

Fort Cronkite Antiaircraft Battery No.1

Matthew W. Kent

The Beginning of Antiaircraft Defenses for HDSF

Beginning in January 1916, district engineer Thomas Rees prepared plans for antiaircraft guns to protect the harbor defenses of San Francisco. This plan called for six 3-inch antiaircraft guns, with two-gun batteries at Forts Miley and Winfield Scott, south of the Golden Gate, and at Fort Barry, north of the bridge.(1) By 1918, 3-inch antiaircraft guns became available, and a March 15, 1918, letter from the adjutant general to the commanding general of the Western Department advised that San Francisco would receive six of the 160 3-inch M1917 Ordnance Department antiaircraft guns on fixed M1917 pedestal mounts that were authorized. These could engage aircraft flying at 24,000 feet within a horizontal range of 5,000 yards.(2) By 1925, construction on all three antiaircraft batteries had been completed, although the guns were not yet mounted.



1. AA Battery No. 1, Gun No. 2, July 24, 1940. GGNRA Park Archives, GOGA 35301.2258

3-inch AA Gun Fixed M1917

Before 1917, the U.S. Army concentrated its antiaircraft efforts protecting its coast defenses. By April 1916, the Ordnance Department had designed a 3-inch gun for fixed emplacements, and by mid-1916, Watertown Arsenal had undertaken the manufacture of one 3-inch AA mount, Model E. Between May 1916 and June 1917, 160 of these guns were ordered from Watervliet Arsenal and Bethlehem Steel. By April 10, 1919, 116 had been delivered and sent to the fortifications. The M1917 gun, improved and upgraded, lasted through WWII, although it was obsolescent early in that war.

The M1917 gun, 55 calibers long, with a drop-block breech mechanism, was fired by means of a firing handle. The firing mechanism was continuous pull, permitting a repetition of blows to the primer without opening the breech in the event of a misfire. It fired at elevations from 0° to 90°, with 360° traverse, and threw a 15 lb projectile, high explosive or shrapnel, at a muzzle velocity of 2,600 fps (in 1920). The M1917 gun, along with the later M2 and M4 fixed 3-inch guns, had the same chamber dimensions and used the same cartridge case as the M1903 3-inch (15 pdr) seacoast gun. The recoil mechanism was hydro-spring, with a single recoil cylinder above two counter-recoil cylinders below. The M1917MI mount added a second recoil cylinder above. The M1917 gun was trunnioned near the breech, allowing it to recoil when fired at high elevation without the breech striking the ground. The barrel was balanced with a breech weight, avoiding the equilibrators used on later M1 and M3 mobile 3-inch guns. The M1917 3-inch AA gun mount was anchored using 16 bolts set below the firing platform, on a concrete base 30 inches thick and 18 feet in diameter, with a “keyhole” indented shape in the concrete.(3)

The 1937 Project

Before 1937, three antiaircraft batteries protected the skies above San Francisco, at Forts Funston, Winfield Scott, and Barry. An addition battery was built at Fort Miley, but it is not clear whether it was armed. As part of the ongoing refinement of the harbor defense projects, in 1937 a local board of officers prepared the “Annexes to Harbor Defense Project, Harbor Defenses of San Francisco.” The annex called for a three-gun antiaircraft position to be constructed at Fort Cronkhite. With this additional battery, the annex called for a complete gun defense of fifteen 3-inch antiaircraft guns, nine on fixed mounts and six guns on mobile mounts, organized into five batteries of three guns each. Two AA batteries were numbered and located north of the Golden Gate Bridge: AA Battery No. 1, Fort Cronkhite (mobile) and AA No. 2, Fort Barry (fixed). Three AA batteries were located south of the Golden Gate Bridge: AA No. 3, Fort Winfield Scott (fixed); AA Battery No. 4, Fort Miley (mobile); and AA No. 5, Fort Funston (fixed).(4)

Antiaircraft Battery No. 1

With the construction of Battery Townsley, there was a need for a fixed position to protect the casemated guns, as in the case with Battery Davis at Fort Funston. The 1937 Annex called for a mobile three-gun antiaircraft battery to be constructed above Battery Townsley at Fort Cronkhite, on a commanding height named Wolf Ridge. However, officers from the harbor defenses concluded a fixed battery was preferable. There was no access road to the proposed site, and the cost to build one would be excessive. Also the terrain at the site did not allow enough room to rest the outriggers of the mobile guns. In 1939, a board of officers reaffirmed their findings and recommend the transfer of the fixed AA battery at Fort Winfield Scott to Fort Cronkhite in place of the proposed mobile battery.(5) Plans were drawn up for three concrete gun blocks for the guns, along with a concrete director well, bombproof

