

CABRILLO

Historic Structures Report



HISTORIC STRUCTURES REPORT FOR HARBOR DEFENSE STRUCTURES

Prepared for the
United States Department of the Interior
National Park Service

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EXECUTIVE SUMMARY

In the following report, we evaluate nineteen structures at Cabrillo National Monument. The purpose of the report is to provide the monument's management and staff with the architectural information it needs to implement a long-range program to restore, rehabilitate and/or stabilize these increasingly significant military structures in order to achieve the park's mission and long-term goals.

The following are included in this report:

- A general history of the site, including period of significance.
- Descriptions of each of the structures, including material, configuration and condition.
- Material and structure specific recommendations for repair, taking into consideration the treatment goals established by the NPS.
- Maps, drawings, photographs and other graphic materials to assist in understanding the structures.
- Structural evaluation and recommendations.
- A cost estimate for the repair recommendations.

The structures examined are primarily constructed of reinforced concrete, and date from the mid 1910s through the mid 1940s. With the exception of the Radio Station, none are open to the public. Most are partially buried. The structures include fire control stations, searchlight shelters, gun mounts, hemi-cylindrical sleeping and storage bunkers, a generator station, a radio station, and an electrical connection box.

While most of the structures were found to be stable, the following deteriorated conditions were noted:

- Cracked and spalling concrete, sometimes in conjunction with corroding reinforcing rods.
- Corroding ferrous metal components, including hatches, shutters and associated hardware.
- Missing camouflage stones.
- Deteriorating wooden elements.
- Excessive vegetation.
- Pest infestations.
- Graffiti.

The second half of the report presents our recommendations. General repairs are as follows:

- Patching of cracked and spalled concrete.
- Painting of concrete and wooden elements where originally painted.
- Cleaning, patching and painting of corroded ferrous metal elements.
- Consolidating, preservative-treating and painting of wooden elements.
- Recommendations for further testing, survey and study, including concrete testing.

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INTRODUCTION

Cabrillo National Monument was established in 1913 to commemorate the voyage of exploration of Juan Rodriguez Cabrillo along the coast of the Californias in 1542. At that time, the monument consisted of one-half acre around the Old Point Loma Lighthouse. In 1958 and 1974, presidential proclamations expanded the monument through the addition of excess U.S. Navy land. The monument now consists of 143 acres. With each expansion, historic military structures, remnants of the coastal defense system operated by the U.S. Army at Fort Rosecrans on Point Loma, were added to the park. These structures are becoming increasingly significant as examples of the technological development of weapons systems, and as World War II fades into history. The military structures are listed as contributing elements on the nomination of Cabrillo National Monument to the National Register of Historic Places. There are currently 21 military structures on the List of Classified Structures for Cabrillo National Monument. This study concerns itself with nineteen of these structures.

Purpose

The purpose of this report is to provide the monument's management and staff with the architectural information needed to implement a long-range program to restore, rehabilitate, preserve and/or stabilize these structures to achieve the park's mission and long-term goals.

The following are included in this report:

- A general history of the site, including period of significance.
- Descriptions of each of the structures, including material, configuration and condition.
- Material and structure specific recommendations for repair, taking into consideration the treatment goals established by the NPS.
- Maps, drawings, photographs and other graphic materials to assist in understanding the structures.
- Structural evaluation and recommendations.
- A cost estimate for the repair recommendations.

Methodology

An on-site inspection of the interior and exterior of the structures was conducted by Carey & Co. and EQE staff during November, 1998. Typical conditions and isolated deterioration problems were noted. The findings of the conditions survey together with historical research were used in generating the evaluations and recommendations that follow.

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HISTORICAL DATA

What follows is a synopsis of the history of Point Loma; for more detailed information, please see the publications sited in the endnotes.

EXPLORATION AND SETTLEMENT

Exploration - 1542-1602

Before the 1542 arrival of wealthy *encomendero* Juan Rodriguez Cabrillo to Point Loma, the Kumeyaay Indians lived at *Totakamiam* village near La Playa. [1] Cabrillo, a navigator in the service of the King of Spain, set sail from Navidad, on Mexico's west coast, on June 27, 1542. [2] On September 28, the flagship *San Salvador* and the frigate *Victoria* entered the harbor Cabrillo later named Puerto de San Miguel, [3] for Saint Michael the Archangel. [4] Cabrillo claimed the area for the King of Spain and the Viceroy of Mexico. [5]

On November 10, 1602, [6] a Spanish explorer, Sebastian Vizcaíno [7] arrived at San Miguel Bay with two ships (one had been lost at sea). [8] He renamed the port "San Diego" for his patron San Diego de Alcala, [9] and christened the finger of land where Cabrillo first landed "La Punta de Guijarros" - the Point of Cobblestones. [10] It would be another 167 years before the Spaniards would come to the area to stay. [11]

Settlement - 1769-1846

Although Cabrillo and Vizcaíno discovered Point Loma in the 16th and 17th centuries, [12] it was not until 1769 that Captain Gaspar de Portolá, accompanied by the Franciscan Father Junipero Serra established the first presidio and mission in California at San Diego. They constructed the presidio five miles inland, atop a hill overlooking the San Diego River delta. The presidio, garrisoned by sixty soldiers and three small cannons, was too far from the harbor to deter the entry of an enemy vessel. Therefore, in 1795, the Spanish began constructing a fort at the base of Point Guijarros (Ballast Point). [13] *El Castillo de San Joaquin*, commonly referred to as Guijarros, was dedicated in 1796, although not completed until 1798. [14] By then, the fort included a battery, a wooden casemate, magazine, barracks, flagstaff, and a flatboat. [15]

In the early-to-mid-1800s, several incidents occurred involving the fort and American merchant vessels attempting to smuggle goods. [16] These incidents marked the end of military activity on San Diego Bay until the Mexican-American war. Alta California became a province of Mexico after Mexico gained its independence from Spain in 1821. The presidio and the castillo deteriorated rapidly in the 1830s, and the garrison departed in 1835. [17] In 1840, local resident Don Juan Machado purchased the buildings as salvage for forty dollars. [18]

Capture of San Diego - 1846

In 1846 war was declared between the United States and Mexico. [19] In July, the USS *Cyane* war sloop, commanded by Captain Samuel E. Du Pont, entered San Diego Bay. There was now no fort on Point Loma to resist its approach. Du Pont, a contingent of Marines, and a battalion of volunteers, all under the leadership of Major John C. Fremont, raised the American flag in the town plaza on July 29, 1846. This ended the Mexican period in San Diego. [20] A strong point was established on top of Presidio Hill first called Fort Dupont in honor of the *Cyane* captain. Its name soon changed to Fort Stockton. [21] In 1848, the Treaty of Guadalupe Hidalgo was signed ending the war. As a part of California, La Punta de Los Guijarros or "Ballast Point," and all of Point Loma passed into the hands of the United States. [22] This treaty, which also included New Mexico, Nevada, Utah and parts of Arizona and Colorado, gave the United States all military reservations in the former Mexican territories. [23]

With California's 1850 admission to the Union, Point Loma became part of the 31st state. [24] At this time, harbor traffic had increased dramatically as ships made their way north toward California's goldfields. [25] On February 26, 1852, [26] the President signed an Executive Order creating the 1,300 acre [27] Point Loma Military Reservation, [28] separate from the public domain that included most of Point Loma. [29]

MARITIME HISTORY - 1854-1891

First Point Loma Lighthouse, 1854 and Second Point Loma Lighthouse, 1891

In 1852, Congress authorized the first eight lighthouses for the Pacific Coast. [30] Point Loma Lighthouse was constructed in 1854. Located at the top of Point Loma, it was the highest light in the United States. Beginning in 1855, the lighthouse remained in service for thirty-six years. [31] In 1891, high-fog caused the structure to be abandoned. A new light situated below the fog was erected that same year at the tip of Point Loma. The original lighthouse, later known as "the old Spanish lighthouse," became a favorite tourist destination because of its magnificent views. [32]

The First Battery Construction, 1870s

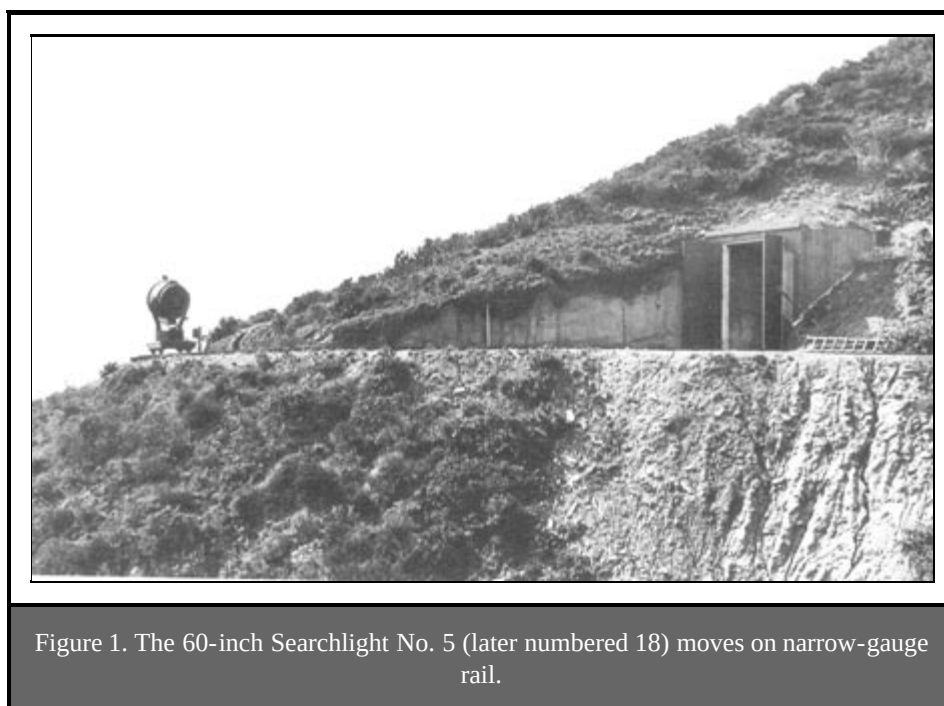
In 1870, the U.S. Army took possession of Ballast Point and the Point Loma Military Reservation. [33] In 1871, San Diego was designated the western terminus of the future Texas & Pacific Railroad, bringing San Diego to the attention of the U.S. Board of Engineers. The Board recognized San Diego's potential as a deep-water port warranting defense. Plans were drawn for a fifteen gun, wedge-shaped, battery to include large 15-inch Rodman smoothbore Civil War cannons. Following a fifty thousand dollar appropriation in 1873, work began on a new fort along the neck of Ballast Point. Work halted a year later, when no further funds were appropriated. [34] In 1897, the incomplete and unnamed battery was obliterated by the construction of a new battery. [35]

FORT ROSECRANS - 1898-1920

In the 1880s, the United States resumed construction of coastal defenses and the Endicott Board made sweeping recommendations to strengthen the nation's harbor defenses. [36] Four sites were selected by the 1895 board for possible defense construction, including one at Ballast Point. Engineers constructed a battery consisting of four 10-inch guns on disappearing carriages. [37] In 1898 Battery Wilkeson was completed, named for an artilleryman killed at Gettysburg in 1863. [38] Located at Ballast Point, the battery included four 10-inch disappearing rifles and a mine-storage casemate, state-of-the-art in military ordnance. [39]

The destruction of the battleship USS Maine in La Habana Harbor on February 15, 1898, clarified the need to provide additional defenses on all coasts. The Spanish-American War began in April of that year. [40]

In the 1880s, the Army had perfected a system of electrically controlled submarine mines (torpedos) for mining harbor entrances. The mines required a bombproof mining casemate, one of which was constructed in 1897 north of Battery Wilkeson. Two million dollars were set aside for mine defenses at the beginning of the Spanish-American War. Fifteen mines were eventually planted in 1898. [41] By 1900, three additional harbor entrance batteries were completed: Battery McGrath, two 5-inch rapid-fire guns on balanced pillar mounts to the right of Battery Wilkeson, used for the defense of the minefield; Battery Fetterman, two 3-inch guns on Wilkeson's left for sweeping the channel in case of attack by boats or small vessels; and Battery James Mead, two 3-inch guns across the channel on North Island (Fort Pio Pico). [42]



Fort Rosecrans Established - 1898-1917

In February 1898, the military reservation at Point Loma was finally occupied, with twenty-two enlisted men sent to Ballast Point to man the new coastal defense fortifications. On July 22, 1899, the War Department named the Ballast Point fortification Fort Rosecrans in honor of the recently deceased (1898) Civil War Major General William Starke Rosecrans. [43] The Coast Guard commissioned the Ballast Point Light Station in 1898. [44]

Activity at Fort Rosecrans included road construction, designation of an historic landmark, and the gradual improvement of the fire control stations during this period. In 1910, a decomposed granite-surfaced road was built along the lighthouse crest point. In 1913, the original Point Loma Lighthouse and its surrounding land was set aside as an historic landmark to commemorate the landing of Cabrillo. [45] The fire control stations transitioned from temporary structures to permanent stations with concrete walls and tar and gravel roofs. [46]

Advances in Coastal Defense, San Diego Harbor, 1901-1920

In 1905, President Theodore Roosevelt convened the Taft Board to review the Endicott

program and update its proposals. The Taft Board made several recommendations including the need for batteries of coastal searchlights to illuminate harbor entrances and approaches; electrification of fortifications to include lighting, communications and ammunition handling; and a modern system of aiming. [47] In September of 1905, a committee of officers sent to address Endicott Board recommendations for San Diego Harbor recommended additional searchlights on Point Loma, but no additional artillery. [48] The searchlights would provide protection by illuminating and sweeping San Diego Harbor at night, preventing enemy activity.

