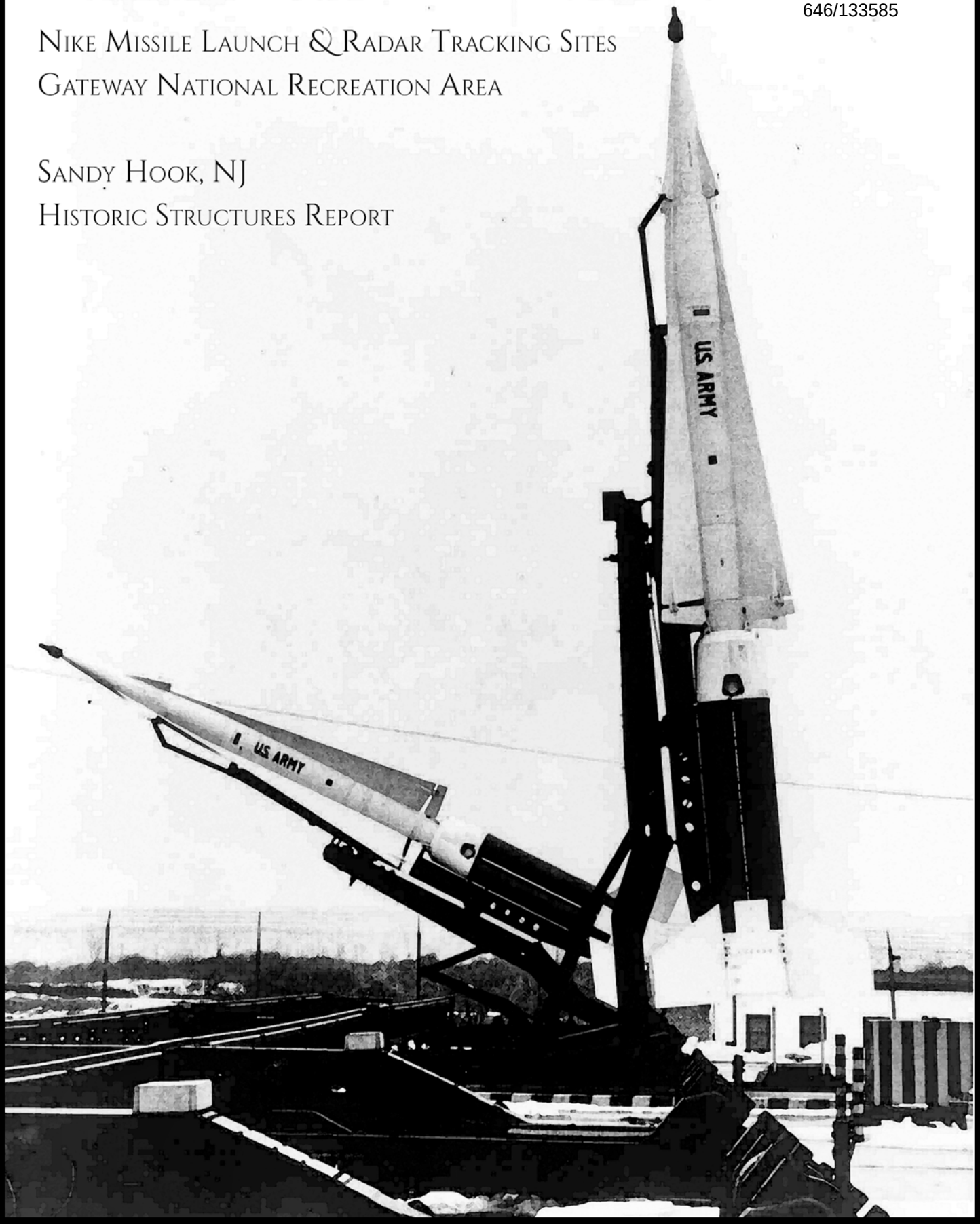
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Nike Missile Launch & Radar Tracking Sites
Gateway National Recreation Area

Sandy Hook, NJ
Historic Structures Report



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Final
Volume 1
June 24, 2016

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Figure 1.3-316: Collapsed roofing in front of kennels.
Figure 1.3-317: CMU walls separating the kennels.
Figure 1.3-318: Overview of southeast corner of Building 458A, showing door on south elevation and deteriorated roof (left) and overview of north elevation showing vegetation and broken window frame (right).
Figure 1.3-319: Overview of interior shelves on east wall (left) and sink and counter on west wall (right) of Building 458A.
Figure 1.3-320: North window of Building 458A, with a broken frame, extant concrete sill and vegetation growing (left) and eave on north side showing missing and deteriorated wood boards (right).
Figure 1.3-321: Debris from dilapidated ceiling accumulating on concrete floor (left) and deteriorated plasterboard ceiling (right) in Building 458A.
Figure 1.3-322: Slab only at front of structure 458A. Front retaining wall is visible at right with missing course highlighted.
Figure 1.3-323: Step cracking around door lintel in Building 458A.
Figure 1.3-324: Missing roof at interior of Building 458A.
Figure 1.3-325: Missing roof at eave of Building 458A.
Figure 1.3-326: Soil erosion at northeast corner of Building 458A.
Figure 1.3-327: Existing Sink in Building 458A.

1.4 Evaluation of Significance – No Illustrations

Part 2- Treatment and Use – No Illustrations

EXECUTIVE SUMMARY

Gateway National Recreation Area wishes to document the history, development and condition of the NY-56 NIKE Missile site, composed of two separate areas (Missile Launch and Radar Tracking) located south of Fort Hancock on the Sandy Hook peninsula in New Jersey. The site is intimately associated with the Cold War of the second half of the 20th Century and the system of national defense put in place by the United States during this time. Today it exists in a partially restored and maintained state. A portion of the Missile Launch Area provides storage, office and work space for Park Service maintenance staff and volunteers. A portion of the Radar Tracking Area has been restored and is open to the general public at specific times. As a basis for planning upcoming projects, the National Park Service commissioned the preparation of this Historic Structure Report by John Milner Architects, Inc. with sub-consultants Keast & Hood Structural Engineers, Inc. and Bruce E. Brooks & Associates.

The scope of work for this project is to document the evolution of the site through archival research and physical investigations, culminating in the preparation of Part 1- Developmental History as defined in Director's Order – 28, Chapter 8. The report will identify and document the original appearance, integrity, and historic evolution of the building; identify the appearance of the site from its construction in 1954 through its decommissioning and transfer to the Park Service in 1974. The extant architectural materials, site elements and character-defining features from this period will also be recorded. In order to fulfill these requirements, the following primary tasks were completed:

- Archival research to retrieve information regarding the initial configuration of the site,
- Archival research to retrieve information pertinent to reconstructing the evolution of the site and its structures,
- Archival research pertinent to assessing the significance of the site and its structures, both in regards to existing material integrity and as an example within the larger NIKE Missile program.
- Assessment of existing conditions to identify and prioritize recommended treatments,
- Documentation of extant architectural materials and site elements.

In accordance with NPS directives for this project, this study focuses on both the northern Radar Tracking Area and southern Missile Launch Area. Fort Hancock and the Sandy Hook peninsula are only discussed as they relate to the context of the NIKE site and its operation. Structures wholly constructed and significant structures and site elements modified after the transfer to the Park Service in 1974 are documented as existing conditions though not dating from the period of significance.

Using reports and original drawings from the archives of Gateway National Recreation Area a chronology of how the NY-56 NIKE site evolved over time was created. Outside reports, photographs and books, as well as contemporary Army Field Manual instructions for the NIKE system, also helped inform the chronology created as the sites were, as intended, all very similar. With the continual technological improvements made to the NIKE Missile program over a relatively short period of time, the NIKE site at Fort Hancock was almost constantly undergoing significant changes. Within one year of its initial construction in 1954, additional buildings were constructed at the Radar Tracking Area. Significant improvements to the radar system and modifications to buildings were made with the advent of the NIKE Hercules missile in 1958 and the introduction of the Missile Master fire control system at Highlands, New Jersey in 1960. A large-scale improvement campaign occurred in 1962 with the introduction of the Improved Hercules system that resulted in multiple new radar stands and buildings.

While not as frequent as seen at the Radar Tracking Area, the Missile Launch Area also underwent a series of significant changes during the site's operation. New buildings were constructed and the missile magazines were significantly modified with the introduction of NIKE Hercules missiles in 1958. This resulted in changes to the site as well with the increased security that accompanied the introduction of nuclear warheads at this time. Smaller scale improvements were made to individual buildings in the area in the following years leading up to the decommissioning of NY-56 and Fort Hancock.

Upon decommissioning, the site was transferred to the National Park Service. While individual buildings and portions of the site were utilized by Park staff, the general lack of maintenance at the remainder of the site led to physical deterioration of the building fabric and contributed significantly to its eventual partial loss. Efforts by volunteer associations have led to the partial restoration of some of the buildings, particularly at the west Control Area #1 of the Radar Tracking Area, allowing for limited interpretation of a portion of the site to the general public.

Determining how the NIKE Missile site at Fort Hancock is utilized moving forward is a challenge both because of the size and character of its site and buildings, but also because of the vulnerability to flooding stemming from its proximity to the shore. The National Park Service is attempting to chart a course that strikes a balance between the practical use and maintenance of the site given limited funds and the desired preservation and interpretation of a unique survivor of the Cold War. To facilitate these deliberations, this report documents the significance and high integrity of the extant site as well as the range of conditions of individual structures and site elements.

ADMINISTRATIVE DATA

RESOURCE: Nike Missile Site – NY-56
The property currently serves two functions. The radar site has been partially restored and is interpreted as part of the United States' Cold War defenses while the launch site serves as maintenance vehicle and equipment storage for Gateway National Recreation Area, Sandy Hook Unit.

LOCATION: Nike Missile Site NY-56 is located on the Sandy Hook Peninsula of New Jersey. The launch and radar sites are 2.5 miles and 3.5 miles north, respectively, of the Sandy Hook Park entrance gate.



Figure AD-1: Detail aerial view of Sandy Hook, NJ. Nike NY-56 Radar (top) and Launch (bottom) sites are circled in red.

NATIONAL REGISTER OF HISTORIC PLACES

Historic District:	Fort Hancock and Sandy Hook Proving Ground National Historic Landmark District
Nomination Number:	#80002505
Resource:	Nike Missile Site
Resource Status:	Contributing Site
Year Listed:	1980
Significance:	Military, Engineering, Social History
Period of Significance:	1953- 1974

PREVIOUS STUDIES

- Bearss, Edwin C. *Historic Resource Study, Fort Hancock: 1948-1974, Sandy Hook Unit, Gateway National Recreation Area, Monmouth County, New Jersey.* Denver, CO: Denver Service Center, November 1982.
- Gateway National Recreation Area. *Analysis of Cultural Resources for the Cultural Resources Component of the Resource Management Plan.* Gateway National Recreation Area, December 1993.
- Kelleher, Michael. *The Changing Standard of National Significance: How the New Environmentalism of the 1960s Redefined National Significance and Led to the Creation of Gateway National Recreation Area, the First Urban National Park.* New York, NY: Department of History, New York University, n.d.
- Layton, Timothy W. *Cultural Landscape Report for the Sandy Hook Coastal Defense Batteries, Gateway National Recreation Area.* Boston, MA: Olmsted Center for Landscape Preservation and National Park Service, 2010.
- Martini, John A. and Stephen A. Haller. *What We Have We Shall Defend: An Interim History and Preservation Plan for Nike Site SF-88L, Fort Barry, California*. San Francisco, CA: National Park Service, Golden Gate National Recreation Area, 1998.

RECOMMENDATIONS FOR FUTURE STUDY

- Complete a comprehensive paint study.
- Complete a site-wide evaluation of hazardous materials.

PART I – DEVELOPMENTAL HISTORY

1.1 HISTORICAL BACKGROUND AND CONTEXT

The structures comprising the NIKE Missile Launch and Radar Tracking Areas stand as contributing features to the Fort Hancock and the Sandy Hook Proving Ground National Historic Landmark District. Decommissioned in 1974, the NIKE Missile installation at Sandy Hook served as the last in a long line of continuously operating coastal defenses on the peninsula stretching back over 80 years.

1.1.1 Development of Fort Hancock[1]

The Sandy Hook peninsula is a 6½-mile long spit of land in Middletown Township, New Jersey, ranging from 500 feet to 1 mile in width and extending north from near the Borough of Highlands.[2] The barrier spit was created by the south-to-north littoral drift of sand occurring after the end of the last ice age. While further growth and other changes to the shape of Sandy Hook have continued to occur over recent centuries, the most dramatic changes appear to have largely stopped in the late 19th century. Most of the peninsula is covered with a broad range of tree species and other vegetation. Large sandy beaches are present at the entire eastern Atlantic edge of the peninsula while shallower beaches line much of the western edge facing Sandy Hook Bay.

Archaeological evidence suggests that Native Americans were present in New Jersey before the creation of the Sandy Hook peninsula and artifacts have been found on the barrier spit confirming their presence there well before its discovery by European explorers.[3] While first observed by Europeans when Giovanni da Verrazano and Estevan Gomez separately sailed through the area in 1524 and 1525, respectively, during the earliest period of European settlement the peninsula was a disputed claim of both the Dutch and the English. This status persisted in the 17th century until the Dutch surrendered all of their New World holdings to England in 1663.

The first permanent structure built on Sandy Hook was the lighthouse constructed by the colony of New York in 1764. Constructed near what was then the tip of the peninsula at that point (the peninsula has grown over a mile northward since) the lighthouse was the fifth active lighthouse in the colonies and is now the oldest working lighthouse in the United States. Built to assist ships navigating the treacherous shoals in Lower New York Bay following a series of wrecks in the preceding years, the lighthouse became strategically important during the American Revolution. The British recognized its importance to maritime travel during the war and occupied the lighthouse and Sandy Hook peninsula despite American attempts to destroy the lighthouse.

[1] A detailed history of the development of Fort Hancock may be found in a report prepared in 2010. The narrative below is drawn largely from this document except as noted otherwise. Timothy W. Layton, ASLA. "Cultural Landscape Report for the Sandy Hook Coastal Defense Batteries, Gateway National Recreation Area, Fort Hancock, New Jersey." Boston, Massachusetts. Olmsted Center for Landscape Preservation, National Park Service, 2010.

[2] Approximate width of peninsula determined using Google Earth. Google. "Google Earth." Accessed August 1, 2015. https://www.google.com/maps/@40.4200555,-73.980437,5412m/data=!3m1!1e3

[3] Layton, "Cultural Landscape Report for the Sandy Hook Coastal Defense Batteries, Gateway National Recreation Area, Fort Hancock, New Jersey." p. 7. Citation of 2004 archeological report.



Figure 1.1-1: Current view of Sandy Hook Lighthouse.

For similar strategic reasons, American forces occupied Sandy Hook during the War of 1812 to protect maritime interests and defend New York City from British attack. To this purpose, a wooden fort, Fort Gates, was constructed and armed with cannons. The cannons were removed following the conclusion of the conflict and the buildings left to deteriorate. With the exception of the Cove House Tavern, a structure standing from circa 1780-1855, the peninsula remained actively occupied solely by the lighthouse until the mid-19th century when the United States Department of the Treasury constructed a series of lifeboat stations to aid in the rescue of mariners shipwrecked during inclement weather.[4] The first station was constructed in 1849 and five additional stations, located on the east and west sides of Sandy Hook, were constructed between 1855 and 1894. The stations were operated by the U.S. Life-Saving Service and supplemented the lighthouse in protecting maritime interests.

[4] Harry Butowsky. "National Register of Historic Places Inventory – Nomination Form for Fort Hancock and the Sandy Hook Proving Ground Historic District." June 20, 1982, rev. November 9, 1982. Continuation Sheet 53.

Prior to the beginning of the Civil War, the Army Corps of Engineers began the construction of a stone fort on the peninsula in recognition of Sandy Hook's strategic significance in prior conflicts. Known simply as "the Fort at Sandy Hook", the pentagonal granite structure was begun in 1859 and continued as the Civil War began in 1861. The fort remained unfinished throughout the war and construction was finally halted in 1868. Due to advancements in armament that took place during the war, the fort's stone masonry construction was no longer effective. Vertical, rigid stone walls could no longer withstand the penetrating force of pointed nose projectiles fired from artillery equipped with rifled bores that had been tested and proven during the conflict. In the face of these technological advances, the military was faced with a surplus of outdated cannons and other armaments after the war. The Army needed to upgrade the country's arsenal and attempted multiple methods of retrofitting the older equipment to serve new purposes. Specifically, a successful and efficient method of rifling the previously smooth bores of older cannon were sought. To test these methods, Sandy Hook was chosen as a temporary proving ground in 1874. Beginning with these early trials, the Sandy Hook Proving Ground would become an active installation for forty-five years. Further advancements in military technology would be tested on the peninsula over the decades even as permanent coastal defenses and a fully-functional fort were introduced and established at Sandy Hook. As the space needs of the fort expanded dramatically during World War I, and the range requirements of new armament tests at the proving ground increased, the limited area of the peninsula became an impediment to safe coexistence. The Sandy Hook Proving Ground was phased out in 1919 after the establishment of a new proving ground in Aberdeen, Maryland in 1917.

Amid public and congressional concern about the state of American defenses given the improvements of foreign forces, the Cleveland Administration directed the War Department, led by William C. Endicott, to study a comprehensive advancement of America's coastal defenses in 1885. The Endicott Board called for fortifying 29 coastal and Great Lakes locations, of which Sandy Hook was one, utilizing the latest in armament technology. Sandy Hook would subsequently have the first concrete, steam-powered hydraulically operated gun-lift battery (completed in 1895) and the first concrete mortar battery (completed in 1894) built in the country. With the combined presence of the new coastal battery emplacements and the Sandy Hook Proving Ground the number of personnel on the peninsula was such that additional support buildings, including new permanent housing, were required. In recognition of this need, Fort Hancock was established by Secretary of War in 1895. Named after Civil War hero Major General Winfield Scott Hancock, the fort was supported by the Army Ordnance Department and Army Corps of Engineers. The fort served as an Army Corps of Artillery post and supported other agencies with a presence on the peninsula such as the U.S. Lighthouse Service, The U.S. Lifesaving Service, the Western Union and Postal Telegraph Companies and the U.S. Weather Bureau.

At the turn of the 20th century, technological advancements in naval warship armor and armament led to more changes at Fort Hancock. To ensure that the country's coastal defenses kept pace with foreign navies, President Theodore Roosevelt tasked Secretary of War William Howard Taft with reviewing the capabilities of the existing defenses. The Taft Board would largely confirm the number and locations of the defensive batteries called for in the Endicott Board, which were being constructed over the previous years as funding allowed. By the early 20th century, nine batteries were in place at Sandy Hook each with multiple guns. The Taft Board recommendations called for improving the technology and support systems of the installations. Armaments were replaced with more powerful and efficient guns, some of which had been tested and proven at the Sandy Hook Proving Ground. Powerful searchlights, battery concealment efforts and additional observation posts to improve fire control were all implemented at Sandy Hook on the Board's recommendation.

Following the conclusion of World War I in 1918 and the corresponding reduction in threats of attack, much of Fort Hancock was placed on "caretaker status." A severely reduced troop contingent served only to maintain the installation and prevent irreversible deterioration. Despite this status, certain improvements to the Fort were implemented. With the increased role of aircraft during and following World War I, additional concealment efforts were made to protect the batteries from identification by air as well as by sea. During the early development of radar in the 1930s, the Army Signal Corps, with the permission of the Army Coastal Artillery Corps, built installations at Sandy Hook that were capable of locating and tracking aircraft. The Signal Corps, in cooperation with Western Electric, built a series of buildings, including eight wooden warehouses to protect the antennae, south of the Fort on the east side of peninsula to hold radar units for testing in a protected environment. These facilities were actively used for this purpose until the early 1940s. Beginning in the 1920s and increasing in the buildup for World War II, obsolete guns were replaced with anti-aircraft weapons. Several batteries had their guns removed entirely and were adapted to provide support operations for the radar and newer armament. Fort Hancock was returned to active duty from caretaker status with the entrance of the United States into World War II as a key part of the defenses of New York Harbor. An influx of troops led to the creation of a "tent city" on the peninsula to house the additional personnel and their support system during the war effort.

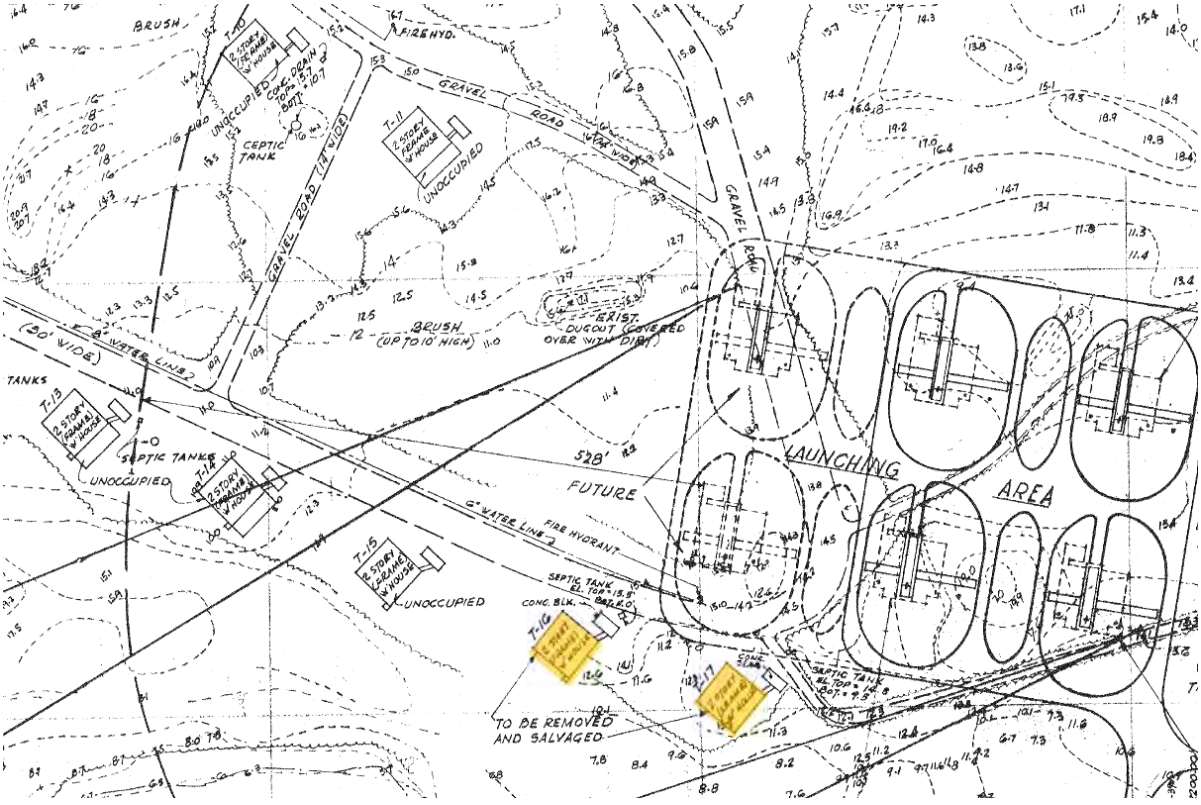


Figure 1.1-2: Launch area drawing indicating location of earlier Army Signal Corps Radar buildings labeled "2 Story (frame) W'house." The two warehouses closest to the missile magazines (highlighted) are called for to be removed and salvaged. (GATE 8781)

With the rapid development of aircraft during the Second World War, both in offensive and defensive capabilities, the remaining batteries at Fort Hancock were not capable of defending the coast from high-speed high-altitude aerial bombers. Deemed obsolete after the conflict, nearly all of the remaining guns were removed from their batteries and salvaged as scrap metal. Following the standing down of military forces, the number of personnel at Fort Hancock were drastically reduced and the installation was identified as surplus and designated for deactivation in 1950. Just 48 hours before the final closure of the Fort, the outbreak of the Korean War forestalled the deactivation as Fort Hancock was once again brought into service and fully staffed as an anti-aircraft defense site and staging area for Army gun battalions. Though the batteries equipped with 90mm anti-aircraft guns were nearly obsolete, this function kept the Fort active until after the end of the war, by which time the implementation of the NIKE program was imminent.[5]

1.1.2 History of the NIKE Missile Program

Development

Following the end of World War II, new defense strategies led to a realignment of the American military. The newly created Department of Defense consolidated all branches of the military, including the recently independent Air Force, under a single entity. Following the spread of Communism throughout much of Eastern Europe, both through coup d'état and referenda, the downward trajectory of relations between the Soviet Union and the United States quickly accelerated. The relationship between the Soviet Union and the West reached a new nadir during the Berlin Blockade of 1948-49 when a dispute over the future of the German state caused the Soviet Union to block off Berlin, deep in Soviet-occupied Germany, from all ground access. Air-lifted supplies coordinated by the United States eventually ended the blockade, but the situation ultimately resulted in the complete division of Berlin and Germany into east and west spheres of influence.

After World War II, the arms race between the United States and the Soviet Union began in earnest. Weapons development would focus on the two countries' respective bomber fleets and nuclear technology. Through scientific and industrial espionage, the Soviet Union would quickly develop bombers that could reach the continental United States and in subsequent years, the rapid development and improvement of fleets of superior bombers by the Soviet Union, both perceived and real, would become extremely troublesome following the first successful test of a nuclear bomb by the Soviets in August of 1949.[6]

While the 90mm guns developed during World War II and installed at Fort Hancock could reach aircraft flying as high as 30,000 feet, continued advancement of aircraft during the war made it clear that shortcomings in range and accuracy meant these weapons would soon be obsolete in preventing an attack. For the high-speed, high-altitude bombers that would soon be operational, surface-to-air missiles guided by the latest in radar technology would be required. Deployed within the United States, the system would serve as the last defense should any enemy aircraft make it past Air Force attempts to intercept the threat. Beginning in 1944, the concept of just such a system was put forward within the

[5] Edwin C. Bearss, "Historic Resource Study – Fort Hancock: 1948-1974, Sandy Hook Unit, Gateway National Recreation Area, Monmouth County, New Jersey," Denver, Colorado. Branch of Cultural Resources, National Park Service, 1982, p. 20

[6] Layton, "Cultural Landscape Report for the Sandy Hook Coastal Defense Batteries..." p. 122.

Army. The concept of a surface-to-air missile would move into the development stages in 1945.[7] Called "Project NIKE," contracts for the radar and computer system were awarded to Bell Laboratories and Western Electric while the missile design and construction contract was awarded to Douglas Aircraft Company.[8] The companies moved quickly until the end of World War II, but with the reduction of military spending following the war, progress on the NIKE system slowed. As tensions with the Soviet Union increased and the nuclear arms race began, the pace of development then increased until significant progress was being made by the outbreak of the Korean Conflict. Finally, after years of work, the first successful interception of a target by a NIKE Ajax missile was achieved on November 27, 1951.[9]

Following the initial successful intercept by the NIKE Ajax, testing continued at the White Sands Proving Grounds in Arizona until 1953 when the first temporary installation was placed at Ft. Meade, Maryland (W-13). This above-ground site was made operational in 1954, but would ultimately be removed and replaced with an Army Air Defense Command Post (AADCP). The first fixed NIKE battery was installed at Lorton, Virginia (W-64) in 1954 and over the next 20 years while the NIKE system was operational, over 250 individual NIKE sites, both Ajax and the successor Hercules, would be constructed throughout the continental United States and Hawaii.[10] This number does not include the supporting headquarter sites with coordinating radars within each defense area. In addition to sites within the United States, additional installations were constructed in friendly nations around the world.

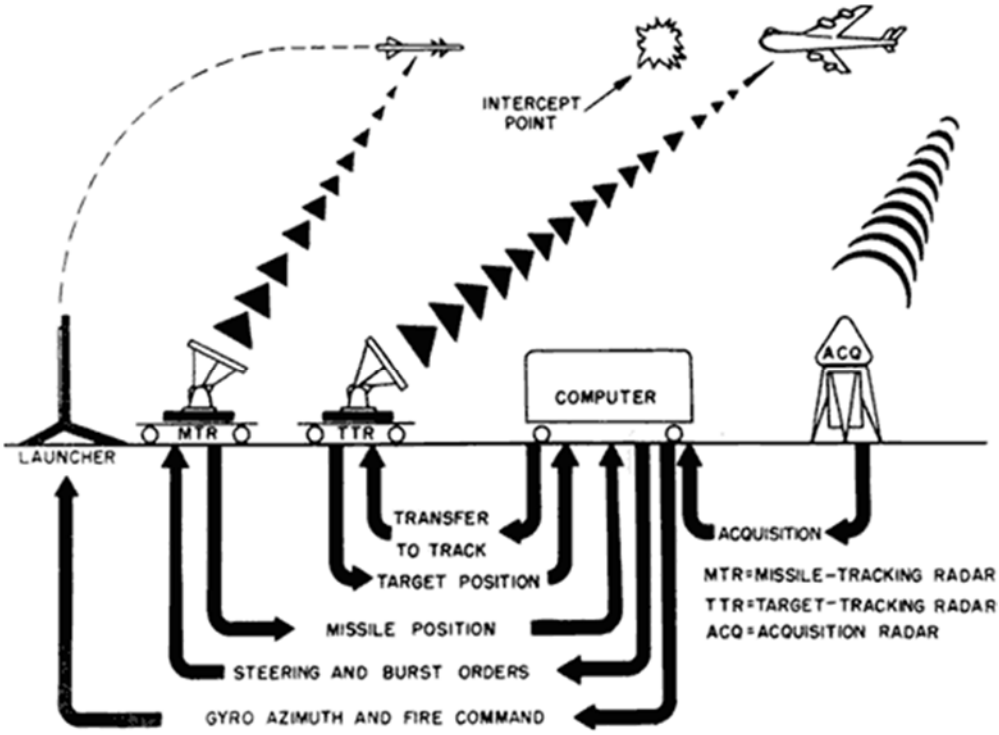


Figure 1.1-3: System diagram illustrating how NIKE Ajax countered hostile targets.

[7] Layton, "Cultural Landscape Report..." p. 121.

[8] John C. Lonnquest and David F. Winkler, "To Defend and Deter: The Legacy of the United States Cold War Missile Program," Rock Island, IL, Defense Publishing Service, 1996, p. 56.

[9] Bearss, "Historic Resource Study…," p. 30.

[10] Mark L. Morgan and Mark A. Berhow, Rings of Supersonic Steel, Bodega Bay, California: Hole in the Head Press, 2010, p. 199. 201.

Radar Targeting

The radar and computer system designed by Bell Laboratories and Western Electric was based on the World War II M33 system.[11] The operation of the system, based in a Radar Control Van and Battery Control Van, began with a Target Acquisition Radar. The acquisition radar picked up all aircraft within a radius of dozens of miles. After being warned of an incoming attack by an offsite anti-aircraft operations center, the target was identified by the acquisition radar operator and locked on. At that point, the target would be picked up and tracked by the Target Tracking Radar. With the launch of the NIKE missiles at the hostile target, the Missile Tracking Radar would track the missiles in flight and the computer system connected to the radar set would then reconcile the information incoming from the two tracking radars and provide flight plan direction to the missiles to correct for changes in the target's trajectories.[12] As a safety precaution, should the Missile Tracking Radar lose contact with the in-flight missile, the on-board system would direct the missile to instantly self-destruct thus preventing uncontrolled flight. This was essential given the location of many NIKE sites in heavily populated areas.[13]

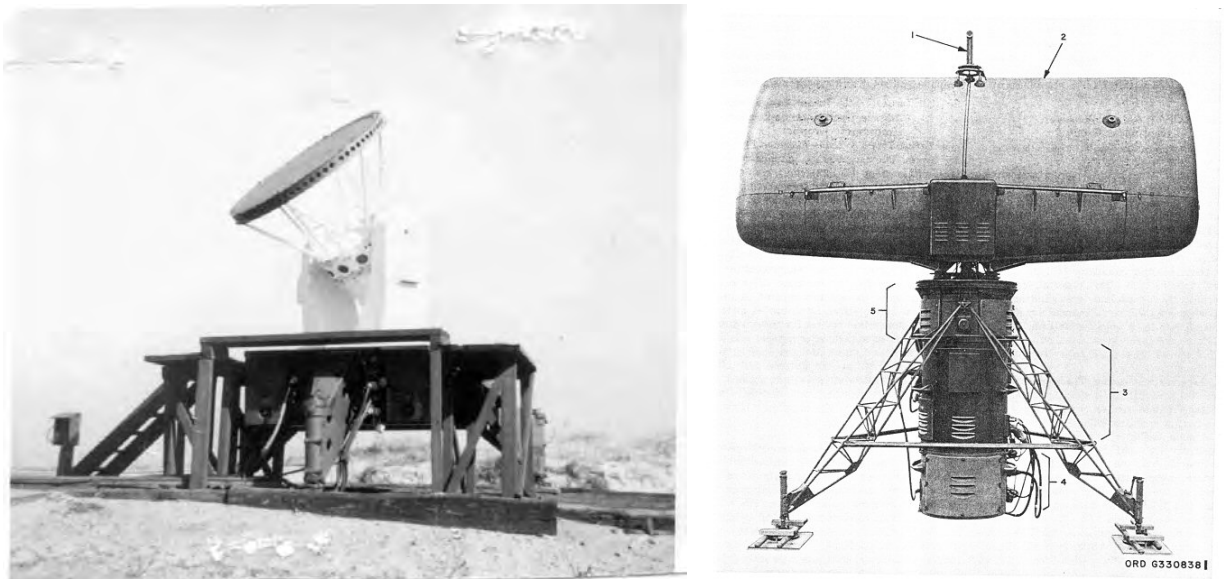


Figure 1.1-4: Radar antenna for the NIKE Ajax system.

In most locations, the radar, launch and administrative areas of each NIKE installation were separated to varying distances. A separation of 1,000 yards was the minimum required distance between the missile launch area and the radar tracking areas.[14] This distance was necessary to allow the missile tracking radars to stay in contact with the missile during its launch. Given the limited speeds at which the radar equipment could track upward with a rising missile, the radar would immediately lose track of the missile if placed too close to the launch due to the extremely high speeds at which the missile left the

[11] John Martini and Stephen Haller, "What We Have We Shall Defend: An Interim History and Preservation Plan for Nike Site SF-88L, Fort Barry, California", San Francisco, California: Golden Gate Recreation Area, 1998, p. 10.
[12] Layton, "Cultural Landscape Report..." p. 121.
[13] Interview with Robert F. Bohlander, at NY-56 Radar Tracking Area, May 27, 2015.
[14] Morgan and Berhow, Rings of Supersonic Steel, p. 12.

launcher. Once contact was lost, the missile's fail-safe would cause it to automatically self-destruct.[15] The other determining factor for radar and missile site locations was the need to maintain lines of sight between the Missile Tracking Radar and the missiles on their launchers. This could be achieved either through topography or by clearing vegetation and other landscape elements. The location of the administrative site varied depending on the proximity of the missiles and radars. If the latter two areas were relatively close together, a single administrative area could be located between them, usually within walking distance, and serve both areas. If the launch and radar areas were more distant, two separate administrative areas would be constructed to serve each of them.[16]

The radar areas for the NIKE Ajax system included the Target Acquisition Radar (low-powered acquisition radar, or LOPAR, for the Ajax system), Target Tracking Radar and Missile Tracking Radar which were typically sited in a relatively straight line with the acquisition radar located between the two tracking radars. Topography dictated when the radars would be elevated on platforms and the height of the platforms. Also depending on the topography of the site, the control and support buildings for the radar area were adjacent to and often on a perpendicular axis to the line of radar assemblies. The control buildings included a Radar Control (RC) Van and a Battery Control (BC) Van.[17] The BC Van contained the equipment coordinating the acquisition radar, launch controls and much of the system's computer module. The RC Van held the coordinating equipment for the two tracking radars.[18] The two vans were connected by an interconnecting corridor (ICC) building that included an administrative area, climate controls for the building and vans and a secure safe for the launch codes.[19] Though many of the earliest sites did not have an interconnecting corridor building when first constructed, they were typically built soon after. A third van, sometimes referred to as the Spare Parts Van, served as a place to store spare parts and perform minor repairs to equipment. The control and support buildings also included a generator building that provided power for the vans and the radars. Depending on a site's location and its proximity to developed areas, these generators either served as the primary power source or as a backup to commercial power where available.[20] A "Ready Room" or "Ready Hut" (sometimes referred to as an Equipment and Operations Building) was also among the support buildings at the radar area. This building was located near the control vans and provided a waiting area for soldiers when on alert status where they could rest or relax as well as store some necessary items. It appears that not every radar area included a Ready Room as part of the original configuration. If, and when, a Ready Room was constructed was likely based on the location of the Administrative Area. The presence of additional storage buildings, such as tool sheds, also varied by installation site.[21]

[15] Bohlander Interview, May 27, 2015.
[16] Morgan and Berhow, Rings of Supersonic Steel, p. 20.
[17] Martini and Haller, "What We Have We Shall Defend…," p. 113.
[18] Lonnquest and Winkler, "To Defend and Deter…," p. 173.
[19] Layton, "Cultural Landscape Report..." p. 128.
[20] Lonnquest and Winkler, "To Defend and Deter…," p. 173.
[21] Some details of the information about how NIKE sites were originally configured and how they evolved is informed by research performed by a general survey of NIKE site construction drawings available online at the Library of Congress and other websites combined with a visual survey of current aerial photographs of former NIKE sites using Google Earth and Bing Maps, both online.

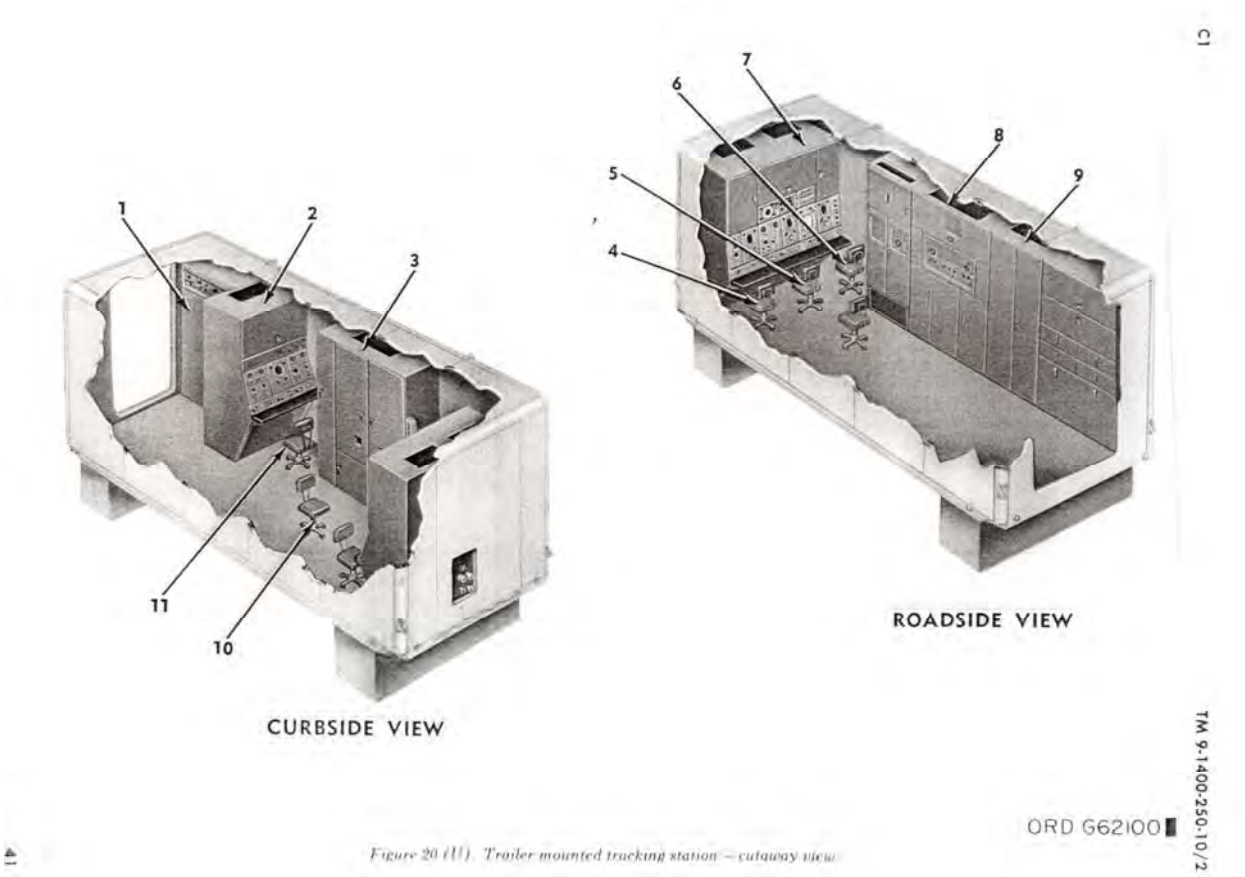


Figure 1.1-5: Radar Control Van for the NIKE system.

Missile Launch

The first-generation missile of the NIKE system, the Ajax, was a two-stage supersonic surface-to-air missile. The missile was 34 feet long with its Rocket booster attached and a slender 12 inches wide excluding the fins. The missile was propelled in two phases by a detachable solid-fuel booster and an internal liquid-propellant motor in the missile itself. Upon launch, the missile had fuel for 70 seconds of sustained flight which would gave it a range of 25-30 miles and a ceiling of 65,000 feet. The missile could achieve speeds of up to Mach 2.3 (1,679 mph).[22] The Ajax was armed with three high-explosive conventional warheads (12 lbs. at nose, 179 lbs. at mid-body, and 122 lbs. at aft) that would be detonated when in close proximity to the target by orders sent from the Missile Tracking Radar.[23]

[22] Lonnquest and Winkler, "To Defend and Deter…," p. 165.
[23] Martini and Haller, "What We Have We Shall Defend…," p. 13.

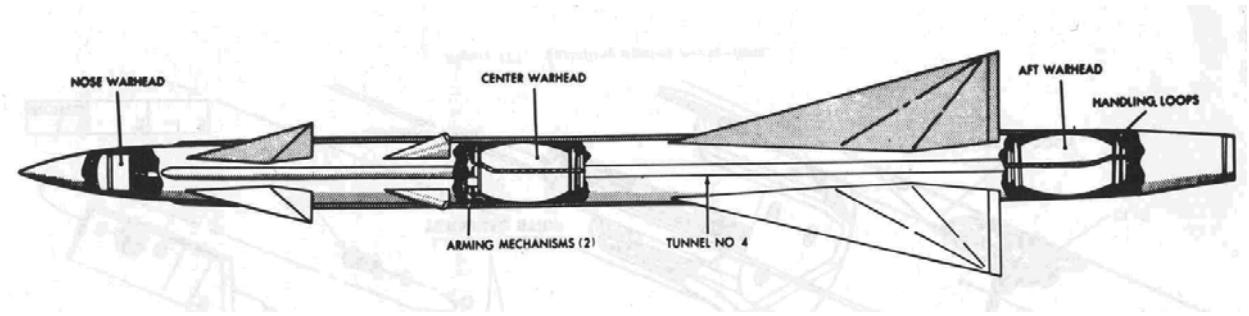


Figure 1.1-6: NIKE Ajax Missile Diagram.

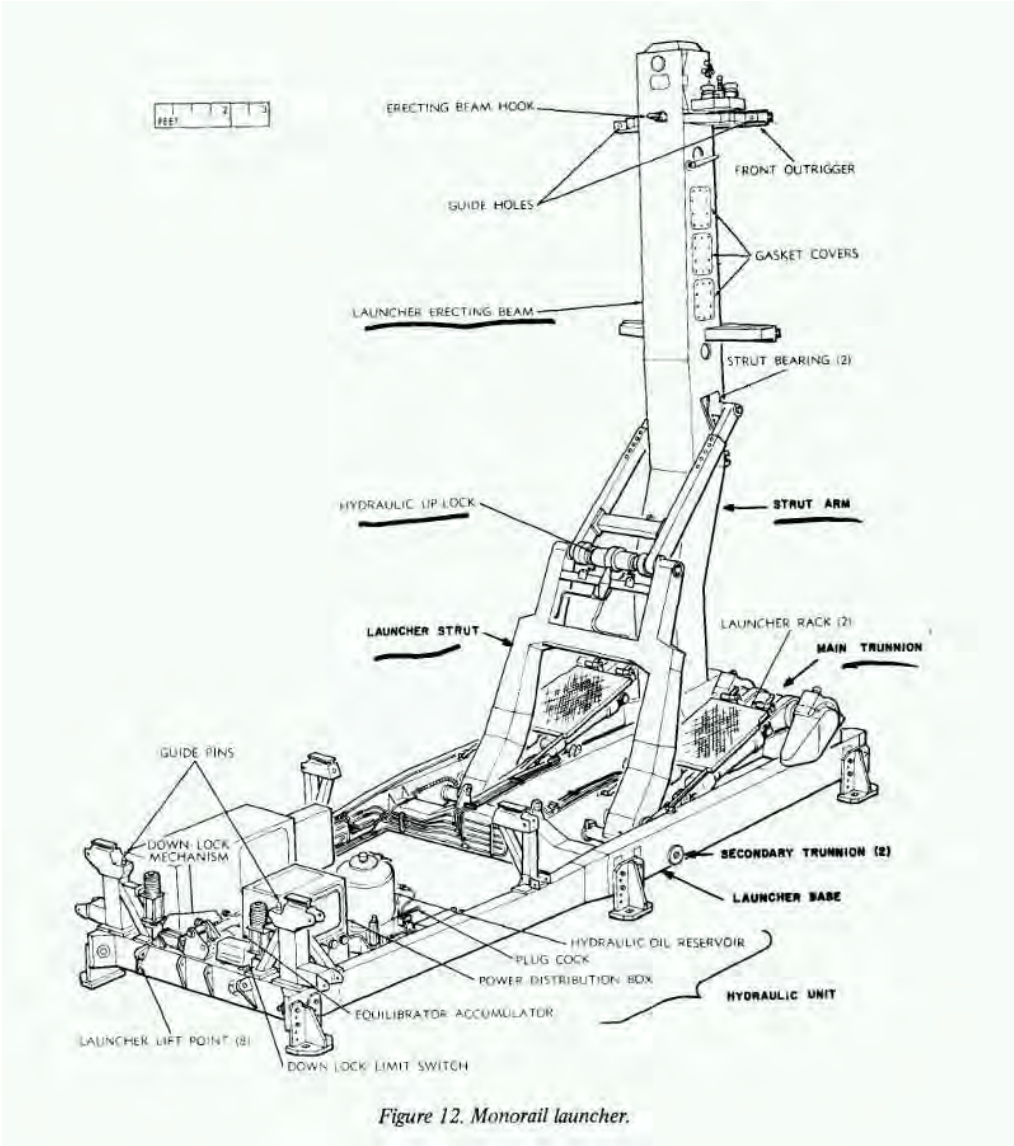


Figure 1.1-7: NIKE Missile Launcher.

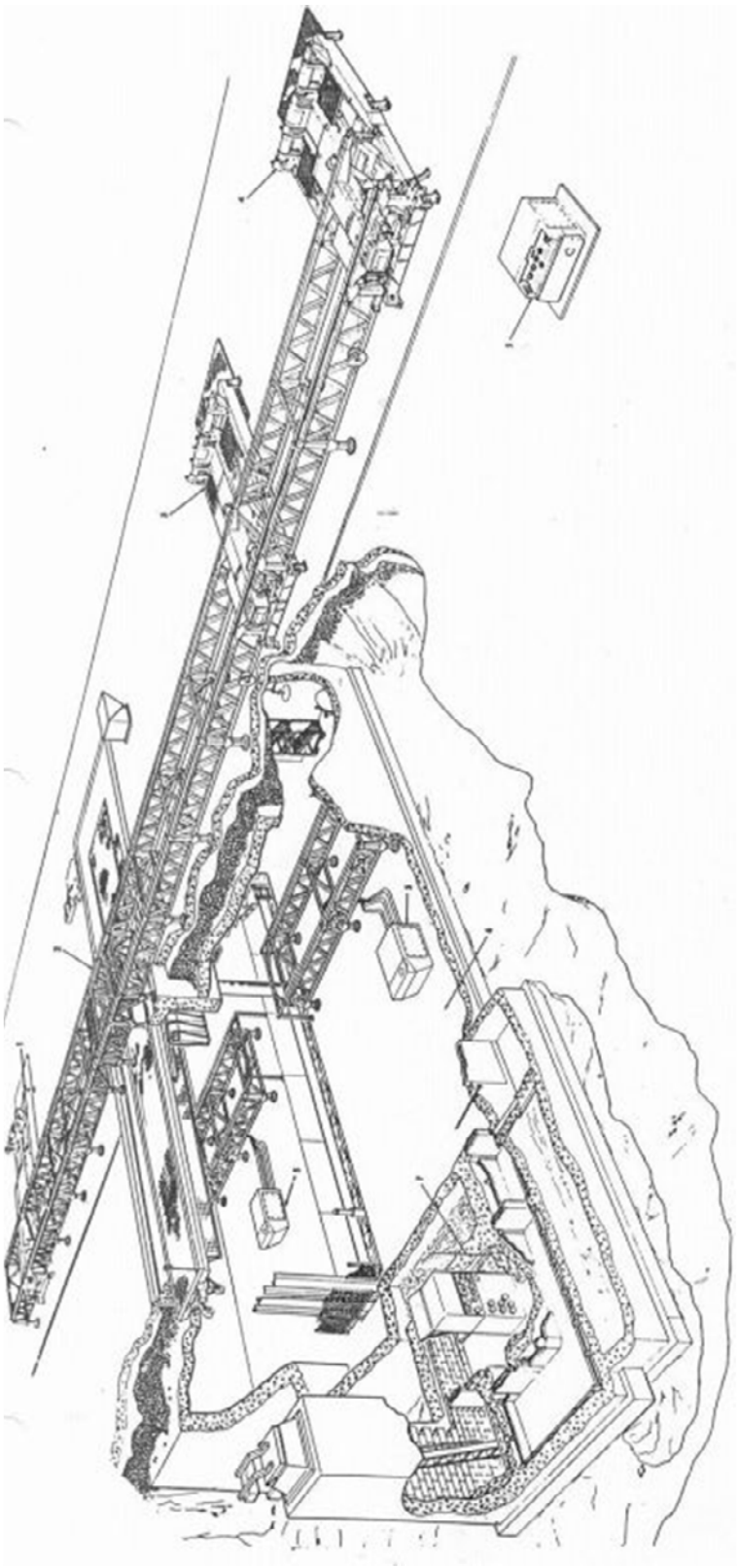


Figure 1.1-8: NIKE underground magazine diagram. Note diagram includes a staircase accessing magazine directly in addition to hatches and ladders.

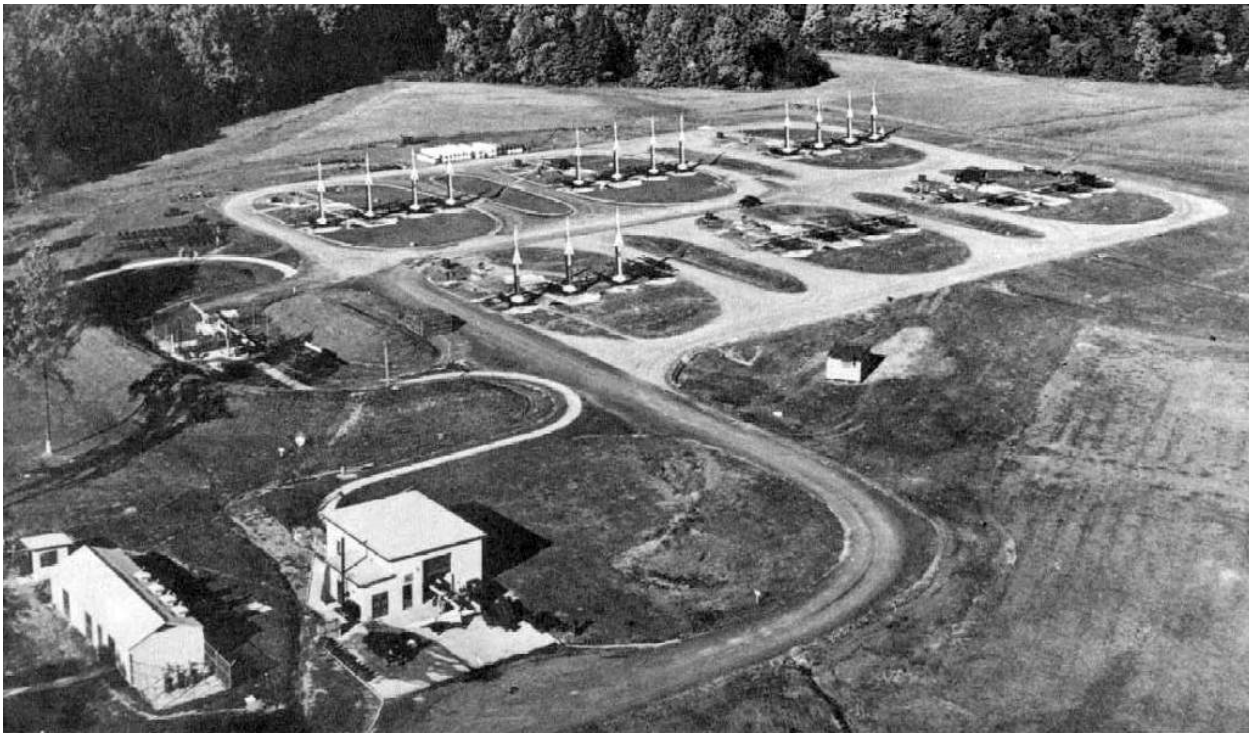


Figure 1.1-9: Launch area at BA-79, a dual-site with six magazines, in the Baltimore Defense Area, c. 1950s, but before 1959 Hercules conversion.

The launch areas for the NIKE Ajax system were originally conceived as being entirely above ground with missiles in place and ready on a series of launchers. The land requirements for such a layout exceeded 100 acres for many of the sites. With the purpose of the NIKE system being the protection of heavily populated areas, the Army realized that finding that amount of available, affordable land for each site near enough to the city to be functional would be very difficult. As a solution, the launch system was modified to incorporate an underground magazine where multiple missiles could be stored.[24] With the identification of a hostile threat, the missiles would be moved to an elevator and raised to the surface where two to four launchers were ready to receive the appropriate command. This configuration allowed each site to hold significant numbers of missiles, up to eleven Ajax missiles per magazine, in a considerably smaller area. With the underground magazine site requiring roughly 40 acres of land, the Army was able to efficiently protect an area by locating sites closer to the cities.[25] A "single" site typically included 1-3 magazines with most having two or three. Some sites, based on strategic location, were constructed as "double" sites with 2-6 magazines. These double sites corresponded with an additional radar group at the companion radar area. The underground magazines included the storage

[24] The missile magazines are referred to by various nomenclature including: silo, pit, magazine. The original drawings refer to them as "underground missile storage structures." For brevity's sake, this report will generally refer to the structure as a whole as "magazines" and when referencing the actual space holding the missiles as "missile storage room."

[25] Lonnquest and Winkler, "To Defend and Deter…," p. 170-171.

area with missile racks and control panel, a crew shelter and connecting corridor.[26] A NIKE Ajax launch area also included a missile assembly and testing building and a liquid fueling station. These buildings were typically located near the underground magazines, but were almost entirely surrounded and separated by large earthen berms due to the high volatility of the liquid fuel used by the Ajax missile. A combination of JP-4 jet fuel, red fuming nitric acid and aniline/furfuryl alcohol, the fuel for the Ajax's second stage was also highly toxic. An acid fuel storage shed was also located near the fueling station, but separated from the station and the magazines by the earthen berms. A generator building was also part of the NIKE Ajax launch area, providing power to the magazine and support buildings. Finally, a launch control van was located at the launch area to receive signals from the missile tracking radar.[27] Because of this communication between the areas, clear and defined lines-of-sight were required between the two areas.[28]

Administrative Area

The administrative area of NIKE Ajax installations exhibited the greatest variation between sites. As stated above, depending on the proximity of the radar and launch areas, sometimes a single administrative area would support both areas. More distant areas might have their own separate administrative areas. In some NIKE locations, an existing military installation in close proximity served some and occasionally all of the administrative functions for the site. The functions served by the administrative buildings typically included barracks, latrines, mess halls, day rooms and accompanying utility plants.[29] As the configuration of the administrative areas varied, so did the character of the buildings. Some buildings were built of concrete block like many of the permanent buildings on the NIKE sites. Other buildings were more temporary pre-fabricated buildings with corrugated siding. On sites where former Army installations or other vacant buildings were located, a variety of building types were used to serve the administrative purposes. [30]

Defense Areas

By 1958, nearly 200 NIKE Ajax sites had been constructed at 40 Defense Areas by the Army. The number of batteries serving a defense area ranged from two to twenty-two in number. Defense areas focused primarily on major population centers with a secondary focus on strategically important Air Force bases. Batteries were arrayed around a city in a rough circle. Where gaps in the circle were present because of geographic conditions, such as at a shorefront location, some of the batteries would be constructed as a "double-site" with twice the missile magazines and radar installations in an attempt to compensate. The naming and numbering convention was based on the location within the circle of batteries. The first part of the name was typically an abbreviation of the adjacent city (NY for New York/New Jersey, C for Chicago, LA for Los Angeles, etc.). That abbreviation was then combined with a two digit number. Sites were numbered in clockwise fashion with 01 being located just east of true north the increasing with the northeast quadrant housing 01-25, the southeast housing 26-50, etc. For

[26] Morgan and Berhow, Rings of Supersonic Steel, p. 14, 80-203. These pages include a site-by-site listing of configuration and number of magazines.

[27] Lonnquest and Winkler, "To Defend and Deter…," p. 173.

[28] U.S. Army Corps of Engineers, New York District, "New York Defense Area – 'NIKE Project' General Plan – Launching and Control Area, Fort Hancock, New Jersey," Gateway National Recreation Area Archives, GATE 8778.

[29] Martini and Haller, "What We Have We Shall Defend…," p. 79-80.

[30] See note 21.

example, if a battery was named SF-88 it could be deduced that it was a San Francisco installation northwest of the city. The most heavily armed defense areas were New York/New Jersey, Chicago, Los Angeles and Washington, DC.[31]

In addition to the battery sites, additional administrative headquarter sites within a defense area helped to coordinate the defense area and served as a link between the local batteries and the overseeing department, Army Air Defense Command (ARADCOM). In the late 1950s, the introduction of the Semi-Automatic Ground Environment (SAGE) and Missile Master radar systems at some ARADCOM regions and defense areas provided the layered system of communication intended to increase the efficiency of the NIKE missile sites. The SAGE system was capable of detecting incoming threats at a far greater distance than the individual acquisition radars of the NIKE sites. After detection by the SAGE system, Air Force interceptors could be sent to identify and if necessary deter the incoming aircraft. If they were not successful, the SAGE system would then notify the relevant defense areas; through their Missile Master systems if present. The Missile Master was then capable of picking up the threats on its radar and coordinating which targets each battery engaged. This prevented multiple batteries from focusing on a single target thereby allowing other targets to pass through unharmed. The support sites for the defense areas were often located with existing Air Force bases or other military installations.[32] With the introduction of the Missile Master system, additional equipment was installed at individual battery sites to facilitate communication and coordination. Known as the Fire Unit Integration Facility (FUIF), this computer equipment was installed in a new building or sometimes as an addition to an existing building.[33]

Introduction of NIKE Hercules

Even before the widespread construction of the NIKE Ajax system was underway, the replacement for that missile had already begun. A shortcoming of the NIKE Ajax system was its inability to differentiate between several targets in relatively close proximity. Because of the limited range of its warheads' explosive burst, it was possible that, despite the system working as designed, the missiles may only partially damage the target or perhaps miss them altogether. The strategy put forward to improve the system was the addition of a nuclear warhead to the missile. The larger explosion would be capable of taking down more than one target even if didn't achieve a direct hit. [34] Faced with a choice between decreasing the size of a nuclear device for inclusion in the Ajax missile and developing a larger missile, the Army pursued the latter strategy with the condition that the existing Ajax infrastructure in development could be used.[35] As a result, as the Hercules missiles were being developed, many of the magazines being constructed for the Ajax were sized to accommodate both missile types.[36]

The NIKE Hercules was, like the Ajax, a two-stage supersonic surface-to-air missile. With its rocket booster attached, the missile was 41 feet long and 31.5 inches wide excluding the fins. Both phases propelling the missile were fueled by solid propellant including the detachable booster, which was

[31] Morgan and Berhow, Rings of Supersonic Steel, p. 11, 80-203. These pages include a site-by-site listing of configuration and number of magazines.
[32] Morgan and Berhow, Rings of Supersonic Steel, p. 41-51.
[33] "Ed Thelen's Nike Missile Web Site – Frequently Asked Questions," http://ed-thelen.org/faq.html, accessed August 1, 2015.
[34] Morgan and Berhow, Rings of Supersonic Steel, p. 27-28.
[35] Lonnquest and Winkler, "To Defend and Deter…," p. 179.
[36] Morgan and Berhow, Rings of Supersonic Steel, p. 26-27.

essentially four Ajax boosters strapped together, and an internal missile motor. The more powerful booster of the Hercules gave the missile a range of 75 to 95 miles and a maximum altitude of up to 150,000 feet. The missile could achieve speeds of up to Mach 3.65 (2,707 mph). There were options for the warhead held by the Hercules. The warhead section of the missile could be armed with a single high-explosive fragmentary warhead or a single nuclear warhead, the W31 being the first available for the Hercules. The W31 nuclear warhead had several available yields ranging from 2 to 40 kilotons. Similar to the Ajax, orders to detonate were given by the Missile Tracking Radar when the missile was in close proximity to the target.[37]

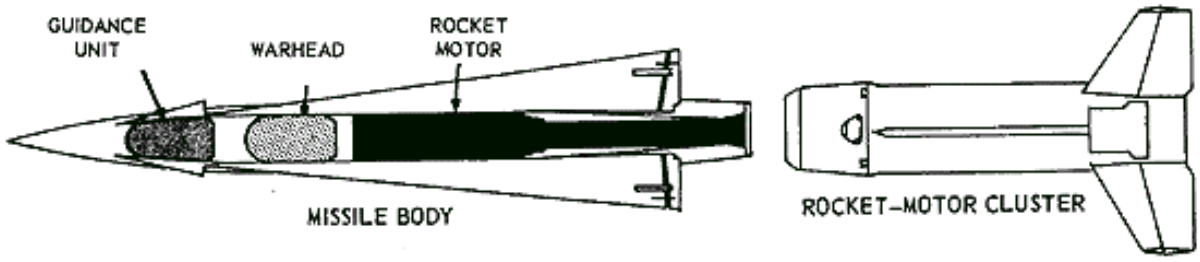


Figure 1.1-10: NIKE Hercules Missile Diagram.

Beginning in 1958, selected NIKE Ajax sites received Hercules missiles. At many locations the conversions took place in phases with both Ajax and Hercules missiles being present in the underground magazines. With the increased speed, range and altitude of the Hercules, it was believed that fewer active sites were required to protect the cities. So while some sites were converted to the newer missile, other Ajax sites, most often those with magazines that were not easy to convert to hold the larger missile were deactivated. Some of these deactivated Ajax sites were transferred to the National Guard who controlled the Ajax sites after receiving specialized Army training. Because the increased capacity of the Hercules missile allowed areas to be protected with fewer batteries, new defense areas were created at some of the country's smaller cities as well as strategically important air force bases. Also due to the increased range of the Hercules, new batteries could be located further from the protected city where land was both more available and less expensive. This allowed the new batteries to be entirely above ground instead of requiring the subterranean magazines to save space. As discussed above, the introduction of the Missile Master radar system greatly increased the efficiency with which the batteries in a defense area were coordinated.[38] Smaller defense areas were equipped with the Battery Integration and Radar Display Equipment (BIRDIE) system, also known as Midget Missile Master, which served the same function as the more robust system but for fewer batteries.[39]

[37] Lonnquest and Winkler, "To Defend and Deter…," p. 177.
[38] Lonnquest and Winkler, "To Defend and Deter…," p. 181-182.
[39] Morgan and Berhow, Rings of Supersonic Steel, p. 41.

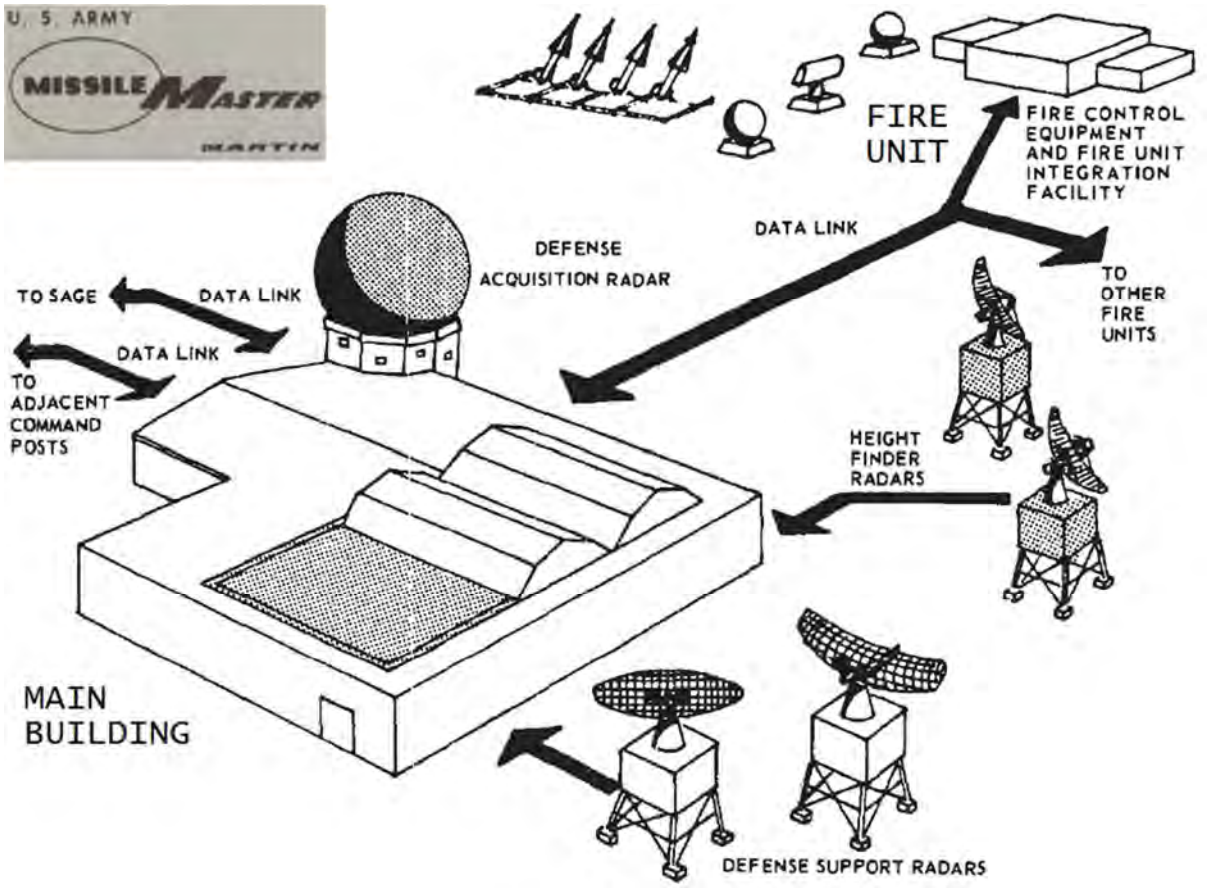


Figure 1.1-11: Missile Master system diagram.

At batteries with the universal magazine, the introduction of the Hercules missile made only a few visible changes to the respective sites. The earliest Hercules systems, as dictated by the Army during development, were designed to work with the existing Ajax systems. The primary changes made to the battery sites were directly related to the presence of nuclear material. Sentry posts were typically installed at the perimeter gates of both the radar and launch areas and also at a newly installed inner fence line that created an "exclusion zone" around the magazines.[40] Kennels were constructed at the launch area of most batteries and German shepherds patrolled the area between the inner and outer fence lines with their military police handlers. The other change to the launch area was due to the absence of liquid fuel in the Hercules missile and booster. With the acid fueling platform now obsolete, it was replaced with a warhead building where warheads were loaded into the missiles. The acid storage shed, also now no longer needed for that purpose, was often either removed or converted to another use, such as flammable materials storage.[41]

A more significant change to many of the Hercules radar sites came when the "Improved Hercules" system was implemented in the early 1960s to take full advantage of the Hercules missiles capabilities. The largest component of the upgrade was the construction of the High-Powered

[40] Martini and Haller, "What We Have We Shall Defend…," p. 111-112.
[41] Layton, "Cultural Landscape Report..." p. 129-130.

Acquisition Radar (HIPAR) antenna. The antenna was typically installed on a high platform and was protected from the elements by a rigid geodesic radome. The superior range of this acquisition radar allowed the battery to make the maximum use of the increased range of the Hercules missile. An adjacent HIPAR building housed the radar's computers and other electronics. In many locations, the power requirements of the HIPAR required the installation of additional generators to supply the necessary electricity. At other NIKE Hercules sites that did not receive a new HIPAR antenna as part of Improved Hercules, a less-powerful Alternate Battery Acquisition Radar (ABAR) was installed. While not as powerful as the HIPAR, the ABAR had a greater range than the LOPAR that accompanied the original NIKE Ajax systems.[42] At some of the radar areas, both HIPAR and ABAR were installed with the latter serving as a backup. In addition to the improvements to the acquisition radars, many of the Improved Hercules sites received upgrades to the target radar systems as well. The Ajax Target Tracking Radars were replaced with a more powerful unit and additional Target Ranging Radars were introduced as well. All of the Improved Hercules modifications were made to batteries by 1967.[43]

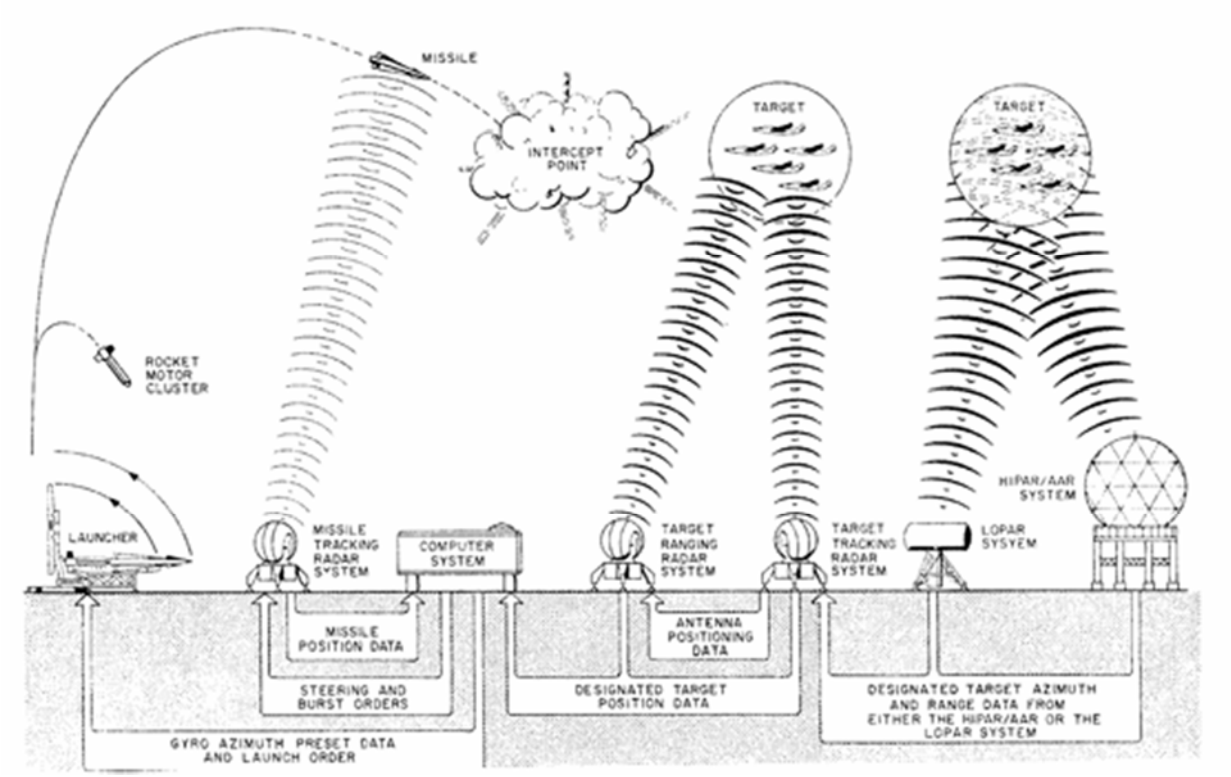


Figure 1.1-12: Improved Hercules system diagram.

[42] Morgan and Berhow, Rings of Supersonic Steel, p. 40.
[43] Lonnquest and Winkler, "To Defend and Deter…," p. 180.



Figure 1.1-13: Improved Hercules Radar Tracking Site at PR-38 in the Providence Defense Area.

End of the NIKE Program

As the Cold War progressed, the emphasis of research in the United States and Soviet Union was on the development of Intercontinental Ballistic Missiles (ICBMs). These ICBMs replaced bomber aircraft as the primary delivery system for nuclear weapons in the case of an attack. For defensive purposes, the NIKE Hercules did not have the range, speed or altitude capabilities required to intercept this new technology and as early as 1958, the Army began the development of the next generation of NIKE missiles. The next missile and radar system was designated NIKE Zeus and while it was often successful during research tests, it did struggle to consistently identify debris and other decoys that drew it away from the primary target. It was deemed unsuccessful and research continued. The next system was designated NIKE X and ultimately evolved into the Anti-Ballistic Missile system designated Spartan. While these systems were more successful, the atmosphere in the United States, influenced by public opinion regarding the Vietnam War and defense spending in general resulted in the ultimate termination not only of the next generation defense systems, but of the NIKE Hercules system as well. [44]

Made largely obsolete by the proliferation of ICBMs, the NIKE Hercules program was targeted for deactivation beginning in 1968. Over the next six years, batteries and entire defense areas were dismantled and the sites shut down.[45] Most sites were considered surplus and offered first to other federal agencies and then to state and local government entities who were the most frequent recipients of the sites. The sites served a variety of uses from weather stations to municipal air fields to parking lots and maintenance yards. While some magazines and radar platforms were imploded or demolished at transfer, many would remain largely intact.[46]

[44] Morgan and Berhow, Rings of Supersonic Steel, p. 62-64.
[45] Morgan and Berhow, Rings of Supersonic Steel, p. 67-68.
[46] See Note 21.

1.1.3 The New York Defense Area

The New York Defense Area, along with the Chicago and Los Angeles Defense Areas, was one of the largest defense areas by number of firing sites. With 19 original Ajax sites built between 1954 and 1957, the defense area formed a rough ring around the city of New York with sites in northern New Jersey as well as New York. All of the sites were given the "NY" prefix and began with NY-03/04 near Orangeburg, NY (NY-01 was a HQ location near Tappan, NY) and worked clockwise around the city to NY-99 near Spring Valley, NY (seven miles NW of NY-03/04). Most of the installations were single sites with two or three missile magazines. There were six double, or dual, sites that included NY-03/04 (Orangeburg, NY), NY-29/30 (Lido Beach, NY), NY-49 (Fort Tilden, NY), NY-56 (Fort Hancock, NJ), NY-80 (Livingston, NJ) and NY-93/94 (Ramsey, NJ). The double sites were all installed with six magazines except for NY-49 and NY-56 which only received four magazines each. At all of the New York Defense Area sites, at least one of the Ajax/Hercules "universal" B-type magazines. Seven of the sites received only B-type magazines. The remainder of the sites received a mix of the B-type magazines and the Ajax-only A-type. Each NIKE site had a radar or integrated fire control (IFC) installation with the dual sites having two, one for each set of magazines.[47] At Fort Hancock, the western IFC area (Control Area #1, or C-1) controlled the two western missile magazines (Sections A and B) at the launch area while the eastern IFC area (Control Area #2, or C-2) controlled the two eastern missile magazines (Sections C and D).



Figure 1.1-14: The New York Defense Area at its most extensive. Several of these sites would be deactivated after the introduction of the Hercules missile.

[47] Morgan and Berhow, Rings of Supersonic Steel, p.149-155.

The New York Defense Area included several headquarters installations including NY-01 at Tappan, which held housing and other administrative buildings for the area. The U.S. Army Air Defense Command (ARADCOM) which had begun to divide the country into regions for defensive and administrative purpose centered the 1st ARADCOM region on New York. Its headquarters was located at Fort Totten in Queens, NY. The original site of the New York area's Army Air-Defense Command Post (AADCP) was located at Fort Wadsworth where coordination between the various batteries in the Defense Area was performed manually. This system was replaced in 1960 with the advent of the Missile Master system which was deployed at Highlands Air Force Station in New Jersey. The Highlands site also served as the Defense Areas contact point with the regional Semi-Automatic Ground Environment (SAGE) radar system.[48]

The introduction of the Hercules missile in the late 1950s resulted in a number of changes to the New York Defense Area, both on a regional and site-specific basis. Of the 19 firing sites in the area, only 10 were upgraded to the Hercules system. The level of disturbance at the sites was minor at sites equipped with the universal B-type magazines, but more involved where the A-type magazines for Ajax missiles were modified to house the Hercules missiles. The remaining 9 sites that were not converted were largely turned over to the National Guard where they remained active as NIKE Ajax sites until the early 1960s. Only sites NY-15 at Fort Slocum, NY and NY-88 at Wayne, NJ appear to have been simply deactivated rather than transferred. When the Improved Hercules upgrades went into effect in 1961-1962, seven sites received the large HIPAR systems while four received the ABAR setup. Documentation suggests that NY-56 at Fort Hancock, NJ received both systems. [49]

The Missile Master system at Highlands would be replaced with the more technologically advanced Missile Mentor system in 1966.[50] It was at around this time that the AADCP for the Philadelphia Defense Area was deactivated and the two defense areas were merged. In 1972, as the NIKE program was winding down and more sites were being deactivated, the Missile Mentor system was replaced with the simpler BIRDIE system, designed for fewer batteries.[51]

1.1.4 NY-56 Fort Hancock/Sandy Hook

In March of 1954, it was announced that Fort Hancock would be one of the battery locations for the new NIKE Ajax system. Located south of the fort, construction on the two areas of NY-56 started later that year and the first group of buildings, consisting of many of the launch area buildings and a portion of the radar area, were completed in 1955. Continued construction at the radar tracking area was completed in 1956. This first phase of the NIKE site construction would remain until the introduction of the NIKE Hercules missile in 1958. The presence of nuclear warheads resulted in significant changes to the site, mostly in connection with increased security. Transportation patterns at the sites were modified as were buildings associated with the switch from liquid- to solid-fuel missile propellants. Another round of site and building modifications would follow the introduction of the Improved Hercules system beginning in 1961. The addition of major radar installations and the associated power modifications

[48] Ibid.

[49] Ibid.

[50] Barry Leonard, ed., History of Strategic and Ballistic Missile Defense: Volume II: 1956-1972, Darby, PA: Diane Publishing Co., 2011. p. 320

[51] B.N. McMaster, et.al., "Historical Overview of the Nike Missile System," Report for U.S. Army Toxic and Hazardous Materials Agency, Aberdeen Proving Ground, Maryland, December 1984, Appendix C, p. C-1-C-24.

would be the last large-scale building campaign at the site. Aside from one new building and minor modifications to existing buildings, the site would remain much the same until its closure in 1974.

A more detailed description of the NY-56 NIKE site and its development over time is provided in Section 1.2 – Chronology of Development and Use

1.1.5 Decommissioning & National Park Service

Efforts to turn Sandy Hook into a public park began as early as the 1930s. Multiple attempts to convince the military to turn over all or part of the peninsula to the state of New Jersey for public use took place through the 1950s. The efforts met with varying levels of success but often fluctuated with the prospects of Fort Hancock itself. When the necessity of the Fort to defense plans was seriously reconsidered in the 1930s and 1940s, the prospects of a public park looked brighter. The outbreaks of World War II and later the Korean Conflict caused the likelihood of immediate turnover to the public to recede. It was not until the late 1950s when significant momentum towards the creation of a national seashore park, similar to the recently created Cape Cod National Seashore, began to develop. The issue became a contentious issue in New Jersey state politics, especially at the gubernatorial level. The Department of Defense steadfastly denied the possibility of transfer, citing the presence of the NIKE batteries at Sandy Hook as illustrative of the peninsula's ongoing military relevance. Public pressure persisted however until President John F. Kennedy intervened in 1961. The president's administration directed the Departments of the Interior and Defense to work out a suitable manner of providing public access to a significant portion of the military reservation at Sandy Hook. The talks ultimately resulted in the agreement that 350 acres, and ultimately 460 acres, of the peninsula would be leased to state for the purpose of creating a public park. Sandy Hook State Park would be open to the public in 1962. Two years later, the Johnson Administration would declare an additional 281 acres as military surplus and add the land to that leased by the state.

A combination of factors in the early 1970s contributed to the eventual deactivation not only of the NIKE program, but of ARADCOM as a whole. The rise of ICBMs as the primary weapon of the Cold War made much of the NIKE system obsolete. With public opinion regarding the Vietnam War and military spending in general at a low, the will to create and invest in the further development of anti-ballistic missile systems as a replacement was not present. With the role of ARADCOM in the nation's defense diminishing, a serious reduction in the size of the NIKE system was announced in 1971. The size of the New York area's population and tactical effectiveness of the Fort Hancock's location allowed NY-56 to avoid closure during this first round of 24 NIKE battery deactivations. Around the same time, Fort Hancock itself was declared a surplus post and plans were formulated to allow the transfer of much of the military reservation to public uses. While the State of New Jersey was interested in adding the land to Sandy Hook State Park, it did not have the resources to develop it for public use. The creation of Gateway National Recreation Area by the Nixon Administration in 1972 would task the Department of the Interior with opening the area, with the exception of some facilities still used by the U.S. Navy and Coast Guard.[52] The decision to close Fort Hancock would coincide with the announcement that the NIKE system, as well as ARADCOM, would be almost entirely shut down. Aside from one installation in Florida, one in Alaska and a training installation in Texas, all remaining sites would be closed.[53] Finally, the closure of NY-56 occurred in August of 1974 with Fort Hancock's closure following four months later.

[52] Butowsky, "National Register of Historic Places Inventory…," Continuation Sheet 15.

[53] The active installations in Florida and Alaska would be closed in 1979 while the training facility would become inactive in 1983.

Overseen by the Department of the Interior through the National Park Service, Gateway National Recreation Area would subsequently open the areas to the public as safety and access concerns were addressed.

1.1.6 NY-56 at Sandy Hook in the Larger NIKE Missile System Context[54]

The NIKE installation at Fort Hancock on Sandy Hook was a relatively unique example of a NIKE site when it was constructed and remained so in the manner in which it evolved as the NIKE System changed over time. NY-56 remains unique today in how well it has survived in comparison to other sites around the country.

Initial Construction and Radar Upgrades

When constructed in 1954-55, NY-56 was a unique site built very near the beginning of the NIKE program's implementation in the United States. One of the most unusual characteristics of the installation is its existence as a "double-site" with two distinct sets of missile magazines and radar control areas. Of over 250 NIKE missile installations in the United States, only 22 of them are double-sites. Six of those double-sites are counted within the 19 installations that made up the New York Defense Area; the highest percentage among U.S. Defense Areas. Even within the category of U.S. double-sites, NY-56 is unique. The typical NIKE single-site was built with a single set of three magazines. Double-sites were typically constructed with two sets of three-magazine batteries for a total of six magazines at the site. Only NY-56 at Fort Hancock and its neighboring double-site, NY-49 at Fort Tilden across New York Harbor, were initially constructed with a pair of two-magazine batteries for a total of four magazines. Also unique to these two sites is the fact that all four of the magazines constructed at each of these installations were of the "Type B" "universal" configuration intended to hold the Ajax missile as well as the Hercules missile then under development. Most sites built at this time, both single- and double-sites, were either built with "Type A" Ajax magazines only or a mix of Type A and Type B.

Another unusual characteristic of the Fort Hancock NIKE installation was the type of Alert Barracks that were constructed at both the Missile Launch and Radar Tracking areas. The large majority of the early NIKE installations were constructed as independent self-contained sites, usually surrounded by residential and other general public areas. Only a handful of sites in the U.S. were constructed near or within an existing military facility. For example, of the 19 missile sites in the New York Defense Area only three were attached to existing bases: NY-56 at Fort Hancock, NY-49 at Fort Tilden and NY-15 at Fort Slocum. It is likely that this proximity to existing barracks at the Fort is why the Alert Barracks at NY-56 were built with more temporary construction. Other sites had more permanent barracks, day rooms and other administrative facilities and even some of those sites attached to existing bases were provided with these types of facilities.

As the NIKE Ajax missile system was replaced by the NIKE Hercules missile in the late 1950s, not all of the original Ajax sites were upgraded. This is true of the NIKE Ajax double-sites as well. Of the 22 double-sites in the U.S., only 17 were upgraded to the Hercules system. Of the six New York Defense

[54] Nearly all of the information in this section is derived from the list of NIKE sites included in Morgan and Berhow, Rings of Supersonic Steel, p.80-203. Additional information on existing conditions for various sites was compiled using aerial imagery available from Google Maps, www.google.com/maps and Bing Maps, www.bing.com/maps in September 2015.

Area double-sites, five were upgraded with only NY-29/30 at Lido Beach remaining an Ajax site until it's closure around 1963.

As sites were upgraded to Hercules and then shortly after the Improved Hercules system, they were typically outfitted with one of two radar systems. The High-Powered Acquisition Radar (HIPAR) or an upgraded Alternate Battery Acquisition Radar (ABAR-69, -71 or -75) to take greater advantage of the capabilities of the Hercules missile. Only two double-sites in the U.S. received both a HIPAR and ABAR radar system instead of a single system. NY-56 and PH-23/25 at Lumberton, New Jersey in the Philadelphia Defense Area received both the HIPAR antenna and ABAR-75 antenna.

Current Condition and Ownership

A survey of existing NIKE sites reveals that a majority of over 500 NIKE areas in the United States (two areas each at over 250 NIKE sites) have no historic integrity remaining. Most have been turned over by the military to state, municipal or private ownership. Only 73 NIKE areas remain under Federal Control through either the military or other Federal agencies. Regardless of ownership, the range of conditions of the various sites is largely similar. The sites in the best condition are typically those that, while not receiving intensive use, have had their major buildings rehabilitated and reused for new purposes while the areas themselves have not been drastically altered. Buildings typically retained for these types of uses are the Missile Assembly and Testing Buildings, Warheading Buildings, HIPAR Buildings, Guard Booths and Administrative Buildings such as the barracks, day rooms, etc. The sites in poorer condition are typically those that have been largely abandoned. These sites are often overgrown, but a few to several original buildings remain, though in very poor condition. Control Area #2 at the NY-56 Radar Tracking Area is a good example of this type of condition. The poorest condition are those areas which have been removed completely and new construction built on the site. In these circumstances there are often no visual clues to a NIKE site having ever existing in these locations. Of the 73 NIKE areas under Federal control, only 16 of these areas are in fair condition. The remainder are either severely deteriorated, heavily modified or have been removed completely.



Figure 1.1-15: N-93 at Hampton, Virginia in the Norfolk Defense Area. This condition is typical of many of the remaining Missile Launch areas: a few buildings remain, the magazines are visible, but many buildings are missing and the site is heavily altered.



Figure 1.1-16: PH-58 at Swedesboro, New Jersey in the Philadelphia Defense Area. This condition is typical of many of the remaining Radar Tracking areas: a few buildings remain but are in poor condition and the site is largely overgrown. PH-58 is unique in that, like NY-56, its radar stands are still present.

NY-56 at Fort Hancock is a very well-preserved NIKE site and, by far, the best preserved double-site in the country. While some buildings are in poor condition, nearly all are still extant and many have received some degree of maintenance. More rarely, many of the site features including roads, berms, fences, lighting remain essentially unchanged since the decommissioning of the site. While there appear to be instances around the country where individual areas within a NIKE site are in equal or better condition, there are very, very few sites where both the Missile Launch and Radar Tracking areas are still extant. For both areas of a site to retain the level of integrity found at the NY-56 site is even rarer still. Another unique characteristic of NY-56 is that of 73 federally-owned NIKE areas, it is one of only 10 areas under the control of the National Park Service. Of those 10 areas, the areas at Fort Hancock are two of only seven that remain in fair condition.

Only NY-56 at Fort Hancock and SF-88 at Fort Barry are under National Park Service control and have both Missile Launch and Radar Tracking Areas in fair condition. While the Missile Launch Area at SF-88 has been largely restored, the Radar Tracking area at NY-56 has retained significantly more historic integrity.



Figure 1.1-17: NY-56 at Fort Hancock. The conditions found at the Missile Launch (top) and Radar Tracking Areas (bottom) are rare among remaining NIKE sites. The fair condition of the buildings themselves at both areas and relatively minimal alterations to the historic site configurations are particularly notable.

1.2 CHRONOLOGY OF DEVELOPMENT AND USE

The development of the NIKE site on Sandy Hook took place over two decades of active use. Beginning in 1954, the site would evolve as changes and improvements were made to the missile system over time. With the most concentrated changes occurring between 1954 and 1962, archival evidence suggests four primary building campaigns with smaller construction projects occurring at other times during the site's active use. In an effort to discuss the various buildings at the two areas in the order that they were constructed and sometimes modified, this report will look at the areas at various dates that correspond with the building campaigns and major milestones in the history of the installation. The significant dates are:

Pre-1954 – Before NIKE
1955 – Initial Completion of Fort Hancock NIKE Site
1956 – Early Modification of Radar Area
1960 – Introduction of Hercules / Missile Master
1963 – Introduction of Improved Hercules
1967 – All Major Buildings Complete
1974 – Configuration at Decommissioning
2015 – Current Configuration

In addition to site visits on April 6-8 and May 26-28, 2015, research at the Gateway National Recreation Area archives was undertaken on February 12, 2015. The drawings in the GNRA archives were indispensable along with the archive's Real Property Record Cards referenced in prior research.

Many of the buildings on both areas of the site appear to have been altered very little over the years of occupation by the Army and this is corroborated by the original drawings in many cases. Where significant changes have been made to the buildings, these changes are discussed in the time period during which they occurred.

1.2.1 Pre-1954 – Before NIKE

Missile Launch Area

The area that would house the Missile Launch Area was located approximately two miles south of Fort Hancock and 1000 feet from the east shore of Sandy Hook. The Launch Area and its associated missile buildings were sited at the northeast edge of an existing natural pond where a network of sand and gravel roads in this location served a series of two-story wood warehouses that were built by the Army Signal Corps to house and protect their tests of early radar equipment prior to World War II. The southernmost group of these warehouses were adjacent to where the launchers would be installed. The portion of the Missile Launch Area containing the launch control vans, alert barracks and area entrance was located on the east side of the main asphalt road running the length of the peninsula. This area was adjacent to an existing gravel road and clearing that may have been associated with some manner of pond use, but no other significant site elements. The vegetation on what would become the Launch Area consisted of a mix of brush and trees ranging up to heights of 20 feet.



Figure 1.2-1: Detail of the 1955 general plan of the NY-56 NIKE site. Note the location of the mean high water line in relationship to the magazines. Also note the unobstructed lines of sight required and the unoccupied buildings near the magazines. (GATE 8778)

Prior to the construction of the Missile Launch Area, two temporary surface launch installations were constructed on Sandy Hook. While no images have been located of these launchers, they were likely similar to the original above-ground design for the NIKE system that preceded the underground magazines. One set of launchers was located along the Atlantic Ocean side of the peninsula north of the modern Parking Lot E, approximately 3¾ miles south of the northern tip of Sandy Hook. The second set of launchers was located near Sandy Hook Point on the bay side of the peninsula near its tip. This installation was near the modern navigational aid tower in this area.[1]

Radar Tracking Area

The Radar Tracking Area was located in a relatively undeveloped area approximately one mile north of the future Missile Launch Area. Located just southeast of Camp Low, a collection of temporary barracks constructed during the military buildup on Sandy Hook for World War II, the site was covered primarily with brush and trees up to 35 feet high. Existing asphalt roads surrounded the site on four sides, including the peninsula's primary north-south road to the west. The most significant site feature was the abandoned railroad bed that provided rail access between Fort Hancock and the area around Highlands to the south. This rail bed ran north-south through the middle of the future radar area. To the west of the rail bed were a series of relatively small concrete foundations that were not serving any current use.

Prior to construction of the permanent IFC/Radar Tracking Area, radar equipment was installed at several temporary locations on Sandy Hook. The northernmost radar installation was near Battery Peck in Fort Hancock. The central installation was located north of modern Fishing Beach Road where it terminates at the beach at the Atlantic Ocean side of the peninsula. The third radar area was east of the modern Parking Lot C near the southern end of Sandy Hook.[2] The radars were supported on wood cribbing, wood platforms and existing concrete structures.



Figure 1.2-2: Photographs taken c. 1955 of temporary Radar Tracking facilities. Left photo is taken at Battery Peck with the lighthouse visible in the background (GATE 18307 and 18309)

[1] Information regarding the temporary NIKE installations pre-dating the completed construction of the permanent sites was provided by Tom Hoffman, Park Historian, Sandy Hook Unit, Gateway National Recreation Area, National Park Service on September 25, 2015.

[2] See Note 1.

The approximately one mile space between the two areas was generally undeveloped except for the abandoned railroad. The original site plans identify the area as a combination of "swampy marsh" and areas of brush and trees similar to that found at the future radar area.

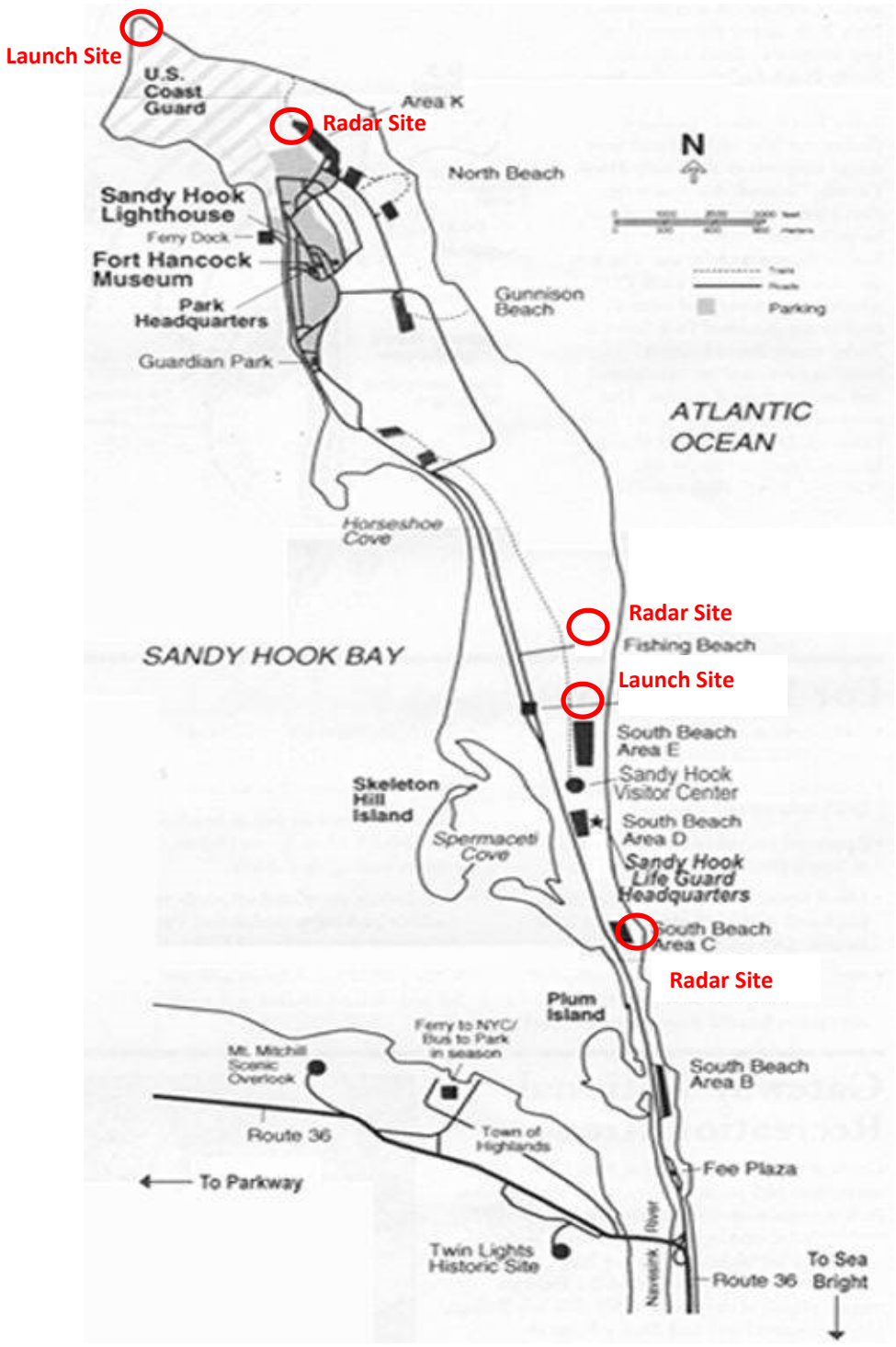


Figure 1.2-3: Modern map of Sandy Hook with approximate locations of temporary NIKE installations indicated.

1955 – Completion of Launch Area

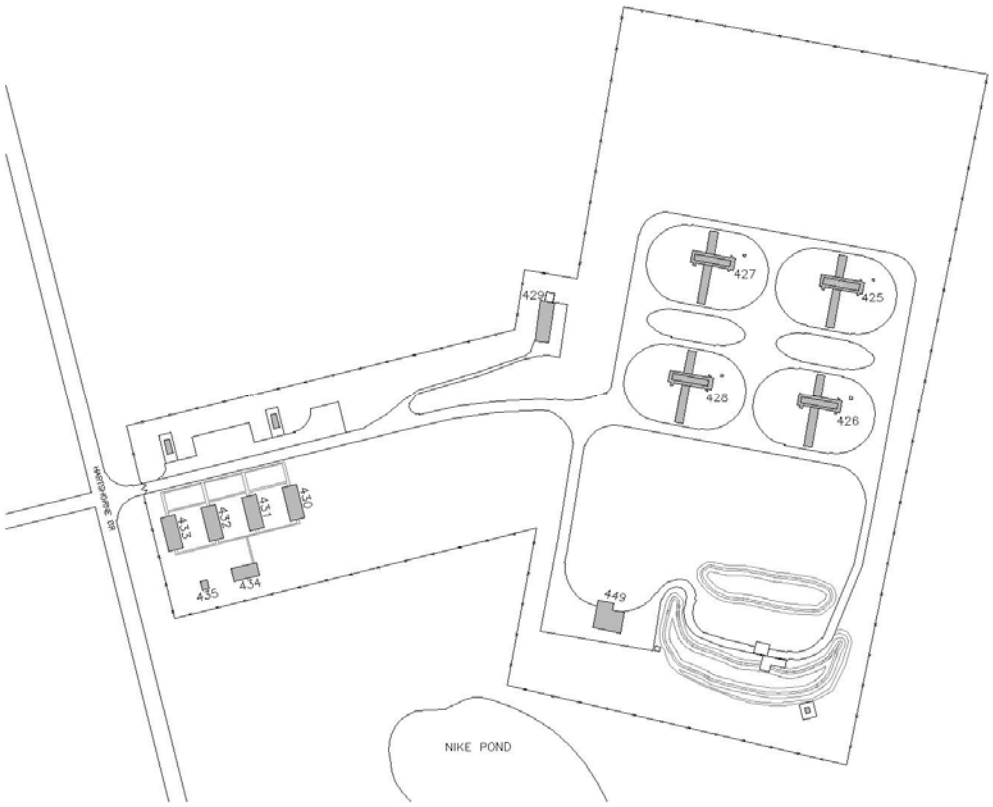


Figure 1.2-4: Missile Launch Area configuration in 1955. John Milner Architects, 2016.