HARBOR DEFENSES OF SAN FRANCISCO
 FORT CRONKHITE, CALIFORNIA
 ANTI-AIRCRAFT BATTERY
 No. of guns ... 3 Caliber ... 3" Carriage ... 1917

REPORT OF COMPLETED WORKS - SEACOAST FORTIFICATIONS
 (Anti-Aircraft Battery)

Form 1 Corrected to July 24, 1940

GENERAL:

Battery commenced : July 3, 1939 : Power equipment to be installed by Ord. Dept.

Battery completed : April 26, 1940

Date of transfer : July 24, 1940 : Max. kw. required for lights: 2 (0.5 for lights; 1.5 for plug-in box)

Cost to date of transfer : \$17,160.00* : Max. kw. required for motors: No motors installed by Engineer Department

Materials of construction : Reinforced Concrete :

Type of cement : Pacific Portland** :

WATER & SEWER:

Connected to water supply : None : Present condition of battery: New

Connected to sewer : No : Rooms wet or dry : Dry

Type of latrine : None : How ventilated : Ventilated doors, 12" dia. vent shafts with non-metallic tops

Trunnion elevation in btry. : Gun #1 - 729.44 : Type of data transmission : Telephone to be installed by Signal Corps

Datum plane : Gun #2 - 732.92 : Synchronous data transmission system for : A.A. guns

Remarks : M.L.L.W. : Magazine, Power and Storeroom are on the reverse slope of hill and are not visible from sea

ARMAMENT

Emplacement No.	Cal.	Length	model	Serial No.	Manufacturer:	mounted	Guns		Carriages		
							Serial No.	Manufacturer:	Type	model	Serial No.
1	3"	174.65"	1917	89	Watervliet	Yes	Fixed	1917	96	Watertown	None
2	3"	174.65"	1917	130	Watervliet	Yes	Fixed	1917	106	Watertown	None
3	3"	174.65"	1917	159	Watervliet	Yes	Fixed	1917	115	Watertown	None