Prior to World War I, Fort Rosecrans had only a few small coastal searchlights. From 1918-1919, the searchlight project was completely revised with the construction of eight 60-inch searchlights grouped into four batteries. Each of the four batteries contained a pair of 60-inch lights (Searchlights 1-8). [49] Concrete shelters containing lights No. 5 and No. 6 (later renamed No. 18 and No. 19) and their concrete generator plant, remained in operation until the end of the harbor defenses (figure 1). [50]

World War I, 1915-1918

By World War I, all the batteries had base-end stations that provided for a modern aiming system. Battery Wilkeson was divided into two batteries, Wilkeson and Calef, [51] each with a base-end station on property later added to the national monument. These stations, on the east side of Point Loma, served the batteries until 1942 when the harbor defenses were modernized. They remain within the national monument. Battery McGrath was served by base-end station O9HS-10 on the east side of Point Loma (now under the Cabrillo statue). Battery McGrath remained in the modernization program, protecting the harbor entrance through World War II. [52]

In 1915, work began on two mortar batteries, each with two mortars in two pits. Battery John White was constructed at Power House Canyon behind the post, and Battery Whistler was constructed near the reservation's northern boundary. Construction was completed in 1916, but the mortars and their carriages were delayed in arriving. They were transferred to the Coast Defenses in August 1919. [53] World War I brought Fort Rosecrans' first radio station (O3HS-2). [54] Built in 1918, it later served as the Cabrillo National Monument's first superintendents' office. [55] According to the National Register of Historic Places Nomination, the radio station remained in active service from World War I to the eve of World War II, when the station became the coast artillery's meteorological station. [56] In 1918, the Army also constructed Sylvester Road [57] on the east side of Point Loma, accessing the fire control station sites and the searchlight shelters built at that time. [58] Early in 1918, the guns from Battery Mead on North Island were installed in Battery McGrath. Batteries Mead and Fetterman were abandoned. The guns of Batteries Fetterman and McGrath were dismantled and sent to Europe for use during WWI. [59] By 1920, eight base-end stations, four on Point Loma and four at Fort Pio Pico were in operation. [60]

BETWEEN THE WARS - 1920-1935

In 1925, the Coast Defenses of San Diego were renamed the Harbor Defenses of San Diego. Defense activities at San Diego declined rapidly after the war and the garrison was reduced to one company of Coast Artillery. In 1932, the Army considered disposing of the fort but quickly reconsidered, retaining the fort for military purposes. [61] That same year, the National Harbor Defense Board's examination of San Diego's harbor defenses showed that the five existing batteries at the fort were inadequate and new seacoast guns had to be added and the 10-inch guns removed. The new project called for two 8-inch (Navy) guns on barbette carriages, two 8-inch (Navy) guns on railway mounts, and eight 155mm guns in two

batteries. It was also decided that some railroad guns stored on the Atlantic seaboard should be moved to the Pacific Coast. [62] For Fort Rosecrans, engineers were directed to prepare plans for six 3-inch antiaircraft gun blocks, an 8-inch fixed battery, four fire control stations, and four Panama mount firing platforms for 155mm guns. Construction funds were not available and the project was not completed. [63] Also in 1932, the Fort Guijarros site became California Registered Landmark #69. [64]

In 1933, the War Department transferred the one-half acre Cabrillo National Monument to the Department of the Interior [65] and the original Point Loma Lighthouse was restored. [66] In 1935, the Fort Rosecrans Post Cemetery (also known as the Bennington Cemetery), became a National Cemetery. [67]

WAR DEFENSES MODERNIZED - 1936-1941

In 1936 the War Department again reviewed the country's coastal defense system and found that San Diego needed a major modernization. It was found that the Ballast Point 10-inch and 3-inch guns were antiquated and that the 12-inch mortars lacked the range to hold off attacks. It was recommended that new batteries be built on the western slopes of Point Loma to engage vessels far out to sea. [68]

As a result, in 1937, construction began on Battery Strong at Fort Rosecrans, located on the ocean side of Point Loma on the north end of the reservation. It was named in honor of the late Major General Frederick S. Strong. The long manufacturing time of the 8 inch gun carriages delayed the battery's completion until 1941. [69]



Figure 2. Battery Point Loma once featured 155 mm guns mounted on field carriages.

The War Department's recommendations also called for two 155mm batteries with four guns each, one to be emplaced at Fort Rosecrans (to be called Battery Point Loma) and one north of Imperial Beach (it was never emplaced) (figure 2). The 155mm gun was a modification of the French "Grande Puissance Filloux (GPF)," a tractor-drawn gun developed in World War I. The first plans called for only a 180-degree traverse emplacement, but it was eventually decided that 360-degree platforms should be installed. [70] The eight 155mm guns were emplaced without platforms at Fort Rosecrans in 1939, with a 60-degree traverse. [71] Battery Point Loma was in full operation by September 1941. After the attack on Pearl Harbor, four of the 155s were moved to Battery Imperial. By January 1942, Batteries Point

Loma and Imperial were completed. Eventually, a 90mm, anti-motor torpedo boat, four-gun battery arose in front of Battery Point Loma. No date has been found for the dismantling of the 155mm guns, although it probably was mid-1943 or later. [72] The emplacements remain at Cabrillo National Monument. Battery Point Loma was replaced by 6-inch Battery Humphreys in 1943. [73]

Battery Imperial's history is similar to Point Loma's. The War Department also called for four 155mm guns to be retained at Fort Rosecrans until there was an emergency. On December 9, 1941, they were moved to their permanent position directly north of Imperial Beach on the Coronado Heights Military Reservation, later named Fort Emory. Battery Imperial gave way to 6-inch Battery Grant in 1943. [74]

On May 28, 1940, Battery Fetterman at Ballast Point was demolished, as it was no longer part of the defense project and the site was needed to erect anti-aircraft sheds. [75] With Europe at war in 1939 and 1940, the War Department approved the combination of Batteries Wilkeson and Calef into the four-gun battery of Calef-Wilkeson. [76]

World War II: 1941-1945

In 1941, the Army and Navy debated the possibility of the old Cabrillo National Monument Lighthouse serving as the Harbor Entrance Control Post, as it commanded a complete view of the harbor. On May 17 of that year, the Secretary of the Interior issued a special use permit to the War Department, turning over Cabrillo National Monument for military use. [77] Later that year, the old lighthouse became the signal station and was equipped with a signaling searchlight, an observation instrument, and telephone communication to Battery McGrath. A temporary signal mast was installed with a set of flags to signal surface craft. [78]

Modernization Program - 1940

By 1940, with the war in Europe in full swing, new plans were initiated for the defense of San Diego Harbor. The plan called for a network of batteries and base-end stations to be installed along the 25 mile coast from the Mexican border to Cardiff. New Fort Rosecrans armament would include two 6-inch guns each for Batteries Humphreys and Woodward, and two 16-inch guns for Battery Ashburn. [79] Located above Point Loma and the new lighthouse, Battery Humphreys was completed on October 14, 1943. [80] Battery Ashburn, a two 16-inch gun battery, the largest type in the harbor defenses in the country, were the only ones in San Diego to be casemated. [81] The battery was completed in March 1944. Battery Ashburn served throughout World War II and was declared surplus in May 1948. [82]

Harbor Defense Construction and Modification

In December 1942, the War Department renamed the Coronado Heights Military Reservation Fort Emory, a sub-post of Fort Rosecrans. In June 1941, construction began on Battery Grant, a 6-inch, two-gun battery on Coronado Heights. The battery was completed in April 1943. Battery Woodward was the last of the 6-inch batteries to be constructed, with construction commencing in March 1943 and completion in August 1944. It was located in northwest Fort Rosecrans, replacing the two Marine Corps batteries. Before the attack on Pearl Harbor, the Marines emplaced two gun batteries in the northwest area of the fort for training purposes. Battery Gillespie included three 5-inch navy guns and Battery Zeilin, two 7-inch navy guns. Both were named for Marine Corps officers involved in the American conquest of California. [83]

Early in World War II, the number of coastal searchlights in San Diego's harbor defenses increased greatly. On the west side of Point Loma, Searchlight No. 15 and a generator were installed in an underground shelter. During this time, a complex network of armored cable

around Point Loma tied together the batteries, base-end stations, searchlights, radar sets, and command posts. Most of the network has been removed, but the electrical connection box remains. [84]

In August 1943, three, four-gun 90mm anti-motor torpedo boat (AMTB) batteries were completed. These included Battery Cabrillo at Point Loma, which inactivated Battery Point Loma's 155mm guns; Battery Fetterman at Ballast Point; and Battery Cortez on the Silver Strand. [85] To supplement these 90mm batteries, three 37 mm anti-aircraft weapon batteries were installed to protect the harbor entrance against motor torpedo boats. Battery Cliff was emplaced above the new lighthouse; Battery Bluff at Billy Goat Point; and Battery Channel, on the east side of Fort Rosecrans. [86]

In 1945, the United States dropped atomic bombs on Hiroshima and Nagasaki, Japan and by the end of August, the San Diego Harbor Defense Post was closed. The war officially ended on September 2, 1945. [87] Fort Rosecrans underwent a quick and unceremonious loss of personnel after the war and by 1946, only a little over 100 men garrisoned the fort. In the meantime, the government returned Cabrillo National Monument to the National Park Service. Donald Robinson, who was hired in 1946 as the Park Custodian, petitioned to have some of the fort's ordnance's preserved, but they were cut and sold for scrap. [88] Robinson was the park's first full time employee and was promoted to park superintendent in 1956.