Missile Launch Area

Construction began on the NIKE Ajax site NY-56 in 1954 and was completed over the course of two years. The Missile Launch Area was the first area to be completed and accepted by the Army in 1955. A series of the original drawings are located in the GNRA archives and most bear a revision line and stamp stating that the drawings represent as-built conditions as of October 5, 1955.

Site

The Missile Launch Area formed roughly a "T"-shaped site with the bottom of the "T" sited at the east side of the main north-south road of Sandy Hook. The area was surrounded by chain link fencing approximately six feet high with three strands of barbed wire strung from arms extending from the top of the fence. A gate at the west end of the area, facing the main road, provided the only entry into the area. A firebreak was introduced along the fence line keeping vegetation 20 feet from the exterior side of the fence and 30 feet from the interior side. The launch area was essentially separated into two smaller areas. Adjacent to the west entrance was the administrative area that contained the alert barracks, latrine, and central heating plant. Also included in this area were the launch control vans. An 18-foot-wide gravel pavement access road led from the main road through the entrance gate and administrative area and continued to the eastern part of the area which consisted of the

missile magazines and their support buildings. In the administrative area, the launch control vans, located at the east and west ends of a gravel parking lot for ten vehicles, were located north of the access road. The barracks, latrine and central heating plant were located south of the access road. A series of four-foot-wide gravel walks connected the barracks to the other buildings and each other as well as the access road.

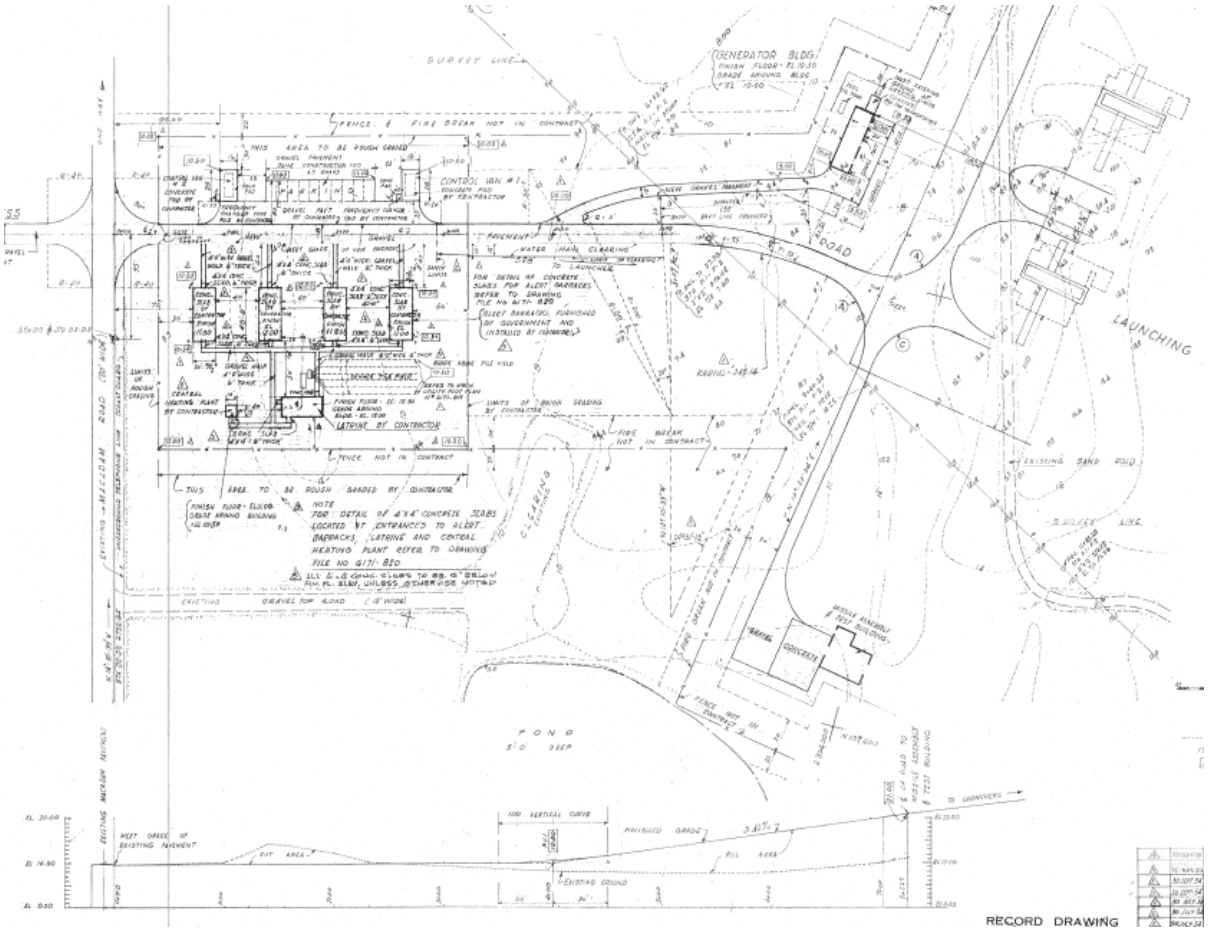


Figure 1.2-5: Detail of the 1955 as-built plan of the barracks portion of the Missile Launch Area. (GATE 8790)

As the access road continued east from the administrative area, a ten-foot-wide spur split northward and led to the generator building for the launch area. Going eastward, the road sloped upward to the missile magazines which were constructed within a man-made plateau to avoid groundwater issues. Towards its eastern end, the access road led directly to the apron of the magazines. The access road then turned southward, narrowing to 12 feet as it led to a paved clearing at the west entrance to the Missile Assembly and Test Building. East of the Missile Assembly and Test Building a gravel apron and path wound its way north and then south and east to reach the Fueling Platform and Acid Fueling Station. Within the gravel path, a smaller 6-foot-wide concrete path was installed to support the missile dollies as they moved to the fueling area. These fueling structures were essentially surrounded, except where the paths entered and exited the fueling, by a large earthwork berms that protected the surrounding areas, including the magazines, for any accidental explosions that may occur. The berms were nine feet high and roughly formed an oval around the fueling area. From the

fueling area, a 12-foot-wide gravel road moved east before turning northward and exiting the bermed area. The road continued north and ultimately terminated at the missile magazine apron. At the location where the road exited the bermed fueling area, a 4-foot-wide gravel walk spurred east and wrapped southward around the berm before arriving at the Acid Storage Shed at the southeast corner of the berm. Two of the two-story wood Army Signal Corps warehouses that fall within the perimeter of the launch area are called for to be removed and salvaged in the original drawings. There is no evidence that they were salvaged. It should be noted that it does not specify that the foundations should be removed nor the small adjacent structures called out as concrete pads and concrete blocks.



Figure 1.2-6: The 1955 as-built plan of the magazine portion of the Missile Launch Area. (GATE 8788)

Barracks 430-433 (April 1955)[3]

At the west end of the launch area were the alert barracks and support buildings that provided housing for soldiers when they were on duty at the site. The typical operating procedure for the NIKE sites was for each of the sites in the New York Defense Area to be on one of three status assignments as determined by Headquarters: maintenance (cold), release (backup), and alert (hot).[4] On alert status, crew members were expected to be ready to fire, if necessary, with 20 minutes

[3] While the original Real Property Record Cards for Fort Hancock could not be located as part of the research for this report, the Historic Resources Study by Edwin Bearss copies the pertinent information from the cards. Any reference to the Real Property Record Cards in this section is taken from the Bearss report.

[4] Crew members in various oral histories refer to the status levels by differing nomenclature.

warning. Release status required soldiers to be ready to fire within 2 1/2 hours. There was no specific time requirement for maintenance status as it was expected that equipment would be down for service. Crews were typically on duty for alternating 12, 24 or 48 hour shifts. Initially, unmarried crewmen were stationed at these barracks at all times. This would change in later years as crewmen were barracked up the peninsula at Fort Hancock when not on alert status. While on alert duty, soldiers were expected to sleep in the alert barracks.

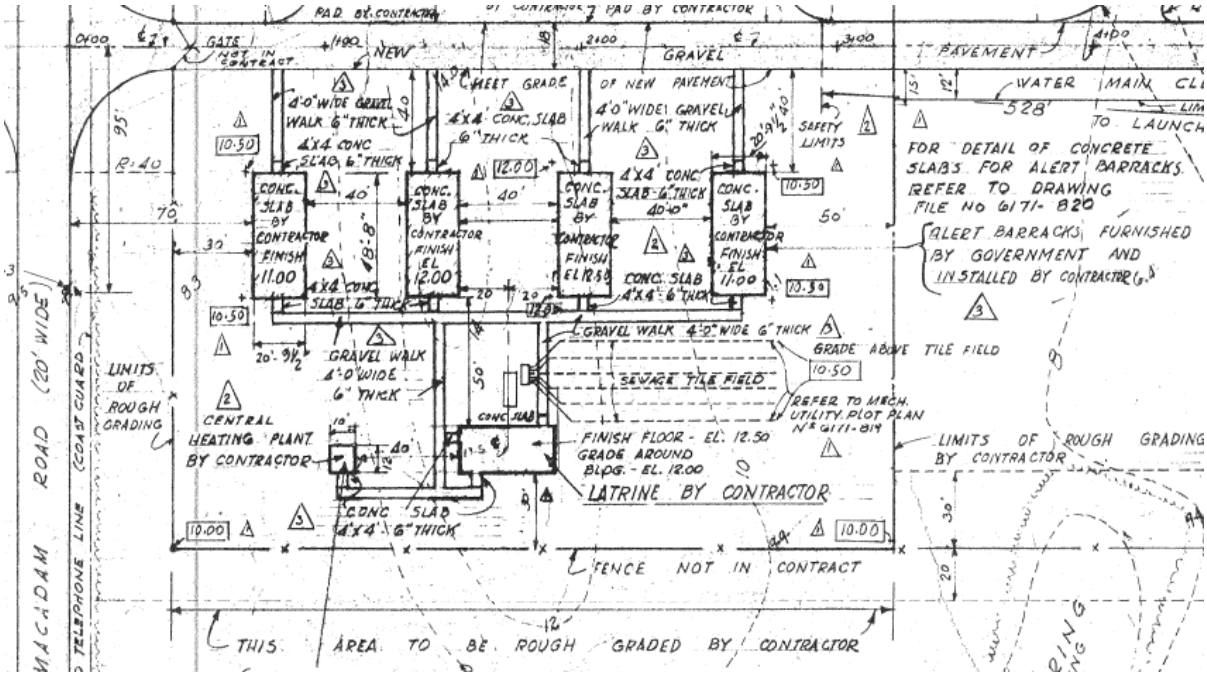


Figure 1.2-7: Detail of the 1955 as-built plan barracks area. (GATE 8790)

The concrete pads for the barracks were constructed by the contractor while the barracks structures were provided by the military and installed by the contractor. The barracks were pre-fabricated buildings constructed of corrugated steel panel walls and roof on a steel frame. According to a manufacturer's plate over the north doors of 432 and 433, the buildings were "Everwear" brand "Rigid Steel Frame Buildings" from the Southern States Iron Roofing, Co. of Savannah, Georgia. The four buildings were identical with the same pattern of fenestration found on each building. Each long side, facing east and west, had six identical removable single-pane windows. The existing window sashes appear to be original, but are glazed with plexiglass, which may not be original. The shorter north and south sides each had a single wood-paneled stile-and-rail door centered on the elevation. A single window matching those on the sides of the barracks was located on both sides of the door. The interior of the building was finished with fiberboard sheets over batt insulation at the walls and ceiling and with vinyl asbestos tile on the floor. Depending on how each building was used, different partitions were constructed in the building. None of the partitions remain today, but some gaps in floor tiles suggesting their location can be seen. A series of exposed fin-tube radiators ran along the perimeter walls below the windows and were fed by ceiling-hung piping. At the exterior southeast corner of each barrack (southwest corner at 430) was a small exterior concrete vault. This vault contained the piping connection between the interior hot water piping and the subterranean piping from the central heating plant. Concrete stoops were built by the contractor at each barrack door.



Figure 1.2-8: Barracks 432 as it exists today which in this view closely resembles its original appearance. Note corrugated metal patches near grade made later.



Figure 1.2-9: Manufacturer's plate on Barracks 432.



Figure 1.2-10: Interior of Barracks 432 as it exists today. Much of the original wallboard at the walls and ceiling is intact. Note remnants of asbestos tile at the floor.

Latrine 434 (April 1955)[5]

The latrine building was located south of the barracks. Constructed of concrete block with a low-slope built-up asphalt roof the building contained toilet, lavatory and shower facilities for 44 enlisted men, the same accommodations for three officers in a separate room and a heater room for supplying hot water to the showers and lavatories. The building had a wood-paneled stile-and-rail door to the enlisted latrine on the north side along with two sets of paired two-lite windows. The windows throughout the building were in-swinging steel windows glazed with wired obscured glass. A revision to the original drawings refers to the glazing as reinforced glass substitute, but it is unclear what they are referring to as it does appear to have been glass. The exterior side of the windows were fitted with wood framed insect screens. The east side of the building had three windows ganged together at the center of the elevation. There were two sets of paired two-lite windows at the south elevation as well as a pair of wood stile-and-rail doors near the west end. The double doors provided the only access to the heater room and were fitted with louvers at the bottom panels. The west elevation had a single window and also a wood stile-and-rail door at the north end to access the officers' latrine. The doors to the enlisted and officers' latrines were also fitted with wood-framed screen doors. Near the

[5] Real Property Record Card, Structure 434, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.

south end of the west side, the exhaust pipe for the hot water heater penetrated the wall from the heater room and joined with a metal exhaust stack immediately adjacent to the building that was supported by a concrete foundation and extended 20 feet above grade. A ventilator at the roof located over the enlisted latrine shower provided ventilation for the space.

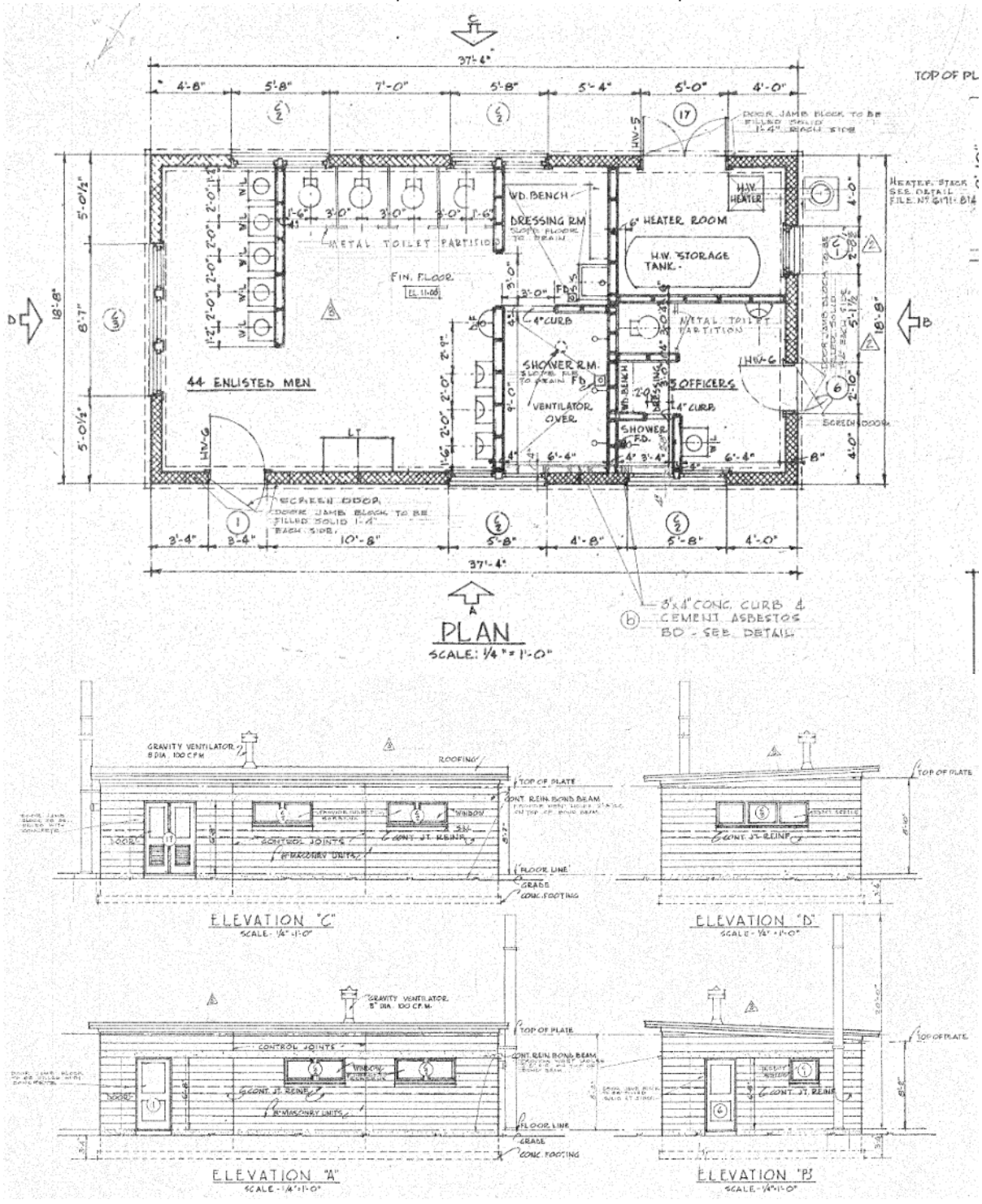


Figure 1.2-11: Detail of 1955 plans and elevations of Latrine 434. (GATE 8785)

At the latrine interior the concrete block is exposed at all of the exterior walls while the interior walls and ceilings are constructed of "cement asbestos board" on wood framing. In the enlisted latrine, the east end of the space is partially enclosed by an interior partition and contained five lavatories, a wood wall shelf and individual wood framed mirrors. The central portion of the of the space held four floor-mounted toilets with metal stall partitions at the south wall while three wall-hung urinals and a drinking fountain were located at the west wall. A divided utility sink was mounted on the north wall of the space. The western portion of the enlisted latrine was separated by an interior partition and was accessed by an opening in the dividing wall. This area consisted of a partially-enclosed shower and a dressing room. The dressing room, at the south end of this space, had a wall-mounted wood bench and a wall-mounted utility sink at the west wall. The shower to the north had a sloped tile floor and walls tiled up to approximately 6½ feet. The west wall had three showerheads and the east wall had three tile soap dishes while the entry at the south wall of the shower was fitted with a shower curtain and rod.



Figure 1.2-12: Latrine 434 as it appears today.

The officers' latrine in the northwest corner of the building consisted of a single space with finishes similar to the enlisted latrine. A urinal was mounted on the south wall and a lavatory, toilet with metal stall partition, wood bench and tiled shower for one person were located at the east wall. The heater room in the southwest corner of the latrine building held a large storage tank for hot water adjacent to the north wall and a hot water heater in the southwest corner adjacent to the vent pipe wall penetration. Both the officers' latrine and the heater room were finished with cement asbestos panels at the interior partitions and exposed concrete block at the exterior walls. A concrete stoop was installed by the contractor at each of the exterior doors. Fin tube radiators were located in both the enlisted and officers' latrines to provide heat to the spaces. The septic field for the latrine was located northeast of the building, just south of Barracks 430 and 431.



Figure 1.2-13: Sink area and stalls (left) and shower (right) in enlisted latrine in Latrine 434 as it appears today.



Figure 1.2-14: Officers' latrine in Latrine 406 as it appears today.

Central Heating Plant 435 (April 1955) [6]

The Central Heating Plant, also referred to as the Boiler House, was located west of the latrine and provided hot water to the latrine and barracks buildings. The building is a steel building manufactured by the Butler Company of Kansas City, Missouri as indicated by a plate on the identical Central Heating Plant 407 at the Radar Tracking Area. Constructed of corrugated steel on a steel frame, the building had a steel four-lite out-swinging awning window in the west wall. A single door was located in the south wall of the building, but it is not clear what type of door it was. The building held a large water heater that fed subterranean pipes running to the latrine and barracks. Similar to the barracks heater room, an exhaust pipe penetrated the north wall and tied into an exhaust stack supported by a concrete foundation. A concrete pad was constructed at the south door.



Figure 1.2-15: Central Heating Plant 435 as it appears today. Note concrete base and wall penetration where exhaust stack previously stood. (left) Manufacturer's plate on Central Heating Plant 407. (right)

[6] Real Property Record Card, Structure 435, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.

Launch Control Vans (by September 1955)[7]

The launch control vans were located at the north side of the access road and were separated by the ten car parking lot. These vans were the primary point of communication between the Radar and Launch areas with the west van in contact with Control Area #1 and the east van with Control Area #2. A ready-made mobile van that was brought on site, the wheels were taken off once the van was in place on a concrete pad constructed by the contractor. The north end of the van was fitted with a flight simulator mast. The interior of the van was fitted with a telephone switchboard, launch control panel and work and storage space. These vans allowed the Battery Control Vans at the Radar Tracking Area to control the missiles electronically. However, if the launch control vans were not functioning, the Control Area could direct the missiles by communicating with the launch crew via telephone and having them input the directions manually.

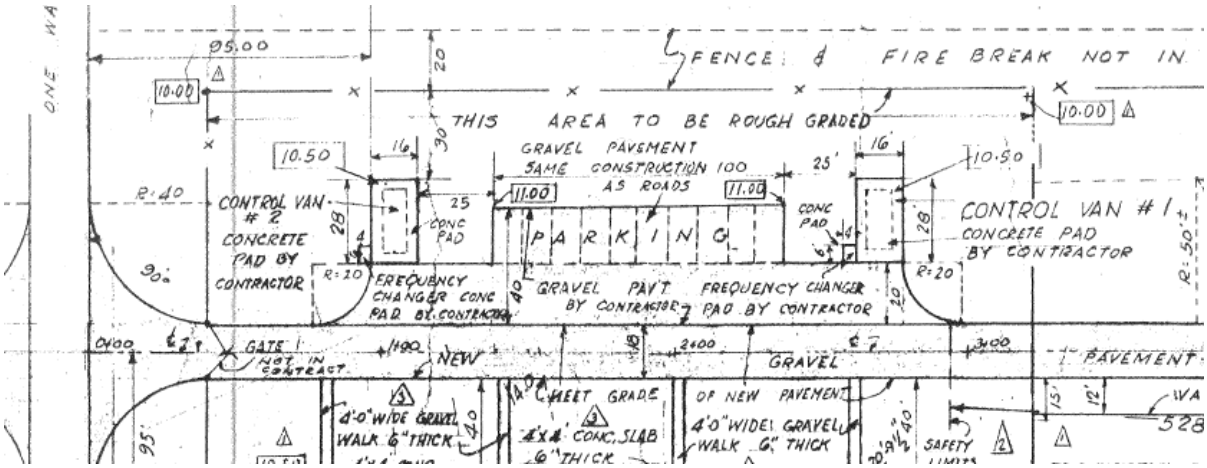


Figure 1.2-16: Detail of the 1955 as-built plan. Launch Control Van area. (GATE 8790)

[7] Control Vans are shown on as-built drawings of the Missile Launch area dated September 1955.

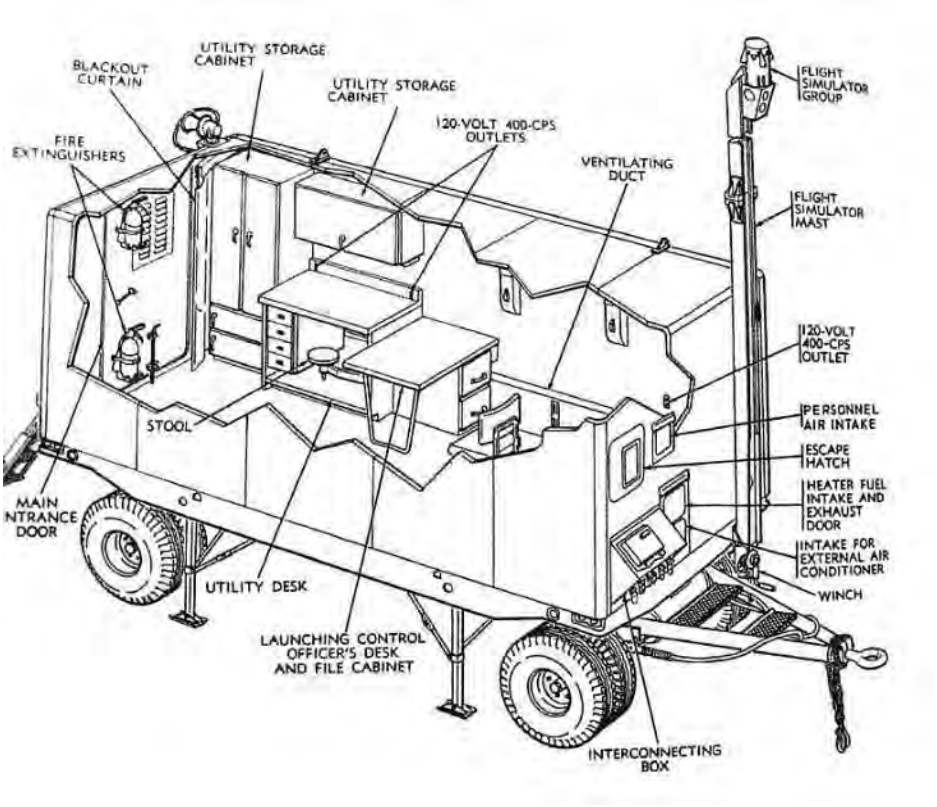


Figure 1.2-17: Diagram of Launch Control Van.



Figure 1.2-18: Detail of c. 1968 photo of launch area entrance. Arrows indicate launch control vans and flight simulator group masts. (GATE 22039)

Missile Magazines 425-428 (April 1955)[8]

At the east end of the Missile Launch Area, four subterranean missile magazines were constructed. According to the original drawings, an additional two magazines were planned for future construction, but were not realized. Because of the high underground water table due to the proximity to the ocean, the site was re-graded to create a plateau that would allow the underground magazines to avoid moisture problems. The magazines were called out in the original drawings as a Type "B" underground missile storage structure. This type of magazine was intended as a universal structure that would contain up to 10 Ajax missiles, but be capable of holding six Hercules missiles at a later date without extensive alterations. The four identical magazines were installed with their long, central elevators running in the east-west direction.[9]

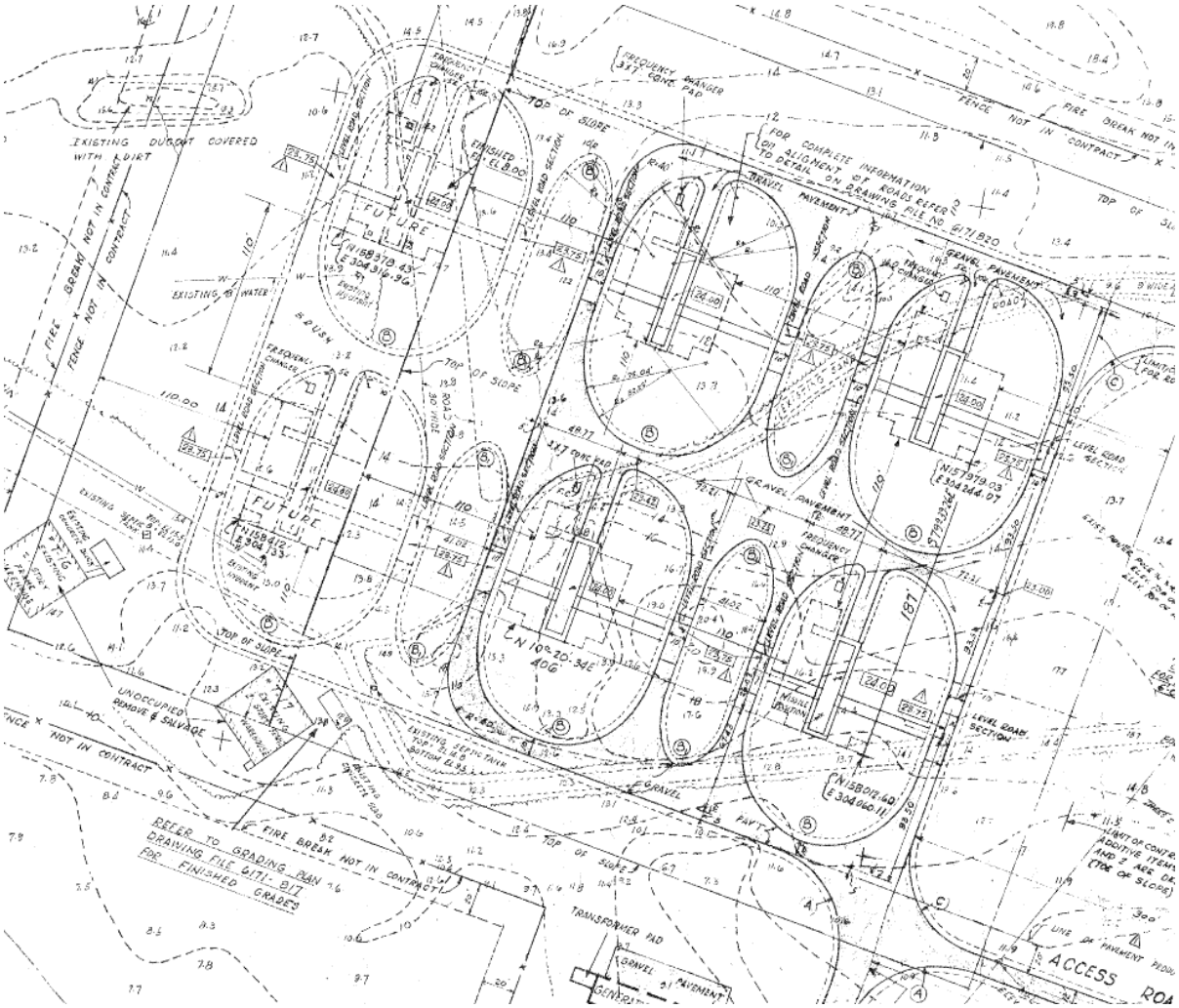


Figure 1.2-19: Detail of 1955 as-built site plan. Magazine plateau area. (GATE 8788)

[8] Real Property Record Card, Structures 425-428, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.

[9] Interview with Bill Jackson, January 28, 2016.

Constructed of reinforced concrete, the structure consisted of three main spaces: the storage magazine itself, a panel room where crewmen would stay during launch and a winding corridor connecting the two primary spaces. The magazine, approximately 62 feet by 62 feet in size, had sets of rails which held the missiles on either side of a central elevator used to raise a missile roughly 16 feet to the surface. At the north side of the west end of the elevator a mechanical exhaust stack connected to sub-floor exhaust ducts cleared air from the elevator pit to the surface. The machinery for the elevator was located on the south side of the west end of the elevator. Adjacent to the elevator machinery, a ladder to the surface accessed an escape hatch from the magazine and a nearby concrete stair provided access to the elevator pit from the magazine floor. The panel for operating the elevator, as well as all of the electrical fuse boxes and other panels for the magazine, was located at the east wall of the magazine near the elevator. In addition to the main exhaust stack, two additional circular vents with operable openings were located in the northeast and southeast corners of the ceiling. Overhead rails and hoists anchored to the ceiling on either side of the elevator facilitated servicing the missiles. All finished wall, floor and ceiling surfaces of the magazine were painted concrete except for the metal floor of the elevator. The elevator would have also held a missile launcher capable of launching the missile from the elevator once it reached the surface. The passage between the magazine and panel room had 3 heavy blast doors that were intended to protect those in the panel room from the force of a possible explosion, but also from the noise of normal operation. The passage's walls and ceilings were lined with sound insulation in the form of acoustical tiles attached to wood furring. Wood trim and a wood-framed bulletin board were attached to the acoustical surface. The panel room contained the control console for the magazine, associated indicator panels and mechanical equipment for climate control. The east wall of the panel room contained the blast door to the passage as well as one to a wall-mounted steel ladder leading to the primary access hatch at the surface. Both hatches were locked with padlocks for security purposes. The walls of the panel room and the escape hatch were lined with cinder block.[10]

At the surface, the elevator would rise through a set of steel elevator doors that dropped open as the elevator brought a missile to the surface. Another set of rails on either side of the elevator allowed missiles to slide away from the elevator to additional launchers already in place. There were two launchers south of the elevator and a single launcher to the north. Once at the surface, the missiles were slid to the launchers by two crewmen.[11] At each launcher a wedge-shaped concrete pad provided a blast area for the missile from which to take off. A concrete apron and curb were installed around the elevator doors as were concrete footings for the rail supports and a frequency changer. An emergency shower for fuel leaks was installed adjacent to the elevator as well. The access hatches at the primary and escape ladders had concrete curbs and counterweighted metal and concrete doors. The circular metal vents with caps and turned rectangular exhaust stack penetrated the surface as well. All of the vents had safety bollards installed around them. The remainder of the surface around the magazine consisted of an oval area of earthen fill. The characteristics of each magazine were identical. Gravel roads ran between and around all of the areas of earthen fill and connected through the earthen fill to the magazine elevator. Smaller ovals of earthen fill were located between the larger ovals and do not appear to have had a specific purpose other than ground cover. The gravel paths then tied into the access roads from the administrative area and the bermed missile preparation area.

[10] The original drawings label the Missile Storage Room ladder as "Access Hatch" and the Panel Room ladder as "Escape Hatch." Comments from Bill Jackson, who was stationed at the site, indicate that these uses were actually reversed with the Panel Room ladder serving as the primary entrance/exit point.

[11] Interview with Bill Jackson, January 28, 2016.

Missile Magazine 425, the northeast magazine, was identified as “D” Section while Magazine 426, the southeast magazine, was identified as “C” Section. These two batteries together constituted a firing battery that was controlled by the eastern Control Area #2 at the Radar Area. Similarly, the battery consisting of Magazine 427, the northwest magazine known as “B” Section, and Magazine 428, the southwest magazine known as “A” Section, were controlled by the western Control Area #1 at the Radar Area.

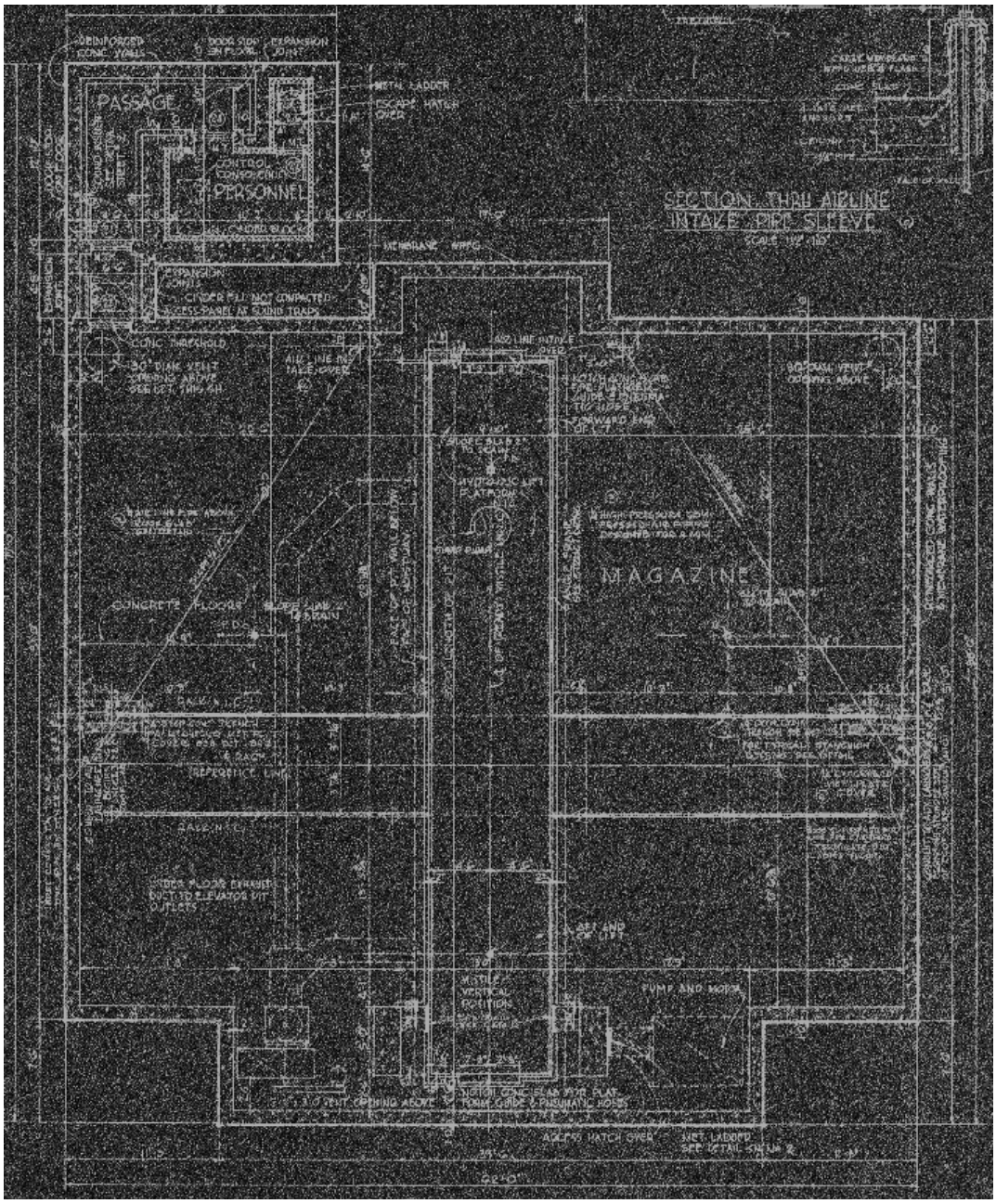


Figure 1.2-20: Detail of 1955 as-built drawing. Magazine sub-grade plan shown. (*GATE 11298)*

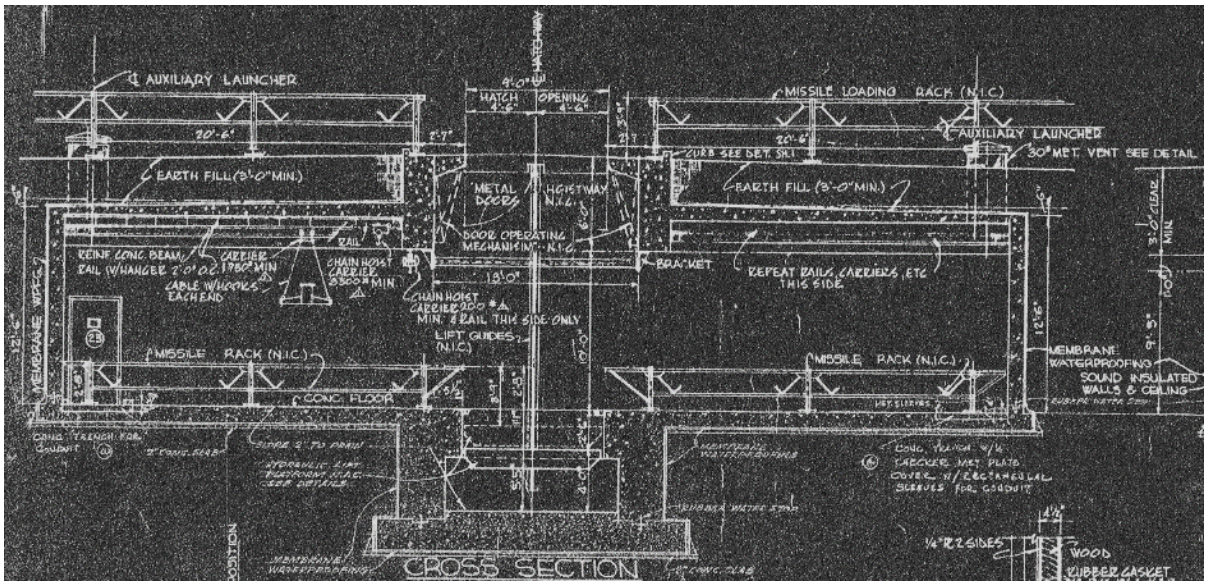


Figure 1.2-21: Detail of 1955 as-built drawing. Magazine section shown. (*GATE 11299)*

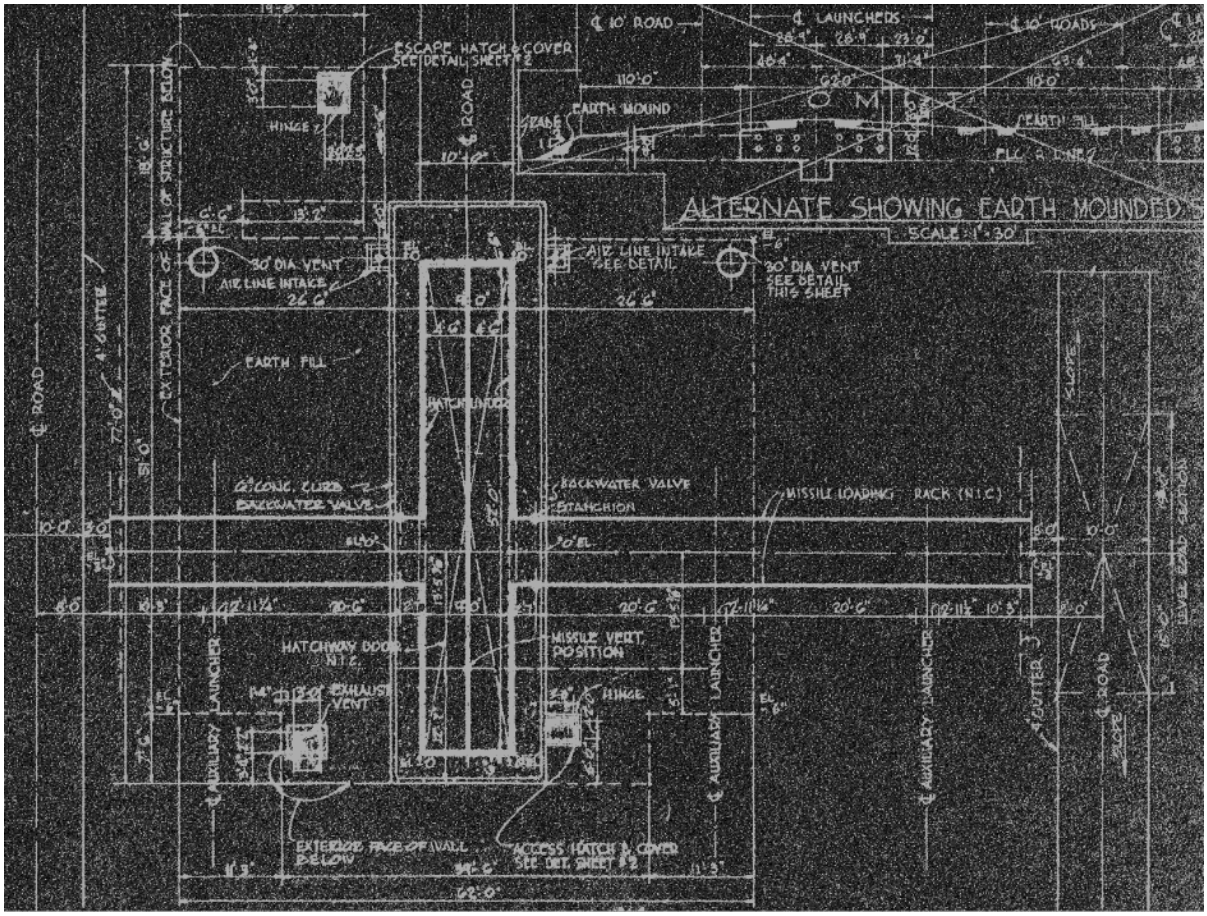


Figure 1.2-22: Detail of 1955 as-built drawing. Magazine surface plan shown. (*GATE 11298)*

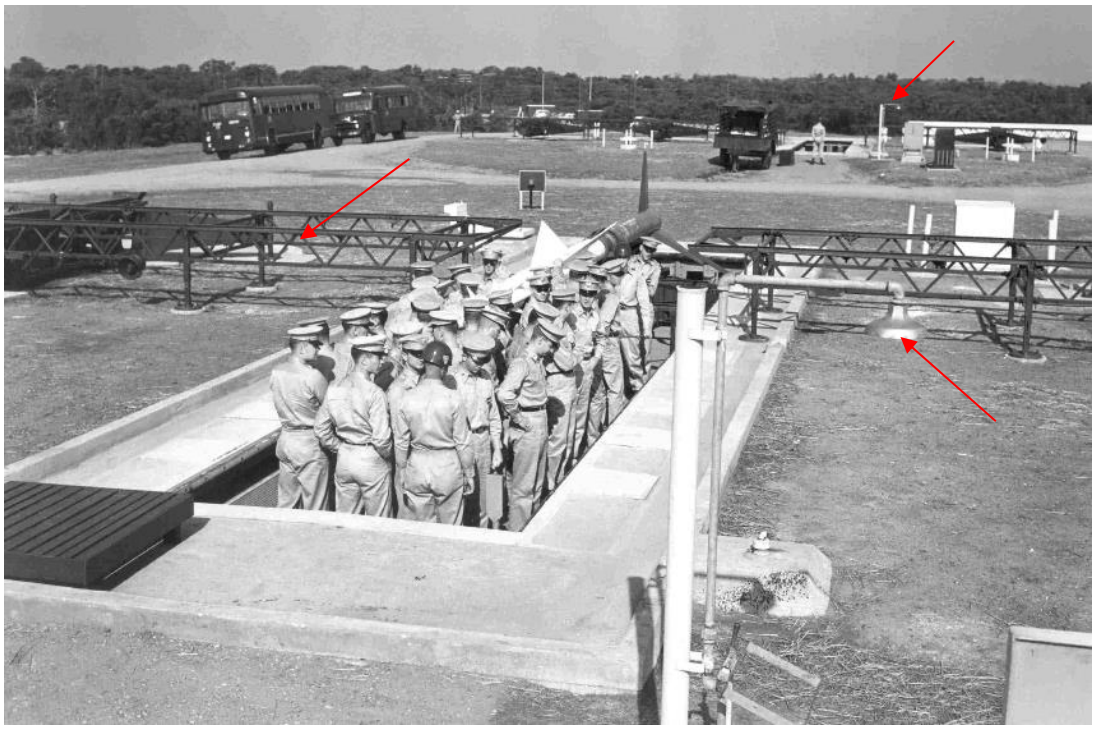


Figure 1.2-23: Photograph of magazine elevator, c. 1955. Ajax missile on the elevator. Note lack of fence around magazine area. Also note earthen fill with gravel roads between. Arrows point to fan-shaped blast area behind launcher and emergency showers. (GATE 21092)



Figure 1.2-24: Current view of Magazine 426 interior, looking southwest. Though missiles and racks are missing, generally looks much like it would have when constructed.

Generator Building 429 (by October 1955) [12]

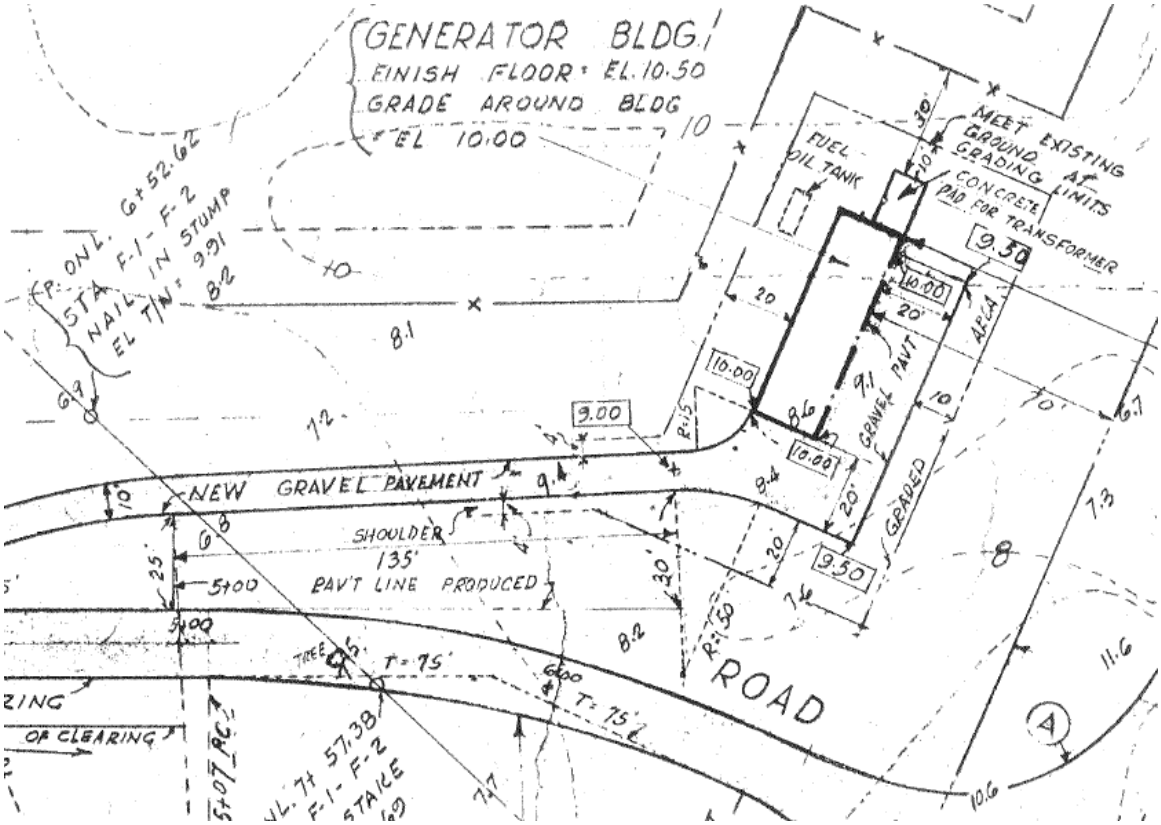


Figure 1.2-25: Detail of 1955 as-built site plan. Generator Building area. (GATE 8790)

The generator building, located west of the magazines, was accessed by the gravel road spur off of the main access road and was at a similar elevation to the administrative area as opposed to the artificially elevated plateau of the magazines. The building was a single large room that contained five generators that supplied power to the entire launch area. Accommodations for a future sixth generator are shown on the original drawings. An area of gravel pavement was installed at the south and east sides of the building and connected to the gravel spur road leading to the building. The exterior walls and roof of the building were constructed of corrugated steel on wood framing. Three equally-spaced pairs of doors were centered in the east entry wall. The original drawings show the doors as wood stile-and-frame doors with louvers in the bottom panel and a glazed six-lite window in the upper panel of each door. A pair of two-over-two-lite wood double-hung windows is shown in the drawing at the east end of the south wall. Similar windows are found in other buildings built at this time on the site. The glazing was plexiglass or other glass substitute as called for in the original drawings. Six removable wood louvers were installed in the west wall to align with the generators at the interior. These provided ventilation for the interior space, but also provided openings for generators to be taken in and out of the building as required. At the north end of the building an

[12] The Real Property Record Card for Structure 429 indicates an acceptance date of December 1958, but this is almost certainly referring to the small addition at the building's east wall. As-Built drawings of the building are dated October 1955.

exterior concrete pad was provided to support a transformer. The pad was surrounded by a six-foot-high chain link fence with matching gate. A metal enclosed cable raceway was installed over the generators and penetrated the north side of the building carrying the connecting cables between the transformers and the generators. In addition to the transformer pen, the original drawings indicate an exterior fuel tank located a few feet west of the northwest corner of the building.

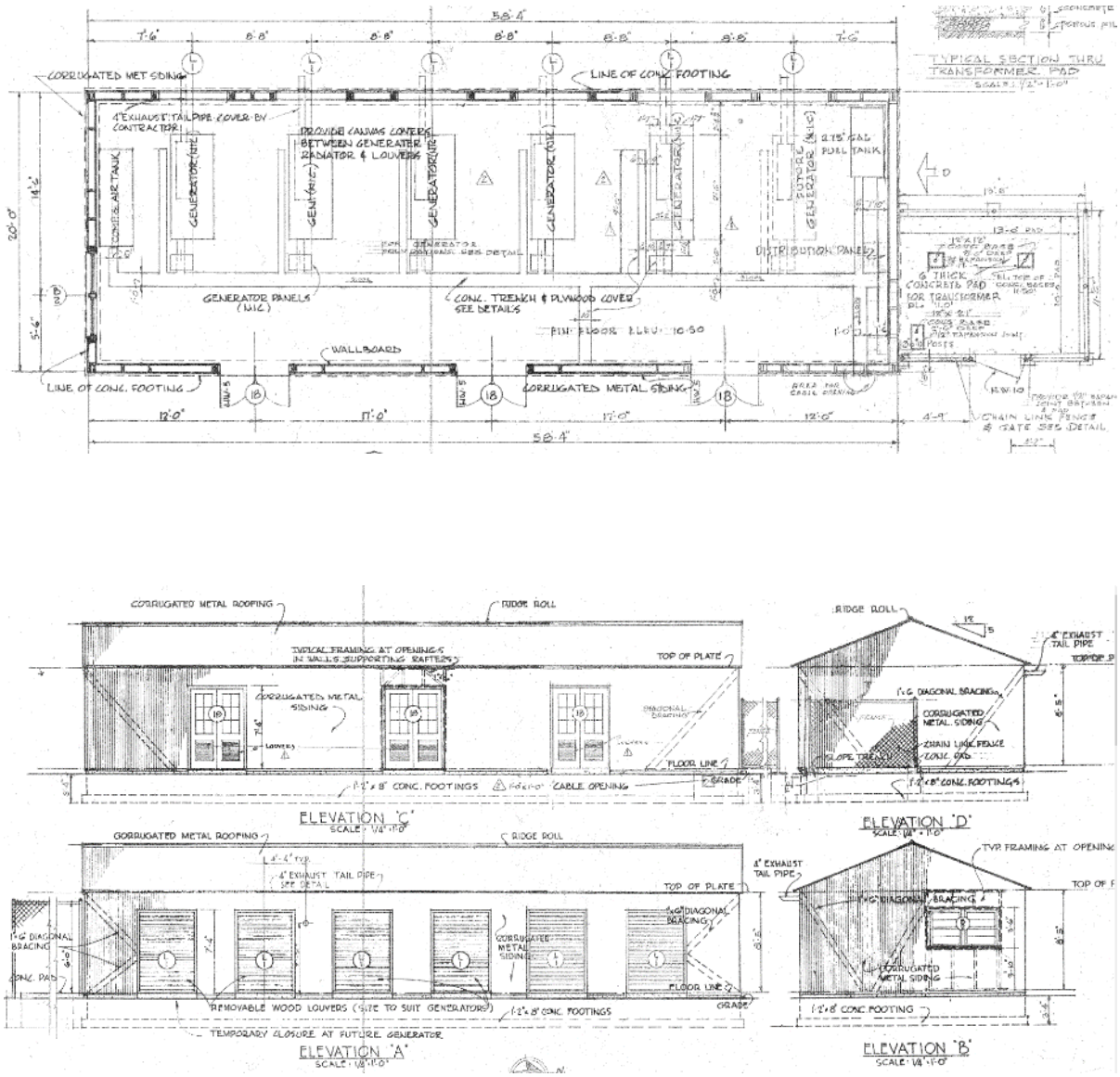


Figure 1.2-26: Original plans and elevations of Generator Building 429. (GATE 11031)



Figure 1.2-27: Current view of Generator Building 429. Wood louvers at west wall shown.



Figure 1.2-28: Current view of Generator Building 429. Transformer pen at north end shown.

The building interior was finished with noncombustible wallboard as called for in the drawings. The contractor may have used the same cement asbestos wallboard that was installed at the latrine in the barracks area. The floor of the building was exposed concrete with a network of trenches for cables and pipes. These trenches allowed connections between the generators, outside transformers and other equipment in the building such as the fuel tank in the northwest corner and the air compressor at the south wall. The trenches also exited the building at the east wall allowing buried cable to run to all of the other buildings in the area except the barracks, latrine and central heating plant. These buildings were served by a series of utility poles running from the generator building.

Missile Assembly and Test Building 449 (by October 1955) [13]

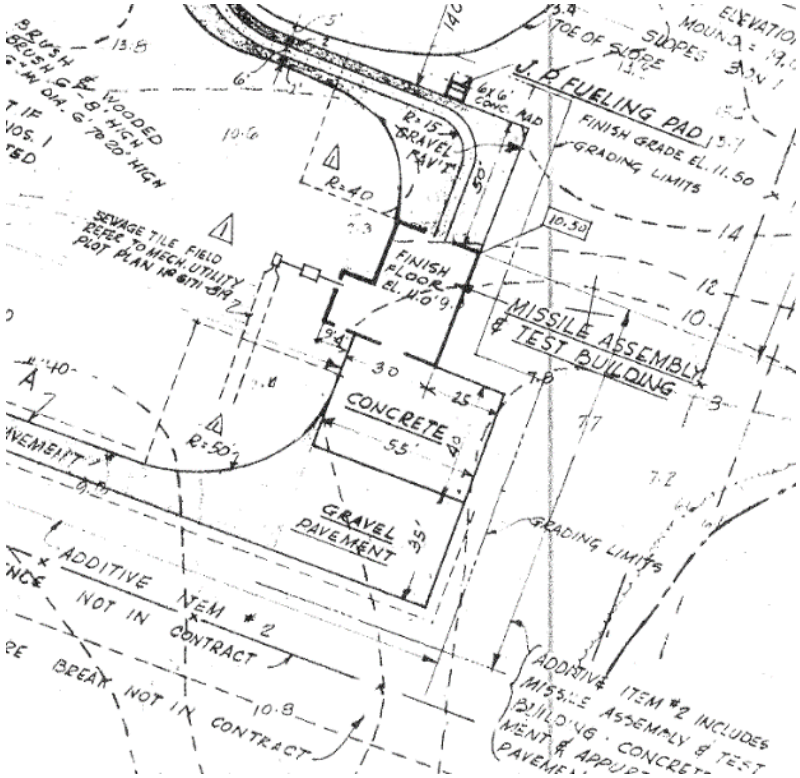


Figure 1.2-29: Detail of 1955 as-built site plan. Missile Assembly and Test Building area. (GATE 8788)

The Missile Assembly and Test Building was located at the end of the access road after it turned south at the corner of the missile magazine plateau. The Missile Assembly and Test (MAT) Building served as the point where missiles, which were delivered to the launch area in pieces due to federal regulations regarding transport, were assembled and tested. The access road terminated at a gravel clearing west of the building. A large concrete pavement area was located east of the gravel clearing and provided an apron at the west side of the building. The form of the building consisted of a single tall block with a smaller, lower block attached to the west end of the north elevation. The entire building was constructed of concrete block and both portions of the building had low-sloped roofs of built-up asphalt on a corrugated metal deck. The structure of the upper roof consisted of metal bar joists while the lower roof was framed with 2x6 lumber. A large ten-foot-wide by twelve-foot-high chain-operated, overhead wood door was centered on the west side of the large block. The six segments of the door were of stile-and-rail construction with wood panels at the bottom two segments and glazed panels at the upper four segments. A smaller wood man-door was located to the north of the large door. The wood stile-and-rail door had a wood lower panel and a four-lite glazed upper panel. These two doors provided access to the main space in the building. A pair of louvered and glazed wood stile-and-rail doors at the west end of the smaller block were very similar to those found at the generator building and accessed the MAT Building's boiler room. The south side

[13] The Real Property Record Card for Structure 449 indicates an acceptance date of April 1959, but this is referring to the new replacement building built as part of the Hercules upgrades. As-Built drawings of the building are dated October 1955.

of the large block had four equally-spaced two-over-two wood double-hung windows centered in the wall. The east side of the large block faced onto the gravel and concrete paths that led to the bermed missile fueling area. A large overhead door matching that on the west side provided access to the path from the interior. The north side of the large block held two windows that aligned with the eastern two windows of the south side and were of identical size and construction. Similar to the latrine and generator building, all glazing in the building was called out to be "glass substitute." The north wall of the small block held a wood man-door matching that of the west elevation that accessed the MAT Building's toilet room. Adjacent to the door, a large metal exhaust stack, supported on a concrete base, received an exhaust duct as it penetrated the north wall of the boiler room. The configuration of the stack was very similar to those found at the latrine and central heating plant in the barracks area. A small metal louver at the boiler room was also located in the north wall of the small block.

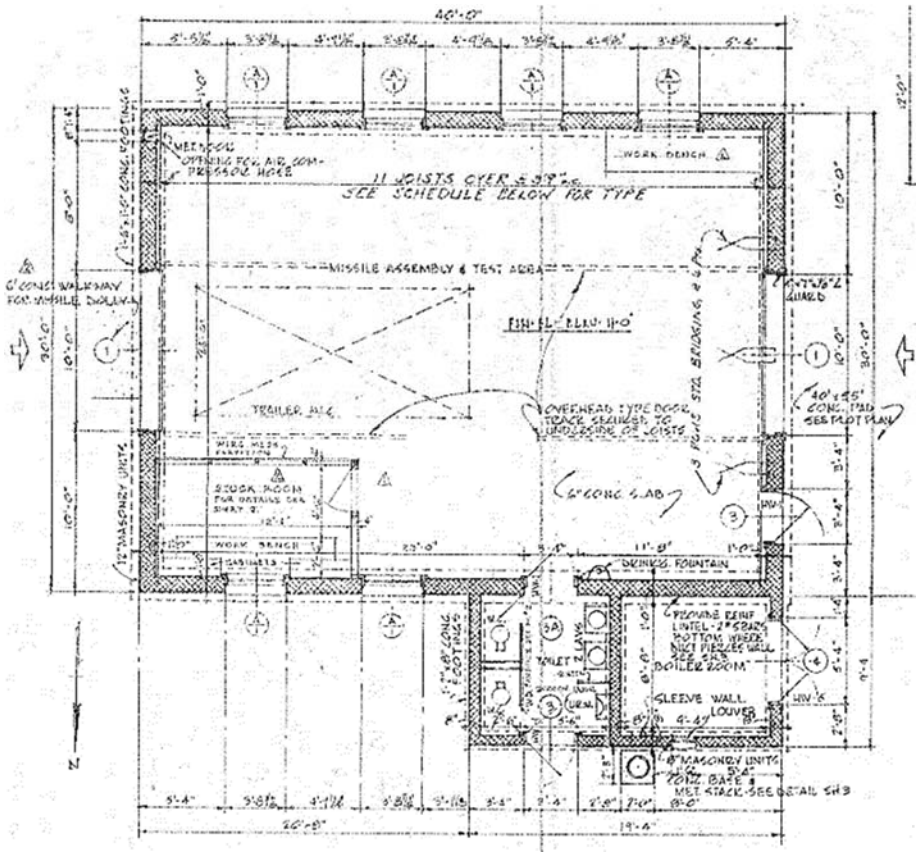


Figure 1.2-30: Original plan of Missile Assembly and Test Building 449. (GATE 11822)

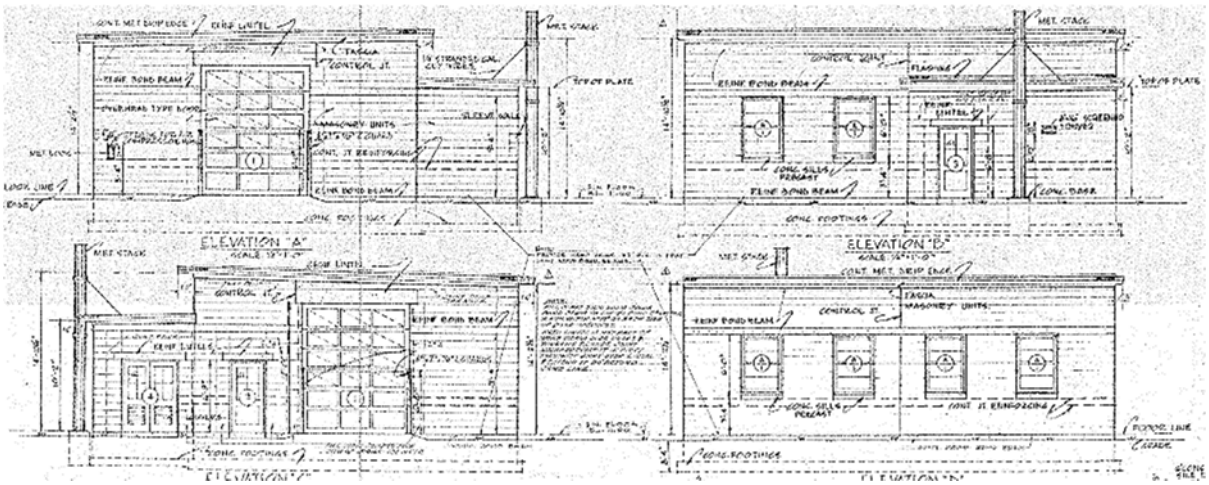


Figure 1.2-31: Original elevations of Missile Assembly and Test Building 449. (GATE 11822)

The interior of the large block of the MAT building consisted of a single large space with a smaller room in the northeast corner that served as a stock room. The large space had exposed concrete block walls, simple wood trim at the windows and a concrete slab floor. The metal bar joists at the ceiling were exposed and the overhead door rails were attached to the underside. A work bench was located in the southwest corner of the space and a drinking fountain was located at the north wall adjacent to a door that led to the toilet room. The toilet room door was constructed in similar fashion to the single man-doors at the building exterior, but had a solid wood panel at the upper panel to provide privacy. The stock room was enclosed with wire mesh partitions with matching door. Approximately twelve feet by seven feet in size, the stock room had a work bench and wall cabinets along the north wall of the room. The toilet room in the smaller block consisted of two toilets at the east wall, enclosed with metal partitions, and two lavatories and a urinal at the west wall, separated by a privacy screen. The walls and floor of the room were exposed concrete block and a concrete slab, respectively, while a wallboard ceiling was attached to the wood roof framing. The heater room contained a boiler to provide heat to the spaces in the building likely either through fin tube radiators or forced air-ductwork. It is not clear from the original drawings, but the heater room likely had a cement asbestos ceiling similar to that in the latrine to protect the wood roof framing from the combustion taking place in the space. The walls were exposed concrete block while the floor was the exposed concrete slab.

Jet Propellant Fueling Platform (by September 1955) [14]

The Jet Propellant Fueling Platform was a six-foot by six-foot concrete pad located east of the Missile Assembly and Test Building along the side of the gravel path that led to the bermed missile fueling area. It was in this location that the missile, once assembled and tested, would leave through the east side of the MAT Building and be fueled with JP-4, a jet fuel consisting of a 50/50 blend of kerosene and gasoline, for the second stage of the missile. Upon completion, the missile on its dolly would travel along the winding concrete path within the larger gravel path to the acid fueling station.

[14] Shown on the As-Built Missile Launch Area site plans dated September 1955.

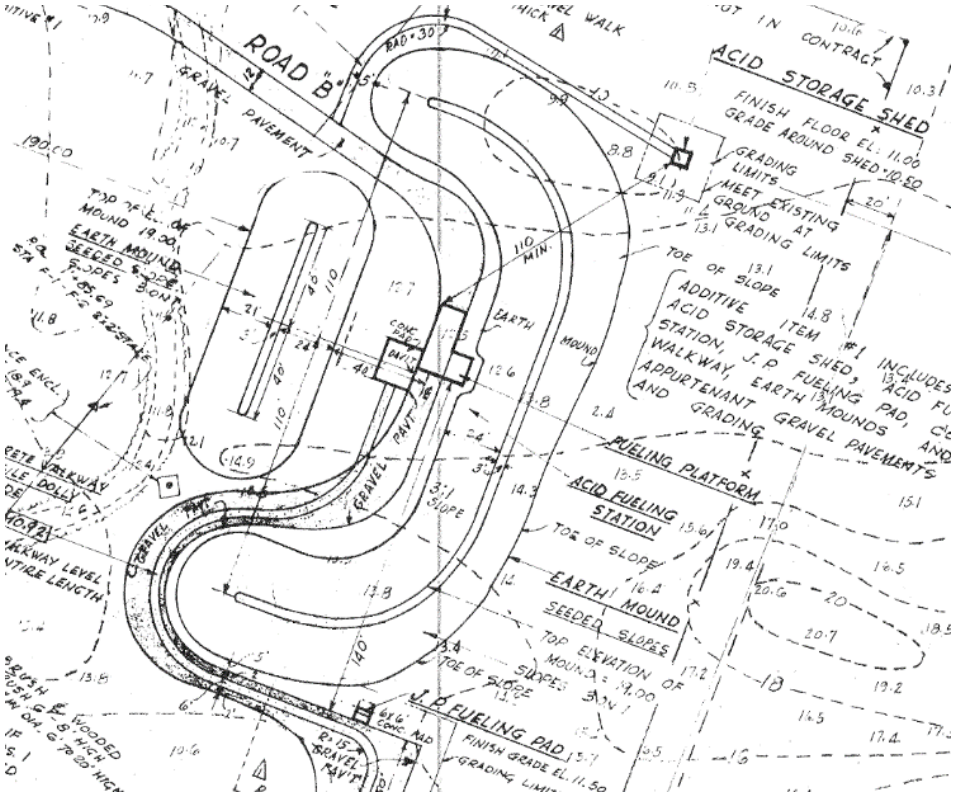


Figure 1.2-32: Detail of 1955 as-built site plan. Acid Fueling Station area. (GATE 8788)

Acid Fueling Station (by September 1955) [15]

The Acid Fueling Station consisted of a series of concrete pads and structures that facilitated fueling the missile with the other component of its liquid propellant, red fuming nitric acid. A concrete structure with a speed bump followed by a divot was located in the gravel road. The bump slowed the missile dolly and then the divot held the dolly tire in place to prevent movement during fueling. On the north side of this structure, a concrete pad with a steel davit helped move the fuel into place once it had been brought to the station from its storage shed. On the south side, an elevated concrete pad held the metal framework that was the fueling apparatus. Also located at this concrete pad, a hydrant and shower were installed to provide emergency relief in case of an acid spill. Once the missile arrived at this location, crewmen would don protective gear and fuel the missile. Upon completion, the missile on its dolly would continue to move along the path to the magazines.

[15] Shown on the As-Built Missile Launch Area site plans dated September 1955.



Figure 1.2-33: Photo of Acid Fueling Station at SF-88. Note davit on other side of missile and protective gear worn by crewmen. (GOGA 22018)



Figure 1.2-34: Current view of Acid Fueling Station at NY-56.

Acid Storage Shed 401 (April 1955)[16]

Near the southeast corner of the launch area, the Acid Storage Shed held the containers of red fuming nitric acid. The remoteness of the structure prevented any accidental ignition from damaging surrounding structures or personnel. The shed was a simple 6½-feet by 6½-feet structure constructed of a simple metal frame on a concrete slab. The roof was constructed of corrugated metal. Three sides of the shed were constructed of corrugated metal as well with the fourth side left open. The metal at the walls stopped six inches above the concrete pad and six inches below the roof creating a relatively open structure to prevent the accidental build-up of fumes. Similar to the Acid Fueling Station, the storage shed was also fitted with a water hydrant and emergency shower.

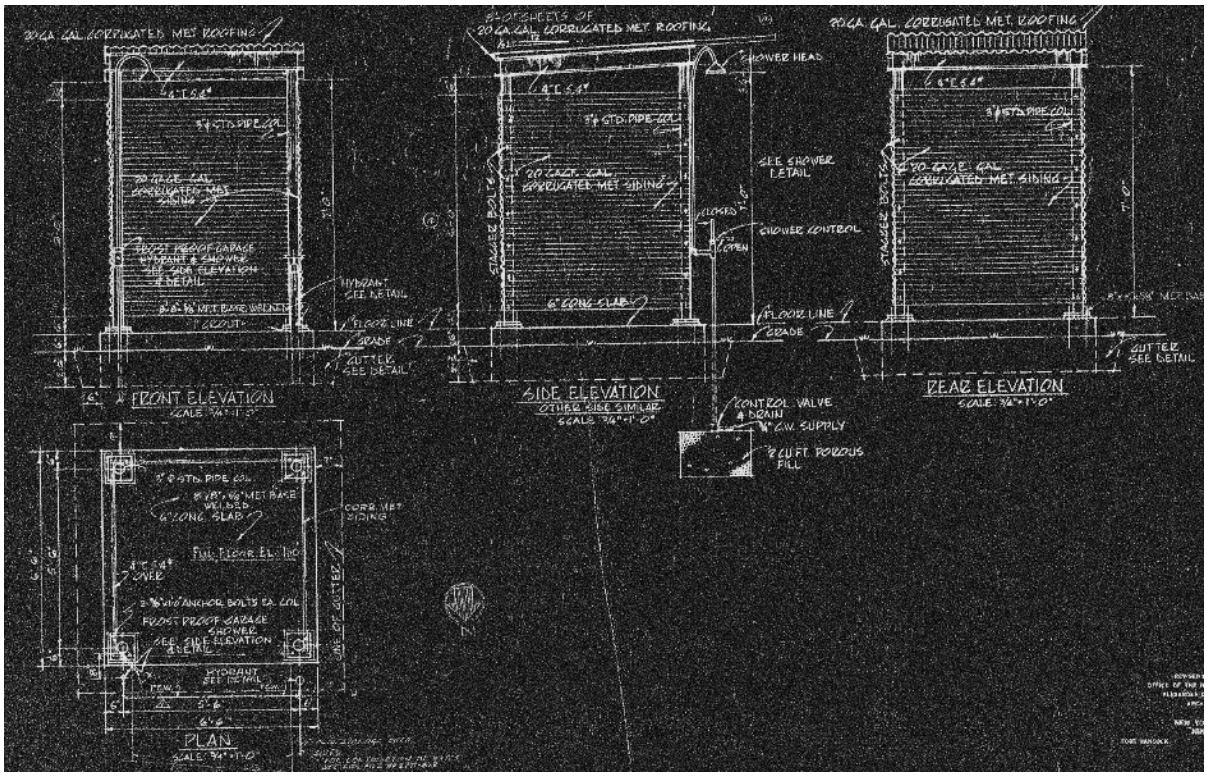


Figure 1.2-35: Original plans and elevations of Acid Storage Shed. (GATE 11317)

[16] Bearss report, in referencing the Real Property Record Cards, includes this building in a group approved in April 1955. The building is also included in As-Built drawings of the Missile Launch Area site plan dated September 1955. The original drawings for the building are not As-Builts and are dated March 1954.

Radar Tracking Area

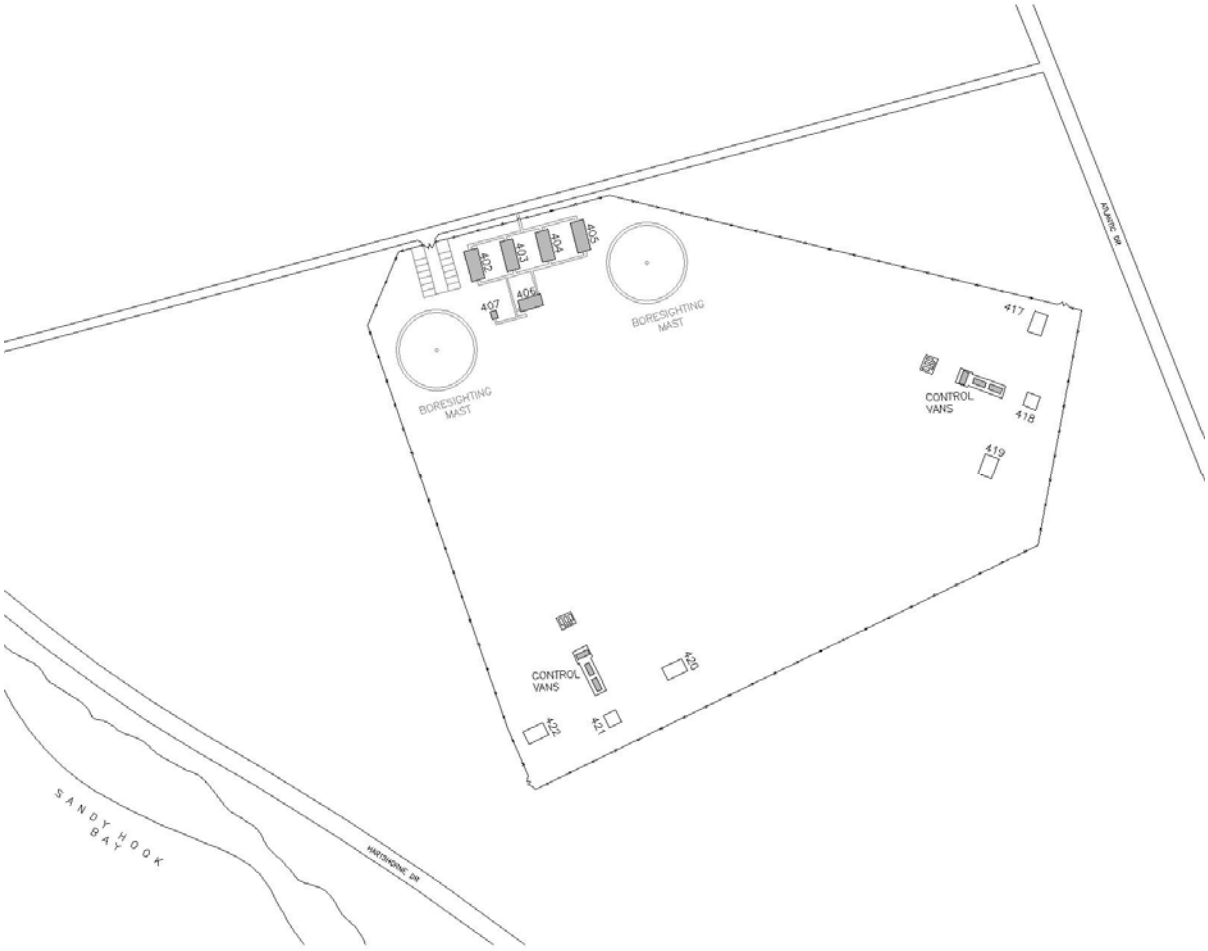


Figure 1.2-36: Radar Tracking Area configuration in 1955. John Milner Architects, 2016.

Site

The Radar Tracking Area, with an administrative barracks area and, as a dual site, two separate Integrated Fire Control Areas, formed a triangle shape with the west side of the triangle essentially aligning with the abandoned railroad bed that had run north-south through the site. The northernmost point of the triangle, the barracks area, was adjacent to an existing asphalt road running west to the main north-south road of the peninsula. The south and east points of the triangle were occupied by Control Area #1 and Control Area #2, respectively. Similar to the launch area, the radar area was surrounded by chain link fencing approximately six feet high with three strands of barbed wire strung from arms extending from the top of the fence. A gate at the north end of the area, facing the main road, is shown on one drawing as providing the only entry into the area except for a nearby man-gate that led to the barracks area. Other drawings however, indicate gates at the southwest and east corners of the area as well providing entry closer to the control areas. A 1956 drawing outlining early modifications to the Radar Tracking Area calls out "existing gates" suggesting that they were in fact constructed as part of the original phase. One 1955 drawing indicates that access roads at these secondary gates were originally intended to access the control areas, but were then deleted

from the scope. The original 1954 drawings do not call for a firebreak at the perimeter fence but only cleared areas associated with the barracks and necessary sightlines for the radar equipment. Clearing vegetation at the center of the area and at the perimeter fence would be standard practice in later years, but it is not clear when this regimen began. The north entrance to the area led to a ten-car gravel parking lot that was immediately west of the administrative area that contained the alert barracks, latrine, and central heating plant. The layout of the administrative area was identical to the barracks area found at the launch area. The primary exception being the pattern of walks at the north end of the barracks. Instead of four north-south walks connecting the barracks to the access road as found at the launch area, at the radar area a single east-west walk connected the four barracks entrance and a single north-south walk centered on the barracks led to the previously mentioned man-gate in the perimeter fence. Not all drawings of the 1954-1960 period show roads connecting the barracks area to the control areas, but some show a dirt road connecting the barracks to Control Area #1 and a gravel road along the south fence connecting the southwest and southeast gates with spurs to Control Areas #1 and #2. Walks are shown on the 1954 drawings connecting the bore sighting masts near the barracks to the control areas, but they are marked as “not in contract” and don’t appear to have been built. The concrete pads and railroad bed that were existing previously on the site are shown, but not specifically called out to be removed. The one exception is a larger foundation that would have been located between two of the barracks which was noted to be removed.

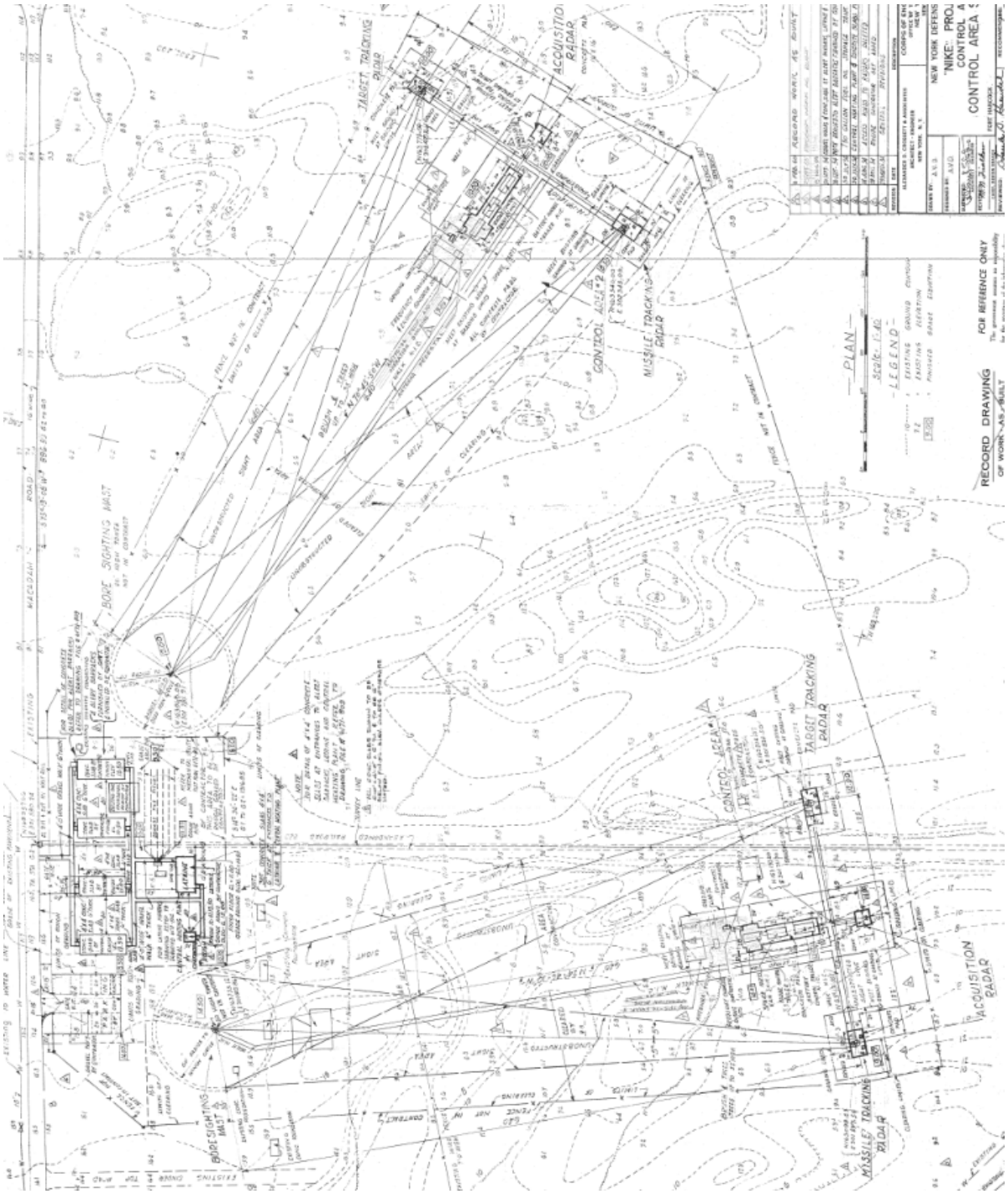


Figure 1.2-37: The 1954-60 as-built plan of the Radar Tracking Area. (GATE 8783)

Bore Sighting Masts (by September 1955) [17]

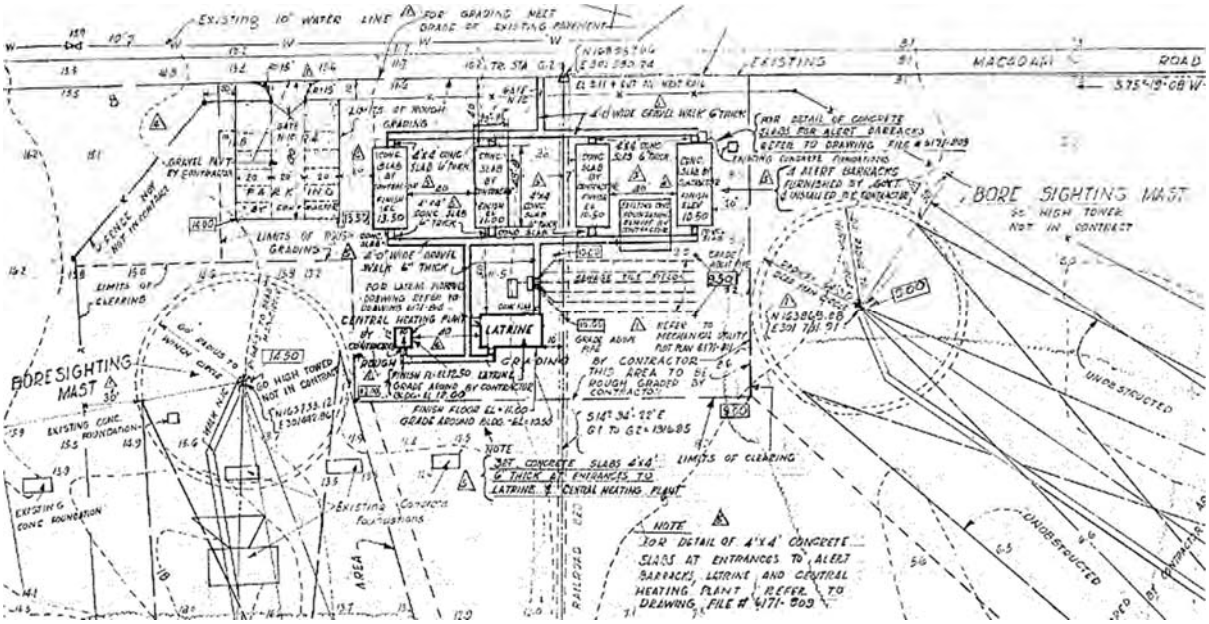


Figure 1.2-38: Detail of 1955-60 as-built site plan. Barracks area. (GATE 8783)

Located to the east and west of the barracks area were Bore Sighting Masts, otherwise known as Collimation Masts that were used to calibrate the radar antennae in the Control Areas. The west mast was used to calibrate Control Area #1 and the east mast to calibrate Control Area #2. The radars were calibrated on a daily basis by turning the antenna towards the masts and running a series of tests. Once complete, the antenna were then put into their typical use. The masts were tall and thin with crossbars and radar targets near the top and reached 60 feet in height. Vegetation between the masts and the radar antennae was kept low to avoid obstruction.

[17] The structures are included in As-Built drawings of the Radar Tracking Area site plan dated September 1955

Radar Control Van, Battery Control Van, Spare Parts Van (by September 1955)[18]

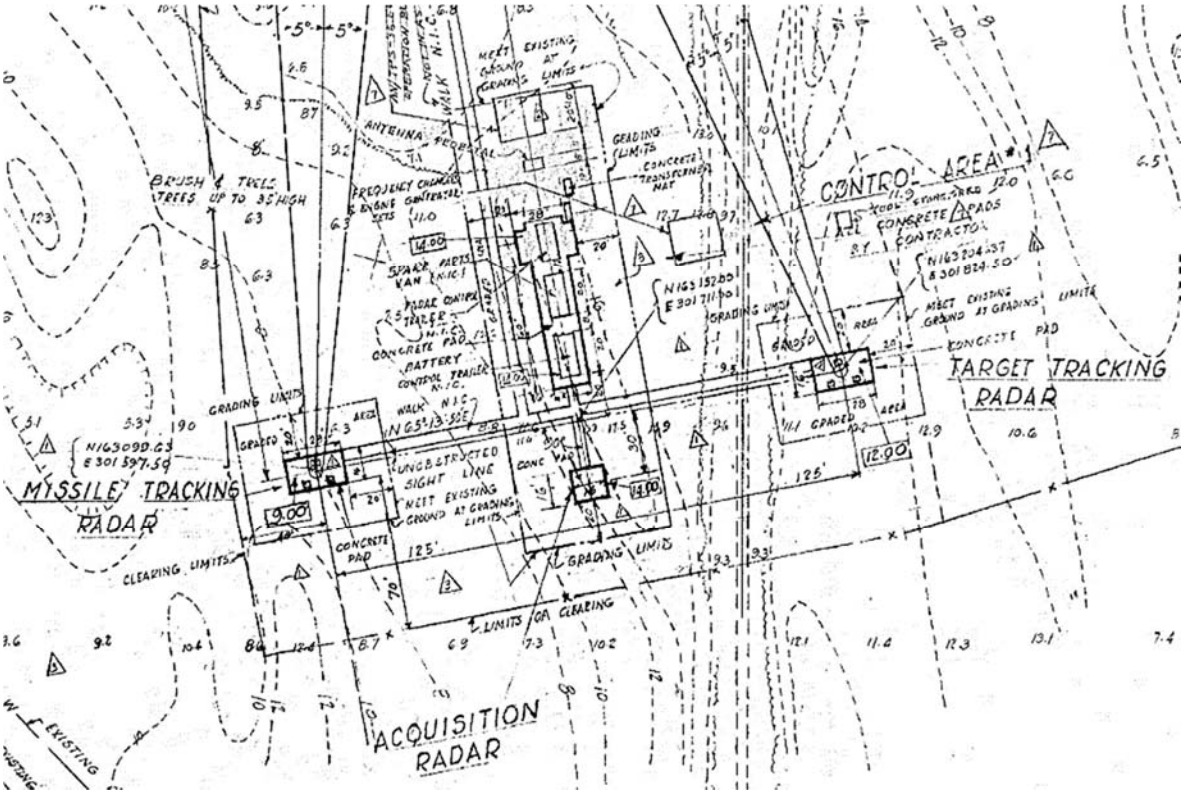


Figure 1.2-39: Detail of 1955-60 as-built site plan. Control Area #1. (GATE 8783)

When construction began on the Radar Tracking Area in 1954-1955 the elements of the NIKE radar system were moved from their temporary location on Fort Hancock near Battery Peck, where the equipment and vans were supported by timber cribbing and existing concrete structures, to the site. A concrete pad was constructed to hold the Radar Control Van, Battery Control Van and Spare Parts Van at each Control Area. As Control Area #1 was almost directly south of the west Bore Sighting Mast, all of the elements of that control area were oriented northward. Control Area #2 was located southeast of the barracks area and the east Bore Sighting Mast therefore this grouping was oriented toward the northwest. The pad was approximately 16 feet wide and 80 feet long and was oriented in the north-south direction. The pad stepped out on the east and west sides to a width of 28 feet for the northernmost 20 feet of the pad. The rectangular vans were set up end-to-end on the pad with the exception of the northern van which was rotated 90 degrees thereby requiring the wider pad at this end. The Radar Control Van was at the north end and the Battery Control Van at the south end. The Spare Parts Van was located in the center, between the two control vans. The three vans were all approximately the same size.

[18] The structures are included in As-Built drawings of the Radar Tracking Area site plan dated September 1955

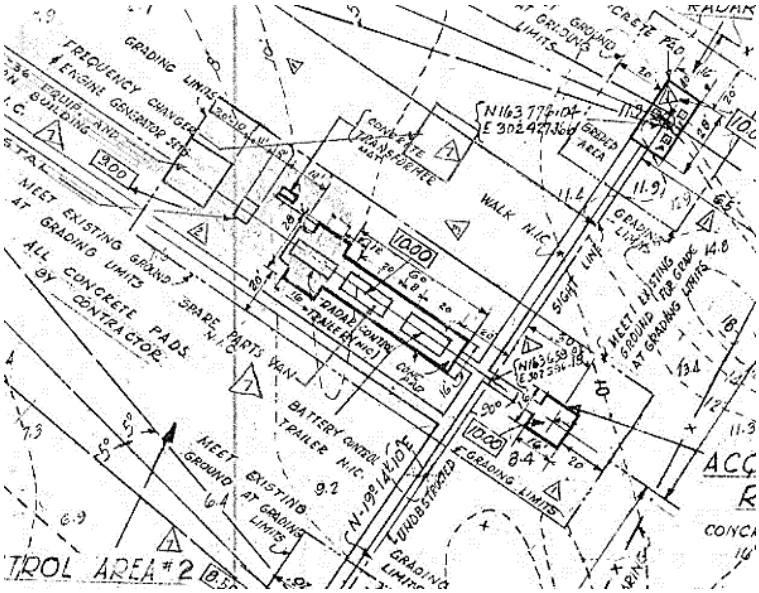


Figure 1.2-40: Detail of 1955-60 as-built site plan. Control Area #2. The vans from left to right: Radar Control Van, Spare Parts Van, Battery Control Van. Note area at northwest end of control vans has been erased and redrawn. (GATE 8783)

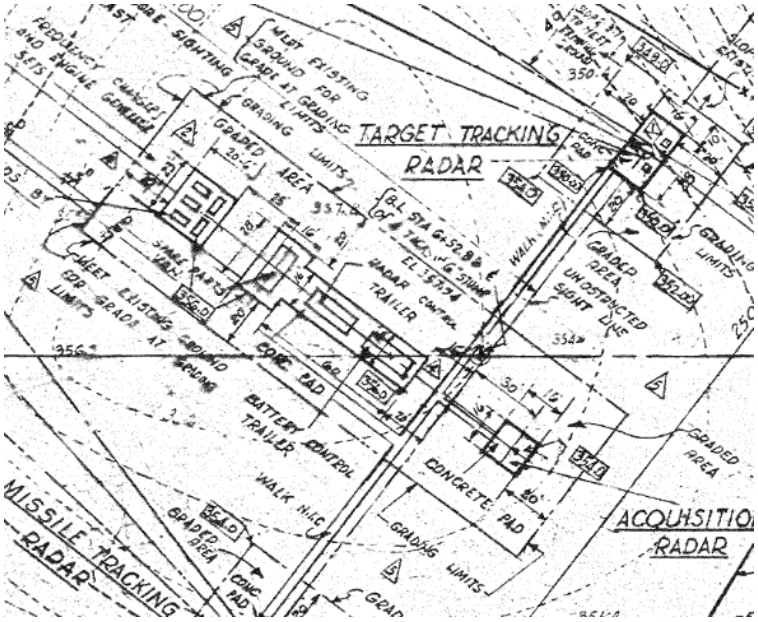


Figure 1.2-41: Detail of 1955 as-built site plan for NY-54 at Holmdel. Control Area explains original pad shape for control vans and configuration of the generators. (GATE 11030)

The Battery Control (BC) Van held the Acquisition Officer's station where the officer operated the Low-Powered Target Acquisition Radar (LOPAR), a plotting board for tracking potential targets and much of the computer hardware for the entire radar system. The Battery Commander would also station himself in the BC Van as this van was the central point of communication, both within the site

and with the command post (AADCP) at Highlands, New Jersey. The Radar Control (RC) Van held the operator stations for the Target Tracking (TTR) and Missile Tracking Radars (MTR). The Spare Parts Van held storage for the range of necessary parts as well as two workstations where technicians could make repairs.

Generators that served the control areas may have been placed on a concrete pad north of the control van area as was typical at other NIKE sites. These generators provide power to the entire Control Area in which it was located including the control vans and the radar antennae themselves. The original drawings do not show them, but the grading limits as shown suggest that they may been erased when a second round of as-builts were completed in 1960. A square that could represent the pad is shown on a separate drawing completed before the construction of Equipment and Operations Building 452 which is located in approximately the same location.

Missile Tracking Radar, Target Acquisition Radar, Target Tracking Radar (by September 1955) [19]

Concrete pads were built to support the three radar antennae utilized by the Ajax system at each Control Area. The pads for the Missile Tracking Radar (MTR) and Target Tracking Radar (TTR) were 16 feet by 23 feet in size while the pad for the LOPAR was 16 feet by 16 feet. The radars were installed in-line with each other with approximately 125 feet between them in this order from west to east: MTR, LOPAR, TTR. A series of gravel walks from the Control Van concrete slab to each antenna pad are shown on the original drawings as "not in contract" and, similar to the walks to the bore sighting mast, does not appear to have been built.

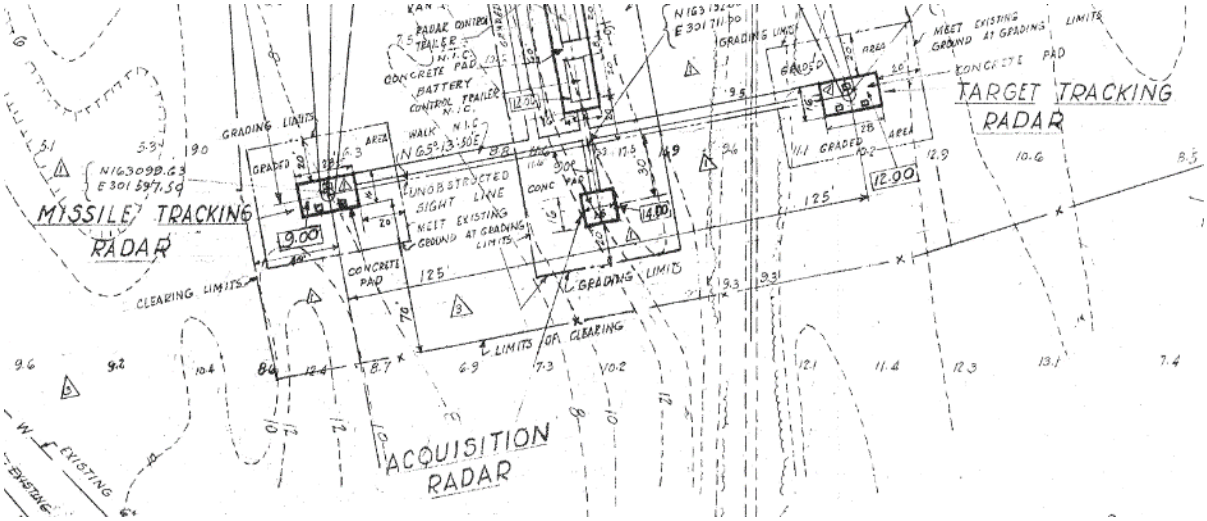


Figure 1.2-42: Detail of 1955-60 as-built site plan. Control Area #1 radar pads. (GATE 8783)

[19] The structures are included in As-Built drawings of the Radar Tracking Area site plan dated September 1955

Barracks 402-405, Latrine 406, Central Heating Plant 407 (by September 1955)[20]

The barracks area at the radar site, including the latrine and central heating plant were identical to the corresponding buildings at the launch area, both in size, materials and relationship.