HOISTS

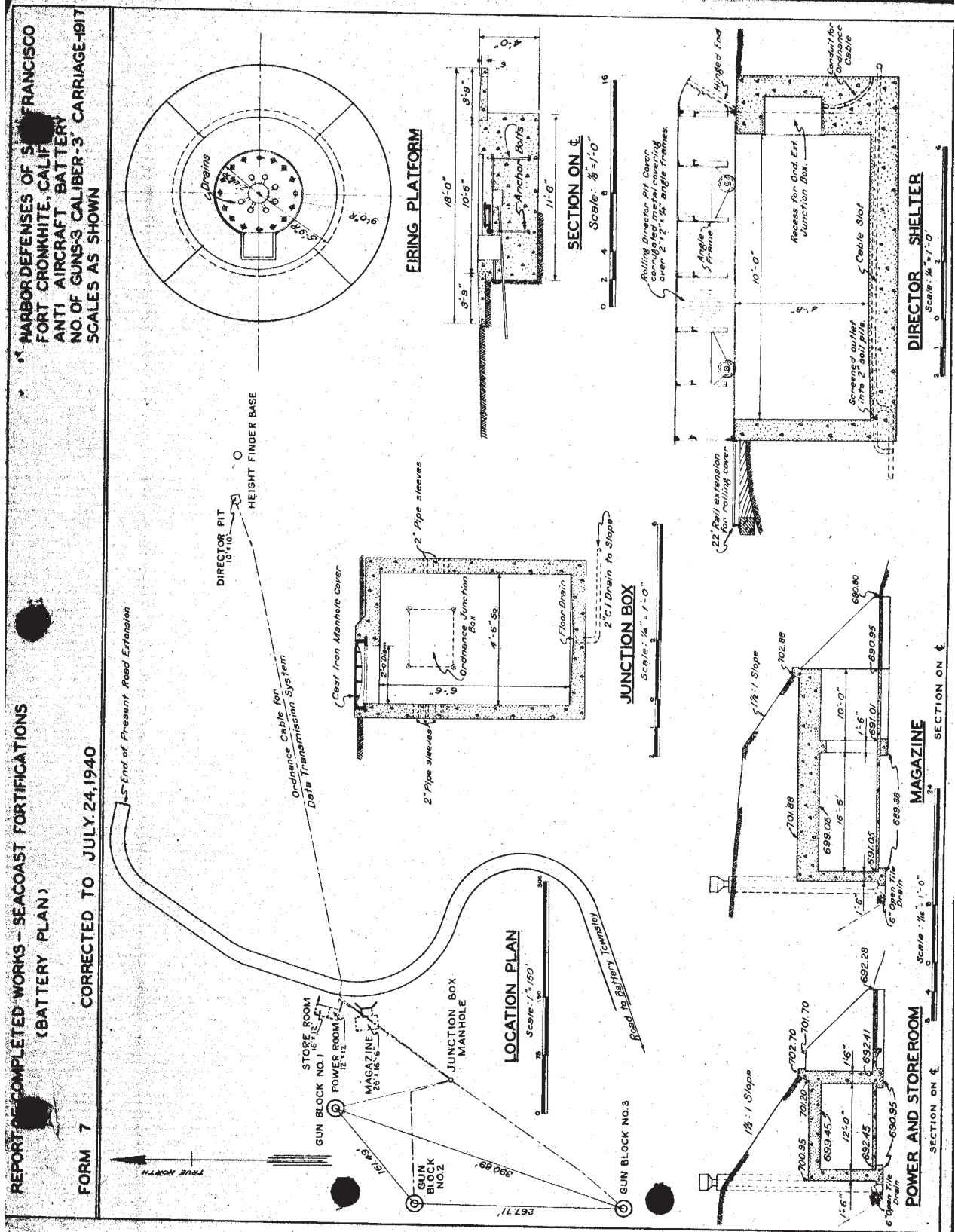
Emplacement : : Motor : : Remodeled for

Number : Type: Delivery : Serial No. : Maker : H.P. : Volts : R.P.M. : Type of control: Date of transfer: long points

NO HOISTS REQUIRED

AC commercial power to be supplied to this battery. 1917 (San Fran) CM 2050

* Exclusive of roadway.
 **Conforming to Fed. Spec. SS-C-206 (for Cement).



2. Antiaircraft Battery No. 1, RCW, Form 7. NARA, RG 77, Entry 1007.

magazine, and a combination store room and power plant. The battery was designed and constructed by the Corps of Engineers, through the U.S. Engineer Office, San Francisco.

Construction commenced July 3, 1939, and was completed on April 26, 1940. The battery was transferred to the Coast Artillery Corps on July 24, 1940, and a series of photographs were taken on that date, including the three mounted guns, magazine, and the store room and power plant. (**Figures 3 & 4**) This new AA battery, designated Antiaircraft Battery No. 1, consisted of three permanent gun blocks for 3-inch M1917A1MII antiaircraft guns on M1917MII fixed mounts.(6) (**Figure 5**) The battery also contained a heavy splinter-proof reinforced-concrete dug-in magazine with inside dimensions of 26 ft long by 16 ft, 6 in wide, by 8 ft high, and a combined storeroom and power plant structure, of the same construction, with the following dimensions (**Figure 6**):

Power room, 16 ft long by 12 ft wide by 7 ft high

Power plant, 12 ft long by 12 ft wide by 7 ft high, complete with two 2½ KVA power units.(7)

Approximately 1000 feet uphill, to the northeast of the antiaircraft guns, on the crest of a knob 847 feet above sea level, were the height-finder and director pits, from which firing data was transmitted to the AA guns below via a buried cable. The height-finder pit is a reinforced-concrete square 11 feet per side, with inside walls 3 ft 2 in high. (**Figure 7**) Once partially sunk into the ground, it now sits exposed atop the knob. On its northwest corner, a three-foot-square entranceway was cut to allow access by way of a tunnel from the rest of the complex. The structure once provided a level and protected platform for an optical height-finder.