NATIONAL PARK SERVICE - CABRILLO NATIONAL MONUMENT

Activities never ceased at the fort, but it was the Navy and not the Army that continued operations at Point Loma. Since 1941, the University of California's Division of War Research had civilians, naval scientists and engineers conducting studies to develop new communications and weapons systems for the military. As postwar research and development expanded in the 1950s, the Navy acquired more and more of Point Loma's real estate from the Army. [89]

In 1959, the Army vacated Fort Rosecrans and transferred it to the United States Navy, except for 80.6 acres which were transferred to the National Park Service and added to Cabrillo National Monument. The Navy has continued to use the area for weapons development and communications research. Many of the old battery emplacements have been converted for new uses. Battery Ashburn's tunnels now house banks of microelectronics and communications equipment. Battery Woodward is a radio facility. Battery Strong is used to develop the latest in surveillance technology. Batteries White and Whistler, the old mortar emplacements, were also utilized, with Whistler having served as an Arctic Submarine Laboratory and White now used as a shop and storage facility. Battery Wilkeson is also a storage area and on the dunes of Imperial Beach, old Fort Emory has been converted into a naval radio station. Also, in the late 1950s, the Navy established a submarine base on Ballast Point, the site of the original series of forts dating back to 1796. [90]

Today, Cabrillo National Monument consists of 143 acres, located near the south end of Point Loma. The rugged terrain reaches from the sheer cliffs bordering the Pacific Ocean on both the east and west sides of the peninsula to an elevation of 422 feet, the highest point on Point Loma. [91] The Old Point Loma Lighthouse has gone through several phases of restoration, including extensive restoration in 1933 and further work in the 1980s. In 1995 it was furnished to approximate its 1887 appearance and is listed on the National Register of Historic Places. [92] Sylvester Road still exists today, and the portion of it that is within the park is known as the Bayside Trail and serves as an interpretive trail for both the history of San Diego's harbor and Point Loma's natural history. [93]

PERIOD OF SIGNIFICANCE

Cabrillo National Monument consists of 143 acres formerly part of Fort Rosecrans, which served as the headquarters of the harbor defenses of San Diego. The period of significance of the military structures located within Cabrillo National Monument is thus the same as that previously defined for Fort Rosecrans, 1905 to 1945.

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ARCHITECTURAL DATA

The following section summarizes information on each of the nineteen structures dealt with in this report, including their location, a brief history, physical description, current condition and a structural analysis. Information on structures of similar type, such as the two end stations Calef & Wilkeson, is grouped.

The structures are concentrated primarily in two locations. Structures on the east side of Point Loma overlooking San Diego Bay are accessed via the Bayside Trail and those located on the west side facing the Pacific Ocean are accessed by roads.

The subject structures are primarily reinforced concrete construction, with concrete floors, walls and roofs. Most of the structures are partially buried beneath the ground or bermed into the hillside. Variations from this typical description include the wood-framed roof of the army radio station, the steel-framed roofs of the searchlight shelters, the primarily corrugated steel pipe bunker complex structures, and the circular concrete gun emplacements, almost fully buried in the ground.

STRUCTURAL SUMMARY

Based upon visual observations (structural drawings are not available), the existing structures typically appear adequately sized and constructed to resist the expected vertical (gravity) and lateral (wind and earthquake) loads. Because they were designed for military purposes, they would likely have been intended to withstand substantial forces. Hence the concrete walls and roofs appear to have been provided with generous thicknesses and reinforcing.

Some deterioration has occurred in the reinforced concrete walls and roofs. This consists primarily of cracking in the concrete walls and localized spalling of the concrete, with the reinforcing bars exposed and corroded in some locations. In addition, the steel components of the structures are corroded in many areas. This deterioration is consistent with the age and weather to which these structures are exposed. In most cases the deterioration is not advanced enough to significantly compromise the integrity or capacity of the structures, however if left unchecked it will eventually become a problem. Specific locations where this deterioration is more significant are noted in the evaluations.



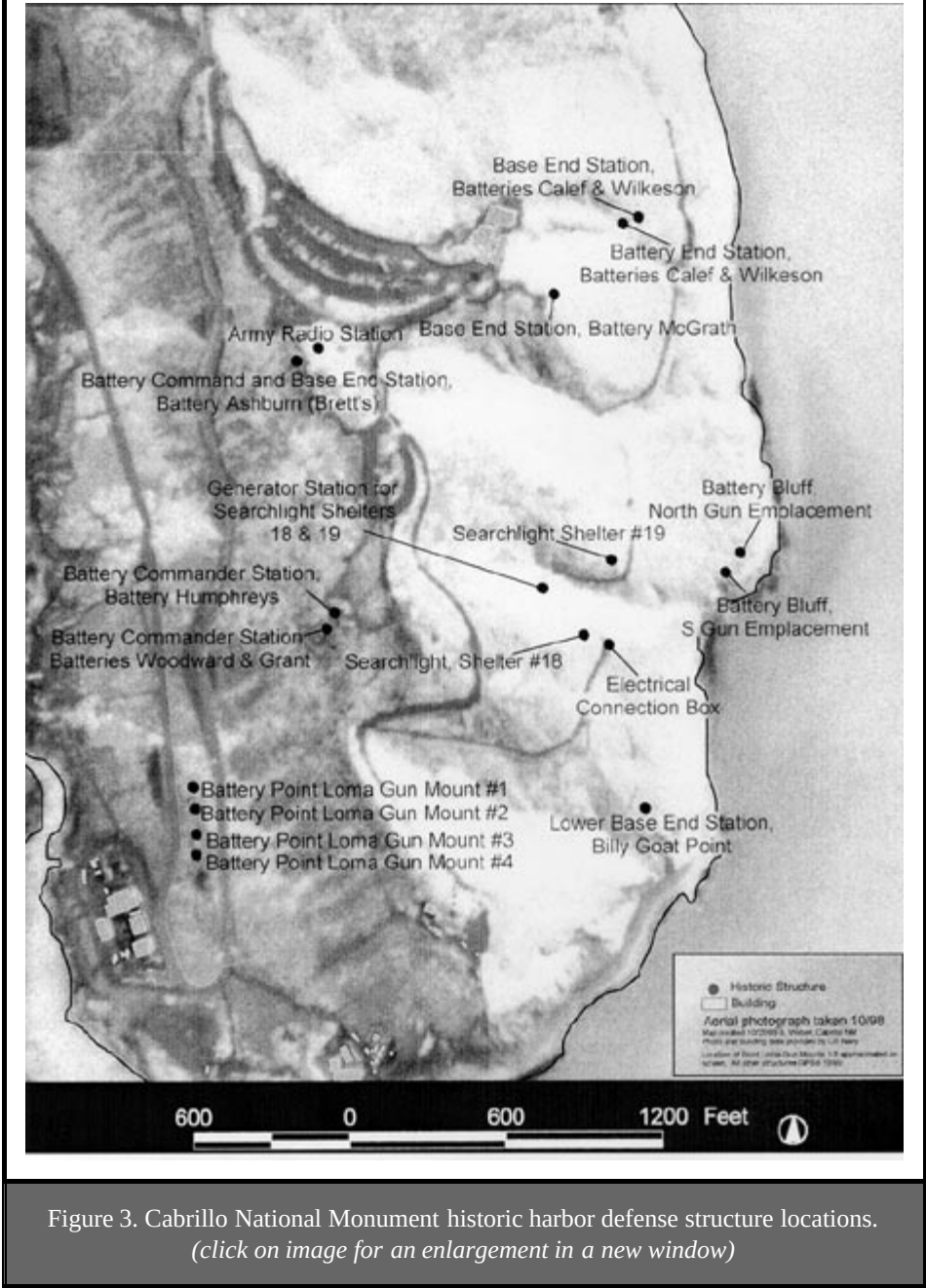


Figure 3. Cabrillo National Monument historic harbor defense structure locations.
(click on image for an enlargement in a new window)

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MATERIAL DESCRIPTIONS, CONDITIONS AND REPAIRS

APPROACH

Our philosophy is that the rehabilitation, restoration, preservation or stabilization of a structure should have a minimal impact on historic fabric. Deficiencies that threaten life and safety, or that are causing deterioration must be corrected. The value of any other improvements should be weighed against the value of the building's integrity. The historic fabric and character-defining features of these structures were described earlier in this report. The following recommendations, extracted from Director's Order 28 (DO-28), Cultural Resource Management Guidelines, apply to all treatments.

- Use is monitored and regulated to minimize both immediate and long-term damage.
- Use of destructive techniques, such as archeological excavation, is limited to providing sufficient information for research, interpretation, and management needs.
- All work that may affect resources is evaluated by an historical architect and other professionals, as appropriate.
- All modification, repair, or replacement of materials and features is preceded by sufficient study and recording to protect research and interpretive values.
- New work, materials, and replacement features are identified, documented, or permanently marked in an unobtrusive manner to distinguish them from original work, materials, and features. The manner and location of identification is recorded using the Inventory and Condition Assessment Program (ICAP). *The ICAP program will be updated and modernized in FY2000, and may become known under a different acronym.*
- A proposed treatment project is initiated by the appropriate programming document, including a scope of work and cost estimate from an HSR or ICAP. Such projects include preservation maintenance as well as major treatment. No treatment is undertaken without an approved HSR or work procedure documenting the work, and Section 106 compliance.
- A treatment project is directed by an historical architect and performed by qualified technicians.
- Representative features salvaged from an historic structure are accessioned and cataloged, provided that they fall within the park's scope of collection statement.
- All changes made during treatment are graphically documented with drawings and photographs. Records of treatment are managed as archival materials by a curator or

archivist within the park's museum collection.

As with any historic building, the State Historical Building Code and the Uniform Code for Building Conservation should be used as the prevailing codes. This allows for sensitive, performance-based means for achieving a safe, improved structure.

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ULTIMATE TREATMENTS

Definitions

The National Park Service has assigned each structure a proposed ultimate treatment. These include Preservation, Restoration, Rehabilitation and Stabilization. The National Park Service has defined these treatments as follows. Also see the Appendix for the Secretary of the Interior's Standards for Preservation, Rehabilitation, and Restoration.

Reconstruction: Depicting, by means of new construction, the form, features, and detailing of a non-surviving structure to replicate its appearance at a specific period of time and in its historic location. Features within the period of significance are preserved and deteriorated features are repaired, or replicated.

Restoration: Restoration accurately presents the form, features, and character of a historic structure as it appeared at a specific period. It may involve the replication of missing historic features and removal of later features, some having cultural value in themselves.

Rehabilitation: Defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.

Preservation: Applying measures necessary to sustain the existing form, integrity, and material of a historic property. Deterioration caused by natural forces and normal use are arrested and retarded. Maintenance and stabilization of the material are means to preserve the structure.

Stabilization: Acting to render an unsafe, damaged or deteriorated property stable while retaining its present form.

Building Recommendations

The following recommended treatments are included to help park staff accomplish the ultimate treatment for each structure at Cabrillo National Monument. In addition to the specific recommendations that follow for each structure, all projects must be documented before, during and after work takes place. Minimally, such documentation should include clearly labeled before, during and after photography; a project description including date, scope and cost; and any drawings or other construction documentation used to guide the project. This information should all be stored in one central archive location.

Cyclical maintenance is also recommended for all structures. This includes: periodic inspections; removal of debris, invasive vegetation and ground infill; monitoring of erosion and subsidence; and verification that structures closed to the public remain securely locked to prevent further vandalism. The seaside location demands especially that routine maintenance include monitoring of metals and concrete, materials especially prone to deterioration in a marine environment.

Painting with approved historic colors is recommended for many of the structures. Paint schemes for each structure are to be based upon building-specific paint analysis and research. As described in the preceding *Conditions and Recommendations* section, paint analysis should be conducted prior to paint removal to avoid destroying historical evidence. Final color selection should be approved by an historical architect or conservator.

ARMY RADIO STATION: REHABILITATION

- Apply finish paint to new door and windows.
- Monitor soil surrounding structure.
- Replicate missing portion of pipe railing at stairs.
- Remove or paint over non-historic graffiti at rear façade.
- Consolidate rotting wood at door and window frames.

ELECTRICAL CONNECTION BOX: RESTORATION

- Clean and coat exposed reinforcing rod.
- Patch spalled concrete.
- Remove rust from all metal elements. Abate or encapsulate lead-containing paint. Treat metal with rust inhibitor, and paint with approved historic colors.
- Paint with approved historic colors.
- Replace eroded earth to cover foundation. Halt further soil erosion.

SEARCHLIGHT SHELTER NO. 15: PRESERVATION

- Repair spalled concrete.
- Repair cracks in concrete if greater than 1/16".
- Remove non-historic graffiti from concrete.
- Investigate water infiltration to retard efflorescence.
- Replicate missing metal roof vent in-kind.
- Replicate original metal entry hatch in-kind.
- Remove rust from all metal elements, abating lead paint hazard, treat with rust inhibitor, paint with approved historic colors.
- Consolidate or replace in-kind deteriorated wood curbs under roof.
- Paint with approved historic colors.