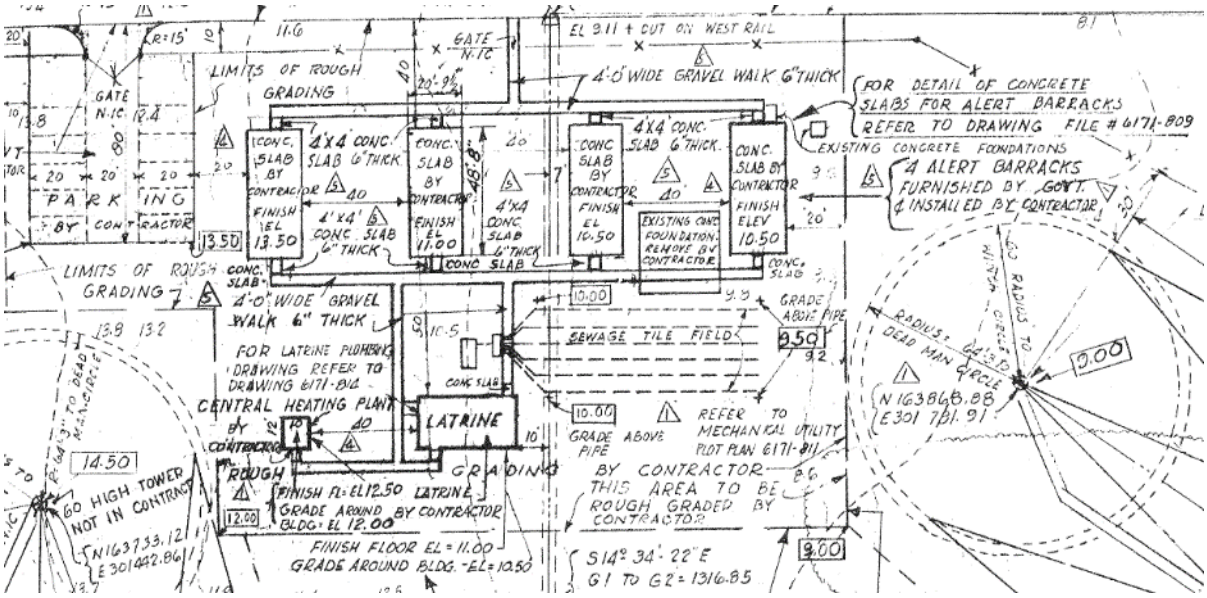


Figure 1.2-43: Detail of 1955-60 as-built site plan. Barracks area. (GATE 8783)

Between the Areas

The original site drawings call for clearing vegetation between the Radar and Launch Areas to provide a series of unobstructed lines of sight between specific site elements. Wedge-shaped unobstructed areas were called for that provided unobstructed views from each Missile Tracking Radar platform of the entire missile magazine plateau. Additional narrower corridors of sight were required between the Missile Tracking Radars and their respective Launch Control Vans at the launch area. (See Figure 1.2-1)

[20] Bearss report, in referencing the Real Property Record Cards, includes these buildings in a group approved in April 1955.

1.2.2 1956 – Early Modification of Radar Area

The Radar Tracking Area was quickly upgraded in 1956, as was typical with the early NIKE Ajax sites, with the construction of additional vital buildings and permanent structures for the generators, radar antennae and control vans.

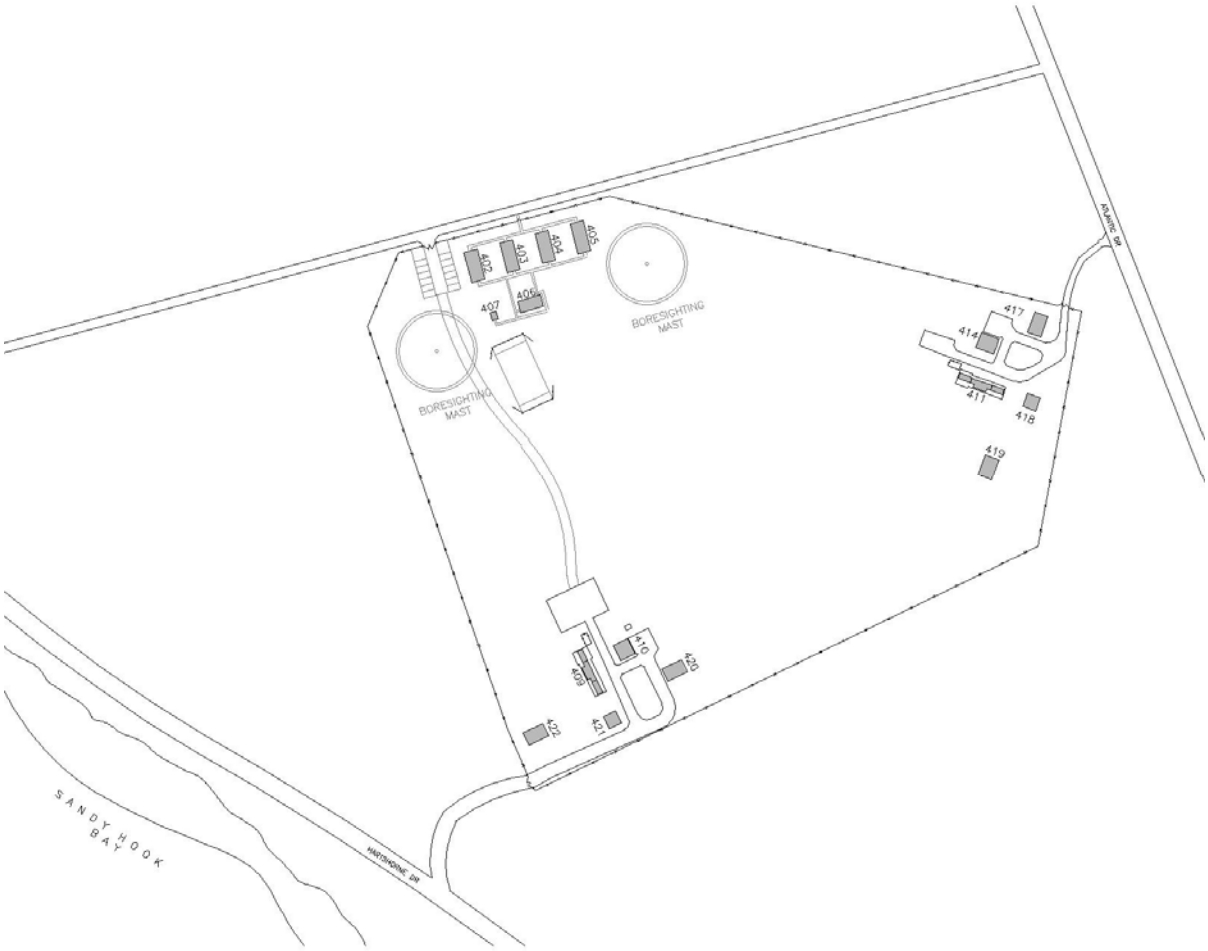


Figure 1.2-44: Radar Tracking Area configuration in 1956. John Milner Architects, 2016.

Radar Tracking Area

Site

Several "as-built" drawings dating from 1956 were updated to reflect additional changes to conditions at the Radar Tracking Area in 1960. The access roads at the secondary gates deleted from the original 1955 scope were now built thereby directly connecting the radar area with Sandy Hook's main north-south road (Hartshorne Drive) and the asphalt road at the east side of the radar area (Atlantic Drive). These access roads may have been built to make transport of construction materials easier to the new structures that were constructed at the control areas at this time. At each control area, an additional road is shown leading from the respective access road, along the side of the control vans, to a parking area. A spur road is also shown that creates a roughly circular road pattern that accesses a paved area

adjacent to the new generator buildings constructed during this period. The parking area covers over the previous generator pad, which would be obsolete after the generators were relocated to the generator buildings. At Control Area #1, a road then continues north from the parking area and heads to the main entry gate of the radar area.[21] Most drawings from this period, if material is indicated, identify this portion of the road as a "Dirt Road." The 1956 drawing that shows these modifications does not show a similar road connecting the barracks to Control Area #2.

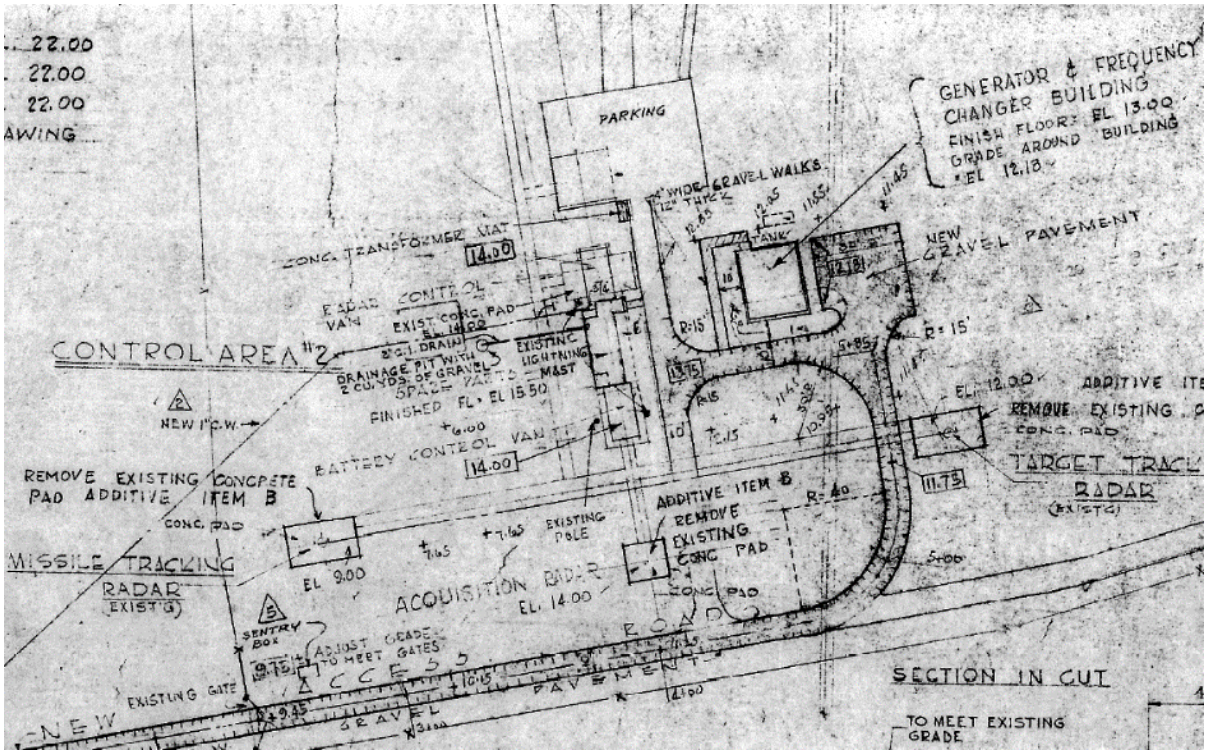


Figure 1.2-45: Detail of 1960 as-built site plan. Control Area #1 area (incorrectly labeled Control Area #2 in plan). (GATE 11053)

[21] Drawing GATE 11053 shows the west Control Area as #2, but other drawings (GATE 8783 specifically) show the name as corrected in As-Builts to #1 which is how it is referred to in soldier interviews as well.

In the same drawing, the road between the barracks area and Control Area #1 appears to jog to avoid what is shown as a large rectangle. This rectangle corresponds with the location of the athletic court on the site. The athletic court consisted of an asphalt paved basketball court (as it is referred to in other drawings) with ten-foot-high chain link fences at the north and south ends. These fences angle toward the center of the court at the corners of the asphalt, likely for lateral support. The athletic court likely dates from this period of construction as it is not on the original drawing for the site. These athletic courts were common on NIKE sites around the country.

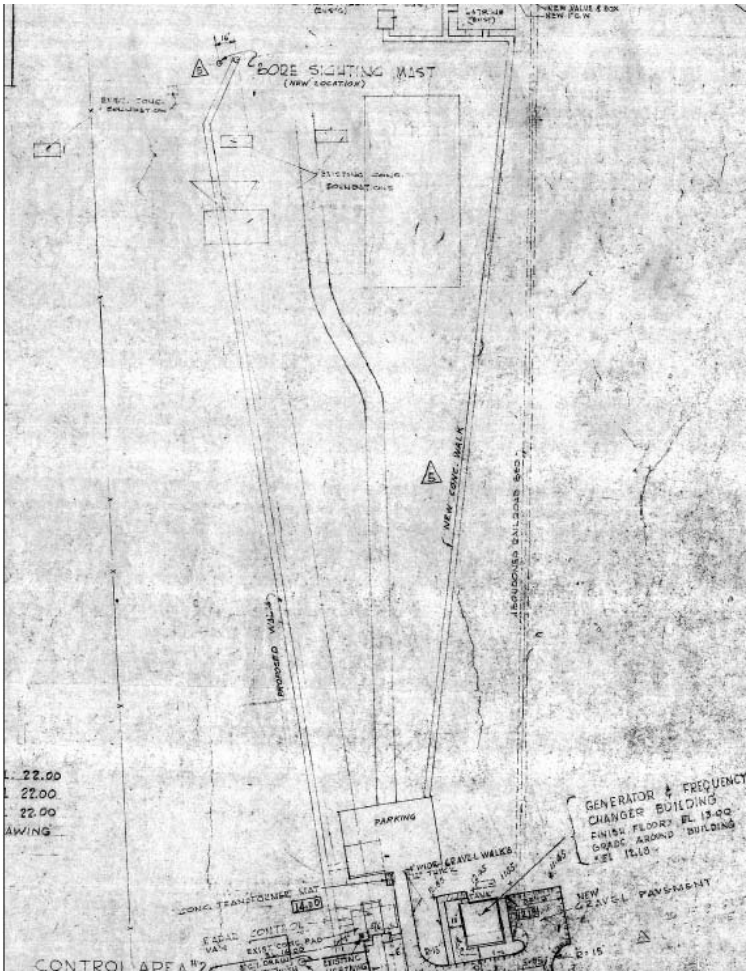


Figure 1.2-46: Detail of 1960 as-built site plan. Road and concrete walk from Control Area #1 area and athletic court shown. (GATE 11053)

Interconnecting Corridor 409 and 411 (May 1956) [22]

(For the sake of clarity of cardinal directions, the below description refers to Building 409. Building 411 was identical.) The interconnecting Corridor (ICC) was constructed to provide a link between the BC and RC Vans, a degree of protection from the elements when entering and exiting the vans, and to serve as additional administrative space. The ICC was constructed of concrete block with a low

[22] Real Property Record Card, Structures 409 & 411, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.

sloping built-up asphalt roof. The main block of the building was approximately 12 feet wide by 21 feet in length and was oriented lengthwise in the north-south direction. A small wing, approximately six feet by seven feet in size, was located at the north and south ends of the main block. These wings served as vestibules for the building as they had doors, in the east wall of the north wing and west wall of the south wing that provided access to the building from the exterior. The doors were likely wood stile-and-rail doors in wood frames, but the panel configuration (glazed, louvered, solid, etc.) is not clear. The wings were also open at the northernmost and southernmost walls to allow the control vans to be placed against the openings. This allowed access directly into the vans from the vestibules. When no van was present, an overhead rollup steel door could be pulled down at either of the walls that the main block shared with the wings. This would secure the corridor portion of the building and protect it from the elements. A pair of wood two-over-two double-hung windows, ganged together with a wood mullion were centered on the west wall of the main block and provided light and air to the main corridor space. Similar to the transitional layout of the vans, the BC Van was located at the south end of the corridor and the RC Van at the north end. Once the vans were in position, lightning protection was put in place at the west side of each van. The protection consisted of a tall metal pole with an affixed point at the top. These lightning rods were mounted to small concrete pads and the attached cable was grounded in the soil.

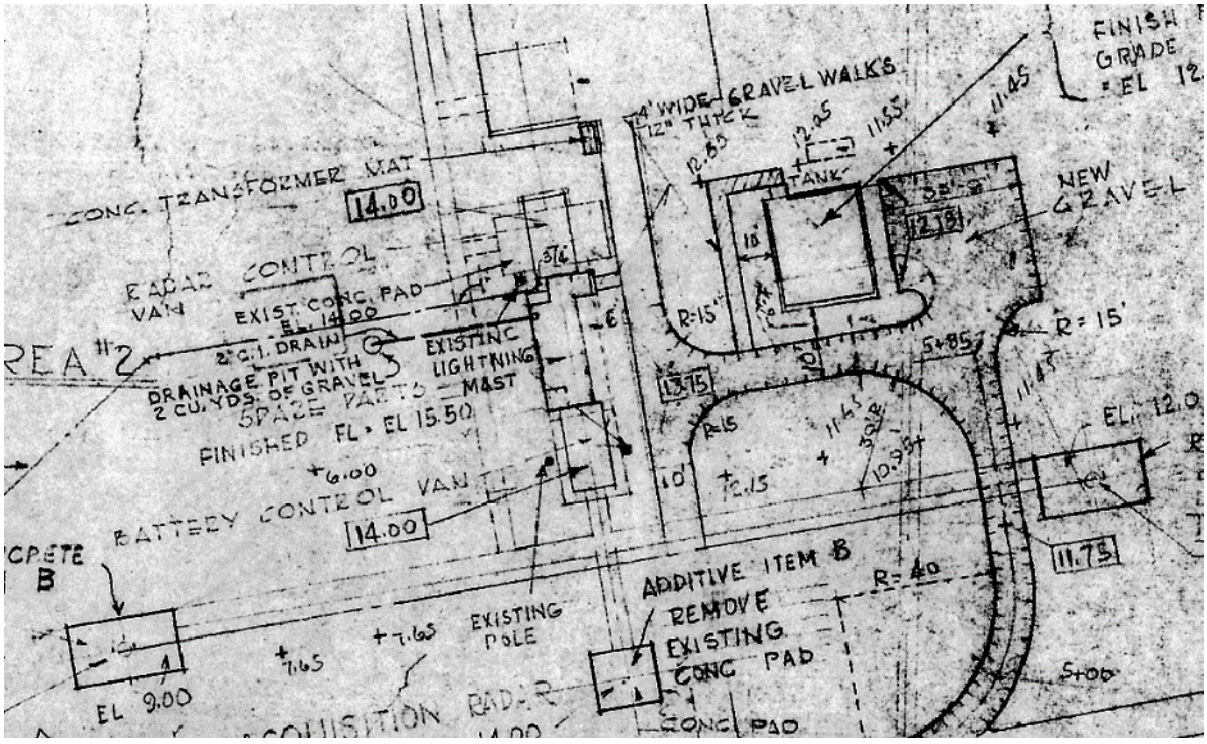


Figure 1.2-47: Detail of 1960 as-built site plan. Interconnecting Corridor 409 with lightning rods and Generator Building 410 and transformer pad shown. (GATE 11053)

At the interior of the building the walls at the wings were exposed concrete block. The walls at the inside of the main corridor block were finished with wallboard on wood furring. The ceiling was acoustical ceiling tile hung from black iron framework attached to the underside of the roof structure of metal bar joists. Ceiling hung fluorescent light fixtures were attached to the structure as well. The floor was finished with 9" by 9" vinyl asbestos tile. A heating and air conditioning unit provided

conditioned air to the corridor and the vans through ductwork and was located in the northwest corner of the corridor. As the first computers and other electronics used in NIKE Ajax system were of the vacuum tube variety, the vans could get extremely warm from the heat given off by the equipment. The corridor would also contain a duty desk for manning the phone 24 hours a day in case a call came in from the command post. The corridor was also the location of the secure safe that held the launch codes and a variety of security measures such as passwords, encryption devices, etc.



Figure 1.2-48: Current view of west elevation of Interconnecting Corridor 409 would be very similar to how it looked when constructed in 1956.





Figure 1.2-49: Current view of original window in west elevation of Interconnecting Corridor 409 (left). Small concrete pad west of the Battery Control Van supported one of the lightning masts (right).

All of the elements of the Radar Area were connected to each other, including the Generator Building, Control Vans and the radar antennae themselves, by a series of cables that attached at interfaces on the outside of the vans. To protect the cables as they ran over much of the Control Area, narrow trenches, constructed of concrete with steel lids were placed in the ground. The cables were run through these trenches where vehicular and foot traffic as well as the elements would not damage them. With the advent of the ICC, it is not clear to where the Spare Parts Van at either Control Area #1 or #2 were relocated as no later plans seem to indicate it anywhere.



Figure 1.2-50: Cable trench running between Interconnection Corridor 411 and Generator Building 414.

Generator Building 410 and 414 (May 1956)[23]



Figure 1.2-51: Detail of 1960 as-built drawing markup of 1955 site plan showing Generator Building 414. Note Delta 7 and penciled-in quality of the building. Arrow looks redrawn from formerly pointing to the generator pad northwest of the control vans. (GATE 8783)

(For the sake of clarity of cardinal directions, the below description refers to Building 410. Building 414 was identical.) The Generator Building, similar to the structure at the Missile Launch Area, provided a protected environment for the generators which were relocated from the concrete pad north of the control vans. The building was constructed of concrete block with a low-slope built-up asphalt roof. A pair of bi-fold wood stile-and-rail doors with wood frame was located in the north wall near the west corner. Each leaf had two bottom panels, one solid wood panel over a wood louvered panel, while the upper panel was glazed. East of this door a pair of wood two-over-two-lite double-hung windows were ganged together with a wood mullion and frame. Three pairs of bi-fold doors, similar to the doors in the north elevation, were centered on the east elevation. Between the doors, 8"x8" wood posts supported the wall above and the door frames. These doors allowed the generators to be moved in and out of the building. The construction of an addition on the south side of the building makes it unclear if there were any openings on that side, but it is possible that the south wall had a window and an additional set of bi-fold doors matching those located in the north wall. A fuel oil tank was located near the northeast corner of the building.

The interior of the building held three generators and a frequency exchanger. The generators were located near the east wall and aligned with the exterior pairs of doors. The frequency exchanger was located immediately west of the center generator. The original configuration of the remainder of the equipment is unclear as much of it is missing and modifications appear to have been made over time. The walls were finished with wallboard that was likely the cement asbestos board used in

[23] Real Property Record Card, Structures 410 & 414, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.

several other buildings on the site including the launch area generator building. The ceiling was finished with the same wallboard material which was attached to the underside of the metal bar joist roof structure. The floor consisted of a concrete slab with a series of concrete trenches to hold the cables associated with the three generators and carry them out of the building. It is unclear as there are none extant, but the trenches were likely fitted with metal plate covers as at the launch area generator building. A series of three vents, positioned over the generators, penetrated the roof and were supported by roof-mounted metal armatures. Four enameled incandescent pendant lights hung from the ceiling.



Figure 1.2-52: Current view of Generator Building 414 looking south. Except for addition at far left, the building appears much as constructed. Note roof armature for exhaust silencers.



Figure 1.2-53: Current view of Generator Building 414 interior looking east. Except for doors in the wall to the right, the building is configured as when constructed. Note likely original bi-fold doors.

Transformer Pad (by December 1956)[24]

A concrete mat north of the control vans served as a platform for transformers. A chain link fence and gate similar to that used for the transformer pad near the launch area generator building ran at the perimeter of the pad.



Figure 1.2-54: Current view of the Transformer Pad at Control Area #2.

Radar Platforms 417-422 (May 1956) [25]

(For the sake of clarity of cardinal directions, the below description refers to Radar Platforms 420-22. Platforms 417-419 were identical.) The concrete pads that held the radars during the Radar Tracking Area's transitional period were removed and replaced with reinforced concrete platforms that stood on sub-grade concrete footings. The platforms for the Missile Tracking Radar and Target Tracking Radar antennae were the identical in construction. A set of six 12"x12" reinforced concrete columns, spaced to create a structural footprint of 16 feet by 28 feet, supported a set of perimeter concrete beams with three cross-beams. The columns flared out at a 45 degree angle as they met the beams above. The beams in turn supported a 6" thick concrete slab platform that cantilevered three feet past the beams at all four sides creating a platform 22 feet by 34 feet in size. Steel channels with the flanges facing out were anchored to the perimeter of the platform. It was to this channel that a three foot high metal pipe safety railing was installed. The railing also ran around the entire perimeter of the platform except where a steel ladder was attached to the channel providing access to the platform from the grade below. The platform for the LOPAR antenna was identical to those for the MTR and TTR except that the LOPAR's platform was only 22 feet by 22 feet in size and had only four columns and one cross-beam beneath the platform. Aside from the differences related to the smaller size, all of the other details of construction were the same.

[24] The transformer pads are not listed in the Real Property Record Cards for the Fort and appear to have been added to the Radar Tracking Area electrical plan as part of as-built drawing revisions in December 1956.

[25] Real Property Record Card, Structures 417-421, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.

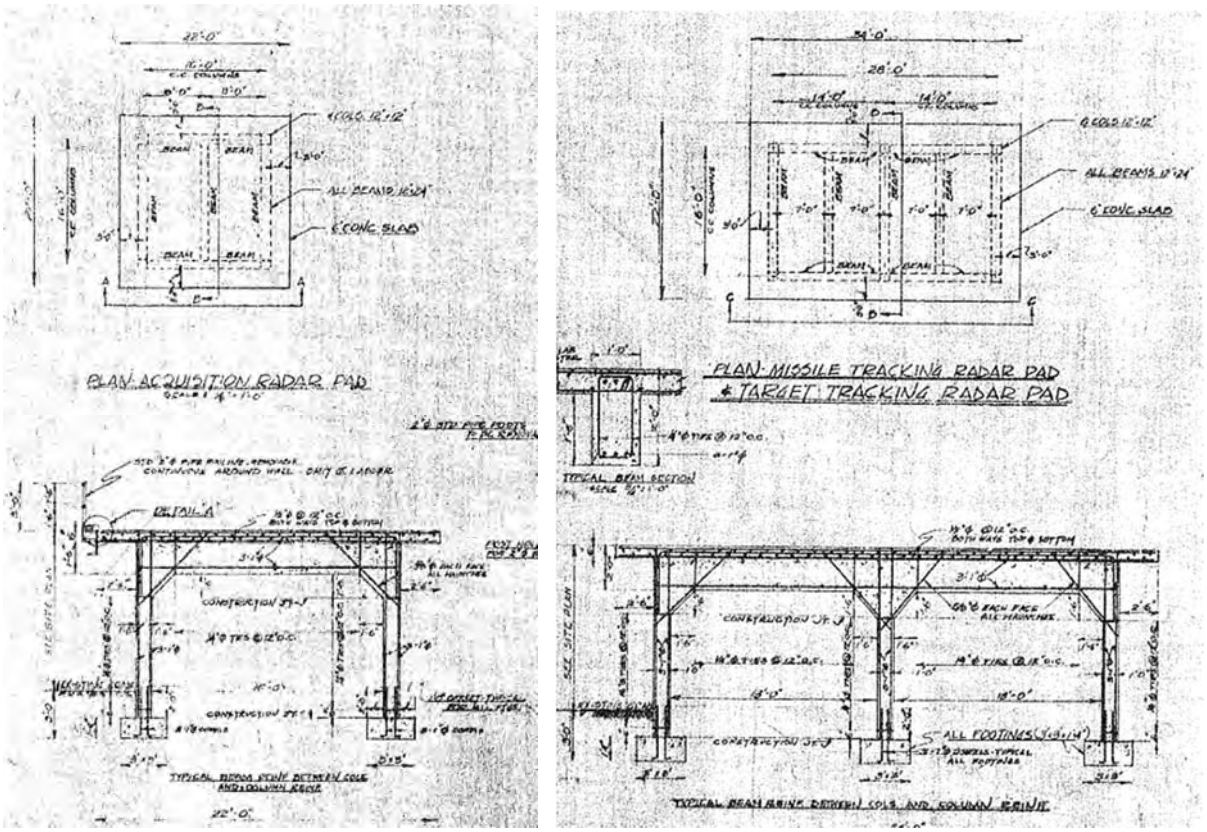


Figure 1.2-55: Original 1956 as-built plans and elevations of radar platforms. (GATE 8884)



Figure 1.2-56: Target Tracking Radar Platform 420 was not expanded as the other platforms were in 1962 and appears as it did when constructed.

1.2.3 1960 – Introduction of Hercules / Missile Master

Beginning in May of 1958, NY-56 began the process of upgrading their facilities to integrate the NIKE Hercules missile. With the introduction of the more powerful, solid-fueled and nuclear-capable missile, many modifications and new buildings were required.

Missile Launch Area

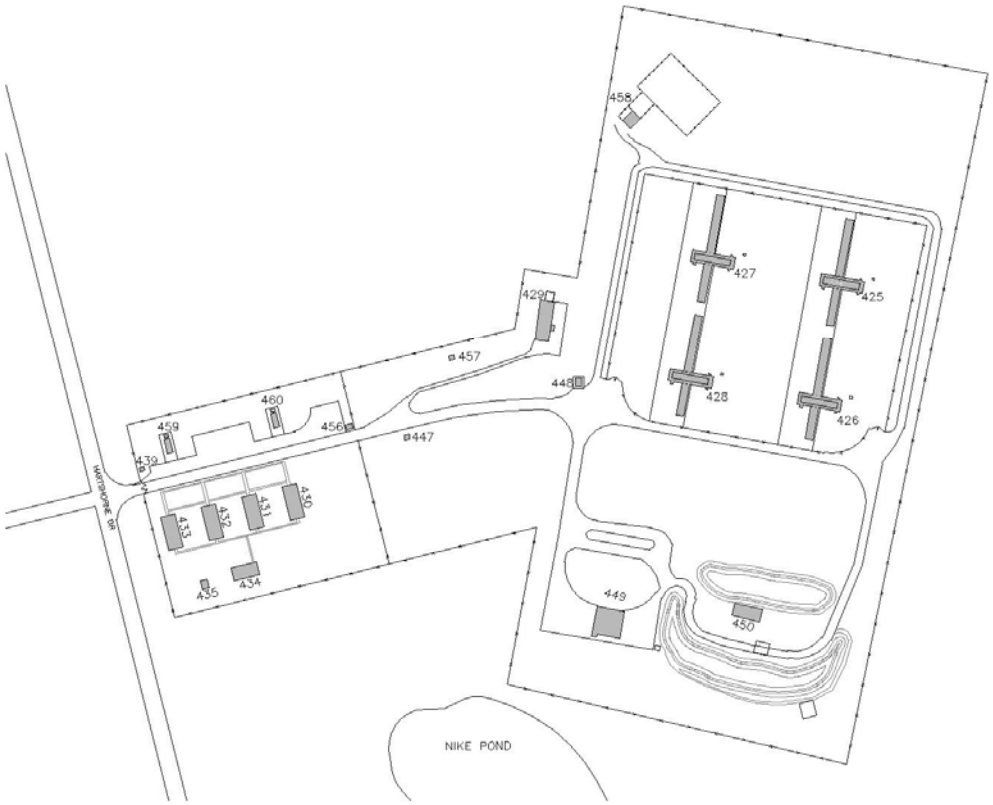


Figure 1.2-57: Missile Launch Area configuration in 1960. John Milner Architects, 2016.

Site

The most obvious changes made to the Missile Launch Area concerned increased security due to the presence of nuclear material on the site. An additional fence perimeter was installed around the missile magazine plateau. Similar to the area perimeter, the fence was a six-foot tall chain link fence with three strings of barbed wire hung at the top. Designated the "Exclusion Area," the enclosed magazines were now accessed by gates at the southwest access road from the barracks area and the southeast access road from the bermed missile preparatory area. Security lighting in the form of floodlights on poles were installed at regular intervals around the Exclusion Area. The remainder of the site within the launch area perimeter became known as the "Limited Area."

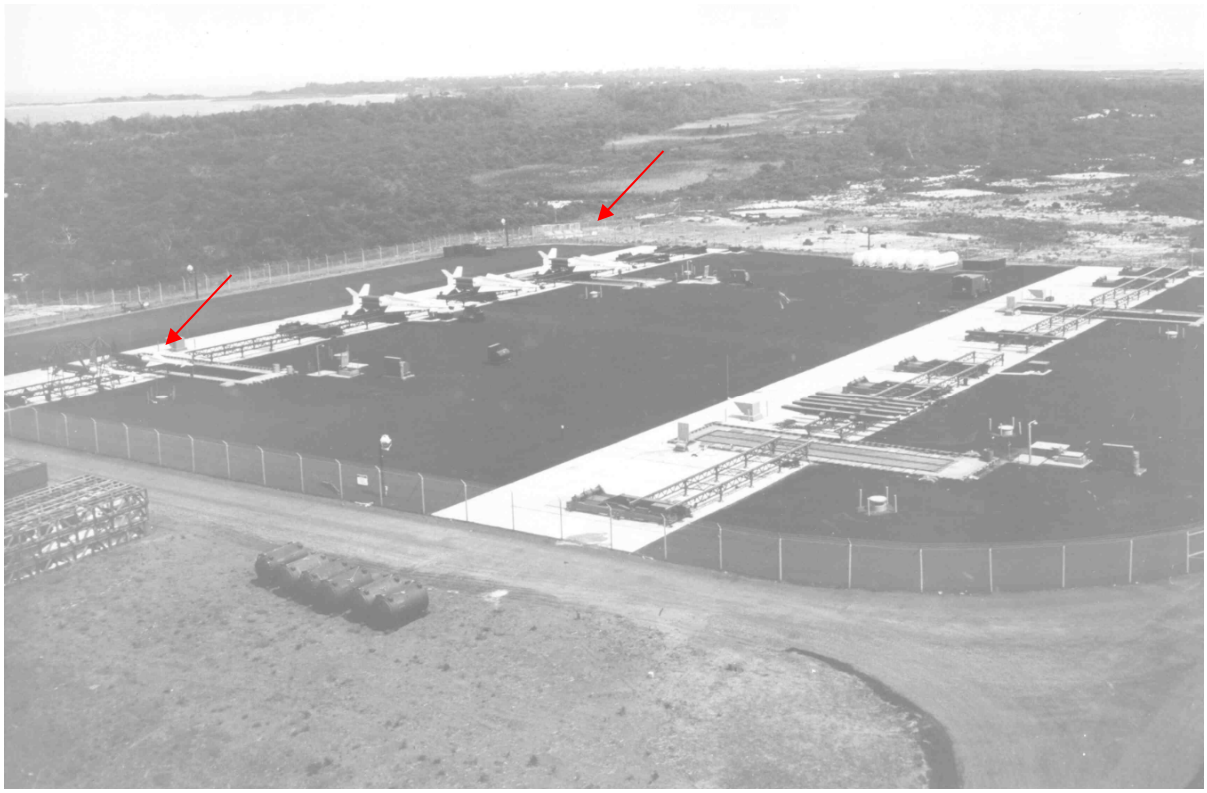


Figure 1.2-58: Aerial photograph of missile launch area, June 1959. Note introduction of Exclusion Area fence and security floodlights. Earth and gravel surface has been replaced with concrete and asphalt. Left arrow indicates two NIKE Ajax missiles at far left suggesting photo dates from phased introduction of Hercules. Right arrow indicates kennels on far side of launch area. (GATE 29196)

While the Exclusion Area fence was installed in 1958 when Hercules was introduced, an additional fence may have been installed by 1960. The installation of this fence, informed by the construction of a guard shelter in 1960, separated the barracks and launch control van portion of the area from the remainder of the site.[26] This created a "Limited Area" that consisted of the area between this fence and the Exclusion Area fence. The Limited Area included the Missile Assembly and Test Building, the Warhead Building, the Sentry Control Station, the kennels and various storage structures.

The pattern of roads near the missile preparation area changed as well. An as-built drawing from 1958 and updated in 1961 shows the introduction of two new roads north of the Missile Assembly and Test Building's septic field that ties the access road from the missile magazine area to the curving path into the bermed area. This pair of roads are labeled "New Ajax Rack Section." This may relate to the phased transition period between Ajax and Hercules. It may also be a reference to NY-56's role as a training installation for National Guard units still operating Ajax sites.

[26] Real Property Record Card, Structure 456, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.

At some point during the active use of NY-56, a telephone booth was installed near the barracks at the Missile Tracking Site.[27] No documentation of when it was introduced has been found, but it was likely installed at the same time a similar booth was installed at the Radar Tracking Area was therefore were in place by the time Improved Hercules and the HIPAR system was introduced in 1962-3.

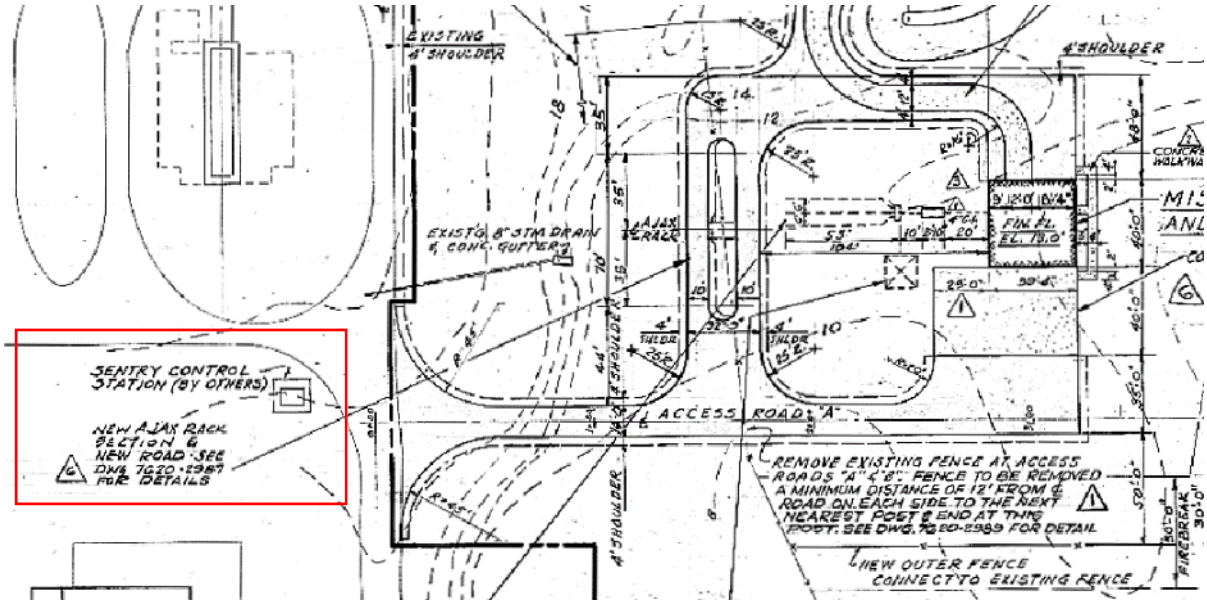


Figure 1.2-59: Detail of original 1961 as-built drawing of the missile preparation area. Note label at left identifying the new roads as Ajax Rack Section. Sentry Control Station at new Exclusion Area is also visible. (GATE 7620-2983)

Sentry Control Station 448 (December 1958) [28]

Adjacent to the southwest gate into the Exclusion Area, a relatively large sentry control station was occupied by guards charged with verifying the credentials of those seeking entry to the restricted area. This station was occupied by personnel who oversaw much of the security of the Exclusion Area once the Hercules missile system was brought on site. When the Hercules system was originally installed, all security for the NIKE site was handled by military police. However, as the war in Vietnam escalated in the following years, demand for MPs was high and other soldiers were pressed into service as security personnel. MPs would continue to serve in the launch area as dog handlers. Sentry Control Station 448 would have been manned 24 hours a day.[29] No records were found to inform what the building looked like except for two photographs taken from a distance. The photograph seems to suggest that the building was similar to those found at other Hercules sites as one would expect. The sentry control station at SF-88 is a single-story building approximately eight feet by eleven feet with a flat roof and wood double-hung windows around the entire perimeter. This resulted in two windows on the short ends and three windows at one long end. The other long end had a single

[27] Interview with Bill Jackson, January 28, 2016.
[28] Real Property Record Card, Structure 448, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.
[29] Interview with Bill Jackson, January 28, 2016.

window on either side of a "Dutch door" that allowed security personnel to interact with others without opening the door entirely. From the picture at NY-56, it appears that the three windows faced west suggesting the door to the station was on the east side. The interior of the station at SF-88 is finished with wallboard at the walls and ceiling with a concrete floor. The building contained workstations and a telephone that connected to telephones in the missile magazines. The building also contained a control panel for the magazine intrusion alarm system and a rack for "Exclusion Area Badges." These badges were issued when appropriate by the sentries to individuals entering the Exclusion Area from the Limited Area.[30]



Figure 1.2-60: Detail of photograph c. 1968-69 of Sentry Control Station 448. Flammable Material Storage 447 and Generator Building 429 are visible at left. (GATE 22041)



Figure 1.2-61: Current view of Sentry Control Station at SF-88 in San Francisco Defense Area.

[30] Comments from Bill Jackson.

Sentry Box 439 (September 1958) [31]

An additional guard booth was constructed at the main gate to the launch area on the north side of the main access road. This guard booth would have been manned only during daylight operating hours when not on alert status. The building was constructed of concrete block on a concrete pad with a low-sloped built-up asphalt roof. A single two-lite-over-two-lite double-hung wood window with concrete sill was centered in the west, north and east sides of the building. A single wood stile-and-rail door with three horizontal wood bottom panels and a six-lite glazed panel above was centered on the south wall. This door appears to be identical to doors found at the Interconnecting Corridor 411 addition and Warhead Building 450 suggesting they all dated to the same building campaign. The interior walls and ceiling of the booth were finished with wallboard and wood base and window trim. The floor was a concrete slab. A wood shelf was installed at the east wall. A ceiling-mounted light fixture was located at the center of the ceiling. An electrical panel and switches were located in the southwest corner of the building.

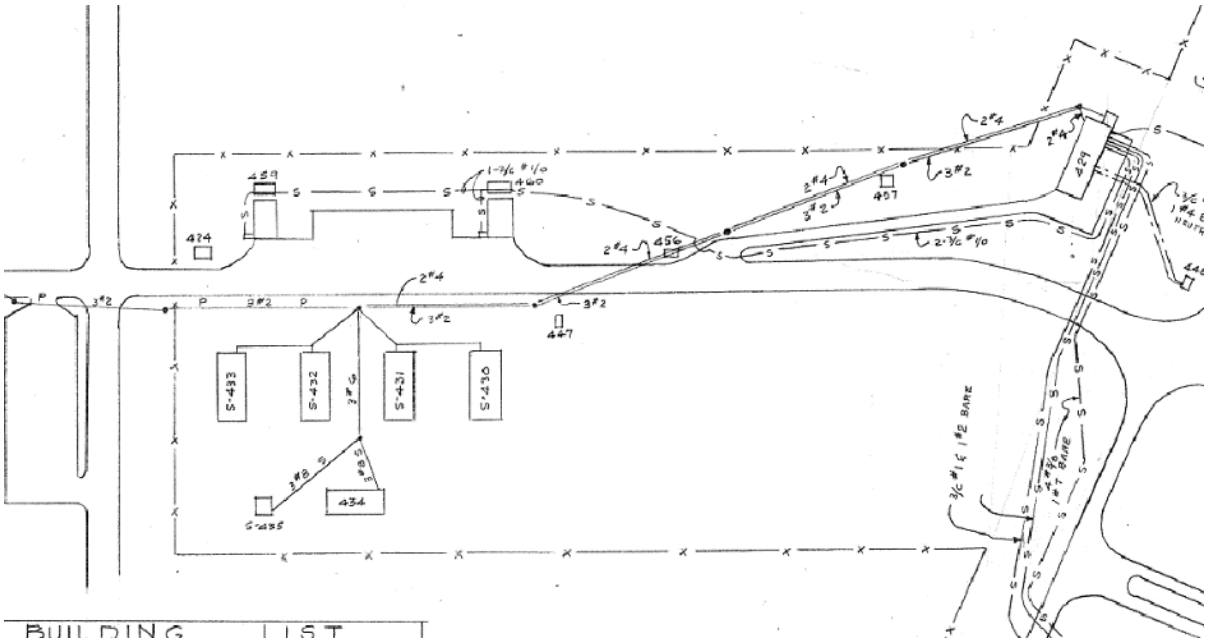


Figure 1.2-62: Detail of 1962 electrical site plan. Sentry Box 439 (previously numbered as 424) is seen at the launch area entrance. Flammable Materials Storage 447, Sentry Box 456 and Storage 457 are also shown. (GATE 11061)

[31] Real Property Record Card, Structure 424, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area. This structure is also referred to as 424 on a 1962 site plan of the Missile Launch Area. It is not clear when the number of this structure was changed.



Figure 1.2-63: Current view of Sentry Box 439. Building appears much as it did when constructed.

Guard Shelter 456 (by May 1958)[32]

This guard booth provided shelter to the military police maintaining restricted access to the Limited Area. Racks inside the structure were used to store the Limited Area access badges and flame-producing devices, such as matches and lighters, which were to be surrendered by an individual before entering the Limited Area. Similar to Sentry Box 439, when not on alert status, this shelter would only have been manned during daylight operating hours. Only the concrete slab for the shelter with scarring from the concrete block walls remains. A photograph taken in the late 1960s or early 1970s provides a distant view of the structure. The structure appears to be very similar to Sentry Box 439 with a low-slope roof and a single window in the west wall. Guard Shelter 456 was slightly longer than the Sentry Box structures to accommodate the storage racks inside.

[32] The Guard Shelter 456 is not listed in the Real Property Record Cards of the Fort, but the Limited Area fence first appears in a Missile Launch Area electrical plan with the earliest date being May 1958. It is presumed that the Guard Shelter would have been necessary with the introduction of the fence and was likely part of the Hercules alterations construction campaign.



Figure 1.2-64: Detail of photograph c.1968-69 of launch area entrance shows Sentry Box 456 (right arrow) and (from right to left) Flammable Materials Storage 447, Sentry Control Station 448, Generator Building 429 and Launch Control Van #1 at left. The poles to the left are the Simulator Group Mast for the Launch Control Van (left arrow) and a Lightning Arrestor (middle arrow). The remainder of the poles in the photograph appear to be related to power distribution (GATE 22042)

Kennel 458 (December 1958)[33]

The military police initially in charge of security at the launch area were assisted by trained attack dogs in patrolling the grounds and especially the area immediately outside the Exclusion Area. The purebred German Shepherds were kept in a new kennel constructed to the northwest of the missile magazines. As noted above, even after the military police ceased to control overall security for the site, MPs maintained a presence as dog handlers. An early drawing shows that the first intended location of the kennel was south of the bermed area near the original Acid Storage Shed. The shed is not shown on the drawing. It is not known why the intended site of the kennel was relocated. The eventual siting placed the kennel in a more accessible position both to the Exclusion Area and the Sentry Station. The kennel is located in the near the location of an abandoned Army Signal Corps warehouse slab. It is not clear that the kennel reused the slab as part of its construction as overlaying the original 1954 construction drawings onto modern aerial photographs do not align the two structures. The orientation of the kennel, unique among buildings at the launch area, does appear to match the orientation of the slabs.

[33] Real Property Record Card, Structures 458, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.

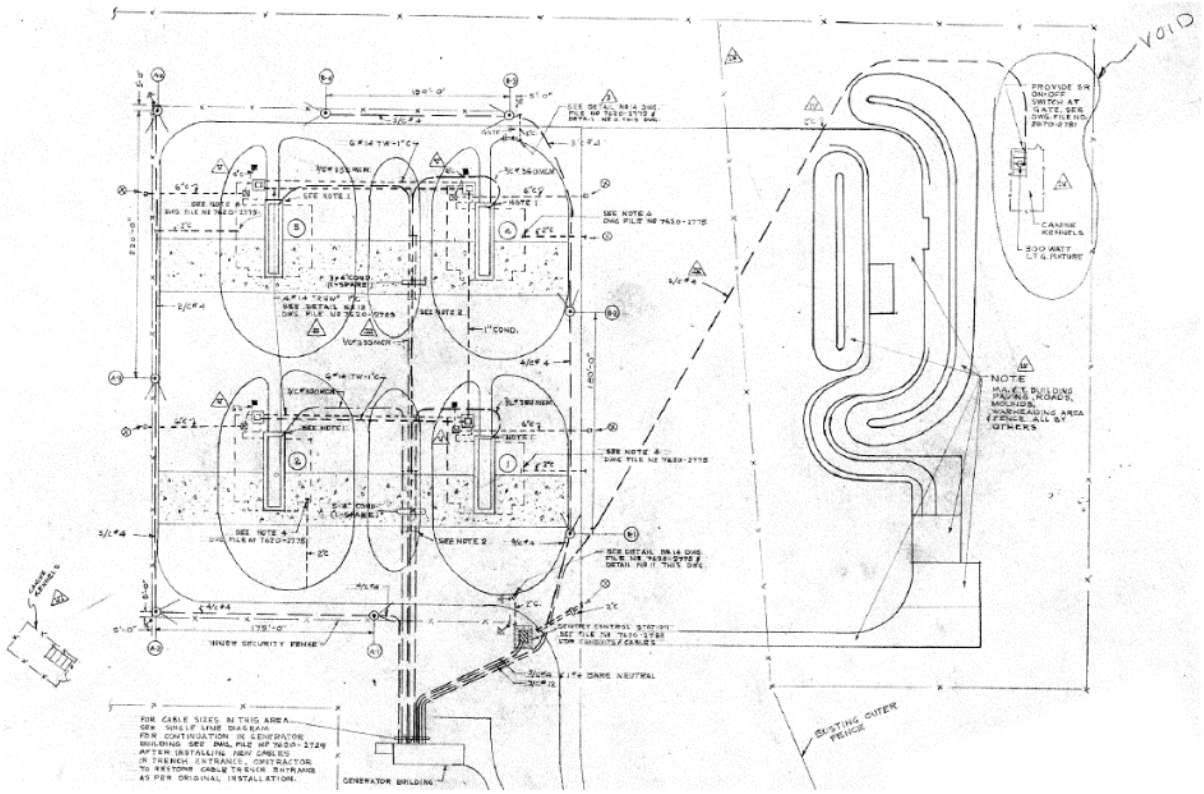


Figure 1.2-65: Detail of 1958 electrical site plan for launch area. Note proposed location of Kennel 258 behind bermed area voided and relocated to final location. Also note Acid Storage Shed is not shown. (GATE 11056)

The kennel was constructed entirely of chain link fences and gates with the exception of the individual dog crates which were constructed of plywood and raised up on wood blocks. The fences were used to create small individual areas in front of each plywood crate with gates at the northwest end. The small kennel areas opened into a larger fenced area that had two gates. One gate at the southwest end provided access to the area from the exterior. The other gate was located at the northeast end and opened to a larger fenced pen. Another gate in the northeast fence of this larger space opened into a still larger fenced area which had a pair of gates to the exterior. The training area for the dogs was located in the largest fenced space.

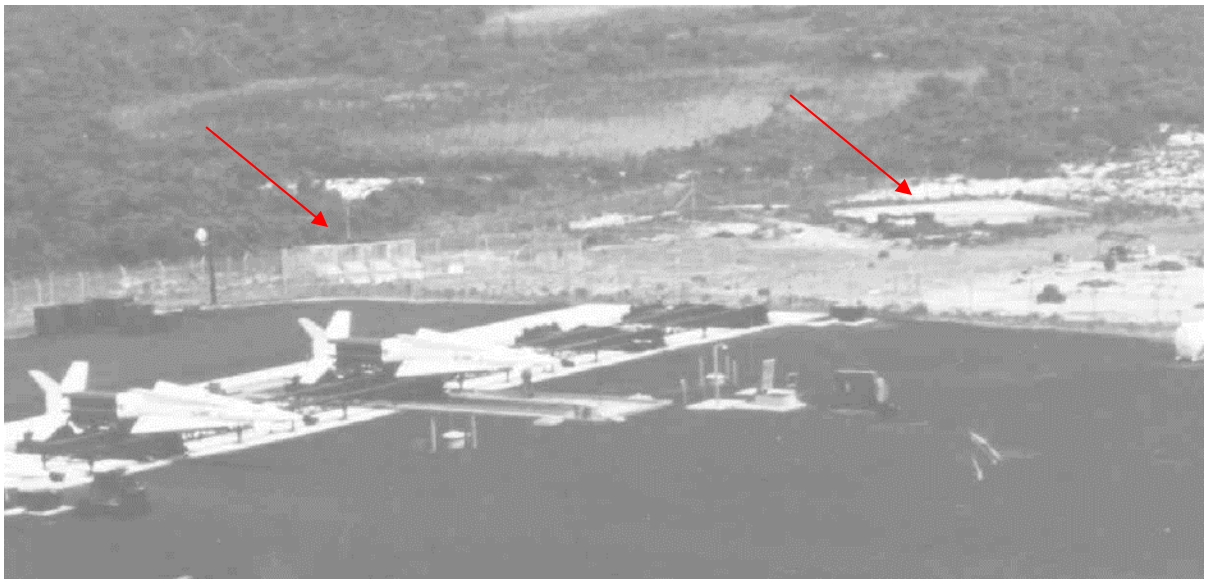


Figure 1.2-66: Detail of photograph c. 1959 showing Kennel 458 in the background. Note Storage 458A is not present. Right arrow points to slab of abandoned Army Signal Corps Building. (GATE 29196)



Figure 1.2-67: Current view of Kennel 458. Roof and wood structure were added in 1965.

Missile Magazines 425-428 (by June 1959)[34]

As the original magazines constructed at the launch area were "Universal" Type-B magazines, little modification was necessary to prepare them to receive the Hercules missiles. Ajax-only magazines required replacement of the interior racks and elevator to accommodate the larger, heavier missile. The NY-56 magazines only required modification to the surfaces above the magazine. With the much-increased thrust of the Hercules booster, created by what were essentially four Ajax boosters strapped together, the small fan-shaped blast areas and earthen fill were not sufficient to withstand the blast. The earth and gravel on top of the four magazines and surrounding area were removed. Two concrete strips approximately 30 feet wide running north-south were installed, each with sufficient length to cover the blast areas and other surfaces supporting the rails and launchers of two magazines. The rails and launchers themselves were also replaced or modified to be compatible with the Hercules missile. The new rails were longer, providing more distance between the missiles due to the increased blast of the Hercules booster. It is not clear if the existing rails were lengthened or completely replaced. The increased length of the Hercules rails changed the arrangement of missiles in relation to the magazine. The Ajax rail layout, according to the original construction drawings and historic photo, resulted in two launchers south of the magazine doors and one launcher to the north. The Hercules rail layout, evident in the 1959 aerial photos consisted of only one launcher to the south and two launchers to the north. The Ajax rails had a gap of approximately 50 feet between the rails of two adjacent magazines. The gap between sets of Hercules rails in the aerial photos appear to be much reduced. Steel plates were placed in the concrete at the rear of each launcher to serve as blast areas. The remainder of the missile magazine plateau was surfaced with asphalt pavement out to the Exclusion Area fence. Despite the presence of the Type-B magazines, switchover to the Hercules missile did not occur instantly. Phased over the course of a year, two magazines were switched first and the other two followed shortly after. An aerial photograph of the Exclusion Area from 1959 shows both Ajax and Hercules missiles on the rails of the same magazine, highlighting the presence of both missiles during this period. While the piping for the showers was still present, the showers were longer needed with the solid-fueled Hercules missile. The original water hydrants continued to be used when cleaning the missiles at the magazines.[35]

[34] A photograph of Missile Launch Area, 18 June 1959, GATE 29196 (Figure 1.2-58) shows the new surface in the Exclusion Zone and new missile launch rails. This work was likely completed in 1958 along with other elements of the Hercules upgrades, but the presence of Ajax and Hercules missiles suggests that the upgrades were still underway.

[35] Interview with Bill Jackson, January 28, 2016.

Missile Assembly and Test Building 449 (April 1959)[36]

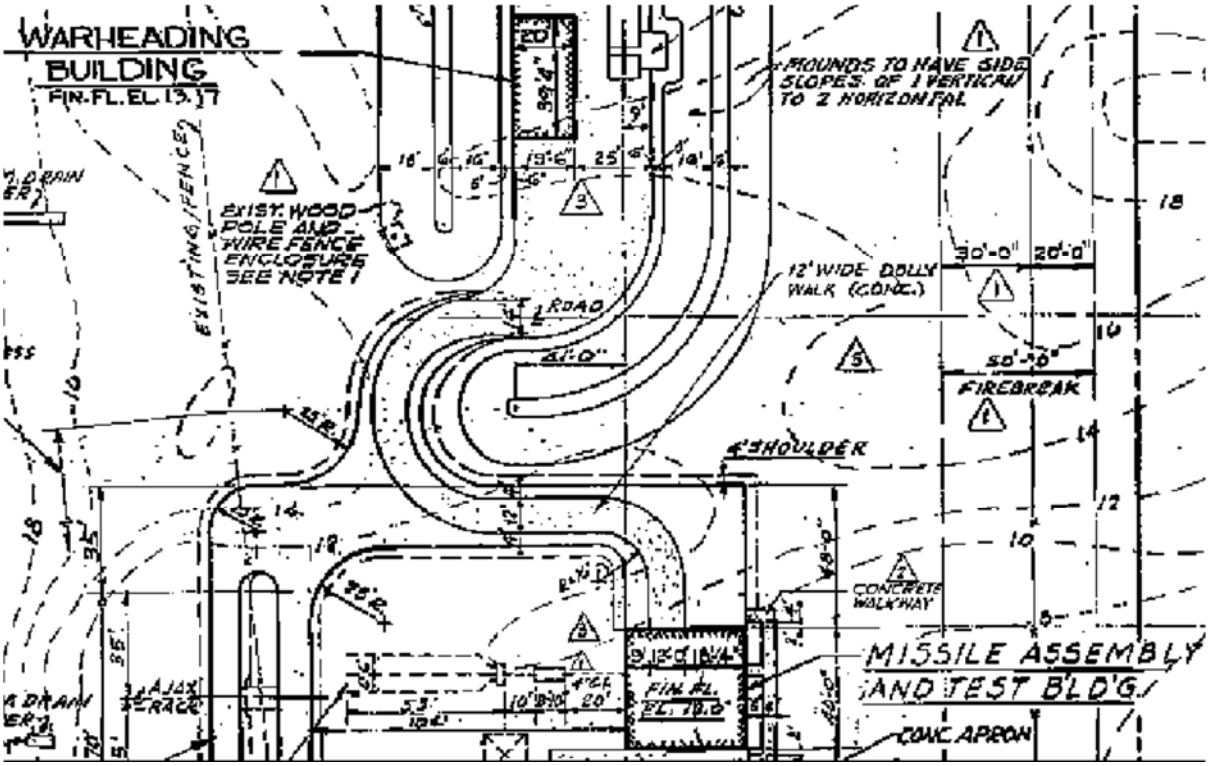


Figure 1.2-68: Detail of original 1961 as-built drawing of the missile preparation area. Note Missile Assembly and Test Building is drawn as full block and in similar fashion to Warhead Building 450, a new building. Also note concrete path increased to twelve feet wide. (GATE 7620-2983)

The Missile and Test (MAT) Building constructed for the Ajax missile was replaced with a new Hercules-ready MAT Building with construction starting in 1958. The two buildings were very similar but held key differences that suggest a complete replacement. The general size of the Hercules MAT Building's main block and the lower block were very similar to the earlier building except that the new building's lower block extended the full length of the building. The pattern of fenestration, except for the longer lower block was essentially the same as the Ajax MAT building except with the addition of a window at the east wall of the stock room area that matched the windows elsewhere in the building. The materials and construction of the new building, including the character of the doors and windows, were largely the same, but the overall plan was mirrored. In the Hercules MAT Building, the lower block was on the south side of the main block instead of the north side as it was in the previous building. The lower block still contained the boiler room and a restroom, but the restroom layout was modified and a window was added in the exterior wall. The toilet room window was a two-over-two double-hung wood window, similar to those found elsewhere in the building, but of a smaller size. The west wall of the toilet room held two sinks while a urinal and two toilets in metal stalls were located at the east wall. The remainder of the lower block held administrative and additional storage space in a single room. This room had two wood windows in the south wall

[36] Real Property Record Card, Structure 449, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.

identical to those found on the north side. A single door, possibly similar to the other wood stile-and-rail doors in the building, was located in the east wall providing egress to the exterior. A heavy metal door with a single vision panel in the north wall of the room accessed the main room of the building. This door appears to be identical to doors installed at the Generator Building 414 and 429 additions suggesting they were all built at the same time. The interior of the main block is very similar to that of the previous building. It is not clear if the existing stock room area is original or a later modification and enlargement. Site plans of the area from the time of the Hercules show the sewage tile field still located north of the building as it was in the original site plan. This may provide additional evidence that the earlier building, with its toilet room on the north side of the building, was replaced and its septic field reused despite the new building's toilet room being located on the south side.

The concrete path that led from the MAT Building to the Fueling Platform was enlarged from the original six feet to twelve feet wide to accommodate the larger Hercules missiles and dollies. The new path led to the Warhead Building.



Figure 1.2-69: Current view of MAT Building 449 looking east. Building appears much as it did when constructed.



Figure 1.2-70: Current view of MAT Building 449 looking northwest. No seams in concrete block walls, or infilled or modified openings could be found to indicate an addition or other change to the structure.

Warhead Building 450 (August 1959)[37]

Located in the bermed missile fueling area north of the original Ajax fueling station, the Warhead Building was a large single-room structure where crewmen would install the nuclear and high-explosive warheads on the Hercules missiles. Constructed of concrete block with a concrete slab floor, the low-slope gable roof was constructed of corrugated metal on a framework of steel I-beam rafters and ridge beam. The building had a single large roll-up metal door centered on the both the east and west walls of the building. A man-door was located to the south of each roll-up door. These doors were wood stile-and-rail doors with three horizontal solid wood bottom panels and a six-lite glazed panel at the upper part of the door. These doors are very similar to and likely match the doors at the sentry boxes constructed during this time. The north and south walls of the building each had four equally-spaced windows centered in the wall. It is unclear what the windows looked like as they are missing entirely. At the interior of the building, the concrete block walls and roof framing were exposed. A large chain lift hung from a curved steel rail and allowed crewmen to lift and move various components of the missile. A series of electrical panels were located near the northwest corner of the building. Once the missile had been armed, the missile moved out through the east door of the building and followed the road to the Exclusion Area magazines.

[37] Real Property Record Card, Structure 450, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.



Figure 1.2-71: Current view of Warhead Building 450 looking east. Note paneled man-door matches configuration of doors at other buildings at NY-56 built at the same time.



Figure 1.2-72: Current view of Warhead Building 450 looking northwest. Building appears much as it did when constructed.



Figure 1.2-73: Current interior view of Warhead Building 450 looking west. Note chain lift mounted at ceiling.

Once the Ajax had been completely phased out and the solid-fueled Hercules was in place, the J-P Fueling Platform, Acid Fueling Station, Fueling Platform and Acid Storage Shed were no longer required for the function of the site. It is possible that the elements at the fueling station may have been simply abandoned following the removal of the fueling apparatus and davit as they were essentially concrete pads and other formations. One drawing from this period shows the fueling platform construction in place, but with no labeled use. The same drawing, as mentioned above, does not show the Acid Storage Shed at all and it may have been removed by this time.

Flammable Materials Storehouse 447 (December 1959)[38]

A small concrete block building with a flat built-up asphalt roof was constructed during the Hercules upgrade of 1958-59 to house flammable materials. In later years, this was specifically used for petroleum-based products including lubrication materials.[39] A single wood-framed door was centered on the north wall. It is unclear what the original door looked like as it has been replaced, but similar buildings on other sites had wood stile-and-rail doors with louvered bottom panels with a four-lite glazed panel above. The interior of this building was not accessible during site visits.



Figure 1.2-74: Current view of Flammable Materials Storehouse 447 looking northwest. Building appears much as it did when constructed.

Storage 457 (June 1960)[40]

According to the Real Property Record Cards, a small 6-foot-by-8-foot storage structure was constructed in 1960. An electrical plan of the launch area dated 1962 shows the structure as being located north of the spur road leading to Generator Building 429. This building was similar to Flammable Materials Storage 447. The plan labels the building as "Paint and Oil Storage" as it does Building 447 and in later years was used to house oil related to the generators in Building 429.[41] The area surrounding this building is completely overgrown and any remnants of this building could not be found.

[38] Real Property Record Card, Structure 447, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.
[39] Interview with Bill Jackson, January 28, 2016.
[40] Real Property Record Card, Structures 457, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.
[41] Interview with Bill Jackson, January 28, 2016.

Generator Building 429 (December 1958)[42]

The addition of a small sound-proof control room to the east side of the generator building may have been constructed during this period. The Real Property card for this building has an acceptance date of December 1958, but the original drawings were marked as "as-built" in 1955. The acceptance date in the records may be referencing this addition. A control room addition was likely added to the Radar Tracking Area generator buildings at this time as well. The addition was built between the south and middle doors of the east wall and clad in corrugated metal at the walls and roof. A single window was centered in the east wall of the addition. The sash of the window is missing and the opening covered with plywood so the character of the original window could not be determined. The addition had no exterior door and was accessed from inside the main generator room. The interior door to the control room, added when the addition was built, was a heavy metal door with a vision panel in the upper part. The door is similar in character to the interior doors at the Missile Assembly and Testing Building and Generator Building 414. The inside face of the door and much of the west wall of the addition room was lined with an acoustic tile to block out the noise of the generators. The other three interior walls and ceiling of the addition were finished with wallboard on wood wall framing. A wood shelf is currently located on the east wall, but this is likely not original to the addition as it runs in front of the window.



Figure 1.2-75: Current view of Generator Building 429 addition looking northwest.

[42] Real Property Record Card, Structures 429, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.



Figure 1.2-76: Current interior view of Generator Building 429 looking northeast. Note door to control room addition at right is similar to other doors installed at buildings built at this time.

Air Conditioners 459 and 460 (by 1960)[43]

Small buildings sheltering air conditioning units for the Launch Control Vans may have been constructed at this time. There is not a definitive date for when the structures were built, but the fort's numbering convention for buildings suggests that they may have been built around the same time as Storage 457 and Kennel 458. The equipment used to cool the vans was similar in nature to the systems used to cool the Interconnecting Corridor Buildings at the Radar Tracking Area.[44] The small slabs that supported the air conditioning units are all that remain of the structures. A picture from the late 1960s appears to show 459 as a small building with a low-sloped roof and a solid door in the west wall.

[43] The Real Property Record Cards for these buildings do not include acceptance dates, but the Historic Resource Study by Bearss groups them with the other buildings built in this Area in 1960, Buildings 456 and 457. A Missile Launch Area electrical plan dated December 1962 shows them in place.

[44] Interview with Bill Jackson, January 28, 2016.



Figure 1.2-77: Detail of Photograph c. 1970 of the entrance to the launch area. Note Air Conditioner 459 beyond Sentry Box 439. (GATE 22039)

Radar Tracking Area

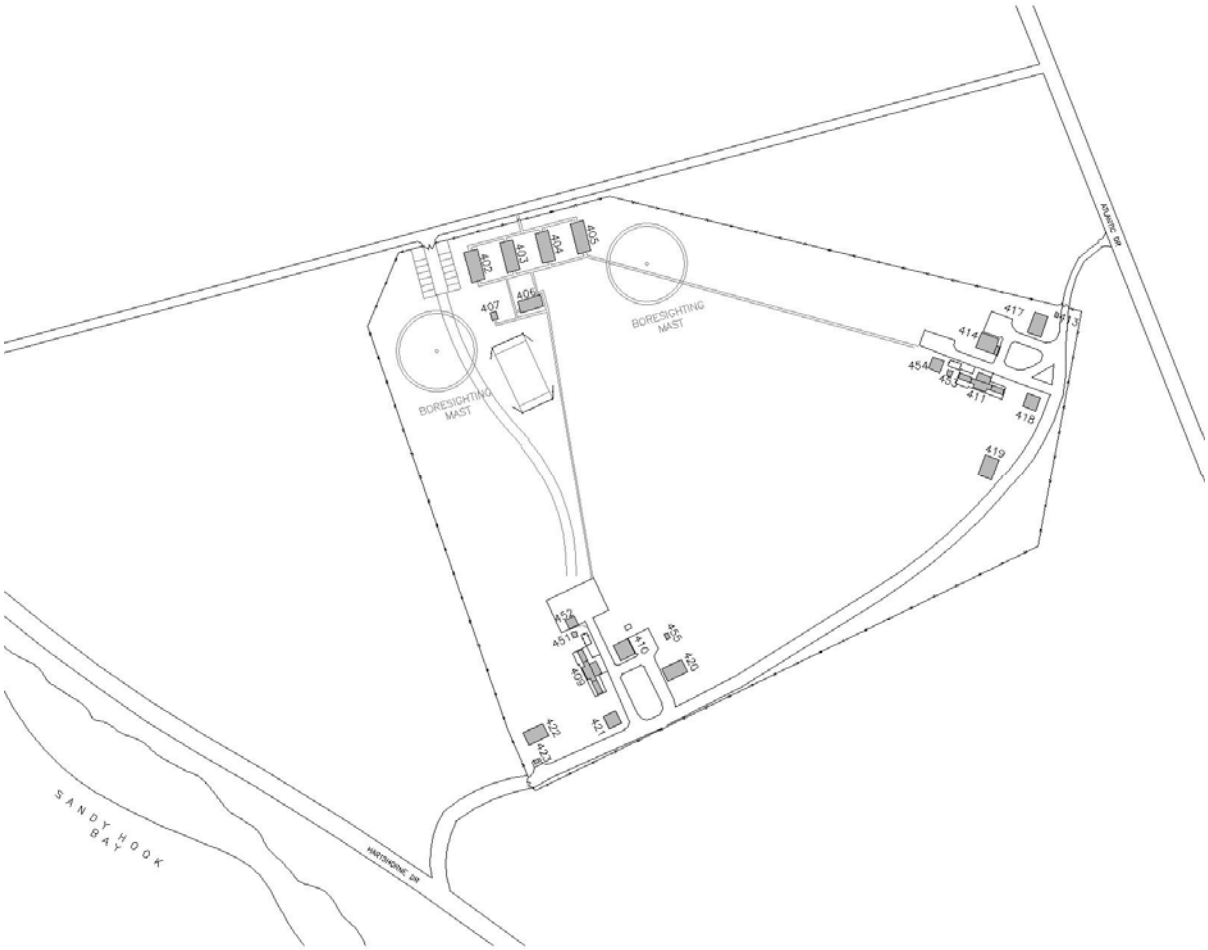


Figure 1.2-78: Radar Tracking Area configuration in 1960. John Milner Architects, 2016.

Site

A series of drawings dating from 1955 and 1956 were updated to reflect "as-built" conditions at the Radar Tracking Area in 1960. These drawings document several changes to the area that took place in the intervening years though the precise sequence and dates are not clear. Taken as a whole, the drawings do provide a good understanding of how the area appeared in 1960 after the implementation of the Hercules system.

The primary changes that occurred at the radar area in the years leading up to 1960 were primarily related to improved circulation on the site for vehicles and personnel. New concrete walks between the barracks and each control area were installed with light standards at regular intervals. The circulation at Control Areas #1 and #2 were improved with the construction of additional gravel pavement roads and a gravel paved area east of Generator Building 410. Another drawing dated 1960 indicates these roads and parking areas as being surfaced with macadam. Later drawings show the roads as macadam as well. It may have been during these modifications to the control area roads that a 13-inch-high concrete block wall was installed at one edge of the entry access road. Starting at the north side of the road just east of Sentry Box 423, the wall continued east and then curved north with the road terminating at the north end of the Radar Control Van. A gap in the wall near the north end allowed access to the path leading to the Interconnecting Corridor 409 entrance. The portion of the wall along the south entry access road also had a single, two-foot-high wood railing mounted to the top. An additional gravel walk was constructed to provide access from one of the new roads to the generator building entry door. Very similar improved circulation patterns, though no wall is indicated, are also shown at Control Area #2. A new gravel road running along the southeast fence line is shown connecting Control Areas #1 and #2 on the as-built drawings of this period. The road connecting Control Area #1 with the barracks area is still noted as a dirt road at this time.

At some point during the active use of NY-56, a telephone booth was installed near the barracks at the Radar Tracking Site. Aerial photographs of the area are not detailed enough to confirm when the booth was installed, but it was likely installed when the Barracks were still regularly used and therefore were in place by the time Improved Hercules and the HIPAR system was introduced.

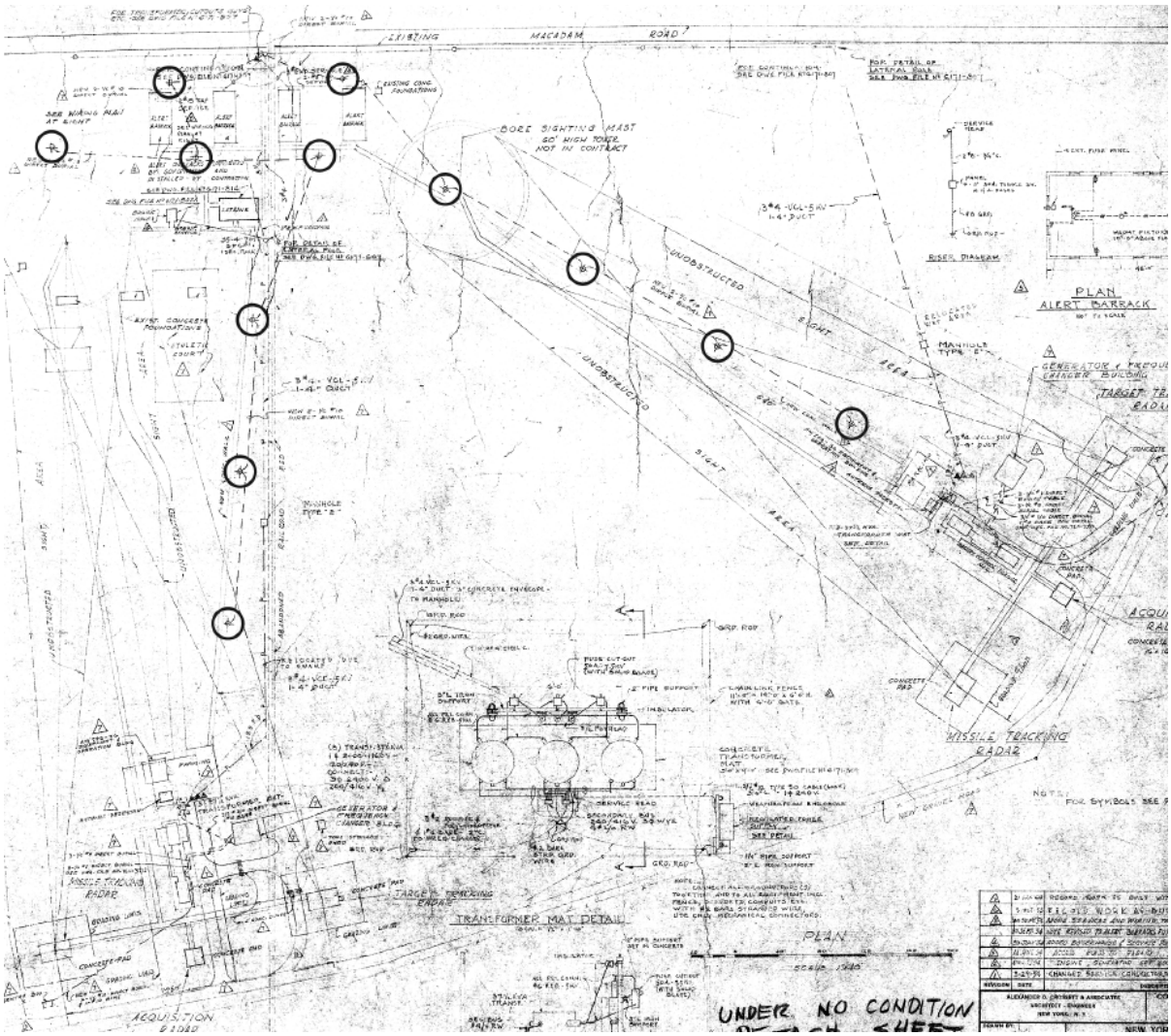


Figure 1.2-79: Detail of 1960 as-built electrical drawing shows the addition of walks and light standards between the barracks and control areas. (GATE 11046)

The installation of sentry boxes at the southwest and southeast gates, but not at the north gates may indicate that the use of these gates were discontinued at this point. This may have been due to the fact that the other gates faced onto more heavily-used roads (Hartshorne and Atlantic Drives) while the road to the gates was a tertiary road. The introduction of additional parking at the Control Areas may have also decreased the utility of the north parking lot. Aerial photos of the area from 1964 and 1966 indicate heavy use of the parking at the control areas and little at the north parking lot. Barracks parking seems to have relocated to the area west of the east Bore Sighting Mast.

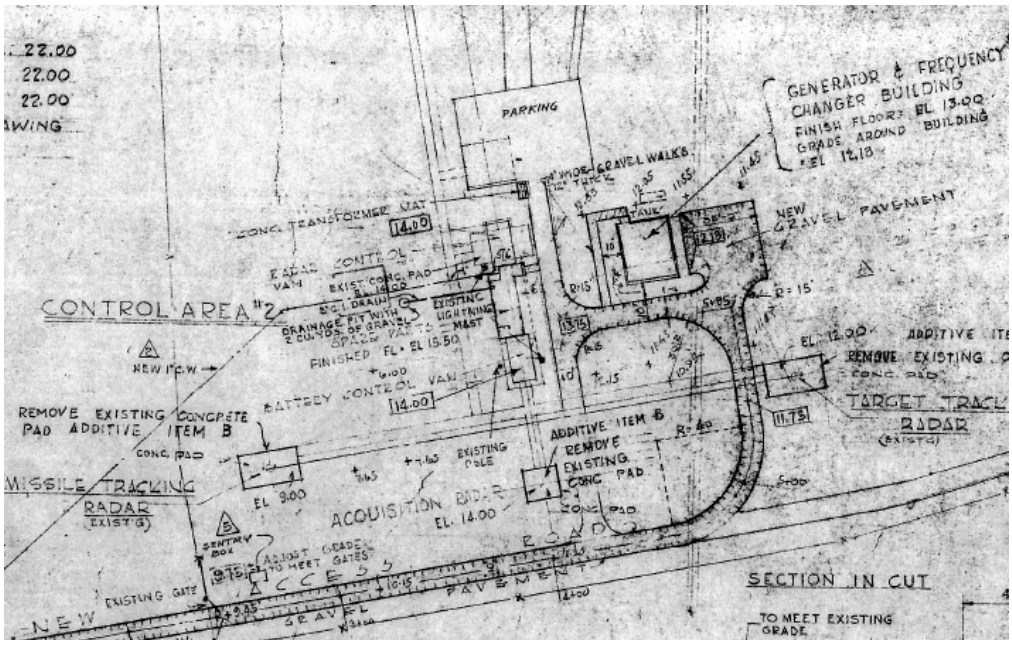


Figure 1.2-80: Detail of 1960 as-built drawing shows additional walks, roads and parking areas. Sentry Box 423 can also be seen. (GATE 11053)

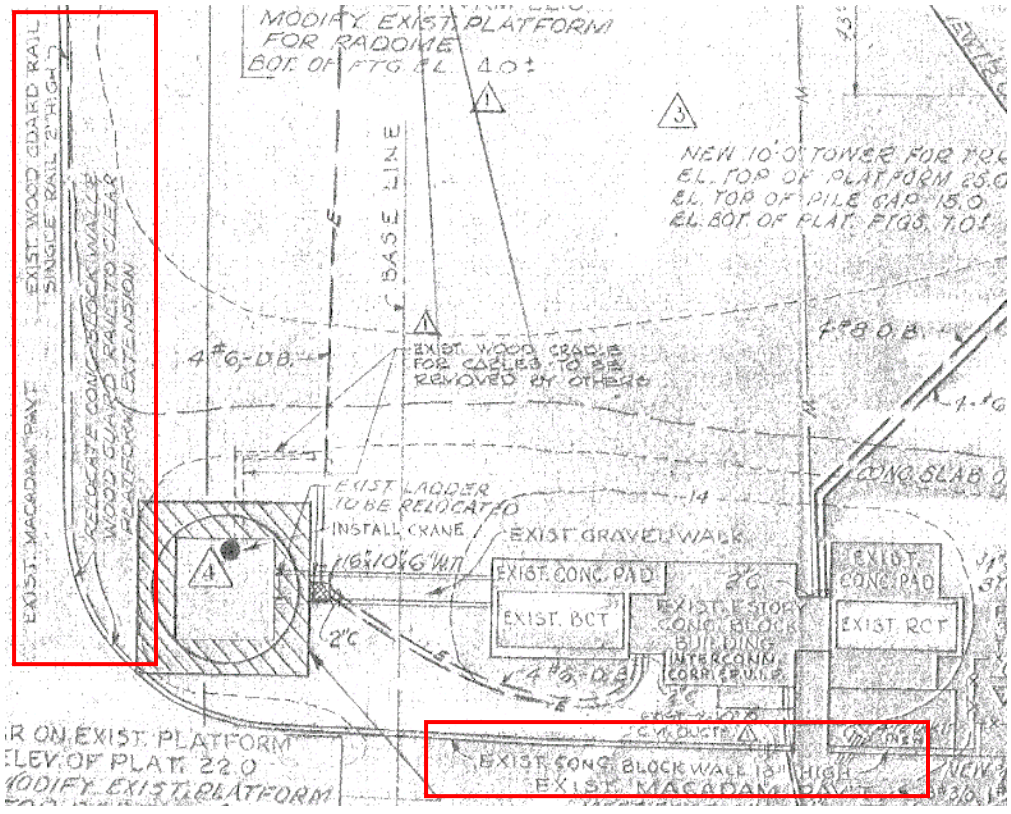


Figure 1.2-81: Detail of 1963 as-built drawing shows prior existence of a concrete block curb at Control Area #1. (GATE 8945)

Sentry Box 413 and 423 (September 1958)[45]

Sentry boxes identical to Sentry Box 439 were constructed at the southwest and southeast gates of the area with the introduction of the Hercules system. Similar to Sentry Box 439 at the Missile Launch Area, these buildings were manned during daylight operating hours. In later years, Sentry Box 413 would rarely be manned at all.[46] The buildings were each located on the north side of the entry gates and access road. The wood stile-and-rail glazed doors are similar to those found at the additions to Interconnecting Corridors 409 and 411 and Warhead Building 450.



Figure 1.2-82: Current views of Sentry Box 413 (left) and 423 (right). Buildings appear much as they did when constructed. Door at 423 matches doors at other buildings built at this time.

Equipment & Operations Buildings 452 and 454 (February 1960)[47]

"As-Built" drawings completed in 1960 indicate the addition of a building north and northwest of the control vans at Control Area's #1 and #2 respectively. These appear to occupy roughly the same location as the generator pads from the initial radar area construction. The buildings are both labeled as equipment and operations buildings for the "AN/TPS-36" and were completed in 1960. The radar reference is likely a labeling error as development of this radar system had not yet begun in earnest in 1960. It is likely referring to the AN/FPS-36 radar system, a predecessor to the AN/FPS-75 ABAR system that NY-56 would receive in 1962 as part of Improved Hercules. A 1962 site map of Control Area #1 lists Radar Pedestal Tower 451 as "FPS 36 Exist. Conc. Base."

[45] Real Property Record Card, Structures 413 & 423, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.
[46] Interview with Bill Jackson, January 28, 2016.
[47] Real Property Record Card, Structures 452 & 454, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.

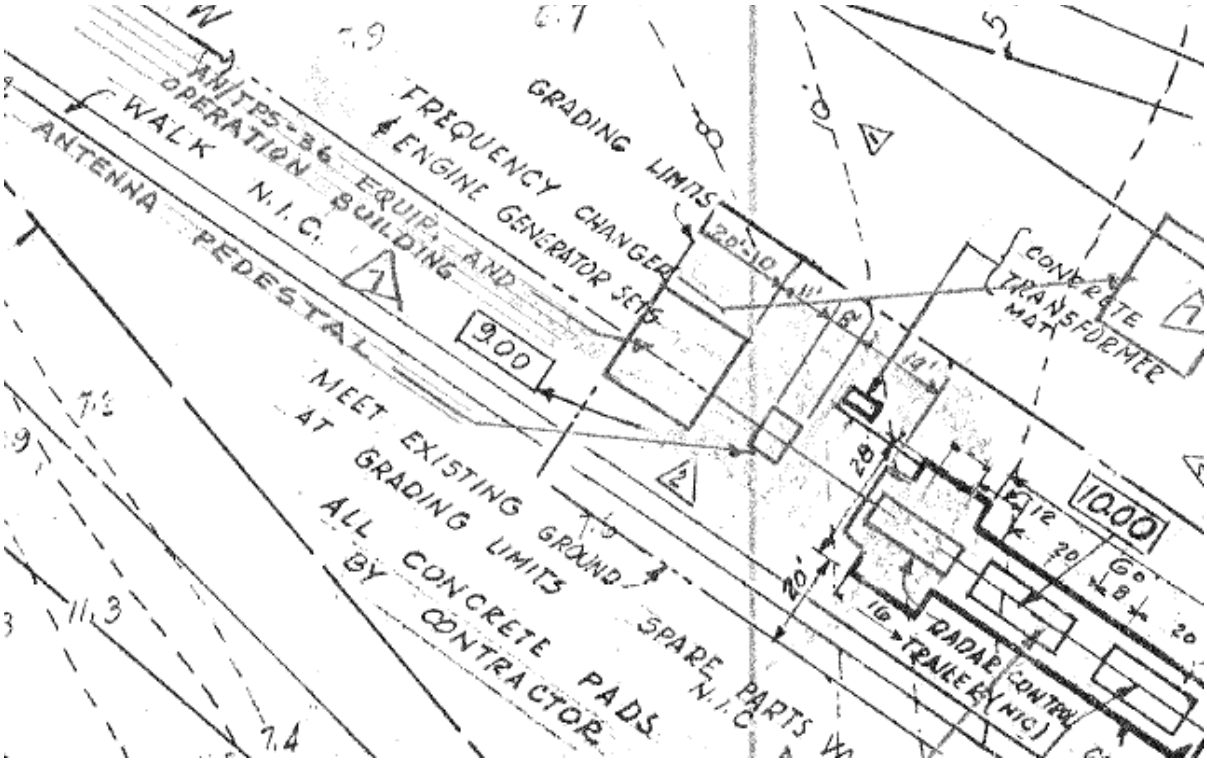


Figure 1.2-83: Detail of 1960 as-built drawing of radar site. Generator pad has been erased and square labeled "AN/TPS-36 Equip. and Operation Building" put in its place. Possibly labeled incorrectly and meant to read AN/FPS-36, a predecessor of ABAR AN/FPS-75. (GATE 8783)

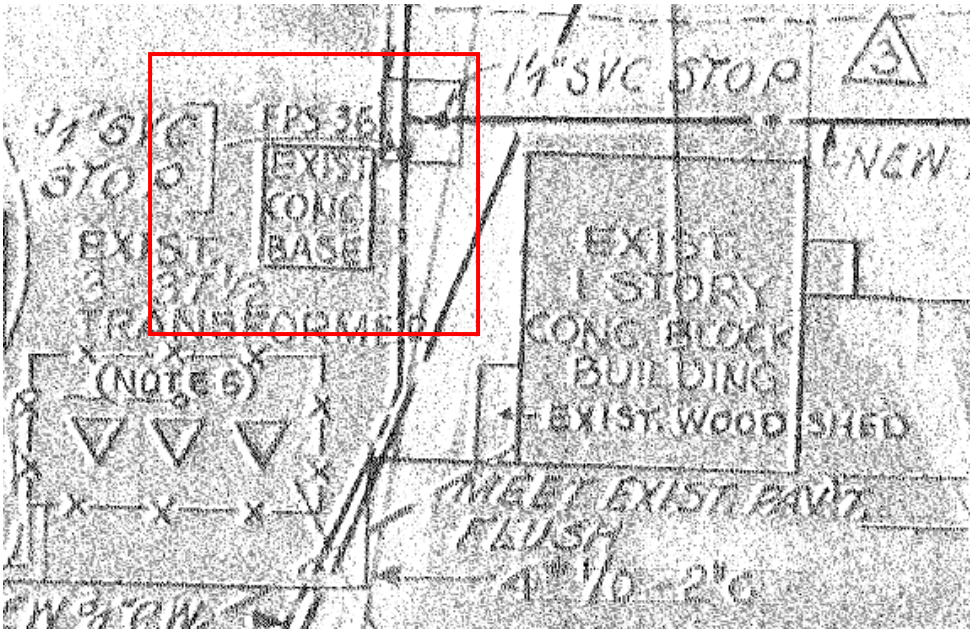


Figure 1.2-84: Detail of 1963 as-built drawing of Control Area #1. Pedestal Radar Tower 451 is labeled "FPS 36 Exist Conc Base." Also note wood shed on Equipment and Operations Building 452. (GATE 8783)

Equipment & Operations Building 454 was constructed of concrete block with a low-slope rolled asphalt roof on wood sheathing and framing. Two wood double-hung six-over-six-lite windows in wood frames were centered on the east wall. The west wall may have had a matching pair of windows, but when a later addition was constructed at the northern end of the west wall, a large opening in the original west wall was created where the north window would have been to connect the two spaces. Only the south window opening in the west wall remains. A single door in a wood frame centered in the north wall provided access into the original building. Given the wood frame and the doors typically used on the site, the door was likely a wood stile-and-rail door, but its configuration is no door remains. Hinges present on the jamb suggest that the building may have been fitted with a storm or screen door. Two openings in the north wall, a rectangular opening approximately four feet above the floor slab and a small circular opening at the floor slab may have allowed for connections between the equipment in the building and the antenna pedestal to the south. Both openings are aligned with the pedestal which appears to have a corresponding opening on its north side. The interior of the building had exposed concrete block walls with a wallboard ceiling attached to the wood roof framing and vinyl asbestos tile adhered to the concrete slab floor.



Figure 1.2-85: Current view Equipment and Operations Building 454 looking northwest. Building exterior appears much as it did when constructed.

Equipment & Operations Building 452 has been demolished and only a concrete slab remains. Aerial photographs taken in 1966 suggest that it had a similar configuration to that of Building 454.

Pedestal Radar Tower 451 and 453 (February 1960)[48]

South of the Equipment & Operations Buildings 451 and 453, drawings identify antenna pedestals that were likely constructed to support the AN/FPS-36 radar antenna. Pedestal Radar Tower 453, as it is referred to by its Real Property Record Card, was constructed of concrete block with a concrete topping slab, the north pedestal wall was largely open which likely allowed cables or other connecting infrastructure to enter the pedestal from the adjacent equipment building. A circular hole in the slab allowed connections from the pedestal to the antenna itself.



Figure 1.2-86: Current view of Pedestal Radar Tower 453 looking southwest.

Pedestal Radar Tower 451 has been demolished and no evidence remains. Aerial photographs taken in 1966 suggest that it was similar to Building 453.

Interconnecting Corridor 409 and 411 (1960)[49]

The activation of the Martin AN/FSG-1 Antiaircraft Defense System, or Missile Master, at the Army Air Defense Command Post (AADCP) in Highlands, New Jersey in May of 1960 brought an increased level of technological sophistication to the New York Defense Area. In order to coordinate its batteries with the AADCP up on the hill, each control area at the radar area was given a Fire Unit Integration Facility, or FUIF. The FUIF was a large set of vacuum tube computers that processed the information it received from Missile Master. How FUIF computers were housed varied between NIKE sites. While some sites constructed stand-alone buildings or FUIF buildings, many others housed the computers

[48] Real Property Record Card, Structures 451 & 453, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.

[49] The additions of FUIF rooms to Interconnecting Corridors 409 and 411 first appear on Radar Tracking Area as-built drawings dated July 1963, but the additions would have been necessary with the introduction of Missile Master in May 1960 and likely date from that period.

in additions to the Interconnecting Corridor buildings. At NY-56, additions to house the FUIF computers and their climate control systems, required because of the heat generated by the computer, were constructed on the east/northeast sides of Interconnecting Corridors 409 and 411. The addition housed two rooms. The south room contained the FUIF computer and the north room held the heating and cooling system that served the south room.

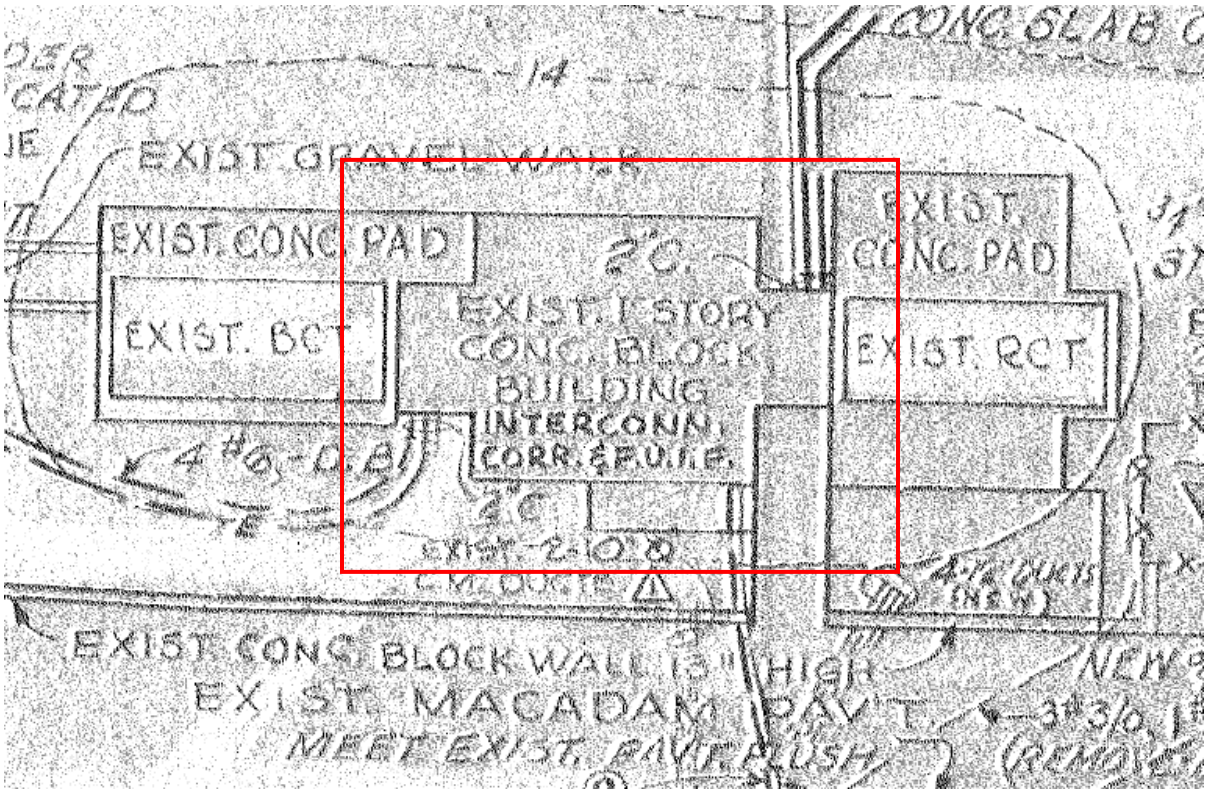


Figure 1.2-87: Detail of 1963 as-built drawing of Control Area #1. Interconnecting Corridor 409 is shown with east addition (though not to scale) and labeled "Interconn. Corr. & F.U.I.F." (GATE 8783)

The additions were constructed of concrete block with a low-slope roof supported by metal bar joists. In the east wall there was one door and window for the south room and one door and one louver for the north room. The door to the south FUIF room was a wood-framed wood stile-and-rail door with three horizontal wood panels at the lower portion of the door and a three-lite window above matching those found at Sentry Box 423 and the Warhead Building 450. Unlike those doors, the door to the FUIF room also had a single-lite fixed transom above. The window to the south of this door was a two-over-two lite double-hung window in a wood frame similar to those on the west side of the corridor building. The door to the north HVAC room was wood-framed and was likely a wood stile-and-rail door as is typical elsewhere on the site, but the configuration is not known as the existing door is a replacement. South of the HVAC room door, a vertical painted metal louver provided ventilation to the HVAC space. Two additional horizontal exhaust louvers were located at the north wall of the addition and were attached to ductwork at the interior.



Figure 1.2-88: Current view of Interconnecting Corridor 409 looking southwest. Building exterior appears much as it did when constructed after construction of the FUIF addition. Note continued presence of concrete block wall at edge of road at left.

The interior of the HVAC room was finished with exposed concrete block walls, exposed roof framing at the ceiling and a concrete slab floor. The interior of the FUIF room was finished with wallboard at the walls and ceilings and vinyl asbestos tile at the floor. Acoustical ceiling tile was installed over the ceiling wallboard in the FUIF room in Corridor 411, but it is not clear if it is original to the addition or a later modification. The partition between the two rooms was wood-framed and may have been lined with sheet metal as can be seen where wallboard has been damaged in Corridor 411. Supply and return air grilles penetrated this partition near the ceiling and the floor.

Generator Building 410 and 414 (by 1960)[50]

(For the sake of clarity of cardinal directions, the below description refers to Building 410. Building 414 was identical.) During this time period, an addition was built on the south ends of Generator Buildings 410 and 414. The exact date of the additions' construction is unclear so it is not clear if the extra generator housed in each addition was needed because of the introduction of the Hercules system, the construction of the FUIF addition to the Interconnecting Corridors, the installation of the experimental radar system, or some combination of these factors. The addition to each generator building was added to the south side and enclosed space for a fourth generator and a separate control room. Evidence for this addition can only be found at Generator Building 414. Generator Building 410 was heavily modified when Improved Hercules was introduced in 1962. Drawings for this renovation include demolition notes that seem to confirm that the addition to Generator Building 410 was originally configured in similar fashion to Generator Building 414's addition.

[50] As the earlier addition was identified as existing in 1962, it is likely that it was constructed at some time between the introduction of Hercules in 1958 and the introduction of Missile Master in 1960.

