

About this same time, several alterations were also made to the exclusion area fence. Sometime between 1972 (when the last base map was prepared) and inactivation in August 1974, two of the vehicle gates were removed and replaced with solid fencing, and a new personnel gate added behind the sentry building. The two demolished gates were the eastern sliding gate at the sentry post (Bldg. S881) and the double swing gate leading to Btry. Alexander (S885). The new personnel gate did not receive a number.[110]

Another undocumented gate was also added to the kennel area, possibly as part of the realignment of the limited area fence described above. This gate, located at the head of the sidewalk leading to the kennel area, restricted access to the training compound. The gate is oversized for its location and is probably a "recycled" gate from some other place.

2. Control Area: SF-88C

The Integrated Fire Control (IFC) area atop Wolf Ridge is officially designated SF-88C. Referred to by site personnel alternately as "Control" or "the IFC," SF-88C was first established in 1954 as part of the temporary Nike I missile battery at Fort Barry.[111] The site was improved and modernized over the years, but remained in its original location throughout SF-88s operational years.

The control site was originally arranged with its radars in a "T" formation conforming to US Army Air Defense standard plans, with the TTR, LOPAR antennae and MTR arrayed in a north-south line at the summit of Wolf Ridge.[112] To the east of the radars, forming the stem of the T, sat the Battery Control (BC) van, the Radar Control (RC) van, and a spare parts van. Behind the vans was a concrete surfaced enclosure for a portable generator and its transformers. Further east was the first permanent building at the site, a cinderblock ready building erected in 1954 for the radar crews. The last structure at SF-88C in its field arrangement was a tall metal antennae atop a concrete column. Known formally as a collimation mast (and informally as a "bore sighting mast"), the IFC crewmen used this mast as a fixed reference point for calibrating their radar antennae.[113]

This simple configuration remained at SF-88C through 1956 when, following completion of the SF-88L launching site, the IFC area was also modernized with the addition of permanent roads and structures. During this upgrade of the site, several improvements were made to make the entire facility more durable and livable:

- New concrete pad for LOPAR acquisition radar
- New concrete pads for BC van and RC van
- New interconnecting concrete corridor between the two vans
- New generator building and transformer pads
- New asphalt road surfacing and concrete sidewalks.[114]

The most conspicuous alteration at SF-88C occurred with the change over to Improved Nike Hercules in the early 1960s, and the corresponding installation of High Power Acquisition Radar (HIPAR) equipment. As noted previously, the most striking feature of HIPAR was a 50' tall tower and dome that dominated the IFC area. In addition, a separate operating building was also constructed to hold the new radar's operating equipment. The existing generator building at the IFC had to be enlarged to handle the additional power load.

By the end of 1961 the following changes had occurred at SF-88C:

- New HIPAR tower and radar installed
- New HIPAR operating building constructed
- New pads constructed for LOPAR, MTR, and TTR radars
- Target Ranging Radar (TRR) added to IFC site
- Generator Building and Interconnecting Corridor Building enlarged
- Two new helipads constructed

Integrated Fire Control (IFC) site SF-88C about 1970. The large dome at center shelters the HIPAR (High Power Acquisition Radar), while the smaller domes cover, from left to right, the TTR (Target Tracking Radar), TRR (Target Ranging Radar) and MTR (Missile Tracking Radar). On the knob at the far left is the bore-sighting mast. Following the Army's departure, this location came to be known unofficially as "Hill 88."
(Golden Gate National Recreation Area, TASC Collection)

- New repair shop building constructed
- Sentry post and main gate moved[115]

By the time this modernization was completed, the radar site contained five radars antennae of varying sizes, each enclosed in a white, weatherproof geodesic dome. Through the 1960s and early '70s, the public came to associate these "golf balls" with military presence in the Headlands, even if they weren't quite sure exactly what they were used for.

In addition to the domes, SF-88C contained a vast array of structures. A 1970 base map for the IFC listed 36 structures, ranging in size from the immense HIPAR tower to minuscule features such as drain sumps and abandoned radar pads.

Once the HIPAR project was completed in 1961, few major external changes occurred to highly visible radars and other IFC structures until the site's inactivation in 1974. Although the Nike Hercules and its IFC systems continued to be upgraded and improved, most of these were technological changes generally confined to the interiors of missile bodies and electronics consoles.

3. Administrative Area: SF-88A

The administrative area for SF-88 has been located in three different complexes of buildings at Fort Barry. Originally, when Battery A of the 9th AAA Battalion arrived in late 1954, they billeted in Bldg. 942 at Fort Barry. This three-story wooden building on the main parade field was originally constructed in 1907 as a barracks for a company of coast artillery troops. When Capt. Paine and his men occupied the rambling building, it contained all operations associated with an Nike administrative area: battery headquarters, mess hall, offices, day room, NCO quarters and enlisted men's barracks.[116]

Battery A remained at the old Fort Barry barracks for at about three years, but eventually moved into the cantonment of World War II buildings near Battery Mendell when the antiaircraft gun battery that had been quartered there departed. (It is believed the move occurred sometime in late 1957 since Battery A was still in the coast artillery barracks when the commanding officer, Capt. Henry Paine, departed in the summer of that year.[117]) The administrative functions had definitely moved into the World War II buildings by 1958, since plans for the Nike Hercules improvement project at SF-88L call for new communications links to be made to the battery HQ in the Mendell area.[118]

There were fourteen buildings in the Mendell cantonment area, but the Nike personnel only used seven of them. These were a mess hall, a headquarters building, a supply room, a day room, and three barracks for EM and NCO quarters. The remaining buildings were apparently boarded up and unused. The only structure specially built for the Nike crewmen was a multi-use athletic court (Bldg. 998) constructed in 1961. Otherwise, these buildings remained relatively unchanged through the mid-1960s.