3. AA Battery No. 1 and supporting structures. *GGNRA Park Archives, GOGA-2316.*



4. AA Battery No. 1, Gun No. 1. *GGNRA Park Archives, GOGA 35301.2259.*



5. AA Gun Block No. 1. *Photograph by author, October 21, 2014.*



6. From right to left: storeroom/power plant & AA magazine. *Photograph by author, October 21, 2014.*



7. Director pit. *Photograph by author, October 21, 2014.*

The director pit is also a reinforced concrete square with outside dimensions of approximately 11 feet per side. **(Figure 8)** The inside walls are 5 ft 6 in high, providing more protection to equipment and crew than at the height-finder pit. In the east corner, four steel ladder rungs are attached to the inside walls. On the southwest wall is a small recess for an electric receptacle and a junction box for the ordnance cable connection. The director pit is sunk some four feet into the ground, and has a 3-foot-square opening cut into its southwest wall to provide access to a tunnel. The movable gable roof that hid the director pit from view could quickly slide open on metal rails imbedded into the tops of the northwest and southwest walls. The equipment at this battery was standard coast artillery equipment at the time and typical of anti-aircraft artillery weapons and emplacements used throughout the continental United States during World War II.(8)



8. From front to back, height-finder and director pits. *Photograph by author, October 21, 2014.*

The site consists of six major structures - height-finder pit, director pit, Quonset hutment, hutment anteroom, battery offices, and day room/mess hall; three minor outlying features (concrete footing pad and two open pits); and a series of collapsed connecting tunnels, all within some 90 feet of the top of the knob.(9) In addition, four more Quonset hutments are located underground near the 3-inch gun blocks.

Antiaircraft Battery No.1 during WWII

The AA battery's primary mission was to fire at any enemy aircraft within range and protect Battery Townsley, which covered the ocean area off the Golden Gate from the north. Prior to December 7, 1941, elements of the 6th Coast Artillery Regiment (Harbor Defense) manned the defenses at Fort Cronkhite. From June 6, 1942, to May 5, 1944, Antiaircraft Battery No. 1 was manned by Battery B,

130th Coast Artillery Battalion (Antiaircraft). In the months following the Japanese air raid on Pearl Harbor, when an attack on the West Coast still seemed a real possibility, the army initiated round-the-clock watches. This in turn led the army to construct “temporary” facilities at the director/height finder site - the hutment and anteroom, offices, day room/mess hall and the generator pad. It is not known if these “temporary” facilities were built by the Corps of Engineers, by coast artillery troop labor, or other units actually manning the site at the time, although similar “concealed hutments” were built elsewhere in the Harbor Defenses of San Francisco “by Government plant and hired labor.”(10)



9. Collapsed battery offices adjacent to director pit. *Photograph by author, October 21, 2014.*

(Note: The following contains excerpts from a site survey performed on 12/22/1992 as contained in HAER No. CA-134-1)

On the south side of the complex is a structure evidently used as battery offices. (**Figure 9**) It is constructed in a cut-and-fill fashion, so that its contours blends into the hillside and lies largely below the surface. It is approximately 32' in length and 9' wide, and is adjoined throughout its length by a 2' 3" wide tunnel which provides the only access to the structure. The office is a rough-finished, wood-framed structure with three rooms and a wood-framed, tar-paper and corrugated tin roof lightly covered with earth for concealment. There is approximately 7' 10" overhead clearance. This structure is in generally poor condition and the roof has partially collapsed in three areas. The room to the southwest, 9' x 12', has two (now empty) windows on the outside wall located over a recessed cupboard from which small wires (evidently for telephones) lead underground. A fuse box and breaker panel are located in this area. The interior walls are painted a dusky yellow and there is linoleum on the floor. An interior door leads into the center room, which has no other access. It is approximately 9 feet wide and 12' long.

with whitewashed walls, one of which has a red-painted octagonal patch on it. There is a doorway between the first room described and the center room, and a window frame is cut into the wall between the center room and the northeast room. The northeast room can only be entered by a door off the tunnel and has whitewashed walls.



10. Collapsed anteroom entrance to underground corrugated steel shelter with 2-foot-thick concrete roof below height-finder pit. *Photograph by author, October 21, 2014.*

On the north side of the complex lies the buried quonset hut (or “hutment”, as the Army called it) and the anteroom which provides access to it. (**Figure 10**) The anteroom is a rough-framed structure, lightly covered with earth, with the interior wood frames and roof rafters exposed. A short tunnel at the far end, now partially filled with earth, leads to a 35’ long, 9’ 5” wide, semi-circular corrugated steel quonset hut. This hut was placed on concrete footings located in a cut made in the side of the hill and then buried underground. Just above the quonset hut, but still underground was laid a shallow-gabled layer of thick concrete which acted as a “burster course” (11) to set off aerial bombs before they penetrated to the hutment. The interior of the hut is lined with 4x4 wooden uprights, which photographic evidence confirms once supported bunks. In the middle of the “ceiling,” there is a circular vent of corrugated steel culvert section formed into a dogleg pattern. Inside are faintly visible words “Ft. Cronkhite.” The far end of the hutment is now boarded up, but once led, by way of a tunnel, to the final “major” structure on the site, the day room/mess hall.