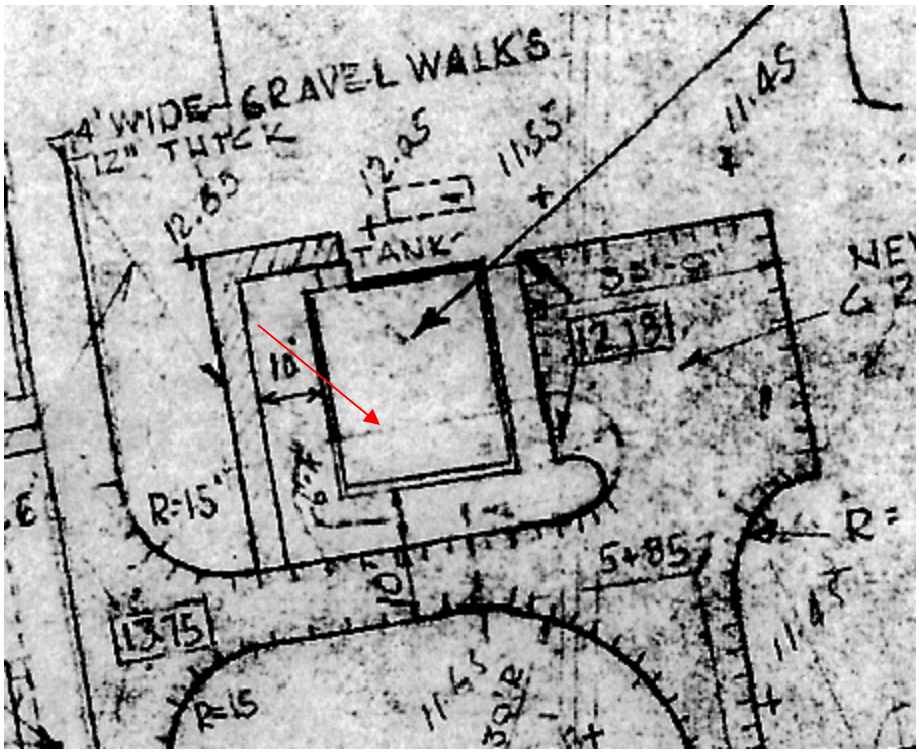


Figure 1.2-89: Detail of 1960 as-built drawing of Control Area #1. Generator Building 410 is shown and a ghost line appears to indicate size of the building before fourth generator addition. (GATE 11053)

The construction of the addition, which ran along the entire south side of the original generator building, consisted of concrete block walls with a low-slope built-up asphalt roof that tucked under the overhang of the original building. A pair of bi-fold doors that matched the doors of the original generator building were centered in the east wall of the addition. As discussed above, it is not clear if these doors were constructed to match the original doors or if all of the doors in the original generator building were replaced when the addition was built. It is most likely that the addition doors were originally located in the original south wall of the generator building, were salvaged and reinstalled in the addition. A pair of double-hung wood windows, matching and aligning with those on the north wall of the generator building, were installed at the addition's south wall. These windows were likely salvaged and reinstalled from the original south wall of the generator building as well. A horizontal wood louver was located near the level of the exterior grade below the window. Another matching pair of windows of the same character were centered in the west wall of the addition as well.

A generator was installed in the east room of the addition. The concrete floor has a trench that is similar to and connects with the trenches in the original building. There was also a ceiling vent in the wallboard ceiling similar to those serving the existing generators. The walls were finished with a noncombustible wallboard, likely similar to that installed at the original building. An opening in the east wall of the addition's generator room provides access to the main building. The opening's width and head height match and align with the windows at the main building's north wall. It is possible that there was a window in this location before the construction of the addition. When the addition was constructed, the window was converted to a door by removing the concrete block below the sill.

Removal of the wallboard at the jamb of the opening may reveal additional evidence of this. The window may have been salvaged and reinstalled in the addition. In the north wall of the addition's generator room a framed glazed vision panel provided a visual connection between the two rooms of the addition. The west room of the addition was the control room for the building. A new doorway in the north wall provided access to the room from the main building. The metal-framed door consisted of a heavy metal door with a vision panel in the upper portion. This door matches doors found in the control room addition of Generator Building 429 and in the Missile Assembly and Test Building. The interior of this room was finished with noncombustible wallboard at the walls and ceiling. Acoustical ceiling tiles were installed on wood furring over the ceiling wallboard, but given the wallboard above the tile is painted and the character of the tile itself, it was likely a later modification.



Figure 1.2-90: Current view of Generator Building 414 looking southwest. Seam in concrete block masonry and lower roof height indicate size of fourth generator and control room addition. Later bathroom addition is seen at left.

Tool Shed 455 (June 1960)[51]

A "Tool Storage Shed" is shown in most of the as-built drawings completed in 1960 as being located east of the gravel pavement area installed east of Generator Building 410 in Control Area #1 during this period. The Real Property Record Cards list the building's size as approximately six-foot-by-nine-foot. The building has been demolished and a surplus control van has been placed on its location so the presence of a remnant slab could not be determined. Aerial photographs from 1964 and 1966 show the structure as a small building with a flat or low-slope roof and a 1962 drawing calls it out as a one-story concrete block building.

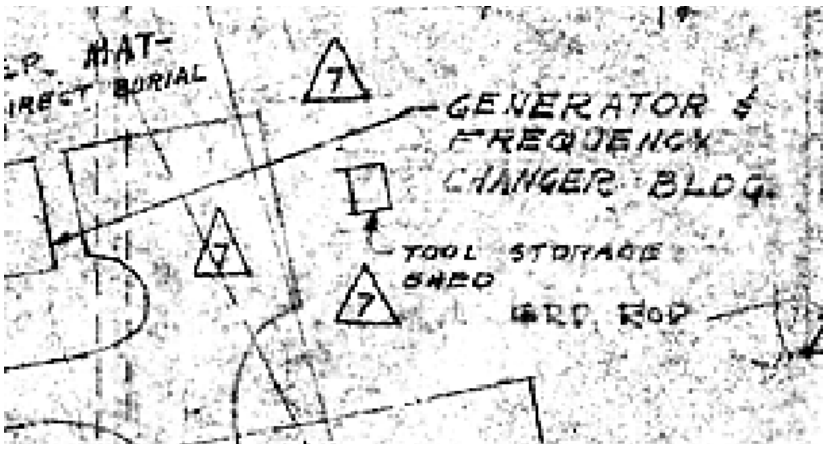


Figure 1.2-91: Detail of 1960 as-built electrical drawing shows Tool Shed 455 in Control Area #1. (GATE 11046)



Figure 1.2-92: Detail of c. 1964 aerial photograph of Radar Tracking Area. Tool Shed 455 is visible at center. (GATE 16185)

[51] Real Property Record Card, Structure 455, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.

1.2.5 1963 – Introduction of Improved Hercules

Radar Tracking Area



Figure 1.2-93: Radar Tracking Area configuration in 1963. John Milner Architects, 2016.

Site

The introduction of the Improved Hercules system in 1962 focused primarily on the radar equipment and systems used to track and acquire targets and guide the Hercules missiles. Replacement of existing antennae with more advanced equipment and the introduction of new radar antennae, including the large High-Power Acquisition Radar (HIPAR), increased the range and sensitivity of the radar system and allowed the battery to take better advantage of the increased speed and range of the Hercules missile. As a result, it was the Radar Tracking Area that underwent the most significant changes during this period.

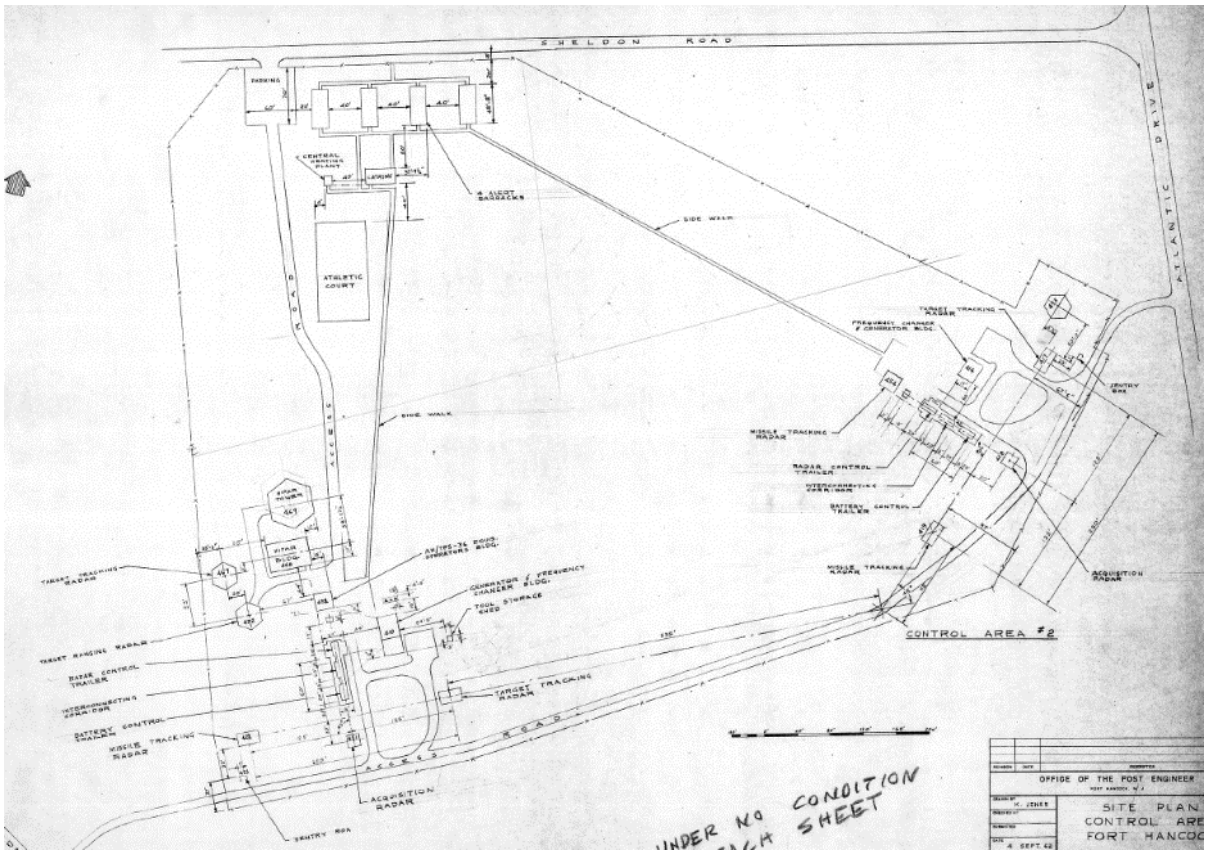


Figure 1.2-94: Detail of 1962 site plan showing changes resulting from Improved Hercules. (GATE 11057)

An early drawing in preparation for the Improved Hercules system, dated 1961, show the south road, macadam from the southwest gate to Control Area #1, remained a gravel road as it continued east from the control area. The road from Control Area #1 to the barracks area remained a dirt road. A 1962 drawing of Control Area #1 indicates that a portion of the concrete block wall and wood railing at the side of the south entry access road were to be relocated to accommodate an expansion of the LOPAR platform. A 1972 aerial photograph of the area, however, seems to indicate that this portion of the wall was simply removed. Macadam roads leading from the existing parking area east of Equipment & Operations Building 452 to Target Ranging Radar (TRR) 472, HIPAR Building 468, and HIPAR Tower 469 were installed as part of the Improved Hercules building campaign. Gravel walks to TRR 472, Target Tracking Radar (TRR) 467 and HIPAR Building 468 were also installed. While the road connecting Control Area #2 to the barracks area is not shown on any of the drawings from this period, a 1963 aerial shows it in place so it was likely constructed during the Improved Hercules building campaign.

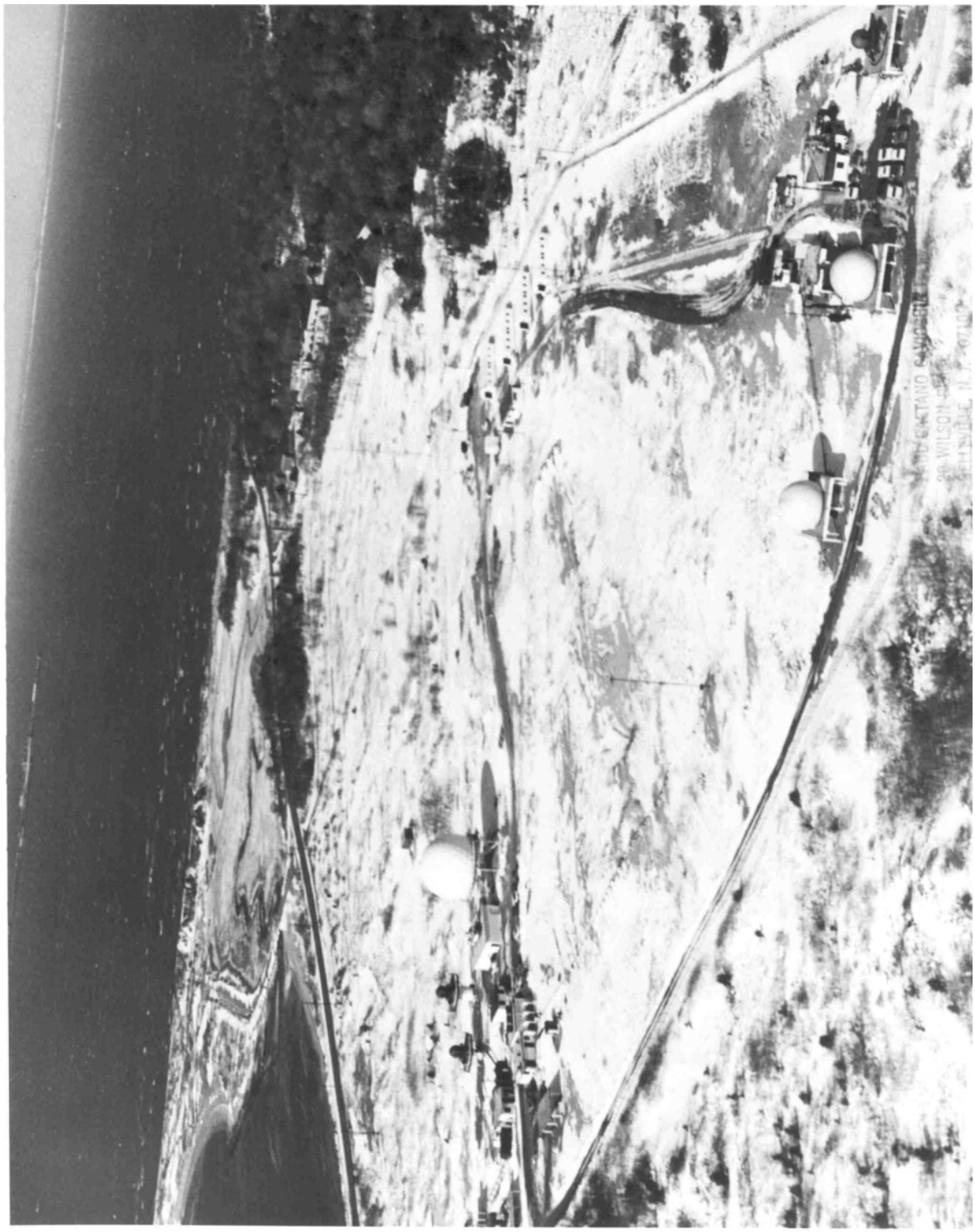


Figure 1.2-95: 1963 aerial photograph of the radar tracking area showing the site following the Improved Hercules construction campaign. (GATE 16185)

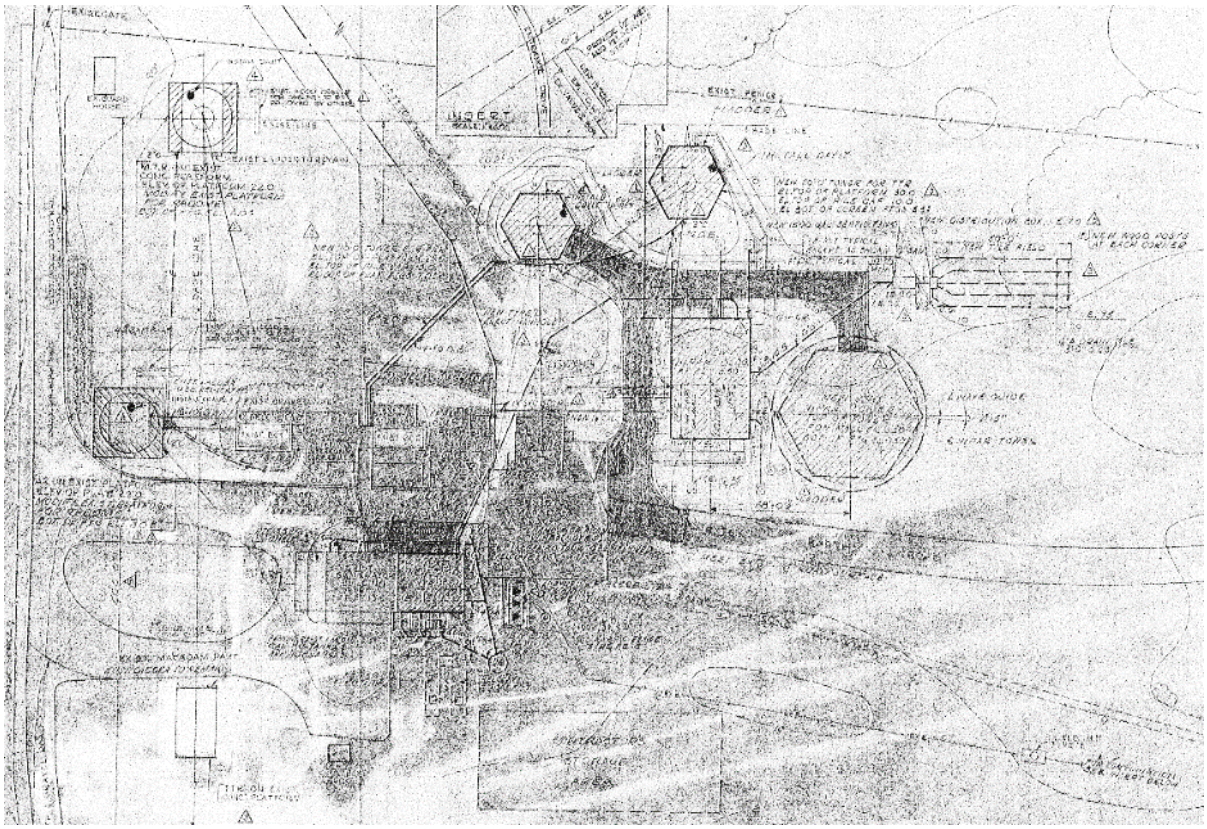


Figure 1.2-96: Detail of 1963 as-built site plan of Control Area #1 showing ultimate location of new Improved Hercules buildings. (GATE 8945)

The perimeter fence of the Radar Tracking Area was realigned to accommodate a new building introduced during the Improved Hercules campaign. The construction of a platform to hold the new Target Tracking Radar 473 at Control Area #2 required that the fence be reconfigured near the southeast gate. The new fence stepped out north, turned east and then returned south to the original fence line west of the east gate.

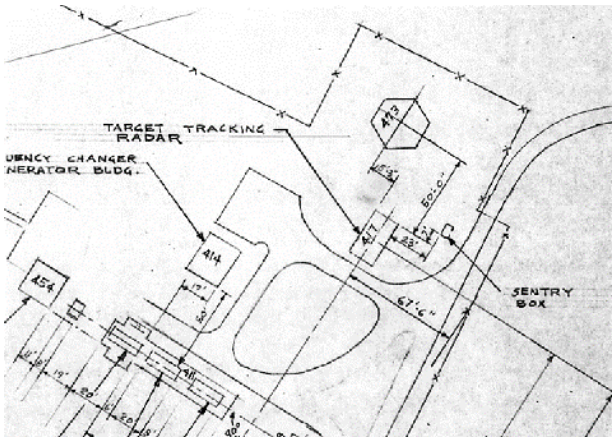


Figure 1.2-97: Detail of 1962 site plan showing fence change to accommodate new Target Tracking Radar Platform 473. (GATE 11057)

A series of infrastructure changes also accompanied the 1962 building campaign. Dry wells and a series of drains were installed around Generator Houses 410 and 414 to reduce the risk of flooding. A septic system was installed north of the HIPAR Building to serve what would serve as Control Area #1's only toilet room facility. Though not confirmed by drawings, a restroom addition may have been added to Generator House 414 at this time and an accompanying septic field in Control Area #2 may have been installed to serve this facility as well.

High-Power Acquisition Radar (HIPAR) Tower 469 (November 1962)[52]

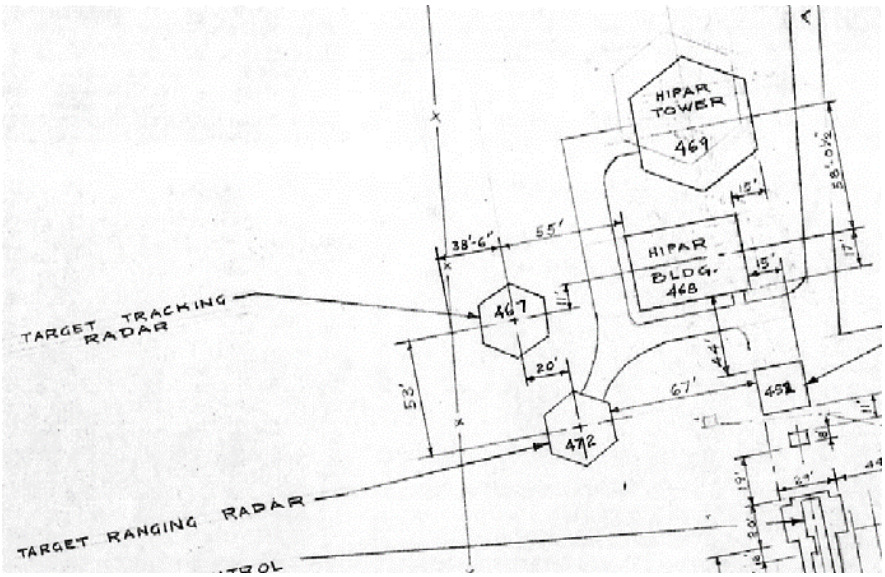


Figure 1.2-98: Detail of 1962 site plan the HIPAR Tower 469, HIPAR Building 468, Target Tracking Radar 467 and Target Ranging Radar 472. (GATE 11057)

The key component of the Improved Hercules system upgrade was the large high-powered acquisition radar installed to increase the range of target detection. The increased range of the Hercules missile outstripped that of the LOPAR installation that accompanied the Ajax and initial Hercules systems. This incongruity limited the opportunity provided by the Hercules missile to counter hostile targets further from the Defense Area. The radar consisted of a large antenna with waveguide, an antenna and radome (CONUS) platform, a trusswork tripod for the antenna, and a large fiberglass geodesic radome. HIPAR installations in some locations also received a highly-braced steel frame platform extension that supported the CONUS platform and tripod to provide a greater height for the HIPAR antenna, but Sandy Hook's flat, oceanfront location did not require this increased height. The HIPAR Tower was installed approximately 120 feet north of Equipment & Operations Building 452.

[52] Real Property Record Card, Structure 469, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.

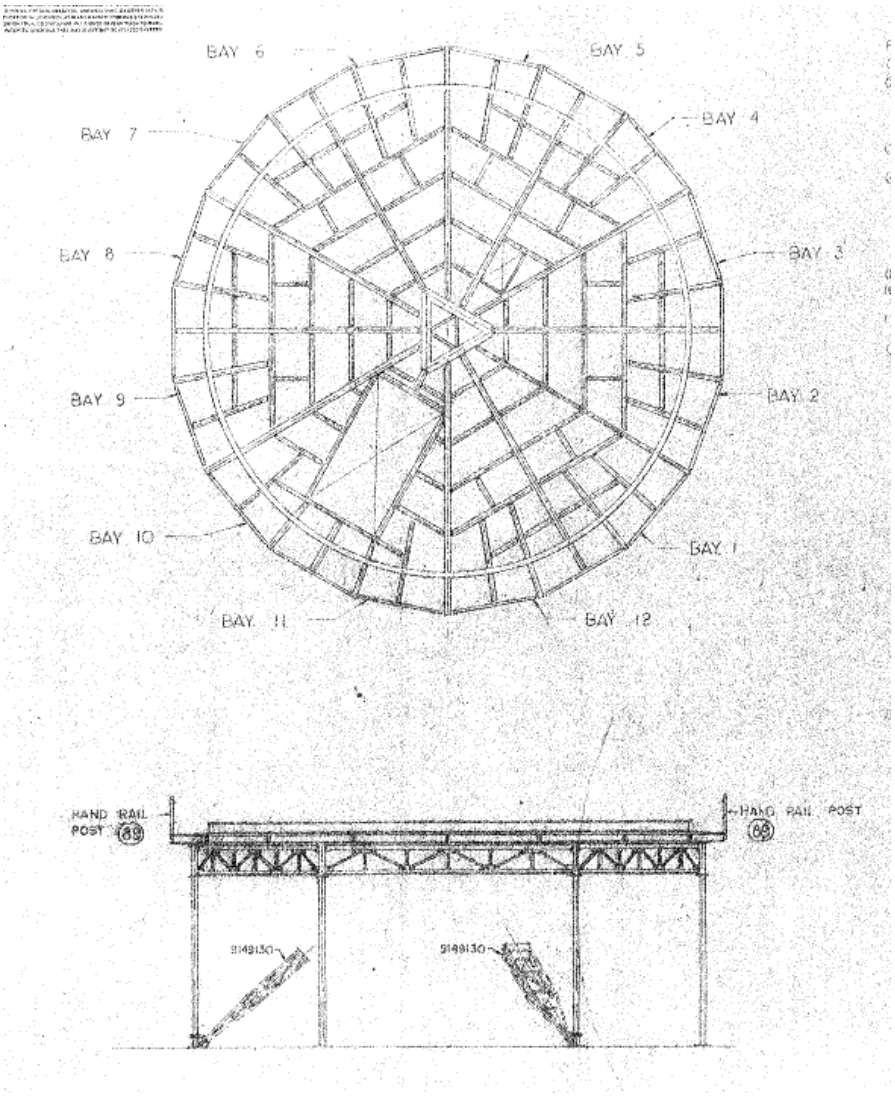


Figure 1.2-99: Detail of 1959 Bell Laboratories drawing of the HIPAR Tower and Platform. (GATE 8914)

The CONUS platform was constructed on a hexagonal concrete base which supported six 21-feet-high, six-inch diameter pipe columns cross-braced with tension rods. The concrete base also supported the trusswork tripod whose three legs stood immediately adjacent to three of the columns. These columns then supported a hexagonal truss constructed of steel angles. The platform itself was constructed of steel framing with steel plates laid over the structure. A pipe guardrail was installed along the platform perimeter. The approximately 30-foot-high fiberglass radome, consisting of over 350 pieces, was of a self-supporting geodesic design and rested on the platform as well.

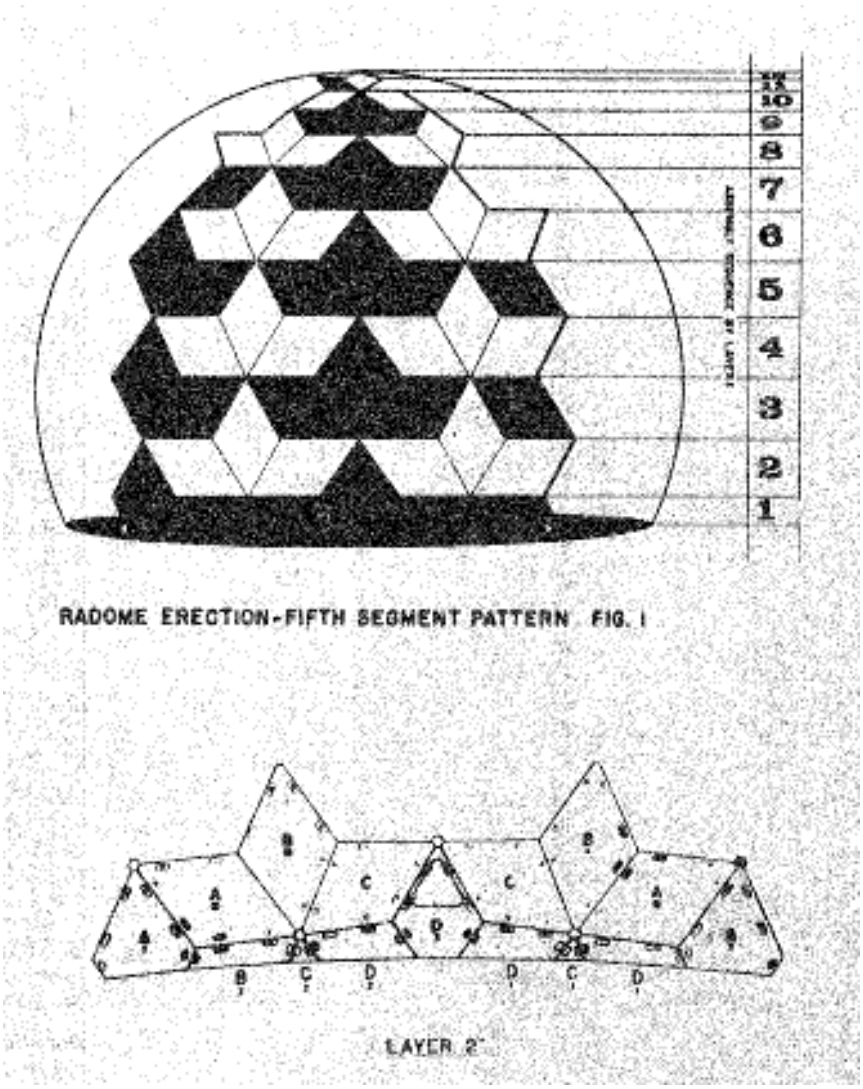


Figure 1.2-100: Detail of 1963 as-built drawing illustrating how to assemble the geodesic radome for the HIPAR Tower. (GATE 8920)

The size of the HIPAR Tower caused it to obstruct the sightlines between some of the other Control Area #1 radar antennae and the west Bore Sighting Mast. This mast was relocated to the east of the control area, not far from Control Area #2. A concrete foundation from the relocated mast is all that remains. Control Area #2 was able to continue to use the east Bore Sighting Mast in its original location.



Figure 1.2-101: Detail of c. 1964 aerial photograph of Radar Tracking Area. All of the new structures constructed at Control Area #1 for Improved Hercules can be seen. Note relocated Bore Sighting Mast. (GATE 16185)

HIPAR Building 468 (November 1962)[53]

Directly south of the HIPAR Tower, a building was constructed to house the computers and other equipment for the HIPAR system. HIPAR Building 468 also housed parts storage and repair work stations for the radar system. The building was constructed of concrete block with a low-slope built-up asphalt roof over an insulated corrugated metal roof deck supported by steel bar joists and beams. At the center of the roof, a concrete block penthouse with flat roof was constructed over the transmitter equipment inside the building. A pair of doors was located in the east wall near the northeast corner providing access to the spare parts area of the main space. The original drawings call for these to be flush wood doors with a large glazed panel in the upper portion. At the north side of the building, a steel waveguide support was constructed on the wall near the northeast corner. At the north side of the building near the west end, a pair of doors provided access to the HVAC room. Also at the north side of the building, an exhaust louver served the building's toilet room and a larger louver served the HVAC room. A pair of large doors was located at the west side of the building providing the primary equipment access to the main space. These doors appear to have been large flush metal doors with no panels of any kind. Concrete block walls with a concrete slab roof extended west from the building providing wind protection for the door opening. North of this opening, the cooling tower for the HVAC room sat on a concrete slab with the piped connections penetrating the west wall of the building. A pair of doors was located in the south wall near the southeast corner and also provided access to the main space. These doors were of similar construction to the northeast doors. West of the south doors, a heat exchanger was mounted on a concrete pad with associated connections penetrating the building's south wall.

[53] Real Property Record Card, Structure 468, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.

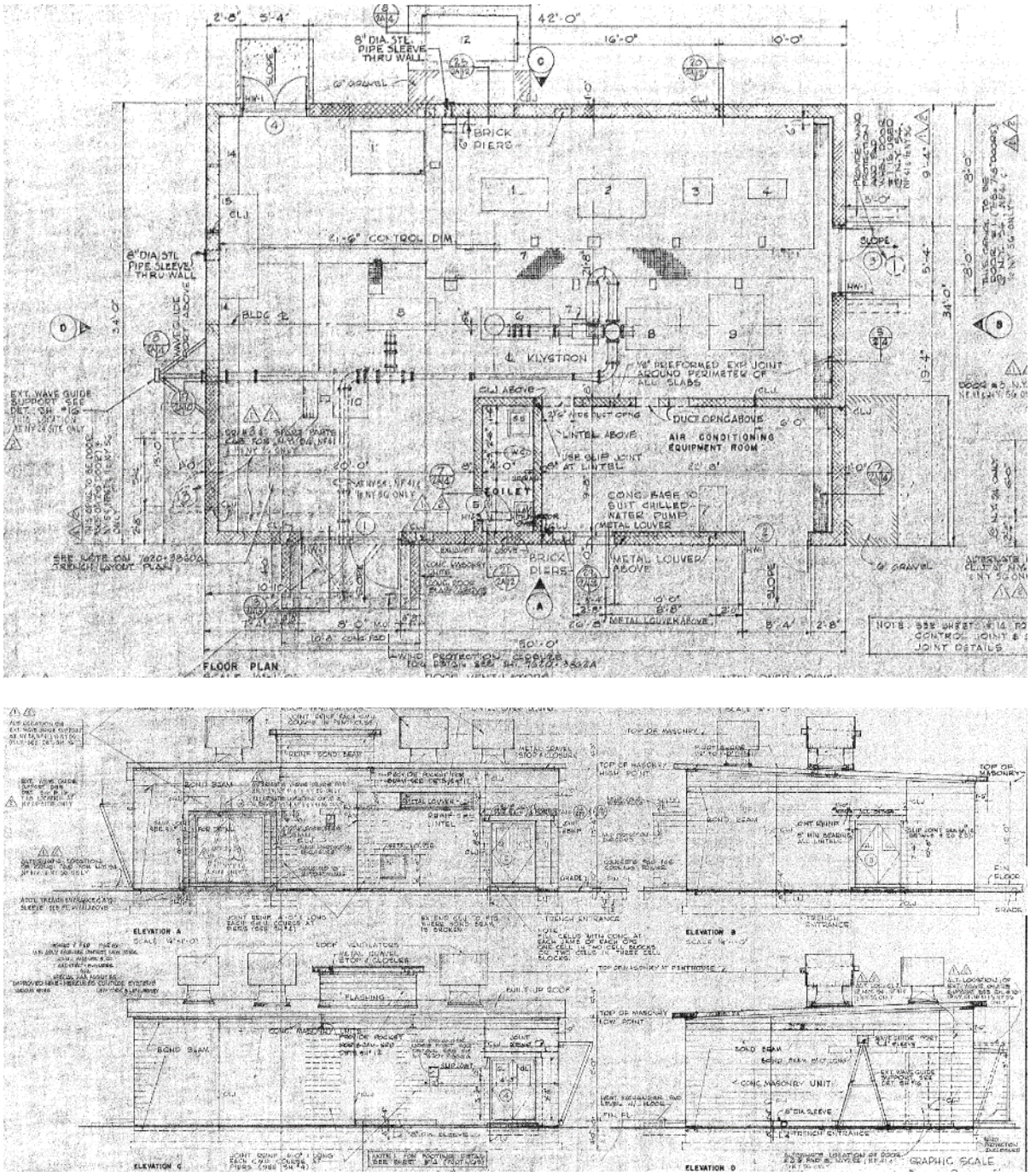


Figure 1.2-102: Detail of 1963 as-built drawing showing plan and elevations of the HIPAR Building 468 (GATE 8900)

The original drawings for this building were used to construct HIPAR buildings at several different sites including NY-24 at Farmingdale, NY-54 at Holmdel, and NF-41 at Grand Island (in the Niagara Falls Defense Area) as well as NY-56. These drawings call for different layouts dependent on the site. The location of the waveguide support and the east and west doors were to be in different locations at NY-24 which appears to have been the basis of design. (There is no reference to cardinal directions

on the drawings. Those mentioned here are in relation to the NY-56 HIPAR Building.) The layout for the other sites, including NY-56, are shown as dashed in suggesting it may have been a later modification to the plan. This corresponds to a preliminary Control Area #1 Improved Hercules site plan which shows the HIPAR Building rotated 90 degrees. At some point during design, it was decided to rotate the building and the drawings were noted to switch the locations at NY-56 (as well as at NY-54 and NF-41).

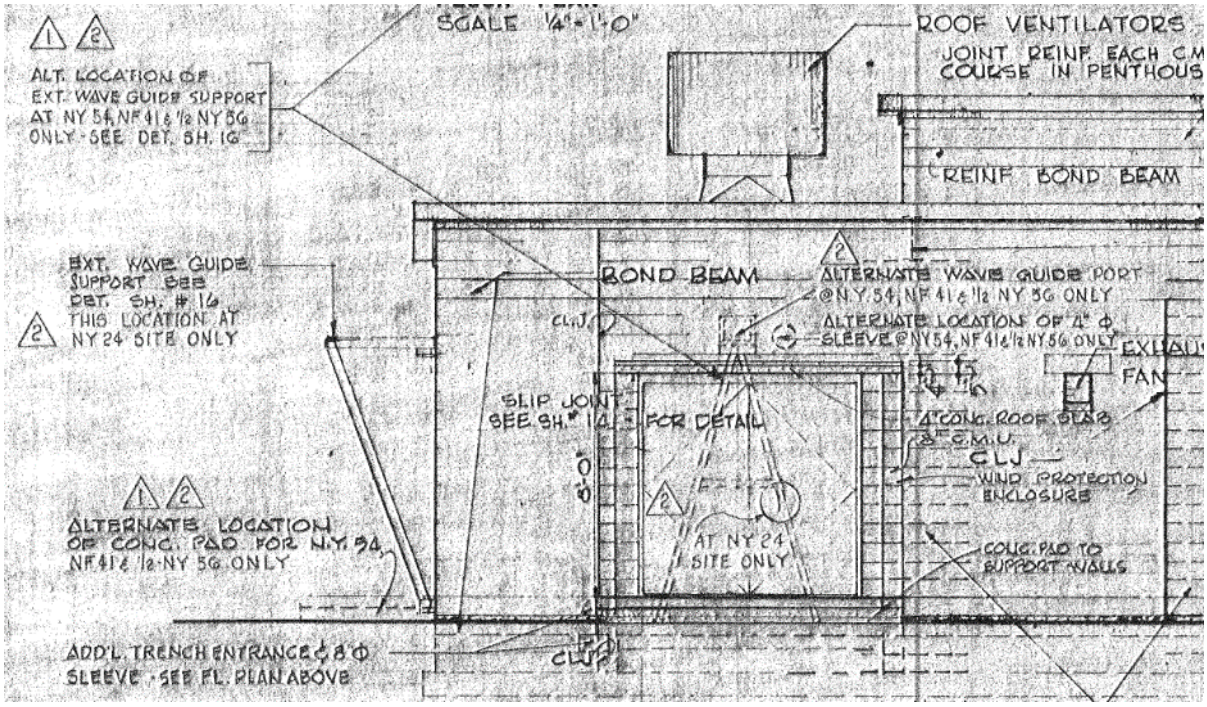


Figure 1.2-103: Detail of 1963 as-built drawing showing configuration of the HIPAR Building elevation for different NIKE sites (GATE 8900)

The interior of the building mostly consisted of a large space that held the equipment for the HIPAR system. The exterior walls were finished with cement wallboard on wood furring while the interior walls and ceiling were exposed concrete block and roof structure respectively. Large supply and return air ducts penetrated the north wall shared with the HVAC Room. A spare parts cabinet and a work station were located at the east wall of the space. A series of trenches in the concrete floor provided raceways for the various cables and other connection lines and were covered with steel plates. These also led out of the building to connect with Generator Building 410. Accessed from the spare parts area of the main space, a small toilet room contained a utility sink, lavatory and toilet. The toilet room is finished in similar fashion to the other rooms in the building with the exception of vinyl tile (likely containing asbestos) at the floor. This toilet room served as the only toilet room for Control Area #1. It is not clear that the area had a latrine other than the one in the barracks area prior to the construction of the HIPAR Building. The interior of the HVAC room in the northwest corner of the building was finished in similar fashion to the main space with exposed roof structure at the ceiling, exposed concrete block at the interior walls and wallboard on furring at the exterior walls.



Figure 1.2-104: Current view of HIPAR Building 469 looking southwest (top) and east (bottom). Building exterior appears much as it did when constructed. Note presence of external wave guide in top photograph.

Generator Building 410 (by July 1963)[54]

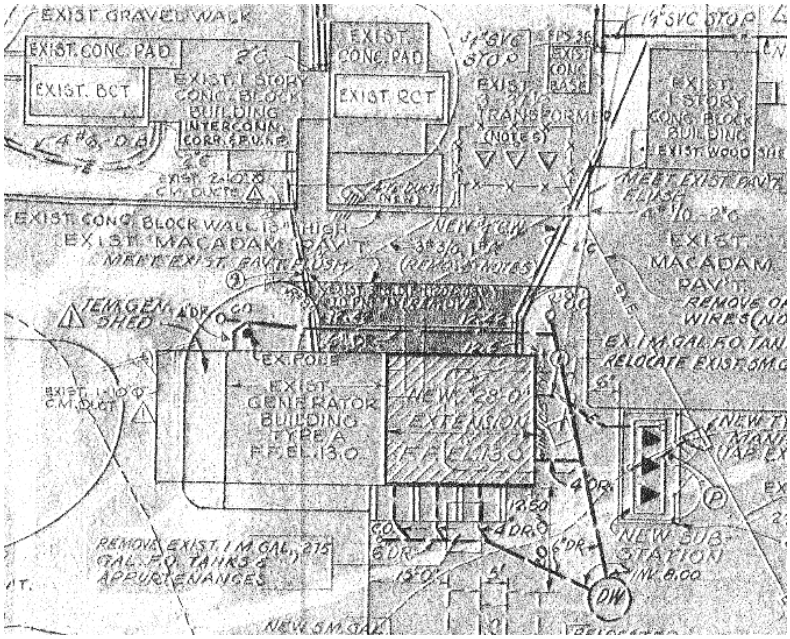


Figure 1.2-105: Detail of 1963 as-built site plan of Control Area #1 showing addition to Generator Building 410. (GATE 8945)

Because of the tremendous power requirements of the HIPAR equipment, extensive renovations to Generator Building 410 were completed to facilitate new, larger generators. Three generators were placed in the building, with one serving as reserve in case another went down.[55] The only elements of the original generator building and its earlier c. 1958 addition that remained were the west, south and east walls and the exterior doors and windows of the addition. These windows and doors all now served the new control room of the building. The original three pairs of doors at the east wall were filled in with concrete block and a new door and louver installed. The drawings for the renovation call for a wood-framed flush wood door with vision panel at the upper portion of the door, similar to those indicated in the HIPAR Building 468 drawings. The door provided access to a sound lock space. The adjacent louver served the main generator room. At the west side of the building, a portion of the original wall was removed and a new pair of doors and an adjacent louver were installed. The drawings call for a pair of wood-framed solid flush wood doors and a louver similar to the new one on the east wall. Both the louver and doors served the main generator room. Most of the original north wall of the building, including its doors and windows, was removed and a new 28-foot-long addition added to the building. Portions of the original wall were left near the east and west walls and a composite steel beam was added to carry the load of the remainder of the wall. Additional concrete block walls currently located beneath both ends of the steel beam appear to be a later modification. The addition was constructed of concrete block with a low-slope built-up asphalt roof on insulation and corrugated metal deck except at the south wall where it extended up past the original generator

[54] The as-built modification drawings for the Generator Building are dated July 1963.

[55] In a story that may be apocryphal, the generators were so powerful that during the Northeast Blackout of 1965, the generators were used to power basic services for all of Fort Hancock. Interview with Robert F. Bohlander, at NY-56 Radar Tracking Area, May 27, 2015.

building's roof. This portion of the wall was constructed of cement asbestos board on metal studs. The west wall of the addition held three sets of flush wood double-doors in wood frames. Over each pair of doors, a fixed metal louver of the same width with insect screen was installed. A metal window was centered in the north wall of the addition. The top two-lite sash was fixed in place. The middle four-lite sash operated as an out-swinging awning window while the bottom two-lite sash operated as an in-swinging hopper window. Against the east wall of the addition, four partial-height wing walls constructed of concrete block were built. The walls served two purposes. They formed bays with concrete slab floors in which radiators for the three generators were installed. The walls also supported large vertical exhaust silencers for the diesel engines that powered the generators. The roof ventilators for the original building and its earlier addition were left in place while three new large ventilators were installed at the roof of the new addition.

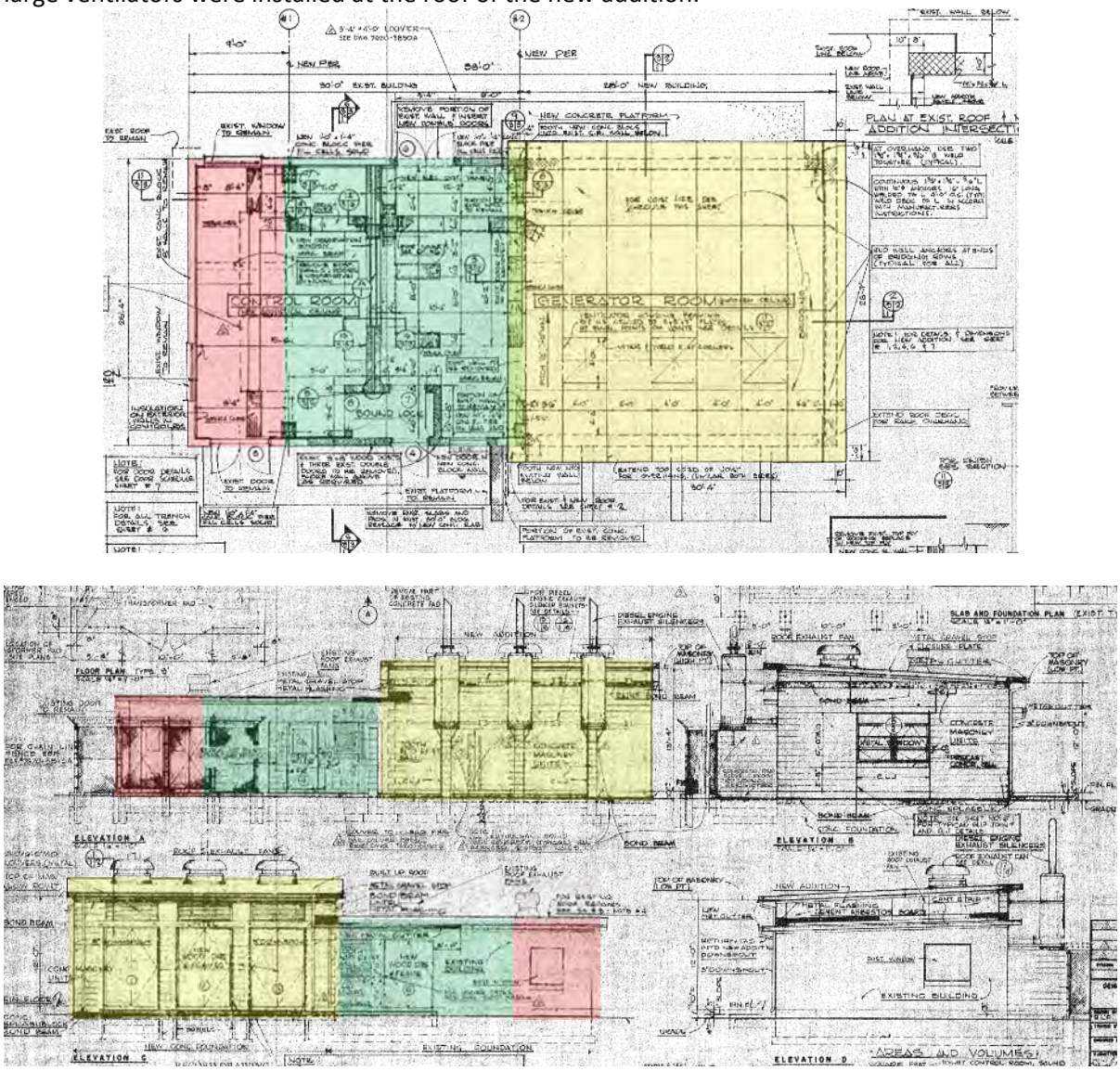


Figure 1.2-106: Details of 1962 plan and elevation drawings of addition to Generator Building 410. Green area is the original 1955 structure, red indicates the c. 1958 addition, and yellow the 1962 improved Hercules addition. (GATE 8891 and 8890)

At the interior of the building, the south wall of the original generator building and the wall that separated the earlier control room addition from the fourth generator room were removed. New concrete block piers and a steel beam were installed to carry the load of the remainder of the original west wall. A concrete block sound lock room was constructed at the east wall and a double- wall of concrete block extended from the sound lock to the west wall creating a control room to the south and a generator room to the north. The doors to the sound lock are shown as solid doors in the drawings, but the material is not clear. The existing doors are solid metal doors and the character of the hardware suggests that they are original. An observation window, double-paned for sound-deadening purposes, was located in the wall separating the control room from the generator room. Similar to the HIPAR Building, the interior of the control room had exposed concrete block interior walls and gypsum wallboard on wood furring at the exterior walls. The entire original concrete slab floor in the building was removed as part of the renovation and new concrete slab floors poured. In both the control and generator rooms, trenches in the floor with steel plate covers allowed connections between the generators, the frequency exchangers and the other buildings in the control area. The ceiling of the control room was finished with acoustical ceiling tile installed over gypsum wallboard attached to new wood ceiling framing. A workbench and open shelving were installed against the north wall of the control room under the observation window. The generator room walls were exposed concrete with exposed roof framing at the ceiling. Three large generators aligned with the double doors in the west wall were located in the generator room. Two frequency exchangers were located south of the generators near the observation window. A wood workbench was located at the east wall below the louver adjacent to the sound lock.



Figure 1.2-107: Current view of Generator Building 410 looking southeast. Except for doors, building exterior appears much as it did when constructed.



Figure 1.2-108: Current view of Generator Building 410 looking west. Note basic forms of original generator building (center) and earlier addition (left) are still discernible.

Transformer Pad (by July 1963)[56]

The enlargement of Generator Building 410 required the installation of a new transformer substation north of the building in addition to the existing transformer pad near the Radar Control Van. Similar to the previous transformer pads, the new one consisted of a concrete pad with a chain link fence enclosing the space. A pair of chain link fence gates were centered on the north side of the pen.



Figure 1.2-109: Current view of Transformer Pad at Generator Building 410 looking north.

[56] The Transformer Pad is shown on an as-built Radar Tracking Area site plan and fencing construction drawing dated July 1963.

Generator Building 414 (by 1964)[57]

With the construction of a toilet room for Control Area #1 constructed with HIPAR Building 468, it may have been during this period that a toilet room addition was constructed at Generator Building 414. While the addition is not indicated on any of the 1960 or 1963 as-built drawings, aerial photographs of the area in 1963 show the addition on the south side of the building at that time. A seam in the concrete block of the generator house's west wall and the character of the plumbing further confirms it was added after the earlier addition. The addition is constructed of concrete block with a low-slope built-up asphalt roof that aligns with the roof of the earlier addition. The southeast wall of the addition has single wood two-over-two-lite double-hung window similar to others found on the site. A single wood-framed wood stile-and-rail door was centered on the southwest wall. The deterioration of the door is severe enough to make the panel configuration of the door unclear.



Figure 1.2-110: Current view of Generator Building 414 looking northwest. Left portion of the elevation is the restroom addition.

The interior of the room is finished in similar fashion as the other buildings built in this campaign with the interior concrete block wall (formerly the exterior wall of the generator building) exposed and the three exterior walls finished with gypsum wallboard on wood furring. A wood base and wood chair rail are also present at the exterior walls. The floor and ceiling are exposed concrete and roof structure respectively. A lavatory, urinal and toilet are all located against the northwest wall of the addition with a metal privacy partition between the lavatory and urinal and a metal stall separating the toilet. Northeast of the toilet, much of the sanitary piping is exposed and raised above the floor. A small shelf and mirror were mounted on the wall over the lavatory and additional wood shelving was located on the southwest wall.

[57] Aerial photograph of the Radar Tracking Area, c. 1963, GATE 16815 (Figure 1.2-95).

Equipment & Operations Buildings 452 and 454

Along with the installation of HIPAR at Control Area #1, Control Area #2 received an AN/FPS-75 Alternate Battery Acquisition Radar (ABAR). While most Hercules sites received one system or the other, NY-56 was a rare site that acquired both. Equipment & Operations Building 454 was used to house the equipment for the ABAR system likely replacing the AN/FPS-36 equipment. It is not clear if the experimental AN/FPS-36 radar system had been removed well before the ABAR installation or if it was replaced by it. With the introduction of the ABAR system, additional power may have been required at Control Area #2. A 1972 aerial photograph of the Radar site shows a piece of equipment adjacent to the northwest side of Building 454. An abandoned generator currently stands in this location and stencils on the equipment suggest it was last serviced in 1974. It is possible that this was introduced with the ABAR system in 1962. Drawings of the site in 1960 do not show a generator in this location and unfortunately this area is not visible in an aerial photograph from 1966. On a 1962 site plan of Control Area #2, Equipment & Operations Building 452 is simply labeled an existing one-story concrete block building, but the adjacent Pedestal Radar Tower 451 is still labeled as "FPS-36 Exist. Conc. Base." The presence of an ABAR predecessor and the HIPAR would have been redundant and the equipment was likely removed. It may have been at this time that the alert barracks were no longer used as any type of housing and 452 was re-purposed as a "Ready Room" for the soldiers of Control Area #1. Many NIKE sites had buildings built specifically for this purpose while other re-used existing buildings. The building would likely have been outfitted with several bunks, seating and possibly a television. This would save the men from traversing back and forth from the barracks area when on alert. The 1962 site plan also shows a small wood shed addition to the south side of 452. The ABAR equipment may have eventually been relocated to a control van to allow Equipment & Operations Building 454 to become a ready room.



Figure 1.2-111: Details of c. 1972 aerial photograph of the Radar Tracking Area. Left photo shows Pedestal Radar Antenna 451 as empty. Right photo shows the ABAR antenna mounted on Pedestal Radar Antenna 453 and a piece of equipment adjacent to Equipment and Operations Building 454. (GATE 20818)



Figure 1.2-112: Current view of generator adjacent to Equipment and Operations Building 454 looking southeast.

Pedestal Radar Tower 451 and 453

When ABAR, an AN/FPS-75 at this site, was introduced at Control Area #2, the ABAR antenna was installed on Pedestal Radar Tower 453. It can be seen in aerial photographs in 1964 and snapshots take in the late 1960s.

With HIPAR making the AN/FPS-36 obsolete at Control Area #1, the antenna may have been removed at this time. Aerial photographs from 1964 and 1966, though blurry, do not appear to show an antennae in place.



Figure 1.2-113: C. 1970 photograph of Control Area #2. While Pedestal Radar Tower 452 is obscured by a supplemental control van, the ABAR antenna mounted on the pedestal is visible. The control van may have received ABAR equipment to allow Equipment & Operations Building 454 to become a Ready Room. (GATE 20160)

Target Tracking Radar 467 and 473, Target Ranging Radar 472 (November 1962)[58]

As part of the Improved Hercules upgrades, improvements were made to the Target Tracking Radars (TTRs) and Missile Tracking Radars (MTRs). Target Ranging Radars (TRRs) were also introduced to counteract efforts by targets to "jam" frequencies and avoid radar detection. Early plans for Improved Hercules called for the addition of new radar platforms east of the existing TTR platforms. The new platforms would hold the new TTR antenna and the existing TTR platform would hold the new TRR antenna. This is how Control Area #2 would ultimately be constructed. At Control Area #1 it is possible that the relocation of the west Bore Sighting Mast (because of the HIPAR radome obstruction) may have required the relocation of the TTR and TRR for collimation purposes. The existing TTR platform would be abandoned and new towers constructed west of the HIPAR Building for the TTR and TRR.[59]

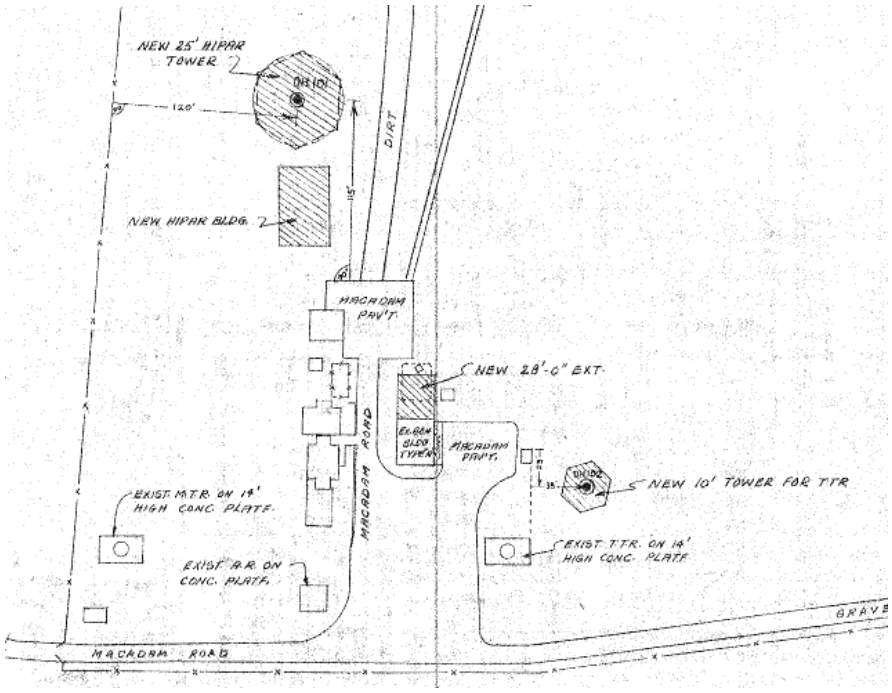


Figure 1.2-114: Detail of 1961 preliminary site plan of Control Area #1 reflecting Improved Hercules before revisions. Note that relationship of the TTR hexagonal tower to original platforms matches eventual radar layout for Control Area #2. (GATE 11057)

[58] Real Property Record Card, Structures 472 & 473, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.

[59] In the 1962 site plan of Control Area #1, a single revision to the drawing (Delta 3) called for relocating the HIPAR Building and Tower, relocating the new ten-foot tower, adding the twenty-foot tower, deleting the modification of the existing TTR platform and relocation of the Bore Sighting Mast.

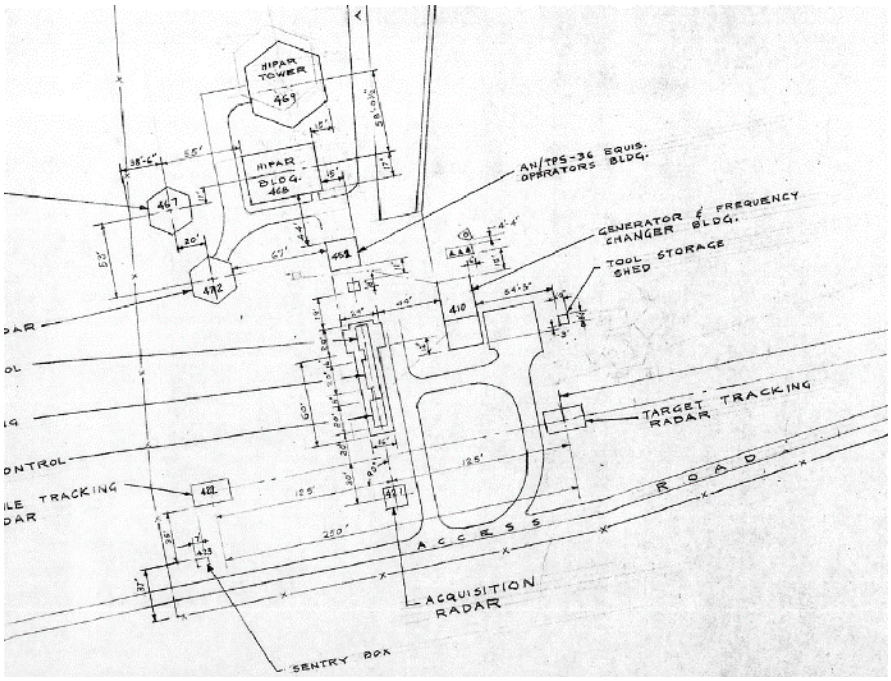


Figure 1.2-115: Detail of 1962 site plan of Control Area #1 reflecting Improved Hercules. (GATE 22455)

The hexagonal platforms for the new radars were constructed of two separate pieces. A hollow concrete shaft topped with three equipment mounting pads laid out in a triangular pattern stood on a hexagonal concrete foundation pad. The three equipment mounting pads supported the radars themselves which were equipped with a mounting tripod. The second piece was a self-supporting platform to support the radome and allow maintenance. The separate pieces of the platform were structurally independent and prevented the larger steel platforms, which were more vulnerable to wind loads, from affecting the concrete shafts and, in turn, the function of the radar antenna.

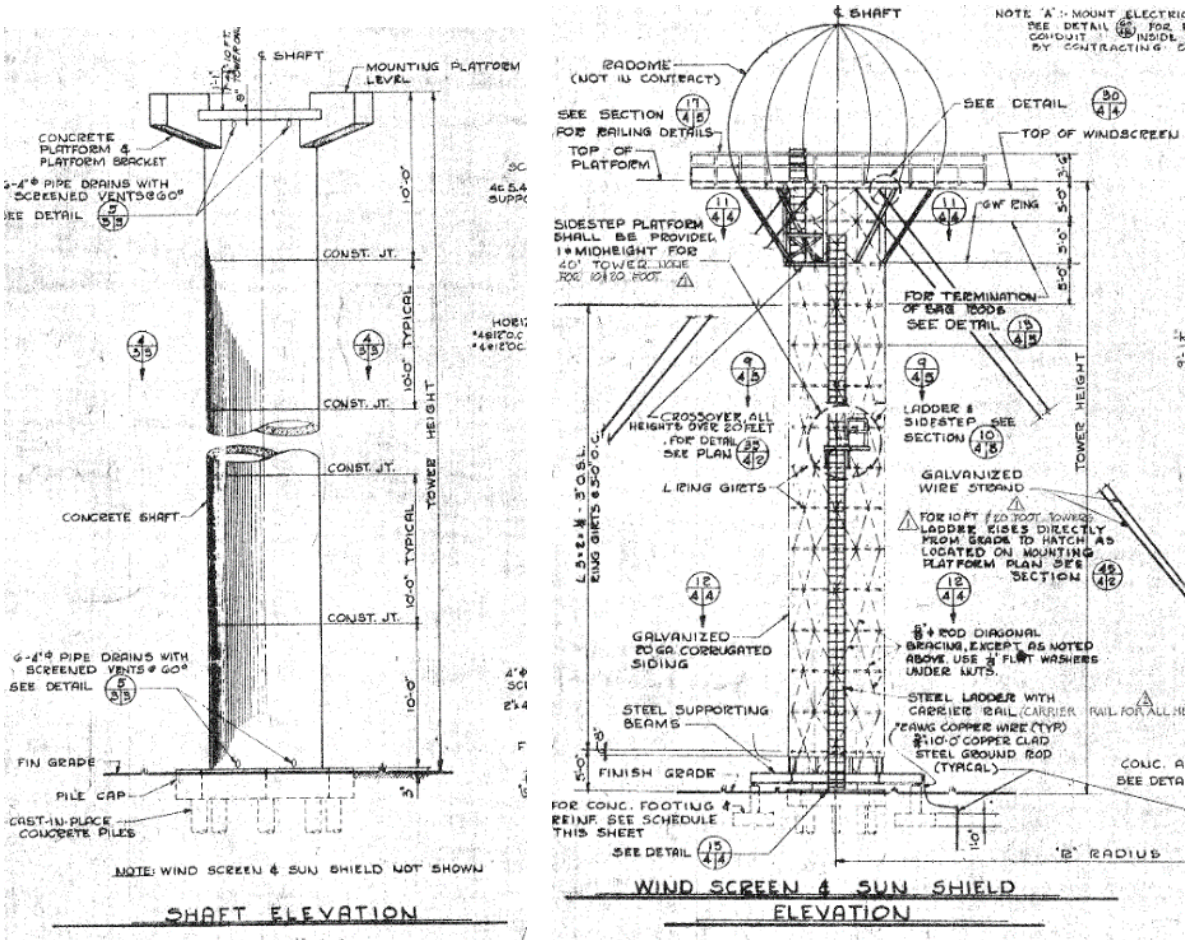


Figure 1.2-116: Details of 1963 as-built drawings for hexagonal radar towers. These drawings were intended to be used at several NIKE sites using a ten-foot module for the tower's height. Shaft elevation is typical at all hexagonal towers. Wind Screen & Sun Shield elevation is representative of Target Tracking Radar 467. (GATE 8877 and 8878)

The concrete shafts for all three radar platforms are essentially the same with the only difference being height. TTR 467 is 20 feet tall while TTR 473 and TRR 472 are ten feet tall. The difference between the platforms was more profound due to the difference in height. The platforms for TTR 473 and TRR 472 were the same. Six I-beam columns were bolted to concrete footings and supported the hexagonal structural steel framework of the platform. Crossed steel angles provided lateral bracing of the columns. The platform itself was constructed of poured concrete on corrugated steel deck. A steel ladder anchored to a concrete footing led up to a hatch in the platform with an operable steel grate cover. A pipe guardrail was installed around the perimeter of the platform. A steel ring ran within the perimeter of the hexagonal platform and provided the mounting system for the radome. A circular penetration within this ring allowed a blower to keep the radome inflated once installed. The concrete of the platform was held five inches clear of the concrete equipment mounting pads to retain structural independence. The platform for TTR 567 was identical except for how it was supported. A structural steel framework clad in corrugated metal surrounded the concrete shaft, and was supported on a structural steel base bolted to concrete footings. The frame extended up to the underside of the platform framing and was supplemented by diagonal structural steel angle braces. The ladder, anchored to a concrete footing extended up to the platform and was enclosed by another

framework of structural steel and corrugated metal. The original drawings indicate that the corrugated metal cladding at the central framework served as a windscreen, protecting the concrete shaft from wind loads. Tension rods running from the platform to concrete anchorages in the ground provided additional lateral bracing. Cranes were installed at the platforms to facilitate the installation and removal of equipment.





Figure 1.2-117: Current view of TRR 472 looking south (top) and of TTR 467 looking south. Buildings appear much as they did when constructed in 1962.

Radar Platforms 417-422 (by July 1963)[60]

Except for Radar Platform 420, which was abandoned after the relocation of the TTR, all of the original radar platforms were enlarged to allow the platforms to accommodate new radomes as part of the Improved Hercules building campaign. Radomes, large balloon-like domes of treated nylon inflated with air, were developed by the U.S. Air Force in the 1950s to protect radar antennae from poor weather conditions. Radar Platforms 417, 419 and 422, originally 22 feet by 34 feet in size, were enlarged on two sides by six feet resulting in a 34-foot-by-34-foot platform. Radar Platforms 418 and 421, originally 22 feet by 22 feet in size, were enlarged by six feet on all sides, also resulting in a 34-foot-by-34-foot platform.

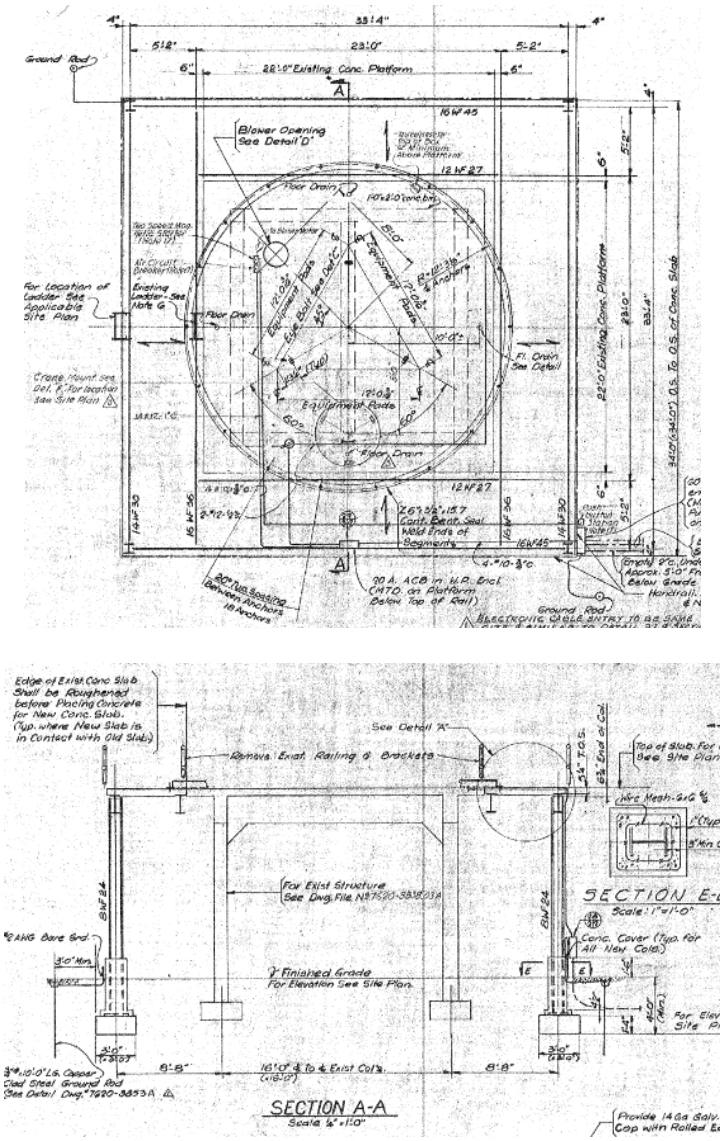


Figure 1.2-118: Details of 1963 as-built drawings for expanding original TAR platforms. (GATE 8881)

[60] Modified Radar Platforms are shown in as-built construction drawings dated July 1963.

The extensions to the platforms were constructed using I-beam posts anchored on concrete footings. The posts supported a structural steel framework topped by a cast-in-place concrete slab. The railings of the original platforms were removed and new pipe guardrails installed at the platform perimeter. At Radar Platforms 418 and 421, the original ladders were removed and new ladders installed at the new platform perimeter. Steel rings similar to those at the new radar platforms were installed on the platform to anchor the radomes. Holes were cut into the original platform to accommodate blowers for inflating the radomes. Davits were also added to the older platforms as they were at the new platforms. Despite the enlargement of all of the radar platforms being completed simultaneously, all of the antenna did not receive the radomes at the same time. A photograph taken c. 1963 shows only Radar Platforms 418 and 419 as having inflated radomes. Though difficult to tell due to the quality of the photograph, Radar Platforms 417 and 421 may have radomes as well, only not inflated at the time of this photograph.



Figure 1.2-119: Detail of c. 1963 photograph showing inflated radomes at Radar Platforms 418 and 419. Radar Platform 417 may be fitted with radome as well, deflated at the time of this photograph. (GATE 16185)





Figure 1.2-120: Current view of TAR 421 looking southwest (top) and of MTR 422 looking north (bottom). Buildings appear much as they did when expanded in 1962.

1.2.6 1967 – All Major Buildings Complete / Missile Mentor

Missile Launch Area

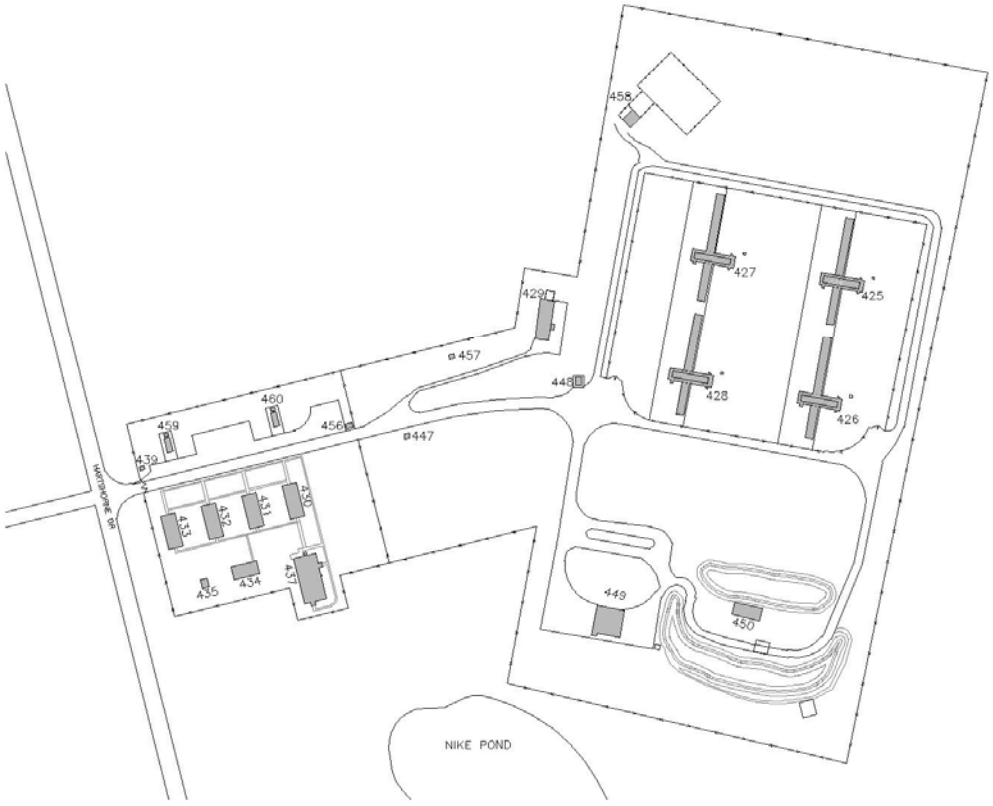


Figure 1.2-121: Missile Launch Area configuration in 1967. John Milner Architects, 2016.

Site

As the Radar Tracking Area was undergoing significant changes in the early 1960s with the implementation of the Improved Hercules system, the changes to the Missile Launch Area were comparatively minor. The only significant changes to the site are related to the construction of the last major building at the Missile Launch Area, Ready Building 437 in 1964.

To facilitate the construction of Ready Building 437 in the administrative barracks area of the Launch Area, the perimeter fence was at the south side of the barracks was reconfigured to accommodate the ready building's relatively large size. In addition, the system of gravel pavement walks that served the barracks and latrine were extended to serve the north, east and south sides of the ready building. The extension of walks connected the ready building with the south sides of the barracks as well as directly with the main access road.

Ready Building 437 (by December 1964)[61]

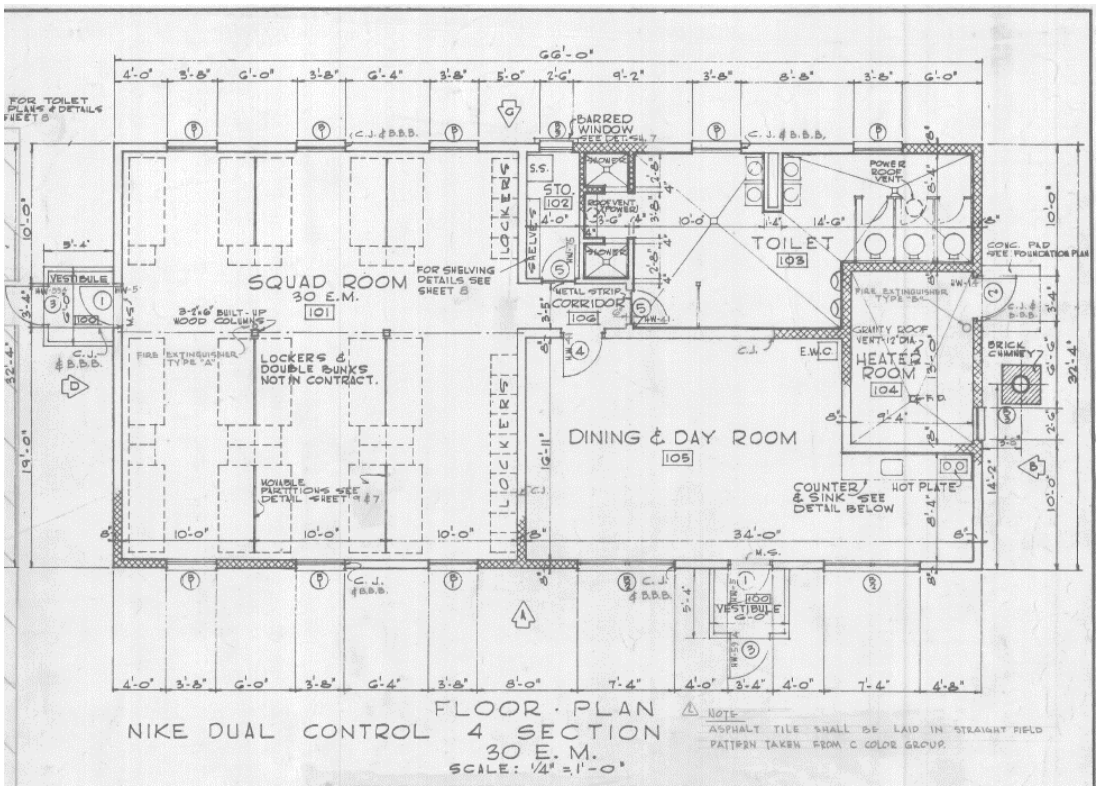


Figure 1.2-122: Floor plan of ready building as shown in 1964 "as-built" drawing. Many of the functions of the Alert Barracks were relocated to this building. (GATE 7620-4778)

Ready Building 437 was constructed in 1964 east of the Missile Launch Area latrine and south of Barracks 430. The functions of the building as outlined in the floor plan drawing suggests that this building was largely intended to serve a similar purpose as the adjacent barrack buildings. This building likely replaced use of the alert barracks as a place for soldiers to sleep during alert status.

The concrete block building had a low-slope built-up asphalt roof with wood fascia boards and soffits and also metal edge flashing at the roof perimeter. Entry doors to the major spaces were located at the south and east facades enclosed by vestibules constructed of wood framing and cement asbestos board sheathing. While the original drawings call for exterior doors on the vestibules, they have since been removed so there is uncertainty regarding their appearance. Hinges for the doors remain and as there appear to have only been two hinges per door, they were likely lightweight. It is possible that they were screen doors. There is a screen door still in place at Latrine 434 that may have been similar to those at Building 437. The main entry doors to the building were likely wood paneled doors similar to the wood door in the north façade that led to the Heater Room. The door was of stile-and-rail construction with nine glazed lites in the upper portion and a panel in the lower portion. The panel configuration is unclear and may have been louvered. A one-over-one two-lite window was located in the upper portion of each door and was fitted with wire security glass. Most of the windows were

[61] Construction drawing of the Ready Building has an "as-built" revision date of December 15, 1964. Drawing File No. 7620-4778.

located at the east and west facades of the building. All of the windows consisted of metal two-over-two double-hung windows. The building's Squad Room had three windows each at the east and west facades. The Dining and Day Room had four windows in the east façade consisting of two pairs ganged together with mullions. The Toilet had two windows at the west façade while the Storage had a similar smaller window at the west façade that was fitted at the exterior with security bars. A similar smaller window was located in the north façade at the Heater Room. Adjacent to the north façade near the Heater Room a brick chimney provided the ability to exhaust the mechanical equipment.

The interior of the building was divided into five spaces by painted concrete block partitions. The south end of the building consisted of a Squad Room intended to hold bunks for the soldiers on alert. Two wood columns were aligned north to south in the center of the room. The bunks were located at the west end of the room while the east end held gaming tables, a television, furniture and other recreational items. The exterior walls and ceiling were finished with gypsum wall board while the walls also had a cement asbestos board wainscot. The floor was finished with "asphalt tile" with a wood wall base according to the original construction drawings. The northeast corner of the building was designated "Dining & Day Room" in the original drawings. This room had the same finishes as the Squad Room and also contained a plastic laminate countertop with base cabinets near the north end of the room. The drawings call or a hot plate and sink to be located at the countertop. The existing cabinets and countertop in the building appear to be original. The sink is present as called for in the drawings, but there is no evidence of a hot plate. At the northwest corner of the building the Toilet contained three toilets with metal stall partitions, two urinals, four wall-mounted sinks and two concrete block shower stalls. The room had concrete floors and cement plaster wainscot at the walls with cement asbestos board above the wainscot at the exterior walls. The ceiling was finished with cement asbestos board as well. South of the Toilet room, a Storage room and Corridor were located. The Storage room has wall-mounted shelves and a service sink at the south wall. The two spaces had painted concrete block walls and gypsum board at the ceiling. The Storage room had a concrete floor while the Corridor had "asphalt tile" flooring to match the adjacent Squad Room. The final space in the building was the Heater Room located at the center of the building's north end. Accessible only from the exterior, the Heater Room housed the building's mechanical and electrical equipment. The room had a concrete floor, concrete block walls and a gypsum board ceiling. The original drawing calls for a fire extinguisher to be located adjacent to the door in the north wall.

Alert Barracks 430-433

As the barracks ceased to house bunks for crews on alert status, they became available for other uses. Barracks 430 and 431 were used as classroom and training space for the soldiers as well as limited storage. Barracks 432 was used as offices for the platoon headquarters, housing desks for use by officers and senior non-commissioned soldiers. Barracks 433 was the security headquarters for the site and included offices for security personnel as well as an armory and ammunition room. The different spaces were created with partitions at the building interior. While the Sentry Box 439 and Guard Shelter 456 were no always manned, security personnel were always on site and were present here to open gates and escort crewmen as necessary. It is not clear when crewmen were relocated to barracks at Fort Hancock and the alert barracks started to serve new purposes, but with the construction of Ready Building 437, it is likely that at this time all barracks were now being used for new purposes.

Kennel 458, 458A (1965, 1967)

The kennel, originally constructed when nuclear-capable Hercules missiles replaced the conventional Ajax missiles in 1958, underwent a number of changes in the ensuing years. In 1965 the kennel was given a wood and corrugated metal roof structure covering the kennels themselves. Two years later, in 1967, screening was added around the perimeter of the kennel areas.[62] The kennel training yard remained in its original configuration throughout this period.



Figure 1.2-123: View of Kennel 458 and Support Building 458A looking northeast.

Concurrently with the introduction of the kennel screening in 1967, a support building for the kennel was built southeast of the kennels themselves. Currently, the sign at the door of the support building indicates the building number as 457, but a site plan of the Missile Launch Area in 1962 indicates that 457 was actually the storage structure located near the Limited Area fence. The Real Property Record Card for 457 indicates the building's size as 6 feet by 8 feet which is much smaller than the kennel support building. With lack of a definitive number, this report has assigned the number 458A to the building to reflect its relation to the kennel, Building 458. The concrete block structure was constructed on a cast-in-place concrete foundation banked into the slope of the site and had a low-slope built-up asphalt roof on wood decking and structure. The perimeter of the roof was fitted with wood fascia boards and soffits and also copper edge-flashing. Cast in place retaining walls extend northeast and southwest from the building, parallel to the northwest wall. At the southwest side of the building, this retaining wall, along with a concrete pad and concrete block retaining walls at the southeast and southwest edges of the pad, formed and entry area outside of the building's entrance.

[62] Real Property Record Card, Structure 458, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.

A single one-over-one lite metal window was located in the center of both the northeast and northwest facades. The windows consisted of crank-operated awning sashes. The existing door is a flush wood hollow-core door with original hardware in a hollow-metal frame. It is not clear if this is the original door to the building despite the period-appropriate hardware. With the presence of the "457" number plate on the door, it may be possible that this door was relocated from the original Building 457 when it was demolished at a later date. The interior of the building was very simple with painted concrete block walls and a concrete floor. The ceiling of the building appears to have been finished with cement board panels similar to those found elsewhere on the site. The doors and windows were left without interior trim. The southeast wall contained wall-mounted wood shelving from near the floor to the ceiling while the northwest wall had a wood countertop with stainless steel work sink and faucet.

As discussed above in the section on the kennel, the kennel and/or this building may have been built on the remaining foundations of the Army Signal Corps radar testing warehouses. The character of the foundation of the kennel support building, which appears to be more weathered than the rest of the structure, may suggest that it predates the current building. The visual appearance of the concrete matches that found at the extant slab that remains where one of the warehouses was demolished northeast of the kennel. While an overlay of the original plans with modern aerials does not result in a close correlation, the orientation of the two structures, unique among the buildings at the Missile Launch Area, as well as the size and relationship of the two structures could be compelling. As the radar buildings were to be demolished with the construction of the NIKE site and no kennel was planned at that time, the accuracy with which the older structures were drawn could be called into question. Additionally, if the support building was not built on an earlier foundation, it is unclear as to why the building would have been sited in a sloped location requiring retaining walls when alternate flatter sites are available close by. Further analysis of the concrete at the kennel support building foundation and at the extant slab at the north edge of the Missile Launch Area may confirm a match of their age and composition.

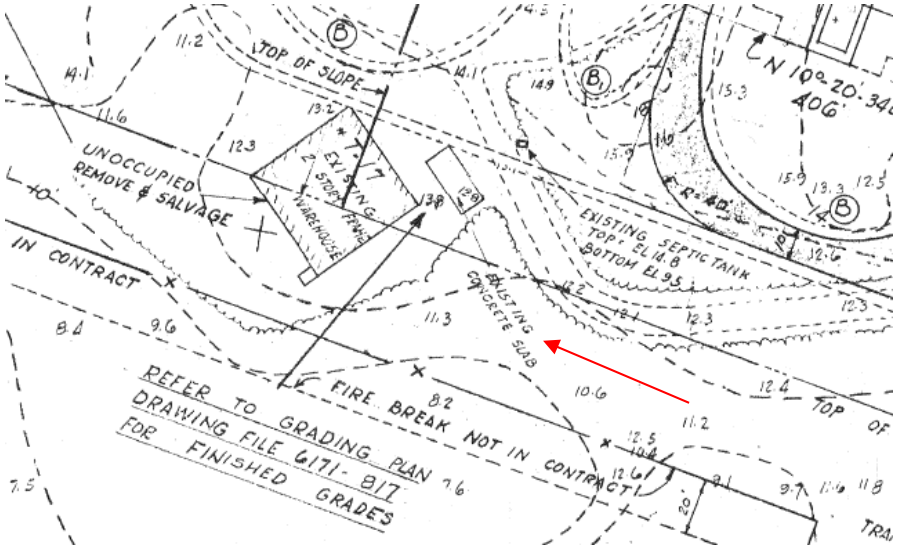


Figure 1.2-124: Detail of 1955 "as-built" drawing of the Missile Launch Area. Red arrow points to note calling out "Existing Concrete Slab" next to a former Army Signal Corps Warehouse that may have later been used as a foundation for the Kennel Support Building. (GATE 8788)


FENCE NOT IN CONTRACT
FENCE NOT IN CONTRACT
LEVEL ROAD SECTION



Figure 1.2-125 (previous page): Detail of 1955 "as-built" drawing of the Missile Launch Area (top) and modern aerial photograph of the same area (bottom). The Army Signal Corps radar warehouses to be demolished are highlighted on the original drawing (blue). An extant slab, Kennel buildings 258 and 258A are highlighted in the aerial (blue). The perimeter fence line (red) and missile magazine doors (purple) are highlighted in both images. (GATE 8788)

Radar Tracking Area



Figure 1.2-126: Radar Tracking Area configuration in 1967. John Milner Architects, 2016.

Interconnecting Corridor 409 and 411

With the development of solid-state technology in the early 1960s, a new fire distribution system was developed and named Missile Mentor. The first of these systems to be implemented in the country was activated at the Army Air Defense Command Post (AADCP) for the New York Defense Area at Highlands, NJ in 1966. A direct result of the solid-state technology for the new system was a drastic reduction in the size of equipment. The large heat-producing vacuum-tube computers that had

occupied the Fire Unit Integration Facility (FUIF) room in the Interconnecting Corridor additions were no longer needed. The new FUIF equipment fit into a case the size of a standard suitcase and could be kept inside the Battery Control Van. With the FUIF rooms no longer required for their intended purpose, they were converted to day rooms for the soldiers. At ICC 411, a door was cut through the masonry wall and step was added to connect the new day room with the corridor. As this work was only performed at ICC 411, it was likely completed by one of the soldiers working in Control Area #2.[63]

Radar Platforms 417-419, 421-422
Target Tracking Radar 467
Target Ranging Radar 472 and 473 [64]

After an initial deployment of radomes at Radar Platforms 418, 419 and possibly 417 and 421 in 1962-63, additional radomes were installed were installed at Radar Platform 422, Target Tracking Radar 467 and Target Ranging Radars 472 and 473 and in 1966. A photograph taken c. 1972 clearly shows all radomes in place and inflated.

Additional improvements were made to some of the platforms as electrical heating was installed at the ladders for Radar Platforms 421 and 422 to prevent icing in 1967. It is not clear why this improvement was not carried out at all of the platforms.



Figure 1.2-127: Detail of c. 1972 photograph showing all radar platforms and their inflated radomes at the Radar Tracking Area. (GATE 20818)

[63] Interview with Robert F. Bohlander, at NY-56 Radar Tracking Area, May 27, 2015.
[64] Real Property Record Card, Structures 421, 422, 467, 472 & 473, Fort Hancock, Files, Sandy Hook Unit, Gateway National Recreation Area.

1.2.7 1974 – Configuration at Decommissioning

Following the completion of all major buildings in 1967, the NIKE site at Fort Hancock underwent only minor changes until its Decommissioning in 1974. These changes appear to have been limited to the construction of a few minor buildings. While the construction date of these structures is not definitively known and may have been constructed in earlier campaigns, they do not appear on any of the site plans for the areas dating to as late as 1962. By their appearance, the below buildings seem to have been constructed by the time the Army left the site and therefore have been placed in this heading until a definitive date of construction can be identified.

Missile Launch Area

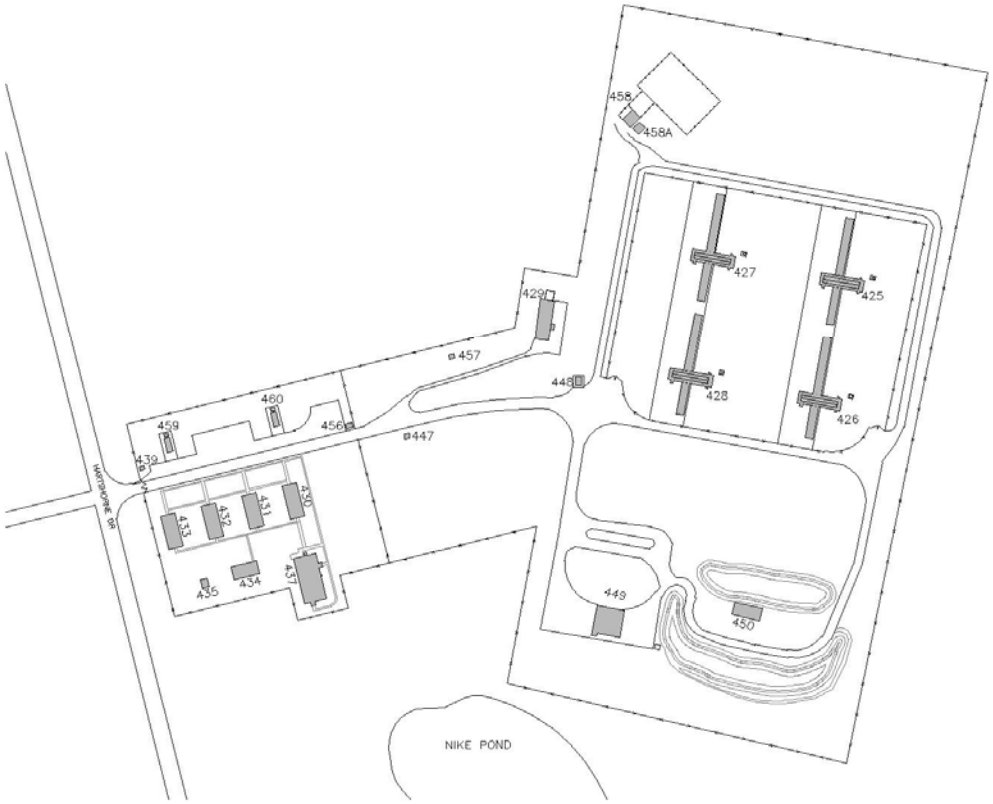


Figure 1.2-128: Missile Launch Area configuration in 1974. John Milner Architects, 2016.

Missile Magazines 425-428

At some time between 1959, when an aerial photograph of the area was taken and 1969, additional security lighting was added to the exclusion zone around the missile magazines. This additional lighting took the form of four wood telephone poles, one at each magazine that housed two halogen floodlights.[65] Located south of the access hatch and east of the elevator doors, these poles were painted yellow at the bottom with the letter of each missile section in black.



Figure 1.2-129: Current photograph of Missile Magazine 428 with security lighting pole visible.

[65] Interview with Bill Jackson, January 28, 2016.

Radar Tracking Area



Figure 1.2-130: Radar Tracking Area configuration in 1974. John Milner Architects, 2016.

Barracks 402-405

After the construction of the HIPAR system as part of the Improved Hercules campaign, the conversion of the Equipment & Operations Buildings 452 and 454 to ready room-type functions largely made the Barracks at the Radar Tracking Area obsolete. The barracks were little used at this point and possibly only as storage or as supplemental day rooms. As part of the maintenance of the site, civilian technicians were often brought in from the surrounding areas to help repair and maintain various components of the NIKE equipment. Barracks 402 was converted to office space for their use. The parking lot immediately to the west of the Barracks and the open area near the east Bore Sighting Mast were used for parking.[66]

Equipment & Operations Building 454

At some time after the aerial photograph of the Radar Tracking Area was taken in 1963-4, a small addition was constructed at the northwest side of Equipment and Operations Building 454. The

[66] Interview with Bill Jackson, January 28, 2016.

three-sided concrete block structure was built along two-thirds of the original building's wall and it appears the west window was replaced with a door to provide access between the two spaces. A large opening in the southwest wall of the addition suggests the addition was enclosed by a large pair of gates or doors. The roof was constructed of built-up asphalt roofing on board sheathing and framing with wood fascia boards and metal edge flashing.



Figure 1.2-131: Current photograph of addition to Equipment and Operations Building 454, looking northeast.

Note on Paint Colors

The buildings at the NY-56 NIKE site appear to have had at least three paint color schemes throughout the course of its active use by the military. Anecdotal evidence suggests that buildings were originally painted a mint green, sometimes referred to as "NIKE green," with a dark green, almost black, color being applied at the doors, windows and trim. At the time of the site's decommissioning, the buildings were uniformly a beige or buff color.[67] The doors, windows and trim were painted a dark green color, but brighter than the original green. Paint evidence at some of the buildings where the beige paint has deteriorated suggests that there was in interim scheme in which the buildings were painted white with dark green trim. This is supported by anecdotal evidence from oral histories and period photographs. While some of the photographs are black-and-white images, the tonal quality suggests a bright color. The various vans appear to have been white from the early 1970s to the site's decommissioning, but period photographs from the 1950s and 1960s indicate that the vans were olive drab for most of the site's period of operation.

[67] Interview with Bill Jackson, January 28, 2016.

2015 – Current Configuration

Following the decommissioning of Fort Hancock and its NIKE site in 1974, the National Park Service assumed control of the site. While some buildings were modified and reused to serve various purposes for the Park, others were left vacant. Over time, some buildings whether by accident or neglect were demolished. Later attempts were made to restore some of the buildings for interpretation to visitors.

Missile Launch Area

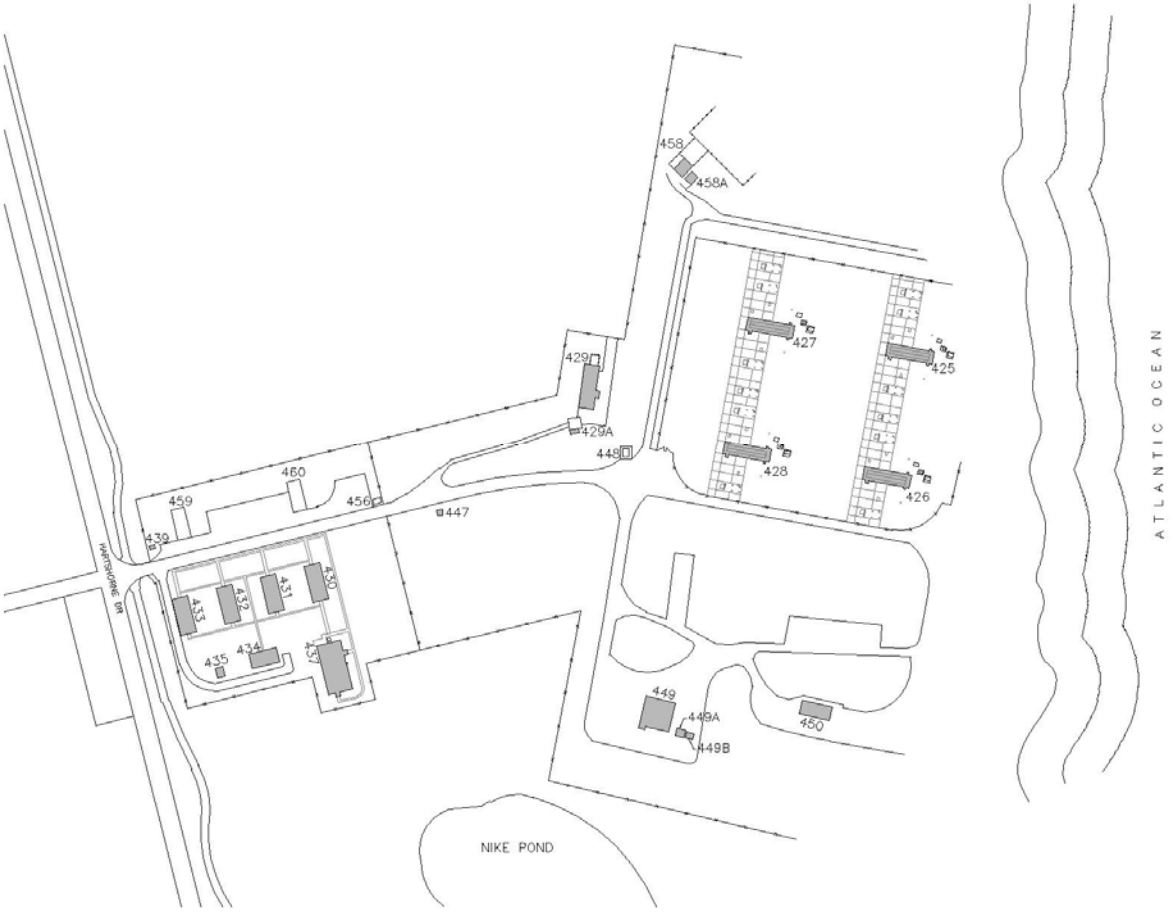


Figure 1.2-132: Missile Launch Area configuration in 2015. John Milner Architects, 2016.

Site

The site at the Missile Launch Area has changed dramatically from how it appeared when transferred to the National Park Service. The primary drivers of change at the area are the growth of vegetation throughout the original launch area and natural erosion caused by the changing shoreline. While the Army occupied the launch area, all vegetation was kept very low and in most places were limited to grasses. As described in the section covering 1955, fire breaks were maintained around the perimeter

fencing both for fire prevention and security. Following decommissioning, vegetation was no longer comprehensively cut back on a regular basis allowing trees, brush and grass to grow unhindered. Some of the buildings, such as the Storage 457 and Kennel 458, and the perimeter fence line became largely overgrown. The areas immediately surrounding the missile preparation area, the generator building and entry/barracks were maintained to some degree as these areas were adapted for continued use of the Park Service. The trails connecting these areas were also maintained to allow continued access and circulation between the active buildings and the area entrance on Hartshorne Drive.