Crewman Ron Parshall remembers life in the old barracks: "The admin area. All of the office work was up there. They were wooden buildings, two stories high, easier to keep care of than the newer buildings. In newer buildings, you had to polish the floors all of the time because they had floor tiles. These wooden floors, all they wanted was them swept, so that's all you had to do. You would walk into any place and everything would be spic and span. Your bed had to be made properly, and all your uniforms had to be lined up ready for inspection at all times. It had a little area [PX] where they had Cokes, candy, writing paper, stuff like that. [The admin area was] where we assembled in the morning. There are stories of the fog coming down... so thick you could not see the guy next to you."[119]

In 1964, as part of a program to upgrade of Nike living quarters and administrative areas, the aging Mobilization buildings were demolished and replaced with more permanent cinderblock structures. Designed according to the Army's standard plans for "Modified Emergency Construction, Special AAA, for Firing Batteries," these new buildings were replicated around the Bay Area and the country.[120]

The new cantonment, completed in 1965, contained four structures: an administrative building (S981) containing offices, a day room, supply room and hobby room; a mess hall (S983); an enlisted barracks with NCO quarters (S984), and another enlisted barracks without rooms for NCOs (S986).[121] Traditionally, one barracks building was occupied by

SF-88A, the Administrative Area, in 1968. From left to right, the buildings are: administration and day room, mess hall, barracks used by NCOs and enlisted personnel, and barracks for enlisted personnel only. At the top left one of the gun casements of Battery Wallace is visible through the trees, and the buildings of the Point Bonita Coast Guard Station are clustered at the upper right.
(Golden Gate National Recreation Area, TASC Collection)

launching area crewmen and the other by control area personnel. Behind the barracks was the only structure surviving from the old cantonment area - the athletic court. The completed administrative area was surrounded by cyclone security fencing.

The last, and only major, modification to the new buildings occurred in 1971 when the enlisted barracks were remodeled. In their original configuration, these barracks contained open "squad bays" where all the soldiers slept in a common room. During the remodeling, each squad room was subdivided into smaller dormitory-type rooms: eight in Bldg. 984 and twelve in Bldg. 986.[122] This remodeling project was part of a nation-wide VOLAR (Volunteer Army) program aimed at providing increased privacy for enlisted soldiers.

Modifications since 1974:

-1976 Perimeter fencing removed by NPS
- c1980 Buildings repainted by YMCA
- c1986 Addition constructed on mess hall

Endnotes for Part II — Historic Structure Report

[1] Maps, various, showing San Francisco Defense Area antiaircraft installations, dated 1952-1953, in the Fort Point Collection, Drawer 10, Park Archives and Records Center (PARC), Golden Gate National Recreation Area (GOGA), San Francisco, CA.
[2] Manuscript, "US Army Air Defense Fire Distribution Systems," Lt. Col. James W. Loop, USA (Ret.), copyright 1993.
[3] Map, "Position #81, 'A' Btry 740th AAA Gun Bn, Ft. Barry," n.d., circa 1952, in the Fort Point Collection, PARC, GOGA, San Francisco, CA.
[4] Manuscript, "US Army Air Defense Fire Distribution Systems," Lt. Col. James W. Loop, USA (Ret.), copyright 1993.
[5] Photograph, "Major General Hobart Hewett, Commanding General 66h AAA Regional Command ... visit[s] a gun site at "B" Btry, 752nd AAA Battalion (credit: 6th Army Photo Lab)," 20 February 1956, P81-072.15, Golden Gate NRA Collection, J. Porter Shaw Library, San Francisco Maritime National Historic Park, San Francisco, CA.
[6] Document, "Report On Guided Missiles (Nike) Program, Estimate of Construction Program as of 30 June 1953," document in the files of the Office of History, Army Corps of Engineers, Washington, D.C.
[7]Letter, William E. Hunt, CSM, US Army, (Ret.) to Col. Milton Halsey, US Army (Ret.), December 1996, concerning Nike-related activities of 359th Engineer Detachment (Utility) during the period 1952-1956.
[8] Photograph, aerial view of Forts Barry and Cronkhite, CA, 6 January 1954, Marin Headlands Cultural Landscape Report files, PARC, GOGA, San Francisco, CA.
[9] Map, "Advance Plan, Surface to Air Missile Units, Launching Positions, For Fort Cronkhite Control," 5 May 1953, Drawer 246, Folder 2, PARC, GOGA, San Francisco, CA.
[10] Map, "San Francisco Defense Area, Project (SAM), SF-88-C&L, Proposed Temporary Site," 4 January 1954, Drawer 247, Folder 5, PARC, GOGA, San Francisco, CA.
[11] Map, "Sketch Map of Fort Barry - Fort Cronkhite," 20 October 1954, Drawer 246, Folder 2, PARC, GOGA, San Francisco, CA.
[12] Map, "Fort Barry Topography, Vicinity of O'Rourke and Alexander," 9 October 1953, annotated with undated site plans for two launcher sections, Drawer 246, Folder 2, PARC, GOGA, San Francisco, CA.
[13] Site visit by John Martini, NPS, accompanied by Col. Milton Halsey, USA (Ret), July 1997.
[14] Photograph, "Members of an anti-aircraft missile battalion of the 30th Anti-aircraft Artillery Group uncover a newly delivered Nike missile in preparation of a position near San Francisco," 18 October 1954, SC-506857, Dept. of Defense, Still Media Records Center, Washington, D.C.
[15] Site visit by John Martini, NPS, August 1994.
[16] "Pair of 6th Region warrant officers began with guns," *ARGUS Magazine*, February 1972.
[17] Interview with Capt. Henry E. Paine, US Army (Ret.), 13 January 1998.
[18] Letter, William E. Hunt, CSM, US Army, (Ret.) to Col. Milton Halsey, US Army (Ret.), December 1996, concerning Nike-related activities of 359th Engineer Detachment (Utility) during the period 1952-1956.
[19] Photograph, "Major General Hobart Hewett asks about the NIKE from Lt. Colonel Burket, Commanding Officer of the 9th AAA Missile Bn and element of the 30th AAA Group commanded by Colonel P.H. Wallaston," US Army photograph, 28 October 1954, Henry E. Paine Collection, PARC, GOGA, San Francisco, CA.
[20] Photographs, "Fort Barry, Calif., Overlooking the Pacific Ocean is one of the Nike launchers of the 30th AAA Group [etc.] 15 March 1955," (same caption on both pictures) SC-506878 and SC-506879, Dept. of Defense, Still Media Records Center, Washington, D.C.
[21] Plans, "San Francisco Defense Area, Special AAA, SF-88-C, Revised Control Area Site Plan," 21 June 1956, Drawer 246, Folder 3, PARC, GOGA, San Francisco, CA.
[22] Plans, "Conversion of Balloon hangar for use as Armament Shop," 20 June 1953, Drawer 191, PARC, GOGA, San Francisco, CA.
[23] Plan, uncaptioned, showing interior of Fort Barry Balloon hangar with Nike missiles and equipment, undated, Drawer 191, PARC, GOGA, San Francisco, CA.