SEARCHLIGHT SHELTER NO. 18: RESTORATION

Note: Exterior painting occurred in early 1999. We do not know the extent of testing, cleaning and preparation that occurred prior to this work. Therefore, we suggest monitoring this structure for signs of recurring cracking, spalling and corrosion.

- Stabilize hillside erosion as best determined by soils engineer and park ecologist.
- Review vegetation on roof. Remove vegetation if root system is damaging roof.
- Repair cracks in concrete if greater than 1/16".
- Repair spalled concrete.
- Remove rust from all metal elements. Abate or encapsulate lead-containing paint. Treat metal with rust inhibitor, and paint with approved historic colors. Repair damaged clay vent pipe.
- Extend searchlight tracks to historic position.
- Mount searchlight on narrow-gauge rails (after confirming that the existing searchlight within the structure is the correct type).
- Ascertain source of water in cable pit. Drain pit and arrest source of water if possible.
- Determine extent, type and location of wall lights and cabinetry. Replicate if possible

using photographs, drawings and/or oral accounts.

SEARCHLIGHT SHELTER NO. 19: PRESERVATION

- Remove invasive vegetation.
- Repair spalled concrete.
- Repair cracks in concrete.
- Treat exposed reinforcing bar.
- Remove rust from all metal elements, abating lead paint hazard, treat with rust inhibitor, paint with approved historic colors.
- Consolidate or replace in-kind deteriorated wood curbs under roof.
- Realign metal roof.
- Paint with approved historic colors.

GENERATOR STATION FOR SEARCHLIGHT NO. 18 & NO. 19: RESTORATION

- Remove invasive vegetation.
- Photo document, measure and record interior furnishing ghosts prior to any interior painting.
- Repair spalled concrete.
- Remove peeling paint, abating lead paint hazard, treat any exposed metal, repaint with approved historic colors. Do not paint interior impact spalls, leave exposed to reveal holes.
- Remove rust from all metal elements. Abate or encapsulate lead-containing paint. Treat metal with rust inhibitor, and paint with approved historic colors.
- Repair partially missing interior wood door surround.
- Restore double hung and hopper windows: remove security bars, chicken wire and plywood infill, replace with glazing.
- Replicate missing exhaust vent in-kind.
- Replace missing metal covers from interior cable troughs.
- Restore doorway to original single door width: remove plywood infill, replicate original wood door.
- Remove infill from second original large window opening.
- Remove bird's nests from exterior vent holes. Cover with screens to prevent further nesting.
- Reconstruct conduit chases.

BASE-END STATION, BATTERY MCGRATH: PRESERVATION

- Remove invasive vegetation at entry hatch.
- Treat exposed reinforcing bar.
- Repair concrete spalls.
- Repair cracks in concrete.
- Remove rust from all metal elements, abating lead paint hazard, treat with rust inhibitor, paint with approved historic colors. For sharp protruding metal on hatch, bend metal back into position or file sharp edges.
- Monitor structure for signs of water infiltration. Reapply bituminous waterproofing to roof if necessary.
- Reattach shutter (currently located inside the structure).
- Remove non-historic graffiti.

BASE-END STATION, BATTERIES CALEF & WILKESON: PRESERVATION

- Remove vegetation from roof drainage channel.
- Repair cracks in concrete.

- Repair spalled concrete.
- Remove rust from all metal elements, including hardware and hatch cover. Abate lead paint hazard, treat with rust inhibitor, paint with approved historic colors.

BATTERY COMMANDER STATION, BATTERIES CALEF & WILKESON: PRESERVATION

- Remove invasive vegetation.
- Remove lichen growth, after first locating and eliminating water source. If hillside drainage is inadequate, create swales to carry water away from structure.
- Repair spalled concrete. Repair spalls surrounding ceiling conduit.
- Repair cracks in concrete.
- Monitor and assess cause of corrosion stains on concrete. (Removing stain is optional for ultimate treatment of preservation.)
- Remove rust from all metal elements, including hardware, abating lead paint hazard, treat with rust inhibitor, paint with approved historic colors.
- Clean efflorescence from north concrete wall after eliminating water source.

BASE-END STATION AT BILLY GOAT POINT: PRESERVATION

- Remove vegetation from roof.
- Remove interior debris.
- Repair concrete spalls, taking special care to repair concrete curb at entry hatch and the front shutter support.
- Repair cracks in concrete if greater than 1/16".
- Survey exposed reinforcing rod to determine if it warrants cutting out and replacement or treatment in place. Monitor reinforcing rods located near the surface of concrete that are causing surface spalls.
- Reinstall metal shutters and hardware.
- Repair or replace damaged shutter hardware in-kind.
- Remove rust from all metal elements, abating lead paint hazard, treat with rust inhibitor, paint with approved historic colors.
- Remove or paint over non-historic graffiti.

BATTERY COMMANDER STATION AND BASE-END STATION, BATTERY HUMPHREYS: RESTORATION

- Remove interior debris.
- Repair concrete erosion if more than 1-2" of surface concrete is missing or if reinforcing rod is exposed.
- Repair concrete spalls., especially at rear of upper roof and at hatch curb.
- Repair cracks in concrete.
- Survey exposed reinforcing rod to determine if it warrants cutting out and replacement or treatment in place.
- Remove rust from all metal elements. Abate or encapsulate lead-containing paint. Treat metal with rust inhibitor, and paint with approved historic colors.
- Replicate missing upper level room azimuth instrument pole.
- Re-attach missing azimuth instrument stand in lower level front rear (it is presently located on its side in the lower level rear room.
- Replicate and replace wooden swivel bench.

BASE-END STATIONS, BATTERIES WOODWARD & GRANT: RESTORATION

- Remove interior debris.

- Remove vegetation from roof drainage channels.
- Repair concrete spalls, especially where reinforcing rod is exposed. Where reinforcing rod is exposed, clean and coat rod or cut out and replace if required.
- Replace missing roof camouflage stones in-kind (approximately 15) using pins if necessary. Clean and fill roof cracks.
- Remove rust from all metal elements, abating lead paint hazard, treat with rust inhibitor, paint with approved historic colors.
- Remove non-historic graffiti from concrete walls, or paint over if surface was originally painted.
- Clean efflorescence from concrete wall after eliminating water source.
- Replicate and replace wooden swivel bench.
- Paint concrete with approved historic colors.

BATTERY COMMANDER AND BASE-END STATION, BATTERY ASHBURN: RESTORATION

Note: Painting occurred in early 1998, and was in progress during field work for this report. We do not know the extent of testing, cleaning and preparation that occurred prior to this work, nor do we know the authenticity of the selected colors. We suggest monitoring this structure for signs of recurring cracking, spalling and corrosion.

- Repair concrete spalls, with special attention to door header. Cut out and replace or treat existing reinforcing rod at this location as needed.
- Repair cracks in concrete.
- Replace metal pipe railing in-kind.
- Remove rust from all metal elements, abating or encapsulation lead paint. Treat with rust inhibitor, and paint with approved historic colors. Recent painting of metal shutters did not remove rust.
- Remove plywood infill at exterior door and replace metal vents at upper and lower openings.
- Replace strip fluorescent fixtures with historically appropriate incandescent (probably bare lightbulb and plain socket).
- Remove peeling paint from floors.
- Replicate and install missing camouflage netting. Netting to be attached to extant eyebolts at roof.
- Review roof slab drainage. Create swales to redirect any surface runoff.
- Remove efflorescence and conduct repairs at exterior door soffit.
- Restore function to metal shutters by removing wood and clamps. Repair or replace in-kind window shutter hardware.
- Straighten bent metal shutters at lower level.
- Replicate and replace removed chart shelf.
- Replicate and replace missing window shelf.
- Remove brick rubble from lower room.
- Reopen electrical raceways between lower rooms.
- Replicate missing metal door frame to match adjacent galvanized metal.

BATTERY BLUFF, NORTH AND SOUTH GUN EMPLACEMENTS: STABILIZATION

- Monitor subsidence of hillside below structures.
- Clear structures of soil and vegetation infill.
- Repair cracks in concrete.
- Perform photographic, written and graphic documentation while structures are still intact and before hillside instability renders vicinity unsafe. Follow the Secretary of the

Interior's Standards for Architectural and Engineering Documentation, Historic American Building Survey/Historic American Engineering Record (HABS/HAER).

- Restrict access to area if advised to do so by soils engineer, and post erosion warning signs.

BATTERY POINT LOMA PANAMA GUN MOUNT: STABILIZATION

- Leave Panama mounts 1, 2, and 3, covered until their ultimate treatment designation is upgraded.
- Repair concrete spalls if larger than 4" x 4" x 1", or if reinforcing rod is exposed.
- Repair cracks in concrete if over 1/16" wide.
- Remove rust from all metal elements, abating lead paint hazard, treat with rust inhibitor, paint with approved historic colors.
- Reattach steel band at central concrete mount, replacing missing bolts.
- Analyze slope erosion and determine if measures are necessary to prevent future soil movement.

BATTERY POINT LOMA BUNKER COMPLEX, GUNS 1&2: STABILIZATION

BATTERY POINT LOMA BUNKER COMPLEX, GUNS 3&4: STABILIZATION

- Replace missing bolts and nuts from metal sections.
- Treat corroded galvanized steel with a rust converter (such as that made by Rustoleum).
- Provide photographic, written, and graphic documentation of structures following the Secretary of the Interior's Standards for Architectural and Engineering Documentation, Historic American Building Survey/Historic American Engineering Record (HABS/HAER).
- Excavate infilled bunkers.

BATTERY POINT LOMA RESERVE MAGAZINE

- Repair concrete curbs.
- Protect stenciled graffiti.
- Stabilize collapsed wood and chicken wire assemblies. Store material on-site in a locked location until ultimate treatment designation is upgraded and bunks can be reassembled.
- Replace missing bolts and nuts from metal sections.
- Treat corroded galvanized steel with a rust converter (such as that made by Rustoleum).
- Provide photographic, written, and graphic documentation of structures following the Secretary of the Interior's Standards for Architectural and Engineering Documentation, Historic American Building Survey/Historic American Engineering Record (HABS/HAER).

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APPENDIX I

MATERIAL MATRIX

STRUCTURE NAME	CONCRETE				METAL																	WOOD										MISCELLANEOUS					
	Smooth Finish, no formwork lines	Smooth Finish, Formwork Lines	Cement Plaster	Camouflage Finish	Reinforcing Steel	Hatch Covers	Steel Window Shutters	Shelter Covers	Ladders	Searchlight Shelter Covers	Curved Steel Roofs/Concrete Camouflage	Narrow Gauge Rails	Metal Covered Wood Doors	Solid Metal Doors	Steel Windows	Vertical Steel Bars	Steel Pipe Filled with Concrete	Corrugated Iron Barrel Vault	Pipe Railing	Plumbing Pipes	Metal Trim	Counter-Weighted Elevator Mechanism	Wood-framed Roof	Wood Doors	Wood Windows	Wooden Curbs	Wood Cabinetry	Wood and Chicken Wire Bunks	Wood Trim	Bituminous Roofing	Hydrostatic Pressure	Subsidence	Vegetation Issues	Graffiti	Painted Exterior	Painted Interior	
Army Radio Station	X	X			X																		X	X					X	X	X						
Battery Command & Base End Station, Ashburn		X		X			X												X	X																	
Searchlight Shelter 18		X											X							X													X		X	X	
Searchlight Shelter 19		X								X		X									X	X							X		X						
Electrical Connection Box	X				X									X																						X	
Generator Station for Searchlight 18 & 19		X			X									X	?	X					X					?					X			X			
Base End Station, Calef & Wilkeson (lower)		X		X	X	X	X		X		X																X				X		X	X		X	
Battery End Station, Calef & Wilkeson (upper)		X		X	X	X	X		X		X																								X		
Base End Station, Battery McGrath		X		X	X	X	X		X		?																				X		X	X		X	
Lower Base End Station at Billy Goat Point		X		X	X	X	X		X		X																				X		X				
Battery Bluff, South Gun Emplacement																																					
Battery Bluff, North Gun Emplacement	X																X															X					
Battery Commander Station, Humphreys	X			X		X			X																												X
Base End Station, Woodward & Grant		X		X	X	X	X		X																		X				X		X				
Battery Point Loma Bunker Complex, Guns 1 & 2																																					
Battery Point Loma Bunker Complex, Guns 3 & 4	X																	X										X					X				
Battery Point Loma Storeroom/Sleeping Quarters																																					
Battery Point Loma Panama Gun Mount	X											X									X																
Searchlight Shelter 15					X	X			X	X		X										X							X				X				

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APPENDIX II

OPINION OF PROBABLE COST FOR HISTORIC STRUCTURES FOR HARBOR DEFENSE STRUCTURES, CABRILLO NATIONAL MONUMENT

INTRODUCTION

This opinion of probable cost has been prepared to reflect the anticipated cost of rehabilitation, restoration, preservation and stabilization of various historic structures, located at Cabrillo National Monument, San Diego, California.