The other driver of dramatic change at the site was the natural change of the shoreline that has been occurring for centuries and that originally led to the creation of the Sandy Hook peninsula. This erosion of the beach near the Missile Launch Area has been periodically exacerbated by singular weather events such as Superstorm Sandy in 2012. Attempts to restock the beach with sand have taken place over this period as well, but the overall trend has been the steady westward movement of the beach bringing it closer and closer to the Launch Area. This movement, beginning even while the area was still occupied by the Army, has resulted in the distance from the Exclusion Area of the Launch Area to the median tide level being decreased from over 700 feet in 1955 to just over 100 feet in 2015. At one point, this erosion led to the exposure of the subterranean missile magazine structure. Originally covered by an artificial plateau created to avoid ground water issues with the magazines, the concrete was exposed as the east edge of the plateau was washed away. The Park Service transported large amounts of sand to the site to rebuild the plateau and cover the exposed structure.

Another result of the shifting shoreline over time has been the removal of large sections of the original fencing at the site. The entire east fence line, originally 80 feet east of the Exclusion Area is missing and the grade in that area dropped by over 10 feet. Where the perimeter fence turns west from the beach at the north and south edges of the site, significant lengths of the fence are largely buried, with nearly all seven feet of their height below the sand. This was likely caused by a combination of large quantities of sand being moved by storm events and the fence gradual sinking overtime as the concrete foundations pull the fence posts down into the sand. In other areas, storm-related flooding and debris have uprooted and mangled the fence. The flooding also resulted in sand being deposited throughout the Missile Launch Area obscuring original roads and paths that were no longer used. At the Missile Launch Area, periodic flooding, most significantly during Superstorm Sandy flooded all of the buildings on the site, damaging interior finishes and doors in many locations.

The Park Service modified portions of the Launch Area to serve new purposes in the years following taking control of the site. The changes are largely concentrated at the area between the missile prep area (including the MAT Building 449, Warheading Building 450 and the enclosing berms) and the Missile Magazines to the north. Originally an unoccupied open area, the Park service introduced a clearing, possibly for storage, with a sandy path running east-west through it from the area near the MAT Building to the beach. A chain link double-gate was installed at the east end of the clearing to discourage entry by the public from the beach. On the north side of the area directly north of the MAT Building, another clearing was created and used as a firing range, presumably by Law Enforcement Rangers.

Another minor change to the site was the relocation of a set of portable vehicular ramps. These large steel ramps, likely used to aid in servicing vehicles from below, were located in the northwest corner of the Radar Tracking Area when the site was decommissioned. In the years that followed, possibly

in the 1980s, the Park Service relocated these ramps to the Missile Launch Area and placed them along the north side of the MAT Building.

Lastly, another change to the site, while not significantly impacting the Launch Area itself, was introduced adjacent to the site. In 2004, a paved multi-use trail was introduced that ran the length of the Sandy Hook peninsula. The path was routed along the western fence line of the Launch Area between the fence and Hartshorne Drive and extended in 2009.

Demolished / Missing Buildings [68]

Following the decommissioning of the site, the Army removed some of the equipment from the site. Many of the buildings were left vacant if not reused by the Park Service and fell into disrepair. In a few instances these buildings were then demolished if sometimes unintentionally.

The Launch Control Vans in the barracks portion of the Missile Launch Area were removed by the Army in 1974. Equipment such as this were either relocated to another NIKE site or placed in storage until needed. Air Conditioners 459 and 460 were essentially equipment sheds attached to and servicing the Launch Control Vans and were likely removed at this time as well. The area where these structures were located became largely overgrown.

Over the years following the transfer of the site to the National Park Service, some minor modifications were made to the Ready Building. The wood paneled doors and their frames at the entrances to the primary spaces were removed from the building and replaced with hollow metal doors and frames with wired glass lites. Partitions were added to the west end of the squad room to create to office spaces for staff use.

Guard Shelter 456 at the Limited Area gate was unused, but in place until the 1990s when it was struck by a large truck and severely damaged. The remains of the building were then removed from the site.

It is not clear when Sentry Control Station 448 and Storage 457, in the Limited Area of the Launch Area, were demolished, but only the slab of Building 448 remains and any remnants of Building 457 were not found.

Modified Buildings

Some of the buildings at the Missile Launch Area were modified by the Park Service over the years to serve new uses. Barracks 430-433 and Ready Building 437 were all modified to varying degrees. Most of the modifications to the Barracks buildings were focused on the interiors and the south elevations where the door configurations were changed. At the interiors, all internal partitions, where they were present, were removed and many components of the heating systems were removed as well. This resulted in large open spaces that could serve many different uses. At Barracks 430, the entire south wall, including the door and windows were removed. This left the interior of the building exposed to the exterior and facilitated using the building as a garage for Park vehicles. Barracks 431 also had its south wall removed, but it was then replaced with a new wall that held a large double door to allow

[68] Specific information on demolished buildings and restoration efforts was provided by Tom Hoffman, Park Historian, Sandy Hook Unit, Gateway National Recreation Area, National Park Service on September 25, 2015.

the movement of large items in and out of the building. Barracks 433 had only a portion of its south wall removed, including the door and west window, to allow a new large double door to be introduced. Barracks 432 was the only barrack building at the Missile Launch Area to have its south wall left intact. Barracks 431, 432 and 433 were all used to store building and site materials as well as seasonal items needed by the Park. Ready Building 437 was largely left unchanged at the exterior and only minor changes were made to the building interior. The large squad room, which held bunks and lockers for soldiers on Alert status was divided by a partition running in the north-south direction immediately east of the room's south door. This partition created a western room accessed by a door in the center of the wall. The western room was then further divided into two spaces by an east-west partition and door. These spaces appear to have served as office space.

At Missile Magazines 425-428, three of the four wooden poles with floodlights are now missing. Only the light pole at the southwest magazine, A Section, remains.

New Buildings

The only entirely new building at the Missile Launch Area is Fueling Station 429A which was built adjacent to Generator Building 429 in the 1990s for the purposes of fueling Park Service vehicles. A simple concrete block enclosure with wood-framed asphalt shingle roof, the building had a concrete pad at the north side to accommodate the vehicles. The south façade had a small fixed plexiglass window while the north wall opening likely held a pair of gates. At some point, the fueling and fuel storage equipment were relocated elsewhere and the gates were removed.

East of the Missile Assembly and Testing (MAT) Building 449 two smaller supplemental structures were built by the National Park Service after transfer of the site. Building 449A is a concrete block structure with a large door opening in the north façade. The opening does not currently have doors, but hinge scarring at each wood jamb suggests that a pair of doors or gates were originally located in the opening, likely also constructed of wood. The roof was a gabled wood roof with wood rake boards, eaves and soffits. Each gable end of the roof was constructed of wood plywood panels while the roof itself likely consisted of composition asphalt shingles or rolled asphalt roofing on plywood sheathing. The interior of the building consisted of concrete block walls and a concrete floor while the wood roof structure is exposed above. Multiple signs in the building suggest what its former purpose may have been. These signs include ones that state the following: "Danger / Explosive Gas / No Smoking," "Diesel Only S_3," and "Danger No Smoking." These signs obviously suggest that the building had been used for fuel and other flammable materials storage.



Figure 1.2-133: Current photograph of Building 449A, north elevation.

Building 449B is located east of Building 449A and is a wood frame structure with medium-slope shed roof. The walls are sheathed with plywood panels scored to look like vertical board siding and the corners of the building have wood corner boards. The roof had wood fascia boards and soffits at its perimeter while the roof itself was rolled asphalt roofing over plywood sheathing. A single wood door or gate with a wood jamb was located in the north façade. The remnant of a hasp at the remaining wood jamb suggests that the door had been held closed by a hasp and padlock. Two wall vents were located near the roof at the north façade, one on either side of the door. Two additional wall vents were located near the floor at the south façade. The interior consisted of a concrete floor and exposed wood framing at the walls and ceiling. Wood shelves were located at the west and south walls, attached directly to the studs. A pipe was also attached to the interior face of the framing at the north end of the west wall. The pipe appears to have served as a vent for a piece of equipment that is now missing. The specific use of Building 449B is not known, but like Building 449A, probably served as support for the MAT Building 449.



Figure 1.2-134: Current photograph of Building 449B, looking southwest.

Restoration Efforts

During the years 2002-2006, the Sandy Hook Unit staff of Gateway National Recreation Area undertook targeted restoration efforts at some of the buildings at the Missile Launch Area. Specifically, the Barracks buildings were rehabbed to halt ongoing deterioration. Rusted portions of the corrugated metal siding near grade were removed and replaced with new corrugated metal siding. In some areas, whole panels of siding were replaced. The areas of replacement are clearly discernable by the variation in the corrugation profile of the siding. The corrugation profile of the original siding material consisted of a simple semi-circle. The corrugation profile of the replacement material consisted of a semi-hexagonal shape. The spacing of the corrugation and the profile width of the two materials is the same. In addition to the siding restoration, many of the doors of the barracks were covered with plywood if they were severely deteriorated. A comprehensive re-painting campaign also took place at this time. It may have been during this campaign that the south walls of the barracks buildings were modified.

Radar Tracking Area

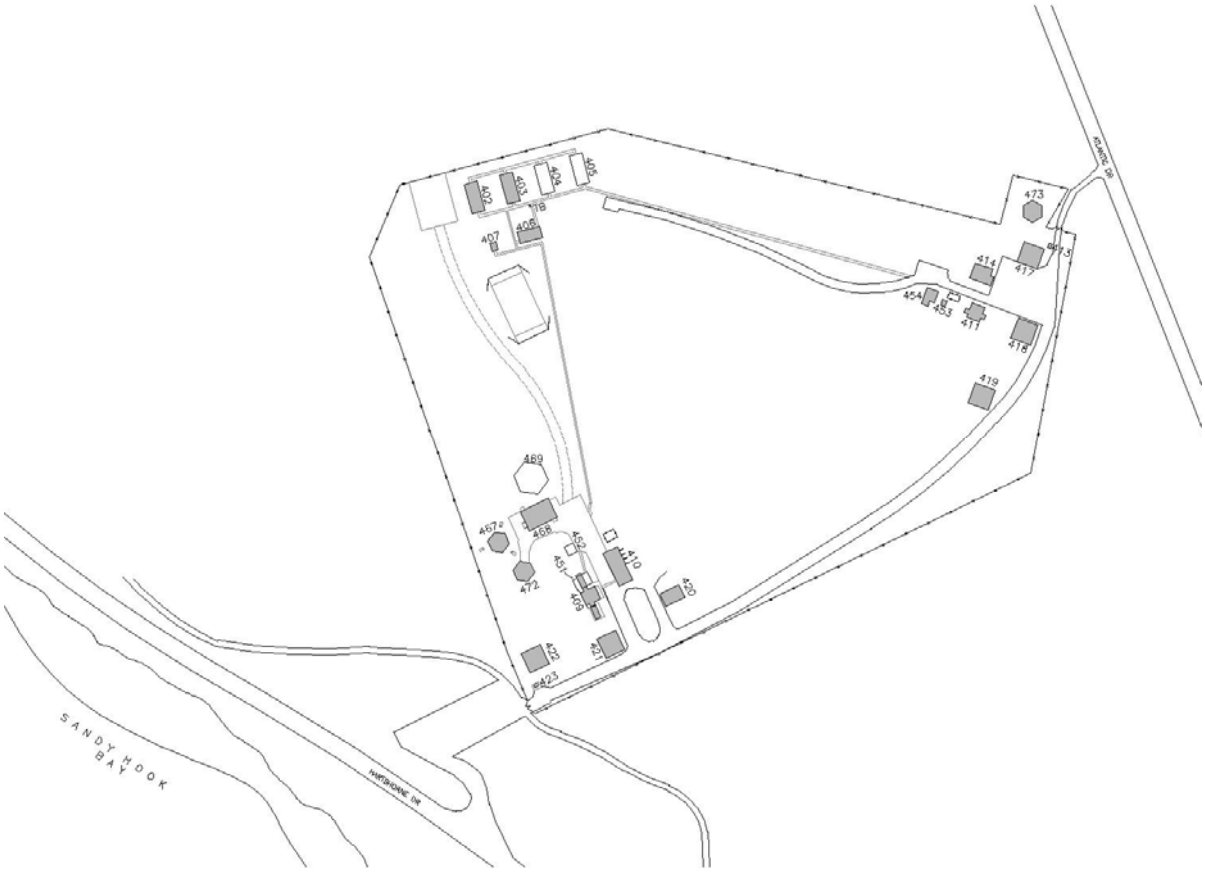


Figure 1.2-135: Radar Tracking Area configuration in 2015. John Milner Architects, 2016.

Site

In contrast to the Missile Launch Area, the Radar Tracking Area site has not exhibited dramatic changes since it was transferred to the National Park Service. Similar to the Missile Launch Area, the key source of change at the area is the growth of vegetation throughout the site. The Army kept vegetation very low as was required to maintain sight lines between the Launch and Tracking Areas. The fire breaks around the perimeter fencing were also maintained both for fire control and security. Following decommissioning, vegetation was no longer comprehensively cut back on a regular basis allowing trees, brush and grass to grow unhindered. Control Area #2 became especially overgrown with the immediate vicinity around Interconnecting Corridor 411, Radar Pedestal 453, Equipment and Operations Building 454 and the radar stands almost becoming inaccessible. The perimeter fence line became largely overgrown with the weight of the vegetation pulling the fence over in many locations. While the roads were still passable, the concrete footpath between Control Area #1 and the Barracks became difficult to use in places. The footpath between Control Area #2 and the Barracks became almost completely obscured.

In similar fashion to the Launch Area, the multi-use trail and accompanying parking lot were introduced at the west end of the site in 2004 and extended in 2009. While not impacting the area

within the fence line, the trail and the parking lot, located at the Control Area #1 gate did alter the approach to the site.

Demolished / Missing Buildings [69]

Similar to the Missile Launch Area, a number of buildings at the Radar Tracking Area were removed following the transfer of the site to the Park Service. Some of these were removed as part of the Army vacating the site, while others were removed due to deterioration.

When the Army left the site, the Control Vans at Interconnecting Corridors 409 and 411 were removed as were the radar antennae. It was likely at this time that HIPAR Tower 469 and its fiberglass radome were removed as well. The generators at Generator Buildings 410 and 414 and the transformers were probably also removed at this time.

Following the transfer to the Park Service, a group of buildings were removed in Control Area #1. These structures included Equipment & Operations Buildings 452, Pedestal Radar Tower 451, Tool Shed 455 and the transformer pen located near the radar pedestal. The reason for their removal is not clear nor is it known if these structures were all removed at once or individually over time. At the Administrative portion of the Radar Tracking Area, Barracks 404 and 405 were also removed. The cause is unclear, but given the amount of rehabilitation work that was required to maintain the Barracks at the Missile Launch Area, it is not hard to imagine that Barracks 404 and 405 were eventually removed due to poor condition if they were not needed for a new use.

Modified Buildings

The two barracks that remained at the Radar Tracking Area, Barracks 402 and 403 were modified for continued use. Barracks 402 had any interior partitions and much of the heating system removed. Barracks 403 had some of the interior partitions removed while the entire north wall, including the door and windows were removed. The north wall was replaced with a new wall with corrugated metal siding and a set of large double doors.

Restoration Efforts

Similar to the Missile Launch Area, starting in 2002 an effort was made to rehabilitate and restore several buildings at the Radar Tracking Area. While the campaign included buildings in the Administrative portion of the Area, the primary focus was on the buildings at Control Area #1. In addition to the modifications made to Barracks 402 and 403 outlined above, the rusted metal siding was patched in similar fashion to the barracks at the Missile Launch Area. All of the building exteriors at the Administrative portion of the Missile Launch Area were painted including Barracks 402 and 403, Latrine 406 and Central Heating Plant 407. More comprehensive restoration efforts were undertaken at Control Area #1. The exterior of HIPAR Building 452, Generator Building 410 and Guard Booth 423 were all repainted. The latter two also underwent repairs to the built-up asphalt roofs. Interconnecting Corridor 409 was the recipient of the most focused restoration efforts. In addition to fresh paint and roof repairs at the exterior, temporary doors were installed and portions of the interior

[69] Specific information on demolished buildings and restoration efforts was provided by Tom Hoffman, Park Historian, Sandy Hook Unit, Gateway National Recreation Area, National Park Service on September 25, 2015.

was re-painted as well. NIKE System Battery Control and Radar Control Vans, though not original to the site, were obtained and placed in the proper location at the north and south ends of ICC 409. Finally, furniture, a safe and other paraphernalia pertaining to the Fort Hancock site and the NIKE System were installed in the corridor space. A few of the radar platforms at Control Area #1 also received some attention as part of the restoration campaign. Radar Platforms 421 and 422 were cleaned and painted and both received radar antennae similar to that used by the NIKE Missile System during its operation. Radar Platform 472 while not restored, did receive a radar antenna.

1.3 PHYSICAL DESCRIPTION

1.3.1 Setting and General Appearance

Setting

The two sites associated with the Nike Missile program, the Missile Launching Site and the Radar Tracking Site, are located on the Sandy Hook peninsula in in Monmouth County, New Jersey. Sandy Hook stretches approximately seven miles north from the Highlands and is bounded by the Lower New York Bay on the north, Sandy Hook Bay on the west and the Atlantic Ocean on the east. There are public beaches on the south end of the peninsula and Fort Hancock Historic District and a U.S. Coast Guard Base are located at the north end. The Radar Detection Site is situated in the center of the peninsula, approximately one mile north of the Missile Launching Site.

The Radar Tracking Site is triangular in shape and is bounded by Hartshorne Drive on the west and Atlantic Drive on the south and east. The site is divided into three areas: Control Area #1, Control Area #2 and the Ready Barracks. Control Area #1 is situated in the southwest corner, adjacent to the Main Gate on Hartshorne Drove. It has three rectangular radar towers (420-422), two hexagonal towers (467 and 472), a hexagonal concrete HIPAR foundation (469) and four buildings (409, 410, 423 and 468). Control Area #2 is located in the northeast corner of the site, west of Atlantic Drive. It contains three rectangular radar towers (417-419), one hexagonal radar tower (473), four buildings (411, 413, 414 and 454) and a concrete ABAR pedestal (453). The third section of the site, the Ready Barracks, is located on the north side of the sight and consists of two barrack buildings (402 and 403), two concrete barrack foundations (404 and 405), the Latrine (406) and the Central Heating Plant (407). Other features at the Radar Tracking Site include a security fence around the perimeter and a basketball court, just south of the Ready Barracks.

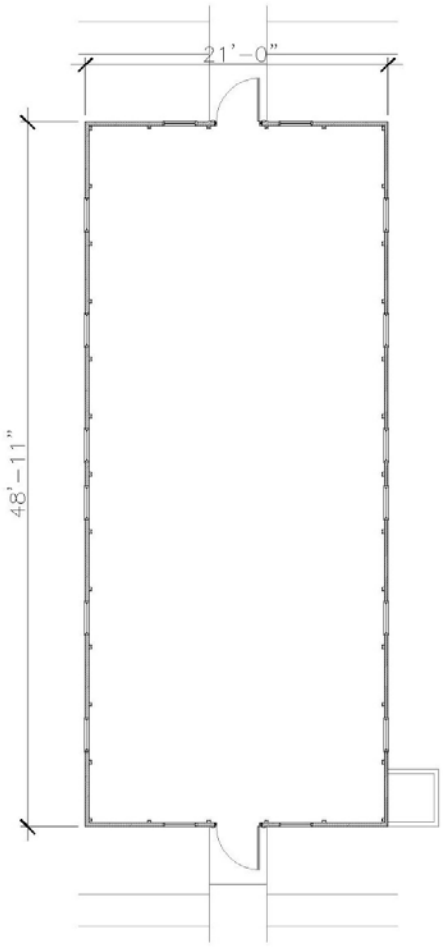
The Missile Launching Site is situated between Hartshorne Drive and the Atlantic Ocean, and is divided into several different areas. The west side of the site, just east of Hartshorne Drive, contains the Ready Barracks (430-433), the Central Heating Plant (435), the Latrine (434), the Ready Building (437), a Sentry Box (439) and Flammable Materials Storage (447). The Missile Range Launching Area, located on the east side of the site, contains four Underground Missile Storage Structures (425-428). West of the Missile Range Launching Area is the Generator Building (429) and an associated Enclosure (429A). The Canine Kennel (458) and Canine Kennel Building (457) are located on the north side of the site, northwest of the Missile Range Launching Area. South of the Missile Launching Area is the Missile Maintenance area, consisting of the Missile Assembly and Test Building (449), its associated storage buildings (449A and 449B) and the Warhead Building (450). Some of the buildings on this site and the Radar Tracking Site have been demolished and there are concrete slabs remaining throughout both sites.

1.3.2 Radar Tracking Site

Individual Structures

No. 401: *Inaccessible*

No. 402: Barrack



Architectural

Description

Exterior

Building 402 is one of two remaining barracks at the Radar Tracking Site (there were originally four barracks). The building is a one-story structure located in the northwest corner of the Radar Tracking Site, adjacent to Buildings 406 and 407. According to the Radar Site map provided by the Park, the barracks were built in 1955 as temporary structures. The rectangular building, situated on a concrete foundation, is sheathed in corrugated metal siding and has a corrugated metal gable roof. The north elevation has

four fenestrations: a solid metal door with a metal frame in the center, two windows on either side of the door, and a vent opening above the door. The door is set into an opening that is partially infilled with wood, and the original door knob has been replaced with a modern chrome knob. The wood window frames, sashes and plexiglass panes are original. All of the windows have mesh bug screens and protective metal screens.

The south elevation has three fenestrations: a door in the center with one window on either side. The original wood paneled door is covered with sheet metal, and similarly to the north elevation, the opening is partially filled in with plywood. The early hardware is still intact, and several modern padlocks have been added. The original wood windows have mesh bug screens and protective metal screens. The east elevation has five original wood-framed windows with protective metal screens, and the west elevation has six wood windows with two sets of screens.



Figure 1.3-1. The south elevation (left) and the north elevation (right) showing fenestrations of Building 402.

Interior

The interior finishes of Building 402 include a concrete floor, a combination of asbestos particle board and corrugated metal on the ceiling, and asbestos particle board on the north and south walls. Parts of the east and west elevations contain remnants of the particle board, however they are mostly corrugated metal exterior siding with partially exposed wood framing.



Figure 1.3-2. Interior of Building 402, facing north.

Conditions

The exterior of Building 402 is in good condition. The structure is exhibiting rust, particularly along the foundation and roofline, caused by water penetration and the ocean atmosphere. There is minor vegetation causing damage around the fenestrations and roof. The paint on the wood trim is peeling and the wood is deteriorating because of water damage and general weathering occurring throughout the building. The interior is in fair condition; the walls, ceiling and framing are deteriorating or missing due to water damage.

Exterior

- The corrugated metal siding is in fair condition. The south elevation appears to have been painted recently. The metal is mostly intact, however there are some large areas of rust, particularly around the fenestrations and at the foundation where there is a gap between the siding and the flashing. There are several areas of patching throughout the exterior as well; the early corrugated metal is faceted and the metal patches are rounded. The west elevation is extremely overgrown with vegetation.

- The conditions of the doors vary from poor to good. The door on north elevation is in good condition, however the metal frame is rusting and has peeling paint. Wood studs are nailed to either side of the door and have peeling paint as well. The door on the south elevation, with sheet metal on the exterior, is in poor condition and is warping and rotting. The paint on the door trim is peeling and the wood studs on either sides are deteriorating.

- Window conditions vary from poor to good. Each window has a protective metal screen. On the east elevation, one sash is missing, including the plexiglass. On the west elevation, one sash is missing; the metal screen is intact, however it is broken. The remaining sashes and metal screens are in good condition. All of the frames and sills are in poor condition, exhibiting rot and peeling paint. There is vegetation growing in one of the windows on the east elevation.

- The conditions of the bed moulding board and roof flashing vary from poor to good. While it is in good condition on the north elevation, it is in very poor condition on the west; it is deteriorating throughout, especially in the center.

- The light fixture on the north elevation is broken and rusted.

- The vent opening has been filled in with plywood.



Figure 1.3-3. Rust at the foundation between the siding and the flashing on the north elevation (left) and a protective metal screen on one of the north windows (right) of Building 402.

Interior

- The interior walls are in poor condition. The particle board is missing on the east and west elevations and the remaining pieces on the north and south walls are in very poor condition. The exterior corrugated metal siding is visible in places where the particle board is missing, and is exhibiting rust. There is vegetation starting to develop on the west elevation.

- The ceiling is in poor condition. There are eight sheets of particle board missing, exposing the wood rafters and corrugated metal roof.

- The concrete floor is in good condition with minor staining and minimal debris, particularly near the south entrance.



Figure 1.3-4. Missing sheets of particle board in the ceiling (left) and deteriorating/missing particle board in the southwest corner (left) of Building 402.

Work Recommendations

- Remove vegetation throughout entire structure, particularly around the fenestrations. Cut out areas of rust and replace with corrugated metal to match the existing patches.

- Replace and paint metal door frame on north elevation. Strip and repaint wood studs on either side of the door. Replace door on south elevation to match original and restore door trim. Replace and paint wood studs on either side of the door.

- Strip, restore and paint window sills, including metal flashing where necessary. Replace missing plexiglass on two windows. Remove existing metal screens and install new metal screens in each window.

- Replace bed moulding board and roof flashing on west elevation to match existing.

- Replace light fixture on the north elevation to match existing.

- Remove plywood over vent on north elevation and replace vent.

- Remove all particle board and insulation on interior walls. Remove metal siding that is rusting and patch to match existing. Replace insulation and particle board on all four interior walls.

- Remove all particle board and insulation on ceiling. Remove rusted metal siding in roof and patch, similar to walls. Replace insulation and particle board on entire ceiling.

- Remove debris, clean and paint concrete floor.

Structural

Description

See Barrack Number 430 at Missile Launching Site.

Conditions

- Exterior cladding is corroded at grade and has been replaced in several sections. Corrosion is also occurring at roof (Figure 1.3-5).

Work Recommendations

- Repair or patch dents, holes, gouges, and surface rust on exterior corrugated metal siding.



Figure 1.3-5: East face of 402 showing corroded cladding at grade, with replacement sections at grade.



Figure 1.3-6: Remaining diagonal bracing at end bay of Building 402.

Building Systems

Description

HVAC

The barracks currently contains existing heating hot water piping that was part of a heating hot water system that included hot water radiators. There are no existing radiators currently.

Plumbing

There is no evidence that these systems existed in this building.

Electrical

The building was used as a barracks, and we assume that it originally contained an electrical panel, lighting fixtures and receptacles similar to the barracks buildings at the launch site. However, none of the original systems remain intact. There does not appear to have been a fire alarm system.

Conditions

HVAC

The existing remaining heating hot water piping is deteriorated and in poor condition.

Plumbing

Not applicable.

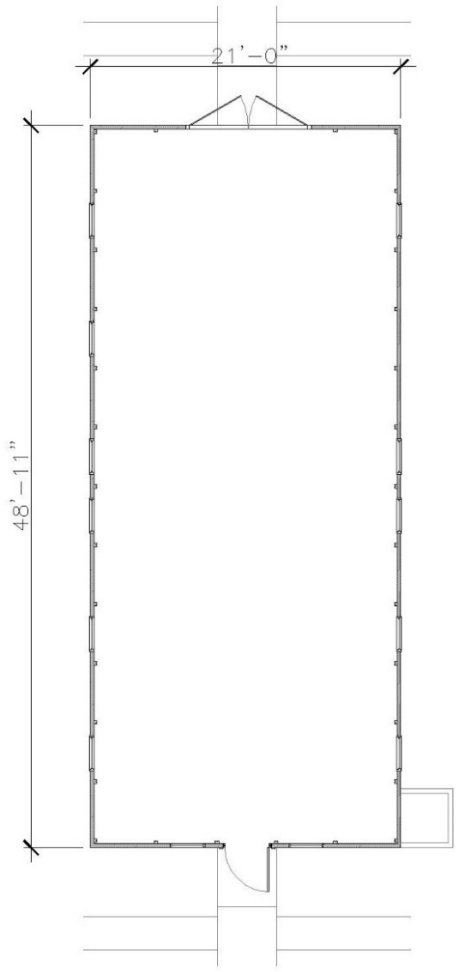
Electrical

Not applicable.

Character Defining Features

- Massing: One story rectangular structure with gable roof ca. 1955.
- Materials: Corrugated metal siding ca. 1955 with some later replacement pieces.
- Doors: Original wood paneled doors with sheets of metal on the exterior.
- Windows: Original wood-framed window openings and sashes.

No. 403: Barrack



Architectural

Description

Exterior

Building 403 is the second of two remaining barracks at the Radar Tracking Site (originally there were four barracks). The building, constructed in 1955, is a one-story structure located in the northwest corner of the site, adjacent to Building 402. The rectangular building has a concrete foundation, corrugated metal siding and a corrugated metal gable roof. The north elevation has one fenestration: a large opening with a wood frame and a set of ribbed sheet metal doors. The south elevation has three fenestrations: a door in the center with one window on either side. The original wood paneled door has been repurposed and a modern padlock has replaced the original hardware. The original wood window frames are extant on this elevation, however the sashes are missing, exposing the building to the elements. The east elevation has five fenestrations and the west elevation has six: original wood-framed windows with plexiglass panes.



Figure 1.3-7: The southwest corner shows evidence of rust and broken windows (left) and ribbed sheet metal doors on the north elevation (right) of Building 403.

Interior

The floor in Building 403 is vinyl asbestos tile. Most of the asbestos particle board is missing on the ceiling and walls, exposing the corrugated metal roof and siding. There is a partition in the center consisting of sheets of plywood on metal framing.



Figure 1.3-8: The interior of Building 403, facing south, showing the removal of all particle board on the ceilings and walls.

Conditions

Building 403 is in fair condition. The structure is exhibiting rust on the south, east and west elevations, caused by water infiltration and the ocean atmosphere, especially along the foundation and roofline. The paint on the wood trim is peeling because of water damage and general weathering. The interior is in poor condition; the walls and ceiling have been removed and the frame is rusted from water damage. Part of the floor is missing and the remaining portions are in poor condition due to water infiltration.

Exterior

- The corrugated metal siding is in fair condition, exhibiting widespread surface rust throughout the south, east and west elevations. The entire north elevation has been replaced and is in good condition. There is severe rust, pitting, penetrations and dents on the south, east and west

elevations, particularly near the foundation. Several replacement patches have been added near the bottom battens between the metal panels. The corrugated replacement patching is rounded, while the early corrugated metal was faceted.

- The doors on Building 403 are in fair condition. Although the south door appears to have been repurposed, the door and the frame are very weathered and have open joints. The frame is delaminating and splitting, and there are several abandoned penetrations.

- The windows are in extremely poor condition, except for one on the east elevation that has most likely been replaced. Many of the windows have broken plexiglass and the majority of the sills and frames have open joints or are badly weathered or splitting. The flashing on the windows is exhibiting an abundance of rust.

- The eaves and roof edges are in poor condition, exhibiting severe rust on all sides.



Figure 1.3-9: A replacement patch of corrugated metal siding with rust near the foundation and plexiglass window on the east elevation of (left) and the repurposed door and window openings on the south elevation (right) of Building 403.

Interior

- The walls of Building 403 are in poor condition. The fiberboard is almost entirely missing. The plywood partitions have open joints, splitting veneer and failing paint. Many of the panels are beginning to separate from the metal framing.

- The ceiling is in poor condition. The furring is generally in fair condition, with minor water staining, however the fiberboard is missing entirely.

- The floor is in very poor condition. The vinyl asbestos tile is almost entirely missing, and the tiles that remain are loose, cracked or broken.

- The interior side of the door is in poor condition with open joints and rotting at the bottom.

- Many of the window sashes are loose or in poor condition.



Figure 1.3-10: Missing fiberboard on the ceiling and walls (left) and missing or deteriorated vinyl asbestos floor tiles (right) of Building 403.

Work Recommendations

- Cut out areas of rust, particularly near the foundation, and replace with corrugated metal to match existing on the south, east and west elevations (the north has been replaced and is in good condition).
- Restore south door and door frame.
- Strip, restore and paint window sills, including metal flashing where necessary (one window frame on east elevation appears to have been replaced).
- Remove existing metal screens and install new metal screens in each window.
- Restore or replace eaves and roof edges on all elevations.
- Remove all particle board and insulation on interior walls. Remove metal siding that is rusting and patch, similar to existing exterior patches. Replace insulation and particle board on all four interior walls. Replace plywood on interior partitions that have open joints, splitting veneer and failing paint.
- Remove all particle board and insulation on ceiling. Remove metal siding in roof that is rusting and patch, similar to walls. Replace insulation and particle board on entire ceiling.
- Remove asbestos floor tiles and replace with new floor tile, laminate flooring or concrete.

Structural

Description

See Barrack 430 at Missile Launching Site.

Conditions

- Exterior cladding is corroded at grade and has been replaced in several sections. Corrosion is also occurring at roof (Figure 1.3-11).

- Roof is open at intersection with wall in several locations (Figure 1.3-12).

Work Recommendations

- Repair or patch dents, holes, gouges, and surface rust on exterior corrugated metal siding.

- Close roof openings.



Figure 1.3-11: West face of 403 showing corroded cladding at grade and roof, with replacement sections over the majority of the wall.



Figure 1.3-12: Open roof-wall intersection of 403.

Building Systems

Description

HVAC

The barracks currently contains existing heating hot water piping that was part of a heating hot water system that included hot water radiators. There are no existing radiators currently.

Plumbing

There is no evidence that these systems existed in this building.

Electrical

The building was used as a barracks, and we assume that it originally contained an electrical panel, lighting fixtures and receptacles similar to the barracks buildings at the launch site. However, none of the original systems remain intact. There does not appear to have been a fire alarm system.

Conditions

HVAC

The existing remaining heating hot water piping is deteriorated and in poor condition.

Plumbing

Not applicable.

Electrical

Not applicable.

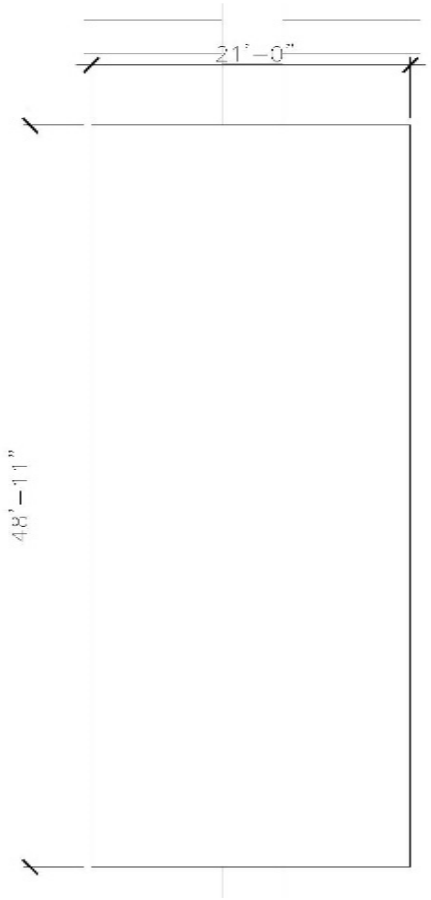


Figure 1.3-13: Building 403 Interior.

Character Defining Features

- Massing: One story rectangular structure with gable roof ca. 1955.
- Materials: Corrugated metal siding ca. 1955 with some later replacement pieces.
- Doors: Original wood paneled door on the south elevation and a set of double corrugated metal doors on the north elevation.
- Windows: Original fenestrations with wood frames on the windows.

No. 404: Barrack Slab



Number 404 is a concrete slab located in the northwest corner of the Radar Tracking Site, adjacent to Barracks 402 and 403.



Figure 1.3-14: Concrete slab of demolished Barrack building 404.

Structural

Description

Concrete Slab.

Conditions

- All that remains of T-404 is a concrete slab, with evidence of the bolted connections between the truss angle and slab (Figure 1.3-17).
- Slab is cracked in the short direction at midspan (Figure 1.3-15, Figure 1.3-18).

Work Recommendations

- No recommendations for existing slabs.
- Clean all exposed steel of corrosion and coat with zinc-rich, rust inhibitive coating.



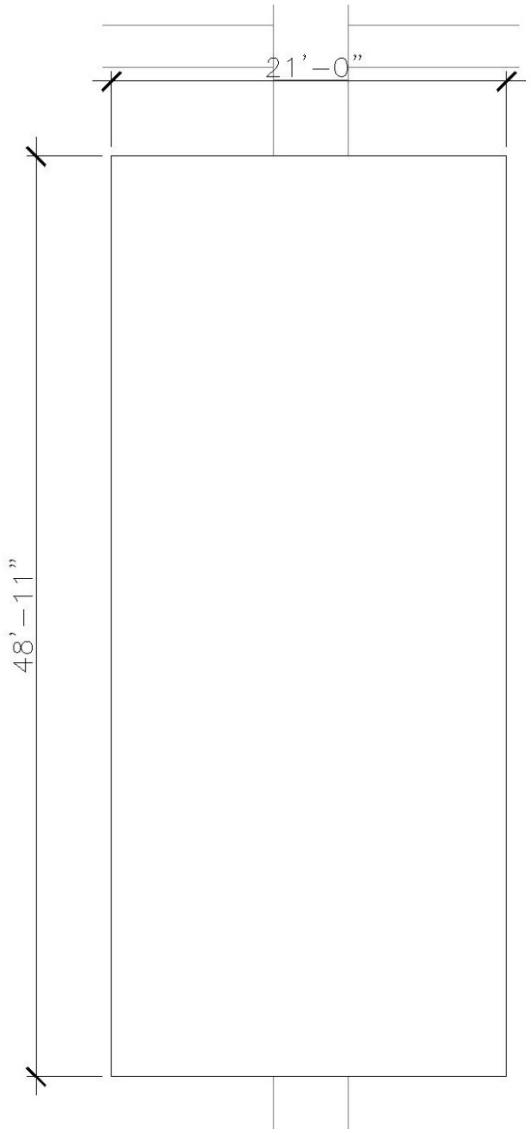
Figure 1.3-15: 404 slab. Arrows indicate mid-slab crack.

Building Systems

Description

No structure or systems exist.

No. 405: Barrack Slab



Number 405 is a concrete slab located in the northwest corner of the Radar Tracking Site, adjacent to Barracks Slab 404.



Figure 1.3-16: Concrete slab of demolished Barrack building 405.

Structural

Description

Concrete Slab.

Conditions

- All that remains of T-405 is a concrete slab, with evidence of the bolted connections between the truss angle and slab (Figure 1.3-17).
- Slab is cracked in the short direction at midspan (Figure 1.3-15, Figure 1.3-18).

Work Recommendations

- No recommendations for existing slabs.
- Clean all exposed steel of corrosion and coat with zinc-rich, rust inhibitive coating.



Figure 1.3-17: Anchor bolt and plate at the slab of 405.



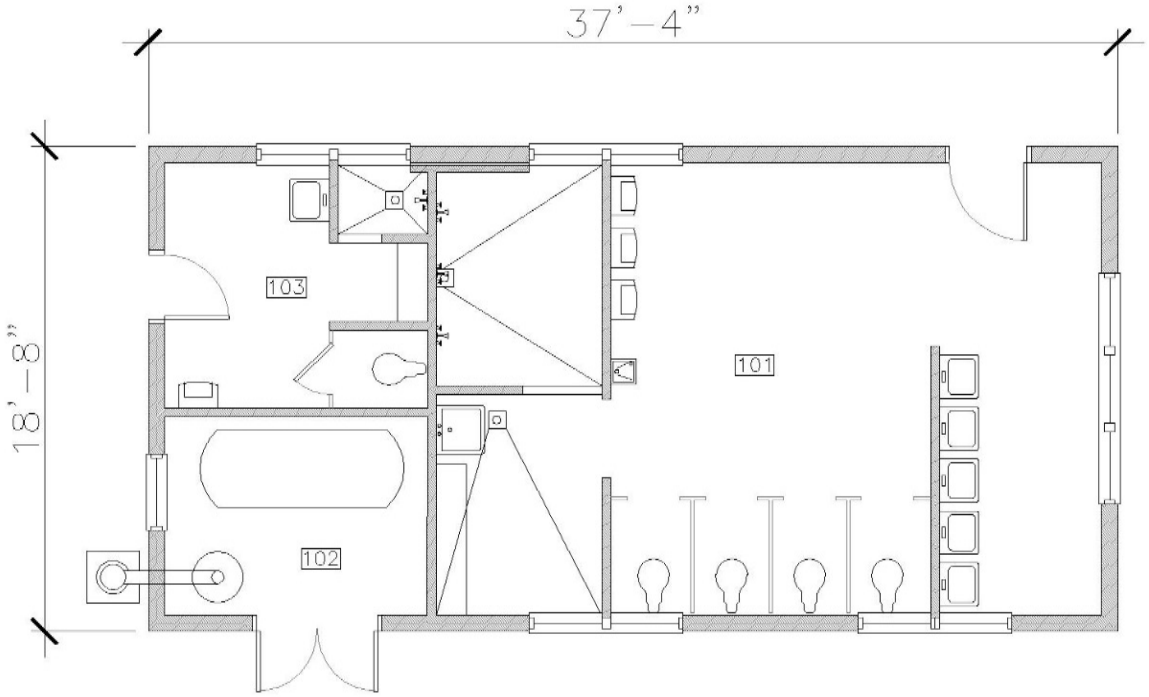
Figure 1.3-18: 405 slab. Arrows indicate mid-slab crack.

Building Systems

Description

No structure or systems exist.

No. 406: Latrine



Architectural

Description

Exterior

Building 406, the Latrine, is a one-story structure located in the northwest corner of the Radar Detection Site, just south of Barack Buildings 402 and 403. The rectangular building, constructed in 1955, has concrete masonry unit walls and is situated on a concrete foundation. The structure has a flat roof with wood bed moulding boards on each elevation. The north elevation has three fenestrations: a wood door on the east side and two windows on the west side. The windows are covered with plywood, however the concrete sills are exposed. The south elevation also has three fenestrations: a set of double plywood doors on the west side and two windows, similar to the north elevation, on the east side.

The west elevation has two fenestrations: a plywood door on the north side and a two-paned metal hopper window with a concrete sill on the south side. There is also a large rusted metal pipe hanging on the south side. The east elevation has a rectangular window in the center of the wall that is covered with plywood.



Figure 1.3-19: The north and west elevations (left) and the west and south elevations showing fenestrations and rusted pipe (right) of Building 406.

Interior

The interior finishes of building 406 include a combination of CMU, plasterboard and tiled walls, plasterboard ceilings and a concrete floors. There are metal partitions for the water closets and many of the plumbing fixtures are in intact, including water closets and lavatories. The interior of the doors and metal windows are covered or replaced with plywood.



Figure 1.3-20: The interior of the Latrine facing south towards water closet partitions (left) and the interior facing east, showing the door on the north elevation and debris accumulating on the floor (right) of Building 406.

Conditions

The exterior of Building 406 is in good condition; there is minor paint failure do to general weathering and the ocean atmosphere. The windows and doors are in poor condition because of water damage and weathering. The interior is in poor condition; the ceiling is missing or deteriorating, the paint on the CMU is failing and the metal partitions are rusting. All of these conditions were caused by water damage, creating a large amount of debris throughout the interior.

Exterior

- The concrete masonry walls on Building 406 are in good condition. There are some horizontal cracks around the heads and sills of the windows and doors on the north elevation, and unit cracks above the window head on the east elevation. One of the masonry units near the window jamb on the south elevation is broken, as well as several units in the southeast corner.

- The doors are in poor condition. On the north elevation, the door is badly deteriorated, delaminated and damaged. The frame is badly rotting, contains fastener holes, and is pulling away from the masonry. The screen door for the opening is no longer in place. On the south elevation, the door has been replaced with plywood and the frame is rotting and splitting near the sill. The door on the west elevation has also been replaced with plywood.

- The windows are in poor condition. There is moderate surface rust on the sash and frame of the west window. All of the other windows are missing, badly damaged or have been covered with plywood.

- The eaves and soffits are in poor condition. Both are badly rotting on the south elevation and the fascia is badly weathered in all other locations. The soffit is rotting in the northeast corner and there is surface rust on the flashing throughout.



Figure 1.3-21: Rotting and deteriorating eave on the south elevation (left) and a rusted hopper window on the west elevation (right) of Building 406.

Interior

- The conditions of the walls vary from poor to fair. There are several cracks, penetrations and abandoned anchors in the CMU. The plasterboard partition is partially missing due to water damage, has open joints and is starting to bow. The tile walls in the shower area are failing.

- The ceiling is in poor condition. Some areas are sagging or missing due to water damage and all of the fasteners in the ceiling are rusting.

- The concrete floor is generally in good condition where visible.

- The interior framing of the north door is severely damaged and falling apart.

- The interior side of the windows are in poor condition; they are badly rusted and all of the glass is broken or missing. Two sashes are missing: one on the east elevation and one on the north. The remaining windows on the north elevation are in fair condition and although the south window is in better condition than the rest, it is rusting and has broken glass.



Figure 1.3-22: Rusted and broken windows on the interior east elevation covered with plywood (left) and missing plasterboard in ceiling due to water damage (right) of Building 406.

Work Recommendations

- Repair horizontal cracks around the heads and sills of the windows and doors on the north elevation. Repair unit cracks above the window head on the east elevation. Replace broken CMU near window jamb on the south elevation, as well as several units in the southeast corner.

- Replace door and frame on north elevation, as well as interior frame and new screen door (missing). Replace door on south elevation and restore or replace door frame. Replace door on west elevation.

- Restore windows on north elevation. Restore window on west elevation (exhibiting moderate surface rust on the sash and frame) and window on south elevation (rusting and broken glass). Replace two window sashes, one on the east elevation and one on the north.

- Replace eaves on south elevation and fascia throughout structure where necessary. Replace soffit on south elevation and in northeast corner. Replace rusted flashing throughout the structure where necessary.

- Repair cracks, fill penetrations and replace abandoned anchors on interior CMU walls. Replace interior plasterboard partition. Replace tile walls in the shower area.

- Replace toilet partitions.

- Replace entire plasterboard ceiling with new plasterboard and paint.

- Remove debris, clean and paint concrete floor.

Structural

Description

The building consists of CMU bearing walls supporting a wood joist roof spanning the short direction of the building.

Conditions

- CMU walls are in fair condition, with limited cracking observed.
- Roof joists tails, soffit, and fascia boards are deteriorated. This condition occurs most commonly where the roof flashing laps (Figure 1.3-23).

Work Recommendations

- Repoint all open joints. Where possible, remove corroded horizontal joint reinforcement. Assume 25% repointing required.
- Repair roof elements effected by roof flashing laps. Consider redesign of roof flashing to prevent future localized deterioration.



Figure 1.3-23: Deteriorated wood elements of Building 406. Arrow points to lap in roof flashing.

Building Systems

Description

HVAC

The building was the latrine. There is evidence of exhaust fans and hot water heating radiators with heating hot water distribution piping.

Plumbing

The plumbing system consists of four (4) waters closets, three (3) urinals, six (6) shower heads and valves, a service sink, a drinking fountain and evidence of a trough type lavatory. There is also evidence of a gas/oil fired domestic hot water heating system. Floor drains are also present.

Electrical

Electrical service to the building was overhead aerial to a panel that served the building loads. The panel rating could not be determined. Internal and exterior building wiring was done by surface mounted conduit, some of which still remains in place. Other than the mechanical equipment, there were incandescent light fixtures, switches, and receptacles. There does not appear to have been a fire alarm system.

Conditions

HVAC

All remaining systems are damaged, deteriorated and in poor condition.

Plumbing

All remaining fixtures are damaged and deteriorated. All visible and remaining domestic water piping is deteriorated and in poor condition. The underground sanitary system is deteriorated and unusable.

Electrical

Building is unoccupied. There are no active electrical systems in the building. The original lights, panel and mechanical equipment starters and disconnect switches are still in place, however, they do not appear to be salvageable for re-use.



Figure 1.3-24: Interior of Building 406.



Figure 1.3-25: Interior of Building 406.



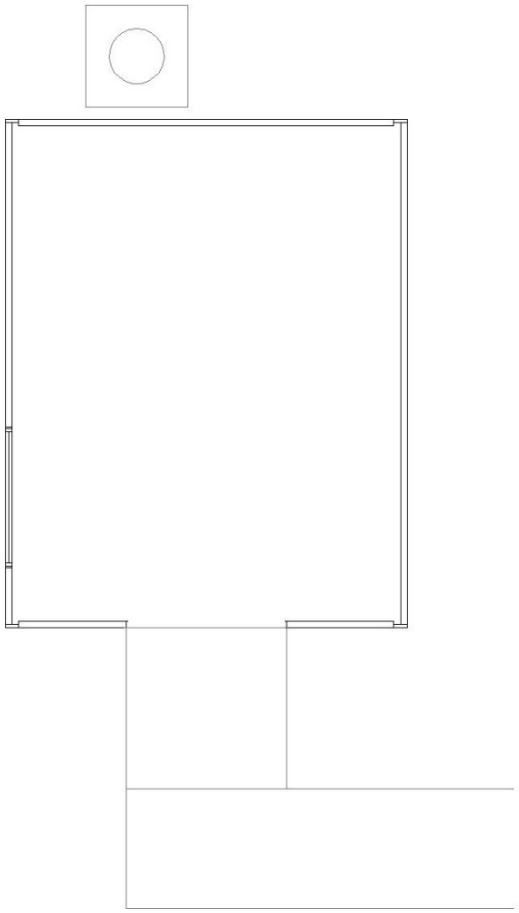
Figure 1.3-26: West Elevation of Building 406.

Character Defining Features

- Massing: One story, rectangular structure with flat roof ca. 1955.
- Materials: Concrete Masonry Unit, wood and sheet metal ca. 1955.
- Doorways: Original wood door on north elevation ca. 1955.
- Windows: Metal hopper windows ca. 1955.

No. 407: Central Heating Plant

Architectural



Description

Exterior

Building 407, the Central Heating Plant, is a one-story structure located in the northwest corner of the Radar Tracking Site, just south of the two remaining barracks. The rectangular building was constructed in 1955 with corrugated metal siding and a corrugated metal gable roof. The structure is situated on a concrete foundation, with two fenestrations: a large, framed metal door opening on the south elevation and a small window on the west elevation. The door opening on the south elevation is covered with a large sheet of plywood, making the structure inaccessible. The window on the west elevation is a four-paned, metal hopper window that is original to the structure. There is a small vent on the north elevation. The only fenestrations on the east elevation is a small hole on the south side for electrical wiring. There are numbered building signs on the north and south elevations, as well as metal signs with the name Butler Manufacturing Company (Kansas City, MO) at the rooflines of the north and south elevations.



Figure 1.3-27: The east (left) and north (right) elevations showing fenestrations of Building 407.

Interior

The interior of the Heating Plant was not accessible, however it was visible through the window on the west elevation. The floor of the small structure is concrete and mostly covered by the original boiler. The ceiling and walls are corrugated metal with no insulation or finished materials.



Figure 1.3-28: The interior of Building 407 showing the rusting boiler.

Conditions

The exterior of Building 407 is in good condition with some rust developing around the foundation, roofline and fenestrations. The window and door have deteriorated due to water infiltration and weathering. The interior is in fair condition; the corrugated metal and metal framing is rusting due to water damage.

Exterior

- The metal siding is in good condition. The metal has been patched above the door opening on the south elevation and there are areas of rust on each elevation, particularly around the foundation, rooflines and all fenestrations. The rust is particularly visible on the north elevation.

- Minor vegetation is visible on the north and west elevations. On the west elevation, the vegetation is beginning to grow around the window, penetrating into the interior of the structure.

- The door on the south elevation is missing. Sheets of plywood have been installed for security and protection.

- The window is in very poor condition. The glass is broken and the frame and sash are rusted.





Figure 1.3-29: Rust around the door and roofline on the south elevation (left) and a rusted and broken hopper window on the west elevation (right) of Building 407.

Interior

- The interior framing of the building is in poor condition. The metal is exposed and extremely rusted.

- The concrete floor appears to be in good condition.

- The light fixture in the ceiling is intact and in good condition with minor rust.



Figure 1.3-30: Rusted boiler (left) and rusted metal framing of Building 407 (right).

Work Recommendations

- Remove vegetation on north and west elevations, especially around the window on the west elevation where it is penetrating the interior of the structure. Cut and patch areas of rust around the foundation, rooflines and fenestrations on each elevation (especially bad on north elevation).
- Replace door on south elevation.
- Restore window frame and sash and replace glass in each of the four panes.
- Remove debris and clean concrete floor.
- Repair minor rust on ceiling light fixture.

Structural

Description

The steel frame structure is clad with corrugated, galvanized sheet metal. Interior access was limited to photographs taken through a small opening. Structure has a slab on grade.

Conditions

- Steel frame and cladding is corroded, but building is intact. Full interior access is necessary to fully survey structural systems.

Work Recommendations

- Clean all corroded steel and coat with zinc-rich rust inhibitive coating.

- Corrosion of cladding is minor but may require replacement. Cut and patch areas of rust, particularly around the foundation, rooflines and fenestrations. Assume 10% replacement required.

- Inspect interior steel framing for condition. Assume 25% of interior elements will need to be cleaned of corrosion and coated with a rust-inhibitive coating.



Figure 1.3-31: Rusting metal framing on the Interior of 407.

Building Systems

Description

Description

HVAC

The building houses a boiler plant. The boiler plant consists of a gas/oil fired water tube boiler.

Plumbing

There is no evidence of any plumbing systems.

Electrical

Electrical service to the building was overhead aerial to a panel that served the building loads. The panel rating could not be determined. Internal building wiring was done by surface mounted conduit, some of which still remains in place. Other than the mechanical heating control circuit, there was an incandescent light fixture and switch, and a receptacle. There does not appear to have been a fire alarm system.

Conditions

HVAC

The boiler is deteriorated and in poor condition. There is no existing flue venting remaining. The heating hot water distribution piping is deteriorated and in poor condition.

Plumbing

Not applicable.

Electrical

There are no active electrical systems in the building. The original panel, light, and switch are severely rusted, and are not salvageable for re-use.



Figure 1.3-32: Southeast Exterior of Building 407.



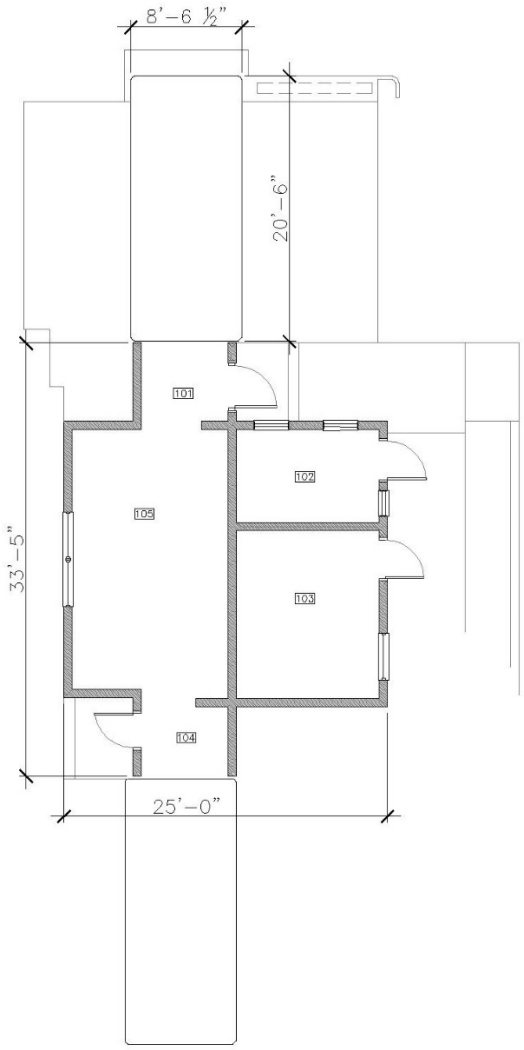
Figure 1.3-33: Interior Boiler of Building 407.

Character Defining Features

- Massing: One story structure with gable roof ca. 1955.
- Materials: Corrugated metal siding ca. 1955 with some later replacement pieces.
- Doorway: Original metal frame opening on south elevation.
- Window: Metal hopper window on west elevation ca. 1955.

No. 409: Inter-Connecting Corridor and Control Vans

Architectural



Description

Exterior

Building 409, the Inter-Connecting Corridor and Control Vans, is a one-story structure located in the southwest corner of the Radar Detection Site. The building, constructed in 1956, has concrete masonry unit walls and is situated on a concrete foundation. It has a slightly pitched roof with wood bed moulding boards on each elevation. The north elevation is three bays wide and has two painted wooden louvered windows on the east bay. There is a white metal van projecting north from the central bay that was used for radar detection at the time the site was in use. Similarly to the north elevation, the south elevation is three bays wide with a van projecting from the central bay, however there are no fenestrations on this elevation.

The east elevation is three bays wide with a total of five fenestrations. The central bay has two plywood doors on the north side (one with a covered transom), a wooden louvered window between the doors, and a two-over-one window on the south side. The north bay has a metal door reached by three concrete steps, and the south bay has no fenestrations. The west elevation is three bays wide with two fenestrations: a double set of two-over-two, double-hung, wood windows in the central bay and a metal door with concrete steps on the south bay. There is also a concrete slab situated north of Inter-Connecting Corridor and Control Vans**.**



Figure 1.3-34: The east and north elevations and control van (left) and concrete slab on the northeast side of Building 409 .

Interior

The interior walls for Building 406 are constructed with a combination of concrete masonry unit and plasterboard, several with wood baseboards. Most of the ceilings consist of the exposed roof structure, and some are finished with acoustical ceiling tiles. The floors in the building are a combination of concrete and vinyl asbestos floor tile. The windows are wood with wood trim, and there are wood doors and metal rollup doors.



Figure 1.3-35: The interior of Building 409 showing vinyl asbestos tile floor, CMU walls, ductwork and furniture.

Conditions

The exterior of Building 409 is in fair condition; there are cracks in the CMU because of moisture and spalling due to general weathering. The roof is exhibiting rust and the paint is deteriorating throughout from water damage and general weathering. The interior is in good condition with similar conditions on the interior CMU walls.

Exterior

- The walls on Building 409 are in fair condition. The CMU is exhibiting movement throughout; there is a stepped crack at the southeast corner, broken units in the northeast corner and displacement at the rusting lintel on the north end. Penetrations, fasteners and anchors have been abandoned and there are areas of soiling and ailing patches. Other conditions include large cracks and missing mortar on the west side of the north elevation, as well as areas of growth and infill.

- The doors are in fair condition. The east doors are exhibiting minor rot, open joints, fastener damage, replacement leaves, a missing threshold and some replacement trim. The north door has a rusted lintel, bent louvers, mild surface rust and a rotting door head. The west door has a rusted frame and a weathered sub-frame. The replacement head is weathered as well. The modules are exhibiting surface rust, mostly at the welding and fasteners.

- The windows are in poor condition. The window on the east elevation has a rotting frame, a missing sill, a replacement bottom sash, a deteriorating top sash and failed putty. The louvered window on the east elevation is rusting. The window on the west elevation is splitting and badly weathered; the sills and muntins are rotting and there is fastener damage, putty failure and several open joints.

- The roof is in poor condition; the metal is warping and rusting throughout, causing the roof to leak.

- The flashing and soffit are in poor condition. They are both badly rusted and several sections are missing. The wood fascia badly weathered and rotting on north elevation.



Figure 1.3-36: The rusted and warping roof on the north side (left) and a large crack and missing mortar in the CMU in the northeast corner (right) of Building 409.

Interior

- The conditions of the walls vary from poor to fair. The CMU in Room 101 is exhibiting serious cracking, however the CMU walls in Room 102 are in fair condition. There is minor cracking in the plasterboard walls in Room 103 and a fair amount of damage around the windows at the east wall. The plasterboard walls in Room 105 are in fair condition with minor cracking.

- The conditions of the ceiling vary from poor to fair. The ceiling is missing in Room 105, and the black iron that remains is rusting. Most of acoustical ceiling tile in Room 101 is in place, however it is loose and displaced. In Room 102, the roof structure is exposed and rusting. In Room 103, the plasterboard and acoustical ceiling is badly sagging, has several tiles that have fallen and the plasterboard has detached from the ceiling.

- The floors are in fair condition. The vinyl asbestos tile is generally in fair condition. There are several layers of tile, some of which are broken or missing and there are open joints throughout. Almost half of the vinyl asbestos tiles in Room 103 are broken, loose or missing. The concrete floor in Room 102 is in fair condition.

- The conditions of the doors vary from poor to fair. The rollup doors are still in working condition. At the van in Room 104, the lintel is badly rusted and the concrete sill is deteriorated. The door trim in Room 103 is in good condition.

- The windows are in fair condition; there are some gouges and a rusting dowel. It appears as though some type of window treatment has been applied. The window trim in Room 103 is completely missing.

- Some of the rooms in Building 409 have a wood base, which appears to be in fair condition. It is pulling away in some areas in Room 103.



Figure 1.3-37: A large crack in the CMU on the west wall of Room 101 of Building 409.

Work Recommendations

- Remove vegetation and clean soiled CMU. Repair stepped crack in CMU at southeast corner, replace broken units in northeast corner and reset CMU at rusting lintel on the north end. Repair large cracks and replace missing mortar on the west side of the north elevation. Fill penetrations and replace fasteners and anchors that have been abandoned. Repair areas that have been infilled and ailing patches.

- Restore east doors including missing threshold and replacement trim; the doors are exhibiting minor rot, open joints, fastener damage and have replacement leaves. Repair rusted lintel, rotting door head, mild surface rust and bent louvers at north door. Replace rusted frame, weathered sub-frame and weathered replacement head at west door. Repair welding and fasteners of modules that are also exhibiting surface rust.

- Replace the window on the east elevation; it has a rotting frame, missing sill, replacement bottom sash, deteriorating top sash and failed putty. Repair the rusted louvered window on the east elevation. Replace the window on the west elevation; it is splitting and badly weathered, the sills and muntins are rotting and there is fastener damage, putty failure and several open joints.

- Replace the roof; the metal is warping and rusting throughout, causing it to leak.

- Replace flashing and soffits as they are both badly rusted and have several sections missing. Replace wood fascia; it is badly weathered and rotting on north elevation.

- Repair interior cracks in CMU, especially in Room 101 where cracks are severe. Repair minor cracking in the plasterboard walls and damaged CMU near windows at east wall in Room 103. Repair minor cracks in plasterboard walls in Room 105.

- Replace missing ceiling in Room 105 and repair rusted black iron. Reattach and/or secure acoustical ceiling tiles that are loose or displaced in Room 101. Provide new ceiling in Room 102; the roof structure is exposed and rusting. Replace plasterboard and acoustical ceiling in Room 103; it is badly sagging, several tiles have fallen and the plasterboard has detached from the ceiling.

- Remove debris, clean and paint concrete floor. Replace vinyl asbestos tile floors with new tile, laminate flooring or concrete; there are several layers of tile, some of which are broken or missing and there are open joints throughout. Nearly half of the tiles in Room 103 are broken, loose or missing.

- Restore the lintel and concrete sill at the van in Room 104; the lintel is badly rusted and the sill is deteriorated. Repair gouges and rusting dowels where necessary; the windows are in fair condition and some type of window treatment has been applied. Replace window trim in Room 103 as it is completely missing.

- Reattach wood base where it is pulling away from the wall, particularly in Room 103. Restore or replace sections where necessary.

Structural

Description

The structure consists of CMU bearing walls supporting steel joists with a metal roof deck. On the north and south ends of the building, small extensions connect the main building to radar control vans.

Vans were inaccessible at the time of the visit.

Conditions

- Signs of differential settlement were observed at the north and south ends. The slab of the extension was lower than the slab of the main building (Figure 1.3-38). Cracking was observed in the walls of the extensions (Figure 1.3-39).

- Soffit is missing in select locations.

Work Recommendations

- Differential settlement:

    - Level 1: Repoint cracks in walls; remove existing vinyl tile flooring to apply a leveling compound to settled slab area to create level floor surface.

    - Level 2: Underpin existing foundation to prevent further settlement; repair as described in Level 1.

- Replace soffit where required.



Figure 1.3-38: Differing slab elevations between the north extension and main section of Building 409. Extension is on the right side of the photograph.



Figure 1.3-39: Cracking in west wall of north extension of Building 409.

Building Systems

Description

HVAC

The building contains an existing ventilation system that consists of a fan and distribution ductwork. An electric heating only vertical air handling unit is also located within the building.

Plumbing

There are no plumbing systems in the building.

Electrical

Electrical service enters the building from an overhead aerial line from the outdoor transformers adjacent to the generator building. Telephone service enters the building in a similar manner from an aerial line. The distribution panelboard is manufactured by ITE and rated 400A, 208/120-volt, 3-phase, 4-wire. The panel consisted of three circuit breakers that fed the two control trailers; one radar and one battery, as well as one 208/120-volt, 100A, 20-pole panel mounted across from the service panel.

The building is connected to two pre-fabricated trailers, one for radar control and the other for battery control. Each trailer has external connections to allow them to be powered by an emergency generator if needed. We were not able to access the interiors of the trailers to observe the condition of the systems inside.

Lighting in the building was recessed fluorescent fixtures in the ceiling and controlled by local switches. Exterior lighting fixtures were building mounted incandescent with jelly jar style type fixtures. Receptacles

were provided in the building for convenience power. Motor starters for the various pieces of equipment are still in place. There does not appear to have been a fire alarm system.

Conditions

HVAC

The ventilation fan system and surrounding ductwork are deteriorated and in poor condition. The interior office area ductwork is not active and appears to be in poor condition. The vertical air handing unit is deteriorated and in poor condition.

Plumbing

Not applicable.

Electrical

The majority of the original electrical systems remain intact within the building, however the systems are not active.



Figure 1.3-40: Ventilation Fan System of Building 409.

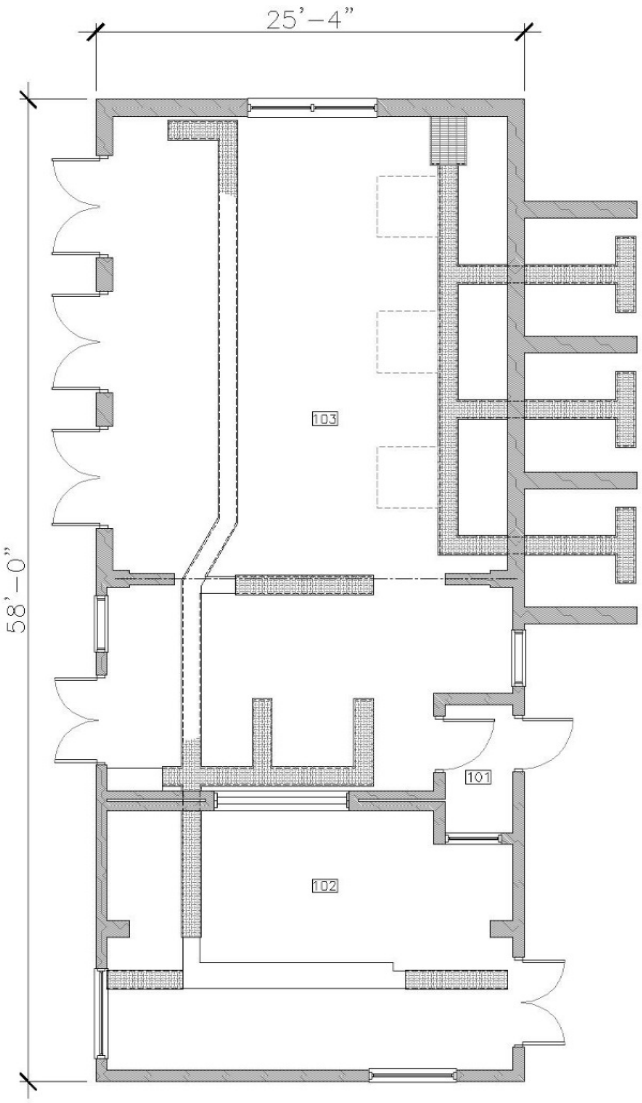


Figure 1.3-41: Vertical Air Handling Unit of Building 409.

Character Defining Features

- Massing: One story structure with slightly pitched roof ca. 1956.
- Materials: Concrete Masonry Unit, wood and sheet metal ca. 1956.
- Doorways: Wood doors with wood trim ca. 1956.
- Windows: Wood louvered windows and wood double-hung windows.

No. 410: Generator House



Architectural

Description

Exterior

Building 410, the Generator House, is located in the southwest corner of the Radar Tracking Site. There were multiple building campaigns for the one-story concrete masonry unit structure. The earliest part of the building was constructed in 1956, with an addition in 1958 and another addition in 1962. The building has a flat roof with a metal fascia on each elevation. The north elevation is one bay wide and has a double set of hopper windows. The four-paned, metal windows contain their original glass and hardware. There is a downspout along the west side of the elevation, as well as a wood bed moulding board.

The east elevation is three bays wide with a stepped roof, the south bay having the lowest roofline. This bay has a large metal frame opening that is covered with a sheet of plywood, making the interior inaccessible from this point. The middle bay has two fenestrations: a wood board and batten door with a concrete sill, and a metal louvered window with a metal frame and wire mesh screen to the right of the door. There is one light fixture to the left of the door. The north bay is the largest, and has four concrete masonry unit walls projecting east from its façade. There are concrete slabs between the walls, each housing mechanical equipment for the building. This elevation has the same wood bed moulding board as the north elevation.

The south elevation is one bay wide and has two fenestrations on the east side. The first is a double set of single-paned, double-hung windows with a wood frame and masonry sill. Two panes have been replaced with boards, and the panes with glass have plywood on the interior. The second fenestration is a louvered vent below the windows. The wood bed moulding board continues below the roofline and there are some electrical wires exposed on the west side of the elevation.

The west elevation is three bays wide with the same stepped roofline as the east elevation. It has a downspout, gutters, and many fenestrations. The north bay has six fenestrations: three door openings with three smaller openings above. Each door opening has a double set of plywood doors with concrete sills and a combination of original and modern hardware. The openings above the doors each contain a double louvered window with a wire mesh screen. The middle bay has a similar set of plywood doors, but on a smaller scale. There is a louvered window with a wire mesh screen and a masonry sill to the left of the door. There is a metal gutter, downspouts and a wood bed moulding board on this elevation as well. The south bay has a double set of one-over-one double hung wood windows with glass panes, similar to the windows on the north elevation.



Figure 1.3-42: The metal hopper window and downspout on the north elevation (left) and the stepped roof and fenestrations of the three-bay wide west elevation (right) of Building 410.

Interior

Building 410 has three rooms. Room 101 is a small vestibule accessed from an exterior door on the east elevation. It has a concrete floor, CMU walls, a particle board ceiling and metal doors with original hardware. Rooms 102 and 103 have concrete floors, corrugated metal ceilings (with a metal vapor barrier in Room 102), CMU walls in Room 102 and particle board walls in Room 103. There are metal “trenches” with tracks in the floors in each room; Room 103 has a metal cover. Room 102 has wood baseboards and shoe moldings in some areas.



Figure 1.3-43: Room 103 of Building 410, facing north, showing CMU walls, metal hopper windows and corrugated metal ceiling.

Conditions

The exterior of Building 410 is in fair condition; there are cracks in the CMU because of moisture and spalling due to general weathering. The roof is exhibiting rust and the paint is deteriorating throughout from water damage and general weathering. Growth and vegetation are also causing cracks in the CMU. The interior is in poor condition; the ceiling is missing and remnants of the vapor barrier are disintegrating. The exposed metal ceilings are rusted due to water penetration and there is graffiti on the walls throughout.

Exterior

- The conditions of the concrete masonry unit vary from poor to fair. Each elevation has peeling paint and minor vegetation throughout. There are several vertical cracks and areas of spalling and deterioration on the north and west elevations. The CMU on the east elevation is broken, deteriorated and spalled, and there is a large horizontal crack and several penetrations that have been filled in near the foundation. The south elevation is exhibiting deteriorating mortar in the CMU.

- The door on the east elevation is in good condition, however the frame is rotting and splitting. There is a combination of original and new hardware on the door; the original hardware is in poor condition and rusting. The metal thresholds on the west elevation are peeling and rusting.

- The window conditions vary from poor to good. Each window retains its original glass throughout the building. The frames and sashes on the north and east elevations are in poor condition, exhibiting rust and peeling paint. On the west elevation, the south window and sill are in good condition, with some peeling paint, and the louvered windows with metal screens are very rusted. The louver on south elevation is also in poor condition; the bottom of the frame is missing, the wood is rotting and the paint is peeling.

- The roof is in poor condition; it is deteriorating and leaking in multiple places. The three roof vent covers are missing and have been replaced with plywood sheets and roofing paper.

- The downspouts appear to be in good condition throughout, with some peeling paint on the west elevation.

- The bed moulding board is rotting on north and west elevations.

- The light fixture on the east elevation is broken.



Figure 1.3-44: Double-hung windows with the original wood frame and masonry sill on the south elevation (left) and a metal louvered window with a metal frame and wire mesh screen on the east elevation (right) of Building 410.

Interior

- The conditions of the walls vary from poor to fair. The walls are a combination of CMU and particle board. The particle board is either missing or extremely deteriorated, exposing the CMU underneath, and the paint is severely peeling on all of the walls.

- The ceilings, made from corrugated metal and particle board, are in poor condition. Approximately thirty percent of the particle board, along with the metal vapor barrier, is deteriorated. The corrugated metal ceiling in Room 103 is in good condition with some rusting, and the metal framing is rusting.

- The concrete floors are in good condition. The trenches in the floor are in fair condition, with some rusting throughout. There is a large amount of debris in Room 102.

- The original metal doors are in good condition, exhibiting minor rust and paint failure. The original hardware is still intact.

- Several of the wood baseboards and shoe molding are intact and in fair condition.
- Some of the light fixtures are intact, however they are in poor condition and rusting.



Figure 1.3-45: The deteriorated metal vapor barrier in Room 102 (left) and remnants of plasterboard and a large opening that is infilled with plywood in Room 102 (right) of Building 410.

Work Recommendations

- Remove vegetation on exterior concrete masonry unit. Repair vertical cracks and areas of spalling and deterioration on the north and west elevations. Repair large horizontal crack and broken, spalled or deteriorated CMU on east elevation. Check for soundness of infilled penetrations near foundation and repair if necessary. Repair deteriorating mortar in CMU on south elevation. Strip and repaint CMU on all elevations.
- Restore or replace rotting and splitting door frame and original rusted hardware on east elevation. Replace peeling and rusting metal thresholds on west elevation.
- Restore frames and sashes on north and east windows, they are exhibiting rust and peeling paint. Restore rusted louvered windows with metal screens on west elevation. Restore louver on south elevation; the bottom of the frame is missing, the wood is rotting and the paint is peeling. Strip and paint all windows.
- Replace deteriorating and leaking roof. Replace three missing roof vent covers that have been replaced with sheets of plywood and roofing paper.
- Restore and paint downspouts (paint is peeling on west elevation).
- Replace rotting bed moulding board on north and west elevations.
- Replace broken light fixture on east elevation.
- Replace all of the missing or deteriorating interior particle board walls. Strip and paint all of the interior CMU walls.

- Replace deteriorated particle board ceiling and vapor barrier, and restore rusted metal ceiling and framing in Room 103.

- Remove debris, clean and paint concrete floor. Restore rusted floor trenches throughout.

- Strip and paint original metal doors that are exhibiting minor rust and paint failure. Restore original hardware where necessary.

- Restore wood baseboards and shoe molding where necessary.

- Replace interior light fixtures that are in poor condition and rusting.

Structural

Description

The structure consists of CMU bearing walls supporting steel joists with a metal roof deck. According to available drawings, the original portion of the structure is the lower side to the south. The addition is toothed into the existing masonry, such that there is no clear division from the exterior between the original structure and addition. At the north end of the east wall, CMU dividing walls extend from the structure by 6'-8" and have approximately half the building wall height. Drawings indicate the walls were to be grouted solid and supported diesel engine exhaust silencers with radiators located between the walls (Figure 1.3-46).

In order to create a large opening between the new and existing structure, a portion of the existing exterior wall was demolished and two continuous channels were installed as lintels (Figures 1.3-47 and 1.3-48).

Conditions

- Horizontal cracking was observed throughout the structure, with corroded joint reinforcement visible where mortar was missing (Figure 1.3-49). Mortar found on the ground at locations of open joints was still hard, suggesting corrosion of the joint reinforcement is the main cause of failure, and not the mortar (Figure 1.3-50). This deterioration is consistent with the location of reinforced bond beams with continuous joint reinforcement as noted on the drawings. The use of non-galvanized steel and inadequate cover have likely contributed to corrosion of the joint reinforcement.

- A vertical crack at the west wall was observed where the building elevation transitions (Figure 1.3-51).

- The rear dividing walls are severely deteriorated at the exposed end, possibly a result of alkali-silica reaction (ASR) in the grout. ASR is an expansive deterioration mechanism in concrete caused by a reaction between silica in the aggregate and alkali in the cement paste. Two CMU blocks at the northernmost wall have spalled significantly, exposing soft, delaminating grout (Figure 1.3-52). The location of the deterioration is identical at all silencer support walls, suggesting the

deterioration may also be a result of mechanical connections between the walls and silencers (Figure 1.3-53).

Work Recommendations

- Repoint all open joints. Where possible, remove corroded horizontal joint reinforcement. Assume 25% repointing required.
- At vertical transition and crack, rout crack and install sealant joint with backer rod.
- At rear dividing walls, replace heavily deteriorated blocks and repoint open joints. Assume 20% replacement and 50% repointing.

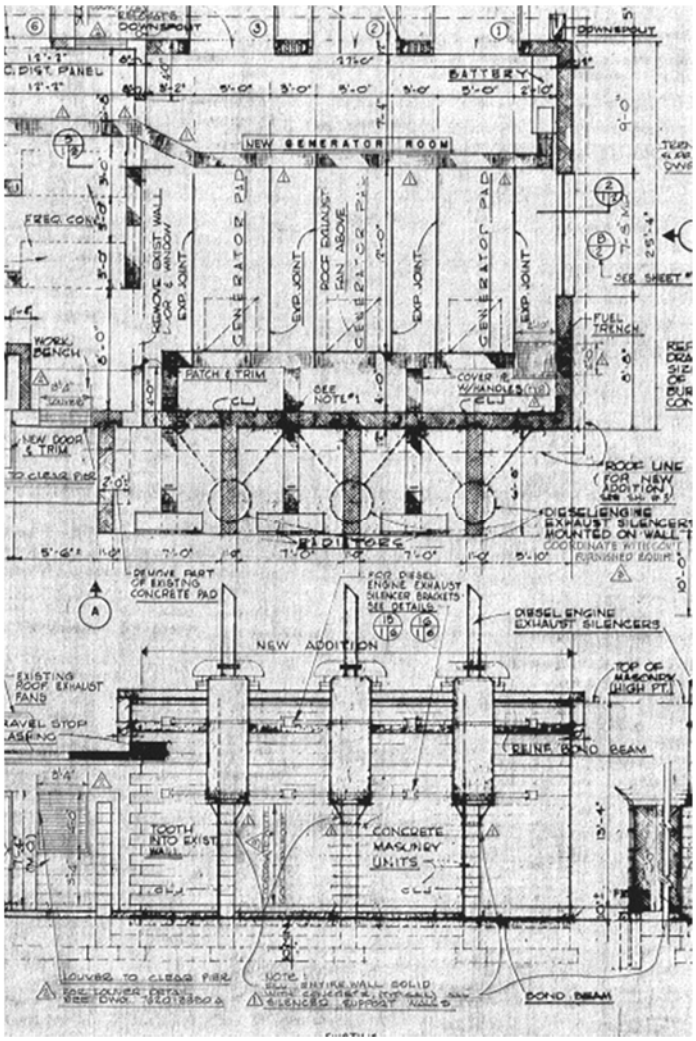


Figure 1.3-46: Plan and elevation showing the diesel engine silencers and radiators. Excerpt from "Generator Building Modification, Type A & B, Plans & Elevations," dated June 10, 1960.

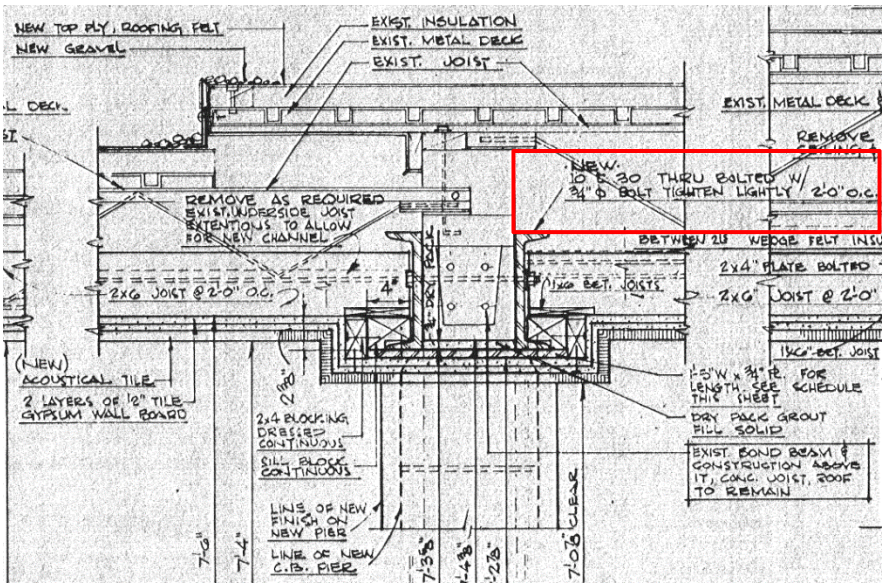


Figure 1.3-47: Excerpt from "Floor Plans & Details for Modification to Existing Generator Building, Type A & B," dated September 11, 1961.



Figure 1.3-48: Channels and plates in Building 410.



Figure 1.3-49: Horizontal cracking at south wall of Building 410.



Figure 1.3-50: Hard, intact mortar found on the ground near open horizontal joint of Building 410.



Figure 1.3-51: Vertical crack at section transition of Building 410.



Figure 1.3-52: Spalled CMU exposing soft grout on Building 410.



Figure 1.3-53: Identical location of deterioration at silencer support walls of Building 410.

Building Systems

Description

HVAC

The building contains motorized louvers, ventilation fans, and electric unit heaters.

Plumbing

There are no plumbing systems in the building.

Electrical

This building housed emergency generators that served as a reserve power source for the site and the radar platforms. Electrical service for the building was provided by the transformers adjacent to the building. The electrical service panel was rated 800A, 208/120-volt, 3-phase, 4 wire and was manufactured by ITE. The panel consisted of the circuit breakers that fed panelboards, equipment, and two non-automatic 400A, 3-pole circuit breakers which fed the radar platforms.

The building contains troughs in the floor that were likely used for the interconnecting cabling between the generators.

Lighting in the building was primarily incandescent and controlled by local switches. In addition, receptacles were provided in the building for convenience power. Circuiting in the building was surface mounted conduit. Various pieces of equipment are still in place. There does not appear to have been a fire alarm system.

Conditions

HVAC

The louvers are currently shut, do not appear to be operable and are in poor condition. The ventilation fans and electric unit heaters have deteriorated and are in poor condition.

Plumbing

Not applicable.

Electrical

There are no active electrical systems in the building. The original generators have been removed from the building. The electrical service panel and some other electrical service equipment remain in place, but have all been disconnected and panel covers removed.



Figure 1.3-54: Electric Unit Heater of Building 410.



Figure 1.3-55: Ventilation Fan of Building 410.

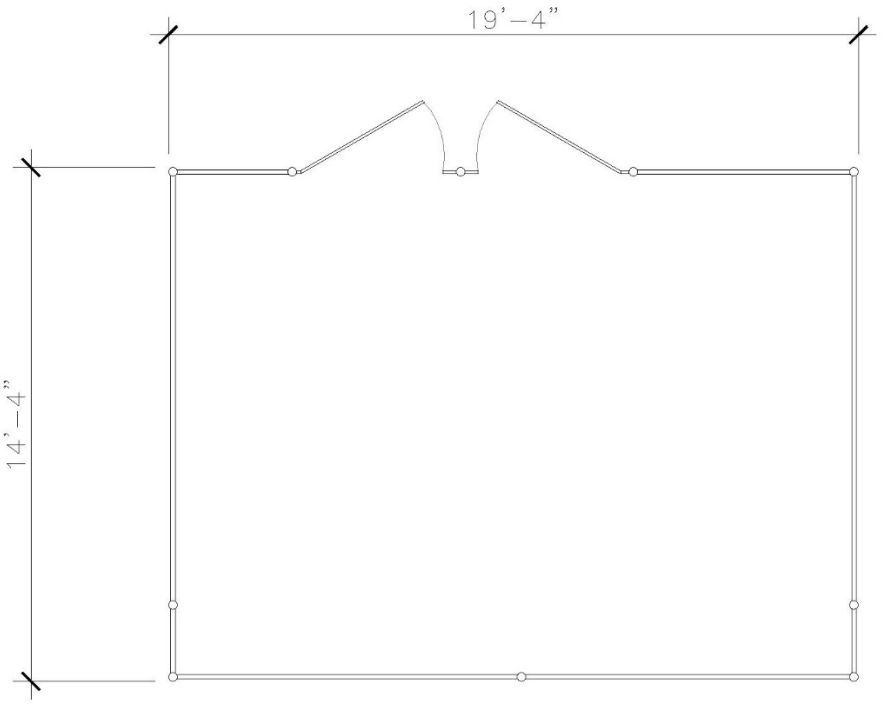


Figure 1.3-56: Motorized Louvers of Building 410.

Character Defining Features

- Massing: One story structure with flat, stepped roof ca. 1956.
- Materials: Concrete Masonry Unit ca. 1956 with later additions.
- Doorways: Large openings with wood trim on east and west elevations: board and batten door on east elevation and four double sets of plywood doors on the west ca. 1956.
- Windows: Metal hopper windows on the north elevation, metal louvered windows on the east and west elevations, and double-hung wood windows on the south and west elevations ca. 1956.

Transformers Pen



The transformers associated with Building 410 have been removed from the site. Although the fence and framing are intact, they are damaged and extremely rusted.



Figure 1.3-57: Damaged and rusted fencing for transformers that are no longer extant.

Building Systems

Description

HVAC

There were no HVAC systems at this location.

Plumbing

There were no plumbing systems at this location.

Electrical

This area consisted of a concrete pad that was fenced in and contained the step-down transformers that provided power to the adjacent buildings and radar platforms. The service was delivered from the utility at medium-voltage and stepped down to low-voltage for site use.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

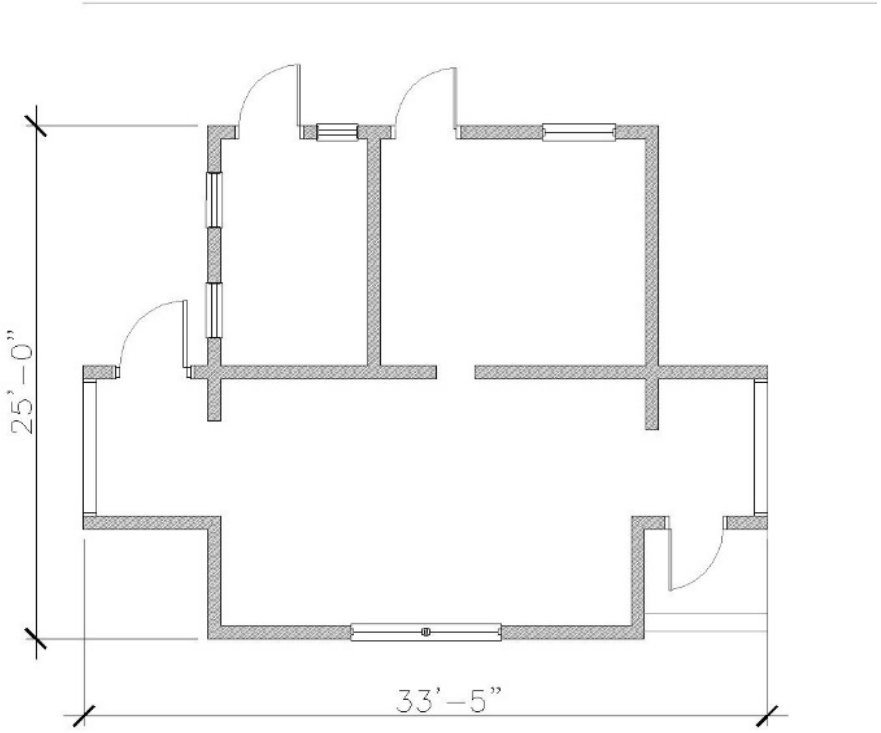
Electrical

The transformers and cabling have all been removed from this location. The original conduits, concrete pad, support structure and fencing are all that remain.



Figure 1.3-58: Transformer Location.

No. 411: Inter-Connector Corridor



Architectural

Description

Exterior

Building 411, constructed in 1956, is a one-story structure located at the northeast side of the Radar Detection Site. It is similar to Building 409, with CMU walls and a concrete foundation, however there are no vans attached to this building. It has a flat metal roof with wood bed moulding boards on each elevation. The north elevation is three bays wide. The center bay has four fenestrations: a window on the east side, a door with a transom in the center, a door on the west side, and another window between the doors. The west bay has one man door and the east bay has no fenestrations. The windows and the transom are covered with plywood, however the concrete sill on the east and the metal sill on the west are still exposed.

The south elevation is three bays wide with two fenestrations: a double set of two-over-two, double-hung, wood windows in the central bay and a metal door reached by concrete steps on the east bay. The east elevation is three bays wide with a door opening in the center bay. The west elevation is three bays wide with three fenestrations: a door opening in the center bay similar to the east elevation, and two wood, louvered windows on the north bay.



Figure 1.3-59: The north, main elevation showing four fenestrations (left) and the west elevation that is almost completely overgrown with vegetation (right) of Building 411.

Interior

The walls in Building 411 consist of a combination of concrete masonry unit and plasterboard and the floors, although mostly obscured, have vinyl asbestos tiles. The ceilings are constructed with plasterboard, however the corrugated metal roof is exposed where the plasterboard is missing.



Figure 1.3-60: The interior exhibiting debris and deteriorating conditions of Building 411.

Conditions

The exterior of Building 411 is in poor condition. It is extremely overgrow with vegetation, causing damage to the CMU, roof and fenestrations. The interior is also in poor condition; the walls and ceiling are extremely deteriorated due to water damage and there is a large amount of debris and vandalism.

Exterior

- The concrete masonry unit is in fair condition. There are abandoned anchors with associated spalls, stepped cracks and holes, as well as mechanical, electrical and plumbing penetrations throughout.

- The doors are in poor condition. Most of the doors are missing, and their frames are badly weathered and rotting. The north door has been modified over time, however both the door and frame are rotting and splitting. Some of the openings to the radar control module are boarded up, while the remaining doors are open to the elements.

- The windows are in poor condition. All of them, including the metal louvered windows, have been covered with plywood. The sills are visible, and they are rusting. The window on the west elevation has a weathered sash, open joints, missing glass and a damaged glazing bead. The frame is weathered and rotting, and the casing is splitting and pulling away.

- The eaves and soffits are in poor condition. The edge flashing and soffit are badly rusted, and there open joints and vegetation throughout. The wood portions are weathered and have abandoned penetrations. The gutters are deteriorated, particularly on the east side.



Figure 1.3-61: Window opening between two doors on north elevation that is covered with plywood (left) and vegetation and deteriorating roof on north elevation (right) of Building 411.

Interior

- The walls are in poor condition. The CMU is exhibiting cracks and broken corners, especially in the southeast corner of Room 103. The plasterboard walls are also in poor condition. They are badly damaged in the front entry: holes, cracking and open joints. In the back room, the plasterboard is heavily damaged with holes, open joints and large areas of delamination.

- The ceilings are in poor condition. The ceiling in Room 103 is failing completely with dramatic sagging. Some areas still have the acoustical tile attached, and some are entirely missing. The

plasterboard ceiling in Room 105 is missing with only the black iron and fragments of plasterboard and acoustical tile remaining. The ceiling in Room 103 are missing with black iron remaining.

- The floors are in poor condition. Though the vinyl asbestos tile in the entry is mostly obscured, it is evident in some places that it is cracking and dislodged. The tile in Room 105 is also obscured, but it is also loose and broken in areas that are visible.

- The conditions of the doors vary from poor to fair. The doors in Room 103 are exhibiting rot near the bottom and at the head casing, and the joints in the transom are open. The plywood casing is badly deteriorating and partially missing. The door casings in Room 103 are in fair condition overall, though some are loose or deteriorating at the bottom. The rollup doors in Room 105 still work, but their rails are rusting and the casing is badly rotting.

- The windows are in fair condition. The windows in Room 103 have some splitting, broken glass, rot at the stool and loose pieces. The interior casing in Room 105 is in fair condition with supplemental attachments.



Figure 1.3-62: Exposed corrugated metal roof with lighting fixture intact (left) and rusted windows with vegetation (right) of Building 411.

Work Recommendations

- Remove vegetation throughout entire structure, particularly around soffits, flashing and fenestrations. Remove abandoned anchors and repair associated spalls, stepped cracks and holes in CMU. Repair mechanical, electrical and plumbing penetrations throughout CMU.

- Replace all doors as each is badly weathered, rotting or missing.

- Restore all windows including rusted sills, splitting casing (exterior and interior), missing glass, damaged glazing beads and open joints. Replace windows that are missing or that cannot be restored.

- Replace deteriorating roof. Replace edge flashing and soffits that are badly rusted and have open joints. Where possible, restore wood portions that are weathered and have abandoned penetrations.

- Replace all gutters and downspouts.

- Repair cracks and broken corners on interior CMU, especially in the southeast corner of Room 103.

- Replace all interior plasterboard walls as they are in poor condition with holes, cracks and open joints (especially in the front entry and back room).

- Replace all ceilings (acoustical and plasterboard).

- Replace vinyl asbestos tile with new tile, laminate flooring or concrete.

- Restore doors and door casings in Room 103 where they are loose, deteriorating or rotting. Restore transoms that have open joints. Restore rollup doors in Room 105 as the rails are rusting and the casing is badly rotting.

Structural

Description

The structure consists of CMU bearing walls supporting steel joists with a metal roof deck. On the east and west ends the building, small extensions extend from the structure. The structure is identical to Building No. 409 on the Radar Tracking Site.

Conditions

- Site is overgrown with vines and other vegetation (Figure 1.3-63).

- Metal deck and steel joists are mildly corroded at interior surfaces (Figure 1.3-64).

Work Recommendations

- Remove vegetation within ten feet of structure.

- Mild corrosion does not require intervention.



Figure 1.3-63: Vegetation overtaking Building 411.



Figure 1.3-64: Mild corrosion of metal deck and steel joists of Building 411.

Building Systems

Description

HVAC

The building contains of a ventilation system that consists of a ducted fan with distribution ductwork and two (2) electric heating air handling units that serve the spaces.

Plumbing

The building does not contain any plumbing systems.

Electrical

Electrical service appears to have entered the building from an overhead aerial line to a fused disconnect switch and fed a step down transformer, and a 400A, 208/120-volt, 3-phase, 4-wire rated panelboard manufactured by ITE. Telephone service enters the building in a similar manner from an aerial line.

The panelboard consisted of the circuit breakers that fed the building loads and the two control trailers. This building, similar to building 409, was connected to two pre-fabricated trailers, one for radar control and the other for battery control. Based on the outdoor overgrown surrounding area, the trailers have been removed years ago.

Circuiting in the building was surface mounted conduit and MC cable. Receptacles were provided in the building for convenience power. Disconnect switches and various pieces of equipment are still in place. There does not appear to have been a fire alarm system.

Conditions

HVAC

All of the HVAC systems and ductwork are deteriorated and in poor condition.

Plumbing

Not applicable.

Electrical

There are no active electrical systems in the building. The original panels, transformers, and equipment still remain in place. They are all rusted and in poor condition, and are not salvageable for re-use.



Figure 1.3-65: Air Handling Unit of Building 411.

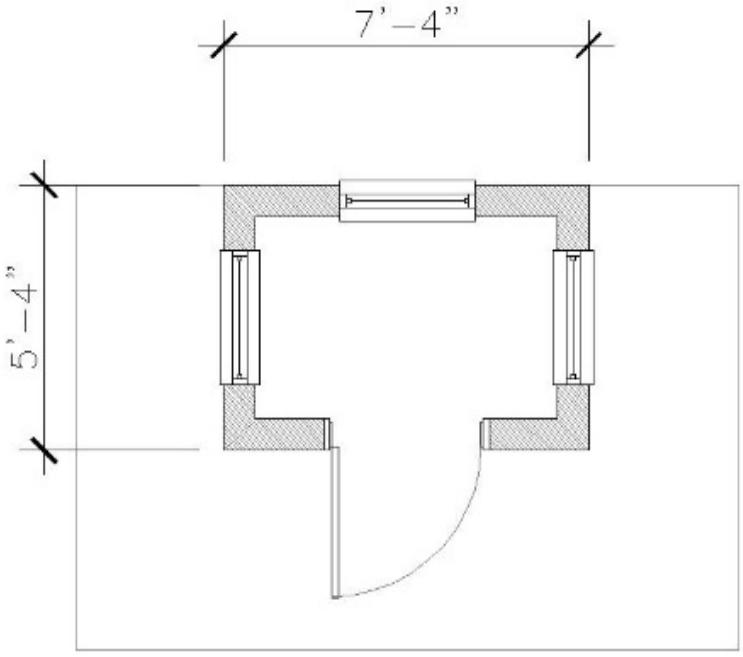


Figure 1.3-66: Air Handling Unit and Ventilation System of Building 411.

Character Defining Features

- Massing: One story structure with flat roof ca. 1956.
- Materials: Concrete masonry unit, wood and sheet metal ca. 1956.
- Doorways: Original wood doors and wood trim ca. 1956.
- Windows: Wood double-hung windows ca. 1956.

No. 413: Sentry Box



Architectural

Description

Exterior

Sentry Box 413, constructed in 1958, is located in the northeast corner of the Radar Tracking Site, approximately 100 feet west of Atlantic Drive. The small concrete masonry unit structure is situated on a concrete slab and has a flat metal and wood roof, and several fenestrations. The door on the east elevation is missing, however the wood door frame and trim is extant. The north, south and west elevations each have one window, all covered with plywood, leaving the concrete sills exposed.



Figure 1.3-67: The north and west elevations showing windows covered with plywood (left) and the east, main elevation of the Sentry Box (right) of Building 413.

Interior

The interior of Building No. 413 has a concrete floor and asbestos particle board on top of the CMU walls. The original two-over-two double hung metal windows are intact and are covered with plywood on the exterior. Very little of the window trim is intact. The electrical boxes on the east wall, as well as the ceiling light on the exposed roof rafters, are intact as well.



Figure 1.3-68: Two-over-two double hung metal windows and exposed CMU walls under deteriorating plasterboard of Building 413.

Conditions

Building 413 is in poor condition. The roof is severely deteriorating and the door is missing. Both of these conditions are due to water damage and weathering. The windows frames are rusted, the glass is broken, the paint is deteriorated and some of the trim is missing. The asbestos particle board walls are extremely deteriorated. These conditions were also caused by water damage and general weathering.