[24] Site visit by John Martini, NPS, and Col. Milton Halsey, USA (Ret), October 1997. Elsewhere within Wallace are faint chalk markings for "Btry A", "Btry B" "Btry C" and "HQ" that possible relate to the 9th AA Missile Battalion units stationed in Marin.
[25] Plan, "For Ordnance - Wallace and Alexander," n.d., Drawer 327, PARC, GOGA, San Francisco, CA. The plan displays the large notation "Acid Storage" over a portion of Wallace. It is believed to date from before 1955 based upon road arrangements that would be drastically altered with the construction of SF-88L.
[26] Site visit by John Martini, NPS, February 1989.
[27] Drawing, "Fence & Details, Type FE-5, FE-6, FE-7, SF-88-C&L," 2 July 1953, Drawer 247, Folder 6, PARC, GOGA, San Francisco, CA.
[28] Map, "San Francisco Defense Area, Project (SAM), Location and Vicinity Map," 15 December 1953, Drawer 247, Folder 5, PARC, GOGA, San Francisco, CA.
[29] Map, "SF Defense Area, Nike-I, SF-88-C&L, Location and Site Maps," 2 March 1954, Drawer 246, Folder 6, PARC, GOGA, San Francisco, CA.
[30] Plan, "Nike-I, SF-88-L, Utility Plan," 12 March 54, Drawer 246, Folder 2, PARC, GOGA, San Francisco, CA.
[31] Map, "San Francisco Defense Area (Project SAM), SF 87 C&L, Location & Vicinity Map," 15 December 1953, Drawer 245, Folder 1, PARC, GOGA, San Francisco, CA.
[32] Plans, "Nike-I, SF-87 C&L, Site Plan," 19 February 1954, and "Nike-I, SF-87, Launchers, Area Grading, Log of Borings," 21 April 1954, Drawer 245, Folder 2, PARC, GOGA, San Francisco, CA
[33] Plans, "Marin County, California, San Francisco Defense Area, SF-88-L, Launchers" (31 sheets), Drawer 246, Folder 2, PARC, GOGA, San Francisco, CA.
[34] Photograph, TO BE ADDED, showing excavation for pits, DOD collection, etc. 1954, PARC, GOGA, San Francisco, CA
[35] Letter, William E. Hunt, CSM, US Army (Ret.) to Col. Milton Halsey, US Army (Ret.), December 1996, concerning Nike-related activities of 359th Engineer Detachment (Utility) during the period 1952-1956.
[36] Interview, Peter J. Bohan, 21 January 1998. Mr. Bohan served as Chief Warrant Officer, Launching Area, at Site SF-88L from 1955 through 1963
[37] Of these temporary buildings, only the acid storage shack survived through the closing of site SF-88, its last use being a flammable materials storage building. It collapsed in 1996.
[38] "Building and Information Schedule, DA Form 2368-R, Nike Site SF-88" July 1971, ADPWE-6, Box 4, PARC, GOGA, San Francisco, CA.
[39] Map, "Fort Cronkhite[sic], SF-88-L, Erosion Control, Launcher Area," 21 June 1956, Drawer 246, Folder 3, PARC, GOGA, San Francisco, CA.
[40] Photographs of SF-88L taken by Lt. Robert Schaeffer, circa 1957, PARC, GOGA, San Francisco, CA.
[41] Plan, "SF-88-L, Plan & Details of Auxiliary Launcher & Stanchion Footings," 22 November 1954, Drawer 247, Folder 6, PARC, GOGA, San Francisco, CA. Nike personnel, in the classic tradition of the Artillery, numbered their launchers from right to left as viewed when facing the direction of the enemy. However, since the elevator-mounted launcher was always designated #l, launchers #2, #3 and #4 were always the above-ground launchers.
[42] Interview, Mr. Ron Parshall, 19 July 1997. Mr. Parshall served as a launcher crewman at SF-88L in 1961.
[43] Interview, Captain Harry Paine, USA (Ret.). 12 January 1997. Capt. Paine served as the first Battery Commander at SF-88L from 1954 to 1957.
[44] Interview, Bohan.
[45] Interview, Paine.
[46] Plans, "San Francisco Defense Area, Special AAA, SF-88-C, Revised Control Area Site Plan," 21 June 1956, Drawer 246, Folder 3, PARC, GOGA, San Francisco, CA.
[47] Interview, Cheney.
[48] Plans, "Fort Cronkhite [sic], SF-88-L, Erosion Control, Launcher Area," 21 June 1956, Drawer 246, Folder 3, PARC, GOGA, San Francisco, CA.
[49] Plan, "SF 88-L, Ready building, (24 EM), Site & Utility Plans & Details," 15 October 1957, Drawer 246, Folder 3, PARC, GOGA, San Francisco, CA.