This document is based on the measurement and pricing of quantities wherever information is provided and/or reasonable assumptions for other works not covered in the drawings or specifications, as stated within this document. Unit rates have been obtained from historical records and/or discussion with contractors. The unit rates are a composite of labor, material and equipment and reflect current bid costs in the area. All unit rates relevant to subcontractor works include the subcontractors' overheads and profit unless otherwise stated.

The following documentation was used in preparation of this opinion:

- Historic Structures Report, prepared by Carey & Co, draft dated April 30, 1999.
- Revised Treatment Recommendations, dated October 5, 1999
- Xeroxes of photographs and maps, prepared by Carey & Co, dated August 4, 1999.
- Conversations and meetings with the architect.

Exclusions:

The following items are excluded:

- Land costs
- Consultant fees and expenses
- Fees for testing construction materials
- Plan check, inspection, testing and utility connection fees
- Permits
- Moveable furniture and furnishings
- Indoor plants and planters
- Equipment other than stated
- Legal and financing costs
- Fire and all risk insurance
- Demolition other than stated
- Off-site utilities
- Escalation beyond Midpoint of construction

Items affecting the cost estimate:

Items which may change the estimated construction cost include, but are not limited to:

- Modifications to the scope of work included in this estimate.
- Unforeseen sub-surface conditions.
- Restrictive technical specifications or excessive contract conditions.
- Any specified item of equipment, material, or product that cannot be obtained from at least three different sources.
- Any non-competitive bid situations.
- Bids delayed beyond the projected schedule.

Assumptions:

The following assumptions have been made:

1. Sufficient space will be provided to the contractor to house temporary site storage and accommodation within the vicinity of the site.
2. Work will be carried out by union labor and during normal working hours.
3. No restrictions on access to the site.

Escalation:

Prices in this opinion reflect current construction costs. We have included escalation to the midpoint of construction at a rate of 5% per annum for one year.

Contingencies:

A design pricing contingency allowance has been included at 20%. This is to allow for items not included in the drawings or specifications and undefined at this stage, (including any addendums produced during bidding stage).

It is prudent for all program budgets to include an allowance for change orders, which occur during the construction phase and impact total project cost. This opinion does not include any such allowance, and it is our recommendation that the client carries in their program budget a percentage of 5% to 7% of the construction cost for this contingency.

Recommendation for Cost Control:

Hanscomb Inc. recommends that the owner, architect and engineers carefully review this document, including line item descriptions, unit prices, clarifications, exclusions, inclusions and assumptions, contingencies, escalation, and markups. If the project is over budget, or if there are unresolved budgeting issues, alternative systems/schemes should be evaluated before proceeding into the final design phase.

Requests for modifications of any apparent errors or omissions to this document must be made to Hanscomb within ten (10) days of receipt of this estimate. Otherwise, it will be understood that the contents have been concurred with and accepted.

It is recommended that a final update estimate be produced by Hanscomb Inc., using bid documents as well as all addenda, to determine overall cost of changes which may have occurred since the preparation of this estimate. The final update estimate will address changes and additions to the documents as well as addenda issued during the bidding process. Hanscomb cannot reconcile bid results to any estimate not produced from bid documents, including all addenda.

Cost Studies:

If the project is over budget or should there be a requirement to reduce the project cost, Hanscomb offers the additional service of Value Engineering. This service would involve preparation of cost studies and evaluation of alternates with subsequent recommendations as to the methods of reducing the project budget.

This opinion has been based on a competitive open bid situation with a recommended 5-7 bonafide reputable bids from general contractors and a minimum of 3 bidders for all items of sub-contracted work. Experience indicates that a lower number of bidders may result in higher bids, conversely an increased number of bidders may result in more competitive bids

Since Hanscomb has no control over the cost of labor, materials, or equipment, or over the contractor's method of determining prices, or over competitive bidding or market conditions, the opinion of probable construction cost provided for herein is made on the basis of professional expenence and qualifications. The opinion represents Hanscomb's best judgment as a professional construction consultant familiar with the construction industry. However, Hanscomb cannot and does not guarantee that the proposals, bids, or the construction cost will not vary from opinions of probable cost prepared by them.

EXECUTIVE SUMMARY

HANSCOMB

**HISTORIC STRUCTURES REPAIRS
CABRILLO NATIONAL MONUMENT
POINT LOMA, CALIFORNIA**

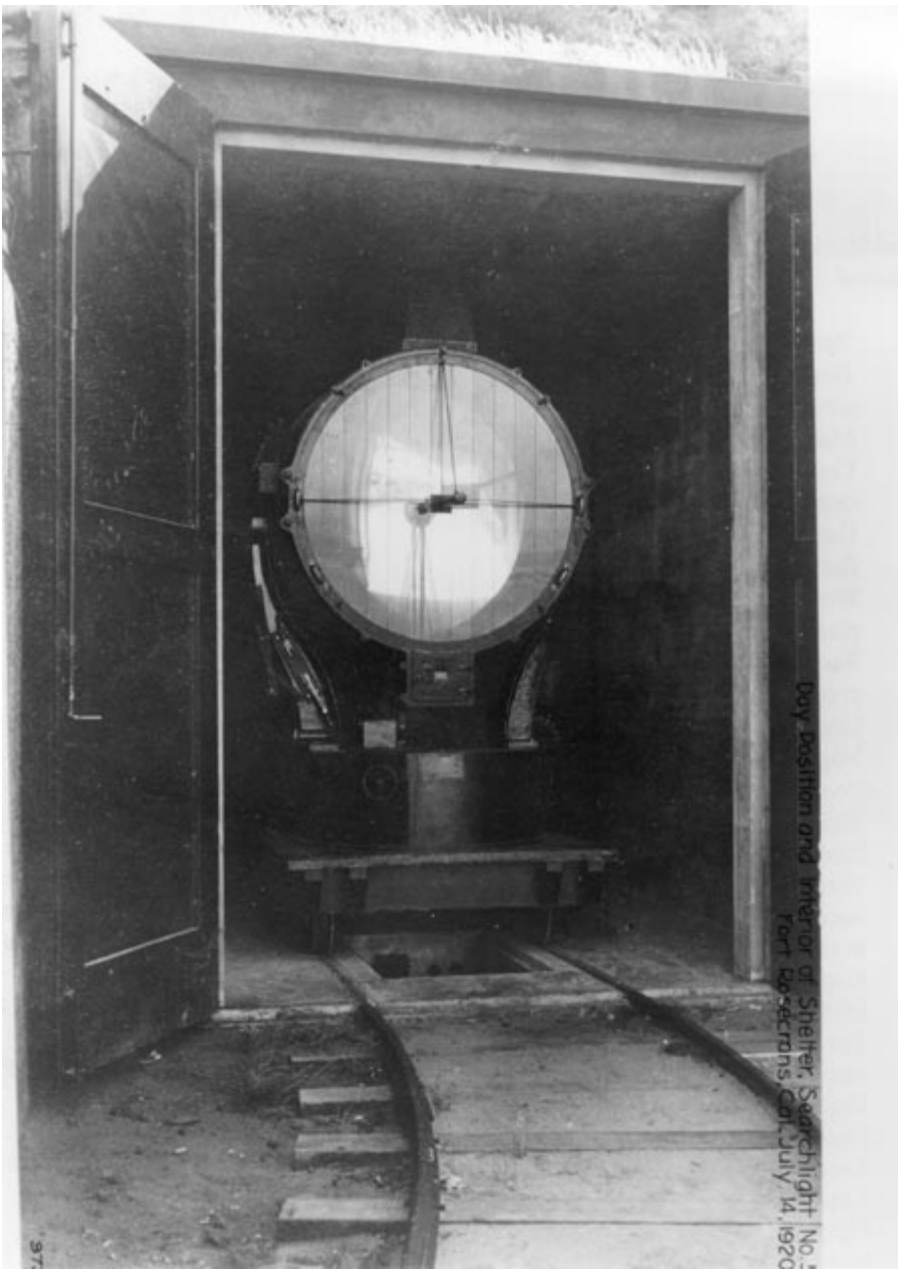
Stage: Feasibility
Study

	TOTAL AMOUNT \$	% Of Total
1) Army Radio Station	8,000	4.2%
2) Electrical Connection Box	2,000	1.0%
3) Searchlight Shelter No. 15	15,200	7.9%
4) Searchlight Shelter No. 18	22,800	11.9%
5) Searchlight Shelter No. 19	12,400	6.5%
6) Generator Station for Searchlight Shelter No. 18 & 19	16,100	8.4%
7) Base End Station, Battery Mc Grath	7,500	3.9%
8) Battery End Station, Batteries Calef & Wilkeson	3,700	1.9%
9) Battery Commander Station, Batteries Calef & Wilkeson	12,200	6.4%
10) Base End Station at Billy Point (Battery White Base-End Station)	7,200	3.8%
11) Battery Commander Station and Base-End Station, Battery Humphreys	12,700	6.6%
12) Base End Station, Batteries Woodward & Grant	16,800	8.8%
13) Battery Commander Station and Base-End Station, Ashburn	9,800	5.1%
14) Battery Bluff, North Gun Emplacement	1,100	0.6%
15) Battery Bluff, South Gun Emplacement	1,100	0.6%

16) Battery Point Loma Panama Gun Mount	3,300	1.7%
17) Battery Point Loma Bunker Complex Guns 1 & 2	2,900	1.5%
18) Battery Point Loma Bunker Complex Guns 3 & 4	2,900	1.5%
19) Battery Point Loma Storeroom / Sleeping Quarters	10,100	5.3%
Subtotal I	167,800	87.7%
Abatement allowance	20,000	10.4%
- additional mobilization allow	3,600	1.9%
Estimated Construction Contract Award (ECCA)	\$191,400	100.0%

(detailed cost estimates for each structure omitted from the online edition)