Exterior

- The concrete masonry unit is generally in good condition. There are horizontal cracks on each elevation, as well as a stepped crack on north elevation. The CMU is deteriorating on the south and west elevations where plywood has been installed, and the paint is peeling and fading on all four elevations. Finally, there is biological growth and staining throughout, as well as vegetation on the north and west elevations.

- The door on the east elevation is missing. The trim is still extant but it is in poor condition, exhibiting rotting wood and peeling paint. The threshold is also missing. The original door hardware is intact but extremely rusted.

- The roof is in very poor condition. Three quarters of the wood boards are missing, exposing the rafters and the interior of the building. The sheet metal on the roof is very rusted.

- The light fixture on the east elevation is in poor condition. It is broken and suspended from the roof, with the wires deteriorating.

- The original building sign is missing; there is a replacement sign that is in good condition.



Figure 1.3-69: Deteriorating wood boards and framing on the roof of Building 413.

Interior

- The asbestos particle board is in very poor condition and is almost completely missing on all four elevations.

- The concrete floor is still intact and appears to be in good condition, however it is difficult to see as there is a lot of debris from roof deterioration.

- The windows on Building 410 are intact but in very poor condition. The frames are rusted, the glass is broken and the paint is deteriorating. The trim is missing on the north and west windows but it is intact on the south window.

- The light fixture in the ceiling is in poor condition; it is broken and rusted, with electrical wires suspended from the ceiling.



Figure 1.3-70: Debris accumulating on the floor (left) and missing section of roof and exposed rafters (right) of Building 413.

Work Recommendations

- Remove vegetation and biological growth, and clean concrete masonry unit. Repair horizontal and stepped cracks in CMU (north elevation). Repair CMU that is deteriorating due to the installation of plywood (south and west elevations). Strip and repaint CMU throughout.

- Replace door on east elevation and restore trim that is exhibiting rotting wood and peeling paint. Replace missing threshold and rusted hinges.

- Restore rusted window frames, replace broken glass and strip and repaint all windows. Replace missing window trim on the north and west windows.

- Replace roof as wood is missing and the sheet metal is extremely rusted.

- Replace light fixture on the east elevation.

- Remove asbestos particle board and replace with new interior wall coverings or leave CMU exposed.

- Replace plasterboard ceilings in conjunction with roof replacement.
- Remove debris, clean and paint concrete floor.
- Replace light fixture in ceiling.

Structural

Description

The building consists of CMU bearing walls supporting a monoslope wood joist roof with an overhanging eave. A concrete turndown slab surrounds the front and sides of the structure. The presence of the slab was not directly observed due to leaf litter, but is assumed based on the structure's similarity to other Sentry Houses at the Nike site. The exterior slab is independent of the structure.

Conditions

- Horizontal cracking was observed throughout the structure, likely a result of corroding horizontal joint reinforcement from the use of non-galvanized steel and inadequate cover (Figure 1.3-71). This condition is typical at the corners of the structure. The horizontal joint reinforcement was not directly observed, but the construction of this structure is similar to others where more serious deterioration confirmed the presence of corroded steel within the wall.
- The roof is severely deteriorated. What material remains is deteriorated (Figure 1.3-72).

Work Recommendations

- Repoint all open joints. Where possible, remove corroded horizontal joint reinforcement. Assume 10% repointing required.
- Replace roof 100%, including sill plate, joists, sheathing, and rim board.



Figure 1.3-71: Horizontal cracking on Building 413.



Figure 1.3-72: Deteriorated and missing roof on Building 413.

Building Systems

Description

HVAC

The building was originally used as a Sentry Box. As such, there was likely heating provided for the sentries. However, we observed no evidence of any remaining systems.

Plumbing

There is no evidence that plumbing systems existed in this building.

Electrical

The building likely originally lighting and convenience power for the sentries use. However, we observed no remaining system.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

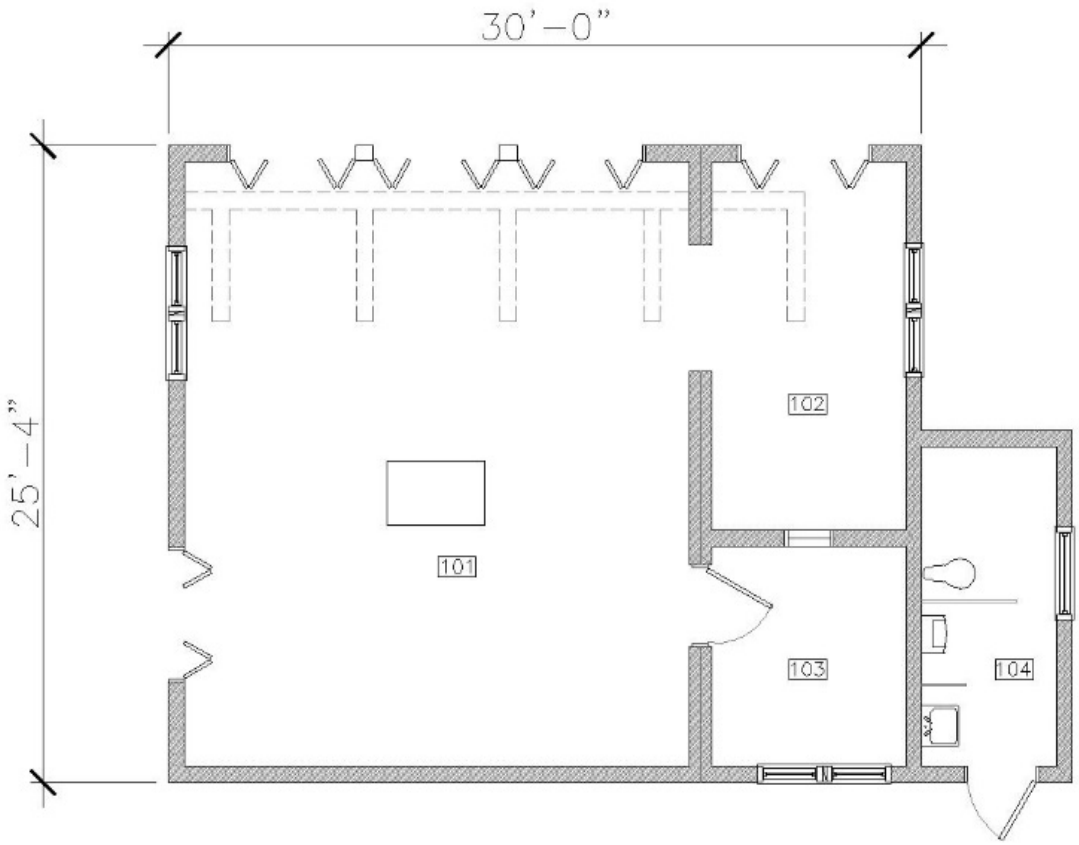
Electrical

Not applicable.

Character Defining Features

- Massing: One story structure with flat roof ca. 1958.
- Materials: Concrete Masonry Unit ca. 1958.
- Doorway: Original wood-framed opening on east elevation ca. 1958.
- Windows: Original one-over-one double hung metal windows ca. 1958.

Number 414: Generator House



Architectural

Description

Exterior

Building 414, constructed in 1956, is located in the northwest corner of the Radar Tracking Site, approximately 300 feet southwest of Atlantic Drive. It is a one-story, concrete masonry unit building with several fenestrations on each elevation. The building has wood bed moulding boards on each elevation. The north elevation is three bays wide, with a visible line in the CMU between the east and middle bays. The west bay of the north elevation has three sets of original wood-paneled, double bi-fold doors with louvers and glass panes. The middle bay is part of a later addition and has one fenestration with a set of wood-paneled, double bi-fold doors, similar to those on the west bay. All of the doors retain their original hardware. The east bay, added after the central addition, is set back from the other bays and has no fenestrations. The east elevation is two bays wide; the south bay has one fenestration, a double-hung, wood, single-paned window. There are several fenestrations on north bay: two sets of one-over-one double-hung windows, a wooden louver under windows near the foundation, a circular vent to the left of the window and three small circular "pipe" openings at top right corner of north bay and one in top left corner of north bay.

The south elevation is two bays wide. The east bay has two fenestrations: two one-over-one, double-hung, wood windows, and a single doorway east of the windows. The door retains its original lock and hinges, and part of the wood frame. The west bay has some penetrations and pipes. The west elevation is two bays wide. The north bay has a double set of one-over-one, double-hung wood windows and the south bay has a double set of bi-fold doors with original hardware (similar to those on the north elevation). There are two circular pipe penetrations on each side of the window, and an electrical box on north side of the north bay.



Figure 1.3-73: The northeast corner showing wooden bi-fold doors and double-hung windows (left) and the east elevation showing the stepped roof and four sets of bi-fold doors (right) on Building 414.

Interior

There are four rooms in Building 414: Room 101 on the north side, Room 102 in the southeast corner, Room 103 in the southwest corner and Room 104, a toilet room on the south elevation that is only accessible from the exterior. There are two interior wall types: plasterboard and plywood with some sections of wood baseboard trim. The ceilings are constructed with a combination of plasterboard and acoustical ceiling tiles. Some of the rooms have concrete floors with metal trenches, while other areas have vinyl asbestos tiles. The interior sides of the doors and windows, as well as their trim, are wood.



Figure 1.3-74: View of interior facing southwest showing plasterboard walls, plasterboard ceiling and concrete floors (left) and view of interior facing northeast showing interior of doors (right) on Building 414.

Conditions

Building 414 is in poor condition. The windows and doors are deteriorating due to general weathering and there are minor cracks in the CMU from moisture damage and vegetation (there is a large amount of growth throughout the structure). There is rust and peeling paint throughout the exterior and interior of the building, both caused by water infiltration.

Exterior

- The concrete masonry unit is generally in good condition. There are minor cracks on the north elevation and the east elevation is exhibiting horizontal and stepped cracks, as well as minor spalling and deterioration, which is starting to expose the rebar. The paint throughout the entire exterior is chipping, peeling and fading. The structure is overgrown with vegetation and there is biological staining near the foundation on the east elevation.

- The doors on each elevation are in poor condition. One of the doors on the north elevation has been removed and one on the south elevation has broken off. The glass on almost every window is missing or broken, the wood is deteriorating, pieces are missing and the paint is almost entirely deteriorated. On every elevation, louvers at the bottom of the doors are missing or broken. Many of the doors retain their original hardware, including hinges and lock latches, however they are in poor condition and extremely rusted. The majority of the door trim is intact, but exhibiting rotting wood and peeling paint.

- The windows on each elevation are in poor condition. While most of the frames and sashes are intact, the glass is missing in each window, the wood trim and sashes are rotting and warping, and the paint is failing. The sills are in good condition, though the paint is almost entirely missing on them as well.

- The various openings in the structure, including louvers and vents are in poor condition, particularly on the east elevation. The louver on the north side of the east elevation is dilapidated and partially missing and the circular vent above is also missing.

- The wood bed moulding board is in poor condition on the north and east elevations; the metal is warping, the paint is peeling, and there is evidence of biological growth.



Figure 1.3-75: A set of intact doors with peeling paint, rusting hardware and missing glass (left) and double-hung windows with missing glass and peeling paint (right) on Building 414.

Interior

- The walls are in fair condition, particularly in Room 103. In other areas, the plasterboard walls are exhibiting widespread holes and penetrations, as well as open joints. The plywood walls are in fair condition.

- The plasterboard ceiling is in fair condition with some sagging, open joints and damage around the roof penetrations. The ceiling is damaged in Rooms 102 and 103; most of acoustical ceiling tile and furring are missing.

- The conditions of the floors vary from poor to fair. The concrete floor is cracking, the metal trenches are filled with debris and their covers are missing. The vinyl asbestos tile is loose where visible.

- The interior doors and door trim are in fair condition with minimal damage.

- The windows are in fair condition. The window stools are rotting, however the casing and trim are in fair condition.

- The wood base is generally in fair condition where visible. The wood base in Room 102 is partially rotting.



Figure 1.3-76: Interior view of electrical equipment (left) and metal trenches in concrete floor with missing covers and debris (right) in Building 414.

Work Recommendations

- Remove vegetation. Repair minor cracks on north elevation. Repair horizontal cracks, stepped cracks, minor spalling and deterioration on east elevation. Strip paint, clean biological staining (particularly near foundation on east elevation) and repaint CMU.

- Replace all exterior doors. The door on north elevation is missing, the one on the south elevation is broken and the rest are in poor condition; the glass on each window is missing or broken, the wood is deteriorating, pieces are missing and the paint is almost entirely worn off. All of the door louvers are missing or broken, the hardware is extremely rusted and most of the door trim is rotting. Repair interior doors and trim as required (most are in fair condition).

- Replace missing glass in each window, restore rotting and warping wood trim and sashes, and strip and repaint windows (including sills which are otherwise in good condition). Restore rotting interior window stools. Restore or replace all exterior louvers on the structure as they are dilapidated or missing.

- Replace roof as it is deteriorated.

- Replace wood bed moulding board on all elevations (it is in particularly poor condition on the north and east elevations).

- Replace all interior plasterboard walls and repair plywood walls where necessary.

- Replace all plasterboard and acoustical tile ceilings.

- Remove debris from metal trenches in floor and replace missing trench covers. Repair cracks in concrete floor and clean concrete. Replace vinyl asbestos tile with new tile, laminate flooring or concrete.

- Restore wood baseboards where necessary.

Structural

Description

The structure consists of CMU bearing walls supporting steel joists with a metal roof deck. The Interior of the structure has a slab on grade floor.

Conditions

- CMU is in fair condition, with minor horizontal cracking observed at the northeast corner (Figure 1.3-77). The horizontal joint reinforcement was not directly observed, but the construction of this structure is similar to others where more serious deterioration confirmed the presence of corroded steel within the wall.

Work Recommendations

- Repoint all open joints. Where possible, remove corroded horizontal joint reinforcement. Assume 10% repointing required.



Figure 1.3-77: Minor horizontal cracking at northeast corner of Building 414.

Building Systems

Description

HVAC

There are no existing HVAC systems in the building.

Plumbing

There are no existing plumbing systems in the building.

Electrical

This building is similar to building 410, and housed the emergency generators that served as a reserve power source for the site and the radar platforms. Electrical service was provided by the transformers across from the building. The service entered the building underground to a fused disconnect switch and into wire troughs that fed panelboards, equipment, non-automatic 400A, 3-pole circuit breakers, as well as the switches which fed the radar platforms. The panels were rated 208/120-volt, 3-phase, 4-wire and consisted of the circuit breakers that served the building lighting and receptacles loads. The ratings for the disconnect switches that fed the radar platforms could not be determined.

The building contains troughs in the floor that were likely used for the interconnecting cabling between the generators.

Lighting in the building was primarily incandescent pendant mounted lighting fixtures controlled by local switches. In addition, receptacles were provided in the building for convenience power. Circuiting in the building was surface mounted conduit. Various pieces of equipment are still in place. There does not appear to have been a fire alarm system.

Conditions

HVAC

Not Applicable.

Plumbing

Not Applicable.

Electrical

There are no active electrical systems in the building. The original panels, switches and equipment still remain in place. They are all in poor condition, and are not salvageable for re-use.

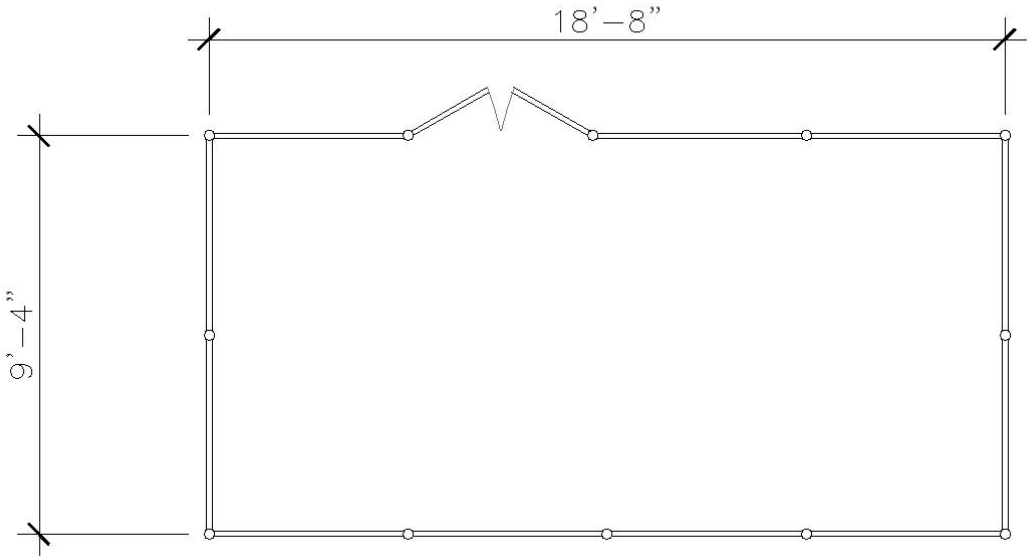


Figure 1.3-78: Building 414 Interior.

Character Defining Features

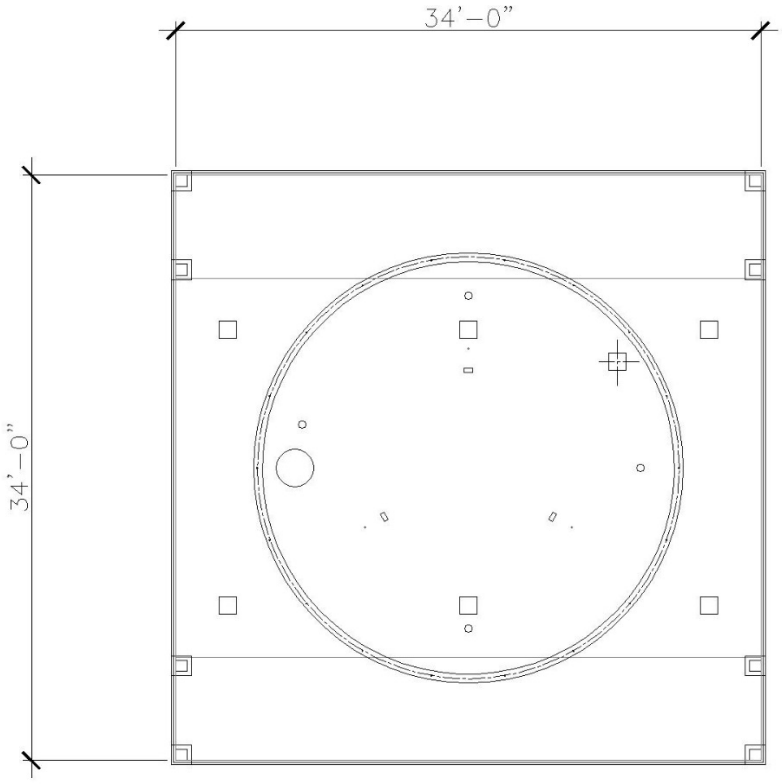
- Massing: One story structure with stepped flat roof ca. 1956.
- Materials: Concrete Masonry Unit ca. 1956.
- Doorways: Original wood-paneled, double bi-fold doors with louvers and glass panes on the north and west elevations and a wood-framed doorway on the south elevation, ca. 1956.
- Windows: Original double-hung, single-paned wood windows on the east elevation, one-over-one, double-hung, wood windows on the south and west elevations ca. 1956.

Transformers Pen



The transformers associated with Building Number 414 have been removed from the site. Although the fence and framing are intact, they are damaged and extremely rusted.

Number 417: Target Tracking Radar



Architectural

Description

Structure 417, constructed in 1956, is a square Target Tracking Radar stand located in the northeast corner of the Radar Tracking Site, adjacent to Sentry Box 413, approximately 200 feet southwest of Atlantic Drive. The east and west sides are metal and the north and south sides are concrete. There is a circular opening with a square frame on the north end, and a ladder opening on the south side.

Conditions

- The radar stand is in poor condition. It is completely overgrown with vegetation, and the metal on the east and west sides of the structure is extremely rusted due to moisture.
- The railing is broken in the southeast corner. It is also severely rusted and the paint is peeling due to moisture and weathering.
- The chain link fence is pulling away with the broken railing because of extreme vegetation.
- The ladder on the south side is no longer intact, however it is on the ground next to the stand and is extremely rusted.



Figure 1.3-79: View of Target Tracking Radar Stand 417, exhibiting rust and extreme vegetation.

Work Recommendations

- Remove vegetation on structure.
- Restore or replace metal that is rusted, particularly on the east and west elevations.
- Replace dilapidated railing and chain-link fence in the southeast corner.
- Strip and paint stand.
- Replace ladder on the south side (located on the ground next to the stand and extremely rusted).

Structural

Description

Radar platforms 417-422 are reinforced concrete construction with later steel and concrete additions. Acquisition radars were initially a 23'-0" square platform supported by four square reinforced concrete columns, whose plan is smaller than the platform (Figure 1.3-80). Reinforced concrete beams span between the four columns, with one intermediate beam. Tracking radars were 34-0"x22'-0", with six square reinforced concrete columns, three along each long dimension, whose plan is smaller than the platform (Figure 1.3-81). Reinforced concrete beams span the perimeter between the columns, with three equally spaced intermediate beams spanning the short direction. At both platforms, the column tops are thickened at the beams, flaring out at a 45° angle (Figure 1.3-82).

Later additions were made to all but one of these platforms, creating 34'-0" square plans. Wide flange columns and beams support the additional cast-in-place deck. The new deck is doweled and grouted into the existing deck (Figure 1.3-83). Available drawings indicate that the new columns bear on the footings and are encased with concrete from the top of the footing to 1'-6" above grade. Drawings indicate a 3'-0" square footing approximately 3'-0" below grade. At the acquisition radars, new footing were placed 4'-0" below grade and 3'-0" below grade at the tracking radars.

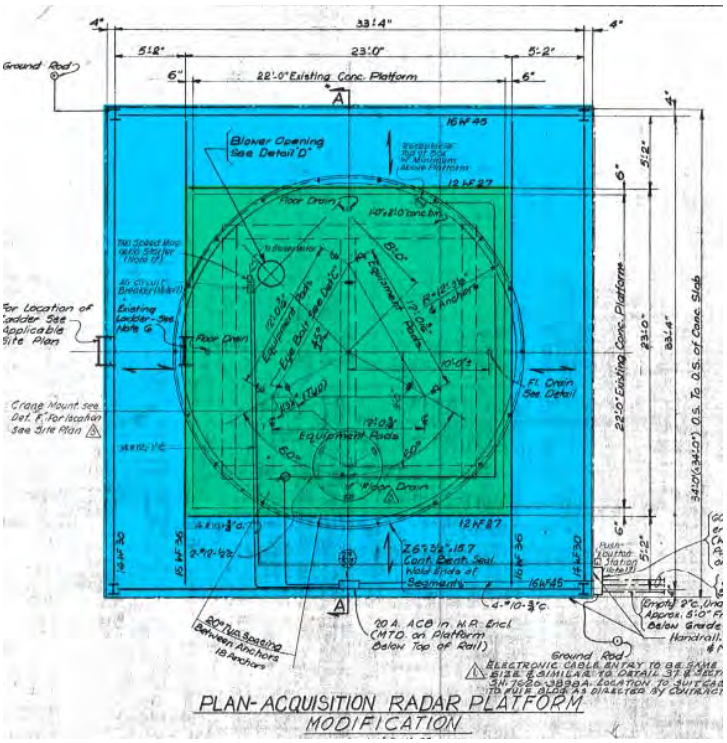


Figure 1.3-80: Acquisition radar platform modification, showing original square platform (green) and addition (blue).

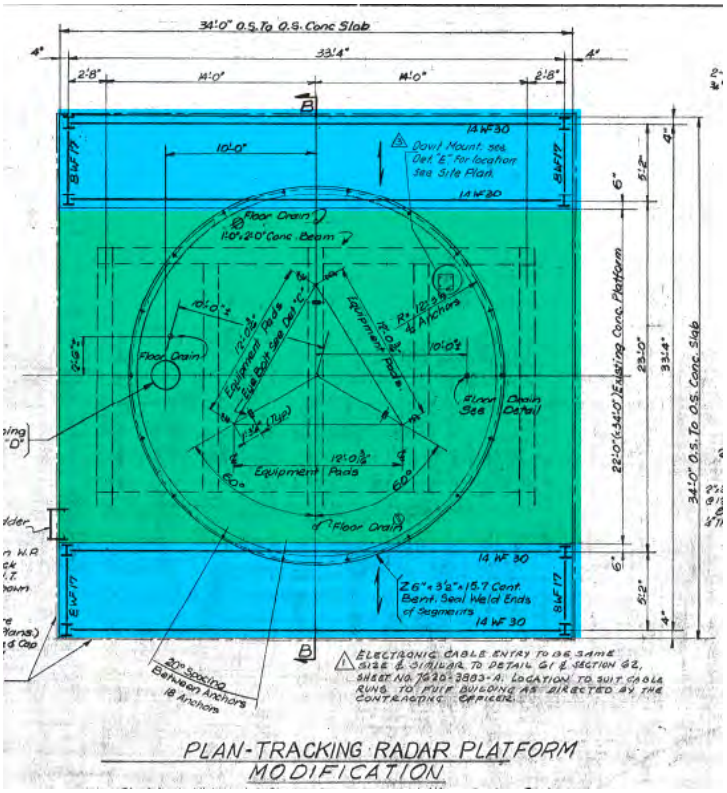


Figure 1.3-81: Tracking radar platform modification, showing original square platform (green) and addition (blue).



Figure 1.3-82: Typical flared columns of Stand 417.

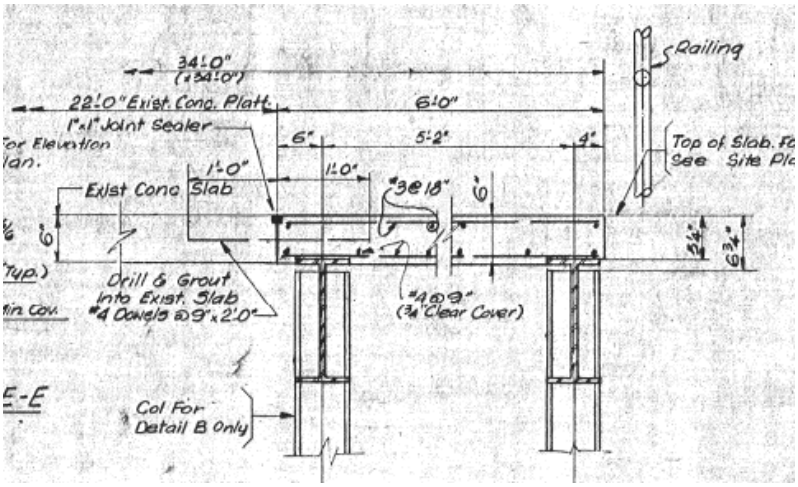


Figure 1.3-83: Connection of existing slab to new.

Conditions

- The platform is a modified tracking radar platform (Figure 1.3-84).
- All exposed steel exhibits surface corrosion.
- The concrete encasement around the base of the addition steel columns are cracked, likely as a result of the corrosion of the encased steel column (Figure 1.3-85). The corrosion of the encased steel may be more severe.
- Underside of platform concrete has spalled in location of steel reinforcement (Figure 1.3-84).



Figure 1.3-84: Platform extension with steel columns and beams, with cast-in-place deck of Stand 417. Spalled concrete is visible on the right of the photograph.



Figure 1.3-85: Cracked column encasement of Stand 417.

Work Recommendations

- Clean all corroded steel and coat with zinc-rich rust inhibitive coating.
- Remove concrete encasement around steel column bases. Assume 10% reinforcement of steel columns. Clean all corroded steel and coat all steel with zinc-rich rust inhibitive coating. Replace concrete encasement.
- At underside of platform, clean all corroded reinforcing steel and coat with zinc-rich rust inhibitive coating.

Building Systems

Description

HVAC

There are no existing HVAC systems.

Plumbing

There are no existing plumbing systems.

Electrical

The electrical service was routed underground to the platform location. A service fuse disconnect switch in a weatherproof, marine grade enclosure, was mounted to a platform base support. The fused switch was to feed a small panelboard that served the platform lighting, power receptacles, and interlocking hatch. An additional separate 20A circuit breaker in a weatherproof enclosure was mounted adjacent to the fuse disconnect switch. The panels were rated 208/120-volt, 3-phase, 4-wire, 70A main lug. There is also a weatherproof light switch and convenience receptacles mounted to the platform supports, which are assumed to have been used for regular access to the platform, and for maintenance purposes. The conduits were surface mounted to supports and underside of the platform as well. The lightning protection system that once existed has been removed.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

Electrical

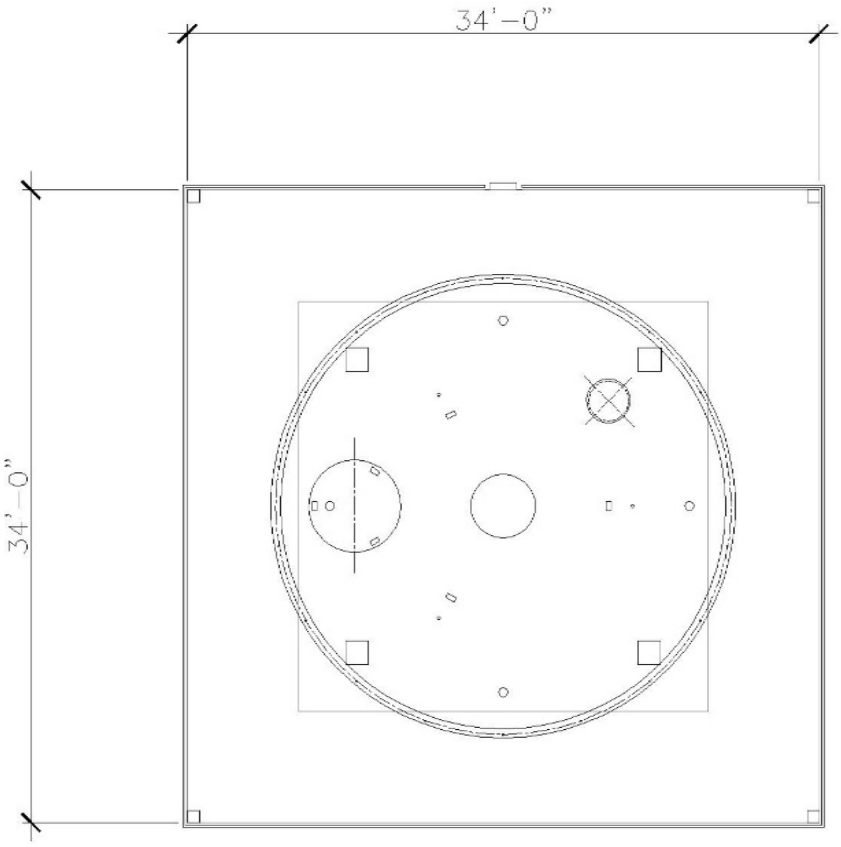
Although the Radar platform's remaining equipment vary from platform to platform, overall the majority of the remaining equipment and conduits are in poor condition and severely rusted. The fused service disconnect switch, circuit breaker enclosure, receptacles and some conduit remain at this platform. We were unable to access the top of the platform to closer observe the equipment.

None of the electrical equipment is active, and the lightning protection system that once existed is no longer present.

Character Defining Features

- Massing: Square, utilitarian structure.
- Materials: Steel and concrete.

Number 418: Acquisition Radar



Architectural

Description

Structure 418, constructed in 1956, is a square Acquisition Radar stand located in the northeast corner of the Radar Tracking Site, adjacent to Building Number 411, approximately 300 feet southwest of Atlantic Drive. The structure is constructed with a combination of concrete and metal. There is a circular opening with a square frame on the west side, as well as a railing opening with concrete footing.

Conditions

- The radar stand is in poor condition and is deteriorating due to weathering. The railing is dilapidated in the southwest corner, pulling the chain-link fence with it.

- The entire stand is exhibiting rust and peeling paint caused by moisture and weathering, and the ladder is missing at the opening on the west elevation.



Figure 1.3-86: Rusting columns, dilapidated fence and vegetation on the Acquisition Radar Stand 418.

Work Recommendations

- Replace dilapidated railing and chain-link fence in southwest corner.
- Strip and repaint entire stand.
- Replace missing ladder at opening on west elevation.

Structural

Description

See Target Tracking Radar 417 Above

Conditions

- The platform is a modified acquisition radar platform (Figure 1.3-87).
- Spalling at the underside of the concrete deck was observed, likely due to inadequate cover of the reinforcing steel (Figure 1.3-88).
- Minor cracking was observed near the flare of one column (Figure 1.3-89).
- All exposed steel exhibits surface corrosion.
- The concrete encasement around the base of the addition steel columns are cracked, likely as a result of the corrosion of the encased steel column (1.3-90). The corrosion of the encased steel may be more severe.

Work Recommendations

- At underside of platform, clean all corroded reinforcing steel and coat with zinc-rich rust inhibitive coating.

- At cracked concrete column, remove spall, clean corroded reinforcing steel, and coat with zinc-rich rust inhibitive coating. Repair spall with concrete repair mortar.

- Clean all corroded steel and coat with zinc-rich rust inhibitive coating.

- Remove concrete encasement around steel column bases. Assume 10% reinforcement of steel columns. Clean all corroded steel and coat all steel with zinc-rich rust inhibitive coating. Replace concrete encasement.



Figure 1.3-87: Platform extension with steel columns and beams, with cast-in-place deck of Stand 418. Spalling of the concrete deck is visible.



Figure 1.3-88: Spalled concrete with visible steel reinforcement at original platform deck of Stand 418.



Figure 1.3-89: Cracked column of Stand 418.



Figure 1.3-90: Cracked column encasement of Stand 418.

Building Systems

Description

HVAC

There are no existing HVAC systems.

Plumbing

There are no existing plumbing systems.

Electrical

The electrical service was routed underground to the platform location. A service fuse disconnect switch in a weatherproof, marine grade enclosure, was mounted to a platform base support. The fused switch was to feed a small panelboard that served the platform lighting, power receptacles, and interlocking hatch. An additional separate 20A circuit breaker in a weatherproof enclosure was mounted adjacent to the fuse disconnect switch. The panels were rated 208/120-volt, 3-phase, 4-wire, 70A main lug. There is also a weatherproof light switch and convenience receptacles mounted to the platform supports, which are assumed to have been used for regular access to the platform, and for maintenance purpose. The conduits were surface mounted to supports and underside of the platform as well. The lightning protection system that once existed has been removed.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

Electrical

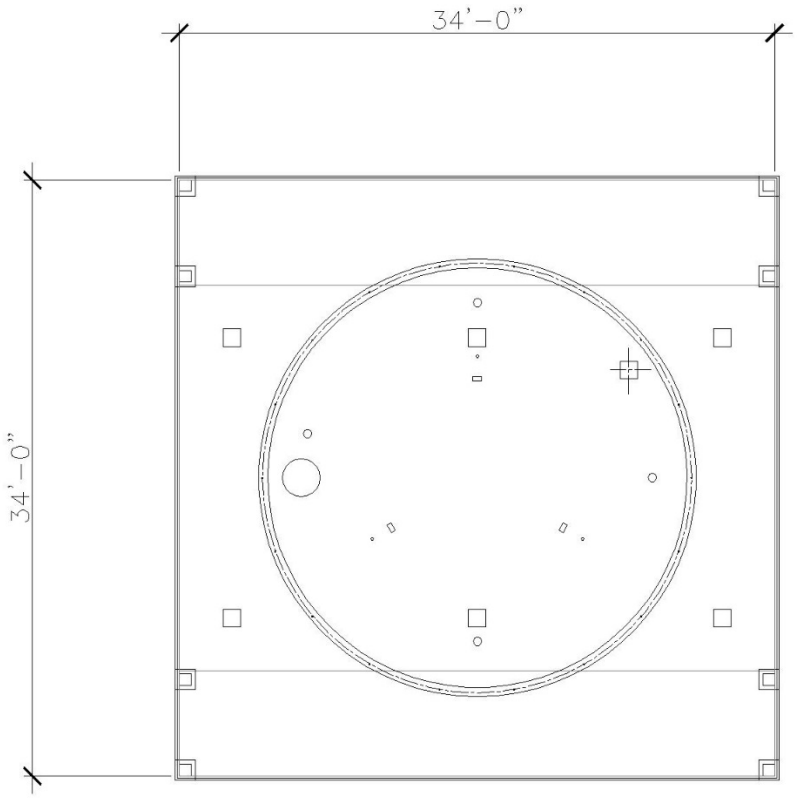
Although the Radar platform's remaining equipment vary from platform to platform, overall the majority of the remaining equipment and conduits are in poor condition and severely rusted. The fused service disconnect switch, circuit breaker enclosure, receptacles and some conduit remain at this platform. We were unable to access the top of the platform to closer observe the equipment.

None of the electrical equipment is active, and the lightning protection system that once existed is no longer present.

Character Defining Features

- Massing: Square, utilitarian structure.
- Materials: Steel and concrete.

Number 419: Missile Tracking Radar



Architectural

Description

Structure 419, constructed in 1956, is a square Missile Tracking Radar stand located on the east side of the Radar Tracking Site, approximately 400 feet southwest of Atlantic Drive. There is a circular opening with a square frame on the north end, as well as an opening for a ladder with concrete footing.

Conditions

- The stand is in fair condition; the railing and chain-link fence are intact, however they are exhibiting severe rust and peeling paint caused by moisture and weathering.

- The ladder is no longer attached to the structure.



Figure 1.3-91: Rusted framing, vegetation, deteriorated fence and spalling concrete on the Missile Tracking Radar Stand 419.

Work Recommendations

- Strip and paint entire structure.
- Replace missing ladder.

Structural

Description

See Target Tracking Radar 417 above.

Conditions

- The platform is a modified tracking radar platform (Figure 1.3-92).
- Spalling at the underside of the concrete deck was observed, likely due to inadequate cover of the reinforcing steel (Figure 1.3-93). This condition was observed at both the original and added platform.
- All exposed steel exhibits surface corrosion.
- The concrete encasement around the base of the addition steel columns are cracked, likely as a result of the corrosion of the encased steel column (1.3-94). The corrosion of the encased steel may be more severe.

Work Recommendations

- At underside of platform, clean all corroded reinforcing steel and coat with zinc-rich rust inhibitive coating.
- Clean all corroded steel and coat with zinc-rich rust inhibitive coating.

- Remove concrete encasement around steel column bases. Assume 10% reinforcement of steel columns. Clean all corroded steel and coat all steel with zinc-rich rust inhibitive coating. Replace concrete encasement with patching cementitious patching material.



Figure 1.3-92: Platform extension with steel columns and beams, with cast-in-place deck of Stand 419.



Figure 1.3-93: Spalled concrete at original platform deck of Stand 419.



Figure 1.3-94: Cracked column encasement of Stand 419.

Building Systems

Description

HVAC

There are no existing HVAC systems.

Plumbing

There are no existing plumbing systems.

Electrical

The electrical service was routed underground to the platform location. A service fuse disconnect switch in a weatherproof, marine grade enclosure, was mounted to a platform base support. The fused switch was to feed a small panelboard that served the platform lighting, power receptacles, and interlocking hatch. An additional separate 20A circuit breaker in a weatherproof enclosure was mounted adjacent to the fuse disconnect switch. The panels were rated 208/120-volt, 3-phase, 4-wire, 70A main lug. There is also a weatherproof light switch and convenience receptacles mounted to the platform supports, which are assumed to have been used for regular access to the platform, and for maintenance purposes. The conduits were surface mounted to supports and underside of the platform as well. The lightning protection system that once existed has been removed.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

Electrical

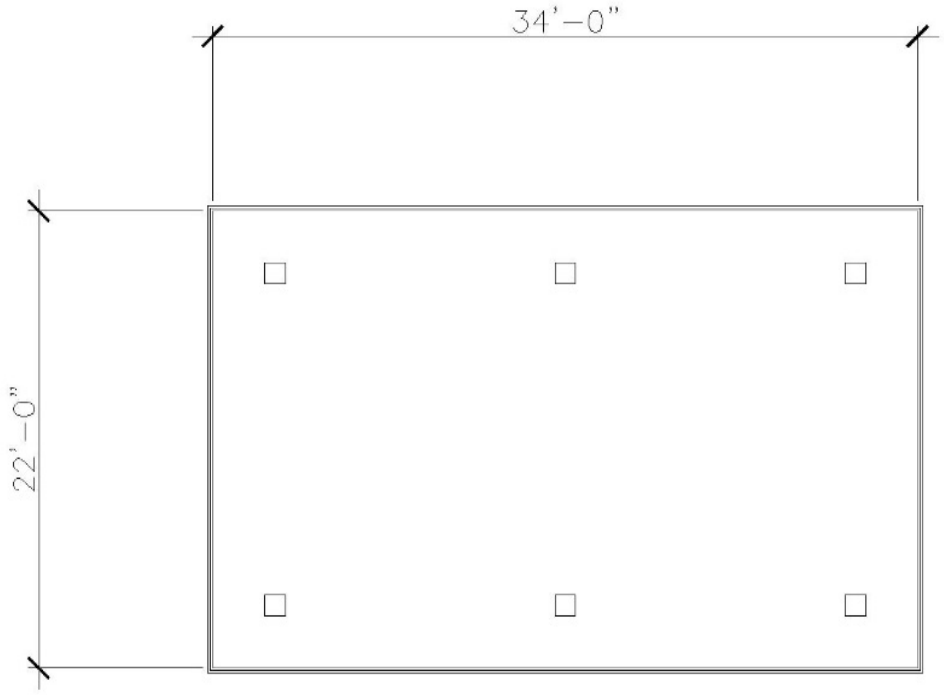
Although the Radar platform's remaining equipment vary from platform to platform, overall majority of the remaining equipment and conduits are in poor condition and severely rusted. The fused service disconnect switch, circuit breaker enclosure, receptacles and some conduit remain at this platform. We were unable to access the top of the platform to closer observe the equipment.

None of the electrical equipment is active, and the lightning protection system that once existed is no longer present.

Character Defining Features

- Massing: Square, utilitarian structure.
- Materials: Steel and concrete.

Number 420: Target Tracking Radar



Architectural

Description

Structure 420, constructed in 1956, is a rectangular Target Tracking Radar Stand located in the southwest corner of the Radar Tracking Site, adjacent to Building 410, approximately 300 feet northeast of the Main Gate. There is a ladder opening and concrete footing on the west side.

Conditions

- The stand is in fair condition however the railing is severely dilapidated and rusted due to weathering and moisture.
- The ladder is no longer extant.



Figure 1.3-95: Severely dilapidated and rusting railing, as well as a missing ladder on Target Tracking Radar Stand 420.

Work Recommendations

- Strip and paint concrete throughout stand.
- Replace dilapidated and rusted railing.
- Replace missing ladder.

Structural

Description

See Target Tracking Radar 417 Above.

Conditions

- The platform is an unmodified acquisition tracking platform (Figure 1.3-96).
- Minor spalling at the underside of the concrete deck was observed, likely due to inadequate cover of the reinforcing steel (Figure 1.3-97).
- One interior column is extensively cracked along the entire height (Figure 1.3-98 and 1.3-99).
- All exposed steel exhibits surface corrosion.

Work Recommendations

- At underside of platform, clean all corroded reinforcing steel and coat with zinc-rich rust inhibitive coating.
- At cracked concrete column, remove spall, clean corroded reinforcing steel. Assume 10% spliced reinforcing of steel required. Coat all exposed steel with zinc-rich rust inhibitive coating. Repair spall with concrete repair mortar.

- Clean all corroded steel and coat with zinc-rich rust inhibitive coating.



Figure 1.3-96: Original acquisition platform 420.



Figure 1.3-97: Spalled concrete at platform deck of Stand 420.



Figure 1.3-98: Top of cracked interior column of Stand 420.



Figure 1.3-99: Bottom of cracked interior column on Stand 420. Daylight is visible through column at location of arrow.

Building Systems

Description

HVAC

There are no existing HVAC systems.

Plumbing

There are no existing plumbing systems.

Electrical

The electrical service was routed underground to the platform location. A service fuse disconnect switch in a weatherproof, marine grade enclosure, was mounted to a platform base support. The fused switch was to feed a small panelboard that served the platform lighting, power receptacles, and interlocking hatch. An additional separate 20A circuit breaker in a weatherproof enclosure was mounted adjacent to the fuse disconnect switch. The panels were rated 208/120-volt, 3-phase, 4-wire, 70A main lug. There is also a weatherproof light switch and convenience receptacles mounted to the platform supports, which are assumed to have been used for regular access to the platform, and for maintenance purposes. The conduits were surface mounted to supports and underside of the platform as well. The lightning protection system that once existed has been removed.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

Electrical

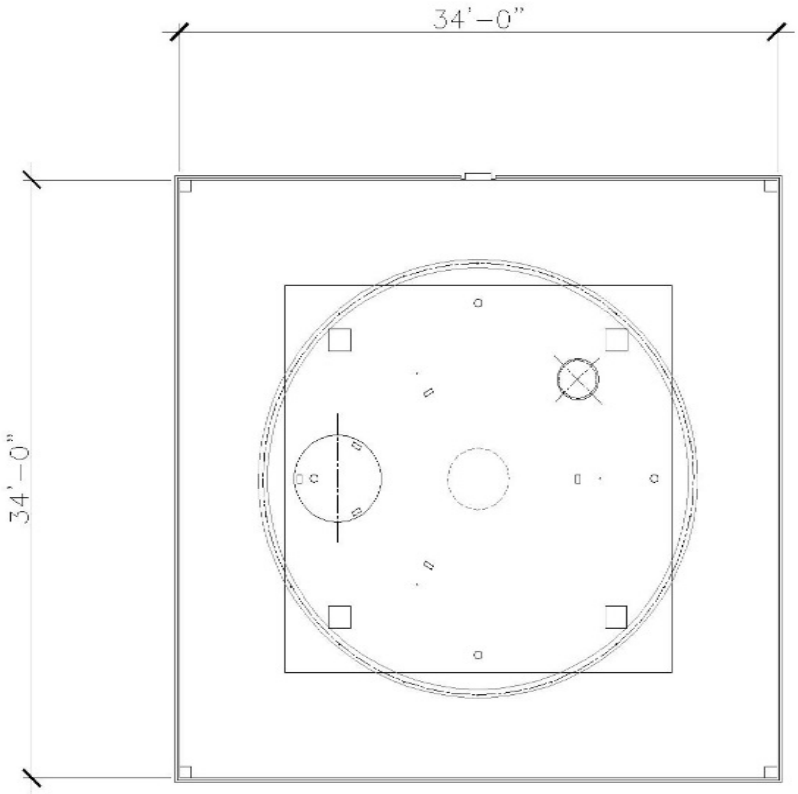
Although the Radar platform's remaining equipment vary from platform to platform, overall majority of the remaining equipment and conduits are in poor condition and severely rusted. The fused service disconnect switch, circuit breaker enclosure, receptacles and some conduit remain at this platform. We were unable to access the top of the platform to closer observe the equipment.

None of the electrical equipment is active, and the Lightning protection system that once existed is no longer present.

Character Defining Features

- Massing: Rectangular, utilitarian structure.
- Materials: Steel and concrete.

Number 421: Acquisition Radar



Architectural

Description

Structure 421, constructed in 1956, is a square Acquisition Radar stand located in the southwest corner of the Radar Tracking Site, adjacent to Building 409, approximately 200 feet northeast of the Main Gate. There is a ladder opening on the north side.

Conditions

- The stand has been recently restored and is in very good condition.
- The radar detector has also been partially reassembled.
- The ladder is no longer extant.



Figure 1.3-100: Restored Acquisition Radar Stand 421 with missing ladder.

Work Recommendations

- Replace ladder.

Structural

Description

See Target Tracking Radar 417 Above.

Conditions

- The platform is a modified acquisition tracking platform (Figure 1.3-101).
- Minor spalling at the underside of the concrete deck was observed, likely due to inadequate cover of the reinforcing steel.
- All exposed steel exhibits surface corrosion, despite recent efforts to coat the steel (Figure 1.3-102).

Work Recommendations

- At underside of platform, clean all corroded reinforcing steel and coat with zinc-rich rust inhibitive coating.
- Clean all corroded steel and coat with zinc-rich rust inhibitive coating.



Figure 1.3-101: Modified acquisition platform 421.



Figure 1.3-102: Paint over a spall and corroded reinforcing steel staining through the paint on Stand 421.

Building Systems

Description

HVAC

There are no existing HVAC systems.

Plumbing

There are no existing plumbing systems.

Electrical

The electrical service was routed underground to the platform location. A service fused disconnect switch in a weatherproof, marine grade enclosure, was mounted to one of the platform supports. The fused switch was to feed a small panelboard that served the platform lighting, power receptacles, and interlocking hatch. An additional separate 20A circuit breaker in a weatherproof enclosure was mounted above the fuse disconnect switch. The panels were rated 208/120-volt, 3-phase, 4-wire, 70A main lug. There is also a weatherproof light switch and convenience receptacles mounted to the platform supports assumed for regular access and maintenance purposes as well. The conduits were surface mounted to supports and underside of the platform. The lightning protection system that once existed has been removed.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

Electrical

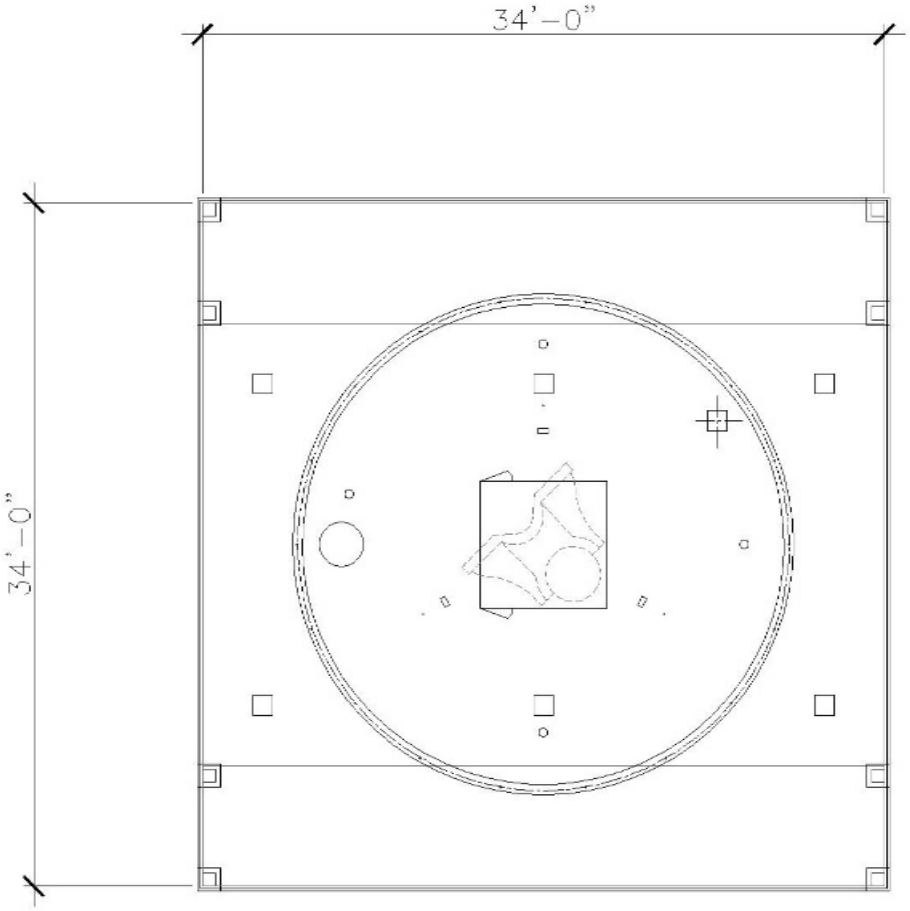
Although the Radar platform's remaining equipment vary from platform to platform, overall majority of the remaining equipment and conduits are in poor condition and severely rusted. The fused service disconnect switch, circuit breaker enclosure, receptacles and some conduit remain at this platform. We were unable to access the top of the platform to closer observe the equipment.

None of the electrical equipment is active, and the lightning protection system that once existed is no longer present.

Character Defining Features

- Massing: Square, utilitarian structure.
- Materials: Steel and concrete.

Number 422: Missile Tracking Radar



Architectural

Description

Number 422, constructed in 1956, is a square Missile Tracking Radar stand, located in the southwest corner of the Radar Tracking Site, adjacent to Sentry Box 423, approximately 100 feet northeast of the Main Gate. On the east side of the stand, there is a circular opening with square frame and a ladder opening with concrete footing.

Conditions

- The stand is in good condition; the railing is intact and is exhibiting minor paint failure due to general weathering.
- The ladder has been removed.



Figure 1.3-103: Missile Tracking Radar Stand 422 is exhibiting minor paint failure and the ladder is no longer intact.

Work Recommendations

- Strip and repaint entire structure.
- Replace missing ladder.

Structural

Description

See Target Tracking Radar 417 Above

Conditions

- The platform is a modified tracking platform (Figure 1.3-104).
- Extensive spalling at the underside of the concrete deck was observed, likely due to inadequate cover of the reinforcing steel (Figure 1.3-105). This spalling is ongoing, with fallen concrete observed directly under the platform (Figure 1.3-106).
- Columns are spalled and cracked in several locations (Figures 1.3-107 and 1.3-108).
- Steel element exhibits surface corrosion, despite recent coating.

Work Recommendations

- At underside of platform, clean all corroded reinforcing steel and coat with zinc-rich rust inhibitive coating.
- At cracked concrete columns, remove spalls, clean corroded reinforcing steel. Assume 10% spliced reinforcing of steel required. Coat all exposed steel with zinc-rich rust inhibitive coating. Repair spall with concrete repair mortar.

- Clean all corroded steel and coat with zinc-rich rust inhibitive coating.

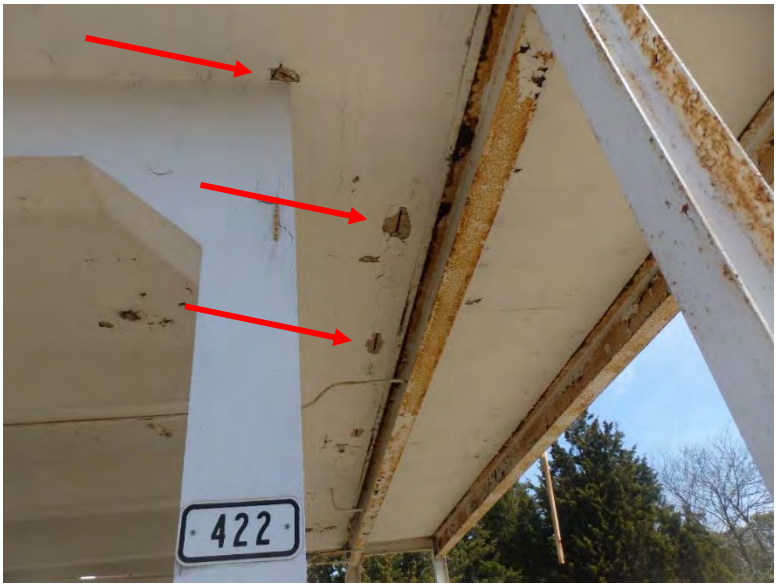


Figure 1.3-104: Modified tracking platform 422, with corroded steel elements and recently spalled concrete.



Figure 1.3-105: Extensive and recent spalling with corroded steel beam of Stand 422.



Figure 1.3-106: Concrete spall debris from Stand 422, located directly under spall shown in Figure 21.



Figure 1.3-107: Cracking and spalling at top of column on Stand 422.



Figure 1.3-108: Extensive and recent spalling at bottom of column on Stand 422.

Building Systems

Description

HVAC

There are no existing HVAC systems.

Plumbing

There are no existing plumbing systems.

Electrical

The electrical service was routed underground to the platform location. A service fused disconnect switch in a weatherproof, marine grade enclosure, was mounted to one of the platform supports. The fused switch was to feed a small panelboard that served the platform lighting, power receptacles, and interlocking hatch. An additional separate 20A circuit breaker in a weatherproof enclosure was mounted above the fuse disconnect switch. The panels were rated 208/120-volt, 3-phase, 4-wire, 70A main lug. There is also a weatherproof light switch and convenience receptacles mounted to the platform supports assumed for regular access and maintenance purposes as well. The conduits were surface mounted to supports and underside of the platform. The lightning protection system that once existed has been removed.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

Electrical

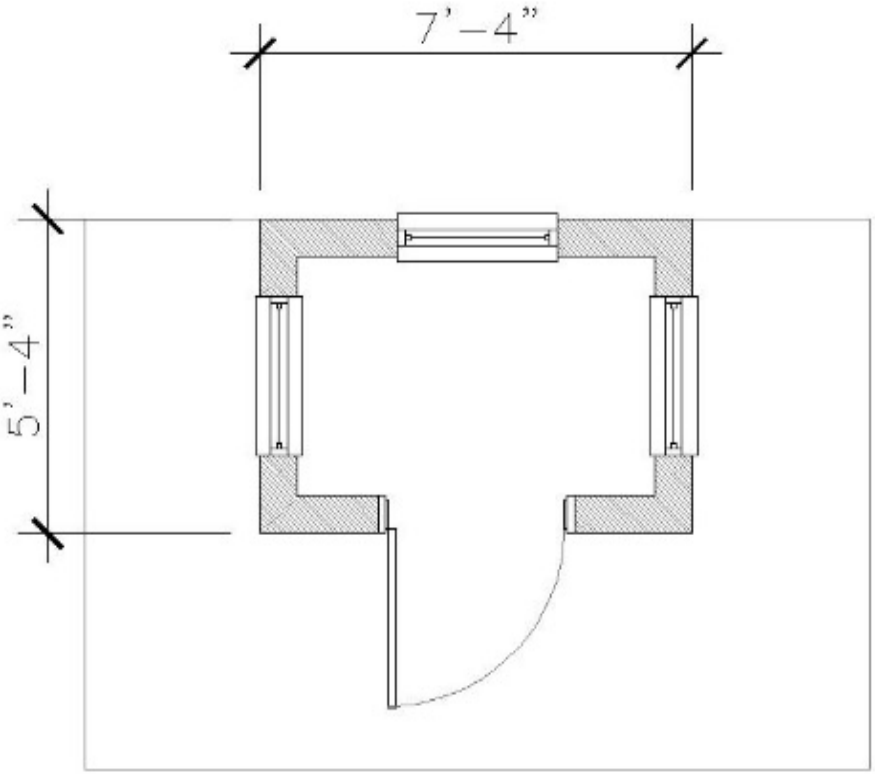
Although the Radar platform's remaining equipment vary from platform to platform, overall majority of the remaining equipment and conduits are in poor condition and severely rusted. The fused service disconnect switch, circuit breaker enclosure, receptacles and some conduit remain at this platform. We were unable to access the top of the platform to closer observe the equipment.

None of the electrical equipment is active, and the lightning protection system that once existed is no longer present.

Character Defining Features

- Massing: Square, utilitarian structure.
- Materials: Steel and concrete.

Number 423: Sentry Box



Architectural

Description

Exterior

Building 423, constructed in 1958, is located on the south side of the Radar Tracking Site, directly adjacent to the Main Gate. The building is a small, one-story square structure that was used as a Sentry Box at the time the site was operating. It is situated on a concrete slab which extends out on all sides except for the north. The structure is constructed from Concrete Masonry Unit that is painted light green, with a flat roof that is painted dark green.

There are four fenestrations on the Sentry Box: one door and three windows. The door, located on the south elevation, has three panels on the bottom, six window panes on the top, and a concrete threshold. The windows, located on the north, east and west elevations, are one-over-one, metal, double-hung windows. The windows, door and door trim are all painted dark green to match the roof. The building was restored ca. 2003.



Figure 1.3-109: View of south elevation (left) and the northeast corner (right) showing restored Building 423.

Interior

The interior of the guard house has a concrete floor, an exposed wood ceiling and concrete masonry unit walls. It is no longer used as a Guard House, and is currently used for sign storage for the Park.



Figure 1.3-110: View of interior of Building 423 through west window showing storage for park.

Conditions

Building 423 is in good condition as it has been restored recently. The exterior concrete slab is cracking due to vegetation, one of the window panes is broken and there is minor biological growth on the interior due to moisture.

Exterior

- The concrete masonry unit is in good condition with minor spalling on south and west elevations.
- The concrete slab is in poor condition with severe cracks in the southwest corner and on south side from vegetation. The concrete slab is pulling away from building on west and east sides, and the paint is peeling throughout.
- The door is in good condition. There is a minor split in the wood near the bottom rail. The brass hardware, not original, is in good condition.
- The windows are in good condition, however the bottom pane of the top sash on the east window is broken.
- The roof is in good condition.



Figure 1.3-111: Crack in the foundation on the south elevation near door to Building 423; the slab is pulling away from the building.

Interior

- The CMU walls are in good condition with minor holes and penetrations, and minor biological growth.
- The ceiling is in good condition with exposed rafters and wood roofing.
- The concrete floor is in fair condition with paint stains and possibly some biological growth.
- The door is beginning to warp and split near the paneling on the bottom.



Figure 1.3-112: View of restored interior of Building 423 with exposed rafters in ceiling.

Work Recommendations

- Repair minor CMU spalling on south and west elevations. Repair cracks on southwest corner and south side of concrete slab. Stabilize concrete slab on west and east sides where it is pulling away from building. Touch up paint as necessary on CMU.
- Restore wood door where it is splitting and warping near the bottom rail.
- Replace broken glass in bottom pane of top sash on east window.
- Repair minor holes and penetrations on interior CMU walls.
- Clean biological staining on concrete floor and interior CMU walls.

Structural

Description

The building consists of CMU bearing walls supporting a monoslope wood joist roof with a pronounced eave. A concrete turndown slab surrounds the front and sides of the structure. The exterior slab is independent of the structure.

Conditions

- No cracking of the CMU walls or deterioration of the wood roof was observed. The structure appears to have been the recipient of regular maintenance as part of park interpretation.
- The turndown slab has settled significantly to the southwest and cracked into three pieces (Figure 1.3-113).

Work Recommendations

- The turn down slab settlement is likely due to changes to grade and slope around the guard house. Underpinning such a small structure is not practical.
    - Level 1: Repair cracks and address level changes to create a smooth walking surface.
    - Level 2: Rebuild turndown slab to accommodate existing grade.
    - Level 3: Regrade area to historic levels (grade was likely near to or level with top of turndown slab) and rebuild slab.



Figure 1.3-113: Settlement and cracking of the exterior turndown slab of Building 423.

Building Systems

Description

HVAC

There are no existing HVAC systems.

Plumbing

There are no existing plumbing systems.

Electrical

The building was originally a guard shack and contained lights and convenience receptacles. The systems are no longer active.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

Electrical

None of the electrical systems remain intact.

Character Defining Features

- Massing: One story structure with flat roof ca. 1959.
- Materials: Concrete Masonry Unit ca. 1959.
- Doorway: Original wood-paneled door with wood frame, six glass panes and replacement hardware on south elevation ca. 1959.
- Windows: Original one-over-one double-hung metal windows with concrete sill on north, east and west elevations ca. 1959.

No. 452: Slab for the Equipment and Operations Building

Number 452 is a 15’-9” by 15’-9” concrete slab located in the southwest corner of the Radar Tracking Site, south of HIPAR Building 468. The slab is being used for the Equipment and Operation Building.

Structural

Description

All that remains of the structure is a concrete slab. Various equipment has been placed on and around the slab.

Conditions

- Edges of the slab are chipped and eroded (Figure 1.3-114).

Work Recommendations

- No recommendations are made for the slab.



Figure 1.3-114: Chipped slab of 452.

Building Systems

No structure or systems exist.

No. 453: Pedestal Radar Tower

Architectural

Description

Number 453 is an 8'-0" by 9'-0" CMU pedestal located in the northwest corner of the Radar Tracking Site, east of Building 454, 300 feet southwest of Atlantic Drive.

Conditions

- The pedestal is in fair condition with minor spalling and deterioration throughout the CMU, caused by moisture, weathering and vegetation.

Work Recommendations

- Remove vegetation throughout.
- Repair minor spalling and deterioration on CMU.

Building Systems

Description

HVAC

There are no existing HVAC systems.

Plumbing

There are no existing plumbing systems.

Electrical

This area consisted of a concrete pad that was fenced in and contained the step-down transformers that provided power to the adjacent buildings and radar platforms. The service was delivered from the utility at medium-voltage and stepped down to low-voltage for site use.

Conditions

HVAC

Not applicable.

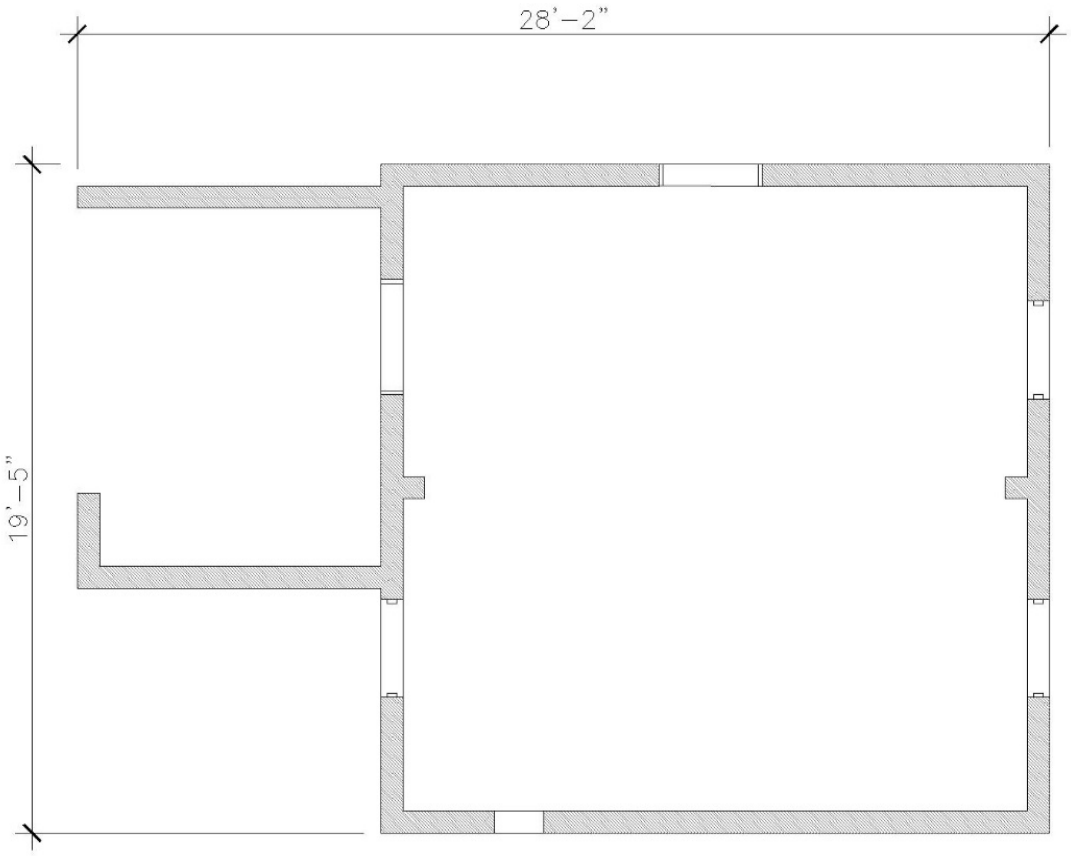
Plumbing

Not applicable.

Electrical

The transformers, cabling, and fencing have all been removed from this location. The original conduits and concrete pad remain, however has been overgrown by shrubbery and vegetation.

No. 454: Equipment and Operations Building



Architectural

Description

Exterior

Building 454, built ca. 1960, is a one-story structure located in the northeast corner of the Radar Detection Site. It is constructed with concrete masonry unit and it situated on a concrete foundation. The roof on the main structure is slightly pitched and has a wooden soffit on each elevation, and the roof on the west addition has collapsed into the building. The north elevation is two bays wide with one door in the center of the east bay. The south elevation is one bay wide and has no fenestrations. The east elevation is one bay wide and has two window openings with wooden frames. The west elevation is two bays wide with one window on the south bay. There is an addition projecting from the north bay, which mostly likely had an opening on the north side, however it is difficult to tell because it is extremely dilapidated.



Figure 1.3-115: Fenestrations and slightly pitched roof of east elevation (left) and dilapidated addition on west elevation (right) of Building 454.

Interior

The interior finishes include CMU walls, plasterboard ceilings and vinyl asbestos floor tile. The trim for the windows and doors is wood.



Figure 1.3-116: View of interior of Building 454, facing west (left) and southwest (right) showing CMU walls, missing doors and windows, and vinyl asbestos floor tile with accumulation of debris.

Conditions

Building 454 is in poor condition; there are cracks and penetrations throughout the interior and exterior CMU, the roof is failing and the windows and doors are deteriorating or missing. These conditions were caused by water penetration and vegetation.

Exterior

- The concrete masonry unit walls are in poor condition. There is a large vertical crack on south side, a vertical crack at the north door and stepped cracks at the window heads. The CMU addition has major cracking and displacement and is near collapse. There are several holes throughout the exterior of the building. The lintel at the west door is damaged and failing.

- The doors are in poor condition and are either missing or badly rotting.

- The windows are in poor condition and are either missing or badly rotting.
- The roof is in poor condition and has almost completely fallen in to the building.
- The soffits and fascia are in poor condition. The fascia is rotting and badly weathered in several places. The edge flashing is rusted and also missing in several places.



Figure 1.3-117: Stepped cracks in CMU (left) and dilapidated roof on west elevation (right) of Building 454.

Interior

- The walls are in poor condition. There is a large vertical crack in the CMU on the south side and a large vertical crack at the north door. There are stepped cracks at the window heads and holes throughout. The lintel on the west door is damaged and failing.
- The plasterboard ceilings are in poor condition and are mostly missing.
- The floor is in poor condition. The vinyl asbestos tile is obscured by debris, but it is loose and broken where visible.
- The doors are in poor condition. The north door is missing and its frame is rotting at the bottom. The casing on the west door is almost entirely missing.
- The windows are in poor condition. The trim is almost entirely missing, and the remnants are splitting or loose in the frame.

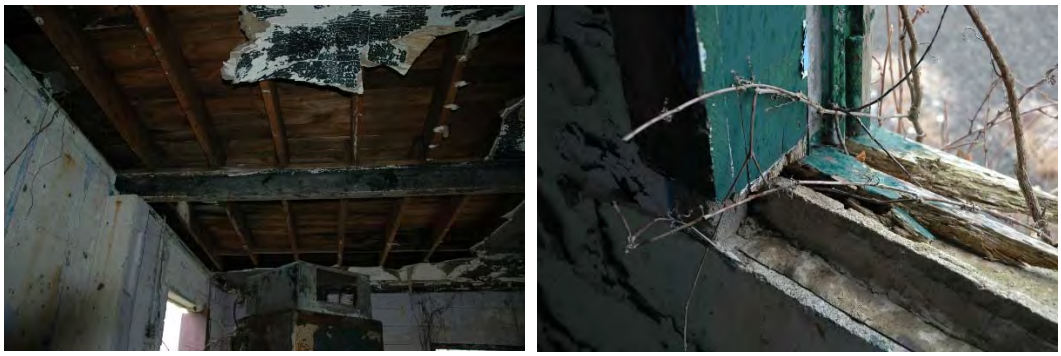


Figure 1.3-118: Deteriorated plasterboard ceiling and exposed rafters (left) and deteriorated wood window sill (right) of Building 454.

Work Recommendations

- Repair large vertical crack in CMU on south elevation, vertical crack at north door and stepped cracks at the window heads. Repair major cracks and displacement in CMU addition as it is near collapse. Fill holes throughout the exterior of the building. Repair large interior vertical crack in CMU on south side and large vertical crack at the north door. Repair holes and stepped cracks at window heads throughout.

- Restore or replace all exterior doors as they are either missing or badly rotting. Restore or replace all interior doors; the north door is missing and frame is rotting, and the casing on the west door is almost entirely missing. Repair/restore lintel at west door.

- Restore or replace all windows as they are either missing or badly rotting. The interior trim is almost entirely missing and the remaining trim is splitting or loose.

- Replace roof.

- Replace soffits, fascia and edge flashing; fascia is rotting and badly weathered in several places and edge flashing is rusted and missing in several places.

- Replace plasterboard ceiling.

- Replace vinyl asbestos tile with new tile, laminate flooring or concrete floor.

Structural

Description

The structure consists of CMU bearing walls supporting a monoslope wood joist roof. Joists lap at midspan and are carried by a steel beam. The beam is supported by CMU pilasters (Figure 1.3-119). The interior of the structure has a slab on grade floor. A lean-to on the south side of the building is connected to the interior of the main structure.

Conditions

- The lean-to roof has collapsed and the walls have cracked (Figure 1.3-120).

Work Recommendations

- Replace lean-to roof 100%, including sill plate, joists, sheathing, and rim board.
- Repoint lean-to CMU. Assume 25% repointing required.



Figure 1.3-119: Interior steel beam of Building 454, with lapped roof joists.



Figure 1.3-120: Collapsed roof at lean-to of Building 454. Arrows indicate crack in wall.

Building Systems

Description

HVAC

There are no existing HVAC systems.

Plumbing

There are no existing plumbing systems.

Electrical

Electrical service to the building was aerial overhead. There was a panel that served the building loads. The panel rating could not be determined. Internal and exterior building wiring was done by surface mounted conduit, very little of which still remains in place. There are no surviving lighting fixtures or receptacles. There does not appear to have been a fire alarm system.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

Electrical

There are no active electrical systems in the building. The original panel, light, and switch are severely rusted, and are not salvageable for re-use.

Character Defining Features

- Massing: One story structure with slightly pitched roof ca. 1960.
- Materials: Concrete masonry unit, wood and sheet metal ca. 1960.
- Doorways: Original door openings with wood door frames ca. 1960.
- Windows: Original window openings with wood frames ca. 1960.

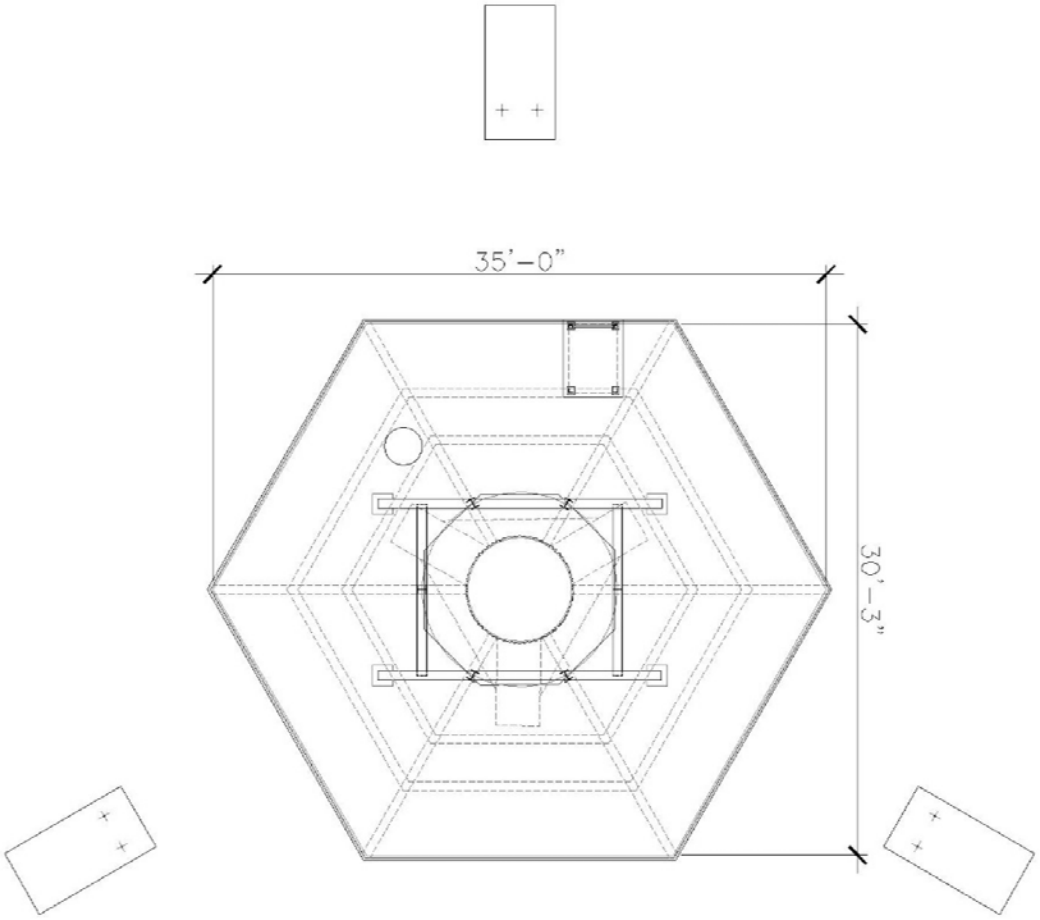
Number 455: Tool Shed

Number 455 is a tool shed that is no longer extant. The foundation is located on the south side of the site, adjacent to Buildings 410 and 420. It was not surveyed because a van has been relocated here.



Figure 1.3-121: Rusted control van located on the foundation of demolished tool shed 455.

Number 467: Target Ranging Radar



Architectural

Description

Structure 467, completed in 1961, is a hexagonal Target Ranging Radar stand located in the southwest corner of the Radar Tracking Site, adjacent to Building 468, approximately 300 feet north of the Main Gate. There is a circular opening with a square frame in the southwest corner. The enclosed ladder shaft is located on the west side of the stand.

Conditions

- The stand is in fair condition; the railing is partially missing on the east side.
- The entire stand is exhibiting rust due to moisture damage.
- The ladder is intact, however the bottom is broken off.



Figure 1.3-122: Overview of Target Ranging Radar 467, exhibiting rust and broken ladder.

Work Recommendations

- Replace partially missing railing on the east side.
- Strip and repaint entire stand.
- Replace ladder.

Structural

Description

Radar towers 467, 472, and 473 consist of two separate structural systems: a central reinforced concrete shaft and slab-on-deck platform supported by steel framing. Available drawings indicate a clear space between the platform supports of the shaft and cast-in-place deck of the steel-framed platform and daylight was visible between the two areas (Figure 1.3-123). Each system has a distinct foundation.

The central shaft is a reinforced concrete tube, supported by eight piles topped with an octagonal pile cap (Figure 1.3-124). The thickness of the shafts are either 12" or 8" according to available drawings, but as the drawings are general in nature and the interior of the shafts are not accessible, it is unclear the thickness of these specific shafts. A triangular concrete cap covers the top of the shaft, and three reinforced concrete platform supports extend the corners of the platforms. Drawings indicate towers were constructed in height increments of 10 feet. Towers 472 and 473 are 10' towers. Tower 467 is a 20' tower.

A hexagonal slab-on-deck platform at the top of the shaft exists at all three towers (Figure 1.3-125). The deck is supported by a steel frame, with wide flange girders radiating from the center to carry the channels forming the hexagonal shape. Where columns frame into the platform, the channels are replaced with wide-flange beams.

At the shorter towers, the platform is supported by wide-flange steel columns, located approximately 8 feet from the outer edge of the shaft, leaving approximately 7 feet of cantilevered deck (Figure 1.3-126). Angles serve as cross-bracing between columns. The columns are supported on concrete piers and footings. At tower 467, the columns connect to the platform frame at the same point but are angled

inward to connect to a steel tower (Figure 1.3-127). This tower is approximately 11 feet in diameter and consists of six wide flange columns connected by wide-flange rings at even spacing. The tower is wrapped in galvanized corrugated steel and is referred to as wind and sun screen. Columns for the tower land on a wide flange grillage with concrete footings (Figure 1.3-128).

The top of the radar platforms were not surveyed due to lack of accessibility.



Figure 1.3-123: Gap between slab-on-deck and platform support.

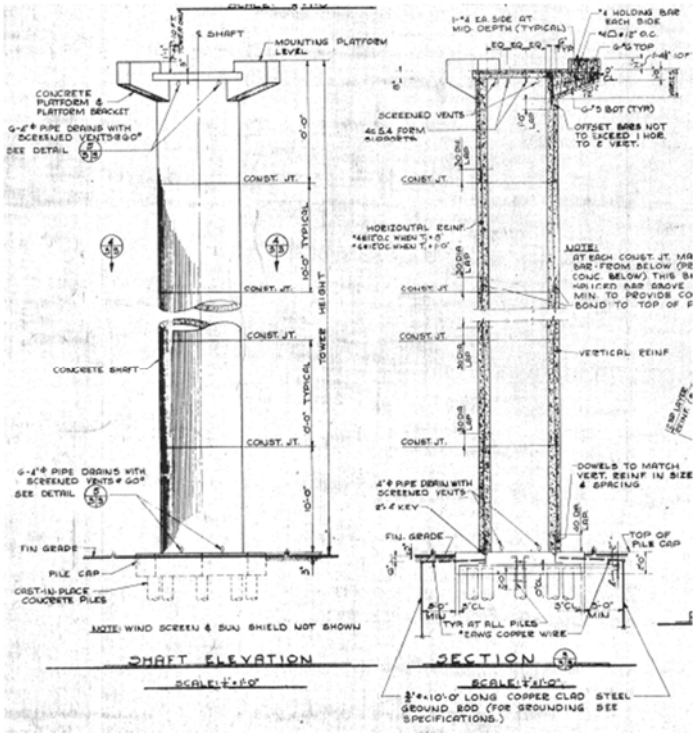


Figure 1.3-124: Elevation and section of typical radar tower, excerpted from "Tower with Radomes Tracking Radar," dated July 15, 1960.

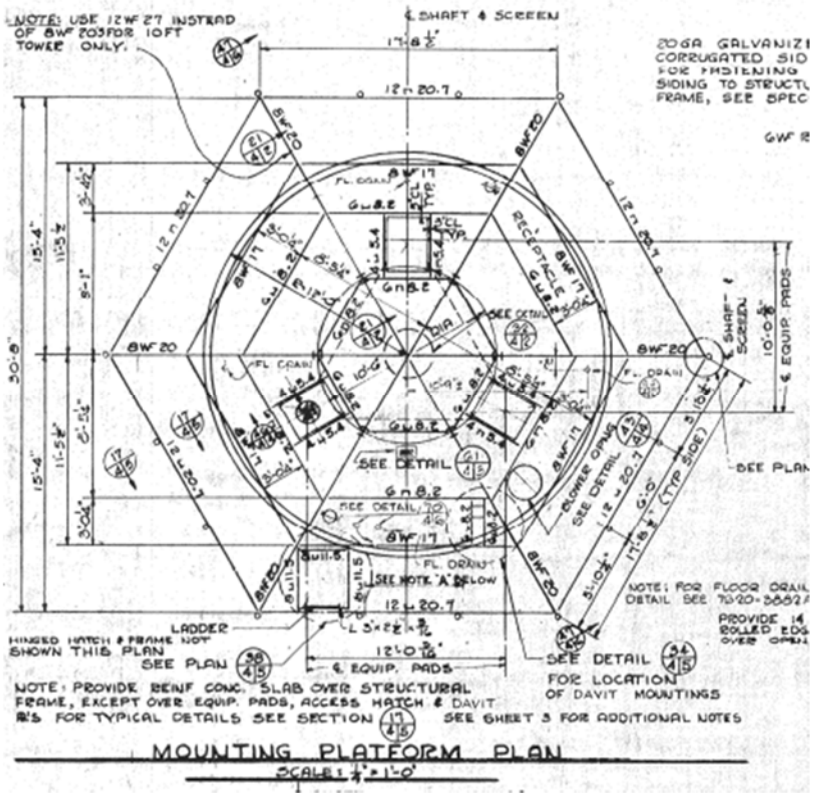


Figure 1.3-125: Mounting platform plan, excerpted from "Tower with Radomes Tracking Radar," dated July 5, 1960.

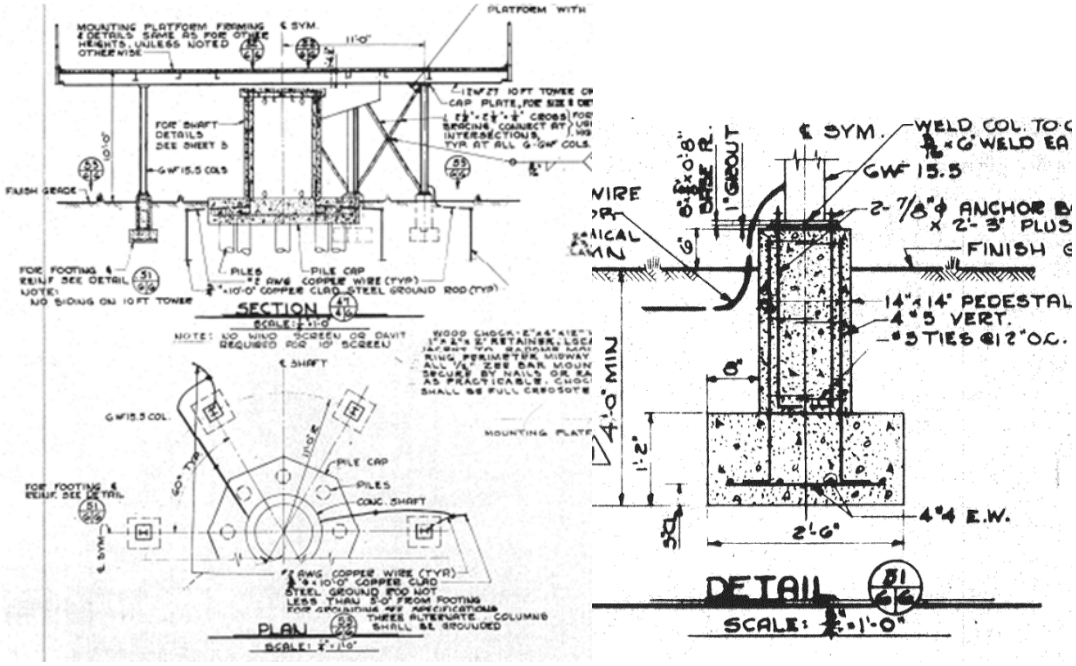


Figure 1.2-126: Section, foundation plan, and column footing detail for 10' radar tower, excerpted from "Tower with Radomes Tracking Radar," dated July 15, 1960.

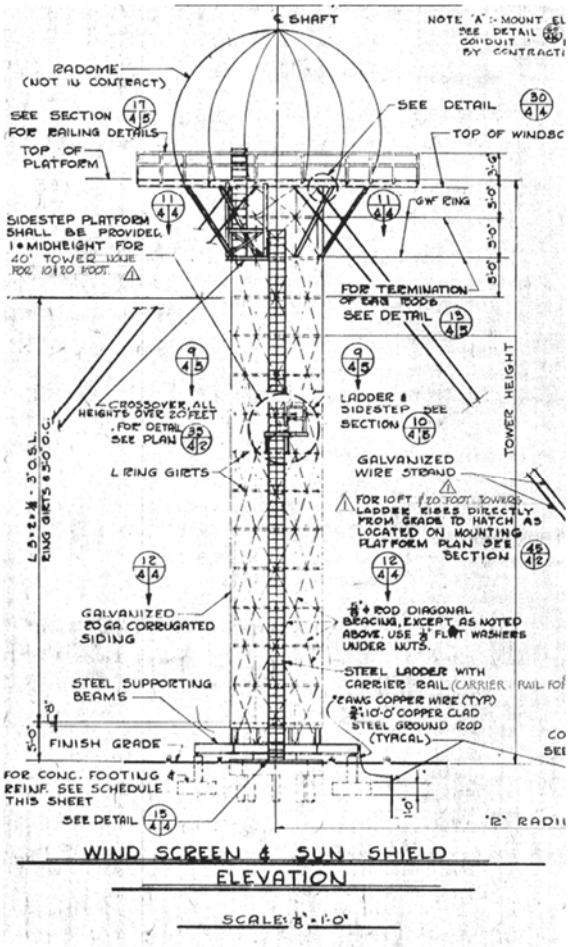


Figure 1.3-127: Wind screen and sun shield, Excerpted from "Tower with Radomes Tracking Radar," dated July 15, 1960.

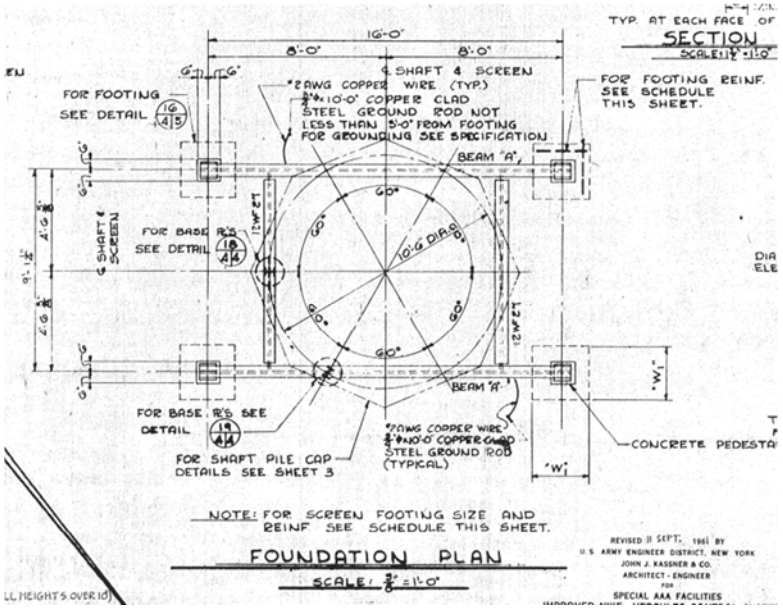


Figure 1.3-128: Foundation plan for wind and sun screen, excerpted from "Tower with Radomes Tracking Radar," dated July 15, 1960.

Conditions

- No. 467 is a 20’ radar tower (Figure 1.3-129).
- Concrete shaft and steel frame platform are in fair condition, but the steel deck is heavily corroded, missing entirely in some sections, exposing the underside of the concrete and the welded wire fabric reinforcing (Figure 1.3-130).
- All exposed steel exhibits surface corrosion.

Work Recommendations

- Access top of platform to evaluate the condition of the upper platform.
- Clean all corroded steel and coat all steel with a zinc-rich rust inhibitive coating. Assume 100% clean and coat, exclusive of corrugated wind screen.
- Upper Platform:
    - Level 1: Stabilize by cleaning all exposed steel elements of corrosion and coat with a zinc-rich rust inhibitive coating.
    - Level 2: Repair missing portions of deck. Replace corrugated decking in kind and recast concrete platform reinforced with welded wire fabric. Assume 25% replacement of deck system.



Figure 1.3-129: 20’ Radome platform 467.



Figure 1.3-130: Deteriorated platform, with exposed welded wire fabric, missing concrete, and corroded deck of Stand 467.

Building Systems

Description

HVAC

There are no existing HVAC systems.

Plumbing

There are no existing plumbing systems.

Electrical

The electrical service was routed underground to the platform location. A service fused disconnect switch in a weatherproof, marine grade enclosure, was mounted to one of the platform supports. The fused switch was to feed a small panelboard that served the platform lighting, power receptacles, and interlocking hatch. An additional separate 20A circuit breaker in a weatherproof enclosure was mounted above the fuse disconnect switch. The panels were rated 208/120-volt, 3-phase, 4-wire, 70A main lug. There is also a weatherproof light switch and convenience receptacles mounted to the platform supports assumed for regular access and maintenance purposes as well. The conduits were surface mounted to supports and underside of the platform. The lightning protection system that once existed has been removed.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

Electrical

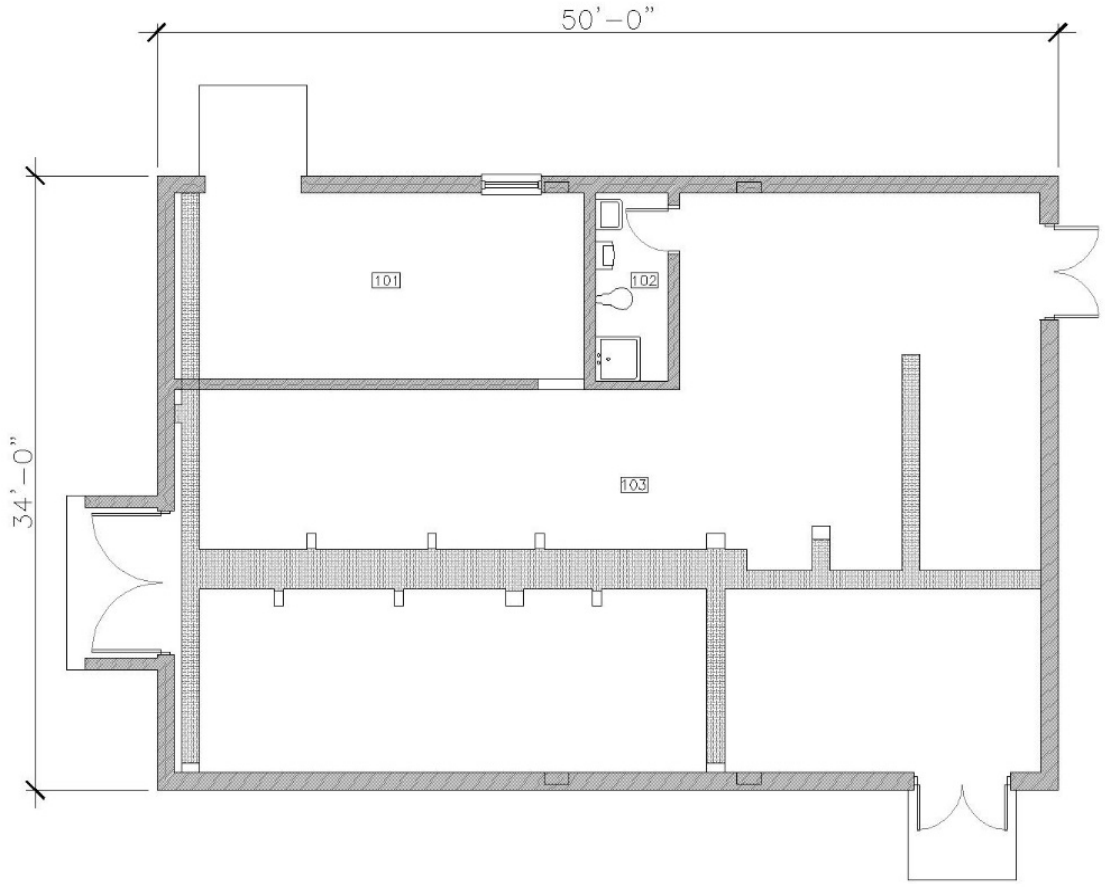
Although the Radar platform's remaining equipment vary from platform to platform, overall majority of the remaining equipment and conduits are in poor condition and severely rusted. The fused service disconnect switch, circuit breaker enclosure, receptacles and some conduit remain at this platform. We were unable to access the top of the platform to closer observe the equipment.

None of the electrical equipment is active, and the lightning protection system that once existed is no longer present.

Character Defining Features

- Massing: Hexagonal, utilitarian structure.
- Materials: Steel and concrete.

No. 468: HIPAR Building



Architectural

Description

Exterior

Building 468, constructed in 1962, is a one-story structure located in the southwest corner of the Radar Detection Site. The structure is situated on a concrete foundation and is constructed with concrete masonry unit. The building has a flat roof that is partially missing with several vent stacks on top and wood bed moulding boards on each elevation. The north elevation is one bay wide and has three fenestrations on the west side: a door, a rectangular window covered with plywood and a square louvered window near grade. The south elevation has three fenestrations on the east side: a double set of plywood door, and two small window openings that are exposing the interior to the elements. The east elevation has one set of plywood doors on the north side and the west elevation has a set of metal doors on the south side that are enclosed with a CMU covered entrance. There are several penetrations throughout the structure, many of which have been abandoned.



Figure 1.3-131: South elevation (left) and southeast corner (right) showing fenestrations, dilapidated roof and deteriorating conditions of CMU of Building 468.

Interior

Building 468 has three rooms: Room 101 in the northwest corner, Room 102, a toilet room east of Room 101, and Room 103, a large room that takes up the remainder of the space. The finishes include a combination of CMU and plasterboard walls and an exposed metal roof structure for the ceiling. The floor consists of concrete and vinyl asbestos tile, with wood baseboards throughout the building.



Figure 1.3-132: Interior view of concrete floor, exposed corrugated metal roof and deteriorated plasterboard walls of Building 468.

Conditions

This building is in poor condition as many of the windows and doors are missing, exposing the building to the elements. There are cracks and penetrations in the CMU and roof is deteriorating due to water damage. The paint is peeling, the floors are deteriorated and there is rust throughout, all conditions caused by moisture and weathering.

Exterior

- The CMU walls are in poor condition. There are stepped cracks, unit cracks at corners and openings, abandoned penetrations and broken or missing units at the loading dock. There is biological growth on the north elevation, significant displacement in the corners and widespread mortar loss throughout. The exhaust on the north elevation is covered with plywood.

- The doors are in poor condition. The frame of the replacement doors on the east elevation is deteriorating and the casing is almost entirely missing. Though not as bad as the east elevation, the door on the south elevation is exhibiting the same conditions as the door on the east side. The doors are completely missing on the west elevation and modern temporary doors have been installed in their place. On the north elevation, the doors are missing and the frame is splitting, badly weathered and rotting at the bottom.

- The windows are in poor condition. The louvers on the north elevation are rusting and the large screen is damaged. The openings on the south elevation are also rusted.

- The roof is in poor condition with missing sections allowing for water penetration and growth.

- The flashing and soffits are in poor condition. They are both badly rusting on the east and south elevations. They are almost entirely missing on the south elevation.



Figure 1.3-133: Missing boards and ballast on roof (left) and window opening with surrounding cracks in CMU (right) on Building 468.

Interior

- The conditions of the walls vary from poor to fair. The CMU is in good condition at the interior partitions and in Room 101. The plasterboard is failing at the south wall and is almost entirely missing. In Room 101, the plasterboard is badly damage in the northwest corner with open joints and water damage at bottom. The east wall is in fair condition except for the damage and cracking at the north end. The north wall is badly damaged, mostly from water staining. The west wall is in poor condition at the north and south ends exhibiting open joints and water staining.

- The ceiling is in fair condition; the roof structure is exposed and has surface rust throughout.

- The condition of the floors vary from poor to good condition. In Room 103, the concrete slab is in good condition and the covers to the trenches are in intact. The concrete floor in Room 101 is in fair condition where visible, however the trench covers are missing. The vinyl asbestos tile is almost entirely missing.

- The doors are in poor condition, exhibiting water staining, open joints and rotting trim, particularly at the bottom. The door trim in Room 101 is weathering and rotting, and has open joints.

- The wood baseboard are generally in poor condition with some pieces in good condition at the north and east sides. Most of the wood base is pulling away from the wall, rotting or missing. The wood base is in especially poor condition in Room 101 where it is pulling away from the wall and rotting in the southwest corner.



Figure 1.3-134: View of Room 102 facing southwest (left) and view of Room 103 facing southeast (right) of Building 468.

Work Recommendations

- Remove biological growth and clean exterior, especially north elevation. Repair stepped cracks and unit cracks at corners and openings of CMU. Fill abandoned penetrations and repair broken or missing units at the loading dock. Stabilize significant displacement in corners and restore deteriorated mortar throughout.

- Replace exterior doors and trim on north, south and west elevations. The doors have been replaced on the east elevation however the frame and casing are deteriorating or missing. Restore or replace interior doors; they are exhibiting water stains, open joints and rotting trim. Replace weathered/rotting door trim in Room 101.