[50] Map, "Nike Battery, S.F.-88L (Fort Barry), As Built Topography," 12 February 1958, Drawer 246, Folder 2, PARC, GOGA, San Francisco, CA.
[51] "S.F. 88, Ft. Cronkhite [sic], Nike Site Improvement, Structures & Utilities, Site Grading & Utility Plans," 14 March 1958, Drawer 247, Folder 6, PARC, GOGA, San Francisco, CA.
[52] Plans, "Special A.A.A., San Francisco Defense Area, Modifications & Improvements, Launcher Area, SF-88-L," (29 sheets), 2 May 1958, Drawer 246, Folder 4, PARC, GOGA, San Francisco, CA.
[53] Ibid.
[54] "5 Nike Bases In Area to Get Atom Missiles," *San Francisco Chronicle*, 29 May 1958.
[55] Interview, Bohan.
[56] "Nike Hercules Missiles Installed at Marin Site." *San Francisco Chronicle*, 20 November 1958.
[57] Map, "SF-88-L, Launchers, Site Plan - Warheading Building," Drawer 247, Folder 5, PARC, GOGA, San Francisco, CA.
[58] Interview, Bohan.
[59] "Bay Defense Posts Get Killer Rockets," Orr Kelly, *San Francisco Chronicle*, 21 January 1959.
[60] *San Francisco Chronicle*, 21 January 1959.
[61] (PHOTO ID TO BE ADDED)
[62] Interview, Bohan.
[63] Map, "Site 88 L Launcher Area (Fort Barry), Erosion Control, Plans & Details," 5 May 1959, Drawer 246, Folder 2, PARC, GOGA, San Francisco, CA.
[64] Map, "Air Defense Missile Site SF-88, Master Plan, Basic Information Maps, General Site Map," 29 June 1970, Drawer 246, Folder 1, PARC, GOGA, San Francisco, CA.
[65] Morgan, Mark L. and Berhow, Mark A., "Rings of Supersonic Steel,"
[66] "San Francisco Defense Area, Improved Nike-Hercules with HIPAR, SF-88-C, Site Utility Plan," 27 February 1961, Drawer 247, Folder 6, PARC, GOGA, San Francisco, CA.
[67] PHOTO CAPTIONS TO BE ADDED
[68] "Building and Information Schedule, DA Form 2368-R, Nike Site SF-88" July 1971, ADPWE-6, Box 4, PARC, GOGA, San Francisco, CA.
[69] "Building Floor plan Diagrams, Nike Site SF-88" October 1970, ADPWE-6, Box 3, Folder 198, PARC, GOGA, San Francisco, CA.
[70] Plan, "Canine Equipment Storage Building, Site and Location Plan, SF-88L," 27 January 1964, Drawer 247, Folder 7, PARC, GOGA, San Francisco.
[71] "Site 88-L, Two Stairwells, U.G. Mag, Plans, Elevations, Sections," 10 April 1964, Drawer 248, Folder 9, PARC, GOGA, San Francisco, CA.
[72] "Building and Information Schedule, DA Form 2368-R, Nike Site SF-88" July 1971, ADPWE-6, Box 4, PARC, GOGA, San Francisco, CA.
[73] "Air Defense Missile Site SF-88, Planting Plan," March 1970, Drawer 247, Folder 7, PARC, GOGA, San Francisco, CA.
[74] Map, "Air Defense Missile Site SF-88, General Site Map," March 1970, Drawer 246, Folder 1, PARC, GOGA, San Francisco.
[75] Map, "Air Defense Site SF-88, Ready building, General Site Plan," 21 April 1972, Drawer 246, Folder 1, PARC, GOGA, San Francisco, CA.
[76] Letter, "Subject: Security of Sites Upon Inactivation", Col. Clarence A. Miller, AD, to Commander, Presidio of San Francisco, 17 April 1974, ADPWE—6, Box 1, Folder 1, PARC, GOGA, San Francisco, CA
[77] Message, "Acceleration of Inactivation Dates," from Commander ARADCOM, Ent AFB, CO, to Commander, Presidio of SF, n.d., ADPWE-6, Box 1, Folder 5, PARC, GOGA, San Francisco, CA.
[78] Interview, Col. John Kern, US Army (Ret.). Kern served as 'Liaison for National Park Service" and "Coordinator, Golden Gate National Recreation Area" for Sixth US Army following legislation of Golden Gate NRA.
[79] "Memorandum For the Record, Subject: Operations Concise/Outline of Real Estate Actions, Presidio of San Francisco," 25 February 1974, Fran M. Roberts, Chief, Real Estate Branch, ADPWE-6, Box 1, Folder 3, PARC, GOGA, San Francisco, CA.
[80] Interview, Kern.
[81] Interview, William Whalen, 1992.

[82] "Memorandum For Record, Subject: Status of Disposition of Deactivated NIKE Sites in San Francisco Defense Area," 16 August 1974, Fran M. Roberts, Chief, Real Estate Branch, ADPWE-6, Box 1, Folder 3, PARC, GOGA, San Francisco, CA.
[83] Memorandum, "This "Discontinuance of Army Use and Release of Real Property to the Golden Gate National Recreation Area," Commander, Sixth US Army to Superintendent, GOGA, 6 February 1976, ADPWE-6, Box 4, File 349, PARC, GOGA, San Francisco, CA
[84] Site visit by John Martini, NPS, October 1974.
[85] Carlson, Christina M. and Lyon, Robert, *Last Line of Defense: Nike Missile Sites in Illinois*, pp. 39-40, Denver, Rocky Mountain System Support Office, National Park Service, 1996.
[86] Map, "Air Defense Missile Site SF-88, Master Plan, Basic Information Maps, General Site Map," 29 June 1970, Drawer 246, Folder 1, PARC, GOGA, San Francisco, CA.
[87] The Antiaircraft Artillery and Guided Missile School, *Underground Launching Equipment (ST-44-161-31)* (Fort Bliss, Texas: October 1955), pp. 3.
[88] Department of the Army, *Nike I Systems: Nike I Round Launching Area and Assembly Area Equipment (TM9-5000-4)*(Army Headquarters: April 1956), pp. 27.
[89] Ibid.
[90] Photograph taken 1975 by Park Technician Sara Conklin, NPS, in Interpretation Files, PARC, GOGA, San Francisco. The shield was painted "1st BN, 61st ADA" and the tablets read "97.1" and "1974."
[91] Carlson, pp. 59.
[92] US Army training film, "Nike Hercules Missile: Part IV: Preparation of Warhead and Forward Section," TF44 3689, (1966).
[93] Oral History Interview, CWO Terry Abel, US Army (Ret.), 7 June 1992.
[94] Interview, Parshall.
[95] Ibid.
[96] Interview, Cheney.
[97] Interview, Bohan
[98] Plans, "S.F. 88L, Fort Barry, Nike Site Improvement, Modifications to Bldg. #962: Ready building," 3 June 1958, Drawer 247, Folder 5, PARC, GOGA, San Francisco, CA.
[99] Interview, Parshall.
[100] Interviews with site personnel, various.
[101] Plans, "S.F. 88L, Fort Barry, Nike Site Improvement, Modifications to Bldg. #962: Ready building," 3 June 1958, Drawer 247, Folder 5, PARC, GOGA, San Francisco, CA.
[102] Drawing, "Fence & Details, Type FE-5, FE-6, FE-7, SF-88-C&L," 2 July 1953, Drawer 247, Folder 6, PARC, GOGA, San Francisco, CA.
[103] Ibid.
[104] Site visit by John Martini, NPS, January 1998.
[105] Plans, "S.F. 88L, Fort Barry, Nike Site Improvement, Modifications to Bldg. #962: Ready building," 3 June 1958, Drawer 247, Folder 5, PARC, GOGA, San Francisco, CA.
[106] Plans, "SF-88L, Erosion Control, Plans & Details," 5 May 1959, Drawer 246, Folder 2, PARC, GOGA, San Francisco, CA.
[107] Map, "Site 88 L Launcher Area (Fort Barry), Erosion Control, Plans & Details," 5 May 1959, Drawer 246, Folder 2, PARC, GOGA, San Francisco, CA.
[108] Photograph, "Fort Barry, CA....Site 88, launcher area...looking north shows launcher sections A and B," 1961, SC-588979, Dept. of Defense, Still Media Records Center, Washington, D.C.
[109] Map, "Air Defense Missile Site SF-88, General Site Map," March 1970, Drawer 246, Folder 1, PARC, GOGA, San Francisco.
[110]Map, "Air Defense Site SF-88, Ready building, General Site Plan," 21 April 1972, Drawer 246, Folder 1, PARC, GOGA, San Francisco, CA.
[111] Interview, Paine.
[112] Plans, "San Francisco Defense Area, Special AAA, SF-88-C, Revised Control Area Site Plan," 21 June 1956, Drawer 246, Folder 3, PARC, GOGA, San Francisco, CA.
[113] Interview, Paine.
[114] Plans, "San Francisco Defense Area, Special AAA, SF-88-C, Revised Control Area Site Plan," 21 June 1956, Drawer 246, Folder 3, PARC, GOGA, San Francisco, CA.