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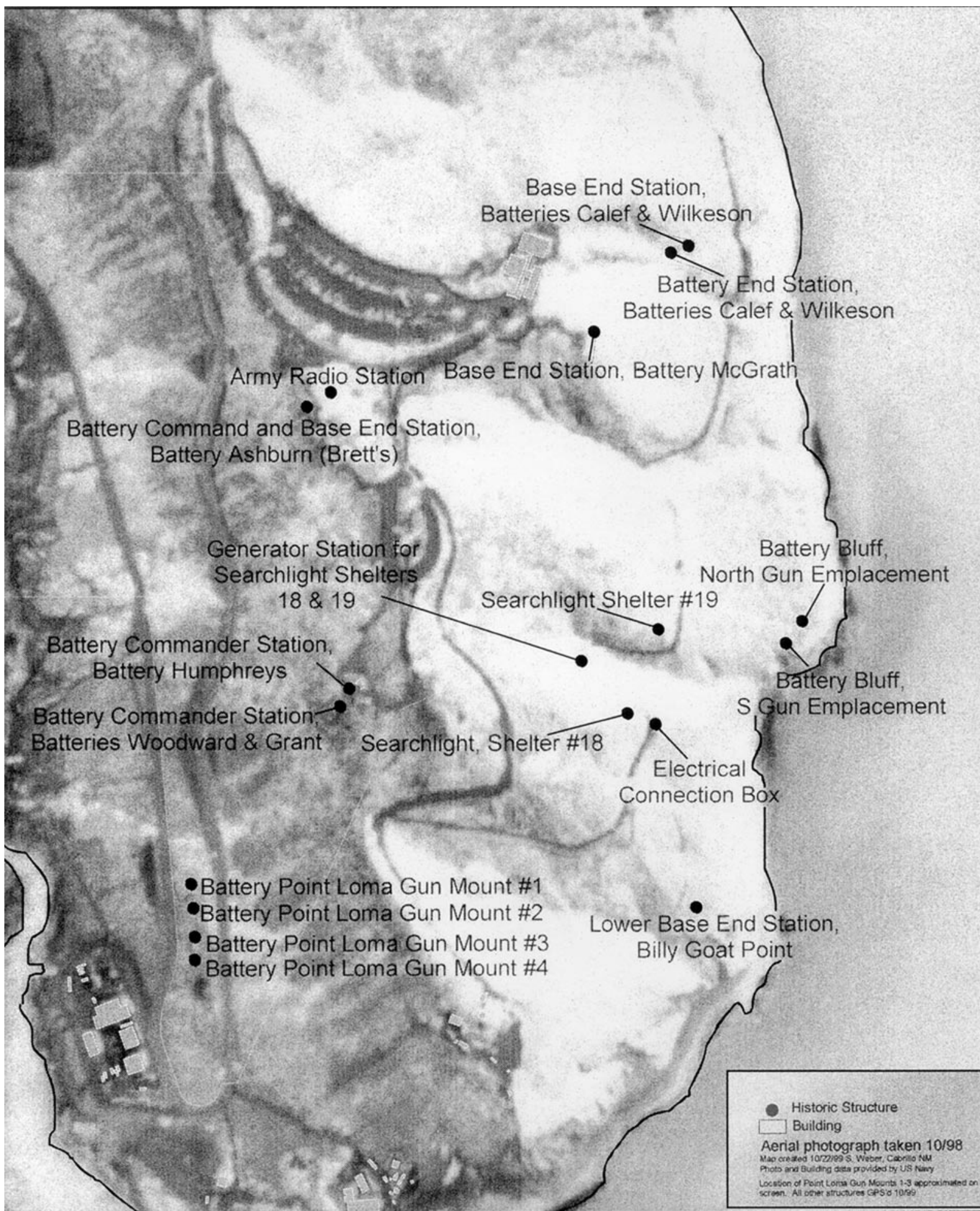


Bay position and interior of Shelter, Searchlight No. 2
Fort Rosecrans, Cal., July 14, 1920

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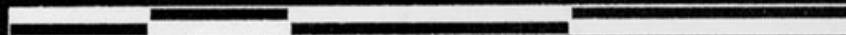


600

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600

1200 Feet









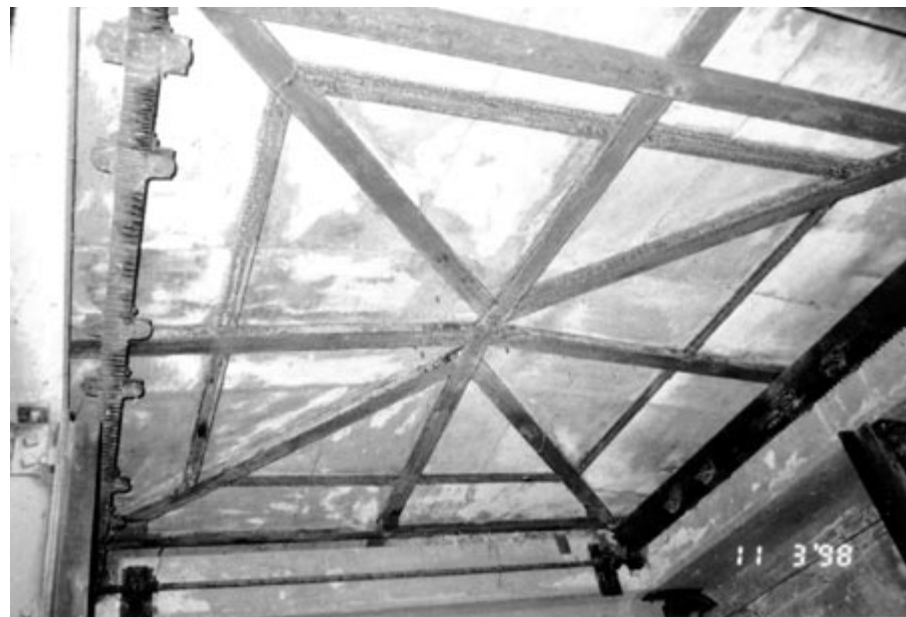




















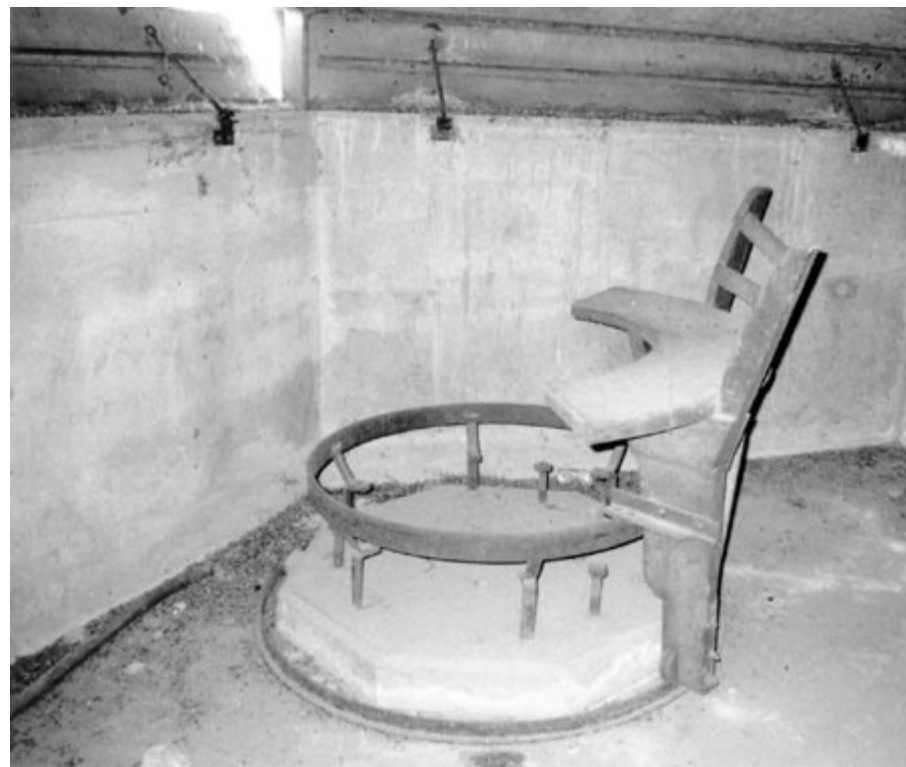
























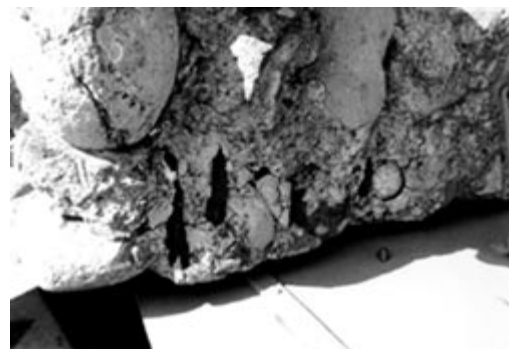


























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ADMINISTRATIVE DATA

The following section summarizes information on the structures useful for their management within the National Park System. Included is a table with building name, NPS and IDLCS numbers, construction date, management category and proposed treatment; National Register status including date(s) listed, criteria and context; and recommendations for documentation, cataloging and storage of materials generated by the HSR. See bibliography for references and related studies.

Structures Included

The following table lists all structures reviewed in the study. The table lists the name, NPS and IDLCS number, Management Category, and Treatment. Definitions of the Management Category (assigned by park staff) are as follows: A, must be preserved (none included); B, should be preserved; and C, may be preserved. Please see the Conditions and Recommendations section of this report for definitions of treatment terms.

NAME	NUMBER	IDLCS	CONST. DATE	MGMT. CATEGORY	TREATMENT
Army Radio Station	03HS2	08195	1918	B	Rehabilitation
Battery Commander Station and Base-End Station, Battery Ashburn	100HS3	08196	1942	B	Restoration
Electrical Connection Box	09HS4	08197	1941	B	Restoration
Searchlight Shelter No. 18	09HS5	08198	1918-19	B	Restoration
Generator Station for Searchlight Shelters 18 & 19	09HS6	08199	1918-19	B	Restoration
Searchlight Shelter No.	09HS7	08200	1918-19	B	Preservation

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Base End Station, Batteries Calef & Wilkeson	09HS8	08201	1920	B	Preservation
Battery End Station, Batteries Calef & Wilkeson	09HS9	08202	1920	B	Preservation
Base End Station, Battery McGrath	09HS10	08203	1920	B	Preservation
Battery Bluff, South Gun Emplacement	09HS11	08204	1942	C	Stabilization
Battery Bluff, North Gun Emplacement	09HS11	08205	1942	C	Stabilization
Battery Commander Station, Battery Humphreys	09HS12	08206	1942-43	B	Restoration
Battery Commander Station, Batteries Woodward & Grant	09HS13	08207	1942-45	B	Restoration
Battery Point Loma Bunker Complex, Guns 1 & 2	09HS14	08208	1941-42	B	Stabilization
Battery Point Loma Bunker Complex, Guns 3 & 4	09HS14	08209	1936-41	B	Stabilization
Battery Point Loma Panama Gun	09HS14	08210	1940-41	B	Stabilization

Mounts

Searchlight Shelter No.15	05HS15	08211	1941-44	B	Preservation
Battery Point Loma Reserve Magazine	05HS17	58563	1936-41	B	Stabilization
Lower Base End Station, Billy Goat Point	09HS22	58566	1918-20	B	Preservation

National Register Status

Cabrillo National Monument was entered, without documentation, onto the National Register in 1966. To provide the needed documentation of the site, a draft National Register Historic District Nomination for Cabrillo National Monument was begun in 1988 and revised in 1994. The documentation for Cabrillo National Monument Historic District was accepted by the National Register on September 18, 1998. In 1996, a district nomination was prepared for the entire Fort Rosecrans Point Loma Coastal Defenses, including properties under NPS jurisdiction at Cabrillo National Monument and under U.S. Navy jurisdiction at Fort Rosecrans. The structures are considered significant under criterion A, history, for their associations with World War I and World War II. The structures are also significant under criterion C, architecture, as examples of military design and technology.

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HISTORICAL DATA

ENDNOTES

1. Barry Alan Joyce, *A Harbor Worth Defending: A Military History of Point Loma* (Cabrillo Historical Association, 1995), 5.
2. Keniston Architects, *Fort Rosecrans: Point Loma Coastal Defenses*, (National Register of Historic Places Nomination, May 1996), Section 7, p1. According to Barry Alan Joyce book, Juan Rodriguez Cabrillo was from Guatemala, p. 5).
3. United States Department of the Interior, *National Register of Historic Places Nomination*, (Statement of Significance, November 1988), Section 8, p.1.
4. Erwin N. Thompson, *The Guns of San Diego: San Diego Harbor Defenses, 1796-1947*, Edited by Howard B. Overton, (San Diego National Park Service, 1991), 2.
5. Keniston, Section 7, p.1.
6. Thompson, 3.
7. Joyce, 6.
8. Thompson, 3.
9. Thompson, 3.
10. Joyce, 6.
11. Joyce, 6.
12. Thompson, 4.
13. Joyce, 6, Thompson, 10.
14. Joyce, 6.
15. Thompson, 10,11.
16. Thompson, 11.
17. Thompson, 12.
18. Joyce, 9.
19. Keniston, Section 7, p.2.