- Restore rusted louvers and replace damaged screen on north elevation. Restore openings on south elevation.

- Replace roof (ceiling is exposed metal roof structure that is exhibiting surface rust throughout).

- Replace flashing and soffits throughout, especially on the east and south elevations where they are badly rusted almost entirely missing.

- Remove plywood on exhaust on north elevation and replace with modern exhaust.

- Replace interior plasterboard walls throughout. Clean, patch and paint CMU walls.

- Remove debris, clean and paint concrete floor. Replace missing trench covers. Replace vinyl asbestos tile with new laminate flooring or concrete.

- Replace wood baseboards are they are pulling away from wall, rotting or missing. Some pieces are in good condition at the north and east sides, however it is in especially poor condition in Room 101 where it is pulling away from the wall and rotting in the southwest corner.

Structural

Description

The structure consists of CMU bearing walls supporting steel joists with a metal roof deck. The top chord of the joists is extended by 1'-6" over the outer face of the walls. At the center of the building, a CMU penthouse rises above the roof plane. The penthouse is carried by two steel beams spanning parallel to the roof joists, with angles bridging the space between (Figure 1.3-135). The steel beams pocket into the exterior CMU walls and bear on brick piers (Figure 1.3-136). According to available drawings, the exterior walls are 12" CMU. At the brick pilaster, the CMU is 4" (Figure 1.3-137). Non-bearing interior CMU walls enclose space formerly used for air conditioning equipment and a bathroom.

Conditions

- The mortar in the east wall is heavily deteriorated (Figure 1.3-138). At the northeast corner, the mortar is entirely absent from some joints (Figure 1.3-139). Mortar remaining in joints is very soft easily removed (Figure 1.3-140).
- On the south wall, west end, the joist extensions are exposed and the eave is missing, leaving the interior exposed to the elements (Figures 1.3-136 and 1.3-141).

- Step cracking was observed throughout the structure (Figure 1.3-142).

- At the front entrance, the walls surrounding the entrance have been damaged, possibly from an impact (Figure 1.3-143).

Work Recommendations

- Repoint entire structure.
- Replace missing joist extension and missing roof. Evaluate existing joists for corrosion and repair as required.
- Repoint step cracking and replace CMU where crack extends through unit.
- Replace any damaged CMU at front entrance.



Figure 1.3-135: Beams and angles carrying penthouse in Building 468.



Figure 1.3-136: Brick pier within CMU wall of Building 468. Open roof is visible at right of photograph. Furring and remnants of interior finishes visible at left.

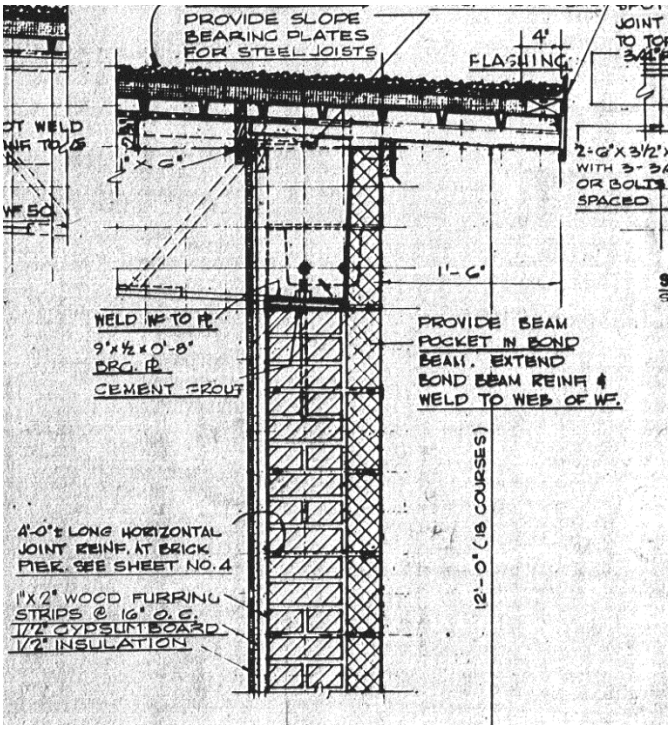


Figure 1.3-137: Wall section at brick pier, excerpted from "Improved Nike-Hercules System HIPAR Building- Non Consolidated Wall Sections," dated June 10, 1960.



Figure 1.3-138: Heavily deteriorated mortar at east wall of Building 468.



Figure 1.3-139: Total mortar loss at northeast corner of Building 468. Arrow indicates loose CMU resting on block below.



Figure 1.3-140: Loose, soft mortar on east wall of Building 468.



Figure 1.3-141: Missing eave on south wall of Building 468.



Figure 1.3-142: Step cracking at south wall of Building 468.



Figure 1.3-143: Possible impact damage at front entrance of Building 468.

Building Systems

Description

HVAC

The building contains a heating only air handling unit. The heated air is ducted to the interior zones. The building also contains ventilation fans.

Plumbing

The building restroom contains a water closet, lavatory, janitor sink, and urinal. Floor drains are also located in the restroom.

Electrical

Electrical service to the building appeared to be underground to a Main Distribution Panel (MDP), which has been removed. The MDP fed a panel that served the building loads. The panel rating could not be determined. Internal and exterior building wiring was done by surface mounted conduit, some of which still remains in place.

Lighting in the building was primarily fluorescent shop lights controlled by local switches. In addition, receptacles were provided in the building for equipment and convenience power. Circuiting in the building was surface mounted conduit. Other than the lighting fixtures and receptacles, various pieces of equipment are still in place. There does not appear to have been a fire alarm system.

Conditions

HVAC

All of the existing HVAC equipment including the ductwork is deteriorated and in poor condition.

Plumbing

All of the plumbing fixtures are deteriorated, not functional and in poor condition. The associated sanitary and domestic water piping systems are also deteriorated and not functional.

Electrical

Majority of the original electrical systems remain intact within the building, however the systems are not active, and are not salvageable for re-use.



Figure 1.3-144: Interior of Building 468.

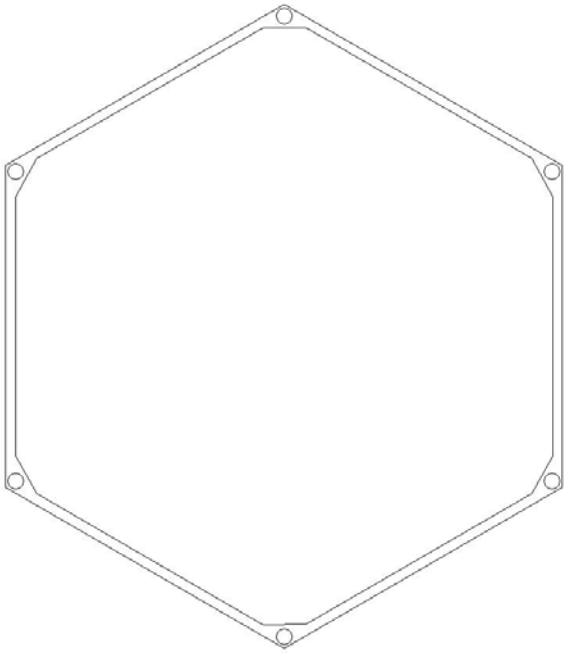


Figure 1.3-145: Building 468 Restroom.

Character Defining Features

- Massing: One-story structure with flat roof ca. 1962.
- Materials: Concrete masonry unit, wood and sheet metal ca. 1962.
- Doorways: Original door openings with wood door frames ca. 1962.
- Windows: Metal louvered windows and original window openings with metal frames ca. 1962.

No. 469: HIPAR Tower Foundation



Number 469 is a hexagonal concrete foundation located in the southwest corner of the Radar Tracking Site, north of HIPAR Building 468, approximately 300 feet north of the Main Gate. The HIPAR Tower Foundation is no longer extant.

Structural

Description

All that remains of the structure is a concrete slab. Survey was limited as a result of heavy vegetation growing on the slab.

Conditions

- Condition of the slab was not assessed due to heavy vegetation (Figure 1.3-146).

Work Recommendations

- Clear vegetation from existing slab.
- No other recommendations likely once vegetation is cleared.

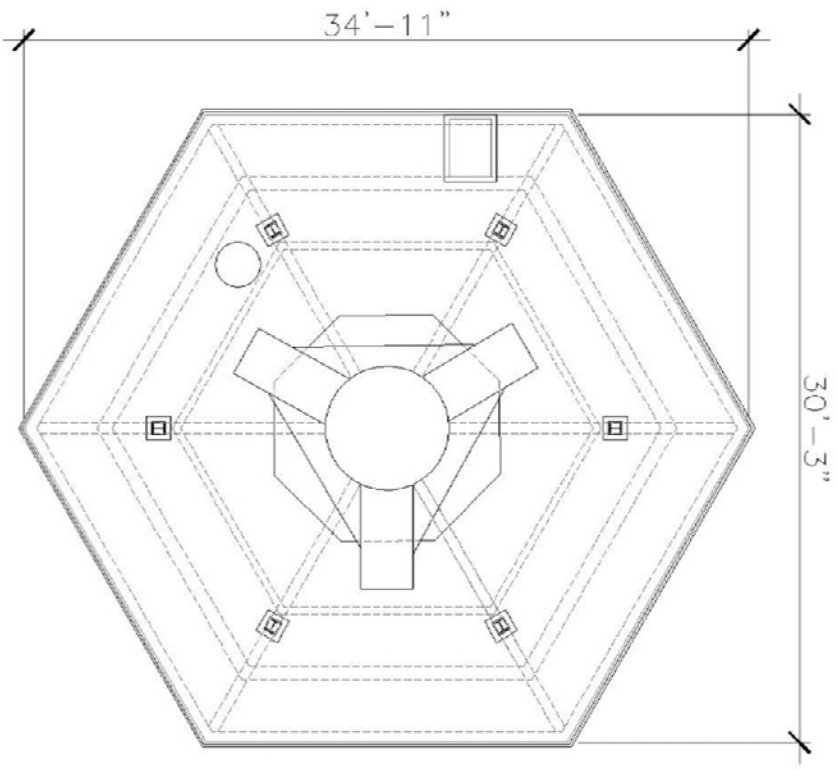


Figure 1.3-146: Heavy vegetation at 469.

Character Defining Features

- Massing: Hexagonal, utilitarian structure.
- Materials: Steel and concrete.

Number 472: HIPAR Target Tracking Radar



Architectural

Description

Structure 472, constructed in 1962, is a hexagonal HIPAR Target Tracking Radar stand. It is located in the southwest corner of the Radar Tracking Site, adjacent to Number 467, approximately 300 feet north of the Main Gate. There is a circular opening with a square frame in the southwest corner and a square hatch for the ladder on the west side.

Conditions

- The radar stand is in fair condition; the radar detector is partially intact and the railing is in stable condition but exhibiting some rust due to moisture and general weathering.
- The ladder is missing but the concrete footing is extant.



Figure 1.3-147: Partially intact HIPAR Tracking Radar Stand 472, exhibiting rust (left) and missing ladder (right).

Work Recommendations

- Strip and paint the entire stand including railing.
- Replace missing ladder.

Structural

Description

See Target Ranging Radar 467

Conditions

- The platform is a 10’ radar tower (Figure 1.3-148).
- Concrete shaft and steel platform frame are in fair condition, but the steel deck is heavily corroded exposing the underside of the concrete in some locations (Figure 1.3-149).
- Available drawings indicate that grade was only 6” below the top of the pile cap and column footings (Figure 1.3-126). However, considerable portions of the pile cap and footings are visible, suggesting loss of soil around the structure which could potentially undermine the foundation (Figure 1.3-150).
- The concrete around the columns is cracked in select locations, likely as a result of the corrosion of the reinforcing steel (Figure 1.3-151).
- All exposed steel exhibits surface corrosion.

Work Recommendations

- Access top of platform to evaluate the condition of the upper platform.

- Clean all corroded steel and coat with a zinc-rich rust inhibitive coating. Assume 100% clean and coat, exclusive of corrugated wind screen.

- Upper Platform:

    - Level 1: Stabilize by cleaning all exposed steel elements of corrosion and coat with a zinc-rich rust inhibitive coating.

    - Level 2: Repair missing portions of deck. Replace corrugated decking in kind and recast concrete platform reinforced with welded wire fabric. Assume 25% replacement of deck system.

- Regrade area to reinstate sufficient bearing for foundations.

- At cracked concrete column base, remove spall, clean corroded reinforcing steel, and coat with zinc-rich rust inhibitive coating. Repair spall with concrete repair mortar.



Figure 1.3-148: 10' Radome platform 472.



Figure 1.3-149: Corroded deck and steel framing of Stand 472.



Figure 1.3-150: Exposed pile cap and column footings of Stand 472.



Figure 1.3-151: Cracked column encasement of Stand 472.

Building Systems

Description

HVAC

There are no existing HVAC systems.

Plumbing

There are no existing plumbing systems.

Electrical

The electrical service was routed underground to the platform location. A service fused disconnect switch in a weatherproof, marine grade enclosure, was mounted to one of the platform supports. The fused switch was to feed a small panelboard that served the platform lighting, power receptacles, and interlocking hatch. An additional separate 20A circuit breaker in a weatherproof enclosure was mounted above the fuse disconnect switch. The panels were rated 208/120-volt, 3-phase, 4-wire, 70A main lug. There is also a weatherproof light switch and convenience receptacles mounted to the platform supports assumed for regular access and maintenance purposes as well. The conduits were surface mounted to supports and underside of the platform. The lightning protection system that once existed has been removed.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

Electrical

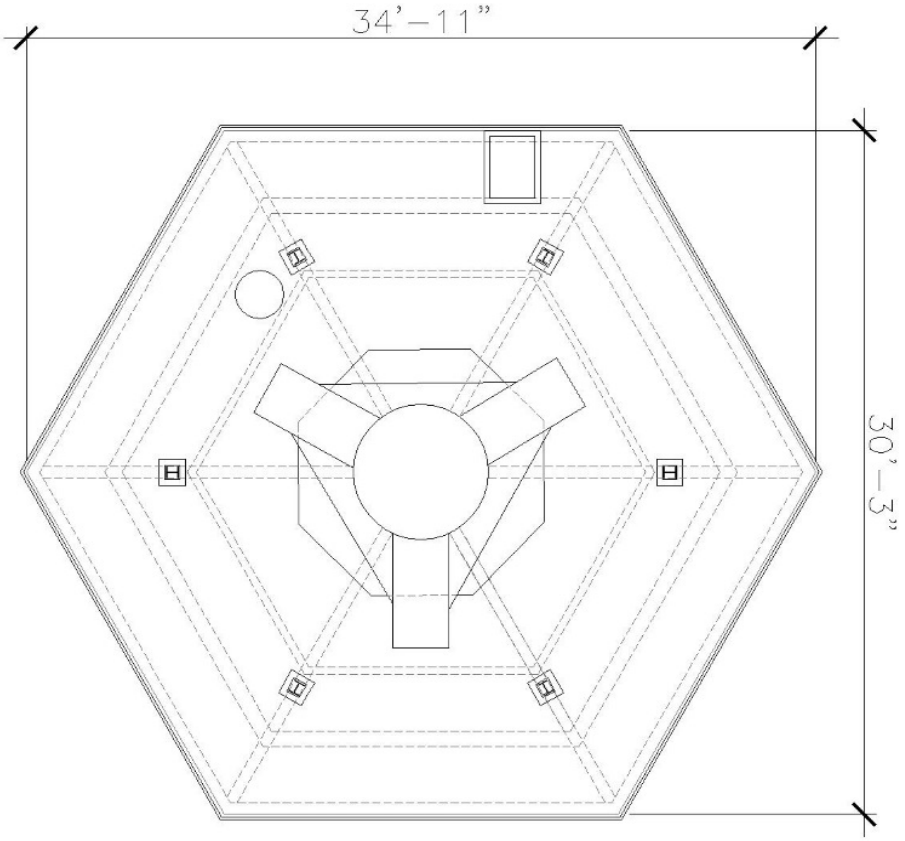
Although the Radar platform's remaining equipment vary from platform to platform, overall majority of the remaining equipment and conduits are in poor condition and severely rusted. The fused service disconnect switch, circuit breaker enclosure, receptacles and some conduit remain at this platform. We were unable to access the top of the platform to closer observe the equipment.

None of the electrical equipment is active, and the lightning protection system that once existed is no longer in present.

Character Defining Features

- Massing: Square, utilitarian structure.
- Materials: Steel and concrete.

Number 473: HIPAR Target Tracking Radar



Architectural

Description

Structure 473, constructed in 1962, is a hexagonal HIPAR Target Tracking Radar stand located in the northeast corner of the Radar Detector Site, adjacent to Building 413 (Guard Booth), approximately 100 feet west of Atlantic Drive. There is a circular opening with a square frame that was possibly used for a vent, as there is a vent on the ground nearby.

Conditions

- The stand is in fair condition exhibiting rust throughout due to moisture and weathering.
- It is extremely overgrown with vegetation.
- The railing is intact, however it is exhibiting a good amount of rust due to moisture and weathering.



Figure 1.3-152: HIPAR Target Tracking Radar Stand 473 is overgrown with vegetation and is rusted throughout.

Work Recommendations

- Remove vegetation.
- Strip and paint entire stand including railing and ladder.

Structural

Description

See Target Ranging Radar 467

Conditions

- The platform is a 10’ radar tower (Figure 1.3-153).
- Concrete shaft and steel platform frame are in fair condition, but the steel deck is heavily corroded exposing the underside of the concrete in some locations (Figure 1.3-154).
- Available drawings indicate that grade was only 6” below the top of the pile cap and column footings (Figure 1.3-126). However, considerable footings are visible and the bottom edge of the pile cap is visible, suggesting loss of soil around the structure which could potentially undermine the foundation (Figure 1.3-155).
- All exposed steel exhibits surface corrosion.

Work Recommendations

- Access top of platform to evaluate the condition of the upper platform.
- Clean all corroded steel and coat with a zinc-rich rust inhibitive coating. Assume 100% clean and coat, exclusive of corrugated wind screen.

- Upper Platform:
    - Level 1: Stabilize by cleaning all exposed steel elements of corrosion and coat with a zinc-rich rust inhibitive coating.
    - Level 2: Repair missing portions of deck. Replace corrugated decking in kind and recast concrete platform reinforced with welded wire fabric. Assume 25% replacement of deck system.
- Regrade area to reinstate sufficient bearing for foundations.
- At cracked concrete column base, remove spall, clean corroded reinforcing steel, and coat with a zinc-rich rust inhibitive coating. Repair spall with concrete repair mortar.



Figure 1.3-153: 10' Radome platform 473.



Figure 1.3-154: Corroded deck and steel framing of Stand 473.



Figure 1.3-155: Exposed bottom edge of pile cap of Stand 473.

Buildings Systems

Description

HVAC

There are no existing HVAC systems.

Plumbing

There are no existing plumbing systems.

Electrical

The electrical service was routed underground to the platform location. A service fused disconnect switch in a weatherproof, marine grade enclosure, was mounted to one of the platform supports. The fuse switch was to feed a small panelboard that served the platform lighting, power receptacles, and interlocking hatch. An additional separate 20A circuit breaker in a weatherproof enclosure was mounted above the fuse disconnect switch. The panels were rated 208/120-volt, 3-phase, 4-wire, 70A main lug. There is also a weatherproof light switch and convenience receptacles mounted to the platform supports assumed for regular access and maintenance purposes as well. The conduits were surface mounted to supports and underside of the platform.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

Electrical

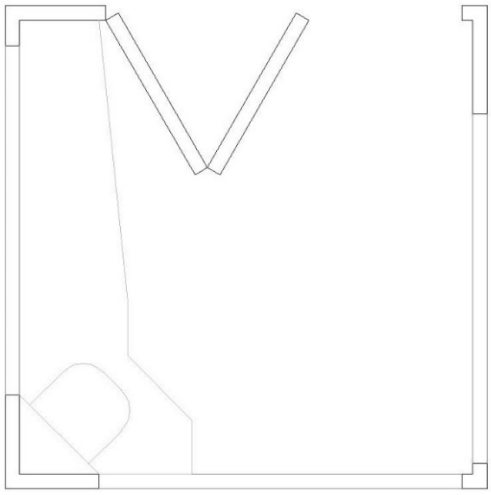
Although the Radar platform's remaining equipment vary from platform to platform, overall majority of the remaining equipment and conduits are in poor condition and severely rusted. The fuse service disconnect switch, circuit breaker enclosure, receptacles and some conduit remain at this platform. We were unable to access the top of the platform to closer observe the equipment.

None of the electrical equipment is active, and the lightning protection system that once existed is no longer present.

Character Defining Features

- Massing: Hexagonal, utilitarian structure.
- Materials: Steel and concrete.

Phone Booth



Architectural

Description

Exterior

The phone booth is a small metal structure located along the cement path in the northwest corner of the Radar Detection Site, just south of the Barracks 402 and 403. It is situated on a concrete foundation and has red metal panels on the bottom of each side, except for the north elevation, where the door is located.



Figure 1.3-156: Overview of Telephone Booth facing south.

Interior

The interior of the phone booth has a concrete floor. There is a phone located in the southwest corner and a light fixture in the ceiling.



Figure 1.3-157: Concrete floor of Telephone Booth is overgrown with vegetation.

Conditions

Exterior

- The metal frame of the booth is in good condition, however the red metal panels are beginning to rust due to moisture.
- The glass for the structure is completely missing.
- The metal accordion door is no longer operable.
- The phone booth is overgrown with vegetation, particularly on the bottom, and it is beginning to grow up the west elevation.
- Some rubber weather stripping remains throughout the structure.



Figure 1.3-158: Overview of Telephone Booth facing north.

Interior

- The plastic light fixture in the ceiling is broken, inoperable and has wires hanging down into the booth.
- The telephone is rusted and no longer operable.
- The red metal panels on the interior of the booth are rusting.
- The concrete floor is obscured by debris and vegetation.



Figure 1.3-159: Deteriorated conditions of telephone and light fixture.

Work Recommendations

- Restore red metal panels are they are beginning to rust.
- Replace glass throughout.
- Replace metal door as it is no longer operable.
- Remove vegetation.
- Replace rubber weather stripping throughout the structure.
- Replace ceiling light fixture.
- Replace telephone.
- Remove debris and vegetation, and clean concrete floor.

Structural

Description

Telephone booth is a prefabricated aluminum structure with glass and enameled steel panel inserts.

Conditions

- All glass is missing from the telephone booth, and enameled coating on bottom steel panels has chipped, causing corrosion of the panels (Figure 1.3-160).

Work Recommendations

- No structural recommendations are made for the Telephone Booth.



Figure 1.3-160: Telephone booth. Note corrosion of lower panels.

Building Systems

Description

HVAC

There are no HVAC systems.

Plumbing

There are no plumbing systems.

Electrical

The booth is located between the barracks and latrine locations. Power and telephone service to the booth were provided underground from one of the adjacent buildings.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

Electrical

The telephone is still in place within the booth, however, there are no active systems remaining.

Character Defining Features

- Massing: Small, rectangular structure with a flat roof ca. 1970.
- Materials: Aluminum, plastic and glass ca. 1970.
- Doorway: Metal bi-fold door ca. 1970.

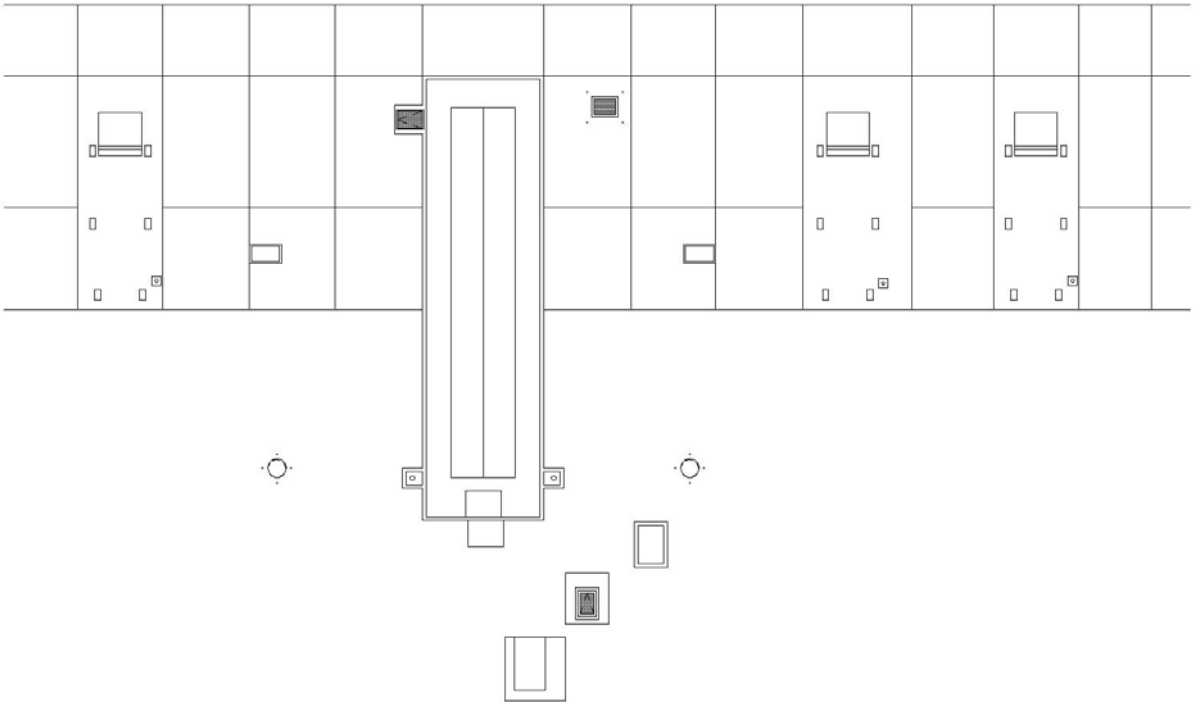
1.3.3 Missile Launching Site

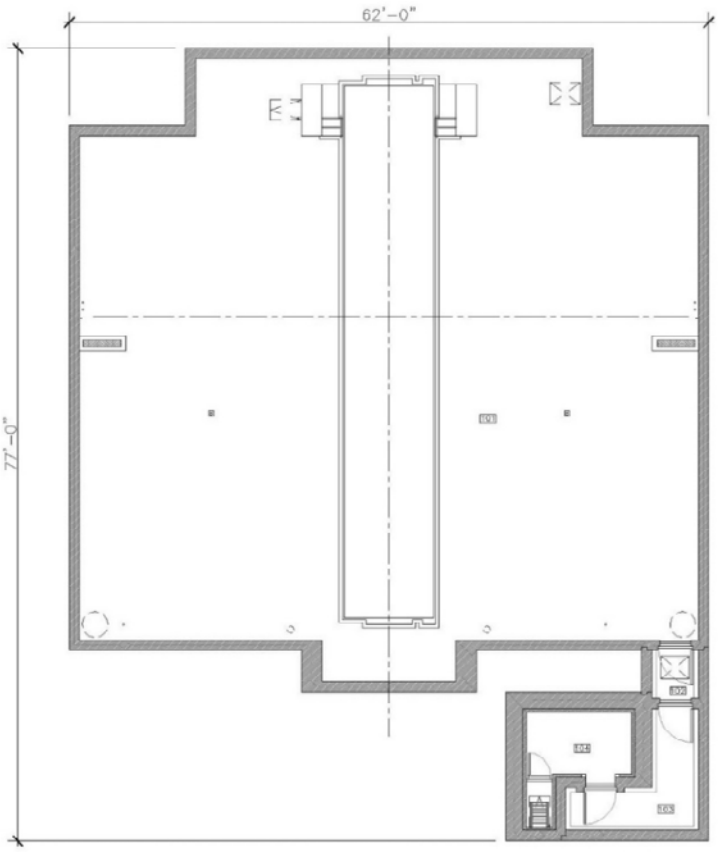
Underground Missile Storage Structures 425-428

The underground missile structures are located in the northeast corner of the Missile Launching Site, approximately 600 feet east of the main gate. There are four underground magazines that can only be reached by a ladder. Underground Missile Storage 425 and 427 are inaccessible.

Number 425 – Northeast Underground Missile Storage: *Inaccessible*

Number 426 – Southeast Underground Missile Storage





Architectural

See Southwest Underground Missile Storage 428.

Structural

Description

The underground missile storage structures consist of subterranean cast-in-place concrete enclosures. The only above grade portions are various mechanical exhaust vents, access and escape hatches, and a curb surrounding the missile elevator doors (Figure 1.3-170). The structures are cruciform in plan, with a control room and escape hatch extending from the northeast corner (Figure 1.3-161). Reinforced concrete girders span each side of the elevator opening. Concrete beams span between the girders and north and south walls.

According to available drawings, the walls were typically 12" thick, with thicker walls at the east side of the missile bay and around the control room (Figure 1.3-162). The thicker walls at the east side function as columns to support the girders flanking the missile bay. The column's west side is inboard of the space (Figure 1.3-171). The floor of the structure is a 12" mat foundation. The elevator pit is approximately 6'-1" below the slab. Heavy grade beams flank the space and are supported by a 2'-6" mat foundation. The pit was not surveyed. Standing water in the southeast missile storage structure and

elevator doors in the down position covering the pit of the southwest missile storage structure prevented access.

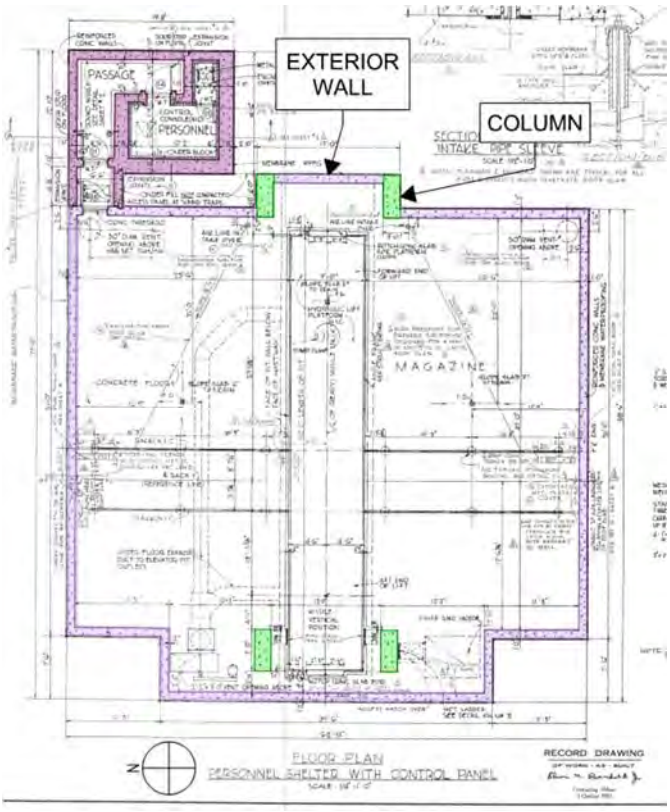


Figure 1.3-161: Plan of "Nike-I Underground Missile Storage Structures- Plans," dated December 23, 1953.

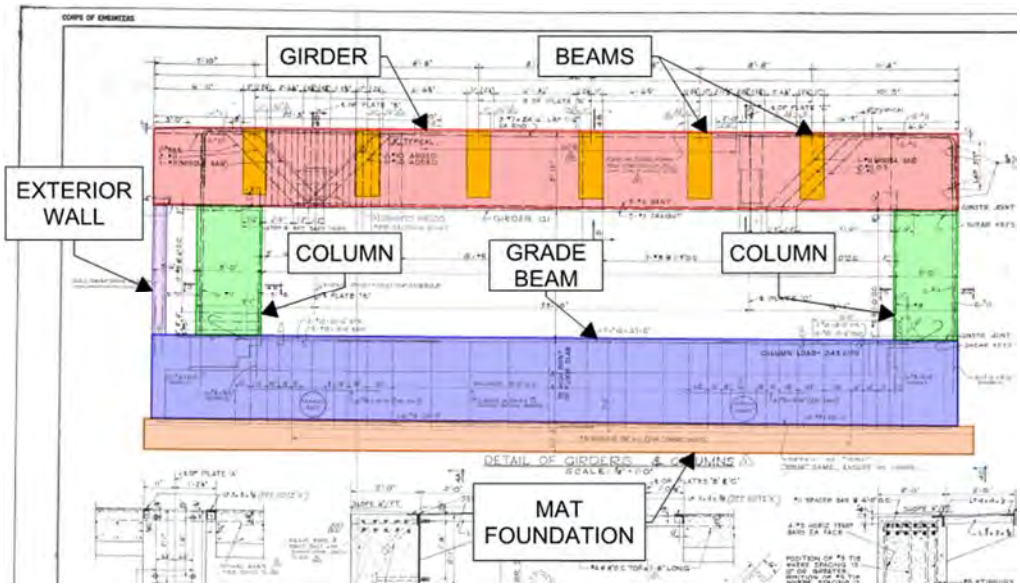


Figure 1.3-162: E-W section through the structure excerpted from "Nike-I Underground Missile Storage Structures- Typ Details," dated December 23, 1953.

Conditions

- Concrete is overall good conditions (Figure 1.3-163), with minor spalls at east and west ends of the missile bay (Figure 1.3-164).
- On the south and west walls, the finishes are flaking from the walls in the assumed location of the vertical reinforcement. The concrete is not spalled (Figure 1.3-165).
- All exposed steel elements within the structure are heavily corroded (Figure 1.3-166).

Work Recommendations

- Clean all exposed corroded steel reinforcement and coat with zinc-rich, rust-inhibitive coating.
- Replace corroded steel elements where required for interpretation.



Figure 1.3-163: Northeast corner of the Underground Missile Storage Structure. The door in the picture leads to the control room. Previous water levels are visible as striations at the bottom of the wall.



Figure 1.3-164: Spalled concrete near west end of the Underground Missile Storage Structure. Note heavy corrosion of ladder.



Figure 1.3-165: Location of vertical reinforcing rebar in the Underground Missile Storage Structure is evidenced by the failed finishes. Concrete is in good condition.



Figure 1.3-166: Heavy corrosion of steel missile elevator components. Underside of the lift is visible.

Building Systems

Description

HVAC

The launch silos 426 and 428 were observed as follows. The other silos are assumed similar. Each silo is provided with a ventilation system consisting of a floor mounted centrifugal belt driven fan and single wall un-insulated ductwork. The fan exhausts air from the silo portion of the structure with intake air being provided via intake vents in the eastern corners of the silo. A smaller centrifugal belt driven fan provides ventilation air to the control room area. The controller room system is also provided with a duct mounted electric heating coil as well as sound attenuators.

Plumbing

Four (4) hose bibs are provided in the corners of the silo. There are two (2) floor drains located on each side of the silo that drain into the lower sump pit in the center of the silo. The sump pit was submerged in water and it could not be verified if a sump pump is present.

Electrical

Launch Silos 426 and 428 were observed as follows. The other Silos are assumed similar.
Electrical service entered the underground silo below grade to a 225A, 3-pole, 440 volt rated circuit breaker type main disconnect switch, manufactured by Westinghouse. The circuit breaker disconnect switch fed a distribution panelboard rated 440/240 volt, 3-phase. The panelboard was manufactured by Westinghouse. The ampere rating of the distribution panelboard could not be determined, and is assumed 225A, 3-pole corresponding with the main circuit breaker disconnect switch. The distribution panelboard was located adjacent to the missile elevator lift. The distribution panelboard consisted of circuit breakers that fed mechanical equipment, motors, and step down transformers for a 240/120-

volt, 3-phase, 20-pole panel mounted next to the service panel. The 20-pole panel fed lighting, receptacles and smaller miscellaneous and mechanical equipment.

Lighting was surface mounted incandescent vaportight fixtures with wire guards. Surface mounted receptacles were provided for small plug-in loads and convenience power. Circuiting in the silo was surface mounted conduit. The panels, motors, and various pieces of equipment are still in place.
There does not appear to have been a fire alarm system.

Conditions

HVAC

All HVAC equipment including the ductwork are deteriorated and in poor condition.

Plumbing

The domestic water piping and insulation are deteriorated and in poor condition. The floor drains are appear to be clogged and silo elevator sump was flooded and could be assumed that the sump pump and drainage piping are deteriorated and not salvageable.

Electrical

There are no active electrical systems in the silos. The original equipment, panels, transformers, lighting fixtures and receptacles are still in place. They are all in poor condition and past their useful service life. The systems do not appear to be salvageable for re-use.



Figure 1.3-167: Typical Control Room HVAC System in Underground Missile Storage Structure.



Figure 1.3-168: Typical Silo Ventilation System of Underground Missile Storage Structure.



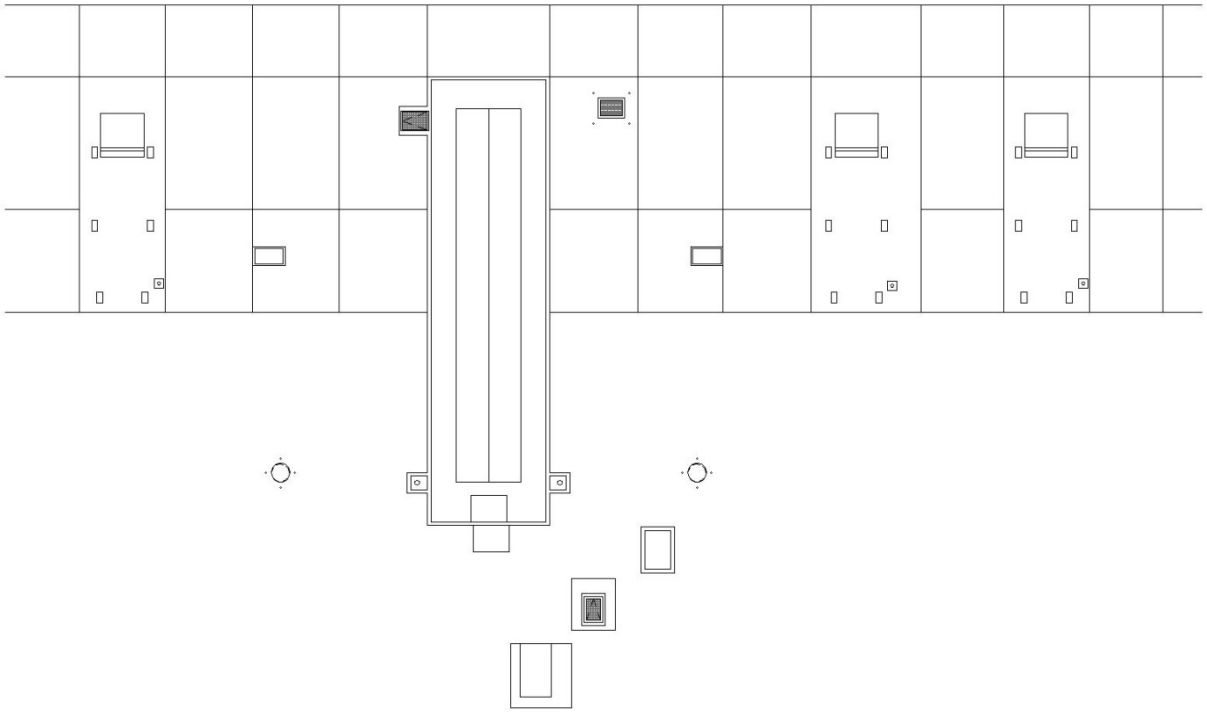
Figure 1.3-169: Typical Silo Hose Bib of Underground Missile Storage Structure.

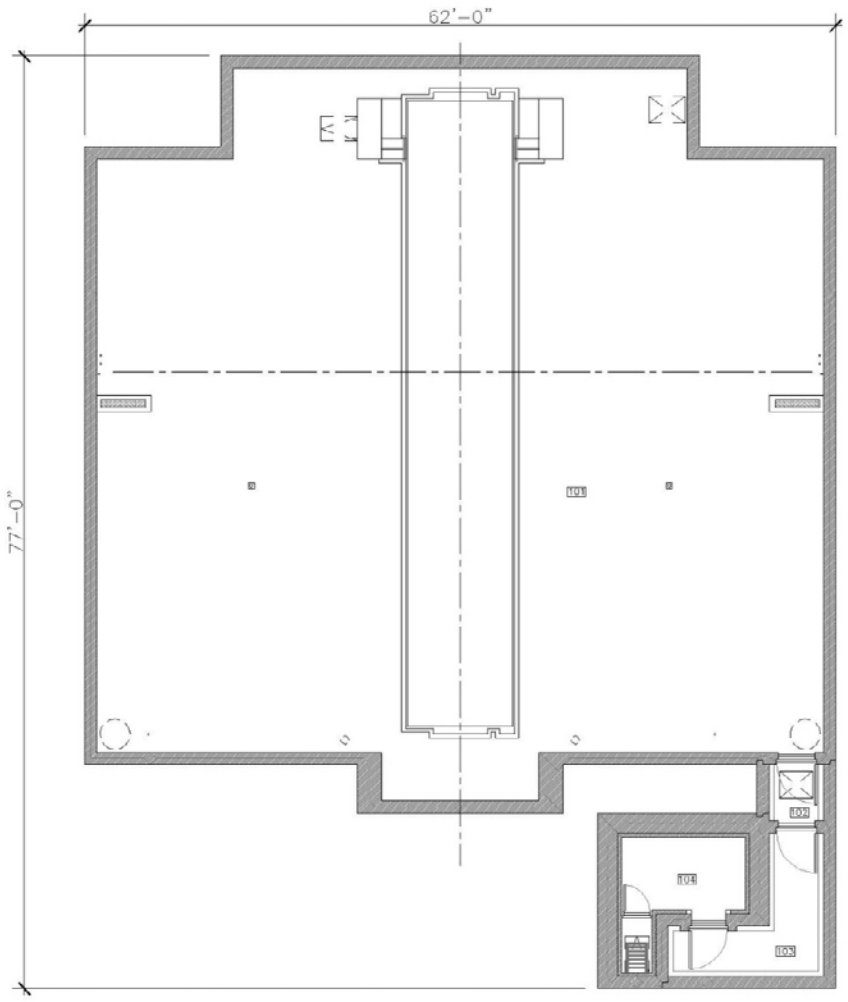
Character Defining Features

See Southwest Underground Missile Storage 428.

Number 427 – Northwest Underground Missile Storage: *Inaccessible*

Number 428 – Southwest Underground Missile Storage





Architectural

Conditions

- The walls are in poor condition. The perforated acoustic panels are deteriorating due to moisture damage, especially in the corridor.

- The ceilings are in poor condition. There are birds' nests throughout the structure, and the perforated acoustic panels are deteriorating and the metal framing is rusting due to moisture.

- The floors are in poor condition. They are wet in some areas where debris is accumulating and the elevator pit is flooded. The lift is covered in debris and the water is causing the angles at the pit edges to rust.

- The doors, including frames and hardware, are in poor condition because of water damage. They are completely rusted, the lift doors are disintegrating and the man doors are not operable.

Work Recommendations

- Replace perforated acoustic wall panels.
- Remove birds' nests from ceiling. Replace perforated acoustic ceiling panels and rusted metal framing.
- Replace all doors, frames and hardware. Replace lift doors and man doors as they are disintegrating and not operable.
- Remove debris and drain elevator pit. Remove debris from lift and restore angles on rusted pit edges.

Structural

Description

See Number 426 – Southeast Underground Missile Storage

Conditions

- Concrete is overall good conditions (Figure 1.3-172), with minor spalls at east and west ends of the missile bay (Figure 1.3-173).
- All exposed steel elements within the structure are heavily corroded (Figure 1.3-174).
- Elevator doors are open and the lift is in the down position, and a wood joist roof was constructed to cover the opening (Figure 1.3-174).



Figure 1.3-170: Exterior view of Missile Storage 428. A wood roof was constructed to cover the open elevator bay.

Work Recommendations

- Clean all exposed corroded steel reinforcement and coat with zinc-rich, rust-inhibitive coating.
- Replace corroded steel elements where required for interpretation.



Figure 1.3-171: Looking west along the missile bay at the two visible columns supporting the girders (Missile Storage 428).



Figure 1.3-172: Concrete beams framing into girder at southeast end of Missile Storage 428. Concrete is in good condition.



Figure 1.3-173: Spalled concrete near west end of the Underground Missile Storage Structure.



Figure 1.3-174: Heavy corrosion of steel missile elevator components. Underside of wood roof is visible.

Building Systems

Description

See Southeast Underground Missile Storage 426.

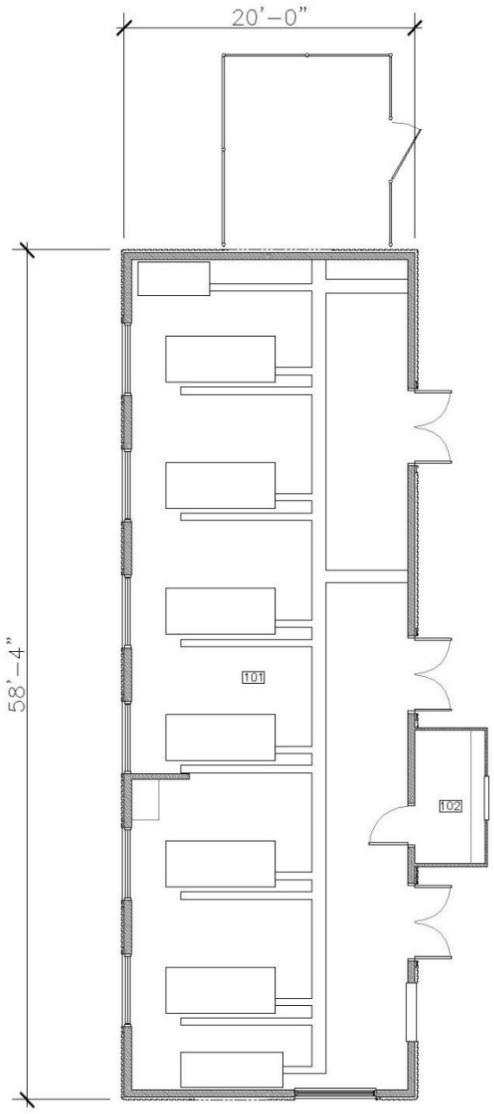
Conditions

See Southeast Underground Missile Storage 426.

Character Defining Features

- Massing: Large one-story structure underground with high ceilings and an elevator ca. 1955.
- Materials: Steel, concrete, concrete masonry unit and acoustical ceiling tile ca. 1955.
- Doors: Original steel doors and frames, and original steel elevator doors ca. 1955.

No. 429: Generator Building



Architectural

Description

Exterior

Building 429, constructed in 1958, is a one-story structure with a gable roof, located in the center of the Missile Launching Site, west of the Missile Range Launching Area. The building is constructed with corrugated metal siding and a corrugated metal roof. The north elevation is one bay wide; there are no fenestrations, however mechanical and electrical equipment are located on this elevation. The south elevation has two fenestrations. The first, located on the east side, is a large double-hung window with a wood frame and six panes on the top sash and three on the bottom. There is a small window opening on the west side that is covered with plywood.

The east elevation is three bays wide, with the central bay project out from the building. The north bay has two fenestrations: a large opening that is covered with plywood on the right and a set of wood doors on the left. The right door has a louvered opening and both doors have two pieces of wood across the front, restricting access to the building. The central bay has one window opening that is covered with plywood and has a metal awning. The south bay has two fenestrations, a wood louvered window on the left and set of wooden doors on the right (the left door is missing). The west elevation has seven fenestrations: five large "door" openings with wood louvers on the north side, a board and batten door on the south bay, and a small window opening with a fan installed between two of the louvered openings.



Figure 1.3-175: Overview of southwest corner of Building 429 showing gable roof, corrugated metal siding and fenestrations (left) and the north elevation showing a fenced in concrete slab where mechanical equipment was previously located (right).

Interior

All of the interior walls are constructed with plasterboard on wood studs, and the ceilings are constructed with a combination of plasterboard and acoustical ceiling tiles. The floors are concrete throughout the building and the door and window trim are wood.



Figure 1.3-176: Overview of interior of Building 429 showing plasterboard walls, plasterboard and acoustical ceilings and concrete floors with storage and debris.

Conditions

Building 429 is in poor condition. The exterior and interior corrugated metal walls are deteriorating from moisture and the ocean atmosphere, the windows and doors are failing because of general weathering and the ceiling is deteriorating or missing because of water damage. The roof is exhibiting surface rust and minor damage from moisture.

Exterior

- The conditions of the corrugated metal siding vary from poor to fair. There are several dents, holes and gouges throughout the exterior of the building. The sides are exhibiting surface rust and areas of severe rust near grade. There is a severe gouge on the west elevation, and some areas have been filled in with plywood. The chain link enclosure is also in poor condition; it is rusting and being torn apart due to biological growth.

- The doors are in poor condition. The wood doors on the east and south elevations are partially missing or deteriorating. Their frames are weathered and rotting and have open joints and splitting or broken pieces.

- The conditions of the windows vary from poor to fair. On the west elevation, the wood louvers and screens are generally in fair condition with some weathering due to UV damage. Most of the shutters are partially or completely missing or detached. The remaining shutters, as well as the trim, are in poor condition with splitting, rotting sills, hinge scarring, UV weathering and open joints. On the east elevation, the windows are badly rotting and falling apart. The windows on the south side are in poor condition with rusted sashes and frames, severely cracked glass, badly weathered sills, splitting trim and missing casing.

- The corrugated metal roof is generally in good condition. There are a few areas exhibiting surface rust and some areas that have minor damage.



Figure 1.3-177: North elevation showing corrugated metal panels that are exhibiting rust (left) and a double-hung wood-framed window on the south elevation (right) of Building 429.

Interior

- The walls are in poor condition. There are open joints, numerous holes and damage in the plasterboard walls throughout. There may have been a partition dividing the space at one point.

- The ceilings are in poor condition. In Room 102, the acoustical ceiling tile is damaged near the walls due to water penetration and several areas are missing. The rest of the ceiling is sagging in places with failing tape and holes in areas that align with holes in the roof.

- The floor appears to be in fair condition, however it is mostly obscured with dirt, debris and sand. Most of the covers are displaced or missing.

- The doors are in poor condition; the hardware is missing and the plexiglass is scratched. The door trim, however, is in fair condition.

- The windows appear to be in fair condition, including the louver trim. The trim and glazing for the window in Room 102 are missing.



Figure 1.3-178: Concrete floors with metal trenches obscured with dirt, debris and sand (left) and a large hole in the plasterboard ceiling showing exposed corrugated metal roof (right) in Building 429.

Work Recommendations

- Repair or patch dents, holes, gouges and surface rust on exterior corrugated metal siding, including severe gouge on west elevation and areas that have been infilled with plywood. Remove biological growth and repair chain link enclosure.

- Replace exterior doors and frames; the wood doors on the south and east elevations are partially missing or deteriorating, and the frames are weathered, rotting and have open joints and splitting or broken pieces.

- Replace windows on east elevation and restore or replace windows on south elevation. Restore wood louvers and screens on west elevation that are weathered due to UV damage. Replace and reattach missing or detached shutters, and restore existing shutters throughout. Restore window trim. Replace trim and glazing for window in Room 102.

- Repair or patch corrugated metal roof at areas that are damaged or exhibiting surface rust.
- Replace plasterboard interior walls throughout as they are damaged and have open joints and holes.
- Replace acoustical ceilings throughout entire structure as they are missing or damaged from water penetration.
- Remove dirt, debris and sand, and clean concrete floor. Replace missing or displaced trench covers.
- Restore or replace doors, and restore door trim where necessary.

Structural

Description

The majority of the structure is hidden by finishes, but wood roof trusses were visible through holes in the ceiling and wood stud walls were visible through holes in the wallboard. Available drawings suggest this structure is a Generator Building, which is a wood framed building with a wood truss gable roof, CMU foundation walls, and concrete footings. A small lean-to on the east side of the structure is not shown on drawings and may be a later addition. Trenches in the slab shown on drawings were partially visible, but the majority of the interior slab was concealed by stored equipment. The structure is clad, both roof and exterior walls, with corrugated sheet metal.

The condition of the wood framing was not observed as a result of the intact exterior and interior finishes.

Conditions

- Corrugated siding is corroded near grade, particularly at east elevation (Figure 1.3-179).
- Corrugated roof has lost the majority of its paint and is corroding (Figure 1.3-180).
- A hole in the roof and wood framing was observed near the south end of the structure and may be the result of chewing animals (Figure 1.3-181).
- While not directly observed, the framing's close contact with grade, the temporary nature of this construction, and the lack of water proofing, it is very likely that significant deterioration of the wood framing has occurred.

Work Recommendations

- Repair or patch dents, holes, gouges, and surface rust on exterior corrugated metal siding, including hole in roof.

- Evaluate wood framing at grade for deterioration.



Figure 1.3-179: Corroded siding on east wall of Building 429.



Figure 1.3-180: Paint loss and corrosion of corrugated metal roof on Building 429. Arrow indicates hole in roof.



Figure 1.3-181: Hole in roof of Building 429. Note loss of section at adjacent wood members, likely from chewing animals.

Building Systems

Description

HVAC

The building is provided with an electric unit heater.

Plumbing

There appears to have been a sink and possibly a domestic hot water heater present in the building.

Electrical

Electrical service to the building was aerial overhead from a pole line along the access road. There was a panel that served the building loads. The panel rating could not be determined. Internal and exterior building wiring was done by surface mounted conduit, some of which still remains in place. Other than the mechanical equipment, there was incandescent light fixtures, switches, and receptacles.

There does not appear to have been a fire alarm system.

Conditions

HVAC

The electric unit heater is deteriorated and not in working condition.

Plumbing

There are only a few remnants of domestic water piping remaining and they are deteriorated.

Electrical

Building is unoccupied. There are no active electrical systems in the building. The original lights, panel and mechanical equipment starters and disconnect switches are still in place, however, they do not appear to be salvageable for re-use



Figure 1.3-182: Building 429 Interior.

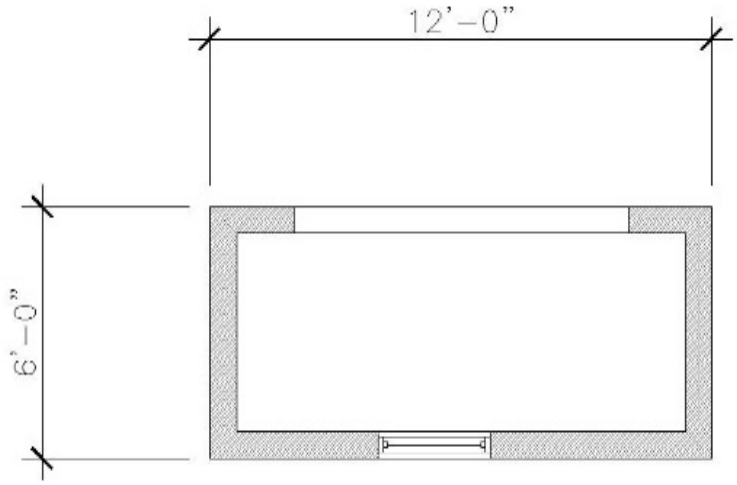


Figure 1.3-183: Building 429 Interior.

Character Defining Features

- Massing: One-story rectangular structure with gable roof ca. 1958.
- Materials: Corrugated metal siding ca. 1958 with some later replacement pieces.
- Doors: Original wood paneled doors and wood louvered doors.
- Windows: Original wood louvered windows and original double-hung windows with glass panes ca. 1958.

No. 429 A: Enclosure



Architectural

Description

Exterior

Building 429 A is a small, rectangular structure located in the center of the Missile Launching Site, just south of Building 429. The building is constructed with concrete masonry unit walls, a hip roof with asphalt shingles, and a wood soffit on each elevation. The north elevation has a large opening, but does not have a door or window. The south elevation has one fenestration: a square, one-paned window with a wood frame, located in the center of the wall. The east and west elevations do not have any fenestrations.



Figure 1.3-184: Overview of the north elevation (left) and the southwest corner (right) showing hip roof and fenestrations on Building 429A.

Interior

The interior finishes include a concrete floor, concrete masonry unit walls, an unfinished ceiling with the wood roof structure exposed, and wood window trim.



Figure 1.3-185: Overview of interior of Building 429A showing CMU walls, window and concrete floor with accumulating sand and debris.

Conditions

The structure is in good condition. There are minor cracks in the CMU from moisture, the window is splitting from weathering and the paint is failing due to moisture and weathering.

Exterior

- The concrete masonry unit walls are in good condition. There are minor cracks at the joints and abandoned anchors, most likely from a gate.
- The window is in fair condition; the frame is weathered, there is some splitting at the sill and although the glass is dirty, it is intact.
- The roof structure and asphalt shingles are in good condition, and appear to have been replaced recently.
- The eave and fascia are in fair condition with some chipping, weathering, rot and MEP damage.



Figure 1.3-186: Eave and fascia of Building 429A exhibiting chipping and weathering.

Interior

- There is no finished ceiling, but the roof framing is in good condition. There is some interior damage including failing paint and spalling concrete.

- The floor is obscured with debris and sand, but appears to be in good condition where visible.



Figure 1.3-187: Exposed wood roof framing of Building 429A is in good condition.

Work Recommendations

- Repair minor cracks at CMU joints and remove abandoned anchors and patch CMU. Patch spalling CMU and touch up paint where necessary.

- Restore weathered window frame and splitting sill, and clean glass.

- Restore eaves and fascia that are exhibiting minor chipping, weathering, rot and MEP damage.
- Paint ceiling.
- Remove debris and sand, and clean concrete floor.

Structural

Description

The building consists of CMU bearing walls supporting a hipped wood joist roof. At the open front side, a 3-member wood beam spans the opening and supports the roof structure. Asphalt shingles are used on the roof. A large concrete slab in front of the structure does not appear to be incorporated into the structure.

Conditions

Structure is in good condition, with minor mortar loss observed at lower courses (Figure 1.3-188).

Work Recommendations

- Repoint open joints; assume 25% repointing.



Figure 1.3-188: Mortar loss at lower courses on Building 429A.

Building Systems

Description

HVAC

There is no evidence that these systems existed in this building.

Plumbing

There is no evidence that these systems existed in this building.

Electrical

There is no evidence that these systems existed in this building.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

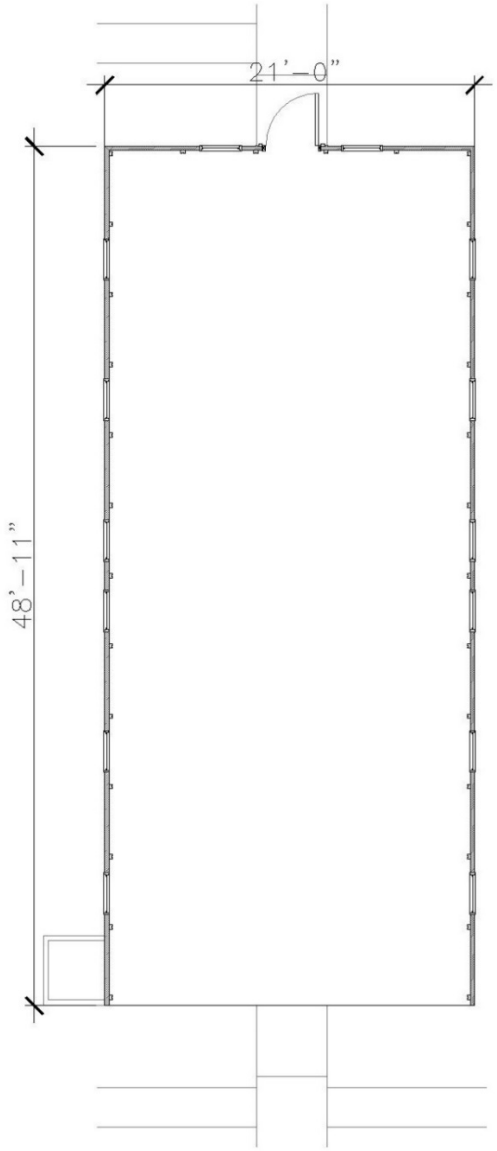
Electrical

Not applicable.

Character Defining Features

- Massing: One-story structure with a hip roof.
- Materials: Concrete masonry unit, concrete floor, wood framing and asphalt shingles.
- Doorways: Large door opening on the north elevation.
- Windows: Original wood-framed window with glass pane and wood trim.

No. 430: Barrack



Architectural

Description

Exterior

Building Number 430, constructed in 1955, is located in the southwest corner of the Missile Launching Site, approximately 200 feet east of Hartshorne Drive. The one-story structure, situated on a concrete foundation, is constructed with metal framing, corrugated metal siding, and a corrugated metal gable roof. The corrugated metal siding comes down over the concrete foundation on the east and west elevations, but stops before the foundation and flashing on the north elevation (there is no siding on the south side elevation, it is completely open).

The north elevation has three fenestrations: the original wood door in the center and two original wood-framed windows, one on either side of the door. The original wood sashes are in place with plexiglass panes. The door retains its original hardware and original wood trim. There is plywood within the frame, wood studs on both sides of the door, sheets of plywood on both sides, and the vent above the door is covered with a metal box. The south elevation is open as it is used for tractors and plows that are stored in this building. The east and west elevations have six wood-framed windows with plexiglass panes. There is a concrete pit at the south end of the west elevation for pipes running from the interior of the structure.



Figure 1.3-189: The north and east elevations (left) and south and west elevation (right) of Building 430 showing corrugated metal siding, corrugated metal gable roof and multiple fenestrations.

Interior

The interior of Building Number 430 has a concrete floor and particle board on the walls and ceiling. There are several electrical boxes on the north side, adjacent to the door. The building is used for vehicle and gasoline storage; there are several shelving units lining the interior walls of the structure.



Figure 1.3-190: The south elevation of Building 430 has been removed to accommodate tractors, vehicles and storage for the park.

Conditions

Building 430 is in fair condition. It is exhibiting rust from water damage and the ocean atmosphere on the interior and exterior. The roof is also exhibiting rust and the interior walls and ceiling are deteriorating from moisture damage. The wood on the doors and windows is splitting and rotting due to moisture and weathering.

Exterior

- The corrugated metal siding on the structure is in fair condition, exhibiting rust along the foundation, around the fenestrations and along roofline on north, east and west elevations. Several areas have been patched on the north, east and west elevations (the original corrugated metal is rounded and the replacement metal is faceted). There are several penetrations and peeling paint throughout the exterior of the structure, and the siding has been removed on south elevation for vehicle use.

- The door on the north elevation is in poor condition. The door is separating from the metal siding, and it is rotting and deteriorating at the bottom. The entire door is exhibiting paint failure and the trim is in poor condition.

- The window conditions vary from fair to good. The windows are exhibiting peeling paint and missing or deteriorating flashing. The conditions of the flashing also vary: some is in good condition, some is deteriorating and some is missing.

- The roof is in fair condition. There is a gap at ridge beam on south elevation, allowing water penetration in the structure. The metal is rusting and the paint is failing.

- The bed moulding board is in poor condition. The metal is beginning to warp and rust, allowing water to penetrate through the roof line.



Figure 1.3-191: Rust and penetrations in corrugated metal siding around fenestrations on the north (left) and east (right) elevations of Building 430.

Interior

- The interior walls are in poor condition. The particle board is deteriorating due to water damage below the windows, exposing rusting exterior metal siding and deteriorating insulation. The remaining particle board is in poor condition, exhibiting paint failure.

- The ceiling is in fair condition. Most of the particle board is intact with some areas of water damage and deterioration.

- The concrete floor is in fair condition. There is dirt, sand and debris accumulating, particularly on the south end as the south elevation is exposed to the elements.



Figure 1.3-192: Rust around the penetration on the interior side of the corrugated metal siding (left) and sand and debris accumulating on the concrete floor near the north elevation (right) of Building 430.

Work Recommendations

- Repair or patch penetrations and surface rust on exterior corrugated metal siding, particularly around foundation, roofline and fenestrations. Strip and paint corrugated metal siding. Provide corrugated metal siding with one door and two windows on the south elevation to match the north elevation.

- Replace door on north elevation.

- Strip and paint all windows. Replace missing or deteriorating flashing.

- Repair gap at ridge beam on south elevation. Strip and paint metal trusses.

- Replace rusted and warping bed moulding board.

- Replace interior particle board walls and insulation; they are missing or deteriorating due to water damage.

- Replace particle board ceiling and strip and paint metal trusses.

- Remove dirt, sand and debris, particularly on south end, and clean concrete floor.

Structural

Description

The buildings consist of a cast in place concrete slab, with pre-fabricated metal trusses that create the walls and roof (Figure 1.3-193). The vertical and sloped members of the trusses are joined with a pinned connection (Figure 1.3-194). The roof connection is made with a bolt (Figure 1.3-195). Diagonal bracing was observed at the end bays in barracks through missing interior finishes and it is likely that all barracks have the same bracing (Figure 1.3-196). A length of steel angle bolted to the floor along the east and west sides supports the truss ends. A vertical channel is welded to the angle and the truss leg, such that the leg is standing off the ground by several inches (Figure 1.3-197). Some leg ends are corroded and some are cut clean, so it is unclear if this was the original construction method or a later repair. The structure is clad with galvanized corrugated sheet metal.



Figure 1.3-193: Interior of Building 430.



Figure 1.3-194: Typical connection between wall and roof members of truss of Building 430.

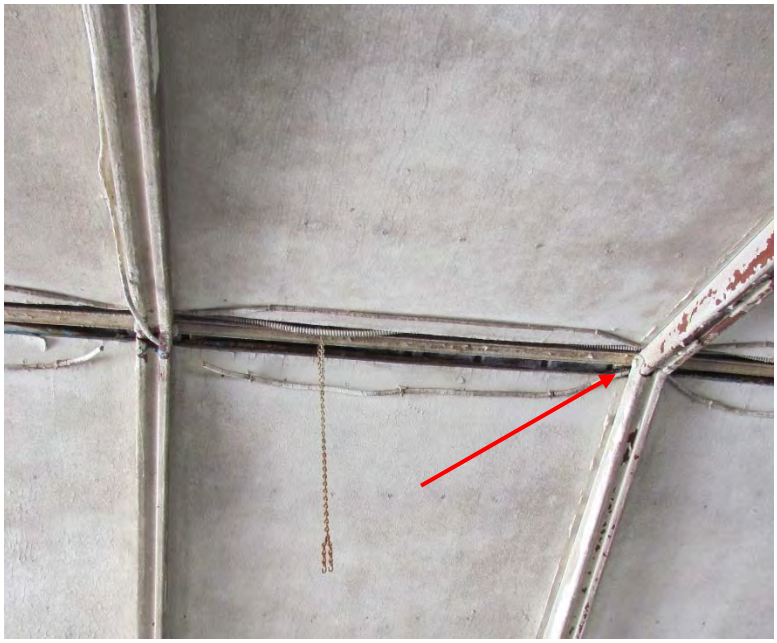


Figure 1.3-195: Bolted connection at roof peak of Building 430.

Conditions

- The building is currently in use as storage shed, and its entire south end has been removed (Figure 1.3-197).
- Exterior cladding is corroded at grade and has been replaced in several sections. Corrosion is also occurring at roof (Figure 1.3-198).
- Truss is corroding at exposed south end (Figure 1.3-194).

Work Recommendations

- Repair or patch dents, holes, gouges, and surface rust on exterior corrugated metal siding.
- At open end, clean truss of all corrosion and coat with zinc-rich, rust-inhibitive primer and paint.



Figure 1.3-197: Open south end of Building 430.



Figure 1.3-198: East face of Building 430 showing corroded cladding at roof line and grade, with replacement sections at grade.

Building Systems

Description

HVAC

The building is currently used as a storage building but appears to have originally been a barracks. The barracks on site historically contained heating hot water piping that was part of a heating hot water system that included hot water radiators. There are no existing radiators currently or heating hot water piping. Ventilation for the building was provided by a wall propeller fan mounted above the entrance door.

Plumbing

There is no evidence that these systems existed in this building.

Electrical

Electrical service came to the building from overhead utility lines along the roadway. There is evidence of an aerial mast on the north elevation. There was a four-pole, 30A fused panel, manufactured by Federal Pacific that served the building loads. One load was an exhaust fan above the north door that would have been used for ventilation. Internal building wiring was done by surface mounted conduit, some of which still remains in place. There are no surviving lighting fixtures or receptacles. There does not appear to have been a fire alarm system.

Conditions

HVAC

The fan has deteriorated and in poor condition. There is no existing heating hot water piping or equipment.

Plumbing

Not applicable.

Electrical

There are no active electrical systems in the building. The original panel and fan disconnect switch are still in place, however, they do not appear to be salvageable for re-use.



Figure 1.3-199: Building 430 Interior.



Figure 1.3-200: Existing Electrical Panel in Building 430.



Figure 1.3-201: Existing Disconnect in Building 430.

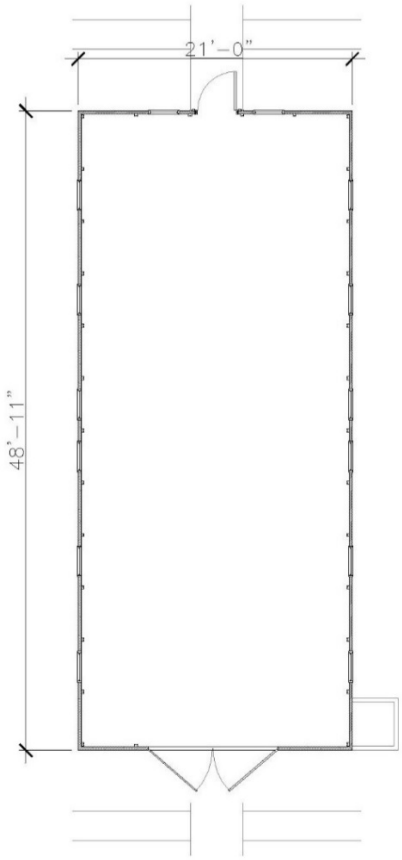


Figure 1.3-202: Existing Ventilation Fan in Building 430.

Character Defining Features

- Massing: One story structure with gable roof ca. 1955.
- Materials: Corrugated metal ca. 1955, with areas of replacement metal.
- Doorway: Original wood-paneled door with original wood on the north elevation.
- Windows: Original single-paned, wood-framed windows ca. 1955 on the east and west elevations.

No. 431: Barrack



Architectural

Description

Exterior

Building Number 431, constructed in 1955, is located in the southwest corner of the Missile Launching Site, adjacent to Building 430, approximately 200 feet east of Hartshorne Drive. The one-story structure, situated on a concrete foundation, is constructed with metal framing, corrugated metal siding, and a corrugated metal gable roof. The corrugated metal siding comes down over the concrete foundation on the south, east and west elevations, but stops before the foundation, and flashing, on the north elevation.

The north elevation has three fenestrations: the original wood door in the center and two original wood-framed windows, one on either side of the door. The original wood sashes are in place with plexiglass panes. The door has sheets of plywood on either side, original wood trim and replacement hardware. There is plywood within the frame and wood studs flanking the door. The south elevation has a large set of double garage doors cut into the corrugated metal siding with sheets of plywood on the interior. The east and west elevations both have six fenestrations: wood-framed windows with original wood sashes

and plexiglass panes. There is a concrete pit at the south end of the east elevation for pipes running from the interior of the structure.



Figure 1.3-203: Overview of the north and east elevations (left) and the south and west elevations (right) of Building 431.

Interior

The interior has a concrete floor and particle board on the walls and ceiling. The building is used as a garage and storage for the park, and there are several large storage containers on the east elevation.



Figure 1.3-204: Overview of the interior of Building 431 facing north (left) and facing south (right).

Conditions

Building 431 is in fair condition. There is rust corroding the interior and exterior, caused by water damage. The roof is also exhibiting rust and the interior walls and ceiling are deteriorating from moisture damage. The wood on the doors and windows is splitting and rotting due to moisture and weathering.

Exterior

- The corrugated metal siding is in fair condition. The north, east and west elevations have several areas of metal patching (the original corrugated metal is rounded and the replacement metal is faceted). There are areas of paint deterioration and rust, particularly at bottom, around the fenestrations, and along the roofline. Several nail pops and penetrations are evident on the east elevation and the metal siding is beginning to separate in the southeast corner.

- The door on the north elevation is in poor condition; it is separating from the metal siding, and rotting and deteriorating at the bottom. The entire door is exhibiting paint failure and the trim is in poor condition. The doors on the south elevation are in good condition.

- Window conditions on the structure vary from poor to good. The original wood trim, sashes and plexiglass are intact. Most of the flashing is deteriorating or missing; four of the windows have flashing that is in fair condition and one window has flashing has been replaced and is in good condition. Each window is exhibiting peeling paint.

- The roof is in fair condition. There is a gap in the ridge beam on the south elevation, allowing for water penetration, and the roof is pulling away from the wall on north elevation. The metal is exhibiting rust and paint failure.

- The bed moulding board is in poor condition. On the east and west elevations, the metal is beginning to warp, deteriorate, rust and separate from the wood underneath. These conditions are allowing water to penetrate through the roof line.



Figure 1.3-205: Severe rust near the foundation (left) at the roof line (right) of the east elevation.

Interior

- The walls are in poor condition. On the east and west elevations, the particle board has been removed below the windows due to water damage. On the south side, the studs and exterior metal siding are exposed. The particle board that is extant is in poor condition with exposed insulation. The particle board above door on north elevation has been removed, exposing wood framing and exterior metal siding. The wall is deteriorating under the east window on north elevation.

- The ceiling is in poor condition. One sheet of particle board is missing on the west end and there are several gaps between the ceiling and the walls.

- The concrete floor is in good condition; there is very little debris and some staining throughout.



Figure 1.3-206: Overview of missing particle board on the walls (left) and in the ceiling (right).

Work Recommendations

- Repair or patch nail pops, penetrations and surface rust on exterior corrugated metal siding, particularly around foundation, roofline and fenestrations. Strip and paint corrugated metal siding. Stabilize metal siding in southeast corner.
- Replace door on north elevation.
- Strip and paint all windows. Replace missing or deteriorating flashing.
- Repair gap at ridge beam on south elevation. Reattach roof where it is pulling away from north elevation. Strip and paint metal trusses.
- Replace rusted and warping bed moulding board.
- Replace interior particle board walls and insulation as they are missing or deteriorating due to water damage.
- Replace particle board ceiling and strip and paint metal trusses.
- Remove dirt, sand and debris and clean concrete floor.

Structural

Description

See Barrack 430.

Conditions

- The building is currently in use as storage shed, and its south end has been replaced with large barn style doors (Figure 1.3-208).
- Exterior cladding is corroded at grade and has been replaced in several sections. Corrosion is also occurring at roof (Figure 1.3-209).
- Roof is open at west side, approximately mid-length of building (Figure 1.3-210).
- Slab has cracked, approximately mid-length of building (Figure 1.3-211).

Work Recommendations

- Repair or patch dents, holes, gouges, and surface rust on exterior corrugated metal siding.
- Close opening in roof.
- No recommendation is made for cracked slab.



Figure 1.3-207: Truss leg welded to channel and vertical leg of angle also visible in Building 431.



Figure 1.3-208: Newer barn doors at south end of Building 431.



Figure 1.3-209: East face of Building 431 showing corroded cladding at roof line and grade, with replacement sections at grade.



Figure 1.3-210: Open roof at west side of Building 431.



Figure 1.3-211: Cracked slab at Building 431.

Building Systems

Description

HVAC

The building is currently used as a storage building but appears to have originally been a barracks. The barracks on site historically contained heating hot water piping that was part of a heating hot water system that included hot water radiators. There are no existing radiators currently or heating hot water piping.

Plumbing

There is no evidence that these systems existed in this building.

Electrical

Electrical service came to the building from overhead utility lines along the roadway. There is evidence of an aerial mast on the north elevation. There was a four-pole, 30A fused panel, manufactured by Federal Pacific that served the building loads. One load was an exhaust fan above the north door that would have been used for ventilation. Internal building wiring was done by surface mounted conduit, some of which still remains in place. There are no surviving lighting fixtures or receptacles. There does not appear to have been a fire alarm system.

Conditions

HVAC

No applicable.
Plumbing

Not applicable.

Electrical

There are no active electrical systems in the building. The original panel is still in place, however, it does not appear to be salvageable for re-use.



Figure 1.3-212: Existing Electric in Building 431.



Figure 1.3-213: Existing Electric in Building 431.

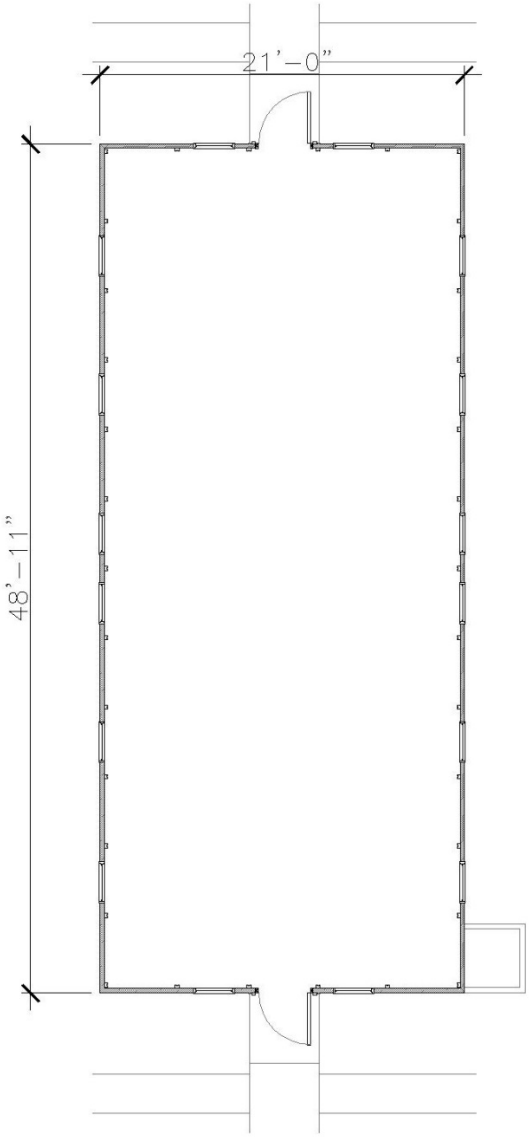


Figure 1.3-214: Existing Building 431 Interior.

Character Defining Features

- Massing: One story structure with gable roof ca. 1955.
- Materials: Corrugated metal ca. 1955, with areas of replacement metal.
- Doorway: Original wood-paneled door with original wood frame on the north elevation.
- Windows: Original single-paned, wood-framed windows ca. 1955, on the east and west elevations.

No. 432: Barrack



Architectural

Description

Exterior

Building Number 432, constructed in 1955, is a one-story structure located in the southwest corner of the Missile Launching Site, adjacent to Building 431, approximately 200 feet east of Hartshorne Drive. The building is situated on a concrete foundation and is constructed with metal framing and corrugated metal siding. The gable roof is also constructed with corrugated metal. The siding extends over the concrete foundation on east elevation, but stops before the foundation and flashing, on the north, south and west elevations.

The north elevation has three fenestrations: the original wood door in the center and two original wood-framed windows, one on either side of the door. The original wood sashes and plexiglass remain in place. The door has sheets of plywood adhered to either side of the door, its original wood trim and replacement hardware. The south elevation is similar to the north elevation and has three fenestrations: a door with one window on either side. The east and west elevations have six fenestrations: wood window frames with original wood sashes and plexiglass panes. There is a concrete pit at the south end of the east elevation that has been covered with five wood boards.



Figure 1.3-215: Overview of the north and east elevations (left) and east and west elevations (right) of Building 432.

Interior

The interior finishes include a vinyl asbestos floor tiles, particle board walls and a particle board ceiling. The building is used as storage for the park and there are pipes and building equipment stacked along the east and west sides of the building.



Figure 1.3-216: View of interior of Building 432 facing north (left) and view of interior facing south (right).

Conditions

Building 432 is in fair condition. The interior and exterior are both exhibiting rust due to water damage and the ocean atmosphere. The roof is also exhibiting rust and the interior walls and ceiling are deteriorating from moisture damage. The wood on the doors and windows is splitting and rotting due to moisture and weathering.

Exterior

- The corrugated metal siding is in fair condition. It is bowing in some places, and there are several areas with surface rust, dents, holes, patching and verging details at grade (the original corrugated metal is rounded and the replacement metal is faceted). There is rust on the flashing and the eaves, and the plate flashing has been replaced.

- The doors are in fair condition. The door frames are rusting and splitting, and there is fastener damage and rotting in some areas.

- The conditions of the windows vary from poor to fair. There is severe UV damage on the majority of windows and rust on almost all of the flashing.

- The roof is in fair condition. Some of the fasteners are popping, and there is a good amount of rust, which is severe in some areas near the eaves.



Figure 1.3-217: View of weathering door and peeling paint on the north elevation (left) and warping and rusting corrugated metal siding and roof on the west elevation (right) of Building 432.

Interior

- The interior walls are in poor condition. The rigid metal framing is generally in good condition, however it is rusted and sistered at the floor. The particle board is failing or missing due to water damage, particularly on the bottom. The furring appears to be in good condition where visible.

- The ceiling is in fair condition. The rigid metal framing has major rust at the eave joints. There are two areas where the particle board and insulation are failing, exposing the roof structure. There is mold throughout the entire ceiling.

- The floor is in poor condition. Areas of the vinyl asbestos tile are missing and the remaining tiles are broken or damaged.



Figure 1.3-218: Failing particle board in the ceiling (left) and deteriorating particle wall boards (right) of Building 432.

Work Recommendations

- Stabilize corrugated metal siding in places where it is bowing. Repair or patch nail pops, penetrations and surface rust on exterior corrugated metal siding, particularly around foundation, roofline and fenestrations. Strip and paint corrugated metal siding.
- Repair or replace fasteners that are popping, and strip and repaint roof as there is a fair amount of rust, especially near the eaves.
- Restore rusting, rotting or splitting door frames and repair fastener damage.
- Strip and paint all windows. Replace missing or deteriorating flashing.
- Replace rusted and warping bed moulding board.
- Replace interior particle board walls and insulation as they are missing or deteriorating due to water damage.
- Replace moldy and deteriorated particle board ceiling, and strip and paint rigid metal framing (it is exhibiting major rust at the eave joints).
- Remove dirt, sand and debris and replace vinyl asbestos tile floor with new tile, laminate or concrete flooring.

Structural

Description

See Barrack 430

Conditions

- The building is currently in use as storage shed, with its original doors intact.

- Exterior cladding is corroded at grade and has been replaced in several sections. Corrosion is also occurring at roof (Figure 1.3-219).

Work Recommendations

- Repair or patch dents, holes, gouges, and surface rust on exterior corrugated metal siding.



Figure 1.3-219: East face of Building 432 showing corroded cladding at roof line and grade, with replacement sections at grade.

Building Systems

Description

HVAC

The building is currently used as a storage building but appears to have originally been a barracks. The barracks on site historically contained heating hot water piping that was part of a heating hot water system that included hot water radiators. There are no existing radiators currently or heating hot water piping. Ventilation for the building was provided by a wall propeller fan mounted above the entrance door.

Plumbing

There is no evidence that these systems existed in this building.

Electrical

Electrical service came to the building from overhead utility lines along the roadway. There is evidence of an aerial mast on the north elevation. There was a four-pole, 30A fused panel, manufactured by Federal Pacific that served the building loads. One load was an exhaust fan above the north door that would have been used for ventilation. Internal building wiring was done by surface mounted conduit,

some of which still remains in place. There are no surviving lighting fixtures or receptacles. There does not appear to have been a fire alarm system.

Conditions

HVAC

The fan has deteriorated and in poor condition. There is no existing heating hot water piping or equipment.

Plumbing

Not applicable.

Electrical

There are no active electrical systems in the building. The original panel and a light switch are still in place, however, they do not appear to be salvageable for re-use.



Figure 1.3-220: Existing Electric in Building 432.



Figure 1.3-221: Existing Ventilation Fan in Building 432.

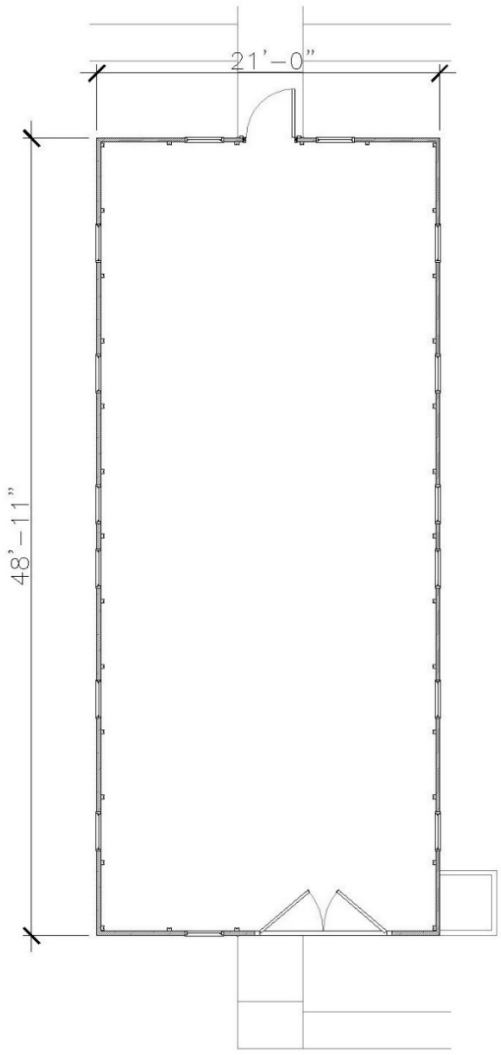


Figure 1.3-222: Building 432 Interior.

Character Defining Features

- Massing: One story structure with gable roof ca. 1955.
- Materials: Corrugated metal ca. 1955, with areas of replacement metal.
- Doorway: Original wood-paneled doors with original wood frames on the north and south elevations ca. 1955.
- Windows: Original single-paned, wood-framed windows ca. 1955 on the east and west elevations.

No. 433: Barrack



Architectural

Description

Exterior

Building Number 433, constructed in 1955, is located in the southwest corner of the Missile Launching Site, adjacent to Building 432, approximately 200 feet east of Hartshorne Drive. The one-story structure is situated on a concrete foundation, has corrugated metal siding and a corrugated metal gable roof. The siding extends over the concrete foundation on the east and west elevations, but stops before the foundation and flashing on the north and south elevations. The north elevation has three fenestrations: the original wood paneled door in the center and two original wood-framed windows on either side,

with wooden sashes and plexiglass panes. The original wood door trim is intact, however the hardware has been replaced.
The south elevation has two fenestrations: a large set of wooden doors on the east side, and a small window on the west side, similar to those on the east elevation. The east and west elevations have six fenestrations: wood-framed windows with original wood sashes and plexiglass panes. There is a concrete pit at the south end for pipes running from the interior of the structure.



Figure 1.3-223: View of fenestrations and failing paint on north elevation (left) and view of pitched roof and double doors on the south elevation (right) of Building 433.

Interior

Building 433 is used as storage and currently houses pipe and building equipment for the park. The interior finishes include a vinyl asbestos floor tiles, particle board walls and a particle board ceiling. There are remnants of piping and electrical throughout, and the vent fan on the north elevation has been removed.



Figure 1.3-224: View of interior storage of Building 433 facing north (left) and facing south (right).

Conditions

Building 433 is in fair condition. Water damage is causing rust to corrode the interior and exterior. The roof is also exhibiting rust and the interior walls and ceiling are deteriorating from moisture damage. The wood on the doors and windows is splitting and rotting due to moisture and weathering.

Exterior

- The walls are in poor condition. The metal siding is missing in several locations and has been replaced with plywood or patched with corrugated metal (the original corrugated metal is rounded and the replacement metal is faceted). There are areas of rust near grade, as well as surface rust, dents, nail pops and holes. The west elevation has been almost entirely replaced, the conduit is rusted and there is a cap over the vent louver.

- The doors are in good condition. The north door appears to have been replaced. The south door is severely weathered; there are fastener holes, hinge scarring, splits in the plywood panels and open joints.

- The conditions of the windows vary from fair to good. Most of the windows are exhibiting UV damage or physical damage at the penetrations. Many of the sills are splitting or rotting, the flashing is rusting and the glass has been replaced with plexiglass. The plexiglass is missing in one of the windows.

- The roof is in fair condition and exhibiting surface rust throughout.



Figure 1.3-225: Rust at foundation on the north elevation (left) and rust/failing paint near the roofline on the west elevation (right) of Building 433.

Interior

- The walls are in poor condition. Large sections of the fiberboard are missing or have been removed due to water damage, particularly at the bottom, and the sections that remain are rotting or cracking. The rigid metal framing is rusting, especially near the floor, and is welded on sisters. The furring is in good condition where visible.

- The ceiling is in fair condition. The fiberboard panels are intact, however there are areas of mold throughout the ceiling.

- The asbestos vinyl floor tile in is poor condition. Multiple layers have been installed, and the tiles are either missing or badly damaged.



Figure 1.3-226: Missing and deteriorated vinyl asbestos tile (left) and deteriorating plasterboard due to water damage (right) in Building 433.

Work Recommendations

- Repair or patch nail pops, penetrations and surface rust, particularly around foundation, roofline and fenestrations, on exterior corrugated metal siding. Strip and paint corrugated metal siding.
- Restore south door as it is weathered with fastener holes, hinge scarring, splitting plywood panels and open joints.
- Restore windows, strip and repaint. Replace missing plexiglass in one window. Most of the windows are exhibiting UV damage, physical damage at penetrations, splitting or rotting sills and rusted flashing.
- Strip and paint corrugated metal roof.
- Repair or replace fasteners that are popping, and strip and repaint roof as there is a fair amount of rust, especially near the eaves.
- Replace rusted and warping bed moulding board.
- Replace rusted conduit and remove cap over vent louver.
- Replace interior particle board walls and insulation as they are missing or deteriorating due to water damage. Strip and paint rusted rigid metal framing.
- Replace moldy and deteriorated particle board ceiling, and strip and paint rigid metal framing as it is exhibiting major rust at the eave joints.
- Remove dirt, sand and debris and replace vinyl asbestos tile floor with new tile, laminate flooring or concrete.

Structural

Description

See Barrack 430

Conditions

- The building is currently in use as storage shed, with a larger replacement door at the south end (Figure 1.3-227).

- Exterior cladding is corroded at grade and has been replaced in several sections. Corrosion is also occurring at roof (Figure 1.3-228).

Work Recommendations

- Repair or patch dents, holes, gouges, and surface rust on exterior corrugated metal siding.



Figure 1.3-227: South face of Building 433 with replacement door.



Figure 1.3-228: North face of Building 433 showing corroded cladding at grade, with replacement sections at grade.

Building Systems

Description

HVAC

The building is currently used as a storage building but appears to have originally been a barracks. The barracks on site historically contained heating hot water piping that was part of a heating hot water system that included hot water radiators. There are no existing radiators currently or heating hot water piping. Ventilation for the building was provided by a wall propeller fan mounted above the entrance door.

Plumbing

There is no evidence that these systems existed in this building.

Electrical

Electrical service came to the building from overhead utility lines along the roadway. There is evidence of an aerial mast on the north elevation. There was a four-pole, 30A fused panel, manufactured by Federal Pacific that served the building loads. One load was an exhaust fan above the north door that would have been used for ventilation. Internal building wiring was done by surface mounted conduit, some of which still remains in place. There are no surviving lighting fixtures or receptacles. There does not appear to have been a fire alarm system.

Conditions

HVAC

The fan has deteriorated and in poor condition. There is only minimal heating hot water piping existing and it is deteriorated and in poor condition.

Plumbing

Not applicable.

Electrical

There are no active electrical systems in the building. The original panel and a light switch are still in place, however, they do not appear to be salvageable for re-use.



Figure 1.3-229: Building 433 Interior.

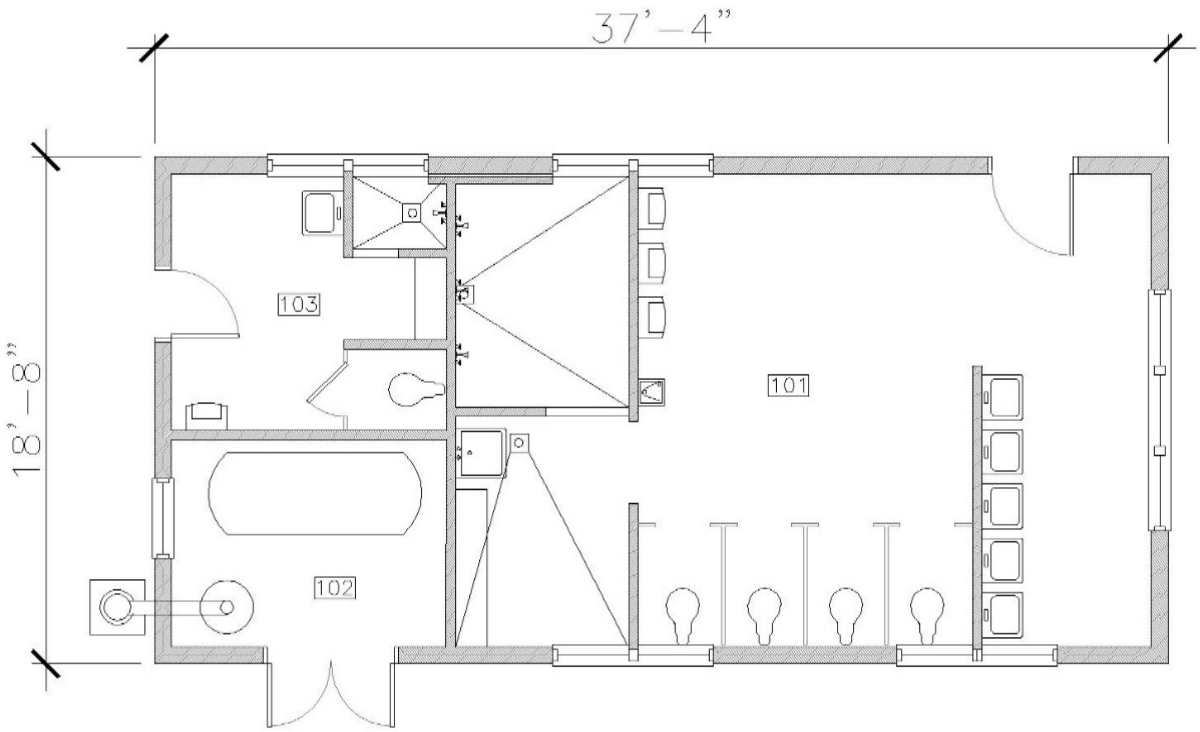


Figure 1.3-230: Existing Electric in Building 433.

Character Defining Features

- Massing: One story structure with gable roof ca. 1955.
- Materials: Corrugated metal ca. 1955, with areas of replacement metal.
- Doorway: Original door opening on the north side.
- Windows: Original single-paned, wood-framed windows ca. 1955.

No. 434: Latrine



Architectural

Description

Exterior

Building 434, constructed in 1955, is a one-story structure located in the southwest corner of the Missile Tracking Site, south of the Barracks buildings, approximately 200 feet west of Hartshorne Drive. The Latrine building is constructed with concrete masonry unit walls and has a flat ballast roof. The north and south elevations have wood bed molding boards. The north elevation has three fenestrations: a single wooden door on the east side and two sets of two rectangular, two-paned, hopper windows on the west side. The south elevation has a large door opening that is boarded up on the west side and hopper windows similar to those on the north elevation.

The east elevation has one fenestration: a set of three double-paned hopper windows with wood frames and sashes and a concrete sill. The west elevation has two fenestrations: a single door on the north side that is covered with plywood and a small window opening on the south side that has been filled in. A large vent stack with concrete foundation is situated on the south side of the elevation.



Figure 1.3-231: Overview of north and east elevations (left) and north and west elevations (right) of Building 434.

Interior

The interior walls of the Latrine are constructed with a combination of CMU and plasterboard, and tiled walls in the showers. The ceilings are plasterboard and the floors are concrete. There are metal partitions for the water closets and many of the plumbing fixtures including water closets and lavatories, are in still intact. The doors and metal windows are covered or replaced with plywood.



Figure 1.3-232: View of Latrine 434 interior, facing south towards water closet (left) and facing west towards shower room (right).

Conditions

The exterior of building 434 is in fair condition while the interior is in poor condition. There are cracks in the CMU caused by water penetration, the ceiling is deteriorating or missing from moisture and the windows and doors are failing due to moisture damage and weathering.

Exterior

- The concrete masonry unit walls are in fair condition. There are stepped cracks on the east elevation and in the southwest corner. The north elevation also has cracking within the masonry units.

- The doors are in poor condition. The main door is badly delaminating and rotting, and it is missing its stop. The jamb is damaged, the screen door is missing and the hardware is rusted. The south doors are completely delaminated and there are holes at the bottom. They are partially covered with plywood and the frames are exhibiting UV damage.

- The windows are in poor condition; the windows, the frames and the sashes are badly rusted and there is broken glass throughout. The jamb is broken at the southeast window and the sill is broken at the northwest window. The window on the east elevation is in poor condition; the screens are badly torn and the wood frames are broken and rotted.

- The roof is in fair condition. The ballast is missing in the corners and the flashing at the penetrations is deteriorating. The vents in the roof are rusting.

- The eaves and soffits are in fair condition. At the south end, there is rot, UV damage, open joints and missing pieces of fascia. The south side is exhibiting rot and missing soffit boards. The edge flashing is in good condition with minor rusting.

Interior

- The walls are in fair condition. There is some cracking in the concrete masonry unit at the south wall of the changing room and toilet room. The plasterboard partition has some damage including holes and cracks at the joints. The tile in the showers is in good condition, however some areas need to be regrouted. The toilet partitions and their hinges are rusted.

- The ceilings are in poor condition. Some areas of the plasterboard are missing, and the remaining sections are swelling and sagging. There are rusted fasteners throughout and areas of mold in the showers.

- The concrete floors are generally in good condition.

- The millwork is in fair condition with some minor splits, open joints and sagging shelves.

Work Recommendations

- Repair stepped cracks on the east elevation and in the southwest corner and repair cracks within CMU on north elevation.

- Repair delaminating and rotting main door and replace its missing stop. Repair damaged jamb, replace missing screen door and repair or replace rusted hardware. Remove plywood and repair delaminating doors on south elevation. Fill in holes at the bottom of the south doors and repair UV damage on the frames.

- Restore windows including rusted sashes, rusted frames and broken glass. Repair broken jamb at southeast window and broken sill at northwest window. Replace torn screens and broken and rotting frames on east elevation.

- Replace missing ballast in corners and deteriorating flashing at penetrations. Repair rusted roof vents.

- Restore or replace eaves and soffits. There are missing soffit boards, rot, UV damage, open joints and missing pieces of fascia on the south end. Repair minor rusting on flashing.

- Repair cracking on interior CMU walls, particularly at the south wall of the changing room and toilet room. Replace plasterboard partition as there are holes and cracks at the joints. Clean and regrout tile walls in showers. Restore or replace toilet partitions (hinges are rusted).

- Replace ceilings; there is missing plasterboard, swelling, sagging, rusted fasteners and mold in the showers.

- Remove debris, clean and paint concrete floor.

- Restore minor splits, open joints and sagging shelves on millwork.

Structural

Description

The building consists of CMU bearing walls supporting a monoslope wood joist roof with an overhanging eave.

Conditions

- Horizontal cracking was observed throughout the structure (Figure 1.3-233). In joints where mortar was missing, corroded horizontal joint reinforcement was visible. The use of non-galvanized steel and inadequate cover have likely contributed to corrosion of the joint reinforcement. Deterioration is consistent with the location of the reinforced bond beam and continuous joint reinforcement (Figure 1.3-234).