[115] "San Francisco Defense Area, Improved Nike-Hercules with HIPAR, SF-88-C, Site Utility Plan," 27 February 1961, Drawer 247, Folder 6, PARC, GOGA, San Francisco, CA.
[116] Interview, Paine. Captain Paine and his family had quarters at "West Portal" near the Baker-Barry Tunnel. There, he and other Nike officers lived in 1941 Mobilization Buildings that had each been converted into four apartments.
[117] Ibid.
[118] Plans, "Special A.A.A., San Francisco Defense Area, Modifications & Improvements, Launcher Area, SF-88-L," 2 May 1958, Drawer 246, Folder 4, PARC, GOGA, San Francisco, CA.
[119] Interview, Parshall.
[120] "San Francisco Defense Area, SF-88, Fort Barry, California, Battery Facilities," 27 January 1964, Drawer 247, Folder 8, PARC, GOGA, San Francisco, CA.
[121] "Building and Information Schedule, DA Form 2368-R, Nike Site SF-88" July 1971, ADPWE-6, Box 4, PARC, GOGA, San Francisco, CA.
[122] "San Francisco Defense Area, California, Rehab Barracks @ Nike Hercules Sites, SF-88, Ft. Barry, Electrical Plans," Drawer 248, Folder 9, PARC, GOGA, San Francisco, CA.

Part III. Recommendations (revised Sep. 1, 1999)

A. General Recommendations

Site SF-88 was in constant service for twenty years, beginning as mobile field emplacements for Nike I missiles during the Eisenhower era and closing during the last days of the Nixon administration. Over the course of these two decades, tensions with the Soviet Union continued to grow, the Cold War reached its zenith, and ARADCOM air defense artillerymen felt very much that they might go to war at any minute.

This was the era of the Berlin Wall, the Cuban Missile Crisis and the deepening of the Vietnam War - the period that most connotes the Cold War in the popular mind. It is also the era that represents Site SF-88's period of greatest historic significance. Nuclear attack by Soviet bombers appeared to many men as an inevitability, and duty at a Nike site was an awesome and immediate responsibility.

For these reasons it is recommended that SF-88L be maintained as it appeared during the years 1959 - 1965. This period reflects the era when the site reached its general present configuration and conforms to the height of the Cold War years. In addition, the site's physical appearance during these years can be well documented through photographs, training films, and interviews with retired ARADCOM personnel.

As with any historic site, though, it will be impossible to "freeze" Site SF-88L at any one point during this era. Modifications were continually being made to the external appearance of the site's structures right up to inactivation, to say nothing of upgrades in electronic and missile technologies. Therefore, rather than trying to replicate one specific moment, the general preservation ethic should be to maintain the site in a general representation of its appearance during these years. This guideline should apply to landscaping, colors, signage, building appearance, furnishings, paving, equipment stowage, missiles, radars and control vans, etc.

B. Recommendations for Interpretation

Interpretation of Site SF-88 should put it firmly in the context of the two centuries of seacoast artillery that guarded the Golden Gate from foreign attack. Antiaircraft artillery began as a part of the Coast Artillery Corps, and the Nike system was the last version of locally-based weapons built to repel an attack on the San Francisco Bay Area. In order to fully understand the history and significance of the Nike site, interpretation of the entire Cold War era is necessary, from its beginnings in the wake of World War II to its end symbolized by the fall of the Berlin Wall (1945-1991).

However, it is recommended that interpretation of the specifics of the operational and human history of SF-88 focus on the years from 1959-1965. These years are critical

because the most complete historical documentation of the site exists for those years. In addition, the tensest dramas of the Cold War took place at that time, while the launching area itself took on most of its present configuration.

Finally, although the site may physically be restored to this six-year period of historic significance, interpretation should not be similarly limited. The entire air defense story from antiaircraft emplacements up through Nike Hercules missiles should be told through graphics, publications and personal services.

C. Specific Recommendations by Area

1) Approved Recommendations

The recommendations in this section have been approved for implementation under the park's project review process (Project Review Proposal No. GOGA-PW-042.99, dated June 22, 1999).

Building exteriors: Exterior colors and building appearances at SF-88L can generally be determined by referencing the numerous photos taken of the site. As a general rule, building colors evolved from overall light green in the 1959-1963 period to overall light green with medium or dark green trim around 1967 (the end of the period of historic significance). Finally, during the last years of operation, launching area buildings were painted in medium green with either dark green or light green trim.

None of these paint schemes, though, seems to have been universally applied to all buildings at SF-88L at any one time. To complicate matters NPS Maintenance crews and various volunteer groups repainted some of the buildings in non-standard colors between 1974 and 1986.

For consistency in appearance and maintenance, it is recommended that a standard paint scheme of overall light green with dark green doors, windows, and eaves be adopted. These colors should conform as closely as possible to appropriate Federal Standard 595B colors for light green and dark green.

Exceptions to this paint scheme will be the dog kennel storage building, which has always been dark beige; the LCT van, which should be painted white to represent its appearance during the period of historic significance; and the storage van bodies, which should be semigloss OD green.

Building interiors: As with most historic sites, interior colors and furnishings varied with time period and building use. Additional information will be necessary to accurately determine color schemes for particular years. As an interim guideline, interiors should be maintained in their existing colors. These colors are more protected than exterior paint schemes, and have survived in a fairly good state of preservation since 1974. In addition, interior stenciling, floor striping, trim details and signs should be preserved.