11. Collapsed day room/mess hall next to director pit. *Photograph by author, October 21, 2014.*

The day room/mess hall is 13' wide and 60' long. (Figure 11) It is rough framed with 4x4 timbers and 2x8 planks on the outside with 2x6 planks over 2x8 roof rafters. The roof is covered with a thin layer of dirt with considerable broken wood debris on top, and has six small square wooden-lined vent holes. There are no interior walls, and the interior framing appears to have once been whitewashed. This structure was constructed in similar fashion to the office; that is, the side of the hill was cut away, the structure was built below grade so that it rises only a couple of feet above its surrounds, and then the site was backfilled. This structure is in very poor condition, since the earth backfill has caused the walls to be pushed inward from the bottom, so that a cross section is now in the shape of the letter V. Nevertheless, the interior is accessible, and contains a number of details indicative of the life of the soldiers who occupied it. There is a rifle rack painted olive drab and also what is evidently a pool cue rack on the southeast wall. The remains of a porcelain sink, a water heater, electric conduit and light fixture boxes indicate what accommodations were made for the soldiers comfort. All the "major" structures at the site were connected by tunnels, now collapsed, formed by plank walls and roofs that were covered by earth when the area was backfilled.

The "minor" structures on the site consist of a 2' x 3' concrete pad with ruined wooden planks alongside, which once may have had a generator on it, and two 5' diameter open pits located approximately 30' west of the western end of the day room/ready room. (Figure 12) Each pit has a concrete-filled vertical pipe at its center, which were evidently used to mount machine guns for close-in protection of the site. (Figure 13)



12. Concrete pad that may have been used for a generator. *Photograph by author, October 21, 2014.*



13. Two pits with concrete-filled vertical pipes at their centers, used to mount machine guns for close-in AA defense. *Photograph by author, October 21, 2014.*

By 1945, in order to insure a reasonably adequate air defense of the armament concentrated from Fort Cronkhite to the Milagra M.R., the battery was reinforced with two 40 mm AA automatic guns on M2A1 carriages and four .50-caliber M2 water-cooled Browning AA machine guns for close-in anti-aircraft protection. Prior to November 1945, an SCR-584 radar set replaced the optical height finder. (13) This unit was set up in a van located just west of Battery Townsley. The 3-inch guns and their associated fire control equipment remained in place until after November 1945, although obsolete. (14) It is not known when the 3-inch AA guns were removed.

Post-War Site Use

In July 1952, ARAACOM (Army Antiaircraft Command) used the site for four 120 mm M1A1 AA Guns, supplemented by .50-caliber “quad-fifty” machine guns. Firing data for the 120 mm guns was supplied by an M33 anti-aircraft fire control system in a van atop the magazine/generator bunkers. The guns, manned by Battery C, 9th Antiaircraft Artillery Battalion, remained until approximately 1956, when the Nike missile system became operational. (15) **(Figure 14)**



14. Firing 120 mm anti-aircraft gun at Wolf Ridge, Fort Cronkhite, August 29, 1951.
GGNRA Park Archives, GOGA 35301.2252.

Antiaircraft Battery No. 1 Today

The site was inspected by the author on October 21, 2014. Two of the three concrete gun blocks for the battery remain. Gun Block No. 1 (37.84171°, -122.54463°) is the best preserved of the three, with most of the concrete firing platform remaining intact. The concrete firing platform for Gun Block No. 2 (37.84142°, -122.54521°) is partially buried, with only a small section of concrete visible in the surrounding soil. As of October 2014, Gun Block No. 3 is completely buried under soil and vegetation.



15. Semi-buried entrance to underground hutment with concrete roof, below Gun Block No. 1.

Photograph by author, October 21, 2014.

There are four buried Quonset huts near the gun blocks. Quonset Hut No. 1, (37.84162°, -122.54493°) lies on the cliff face below and to the left of Gun Block No. 1. The entrance to this underground hutment is partially blocked with dirt, preventing entry. **(Figure 15)** However, there is gap several feet wide between the concrete roof and the entrance which allowed for visual inspection of the entrance way. Most of the original wood entrance way is remarkably well preserved and still has well-painted personnel warning stencils. **(Figure 16)**



16. Surviving painted stencil inside underground shelter below AA Gun Block No.1

Photograph by author, October 21, 2014.