- Roof joists tails, soffit, and fascia boards are deteriorated. This condition occurs most commonly where the roof flashing laps (Figure 1.3-235).

Work Recommendations

- Repoint all open joints. Where possible, remove corroded horizontal joint reinforcement. Assume 25% repointing required.

- Repair roof elements effected by roof flashing laps. Consider redesign of roof flashing to prevent future localized deterioration.

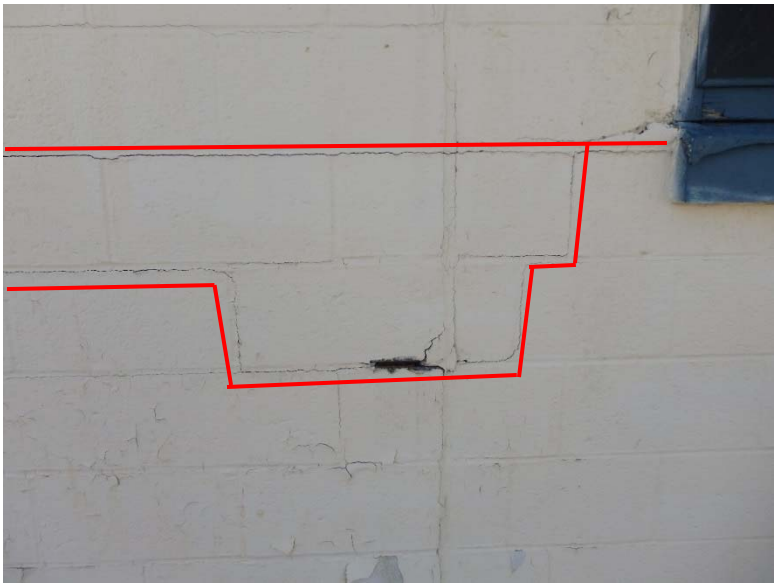


Figure 1.3-233: Horizontal and step cracking on Building 434.

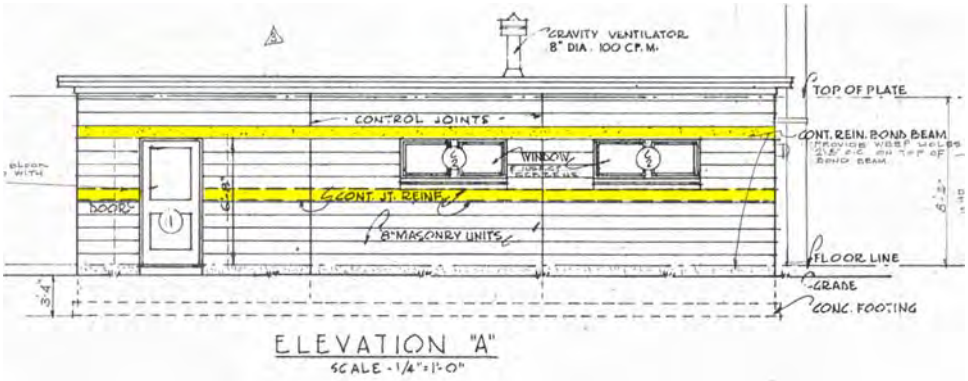


Figure 1.3-234: Front elevation of Building 434 with reinforced bond beams highlighted in yellow, excerpt from "Nike-1 Latrine (Type C)," dated June 2, 1953.



Figure 1.3-235: Deteriorated wood elements of Building 434. Arrow points to lap in roof flashing.

Building Systems

Description

HVAC

The building was the latrine. There is evidence of exhaust fans and hot water heating radiators with heating hot water distribution piping.

Plumbing

The plumbing system appeared to consist of four (4) waters closets, three (3) urinals, six (6) shower heads and valves, a service sink, a drinking fountain and evidence of a trough type lavatory. There is also evidence of a gas/oil fired domestic hot water heating system. Floor drains are also present.

Electrical

Electrical service to the building is from overhead utility lines along the roadway. The existing aerial mast is on the east elevation. There was a 100A panel manufactured by Federal Pacific that served the building loads. One load was an exhaust fan that would have been used for ventilation. Internal building wiring was surface mounted conduit, some of which still remains in place. There are incandescent lighting fixtures and several receptacles. There does not appear to have been a fire alarm system.

Conditions

HVAC

All remaining systems are damaged, deteriorated and in poor condition.

Plumbing

All remaining fixtures are damaged or missing and deteriorated. All visible and remaining domestic water piping is deteriorated and in poor condition. The underground sanitary system is deteriorated and unusable.

Electrical

There are no active electrical systems in the building. The original panel, several light fixtures and light switch are still in place however, they do not appear to be salvageable for re-use.



Figure 1.3-236: Building 434 Interior.



Figure 1.3-237: Remaining Heating Radiation in Building 434.

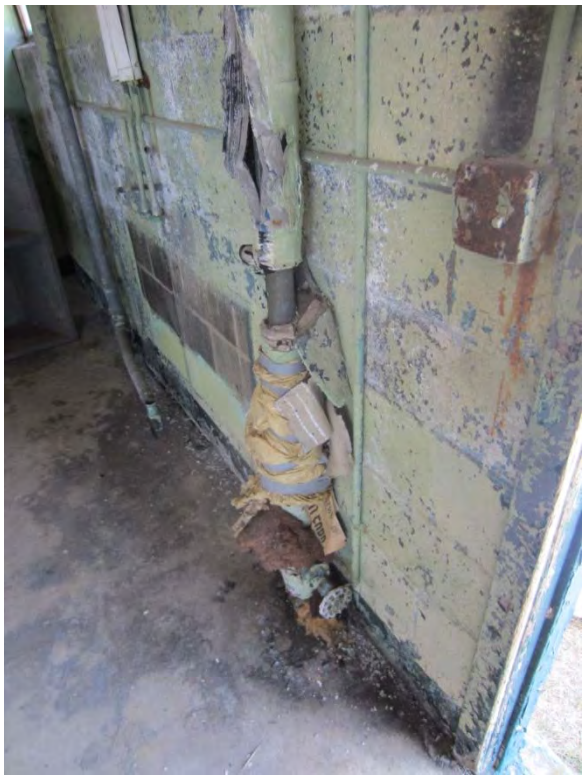
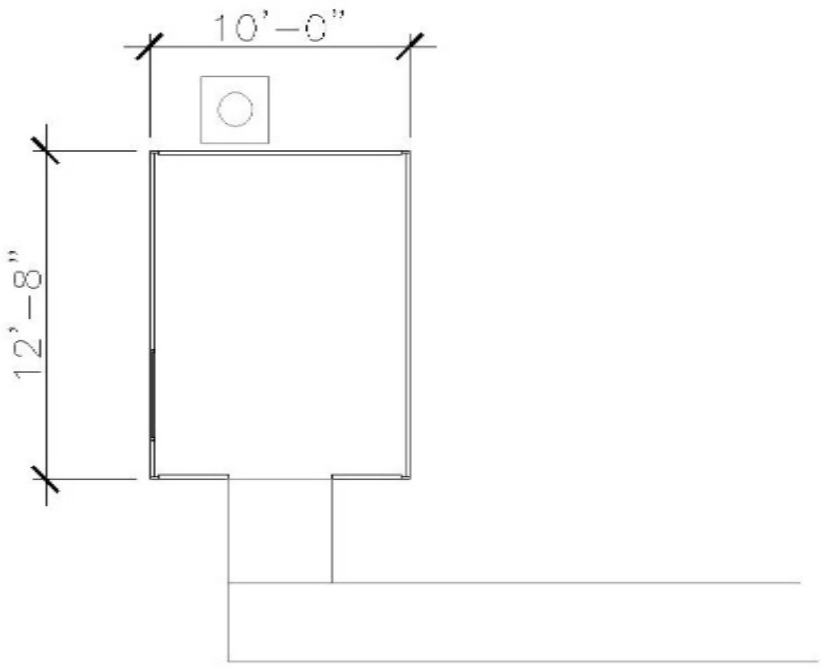


Figure 1.3-238: Building 434 Interior.

Character Defining Features

- Massing: One story, rectangular structure with flat roof ca. 1955.
- Materials: Concrete Masonry Unit, wood and sheet metal ca. 1955.
- Doorways: Original wood door on north elevation ca. 1955.
- Windows: Metal hopper windows ca. 1955.

No. 435: Central Heating Plant



Architectural

Description

Exterior

Building 435, the Central Heating Plant, is a one-story structure located in the southwest corner of the Missile Launching Site, approximately 200 feet west of Hartshorne Drive. The rectangular building was constructed in 1955 with a concrete foundation, corrugated metal siding and a corrugated metal gable roof. The north elevation has one opening, a small round vent on the top portion. The south elevation has one fenestration: a large opening with a missing door, exposing the interior to the elements. There are no fenestrations on the east elevation. The west elevation has a four-paned hopper window that is original to the structure. There are numbered building signs on the north and south elevations.



Figure 1.3-239: View of fenestrations on west and south elevations (left) and vent on north elevation (right) of Building 435.

Interior

The interior finishes of the Central Heating Plant include corrugated metal walls with no insulation or siding, a plasterboard ceiling and a concrete floor. The structure is filled with mechanical equipment and the electrical conduit is still in place.



Figure 1.3-240: View of extremely dilapidated interior of Central Heating Plant 435.

Conditions

Building 435 is in poor condition. The structure is dilapidated from weathering and moisture. The ocean atmosphere has caused rust, corrosion and penetrations throughout the interior and exterior.

Exterior

- The corrugated metal siding is in extremely poor condition. Several portions of the siding are missing and the remaining pieces are warped, bent, and rusted. There are holes and surface rust throughout.

- The only door to this structure is missing.
- The window is in poor condition with rusted metal, broken and missing glass, failed putty and rusted hardware.
- The corrugated metal roof is in poor condition; the eave overhangs have rusted off, the rakes are rusted and there are holes and surface rust throughout.
- The vent stack and armature are missing, rusted or bent. The base of the vent stack is damaged, and the concrete is filled with debris.



Figure 1.3-241: View of corrugated metal siding and metal window in extremely poor condition of west elevation (left) and deteriorating CMU and vent on the north elevation (right) of Building 435.

Interior

- The interior of the structure is dilapidated with structural damage and severe rust throughout. Every element of the interior is in extremely poor condition and appears as if it is going to collapse.



Figure 1.3-242: View of severely rusted and dilapidated metal framing of Central Heating Plant 435.

Work Recommendations

- Replace all corrugated metal siding; several portions are missing, warped, bent, and rusted, and there are holes and surface rust throughout.
- Replace missing door to structure.
- Replace window. The metal is rusted and broken, the glass is missing, the putty is failing and the hardware is rusted.
- Replace corrugated metal roof. The eave overhangs have rusted off, the rakes are rusted and there are holes and surface rust throughout.
- Remove debris and replace vent stack and armature.

Structural

Description

The steel frame structure is clad with corrugated, galvanized sheet metal.

Conditions

- Steel frame has sustained some sort of impact damage to the west side. Large section of the corrugated cladding are missing (Figure 1.3-243).
- Interior steel framing is heavily corroded and dislocated as a result of the impact (Figure 1.3-244).

Work Recommendations

- Repair or patch dents, holes, gouges, and surface rust on exterior corrugated metal siding.
- Replace west side corrugated cladding 100%.
- Repair steel frame. Assume 75% replacement of existing framing requires replacement.



Figure 1.3-243: West elevation of Building 435, showing severe damage to structure.



Figure 1.3-244: Interior steel framing of Building 435, corroded from exposure and dislocated due to unknown circumstances.

Building Systems

Description

HVAC

The building houses a boiler plant. The boiler plant consists of a gas/oil fired water tube boiler.

Plumbing

There is no evidence of any plumbing systems.

Electrical

Electrical service to the building appears to be from below grade. There was a panel that served the building loads. The panel rating could not be determined. Internal building wiring was done by surface mounted conduit, some of which still remains in place. Other than the mechanical heating control circuit, there was an incandescent light fixture and switch, and a receptacle. There does not appear to have been a fire alarm system.

Conditions

HVAC

The boiler is deteriorated and in poor condition. There is no existing flue venting remaining. The heating hot water distribution piping is deteriorated and in poor condition.

Plumbing

Not applicable.

Electrical

There are no active electrical systems in the building. The original panel, light, and switch are severely rusted, and are not salvageable for re-use.



Figure 1.3-245: Building 435 Interior.

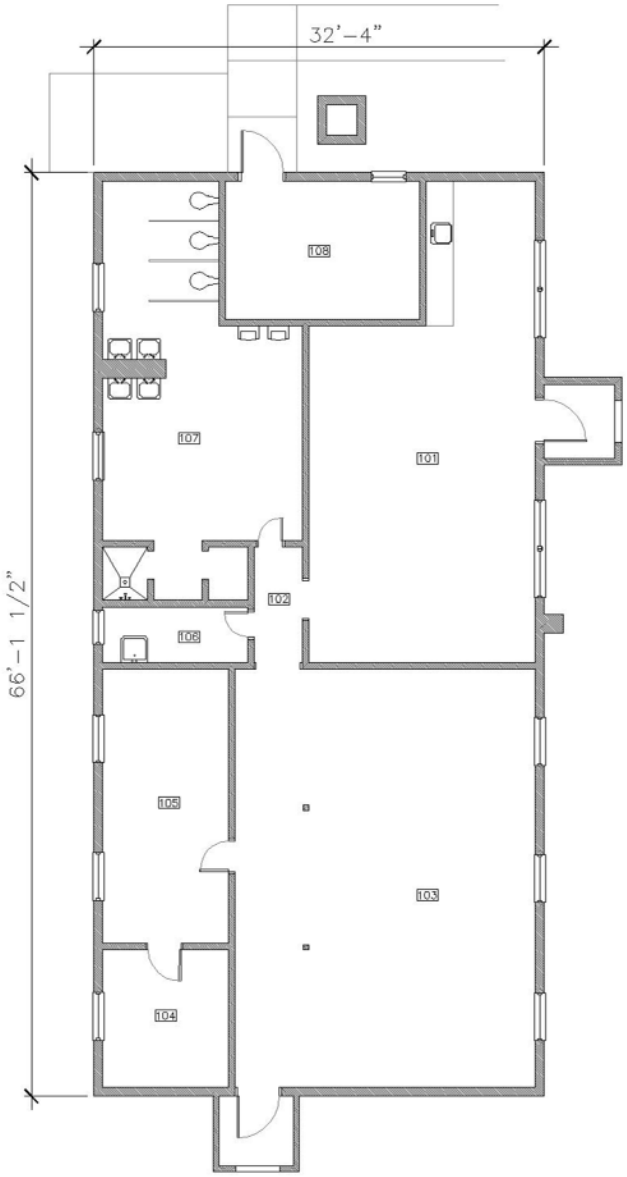


Figure 1.3-246: Existing Boiler in Building 435.

Character Defining Features

- Massing: One story structure with gable roof ca. 1955.
- Materials: Corrugated metal siding ca. 1955.
- Doorway: Large metal frame opening on south elevation ca. 1955.
- Window: Metal hopper window on west elevation ca. 1955.

No. 437: Ready Building



Architectural

Description

Exterior

Building Number 437, constructed in 1964, is located in the southwest corner of the Missile Launching Site, approximately 200 feet east of Hartshorne Drive. It is a one-story, painted CMU structure with a flat roof. Each elevation has bed moulding boards consisting of sheet metal and wood. The roof is wood and metal with mesh on the underside of the roof overhang. The ballast roof has two vents, four stacks and one hatch.

The north elevation has two fenestrations: a modern single-paned, double-hung metal window with a concrete sill on the east side and a wooden door with nine window panes, a metal door frame and original hardware on the west side. The door has plywood on the exterior side of the door. There is a brick chimney stack with a concrete foundation between the fenestrations that is not attached to the building; there is a vent on the wall behind it. There is a fuel box on a concrete slab on the west side and several mechanical and electrical boxes throughout the elevation.

The east elevation has six fenestrations: three single-paned, double-hung metal windows on the south side, an original metal door with a two-paned window and two sets of double-hung metal windows on the north side. One set includes original one-over-one, double-hung metal windows, located on the north side of the elevation, while the other three are replacements that match those on the south side. The modern windows have mesh wire within the panes, and six contain modern, metal storm windows on the exterior; the original concrete sills are intact. The door has a covered wooden vestibule with a concrete foundation and a flat roof similar to the roof of the building. In the center of the elevation, there is a narrow CMU chimney stack with a pipe attached to the building. Another small wooden structure, not attached to the building, is situated south of the entry vestibule.

The south elevation has one fenestration, an original metal door with a two-paned window. The door on the south elevation has a wood vestibule with a flat metal and wood roof and a concrete foundation similar to the east elevation. The west elevation has six modern single-paned, double-hung windows with original masonry sills and modern metal storm windows.



Figure 1.3-247: View of fenestrations, additions and chimney stacks on the north and east elevations (left) and north and west elevations (right) of Building 437.

Interior

Building 437 has eight rooms. Room 101, the employee lounge, is accessed from the main door on the east elevation. The room has CMU on the south and west walls and a combination of drywall and particle board on the north and east walls. The floor consists of asbestos tiles. The furnace, located on a raised brick floor along the east wall, is connected to the exterior CMU stack. There are heater units on the north and east walls and a sink on the north end of the west wall. The finishes in Room 102, the hallway to the west of Room 101, include CMU walls, asbestos floor tile and hollow core wood doors with wood frames. The door leading to Room 104 has its original hardware and wood “trim” for molding. A wood frame was added to the door that leads to Room 103.

Room 103 is located on the south side of the building. The room has two wood columns supporting a beam in the ceiling and a pipe on the east wall, protruding from the exterior. The wall finishes include CMU on the north, drywall on the west, and a combination of drywall and particle board on the south and east walls. Other finishes include asbestos floor tile and a drywall ceiling. Room 106 is located on the west side of the building. The finishes include a concrete floor, CMU walls and wood "crown molding". There is a window on the west wall, a slop sink on the north wall and pipes protruding from the ceiling.

Room 107 is a large bathroom located on the north side of the building. It has a painted concrete floor and the walls are a combination of drywall, CMU and concrete. The fixtures include a shower on the south wall, wall mounted lavatories on the north and west walls and three water closets with metal partitions on the west wall. There is a closet across from the shower on the south wall. Room 108 is a mechanical room, only accessible from the exterior door on the north elevation. The west wall consists of plywood supporting mechanical and electrical equipment, and the ceiling is a combination of finishes: particle board, wire mesh, insulation and several pieces of wood. Rooms 104 and 105 are inaccessible.



Figure 1.3-248: View of Room 101 in Building 437, facing west (left) and view of Room 103 facing southeast (right).

Conditions

Building 437 is in good condition. There are large cracks in the CMU walls and the brick and CMU chimneys to moisture. The windows and doors are deteriorating in some places and the paint is peeling throughout, all caused by moisture and weathering.

Exterior

- The concrete masonry unit is in fair condition. The north elevation is exhibiting cracks and paint failure, especially around the fenestrations. The east elevation has several vertical and stepped cracks in CMU, rust and paint failure. The painted CMU on the south elevation is in very poor condition. There are a few small cracks in CMU on the west elevation, as well as severely deteriorating paint near the foundation.

- The doors are in poor condition. The wood door on the north elevation is deteriorating, particularly at the bottom. The door and the concrete sill are both exhibiting paint failure. The

door to the vestibule on the east elevation is missing. The door to the building is intact, and has a metal frame that is exhibiting rust.

- Window conditions on the structure vary from poor to good. Two glass panes on the north door are broken. The east windows are exhibiting paint failure and the paint is peeling on all of the window sills on west elevation.

- The roof is in good condition. There is a fair amount of biological growth but the flashing is in good condition. Several sections of the mesh overhang are missing on the north, south and east elevations. The metal roof is rusting, particularly on the south elevation.

- The bed moulding board is in poor condition, especially on the west elevation. The wood is rotting and the metal is rusting.

- The conditions of the chimneys stacks vary from poor to fair. The brick stack on the north elevation is in poor condition and has a severe crack through the top. The CMU stack on the east elevation is in fair condition however the top is broken.



Figure 1.3-249: View of severe vertical crack on north side of brick chimney on north elevation (left) and rotting and deteriorating eave on the south elevation (right) of Building 437.

Interior

- The conditions of the walls vary from fair to good. The walls in Rooms 101 and 102 are in good condition. The walls in Room 103 are in fair condition; the drywall on the east elevation has a fair amount of water damage and there are nail pops in the drywall throughout the room. The same conditions are exhibited in Room 107 as well. In Room 106, there are cracks in the CMU on the west wall around the fenestrations and paint failure throughout. In Room 107, the concrete is deteriorating at the bottom of the walls and the paint is failing on the metal partitions.

- The conditions of the ceilings vary from poor to good. The paint is peeling at the south end of the ceiling in Room 101. The ceiling in Room 108 is in very poor condition; the ceiling rafters are partially exposed and the particle boards, as well as other finishes are hanging from the ceiling.

- The floors are generally in good condition. The asbestos floor tiles in Room 101 are in good condition with some deterioration near the main entrance, and approximately four asbestos tiles are missing in Room 102. In Room 103, some of the tiles are fading or stained and the tiles near the threshold from Room 102 are cracked. The concrete floor in Room 106 is in good condition, however the paint is peeling on the concrete floor in Room 107.

- The conditions of the doors vary from poor to good. One of the doors in Room 102 is exhibiting paint failure and the other is missing. The other doors in the building are generally in good condition.

- The windows are generally in good condition, however those on the south side of west elevation in Room 107 are covered with plywood.



Figure 1.3-250: View of north door to Mechanical Room 108 (left) and concrete floor and plumbing fixtures in Room 108 (right) of Building 437.

Work Recommendations

- Repair cracks on north elevation, especially around fenestrations. Repair vertical and stepped cracks in CMU on east elevation. Repair vertical and stepped cracks on east elevation and minor cracks on west elevation. Strip and repaint exterior.

- Restore all doors. The door to the vestibule on the east elevation is missing and the wood door on the north elevation is deteriorating. All of the doors are exhibiting paint failure, two glass panes on the north door are broken and the metal frames are exhibiting rust. Replace missing door in Room 102. Strip and paint all interior doors.

- Restore all windows as there is paint failure throughout. Remove plywood from windows in Room 107.

- Remove biological growth from roof. Replace sections of missing mesh overhang on the north, south and east elevations. Repair rusting metal roof on south elevation.

- Replace bed moulding board.

- Repair severe crack in brick chimney stack on north elevation. Repair top of CMU stack on east elevation.

- Replace all interior drywall partitions. There are nail pops and water damage throughout. Repair interior CMU cracks around fenestrations, particularly in Room 106. Repair spalling concrete in Room 107. Strip and paint drywall, CMU and metal partitions throughout interior (replace interior partitions if necessary).

- Replace all particle board ceilings and paint.

- Remove debris, clean and paint concrete floors (Rooms 106 and 107). Replace deteriorating asbestos tile floors with new tile, laminate or concrete flooring.

Structural

Description

The building consists of CMU bearing walls supporting a monoslope wood joist roof with a pronounced eave. The building has interior CMU partition walls. In the larger open room to the south, wood 4×4 posts support a 3-member wood beam spanning north-south. A brick chimney on the north side of the building formerly vented the boiler. A 16-inch square CMU chimney on the east side vents a small stove. The brick chimney is no longer connected to the mechanical system and it is unclear if the stove is still in use.

Conditions

- Horizontal cracking was observed throughout the structure. In joints where mortar was missing, corroded horizontal joint reinforcement was visible. (Figure 1.3-251). This deterioration is consistent with the location of reinforced bond beams with continuous joint reinforcement as noted on the drawings. The use of non-galvanized steel and inadequate cover have likely contributed to corrosion of the joint reinforcement.

- Roof joists tails, soffit, and fascia boards are deteriorated. This condition occurs most commonly where the roof flashing laps (Figure 1.3-252).

- The boiler room ceiling has deteriorated, compromising the fire-rating of the room and building (Figure 1.3-253).

- The brick chimney is extensively deteriorated. Large vertical cracks near the base were observed on three sides (Figure 1.3-254). At the top, the northeast corner of the masonry has dislocated

and the vertical crack extends the entire height of the chimney (Figure 1.3-255). Several bricks are missing from the top courses and many other bricks are spalled.

- The CMU chimney is cracked and spalled at the top five courses (Figure 1.3-256).

Work Recommendations

- Repoint all open joints. Where possible, remove corroded horizontal joint reinforcement. Assume 25% repointing required.

- Repair roof elements effected by roof flashing laps. Consider redesign of roof flashing to prevent future localized deterioration.

- Reinstate boiler room ceiling to appropriate fire rating.

- Repair brick chimney. Reconstruct upper four feet of brick chimney and repair all vertical cracks.

    - Alternative: If chimney is no longer in active use, demolish chimney.

- Repair CMU chimney. Replace upper six CMU. Evaluate internal terra cotta flue and repair or line as necessary.



Figure 1.3-251: Horizontal and step cracking on Building 437.



Figure 1.3-252: Deteriorated wood elements of Building 437. Arrow points to lap in roof flashing.



Figure 1.3-253: Deteriorated ceiling in boiler room of Building 437.

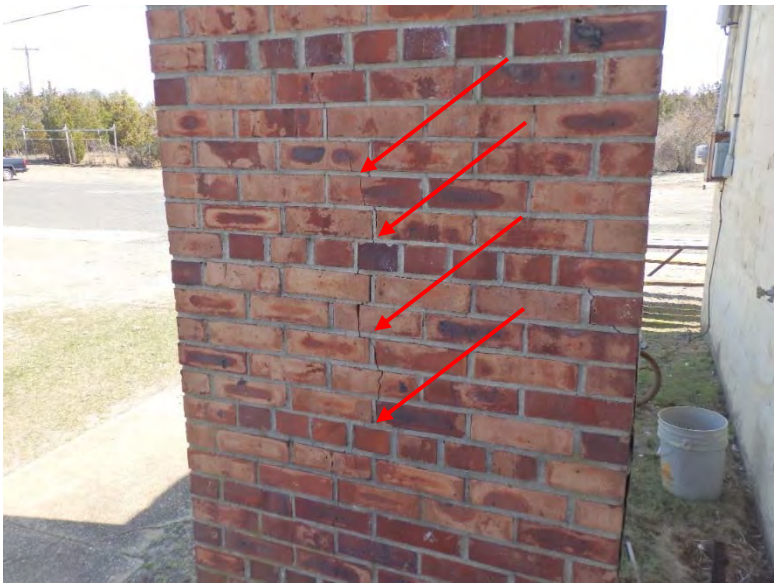


Figure 1.3-254: Vertical crack in chimney of Building 437.



Figure 1.3-255: Dislocated corner of chimney of Building 437, with vertical crack.



Figure 1.3-256: Cracked and spalled CMU chimney of Building 437.

Building Systems

Description

HVAC

The building is provided with a heating hot water boiler that provides the primary heating for the building via the perimeter finned tube radiation. The 160 MBH oil-fired boiler is provided with a draft inducing fan on the boiler flue and is controlled with a Honeywell control system. Supplemental electric unit heaters also provide heating. A 400 gallon oil tank is located above grade on the northwest side of the building. The building also contains a wood fired stove that is currently not used. Cooling is provided by window mounted air condition units. Roof mounted exhaust fans serve the restrooms.

Plumbing

The domestic water enters the building in the northwest mechanical room. A 30 gallon electric water heater provides domestic hot water to the building. The building restrooms consist of wall mounted lavatories, wall mounted urinals, and showers. There is also a kitchen style sink and ice machine located in the common room as well as a hose bibb located on the southwestern exterior wall. The sanitary piping is cast iron and the domestic water piping is copper.

Electrical

Electrical service to the building is from overhead utility lines along the roadway. The existing aerial mast is on the north elevation. There was a 100A panel manufactured by Federal Pacific that served the building loads. Internal building wiring is done by surface mounted conduit, which still remains in use. There are incandescent lighting fixtures, receptacles, and mechanical equipment currently existing in service. The fire alarm system is an old antiquated hard wired zoned type system, manufactured by Acme. The system consists of pull stations and bells.

Conditions

HVAC

The boiler was currently operating and in good condition. The oil storage tank appeared to be in good condition. The majority of the heating hot water piping was not insulated. The finned tube radiator covers were in fair to poor condition. It could not be determined if the exhaust fans were operational but they appeared to be in fair to poor condition.

Plumbing

The domestic water heater appeared to be in good to fair condition. The majority of the domestic water hot and cold piping was not insulated. One of the two urinals was not operational and in poor condition. One of the two showers was not operational and in poor condition. The remaining fixtures were in fair to poor condition.

Electrical

There are existing active electrical systems in the building. The building appears to be used as a maintenance facility. The original panel, light fixtures and mechanical equipment are still in place, however, they are past their expected useful service life. Replacement of these systems should be considered.



Figure 1.3-257: Above Ground Oil Storage Tank of Building 437.



Figure 1.3-258: Building 437 Interior.



Figure 1.3-259: Existing Urinals in Building 437.



Figure 1.3-260: Existing Shower in Building 437.



Figure 1.3-261: Existing Electric in Building 437.



Figure 1.3-262: Existing Boiler in Building 437.

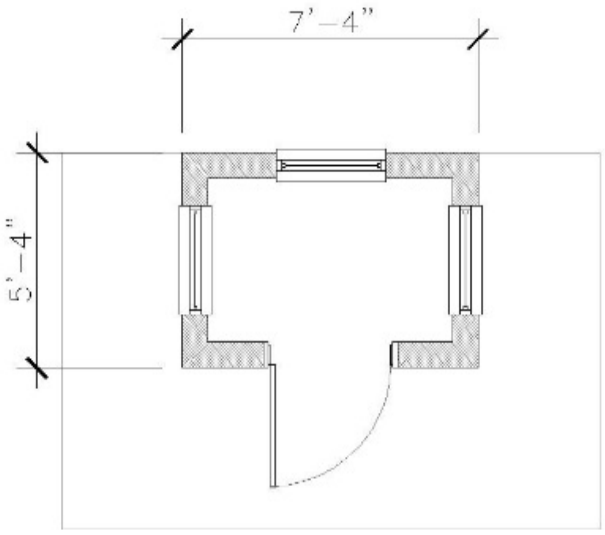


Figure 1.3-263: Existing Domestic Water Heater in Building 437.

Character Defining Features

- Massing: One story structure with flat roof and two chimney stacks, ca. 1964.
- Materials: Concrete Masonry Unit ca. 1964.
- Doorways: Original wood-paneled door on the north elevation and original metal doors with one-over-one windows and original hardware on the south and east elevations.
- Windows: Original one-over-one, double-hung metal window on the north side of the east elevation and modern, single-paned, double-hung metal windows on the north, east and west elevations.

No. 439: Sentry Box



Architectural

Description

Exterior

Located in the southwest corner of the Radar Tracking Site, approximately 50 feet east of Hartshorne Drive, Building 439 was constructed in 1958 and was used as a Sentry Box. The structure is situated on a concrete slab and is constructed with concrete masonry unit walls and has a flat metal and wood roof. The south elevation has a wood door opening and frame, however the door is missing. The north, east and west elevations each have one fenestration: a one-over-one, double-hung, metal window with a concrete sill.



Figure 1.3-264: View of southeast corner of Sentry Box 439 (left) and view of door on south elevation (right).

Interior

The interior finishes of the Sentry Box include a concrete floor and a plasterboard ceiling. The walls have a plasterboard finish with a plywood wainscot soffit. Some mechanical and electrical systems remain, but are no longer in use.



Figure 1.3-265: Plasterboard walls, concrete floor and original metal windows of Sentry Box 439.

Conditions

Building 439 is in good condition with some cracks in the CMU and peeling paint on the interior CMU walls. The roof is deteriorating, including the soffits, eaves and edge flashing. These conditions are all caused by moisture and weathering.

Exterior

- The walls are in fair condition. The concrete masonry unit is cracking on the east elevation, as well as in the northeast and southeast corners. There are several cracks in the units throughout. The CMU is exhibiting fastener damage and abandoned clips and anchors. There are cracks and broken corners in the concrete apron as well.

- The only door on the structure is missing and the frame is rotting and showing signs of UV damage.

- The windows are in fair condition; the sills and hardware are rusted, the putty is failing and there is surface rust on the sashes. The glass window panes on the east elevation are broken.

- The soffits and eaves are in poor condition. The edge flashing is rusted throughout the northeast corner and there is UV damage throughout. There is rot on the north elevation and a hole in the south elevation.



Figure 1.3-266: Deteriorating and rotting eaves (left) and broken glass in bottom of sash on east elevation (right) of Building 439.

Interior

- The plasterboard walls are in fair condition with a hole in the north elevation and minor cracking throughout. The soffit is exhibiting minor splitting and open joints.

- The ceiling is generally in fair condition with peeling paint and deteriorating plasterboard throughout.

- The floor is in good condition despite the debris that is accumulating.

- The windows are overall in fair condition; the stools are heavily weathered and damaged, however the trim is in good condition.
- The wood base is in poor condition; it is rotting and pulling away from the walls. The millwork is also in poor condition as the shelf is broken or missing.



Figure 1.3-267: Debris on concrete floor (left) and failing paint and deteriorating plasterboard on ceiling and walls (right) of Building 439.

Work Recommendations

- Repair cracks in CMU on east elevation and in northeast and southeast corners. Repair cracks and broken corners in concrete apron. Remove abandoned clips and anchors and repair fastener damage.

- Replace missing door and rotting trim.

- Restore rusted window sills, sashes and hardware, replace failing putty and replace broken window panes on the east elevation. Restore heavily weathered or damaged stools on interior windows.

- Restore or replace soffits and eaves. Replace rusted edge flashing and repair UV damage throughout.

- Replace or repair sections of plasterboard walls. There is a hole in the north elevation and minor cracking throughout. Repair soffit as it is exhibiting minor splitting and open joints.

- Replace deteriorating plasterboard ceiling and paint.

- Remove debris, clean and paint concrete floor.

- Replace wood baseboards (rotting and pulling away from wall) and repair millwork where necessary (shelves are broken or missing).

Structural

Description

The building consists of CMU bearing walls supporting a monoslope wood joist roof with a pronounced eave. A concrete turndown slab surrounds the front and sides of the structure. The exterior slab is independent of the structure.

Conditions

- Horizontal cracking was observed throughout the structure, likely a result of corroding horizontal joint reinforcement (Figure 1.3-268). This condition is typical at the corners of the structure. The horizontal joint reinforcement was not directly observed, but the construction of this structure is similar to others where more serious deterioration confirmed the presence of corroded steel within the wall.

- Roof joists tails, soffit, and fascia boards are deteriorated. This condition occurs most commonly where the roof flashing laps (Figure 1.3-269).

- The turndown slab has settled and cracked (Figure 1.3-270).

Work Recommendations

- Repoint all open joints. Where possible, remove corroded horizontal joint reinforcement. Assume 10% repointing required.

- Repair roof elements effected by roof flashing laps. Consider redesign of roof flashing to prevent future localized deterioration.

- The turn down slab settlement is likely due to changes to grade and slope around the guard house. Underpinning such a small structure is not practical.

    - Level 1: Repair cracks and address level changes to create a smooth walking surface.

    - Level 2: Rebuild turndown slab to accommodate existing grade.

    - Level 3: Regrade area to historic levels (grade was likely near to or level with top of turndown slab) and rebuild slab.



Figure 1.3-268: Horizontal cracking on Building 439.



Figure 1.3-269: Deteriorated wood elements of Building 439. Arrow points to lap in roof flashing.



Figure 1.3-270: Settlement and cracking of the exterior turndown slab of Building 439.

Building Systems

Description

HVAC

There are no existing HVAC Systems.

Plumbing

There are no existing Plumbing Systems.

Electrical

Electrical service entered the building underground to a fused disconnect switch that fed a 120/240-volt, single-phase, 60A rated 4-pole load center manufactured by Square D. The load center was located in the southwest corner of the building. This load center consisted of two circuit breakers that fed a light, receptacle and presumably a unit heater.

The lighting fixture was incandescent, and the receptacle was for convenience power. Circuiting in the building was surface mounted conduit. The building originally appears to have been used as a guard house. The disconnect switch, load center and devices are still in place.
There does not appear to have been a fire alarm system.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

Electrical

There are no active electrical systems in the building. The original equipment and devices are severely rusted, and are not salvageable for re-use.

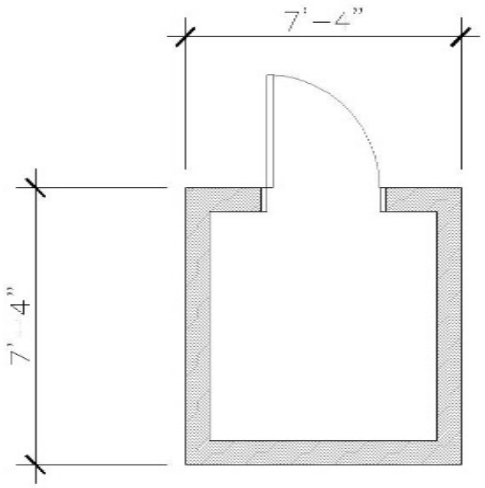


Figure 1.3-271: Building 439 Exterior.

Character Defining Features

- Massing: One story structure with flat roof ca. 1958.
- Materials: Concrete Masonry Unit ca. 1958.
- Doorway: Original wood-framed opening on east elevation ca. 1958.
- Windows: Original one-over-one double hung metal windows ca. 1958.

No. 447: Flammable Materials Storehouse



Architectural

Description

Exterior

Building Number 447, constructed in 1959, is located near the center of the Missile Launching Site, approximately 350 feet west of Hartshorne Drive. It is a small one-story, CMU structure with a flat wood and metal roof. The building has one fenestration: a metal door on the north elevation with a concrete sill, metal threshold, wood frame and original hardware. There are four building signs, two original and two that were added later. The signs are located on the east and west elevations.



Figure 1.3-272: Door and concrete slab on north elevation (left) and overview of northeast corner (right) of Building 447.

Interior – *Inaccessible*

Conditions

Building 447 is in fair condition. The wooden roof is rotting, the door hardware is rusting and the bed molding board is failing, all due to moisture. The paint on the exterior CMU walls is failing from weathering and moisture.

Exterior

- The CMU is in fair condition. Although there are no major cracks on the structure, there is severe paint failure on each elevation. The east elevation has vegetation growing along the wall.
- The door is in poor condition. The door and hardware are both exhibiting a fair amount of rust and the threshold is exhibiting paint failure.
- The roof is in poor condition. The wood is rotting in the southeast and southwest corners, the metal is rusting and the paint is peeling. The wire mesh under the overhang is intact, but is in poor condition.
- The metal and wood bed moulding board is in poor condition; the paint is failing on all four elevations.
- The original building signs are in poor condition, creating rust on the CMU walls below.



Figure 1.3-273: Rusted and deteriorating door and frame on north elevation (left) and rotting eaves and roof (right) of Building 447.

Interior - *Inaccessible*

Work Recommendations

- Remove vegetation, particularly on east elevation. Strip and paint CMU throughout.
- Restore door and hardware as both are exhibiting a fair amount of rust. Strip and paint threshold.

- Replace roof. Wood is rotting in the southeast and southwest corners, metal is rusting and the paint is peeling. Replace mesh under overhang.
- Replace metal and wood bed moulding board.

- Replace building signs.

Structural

Description

The building consists of CMU bearing walls supporting a monoslope wood joist roof with an overhanging eave. A concrete turndown slab exists only at the front of the structure (Figure 1.3-274).

Conditions

- No cracking was observed in the CMU walls at the exterior face.

- The roof is deteriorated at the southeast corner (Figure 1.3-275).

Work Recommendations

- Replace roof 25%, including sill plate, joists, sheathing, and rim board. This assumes a portion of the roof is damaged that was not observed from the exterior.



Figure 1.3-274: Slab only at front of structure 447.



Figure 1.3-275: Deteriorated roof of Building 447.

Building Systems

Description

HVAC

There are no existing HVAC Systems.

Plumbing

There are no existing Plumbing Systems.

Electrical

There is no evidence that these systems existed in this building.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

Electrical

Not applicable.

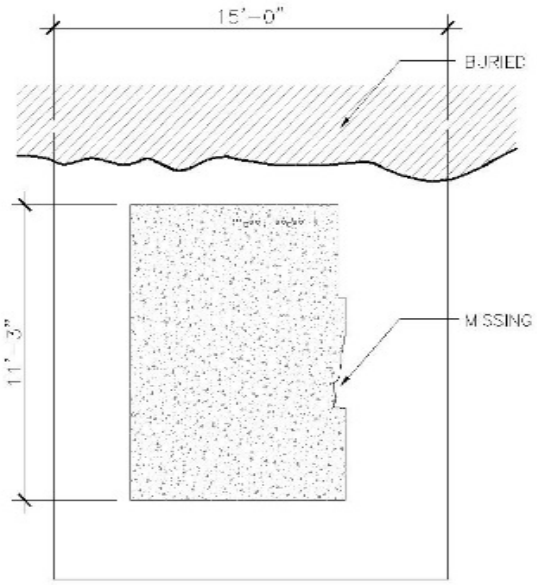


Figure 1.3-276: Building 447 Exterior.

Character Defining Features

- Massing: One story structure with a flat roof ca. 1959.
- Materials: Concrete Masonry Unit ca. 1959.
- Doorway: Original metal door with metal threshold, wood frame and original hardware on the north elevation ca. 1959.

No. 448: Slab



Number 448 is a concrete slab located in the center of the Missile Launching Site, south of Building Number 429, approximately 600 feet east of the Main Gate.

Structural

Description

All that remains of the structure is a concrete slab with a raised pedestal.

Conditions

- Lower slab is cracked in two locations (Figure 1.3-277).

Work Recommendations

- Clear area of vegetation.
- Since the slab no longer supports a structure, no recommendations are made for the cracked slab.

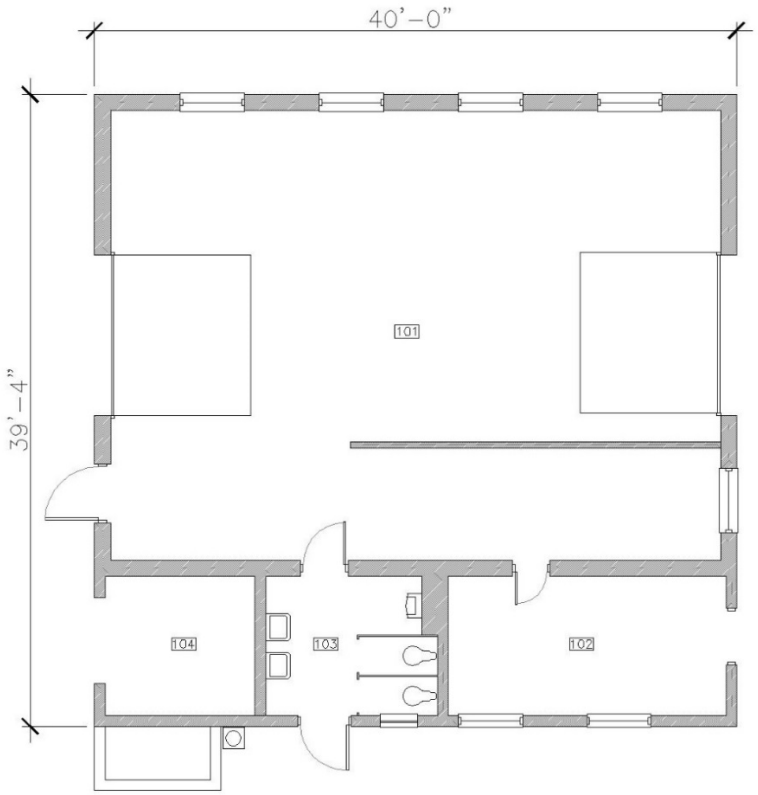


Figure 1.3-277: Cracked slab of 448.

Building Systems

No structure or systems exist.

No. 449: Missile Assembly and Test Building



Architectural

Description

Exterior

Building 449, constructed in 1959, is a one-and-one-half story structure located in the southeast corner of the Missile Launching Site, approximately 600 feet east of the Main Gate. It is situated on a concrete foundation with concrete masonry unit walls and a slightly pitched ballast roof. The north elevation is one bay wide with four windows. Originally the windows were one-over-one, double-hung metal windows, however some of the muntins are no longer in place. There is a small vent on the east side of the elevation and a small, round opening in the center. The south elevation has five fenestrations: three windows on the west side that are partially covered up, a single door in the center, and a small opening with plywood on the east side. There is a CMU chimney stack on the east side between the door and the small opening.

The east elevation is two bays wide; the north bay is one-and-one-half stories tall with two fenestrations. The first is a large door opening with a rolling door on the right side and the second is a window on the left side that has been boarded up. The south bay is one story tall and has a small man door in the center. Similarly to the east elevation, the west elevation is two bays wide. The north bay is one-and-one-half stories tall and has two fenestrations: a large door opening with a rolling door on the

left side and a single man door on the right side. The south bay is one story tall and has a large opening with no door, exposing the interior to the elements.



Figure 1.3-278: Overview of fenestrations on east (left) and west (right) elevations of Building 449.

Interior

Building 449 has four rooms. Room 101, located on the north side, is the largest room and was used as the Missile Assembly Room. Rooms 102, 103 and 104 are much smaller than Room 101. Room 103 is a toilet room located in the center of the south side of the building, between Rooms 102 (southeast corner) and 104 (southwest corner). The interior finishes include CMU and plasterboard walls and a combination of plasterboard and exposed metal ceilings. Some of the floors have vinyl asbestos tiles and the rest are concrete.



Figure 1.3-279: Overview of interior showing CMU walls, exposed corrugated metal ceiling and concrete floor of Building 449.

Conditions

Building 449 is in poor condition. While the exterior CMU walls are in fair condition, the doors and windows are deteriorating due to moisture, growth and weathering. The eaves and soffits are rusting or exhibiting penetrations and the plasterboard ceiling and walls are missing or deteriorating. These conditions are also caused by moisture.

Exterior

- The walls are in fair condition. There is displacement in the CMU on the west elevation, as well as stepped cracks, abandoned anchors and holes throughout the building. There are areas of the concrete masonry unit where the mortar is missing. There is also evidence of soiling and biological growth on north elevation and vines and trees growing out of the masonry on the east and south elevations.

- The doors are in poor condition. The original roller doors on the east and west elevations are no longer in place. A partial door has replaced the original door on the east side, however it is bent and dented. The man door to the missile bay on the west side retains its original frame, however the door has been replaced with a plywood door. The replacement door has UV damage, open joints and minor splitting. The original frame is splitting, rotting and exhibiting UV damage, and the hinge and lock have some scarring. The replacement stop is in good condition. The door to the air handler bay is missing and only a portion of the north jamb remains. The man door on the east elevation is also missing, and the frame badly rotted and damaged by growth. The man door on the south elevation is almost completely missing and the frame is badly rotted and exhibiting UV damage.

- The windows are in poor condition. Many of the windows are damaged by biological growth. Some sashes have been repaired with plexiglass and bondo, and other windows are exhibiting open joints, broken glass and missing or broken stops. Many of the muntins are broken, missing or modified. The window on the east elevation is badly rotted, has a missing sash and is covered with plywood. The south window is exhibiting UV damage, open joints and splitting or delaminating trim. The sills on the north elevation are rotting, some more severely than others. Several windows throughout the structure are covered with Plywood.

- The eaves and soffits are in poor condition. The sheet metal is sagging and has holes and open joints. The metal flashing is bent.



Figure 1.3-280: The east elevation of Building 449 is exhibiting broken and boarded up windows, deteriorating metal roof, and vegetation (left) and the south elevation is exhibiting warping metal on the roof around the chimney stack and vegetation throughout (right).

Interior

- The interior walls are in poor condition. The CMU is cracking throughout the building, and water infiltration has caused damage to the concrete in the missile bay. The concrete walls are exhibiting rust, staining, cracking and spalling at penetrations, and the plywood partitions are

damaged at floor. The plasterboard walls are in poor condition as well: open joints, damage under the south window and failing paint. The partitions in the restroom are rusting.

- The conditions of the ceiling vary from poor to good. Some areas of the plasterboard ceiling have large holes, open joints or rusting fasteners. The exposed roof trusses are exhibiting surface rust throughout.

- The conditions of the floor vary from fair to good. The concrete floor is in good condition, while some of the vinyl asbestos tiles are missing or broken.

- The doors are in poor condition. The door in the restroom is badly damaged; the bottom rail and bottom panel are missing, the stiles are split or broken, and the frame has open joints and is rotting at the bottom.

- The windows appear to be in good condition where visible, however there is no glass, only screens.



Figure 1.3-281: Deteriorating plasterboard ceiling exposing corrugated metal roof (left) and deteriorating plasterboard walls in Building 449 (right).

Work Recommendations

- Repair displacement in the CMU on the west elevation. Repair stepped cracks, remove abandoned anchors, replace missing mortar and fill in holes throughout structure. Remove biological growth and clean soiling on north, east and south elevations.

- Replace roller doors on the east and west elevations. Replace man door to the missile bay on the west elevation and restore frame. Replace door to air handler bay and restore or replace jamb. Replace man door on east elevation and repair badly rotted and damaged frame (damaged from vegetation). Replace man door on the south elevation and badly rotted and damaged frame (UV damage). Repair or replace interior doors.

- Restore all windows including sashes, trim, screens, glass, stops, joints and muntins.

- Restore or replace eaves and soffits. The metal flashing is bent and the sheet metal is sagging and has holes and open joints.

- Repair interior CMU cracks and damaged concrete exhibiting rust, staining, cracking and spalling at penetrations. Replace damaged plywood partitions. Replace plasterboard walls exhibiting damage under south window, open joints and failing paint. Strip and paint or replace rusted bathroom partitions.

- Replace plasterboard ceiling. There are large holes, open joints and rusting fasteners. Strip and paint exposed roof trusses as they are exhibiting surface rust throughout.

- Remove debris, clean and paint concrete floor. Replace vinyl asbestos tile with new tile, laminate or concrete flooring.

Structural

Description

The building consists of CMU bearing walls supporting a monoslope steel joist roof with a pronounced eave. A shorter section runs along the entire south side of the building, with a monoslope steel joist roof. Drawings for a similar Missile Assembly and Test Building indicate the shorter section should have a wood framed roof, but the building is steel joist with metal deck throughout. The top flange of joists bear on the top of CMU walls at exterior walls. At the shared wall between the spaces, the lower roof joists pocket into the wall.

According to available drawings, the walls were constructed with a reinforced CMU bond beam at the floor level, under the windows, above the windows, and at the top of the wall. Where door openings do not correspond to bond beam heights, a reinforced CMU lintel spans the opening. Continuous joint reinforcement was used at bond beams. At the door lintels, joint reinforcement extends 30” beyond jamb.

Conditions

- Horizontal and step cracking were observed throughout the structure (Figure 1.3-282). In joints where mortar was missing, corroded horizontal joint reinforcement was visible (Figure 1.3-283). This deterioration is consistent with the location of reinforced bond beams with continuous joint reinforcement as noted on the drawings. The use of non-galvanized steel and inadequate cover have likely contributed to corrosion of the joint reinforcement.

- Roof joists extensions and metal deck have corroded and fascia boards are deteriorated where roof flashing and soffit are missing (Figure 1.3-284).

- A vertical crack was observed at the southeast corner of the low portion of the structure (Figure 1.3-285).

Work Recommendations

- Repoint all open joints. Where possible, remove corroded horizontal joint reinforcement. Assume 25% repointing required.

- Evaluate roof joists extensions and repair or replace as necessary.
- At vertical crack, replace all cracked CMU and repoint surrounding area.



Figure 1.3-282: Step cracking at west side of structure 449.



Figure 1.3-283: Open joint at joint reinforcement on Building 449.



Figure 1.3-284: Deteriorated wood and steel elements at missing flashing and soffit on Building 449.



Figure 1.3-285: Vertical crack at southeast corner of Building 449.

Building Systems

Description

HVAC

The building contains a ventilation only HVAC unit that serves the building. The ventilation air is ducted throughout the building via galvanized steel un-insulated ductwork.

Plumbing

The building restroom contains two wall mounted lavatories, one urinal, and two floor mounted water closets. There did not appear to be any domestic hot water generating equipment located in the building. All of the domestic water piping is un-insulated copper and galvanized steel and the sanitary piping is cast iron.

Electrical

Electrical service entered the building underground to a 200A, 480/277-volt, 3-phase rated panelboard manufactured by Square D. The panel consisted of four circuit breakers that fed two transformers, one for the adjacent shed and one for a 208/120-volt, 3-phase, 100A, 20-pole distribution panel mounted next to the service panel.

Lighting in the building was primarily incandescent pendant mounted lighting fixtures. In addition, fluorescent shop fixtures were used. Exterior lighting fixtures were building mounted HID fixtures. Receptacles were provided in the building for convenience power. The building was originally used as a missile assembly shop. Motor starters for the various pieces of equipment are still in place. There does not appear to have been a fire alarm system.

Conditions

HVAC

The HVAC unit is not operational and in poor condition. The ductwork has deteriorated and is in poor condition.

Plumbing

All remaining fixtures are damaged and deteriorated. All visible and remaining domestic water piping is deteriorated and in poor condition. The underground sanitary system is deteriorated and unusable.

Electrical

There are no active electrical systems in the building. The original panels, transformers, lighting fixtures and receptacles are still in place. They are all in various degrees of disrepair. The systems do not appear to be salvageable for re-use.



Figure 1.3-286: Electrical Distribution Panels are visible at rear of Building 449, original lighting fixtures are overhead.



Figure 1.3-287: Existing Air Handling Unit in Building 449.



Figure 1.3-288: Existing Plumbing Fixtures of Building 449.

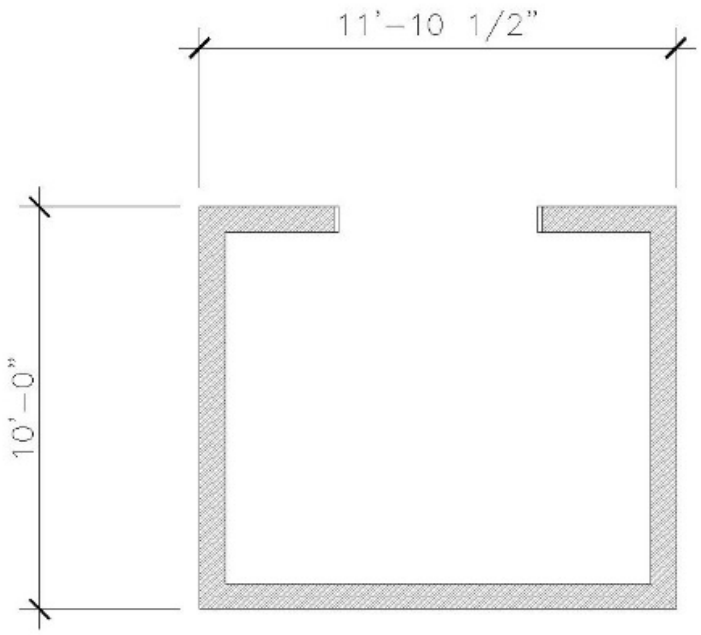


Figure 1.3-289: Interior View of existing plumbing fixtures in Building 449.

Character Defining Features

- Massing: A one-and-one-half story building ca. 1959.
- Materials: Concrete masonry unit, wood and sheet metal ca. 1959.
- Doorways: Original door openings with some original doors ca. 1959.
- Windows: Original window openings with some original windows ca. 1959.

No. 449 A: Storage



Architectural

Description

Exterior

Building Number 449A, associated with Building 449, is located on the south side of the Missile Launching Site, approximately 350 feet south of the Missile Range Launching Area. It is a one-story, CMU structure that's is situated on a concrete foundation. The gable roof is constructed from wood framing and asphalt shingles. The structure has one fenestration: a large wood-framed door opening on the north elevation.



Figure 1.3-290: Overview of north elevation (left) and southwest corner (right) of Storage Building 449A.

Interior

Building 449A has one room that is used for miscellaneous storage. The finishes include CMU walls and a concrete floor. The ceiling structure has exposed beams, rafters and sheets of plywood.



Figure 1.3-291: Interior of Building 449A, showing CMU walls and concrete floor with debris accumulating.

Conditions

Building 449A is in fair condition. There are cracks in the CMU, rotting wood and deteriorating shingles on the roof, and splitting wood and peeling paint on the trim (door is missing). These conditions are caused by moisture and vegetation.

Exterior

- The CMU walls are in fair condition. There is a large stepped vertical crack, as well as a round penetration on the west side of the north elevation. Each elevation is exhibiting fading or deteriorating paint on the CMU. There is major vegetation on the south elevation and some minor vegetation on the east and west elevations as well.

- The door on the north elevation is missing. The trim is intact, however it is in poor condition. The wood trim is beginning to deteriorate, the paint is failing and it is beginning to pull away from the CMU on the east side of the doorway. One of the hinges is partially intact.

- The roof is in poor condition. The wood is rotting and splitting and there is some vegetation growing. The asphalt shingles are deteriorating, particularly along the roofline and ridge beam.



Figure 1.3-292: Vertical crack and deteriorated and rotting wood on roofline on north elevation (left) and stepped/vertical crack on north elevation (right) of Building 449A.

Interior

- The CMU walls are in good condition, aside from a minor crack with some vegetation on the west side of the north elevation.

- The ceiling is in good condition. The rafters and beams are exposed, but show no signs of deterioration.

- The concrete floor is in good condition, with one aperture in the center of the floor for pipes. The pipes have been disconnected and filled in with cement. The north elevation is open, exposing interior to the elements, therefore sand and debris are accumulating.



Figure 1.3-293: Exposed rafters in ceiling (left) and concrete floor with hole for MEP (right) in Building 449A.

Work Recommendations

- Remove vegetation, especially on south elevation. Repair large stepped vertical crack and penetrations in CMU on north elevation. Strip and paint CMU.

- Replace missing door and restore trim and hardware on north elevation.

- Replace deteriorating roof. There is vegetation, rotting and splitting wood, and deteriorating asphalt shingles.
- Repair minor CMU crack on north elevation caused by vegetation.

- Remove sand and debris, clean and paint concrete floor.

Structural

Description

The building consists of CMU bearing walls supporting a peaked wood joist roof. The structure has a large opening at the front and a double top plate spans the opening and supports the roof structure. Asphalt shingles are used on the roof. The structure has its own slab, independent of the larger slab at the front.

Conditions

- Step cracking was observed at the front on the structure (Figure 1.3-294).

- Wood roof is experiencing deterioration, most prominently at the corners (Figure 1.3-295).

Work Recommendations

- Repoint all open joints. Where possible, remove corroded horizontal joint reinforcement. Assume 10% repointing required.

- Replace roof 25%, including sill plate, joists, sheathing, and rim board.



Figure 1.3-294: Arrows point to joint between slabs on Building 449A. Step cracking highlighted by red lines.



Figure 1.3-295: Deteriorated roof at corner of Building 449A.

Building Systems

Description

HVAC

There is no evidence that these systems existed in this building.

Plumbing

There appears to have been a storm drain located at the center of the enclosure. The underground pipe stub remains and has been capped.

Electrical

There is no evidence that these systems existed in this building.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

Electrical

Not applicable.

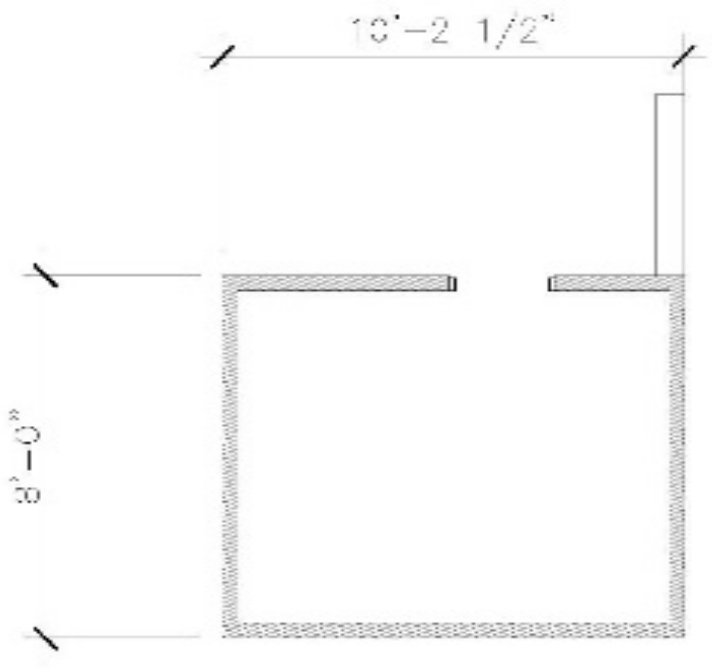


Figure 1.3-296: Capped pipe below slab of Building 449A.

Character Defining Features

- Massing: One story structure with gable roof, ca. 1959.
- Materials: Concrete Masonry Unit ca. 1959.
- Doorways: Original door opening on north elevation ca. 1959.

No. 449 B: Storage



Architectural

Description

Exterior

Building Number 449B, associated with Building 449, is located on the south side of the Missile Launching Site, approximately 350 feet south of the Missile Range Launching Area. The building, situated on a concrete slab, is a small one-story wood frame structure with a shed roof. The walls are constructed with plywood and the roof is wood and metal. The only fenestration on the structure is a door opening on the north elevation. The frame is partially intact, but the door is missing. There is a small vent on the west side of the north elevation, and two small vents near grade on the west elevation.



Figure 1.3-297: Northeast corner with missing boards (left) and southeast corner with a fair amount of vegetation (right) of Building 449B.

Interior

The interior finishes include a concrete floor and plywood and wood studs for the ceilings and walls.



Figure 1.3-298: Interior of Building 449B showing exposed studs and deteriorated wood roof boards.

Conditions

Building 449B is in poor condition. The roof shingles are missing and the plywood ceiling and walls are deteriorating from weathering and water penetration.

Exterior

- The walls are in poor condition. Most of the north elevation is missing or extremely deteriorated; the west side is extant, however the east side is supported by one stud. The south elevation is intact with some fading paint and vegetation growing. The east elevation is partially missing and has deteriorating wood and a large hole on the south side. The west elevation is deteriorated with splitting, warping and missing wood. The wood frame is splitting in the southwest corner and there is vegetation growing.

- The door frame is partially intact but the door is completely missing.

- The roof is in extremely poor condition. Most of the shingles are missing, the plywood is deteriorating and there is a large hole in the west side.



Figure 1.3-299: Deteriorated wood siding on west elevation (left) and partially missing door on the north elevation (right) of Building 449B.

Interior

- The wood framing appears to be in good condition, however the plywood walls are deteriorating and in poor condition.

- The ceiling is in extremely poor condition with deteriorating plywood and large holes throughout.

- The concrete floor is generally in good condition with some accumulation of sand and debris.

- The light fixture in the ceiling is broken.



Figure 1.3-300: Interior of Building 449B showing exposed roof rafters, broken door frame and existing electrical fixtures.

Work Recommendations

- Replace deteriorating plywood walls and paint. Most of the north elevation is missing or extremely deteriorated and the east side is supported by one stud. Repair splitting wood frame in southwest corner.
- Replace door and restore door frame.
- Replace roof. Most of the shingles are missing, the plywood is deteriorating and there is a large hole in the west side.
- Replace ceiling. The plywood is deteriorating and there are large holes throughout.
- Remove sand and debris, clean and paint concrete floor.
- Replace broken light fixture in ceiling.

Structural

Description

The building is a wood frame lean-to, with a monoslope wood joist roof. The structure has a large opening at the front and vertical clapboard siding on all sides. The structure has its own slab, independent of the larger slab at the front.

Conditions

- Structure is seriously deteriorated. Many studs are no longer connected to the sill plate. The clapboard siding is deteriorated, detached, or missing in many areas. (Figure 1.3-301).

Work Recommendations

- The building is dilapidated and should be removed as it is not associated with the period of significance.

- The advance state of deterioration would require the structure to be rebuilt 100%.



Figure 1.3-301: Arrows point to dislocated wall of Building 449B, where studs are not attached to sill plate.

Building Systems

Description

HVAC

There were been grilles provided in the walls of the enclosure to provide passive ventilation. There is no evidence of active HVAC systems.

Plumbing

There is no evidence that these systems existed in this building.

Electrical

There is a light fixture with a motion sensor mounted to the exterior of the enclosure. There is no evidence that there were any other electrical systems present.

Conditions

HVAC

The grilles remain in place but were are in poor condition.

Plumbing

Not applicable.

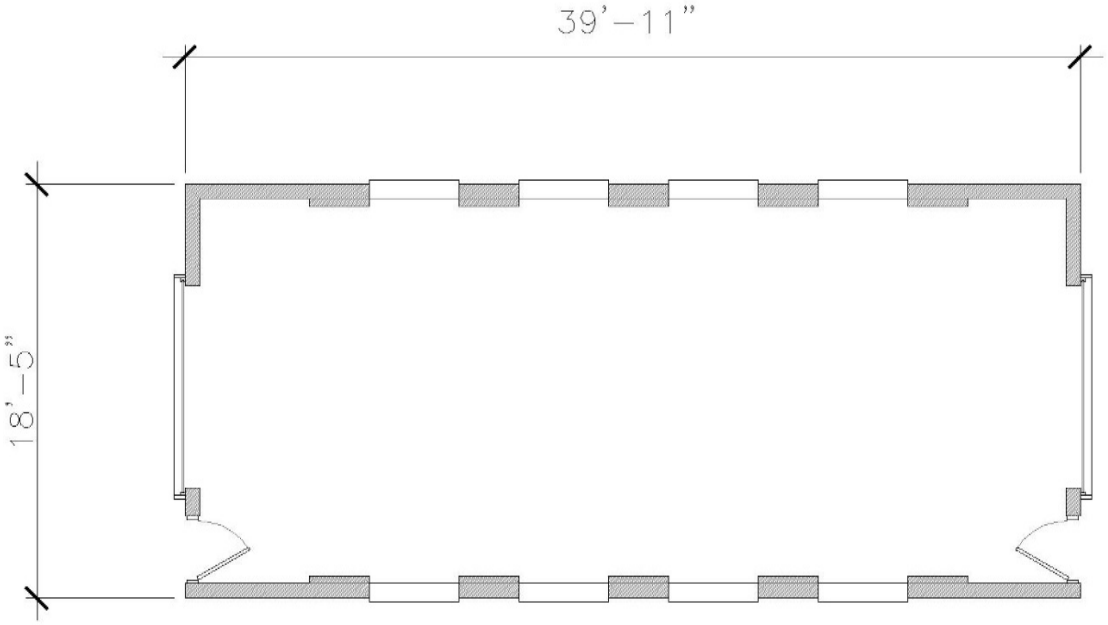
Electrical

The lighting fixture and motion sensor are still in place but are in poor condition and non-functional.

Character Defining Features

- Massing: One-story structure with gable roof.
- Materials: Wood studs, plywood and metal.
- Doorways: Evidence of original door frame.

No. 450: Warhead Building



Architectural

Description

Exterior

Building 450, constructed in 1959, is a one-story structure located in the southeast corner of the Missile Launching Site. The building is situated on a concrete foundation and is constructed with concrete masonry unit walls and a slightly pitched corrugated metal and ballast roof. The north elevation has four window openings; the concrete sills are extant, however the windows are completely missing. The south elevation is similar to the north elevation and has four window openings with concrete sills and missing windows.

The east elevation is one bay wide and has two fenestrations: a large metal garage door opening in the center and a man door opening on the south side. The metal rolling door in the large opening is intact, however the man door is missing. There are two light fixtures on the elevation: one above the smaller door on the south side, and one on the north side of the rolling door at the same height as the other light. There is an electrical pole projecting from the center of the roof line. The west elevation is similar to the east with a large metal rolling door in the center and a wooden man door that is partially intact on the south side. There are light fixtures and an electrical pole on this elevation as well.



Figure 1.3-302: Overview of fenestrations on west elevation (left) and on south and east elevations (right) of Building 450.

Interior

The interior finishes for Building 450 include a concrete floor, concrete masonry unit walls and a corrugated metal ceiling with steel beams. The mechanical equipment and pulleys are still intact, and there are eight light fixtures suspended from the ceiling.



Figure 1.3-303: Overview of interior of Building 450, facing east (left) and west (right) showing doors, exposed corrugated metal ceiling and CMU walls.

Conditions

Building 450 is in poor condition. Its proximity to the ocean is causing corrosion, cracks in the CMU, warped doors and rust throughout. The windows have been removed, allowing water to penetrate the interior of the building and causing light fixtures and pulley systems to rust.

Exterior

- The concrete masonry unit is in poor condition; there is severe paint failure on every elevation, penetrations on the east elevation and spalling CMU. There are both minor and severe cracks on all elevations, especially around the fenestrations. Biological growth and vegetation are growing throughout, especially on the north elevation, where the vegetation is penetrating the roof. Sand is accumulating below the window on north elevation.

- The doors are in poor condition. The rolling doors on the east and west elevations are severely damaged by the water surge. The doors, including frames and mechanisms, are rusting and have peeling paint. The smaller door on south side of east elevation is missing, and nails are protruding through the frame. The frame on south side of west elevation is intact but in poor condition; half of door is missing and the original hardware is intact but deteriorating.

- All of the windows are missing. The concrete sills are intact on all but one window and pieces of the wood frames are intact, including their screws. There is peeling paint on all of the remaining frames.

- The roof is in poor condition; the paint is peeling and the metal siding is rusting. The rust from the roof is deteriorating some of the CMU below, especially on south elevation.

- The gutters and downspouts are in poor condition. The gutters are rusting and deteriorating on the north and south elevations and the downspout is missing on north elevation.

- The light fixtures are in poor condition; they are broken and partially missing on the east elevation, and on the west elevation, one is broken and one is intact.



Figure 1.3-304: Warped and rusted rolling door (left) and spalled concrete sill and CMU walls (right) of Building 450.

Interior

- Concrete masonry unit walls are in poor condition. There are severe cracks under the windows on the north and south elevations.

- The concrete floor is in good condition with a small amount of debris and sand accumulating throughout.

- The doors are in poor condition. There are remnants of the broken door on the ground on the west side of the building.

- The light fixtures are in poor condition. Three of the eight fixtures are still intact, however they are in poor condition. The other five are broken or missing.



Figure 1.3-305: Existing electrical equipment in northwest corner of Building 450 (left) and block, tackle and winch with stenciling stating it was last inspected in April 1974, shortly before the site was deactivated (right).

Work Recommendations

- Remove biological growth and vegetation, especially on north elevation, where vegetation is penetrating the roof. Repair spalling CMU and penetrations, particularly on the east elevation. Repair cracks in CMU, some severe, on each elevation, especially around fenestrations. Strip and paint exterior CMU. Repair interior cracks under windows on north and south elevations. Remove sand accumulating under windows on north elevation. Strip and paint interior CMU.

- Replace all doors. The rolling doors on the east and west elevations are severely damaged by the water surge, the frames and mechanisms are rusting and have peeling paint. The smaller door on south side of east elevation is missing, and nails are protruding through the frame. The frame on south side of west elevation is intact but in poor condition. Half of the door is missing and the original hardware is intact but deteriorating.

- Replace windows (all are missing). Restore concrete sills where necessary and replace frames as most are partially if not completely missing or deteriorating.

- Replace roof. The paint is peeling and the metal siding is rusting (the rust from the roof is deteriorating some of the CMU below, especially on south elevation).

- Replace all gutters and downspouts. The gutters are rusting and deteriorating on the north and south elevations and the downspout is missing on the north elevation.

- Remove sand and debris, clean and paint concrete floor.

- Replace all interior and exterior light fixtures.

Structural

Description

The building consists of CMU bearing walls supporting a gabled steel framed roof with a metal deck. The ridge beam is pocketed in the east and west walls. The roof ribs bear on CMU pilasters at the north and south walls. A hoist beam is connected to the underside of the ridge beam.

Conditions

- Extensive damage to the south exterior walls of the structure was observed, possibly from fire damage. CMU has spalled and joints are missing mortar (Figure 1.3-306).
- Step cracking was observed at the west façade above the smaller door (Figure 1.3-307).
- Similar step cracking on the east wall has contributed to a significant spall of the door lintel (Figure 1.3-308).
- Steel framing in the roof shows mild corrosion, but the base plates are more heavily corroded (Figure 1.3-309).

Work Recommendations

- Repoint all open joints, including step crack locations. Replace all cracked CMU. Assume 50% repointing and 5% CMU replacement.
- Repair door lintel by reinstating spalled CMU with concrete repair material.
- Clean all steel of corrosion and coat with a rust-inhibitive coating.



Figure 1.3-306: Fire damage at south wall of Building 450.

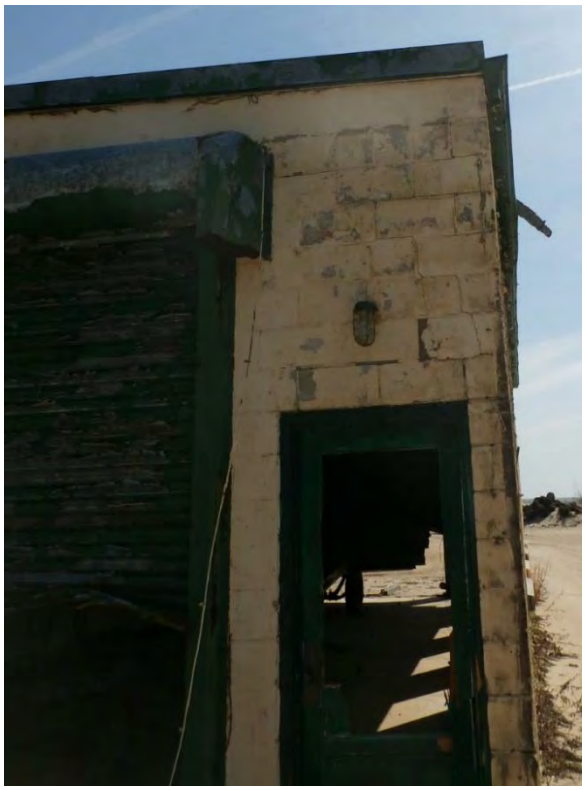


Figure 1.3-307: Step cracking above door on west wall of Building 450.

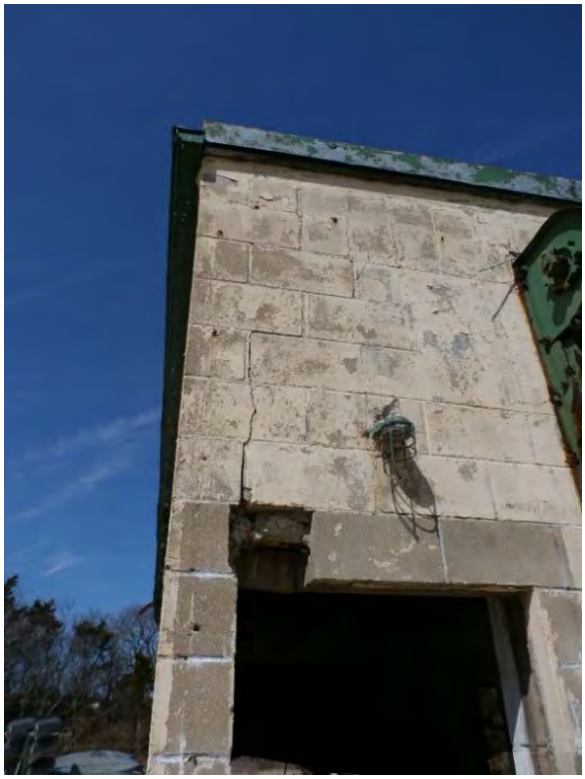


Figure 1.3-308: Step cracking and spalled lintel at east wall of Building 450.



Figure 1.3-309: Corroded steel base plate and mild corrosion of steel framing of Building 450. Hoist beam can be seen to the right, supported on supplemental framing.

Building Systems

Description

HVAC

The building is currently unused. The building was provided with electric unit heaters.

Plumbing

There is no evidence that these systems existed in this building.

Electrical

Electrical service appears to have entered the building underground to a fused disconnect switch that fed a 480-volt, 3-phase, 200A rated panelboard manufactured by Square D. The panelboard was located in the northwest corner of the building. This panel consisted of six circuit breakers that fed a 120/240-volt, 1-phase, 100A panel by means of a 10 kVA transformer.

Lighting fixtures were incandescent pendant fixtures. Circuiting in the building was by means of surface mounted conduit and MC cable. Receptacles were provided in the building for convenience power. The building was originally used as a missile fueling station. Disconnect switches for the various pieces of equipment used here are still in place. There does not appear to have been a fire alarm system.

Conditions

HVAC

The electric heaters are deteriorated, unusable, and in poor condition.

Plumbing

There are no existing plumbing systems in the building.

Electrical

There are no active electrical systems in the building. The original panels, transformers, lighting fixtures and receptacles are still in place. They are all in various degrees of disrepair, with majority in very poor condition. The systems do not appear to be salvageable for re-use.



Figure 1.3-310: Remnants of electrical distribution system of Building 450.

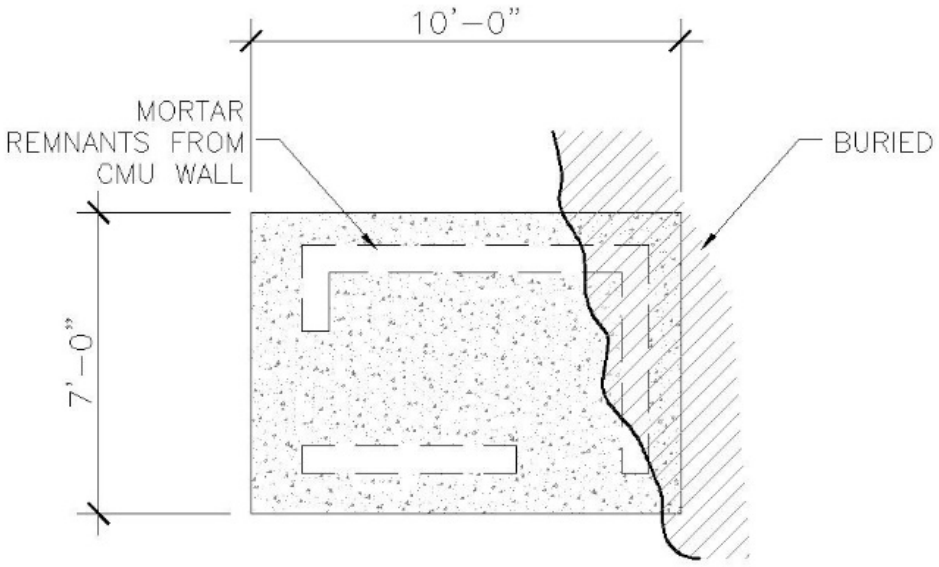


Figure 1.3-311: Existing Electric Unit Heater of Building 450.

Character Defining Features

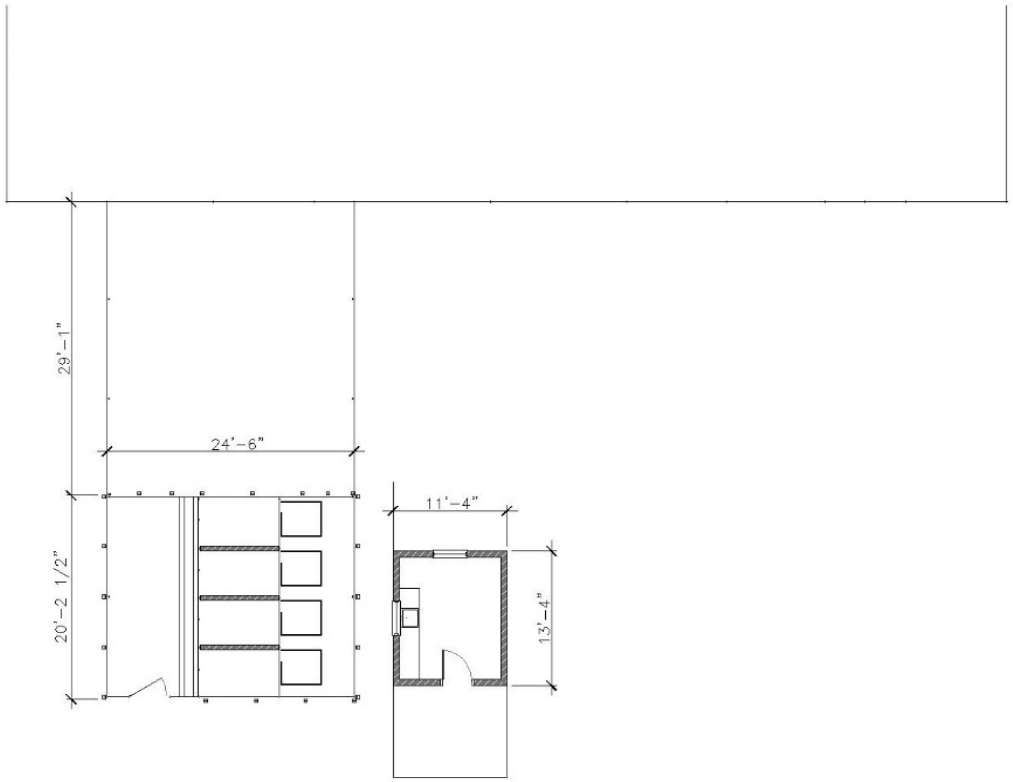
- Massing: One-story structure with flat roof ca. 1959.
- Materials: Concrete Masonry Unit, wood and metal ca. 1959.
- Doorways: Two rolling garage door openings and two man door openings on the east and west elevations ca. 1959.
- Windows: Eight original window openings ca. 1959.

No. 456: Slab



Number 456 is a concrete slab located in the southwest corner of the Missile Launching Site, west of Building Number 447, approximately 300 feet east of the Main Gate.

458: Canine Kennel



Architectural

Description

Exterior

Number 458 is a canine kennel located on the northwest side of the Kennel Building, Number 457. The structure is framed with metal fence posts and wood studs. The walls are constructed with corrugated metal on the bottom and a chain-link fence on the top. The corrugated metal roof if flat over the kennels and sloped behind them on the east side.

There is a large area on the north side of the kennels that is enclosed with a chain link and corrugated metal fence on the east and west sides. The entrance to the kennels is on the south elevation, with a dirt pen between the fence and the cages. The east elevation has a cement curb, painted blue, next to the concrete walkway separating the kennels from Building 457. The west elevation has electrical boxes and an electrical pole connecting to other electrical sources throughout the site.



Figure 1.3-312: Overview of north elevation (left) and south elevation (right) of Canine Kennel.

Interior

The structure has four dog houses with a CMU wall between each. The dog houses are wooden with a sloped corrugated metal roof, similar to that of the kennel. The concrete floor is sloped outside of the dog houses and has a concrete trench at the bottom for ease of cleaning.



Figure 1.3-313: Entrance to kennels through chain link fence (left) and dilapidated corrugated metal roof that has fallen into pen outside of kennels (right).

Conditions

The Kennel is in poor condition due to vegetation and lack of maintenance. The corrugated metal and chain-link fence is dilapidated, as are the corrugated metal roofs of the dog houses. There is a large amount of debris throughout the site.

Exterior

- The walls are in poor condition. The framing and the corrugated metal are dilapidated and partially missing on the north elevation. On the east elevation, the chain-link fence is partially missing and the wood framing and mesh are deteriorating. The walls are rusting and overgrown with vegetation.

- The roof over the kennels is partially missing on the west side, and has collapsed into the pen outside of the kennels.



Figure 1.3-314: Overview of wood and metal fencing around kennels (left) and pen on north side of side that is overgrown with vegetation (right).

Interior

- The wooden dog houses are in poor condition and some are extremely dilapidated.
- There is a lot of debris throughout the interior of the structure, especially on the west side near the entrance to the kennels.



Figure 1.3-315: One kennel that is in poor condition (left) and sloped corrugated metal roofs of kennels (right).

Work Recommendations

- Remove vegetation. Replace dilapidated or partially missing corrugated metal walls. Replace chain-link fence around entire site, including wood framing and deteriorating mesh.
- Replace corrugated metal roof.
- Restore or rebuild dilapidated wooden dog houses.
- Remove debris and clean site, particularly on the west side near the entrance to the kennels.

Structural

Description

Building 458 is an open structure, with a frame constructed from fencing posts. Galvanized corrugated sheet metal is used for the roof and to enclose the lower portions of the dog run fencing. Individual kennels were separated by CMU walls and chain link fence.

Conditions

- A portion of the roof appears to have collapsed in front of kennels (Figure 1.3-316).
- CMU walls separating the kennels are in good condition (Figure 1.3-317).

Work Recommendations

- Reinstall roofing.
- No recommendations are made for CMU walls.



Figure 1.3-316: Collapsed roofing in front of kennels.



Figure 1.3-317: CMU walls separating the kennels.

Building Systems

Description

HVAC

There is no evidence that there were any HVAC systems.

Plumbing

There is no evidence that there were any Plumbing systems.

Electrical

There is no evidence that these systems existed in this building.

Conditions

HVAC

Not applicable.

Plumbing

Not applicable.

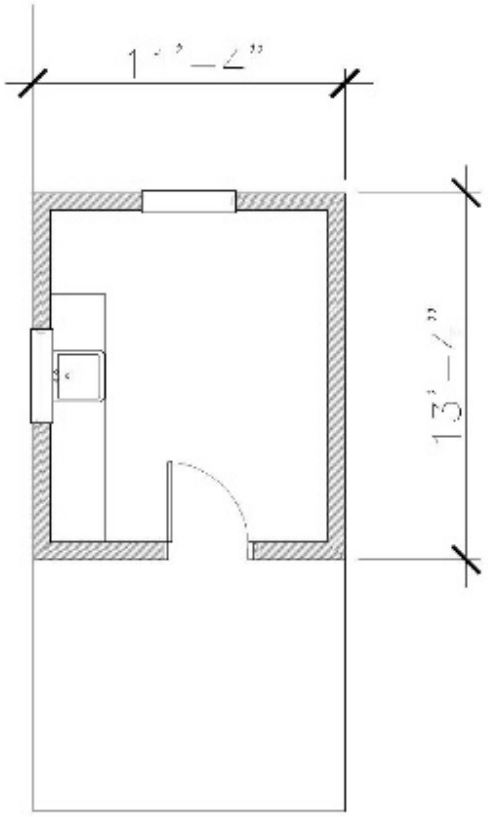
Electrical

Not applicable.

Character Defining Features

- Massing: Large enclosed area with original fence and original wooden dog houses ca. 1960.
- Materials: Wood, wood studs, metal framing, concrete, corrugated metal and chain-link fence ca. 1960.
- Doorways: Original metal frame and chain-link fence door openings ca. 1960.

No. 458 A: Canine Kennel Support Building



Architectural

Description

Exterior

Building 457, constructed in 1960, is a one-story structure located on the north side of the Missile Launching Site, approximately 900 feet northwest of the Main Gate. The Kennel Building is associated with the Kennel, which is located on the northwest side of the structure. The structure is situated on a concrete slab and is constructed with concrete masonry unit walls and a slightly pitched roof. The north elevation is one bay wide with one fenestration: a metal window frame with a missing window. There is a low retaining wall on the west side of the north elevation.

The south elevation, the main façade, is one bay wide and has one fenestration, a wood door and door frame with original the hinges and lock and a concrete slab in front. The roof overhang has particle board underneath with a light fixture and an electrical pole projecting through the roof. The east elevation has no fenestrations and the west elevation has one. The one-over-one window is most likely original and has a cement window sill. The concrete foundation on this elevation joins the retaining walls on the north and south sides, and there is a path between the building and the kennel.



Figure 1.3-318: Overview of southeast corner of Building 458A, showing door on south elevation and deteriorated roof (left) and overview of north elevation showing vegetation and broken window frame (right).

Interior

Building 457 has one room. The interior finishes include a concrete floor, CMU walls and a particle board ceiling with exposed wood framing. There are shelves for storage on the east side and a counter with a sink of the west side.



Figure 1.3-319: Overview of interior shelves on east wall (left) and sink and counter on west wall (right) of Building 458A.

Conditions

Building 458A is in poor condition due to water penetration and growth. The roof is almost completely missing, there is vegetation throughout the interior and exterior, cracks in the CMU and a large amount of debris, particularly from the deteriorating ceiling.

Exterior

- The CMU walls are generally in good condition. It appears as though the walls were painted at one time, however the paint is almost completely failing. There are minor cracks on the north and east elevations, cracks near the lintels in the south and west elevations and minor deterioration near foundation on south elevation. There is biological growth near the foundation on each elevation and some vegetation, especially near the roof. A section of the foundation is missing on the north elevation.

- The retaining wall is in poor condition. It has been partially disassembled, and the remaining concrete masonry units are in poor condition. The paint on the wall is failing.

- The door is intact, however it is in poor condition. The layers of wood are splintering and peeling off, the metal frame is completely rusted and the existing hardware is rusted.

- The windows are in poor condition; the sashes are almost entirely missing, the glazing is deteriorated, the frames are broken and the glass is missing in the north window and broken in the west window. The cement window sill is in fair condition on west elevation and good condition on the north elevation.

- The roof is in poor condition; there are holes and missing plywood throughout, as well as minimal vegetation at the roofline. The bed moulding board is in poor condition and exhibiting rot. The particle board at roof overhang is in poor condition.

- The light fixture is in poor condition and has broken off.



Figure 1.3-320: North window of Building 458A, with a broken frame, extant concrete sill and vegetation growing (left) and eave on north side showing missing and deteriorated wood boards (right).

Interior

- The CMU is in fair condition; there are cracks in the north elevation and around the lintel on the south elevation. There is paint failure throughout and biological growth on all sides, particularly near the foundation.

- The ceiling is in poor condition. There are large holes in the plywood from the roof above, exposing the wood framing and particle board ceiling. Water damage has deteriorated the particle board ceiling and approximately 80% of the boards are missing.

- The concrete floor is likely in good condition, however there is a large amount of debris on the ground from the deteriorating ceiling above.

- The windows are in poor condition. The metal frames are broken and appear to be no longer operable.

- The shelves on east elevation are in poor condition, exhibiting rot, peeling paint and rusted hardware. The counter is also in poor condition; the wood is delaminating.



Figure 1.3-321: Debris from dilapidated ceiling accumulating on concrete floor (left) and deteriorated plasterboard ceiling (right) in Building 458A.

Work Recommendations

- Remove vegetation and biological growth on exterior and interior. Repair minor cracks on the north and east elevations, cracks near the lintels on the south and west elevations and minor deterioration near foundation on south elevation. Dutchman section of missing foundation on north elevation. Repair interior CMU cracks on north elevation and around the lintel on the south elevation. Strip and paint interior and exterior CMU.

- Rebuild partially disassembled retaining wall and replace deteriorating CMU. Strip and repaint wall.

- Replace deteriorated door, rusted metal frame and rusted hardware.

- Replace windows. The sashes are almost entirely missing, the glazing is deteriorated, the frames are broken and the glass is missing in the north window and broken in the west window. Restore cement window sill on west elevation.

- Replace roof. There are holes and missing plywood throughout, as well as minimal vegetation at the roofline.

- Replace bed moulding board and particle board at roof overhang.

- Replace broken light fixture.

- Replace ceiling. There are large holes in the plywood from the roof above, exposing the wood framing and particle board ceiling. Water damage has deteriorated the particle board ceiling and approximately 80% of the boards are missing.

- Remove debris, clean and paint concrete floor.

- Replace all windows including broken and inoperable metal frames.

- Rebuild shelves on east elevation as they are exhibiting rot, peeling paint and rusted hardware.
- Replace delaminating wood counter.

Structural

Description

The building consists of CMU bearing walls supporting a monoslope wood joist roof with a pronounced eave. Door and window openings are spanned by cast-in-place concrete lintels. The lintel construction is assumed based on available drawings. A concrete slab exists only at the front of the structure (Figure 1.3-322). A short retaining wall extends from the front and back at the north side and from the front only at the south side.

Conditions

- Step cracking was observed associated with door and window openings (Figure 1.3-323). Remaining portions of walls are in fair condition, with no horizontal cracking typical of similar structures.
- The roof is heavily deteriorated and missing in large sections at both the eave and interior (Figures 1.3-324 and 1.3-325).
- At the rear of the building, the concrete slab is visible as a result of soil erosion (Figure 1.3-326).
- The front retaining wall appears to be missing sections, with a differently colored area on the CMU wall indicated the former height of the retaining wall. The remainder of the wall and the general deteriorated condition of the remainder of the retaining wall with visible and open cells further suggest the wall is missing courses of CMU (Figure 1.3-322).

Work Recommendations

- Repoint open joints. Assume 25% repointing required.
- Replace roof 50%, including sill plate, joists, sheathing, and rim board.
- Reconstitute grade at rear of building.
- Retaining wall:
    - Level 1: No recommendations. The wall is no longer required to retain soil.
    - Level 2: Reconstruct missing elements of retaining wall.



Figure 1.3-322: Slab only at front of structure 458A. Front retaining wall is visible at right with missing course highlighted.



Figure 1.3-323: Step cracking around door lintel in Building 458A.



Figure 1.3-324: Missing roof at interior of Building 458A.



Figure 1.3-325: Missing roof at eave of Building 458A.



Figure 1.3-326: Soil erosion at northeast corner of Building 458A.

Building Systems

Description

HVAC

There are no existing HVAC systems.

Plumbing

The building contains a sink. The domestic water piping is un-insulated copper and the sanitary piping is cast iron. There did not appear to be any evidence of a domestic hot water generator.

Electrical

Electrical service to the building was from overhead utility lines along the roadway. There is an aerial mast and service conductors that remain on the west elevation. The service mast still exists, however, the overhead service conductors have been cut to disable service. There was no panelboard. Internal building wiring was done by surface mounted conduit, some of which still remains in place. There is a surviving incandescent lighting fixture and receptacle. There does not appear to have been a fire alarm system.

Conditions

HVAC

Not applicable.

Plumbing

The sink and piping are deteriorated and unusable.

Electrical

There are no active electrical systems in the building. The original panel, lighting fixtures and receptacles are still in place, and in poor condition. The systems do not appear to be salvageable for re-use.



Figure 1.3-327: Existing Sink in Building 458A.

Character Defining Features

- Massing: One-story structure with a slightly pitched roof ca. 1960.
- Materials: Concrete masonry unit, wood and sheet metal ca. 1960.
- Doorways: Original metal frame opening on the south elevation ca. 1960.
- Windows: Original metal frame openings with cement sills on the north and west elevations with some remnants of the original windows intact ca. 1960.

1.4 Evaluation of Significance

The Nike Missile Launch and Radar Tracking Sites at Fort Hancock are standing examples of a technologically-advanced defensive weapons system that played a key role in protecting the United States for two decades during the Cold War. Decommissioned in 1974, the Nike Missile installation at Sandy Hook also served as the last in a long line of continuously operating coastal defenses on the peninsula stretching back over 80 years. The sites' location at Sandy Hook where the evolution of coastal defenses are still present in the form of the numerous batteries provides a unique opportunity to interpret these developments over time in a single location. Specific to the NIKE Project, sites such as those found at Sandy Hook were located near every major city in the country and several, but few are as intact as NY-56.

1.4.1 Comparison to other NIKE Sites

When viewed as a single NIKE Site among more than 250 sites around the United States, the first impression of NY-56 at Sandy Hook would not be of the uniqueness of the site. Strong similarities between NY-56 and other site layouts are obvious and were, of course, necessary for purposes of cost and operational efficiency of the system. However, upon closer examination, there was significant variation between many of the sites. The biggest impetus for differences between the installations was the siting. Sites were located in a wide range of landscapes including, mountains, plains, and seacoasts, as well as urban, suburban and rural locales. And with the later installations of the Hercules expansion sites, above ground in addition to subterranean. Along with these site-related differences between NIKE sites, more subtle but clear differences result from the presence of earlier structures on the site. These buildings, when present, were often reused and sometimes modified to serve some of the administrative roles associated with a NIKE site. When there were no existing structures to use, there does appear to have been standard designs used for new administrative buildings. Possibly because of the proximity of Fort Hancock and its building stock, NY-56 did not use these standard designs for their ready barracks, day rooms, etc.

Despite more obvious differences between sites due to location, there were often differences among the more interchangeable elements of the site such as magazines and radar systems. One of the more unique characteristics found among the NIKE sites around the country is when a site was designated to be a dual-site complete with two sets of missile magazines and two corresponding IFC areas. NY-56 at Fort Hancock is one of only 22 dual-sites that were constructed around the country, six of which were located in the New York Defense Area. As was the case with most NIKE sites, both single and dual, these sites more mostly outfitted with a mix of Ajax-only A-Type magazines and the Hercules-ready universal B-Type magazines. Of the dual-sites, only NY-49 at Fort Tilden and NY-56 were outfitted solely with the universal B-Type magazines. This may reflect the unique quality that these two sites were the only dual-sites to receive four magazines. Magazines were typically installed in sets of three, though there are a few single sites with only two magazines. As can be seen in the original drawings for the launch site, NY-56 was laid out to possible receive an additional two magazines in the future which would have given it six magazines total. Of the original 20 Ajax dual-sites (OA-32 and OA-63 in Oahu, Hawaii were built as dual Hercules sites in 1970), only 15 were eventually upgraded to receive the Hercules missile system. Of the sites upgraded to Hercules and ultimately Improved Hercules, some sites were outfitted with the large HIPAR antenna while others were outfitted with ABAR antennas. Only NY-56 and PH-23/25 (Lumberton, NJ) of the Philadelphia Defense Area received both the HIPAR system and the ABAR system. The ready barracks located at

the launch and radar sites are not typical to most NIKE installations. The "Butler-type" buildings are unusual as many NIKE sites have long L-shaped and rectangular buildings to serve as barracks, day room and mess hall. To summarize, NY-56 was unique due to the combination of rare magazine and radar system configurations.

In addition to the unique characteristics of how NY-56 at Fort Hancock was constructed and evolved, the site is also significant because of how much of both sites remain intact and in relatively good condition. Many sites around the country have had their buildings reused and have survived, but the quality of many of the buildings at NY-56 appear to be superior to the typical survivors and have not been modified, for the most part, by subsequent uses. Where they have not been obliterated, launch areas of NIKE sites around the country are typically better preserved than the IFC sites. The magazines can usually be seen and the Missile Assembly and Warheading buildings often remain. However, the generator building, kennels (where the site was upgraded to Hercules) and other support buildings are often gone. The series of earthworks that protected the buildings have been removed in many cases as well. There are a few very good examples that remain, the best being SF-88 in California that has had its launch site restored. Typically, IFC sites, where still intact, have not fared as well. Of these, there are a number of sites that have retained their Interconnecting Corridors, Generator Buildings and HIPAR Buildings, but only a few have retained their radar towers and many of those still standing are only partially complete, with the concrete pier present but metal and concrete platform missing. There are only a few examples where the HIPAR antenna armature is present, but none of them have retained the antenna platform. An additional characteristic that NY-56 retains that is seldom present at other sites is the connection between the launch and IFC sites. While currently overgrown with vegetation, targeted removal of this vegetation would allow for the clear line-of-sight required by the NIKE system. Many other installations, where both of the sites are intact, have had the area between them developed to varying degrees making restoration of the visual connection difficult or impossible. While other sites may retain one area or another that is in better condition than that found at NY-56, none can match the completeness, condition or context of NY-56 when looking comprehensively at the entire site.