Signage: Signs were an ever-present feature of a Nike site, and at SF-88L these ranged from large entrance gate signs to small building number placards affixed to exteriors. Examples of all these sign types have been put into museum storage and should be used as "masters" for replicating additional signs. Also, each building at the launching area was affixed with a small wood plaque bearing its building number. These signs should be replaced according to historic photos.

If interpretive waysides are developed, consultation will occur with the park's interpretive media specialist.

Fences and gates: Gates and fences should replicate as closely as possible their basic post-1959 configuration, including replacement of the missing gates at east and west end of the exclusion area compound. (At very least, the Battery Alexander gate should be replaced to facilitate maintenance and other operational needs.) Replacement of fencing and gates is being undertaken by the park, and it is recommended that features such as fence heights, alignments, barbed wire patterns and gate designs be replicated as closely as possible. One design feature that may be difficult to replicate is the foot-thick concrete "foundation," into which the bottoms of the cyclone fence panels are set. This footing is not critical to accurate representation of the fences during the historic era, but it should be considered for future replication. Vegetation mowing for the fence installation will occur outside of the bird nesting season; vegetation will be allowed to grow back, and any establishment of exotic species within the newly created mowing strip will be treated by maintenance staff or Nike site volunteers under guidance by the Natural Resources staff.

Landscaping: Vegetation within the launch site was historically kept to a bare minimum. The only ground cover that grew inside the limited area fence line were grass, ice plant and low-lying clumps of coyote brush. Many areas were left as bare rock or earth.

Recommend that this appearance be partly restored by establishing a maximum height of 12-18" for all vegetation within the launcher area, and that a regular schedule of mowing and trimming these areas instituted. A mowing strip 36" wide should be maintained on both sides of the limited area fence. Ice plant should be reintroduced on slopes where needed as an erosion control measure, especially on steep hillsides such as the ones southeast of the fueling area. Any establishment of exotic species within the newly created mowing strip will be treated by maintenance staff or Nike site volunteers under guidance by the Natural Resources staff.

Also, the toe of the hill between the warheading building and the launcher area gate is higher than it was during the period of historic significance. This area was built up with an overburden of approx. 4'-6' of crushed red rock at some undetermined date. This rock should be removed and the slope returned to its original profile. (Source: 1961 US Army photograph.)

Assembly and Test Area: This area should reflect the overall appearance it had during the period of significance, including reintroduction of a maximum of three LCT- or BC-type van bodies for use as storage and workshop space. This will replicate the practice

initiated by crewmen during the early 1960s of using spare vans for these purposes. These vans should be placed on the level, paved area just north of the missile assembly and test building. They should be painted overall semigloss OD green.

Generator Building: One diesel generator should be installed for interpretive purposes. It is recommend that the 250 KW General Electric generator recently acquired from Pacific Bell be used for this purpose, and that it be installed on the mounting pad closest to the existing fuel tank inside the building.

LCT: Recommend that the existing, empty LCT body be removed from the historic van pad and replaced with the complete launch control trailer acquired from Ft. Bliss. This newer LCT should be dismounted from its wheeled trucks and placed on concrete piers at ground level, as was traditionally done at permanent launch sites. The LCT should be repainted overall white. The old LCT should be moved to a location adjacent to the assembly building for continued use as storage or workshop space. (See "Assembly and Test Area," above.)

Kennel Area: Recommend restoring the dog kennels and storage building to historic era appearance, including replacement or repair of utilities. Maintain existing color scheme.

Dog Training Area: The original barricades, jumps and other equipment used in training sentry dogs were constantly being moved around and rebuilt by the MPs. Consequently, no single design or layout for this equipment is proposed. The dog training aids currently in use at the site are modern replicas that can continue to be used for dog training exercises and public demonstrations. The only recommendation is that the aids be kept in the same location as the historic training area, on the east side of the kennel enclosure. Otherwise, they may be rebuilt or modified as needed and should be treated as "site furnishings" than as historic structures.

A Section: This launcher section and magazine should be maintained in its appearance during the historic period when the site was equipped with Nike Hercules missiles. Maintain existing color schemes and stenciling to replicate the Nike Hercules time period. Replace missing acoustic panels and stencils in panel room hallway. Maintain color schemes on conduits and pipes: green for water, blue for electric, gray for hydraulic. Replace missing stenciled numbers for Fire Points. Five Nike Hercules missiles should be displayed in the magazine. In order to reflect the nuclear capability of the weapons, the missiles should be displayed with safety flags, color patches indicating warhead yield, and barometric probes covered with removable "dog houses".

B Section: B Section and its magazine should be restored to reflect its appearance during the Nike Ajax period. This historic scene should include Ajax-pattern launching rails, safety showers, chain hoists, and up to ten Nike Ajax rounds. Colors should be maintained in their existing condition, except that Hercules-period additions such as the panel room colors, the confederate flag on the overhead beam, and the psychedelic star pattern in the stairwell should be documented and painted out. Replace missing acoustic panels in Panel Room hallway. Maintain color schemes on conduits and pipes: green for

water, blue for electric, gray for hydraulic. Replace missing stenciled numbers for Fire Points. Replace emergency shower heads and pull chains at four Fire Points in magazine.

Missiles: Nike Ajax missiles should be painted and stenciled to replicate the color scheme used between 1953 and 1958: white missile body; OD booster, fins and coupling. (Source: 1953-1956 photos from Capt. Henry Paine Collection). Nike Hercules missiles should be painted and stenciled to replicate the MIM-14 color scheme used at SF-88 bases during the period of significance: white missile body section, OD booster cluster, white front booster fairing, white booster fins, and white fin fairing.

IFC Equipment Display Area: For the immediate future, it is recommended that the current examples of control equipment continue to be displayed inside the launcher area. In order to protect these artifacts and to facilitate visitation, it is recommended that a display area consisting of concrete pads and walkways be constructed west of the generator building near the limited area fence. The display should be constructed in a compatible, yet reversible, design appropriate to the launching area. Staff and Nike volunteers will work with the Park Hydrologist on the possibility of removing an equivalent amount of impervious surface to offset what was created for the IFC display.

2) **Recommendations Requiring Future Planning.**

The recommendations in this section have management and planning implications that reach beyond the specific boundaries of Nike Site SF-88L. They are not approved for implementation as of this writing, but are recorded here in order to allow for them to be built into future park planning efforts.

IFC Equipment Display Area: Accurately interpreting the radar and fire control system for the Nike site is a challenge. A complete TO&E for an Improved Nike Hercules firing battery included five different radars, one of which was the massive HIPAR antennae. A complete IFC area occupied more than 40 acres. In the best of all possible worlds, we would restore the original SF-88C atop Wolf Ridge. However, that area is now inaccessible.