Quonset Hut No. 2 (37.84110°, -122.54534°) is below and to the left of AA Gun Block No. 2, and can currently be entered. Much of the wood entrance way has degraded, but the underground shelter is in remarkable good shape. (Figure 17) The shelter had a rear underground connecting tunnel that has now collapsed and is not accessible. Quonset Hut No. 3 (37.84070°, -122.548473°) is below and behind Gun Block No. 3. While a collapsed wood tunnel entranceway was located, the author was unable to find the second underground entrance to gain access to the site due in part to heavy vegetation, including poison oak.

Quonset Hut No. 4 (37.84224°, -122.54154°), in front of the day room/mess hall, is in poor shape. The anteroom entrance is almost completely collapsed. Clearly visible on both sides of the shelter is the two-foot concrete roof. As of October 2014, most of the underground entranceway was partially covered with soil, preventing entry to the shelter. All three shelters are consistent in design with cut and cover shelters as illustrated in the 1944 Corps of Engineers field manual on field fortifications. (16)

The battery magazine (37.84167°, -122.54378°) and the combination power house and store room (37.84719°, -122.54518°) are still well preserved except for the large amounts of graffiti on the interiors and can still be entered today. Moving up the knob from the AA battery, the concrete "generator pad" (37.84223°, -122.54308°) still remains, ringed with concrete-filled sandbags. Nothing remains of the wood that surrounded the pad. The two 5 ft-diameter open pits approximately 30 feet west of the western end of the day room/ready room (37.84216°, -122.54210°) each contain a concrete-filled vertical pipe at its center, used to mount machine guns for close-in antiaircraft protection. The



17. Interior of underground corrugated-steel shelter below AA Gun Block No. 2, October 21, 2014.

Photograph by author, October 21, 2014.

height-finder pit (37.84213°, -122.54196°) is still intact, exposed on top of the knob. The remains of the metal cover that once sat on top of the shelter are currently lying inside the pit. The director pit (37.84217°, -122.54173°) is also still intact. All of the underground tunnels that connected the pits are now collapsed, with only the trenches cut in the rock knob remaining where the tunnels once were. The battery offices and day room/mess hall are completely collapsed, rendering an interior inspection impossible at this point. As of October 2014, all the wooden underground structures are collapsed and in ruins. Despite this, Antiaircraft Battery No. 1 is still the finest surviving antiaircraft artillery emplacement from the WWII era within the Harbor Defenses of San Francisco.

Sources

1. Erwin N. Thompson, *Historic Resource Study: Seacoast Fortifications, San Francisco Harbor* (Denver, CO: GGN-RA, NPS, 1979), p. 281. (Hereafter cited as HRS.)
2. HRS, p. 282.
3. Mark Berhow, *American Seacoast Defenses: A Reference Guide Second Edition* (CDSG Press, 2004), p. 243.
4. War Department, "Annexes to the Harbor Defense Project, Harbor Defenses of San Francisco, (CCA-AN-SF), April 4, 1937," Annex E, Antiaircraft Gun Defense, p. 4.
5. HRS, p. 356.

6. Stephen A. Haller, "Fort Cronkhite, Antiaircraft Battery No. 1, HAER No. CA-134-1" (San Francisco: NPS, 1993), p. 4. (Hereafter cited as HAER No. CA-134-1). <http://lcweb2.loc.gov/master/pnp/habshaer/ca/ca1700/ca1755/data/ca1755data.pdf>.
7. War Department, "Supplement to the Harbor Defenses of San Francisco, 1945," Annex E, Antiaircraft Artillery (Harbor Defense), p. 4.
8. HAER No. CA-134-1, p. 4.
9. HAER No. CA-134-1, p. 2.
10. HAER No. CA-134-1, p. 5.
11. The report terms the concrete roof a "burster course," but this is not strictly accurate.
12. HAER No. CA-134-1, pp. 2-4.
13. War Department, "Supplement to the Harbor Defenses of San Francisco, 1945," Annex E, Anti-Aircraft Artillery (Harbor Defense), pp. 1-7.
14. HAER No. CA-134-1, p. 5.
15. HAER No. CA-134-1, p. 5.
16. War Department Field Manual FM 5-15, *Corps of Engineers: Field Fortifications* (GPO, 1944), p. 174.