20. Joyce, 9.

21. Thompson, 13.

22. Joyce, 9.

23. Keniston, Section 7, p. 2.

24. Keniston, Section 7, p.2.

25. Joyce, 11.

26. Thompson, 24.

27. Keniston, Section 7, p.2.

28. Thompson, 24.

29. Keniston, Section 7, p.2.

30. Thompson, 25.

31. Keniston, Section 7, p.2.

32. Thompson, 25, 26.

33. Keniston, Section 7, p.2.

34. Joyce, 11.

35. Thompson, 28, 30.

36. This comment is from NPS Historian Gordon Chappell: "The nation had always been serious about coast defenses, and prior to 1861 had spent millions building 'Third System' forts of the Fort Sumter type all up and down the Atlantic and Gulf Coasts and even one at the entrance to San Francisco Bay. The program stumbled to a stop in the late 1860s, 1870s and 1880s because the assaults during the Civil War on Fort Pulaski and the Confederate assault on the Union Fort Sumter, and the later Union assault on the Confederate Fort Sumter, had proved that the new rifled artillery could penetrate the walls of brick and masonry Third System forts like the proverbial hot knife through butter. During the 1870s the Army fell back to building earthwork-protected magazines for barbette batteries similarly behind earthworks as sort of an interim measure. Meanwhile, new developments in the making and casting and machining of steel permitted by the 1880s construction of large caliber, breech-loading rifles and mortars, while military inventors provided a new generation of barbette and mortar carriages and wholly new type of 'disappearing' carriage for heavy caliber rifles which allowed the gun to recoil back and downwards to a loading position protected behind the earthworks, then raising it again to firing position. Concurrently, new developments in explosives chemistry produced both 'smokeless' powder and powders in the nitrocellulose family such as guncotton which burned more slowly than black gunpowder and thus provided a continuous kick to a shell throughout the time of its traverse of a long rifled barrel, which black powder could not. These scientific advances made possible the new 'Endicott System' of batteries, with ranges greatly increased over those of smoothbore and even rifled muzzle loading cannon of the Civil War era. It was not that the Army and the Nation was not serious about harbor defense; it was that the Civil War demonstrated the obsolescence of the pre-Civil War 'Third System' brick and masonry forts, and it was not until the new steel

technology, new carriages, and new explosives made possible the Endicott type batteries that serious construction on coast defenses could resume."

37. Thompson, 34.

38. Thompson, 35.

39. Joyce, 14.

40. Thompson, 41.

41. Thompson, 41, 42.

42. Thompson, 41.

43. Thompson, 43.

44. Keniston, Section 7, p.2.

45. Keniston, Section 7, p.3.

46. Thompson, 56.

47. Thompson, 55.

48. Thompson, 57.

49. Thompson, 62, 69.

50. National Register Nomination, Section 8, p.4.

51. Thompson, 57; National Register Nomination, Section 8, p.4.

52. National Register Nomination, Section 8, p.4.

53. Thompson, 60.

54. National Register Nomination, Section 8, p.4.

55. Thompson, 66.

56. National Register Nomination, Section 8, p.4.

57. Thompson, 137. This road was originally named Meyler Road in honor of 1st Lt. James Meyler, the engineer who built the first Endicott batteries in San Diego. The road was renamed Sylvester Road in honor of 1st Lt. William G. Sylvester, who was killed during the attack on Pearl Harbor. The portion of this road located inside the park today is called the Bayside Trail.

58. National Register Nomination, Section 8, p. 6.

59. Keniston, Section 7, p.3.

60. Thompson, 57.

61. Thompson, 78.

62. Thompson, 80, 82.
63. Thompson, 82.
64. Keniston, Section 7, p. 4.
65. Thompson, 80.
66. Keniston, Section 7, p. 4.
67. Keniston, Section 7, p.4.
68. Joyce, 36.
69. Thompson, 91.
70. Thompson, 94.
71. Thompson, 95.
72. Thompson, 96.
73. Thompson, 98.
74. Thompson, 98.
75. Thompson, 99.
76. Thompson, 100.
77. Thompson, 101.
78. Thompson, 102.
79. Keniston, Section 7, p.4.
80. Thompson, 112.
81. Thompson, 108.
82. Thompson, 109.
83. Thompson, 112.
84. National Register Nomination, Section 8, p. 5.
85. Thompson, 121.
86. Thompson, 122.
87. Keniston, Section 7, p.4.
88. Joyce, 67.
89. Joyce, 67.

- 90. Joyce, 69.
- 91. National Register Nomination, Section 6, p.1.
- 92. National Register Nomination, Section 7, p.2.
- 93. National Register Nomination, Section 8, p.6.

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ARCHITECTURAL DATA (continued)

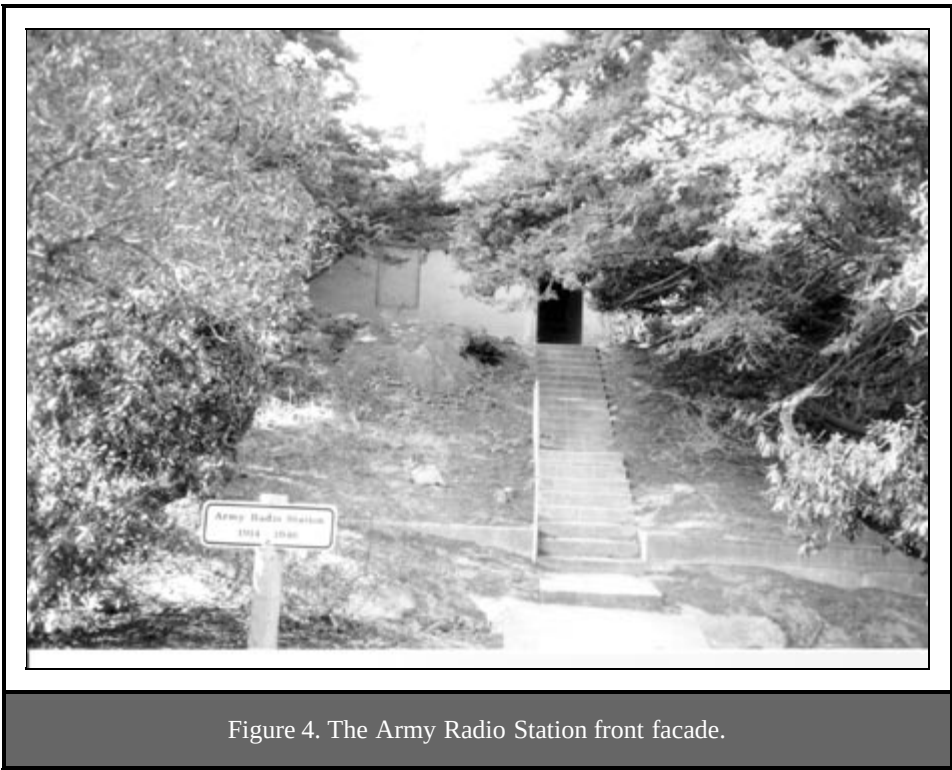


Figure 4. The Army Radio Station front facade.

ARMY RADIO STATION (Rehabilitation)

Location

The Army Radio Station sits 1000 feet northwest of the old lighthouse, its radio towers were once situated between the two structures.

History

World War I stimulated San Diego coastal defense developments, including the construction of the Army Radio Station at Fort Rosecrans, authorized in 1917. Both constructed and operational in 1918, the building was the Army's first radio station in the Harbor Defenses of San Diego. The structure functioned as a radio station through 1936, when radio operations were relocated to the harbor defense command post. The building next became the meteorological station for the coast artillery, later housing the Monument Superintendent's office, then storage. The building was rehabilitated in 1998-1999. An exhibit on the military history of Fort Rosecrans was installed in March, 1999.

Description

Exterior

This one-story building is rectangular in plan and set into the sloping hill (figures 4 and 5). Walls are reinforced concrete, with a flat, asphalt roll roofing-clad, wood-framed roof. One single, wood-panel door with glazing, is located on the northwest side of the building. Windows are fixed, wood sash with eight lights each containing wire-mesh glazing, replicated from a sample window taken from Battery Whistler. The original door hardware was replaced, originally consisting of a knob and keyhole system.

Interior

The three rectangular interior rooms feature vinyl tile flooring, painted concrete walls, one-and-one-half- inch crown molding and a beaded six-inch wood tongue-and-groove ceiling. Flat wood door and window surrounds are approximately five-inches wide. The Operating Room contains two fluorescent light fixtures, while the Sleeping Quarters and Motor Generator rooms each have one. Electrical equipment hangs on the south wall of the Operating Room. The opening connecting the Operating Room and the Motor Generator Room is an alteration, as is the tan and green vinyl flooring and fluorescent lighting (figure 6).

Condition

Exterior

The exterior is in good condition overall. However, the concrete foundations and walls are in fair condition with spalls, exposed reinforcing rod, and cracks visible on the exposed north facade. At the time of this survey, the south foundation was partially covered by the hillside and excavation to clear a path around the building was in progress. The wood trim at the roof fascia needs paint, while the roof itself was recently replaced. Nails attaching the non-original plywood infill have punctured the door and the surrounding trim. The windows are in good condition.

Interior

The concrete walls are in fair condition with hydrostatic pressure at the lower south wall causing blistering of the paint and concrete and stress cracks at the window and door headers. Unfinished concrete and spalls are visible at the new door cut. The ceiling has loose boards, failing paint and missing crown molding trim. The ferrous metal suspended light fixtures are corroded.

Structural Analysis

No significant structural concerns were noted. The cracks and spalling in the concrete walls and foundations noted above are relatively minor and do not at this time appear to compromise the structural capacity of the building.





Figure 5. Roll-roofing clads the roof of the Army Radio Station.



Figure 6. A non-original opening connects the Operating and Motor Generator Rooms.

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ARCHITECTURAL DATA (continued)



Figure 29. Small corrugated metal structures served the four Panama Mounts once here.

Cultural Resources Satisfaction Survey



Thank you for visiting our site. You have been randomly selected to take part in this survey to let us know what we're doing well and where we need to do better. All results are strictly confidential.

Continue

BATTERY POINT LOMA BUNKER COMPLEX, GUNS 1 & 2 (Stabilization)
BATTERY POINT LOMA BUNKER COMPLEX, GUNS 3 & 4 (Stabilization)
BATTERY POINT LOMA RESERVE MAGAZINE

Location

These structures are located on the west side of Point Loma, originally supporting the four Panama gun mounts located nearby.

History

These bunker complexes each consist of five structures; one located to the south of each gun, one to the north of each gun and one to the east situated between the guns. Associated with the Panama Mounts, these corrugated metal bunkers connected to a communications tunnel at the rear of the battery. Actively used from 1941-42, they were abandoned in 1943. The bunkers were either ready magazines, storage facilities or sleeping quarters. The reserve magazine might be the magazine specified in 1936 drawings, with a later conversion into a bunkroom.

Description

Exterior

Partially covered with earth and vegetation, these quarter-inch thick corrugated metal barrel vault structures range from seven-and-one half to ten-feet long, and are ten-feet wide (figure 29). Exposed corrugated metal, approximately four foot wide panels bolted together, form both the ceilings and the walls of these structures. The panels run the length of the bunkers. Corrugations are six-and-one-half inches on center and about one-and-a-half inches deep. The metal panels are connected with two-inch threaded bolts with square nuts, the joints overlapping about five-inches. Some of these bunkers are almost entirely buried and the

interiors of others are relatively free of debris.

The reserve magazine (storeroom/sleeping quarters) is a partially buried, corrugated metal barrel vault covered with a 12-inch layer of concrete (figure 30). Ten-feet wide and forty-feet long, only the ends of the structure are visible, the remainder covered by earth and vegetation, creating an artificial hill.

Interior

One of the bunkers has an intact wooden rear wall constructed of five-inch wide boards with two-inch wide cross pieces. Two collapsed corrugated pipes are inside.

At the reserve magazine, the remains of wood one-by-three inch tongue-and-groove flooring and a built-in wood and chicken wire bunk or storage assembly are scattered about the floor with other debris.