We will never be able to replicate a complete IFC accurately, but we should make an effort to interpret the IFC story by creating a 'scaled down' control area near, but not inside, SF-88L. As a long range plan, it is recommended that a facsimile IFC site be constructed outside launcher area but within the immediate vicinity of SF-88L. Such a radar display could be constructed across from the launcher area in the rear of Battery O'Rourke. This site is a disturbed area created when O'Rourke was excavated at the turn of the century, and is still sparsely vegetated. This area could easily hold the LOPAR and MTR antennae and the two control vans currently in the park collection. In addition, a TTR should be added to the existing equipment when this new display is constructed. This grouping of three radars would represent the complete array of antennae installed at SF-88C at its earliest stage of development.

We recognize that this proposal could entail public hearings and environmental review. However, we believe that the Nike story - including radar control sites - is a critical part of the Headlands' story and that any potential impacts can be mitigated.

Administrative Area: The SF-88A administrative area is currently in use as a YMCA conference and education center. This is an acceptable use of the area since the buildings are basically being used for their original purposes (e.g. dormitory space, dining facilities, administrative offices). Although it is not under immediate NPS control, SF-88A is a critical part of the battery and the park should ensure its continued preservation. Recommend returning exteriors to their ARADCOM appearance by repainting all buildings in their original colors (light green walls with dark green trim) and maintaining landscaping around buildings as shown in the 1972 "Planting Plan."

D. Recommendations for Additional Research

Reference Resources: Park staff have been taking photographs of SF-88L from nearly the beginning of NPS control. An exceptionally fine series of pictures was taken in the summer of 1975 by then-Park Technician Sara Conklin. These 35mm black-and-white photos document overall site and building appearances, some interiors, and small details such as signage and stenciling. These pictures are now in the Park Archive and Record Center and should serve as a guideline for replacing signs and other small details. (Reference: Park Archives and Records Center, GOGA, Interpretation Collection, Negative Nos. 76-A-47, 76-A-48 and 76-A-49.)

Other useful photos are color slides taken about the same time for interpretive talks. Some of these slides illustrate features such as building colors and signage that disappeared during subsequent, undocumented repainting projects. These slides are also in the Interpretation collection but have not yet been gathered into one collection.

In addition, the US Army produced several Nike training films that included shots of SF-88 Launcher and Control Areas. In addition to providing invaluable information on assembly and maintenance of Nikes, these films include numerous documentary details such as building and equipment colors, landscaping, and even some building interiors. The films known to have SF-88 footage are *Nike Hercules Missile & Launching Area Daily Checks and Adjustments, Part I (TF44-3909)*, 1968; *Nike Hercules Missile, Part IV: Preparation of Warhead and Forward Body Section (TF44 3689)*, 1966. *Nike Hercules System Cabling (TF44 3060)*, 1960; and *Introduction to the Nike Hercules System (TF44 3884)*, 1968.
Recommended research projects: This document gives only a cursory overview of the histories of the administrative and control areas of SF-88. Recommend that a Historic Resource Study (HRS) be prepared for each of these important components of the site.

Recommend that individual Historic Structure Reports (HSRs) be prepared for each of the major structures at SF-88L, SF-88A and SF-88C.

Recommend that a complete Historic Furnishings Report (HFR) be prepared for the following buildings at Site SF-88L: Missile Assembly and Test Building, Generator Building, Warheading Building, "A" and "B" Section magazines, and Launcher Area Sentry Station.

The HRS, HSR and HFR documents referenced above must conform to NPS-28 guidelines.
Recommend that additional oral history interviews be performed with soldiers who were assigned to SF-88, especially during the 1962-1970 time period. Military Police, IFC crewmen and administrative personnel should be given highest priority.

Further research will be necessary to fully document the physical, operational and human history of SF-88. It is recommended that secondary sources be borrowed from distant repositories by inter-library loan whenever possible. If the Freedom of Information Act request results in identification of, and permission to use, site-specific Army records such as battery morning reports and unit historical summaries, it is recommended that the authors travel to the appropriate repository to do research into those records.

This study should be regarded as an interim document until such time as more complete research into official Army records and significant other sources not available locally is completed.

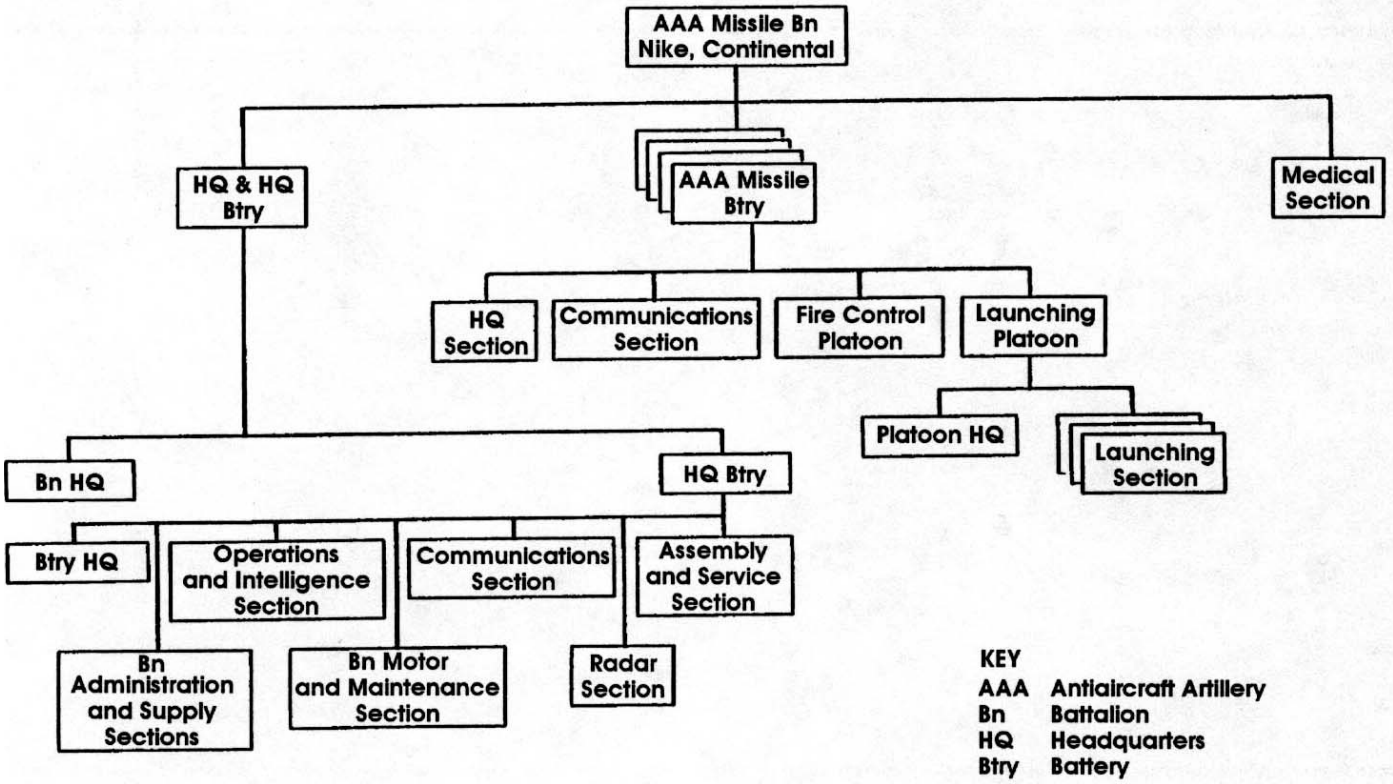
Several ARADCOM veterans have personal collections of snapshots of SF-88 taken during the site's active history. A few of these photographs have been formally acquired by the park and were referenced during the preparation of this study (i.e. Henry Paine and Robert Schaeffer collections). Additional effort should be given to identifying other collections and copying them for the collection.

The post-1974 history of SF-88 should also be researched. The operational and administrative records of Golden Gate National Recreation Area are believed to contain a wealth of information concerning the park's activities at the site. These documents include maintenance work orders, Marin Headlands district reports, VIP reports, compliance actions, contracting records, interpretive photo collections, museum collection accession records, etc. Also, interviews should be carried out with district personnel involved in preservation activities at the site

Since 1994, the Lead VIP at the site has maintained thorough records of volunteer work hours and projects. These record books, known as "Nike Site Logs - Work Details," contain invaluable information for future researchers. Personal photographs and videos made by Nike Site VIPs of their work projects may also prove useful to future researchers.

Appendix 1.

Nike Firing Battalion, Table of Organization and Equipment

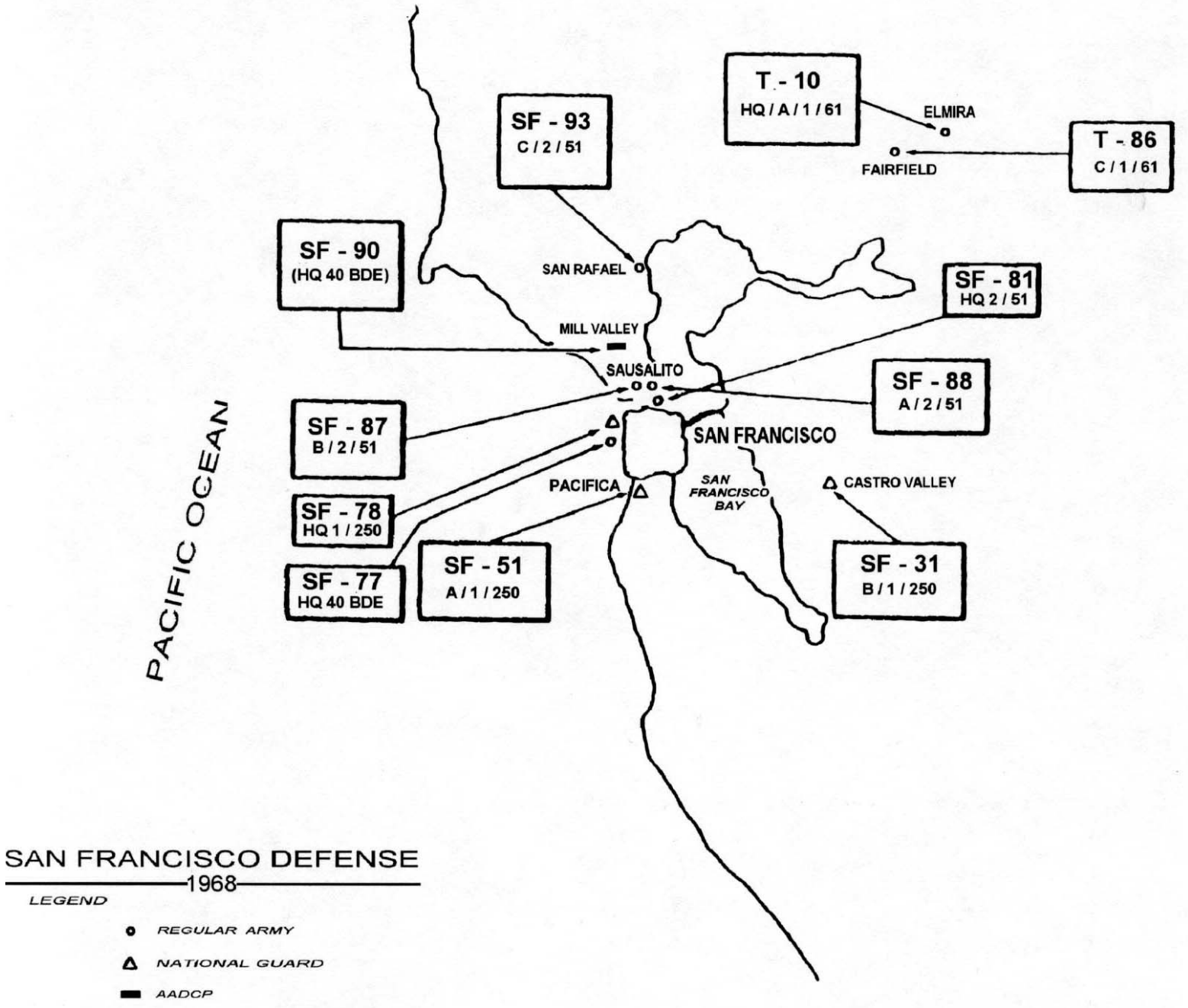


Organization of a Typical Nike Battalion (TOE 44-145) 1956

(From: *Historical Overview of the Nike Missile System,* 1984, McMaster et al)

Appendix 2.

Nike Sites in the San Francisco Bay Area



Map adapted from: *Historical Overview of the Nike Missile System,* 1984, McMaster et al.

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