Condition

The corrugated metal bunkers range from partially infilled to almost entirely infilled with earth and vegetation from the site. Their condition is difficult to access. The exterior exposed portions of the metal structures are heavily corroded and the interiors viewed showed signs of galvanization.

Reserve Magazine: the concrete curbs at the base of the walls, which apparently once supported the wooden infrastructure, have collapsed, taking the wooden elements with them. The structures are overgrown with vegetation.

Structural Analysis

No major structural concerns were noted. The wood retaining wall at the north end of the south bunker at Guns 3 and 4 is decaying and does not appear to be well tied to the steel pipe. Several bolts or nuts that tie together the sections of the steel pipe at the reserve magazine structure are missing, however this is not serious. Sections of the concrete support for the wood bed frames have collapsed, however this does not affect the overall stability of the structure.

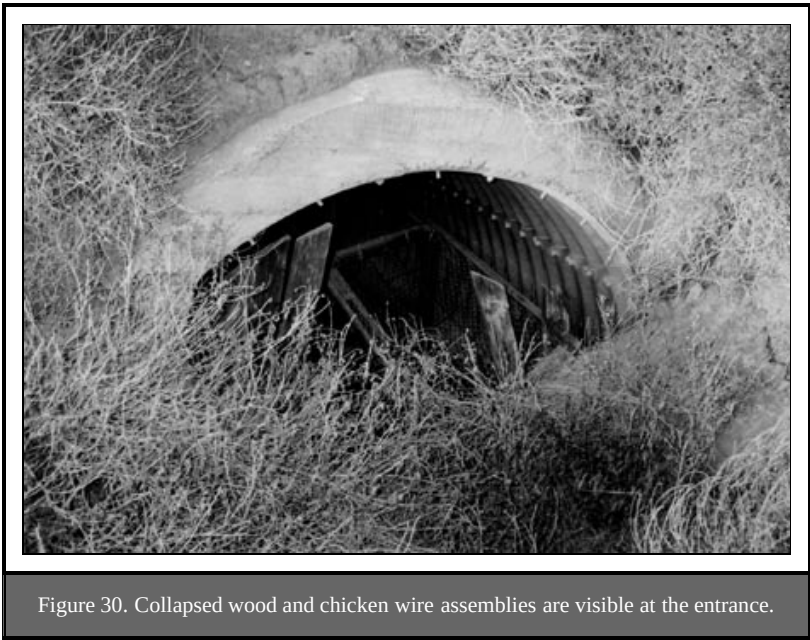


Figure 30. Collapsed wood and chicken wire assemblies are visible at the entrance.

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MATERIAL DESCRIPTIONS, CONDITIONS AND REPAIRS (continued)

REPAIR PROCEDURES (continued)



Figure 31. Concrete cracks at Army Radio Station headers.



Figure 32. Concrete cracks at Base of Battery Calef & Wilkeson Base-End Station hatch.

REPAIR PROCEDURES

Prior to implementing any repair program, the cause of the problem must be thoroughly identified and understood. Our recommendations therefore begin with survey and diagnoses. This approach will assure that causes as well as symptoms are addressed, and that the problems are less likely to recur. Refer to the Material Matrix located in the Appendix for information on material existing at each structure. Refer to the Ultimate Treatments section, below, for structure-specific recommendations.

Concrete

Description

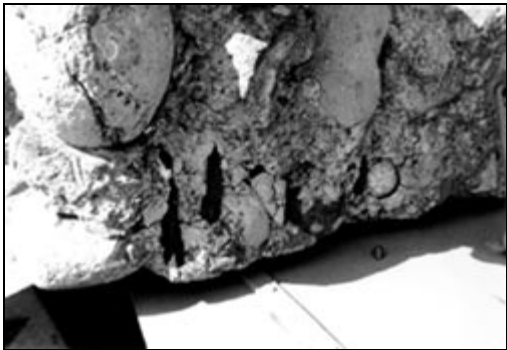
The majority of the structures surveyed are of reinforced, cast-in-place concrete construction. Finishes on these structures vary, and include the following:

- Smooth finish, no visible formwork lines. Examples: Army Radio Station
- Smooth finish, visible formwork lines. Examples: Battery Commander and Base-End Station for Battery Ashburn, Searchlight Shelters No. 18 and No. 19

- Camouflage finishes, scored or left rough, often with stones embedded into the concrete during the curing process. This finish is common to bunker roofs. Examples: Base-End Station, Batteries Woodward and Grant, Battery Commander Station, Battery Humphreys, Battery Commander and Base-End Station, Battery Ashburn.

Smooth-finished structures are typically painted, while the camouflage-finished surfaces are unfinished. Camouflage roof surfaces typically have a soil-and-vegetation cover.

Some of the concrete may have inherent characteristics that promote deterioration. Many of the structures were constructed quickly, which could result in flaws in workmanship. A large number of structures appear to have inadequate depth of concrete covering the steel reinforcing, leading to corrosion jacking, the expansion of steel reinforcing rod as it rusts. The common use of very large aggregate, especially at the surface, promotes concrete deterioration: aggregate stones get dislodged, creating recesses that collect water. In addition, inherent flaws in the mix can cause long-term problems. Laboratory testing will be essential in determining the concrete's chemical and physical properties.

		
Figure 33. Spalled concrete at Searchlight Shelter No. 15.	Figure 34. Missing corner and exposed reinforcing rod at lower Billy Goat Point Base-End Station.	Figure 35. Exposed reinforcing rod and post spalls at Calef & Wilkeson.

Conditions

Cracks

Cracks are a common condition in concrete. The cracks at Cabrillo vary in depth, width, and direction. Causes of these cracks may be equally varied, and may include curing-induced shrinkage, seismic movement, structural overload, differential settlement, thermal stresses, and corrosion jacking. Cracks may be active or dormant; dormant hairline cracks may not require repair.

The Army Radio Station, Searchlight Station No. 18, and the Generator Station have cracks common at reentrant corners, and window and door headers; while the base-end stations have cracks around rough-tooled areas at the connections of roofs with shutters. Curing-induced cracks typically occur at rough-tooled or stone-embedded camouflage concrete: variation in mass during curing causes cracking. Once this occurs, water infiltration is more likely, creating additional problems.

Spalls

Spalls are loss of surface material in patches of varying size. Often, reinforcing rods are

visible and are the primary cause of the failure. As reinforcing rods corrode, they expand, creating high stresses within the concrete. Surrounding concrete will then become loose and eventually fall off. Incipient spalls are portions of loose concrete that have not yet detached from the building. Indicative signs of spalls or potential spalls are missing material, visible cracks around the edges of a spall, and concrete that bulges beyond the wall plane.

Headers and sills show extensive spalling, often a result of reinforcing steel placed too close to the surface. Critical spalls occur at the header at Battery Commander and Base-End Station, Battery Ashburn. Impact spalls occur at exposed corners at the Army Radio Station. Impact spalls, possibly from an explosive device, were noted at the interior of the Generator Station.

Erosion

Concrete erosion is the weathering of a concrete surface by wind, rain, and salt air or spray. Most of the Cabrillo structures appear to be undergoing this process, particularly where water is not allowed to drain or where paint finishes are absent or worn away.

Stains

Two types of stains were observed on the Cabrillo structures: corrosion and efflorescence. Corroded reinforcing rod and ferrous metal attachments, including shutters and hardware, have caused corrosion staining at almost all structures. The stains occur below or adjacent to exposed metal. Efflorescence, a powdery white surface stain, was also observed on many structures. Efflorescence is often produced by the leaching of lime from Portland cement, or by the pre-World War II practice of adding lime to the mix to whiten the concrete.

Failed Coatings

Flaking and loss of adhesion characterize failed paint coatings. This is a common condition on many of the painted concrete surfaces. The coatings protect the concrete surfaces from eroding, and are also important in retaining the historic appearance of many of the structures. Common colors here include gray and drab green, allowing the structures to blend in with their environment (refer to *Paint*, below, for more information).

Recommendations

In general, repairs should duplicate, as closely as possible the original construction to assure that the repair is physically and aesthetically compatible with the existing material. For example, formwork lines, where visible in the existing wall, should be duplicated in the repair. This will require imprinting lumber marks on fresh concrete patches and avoiding the use of plywood formwork. Other original surface textures, such as rough camouflage finishes, should be duplicated as closely as possible in the repair. Of course, original details and mix components that may have had deleterious effects should be avoided. The concrete analysis tests will determine the appropriateness of the original concrete mix.

General Concrete Repair Methodology:

1. Begin with a field survey to identify and locate all problems. Map cracks, spalls, stains and other conditions on elevation, floor plan and roof plan drawings.
2. Conduct in-situ tests as appropriate. These include sounding the concrete to identify voids and loose material; using a calibrated metal detector to locate the position, depth and direction of reinforcing bar; and using moisture meters to identify water infiltration and migration patterns.

3. Collect samples for laboratory tests. Recommended tests include petrographic analysis, strength tests, and chemical tests for chlorides and other components. Laboratory testing is essential not only to determine the characteristics and composition of the original concrete mix formulations, but also in identifying the nature and underlying causes of many of the observed problems.
4. On structures where repair work is not immediately scheduled, monitor the deficiencies. For instance, apply calibrated crack monitors to selected cracks to gauge their activity level.
5. Make sure any patch material is physically and visually compatible with surrounding existing material. Repair material should match the composition of the original material as closely as possible.

Concrete Stabilization

The following recommendations are appropriate for structures with designated ultimate treatments of stabilization, preservation, restoration and rehabilitation. For restoration treatments, additional work may be required to return the structure to its appearance during the period of significance.

Cracks

1. Remove any loose material. Test with wooden mallet to identify loose or unstable areas.
2. Repair cracks less than 1/16 inches wide with a mix of cement and water.
3. Repair cracks greater than 1/16 inches with a mixture of cement, sand and water. Field test crack prior to patching to determine whether the crack should be routed (widened and deepened) minimally prior to patching. Patch material must be compatible with surrounding material as determined in laboratory tests described above.
4. Apply coating to match existing or as determined by paint analysis (see below). Coating must be vapor permeable to avoid trapping moisture within walls.

Spalls

1. Remove loose material.
2. Clean corrosion from rusted reinforcing rod by wire brushing or other approved method. Immediately apply an epoxy coating to the clean reinforcing rod to discourage future corrosion. Severely corroded reinforcing rod may need to be supplemented with or, if determined non-essential by a structural engineer, removed entirely.
3. Prepare area to be patched by roughening the surface with a hammer or chisel. Wet area to be patched, and keep moist for at least one hour prior to patching.
4. Encourage bond between patch and substrate by scrubbing substrate with cement paste, or by applying a liquid bonding agent.
5. Patch the area with approved compatible material, matching the original in strength, aggregate, color, and texture. Match surface to surrounding texture.
6. For structures that were originally painted, coat with vapor permeable paint matched to

original paint color. If original color is unknown, match existing, leaving earlier paint layers intact.

Camouflage Roof Repairs

1. Survey location and size of voids.
2. Locate compatible stones to fill voids.
3. Clean voids of dust or debris.
4. Clean any exposed rusted reinforcing rod and coat with rust inhibitive coating system. Cut out reinforcing rod if not treatable and insert new reinforcing.
5. Match new concrete mix to existing in strength, aggregate, color, and texture unless testing proves original mix to be unacceptable. Match new surface to surrounding texture.
6. Install new stones in voids, back-bedding with mortar, and pinning the larger stones with stainless steel pins as determined by structural engineer.

Concrete Erosion

1. Diagnose cause of erosion and correct if possible. If cause is coursing water, consider installing drip grooves to undersides of overhanging edges.
2. If erosion is substantial, over one-and-one-half inches of lost surface material, replace lost surface material with a compatible patch as described above.
3. Apply non-staining, vapor permeable water-repellent to horizontal concrete surfaces.

Stains

1. Determine type and source of stain. If the stain is ferrous metal corrosion, locate the metal and determine the cause of the corrosion. Staining may be the first clue that reinforcing rod within the wall is corroding. If the stain is efflorescence, determine and eliminate the source of water.
2. Remove non-historic, non-functional metal attachments. Patch subsequent holes as described above under *Spalls*. See *Ferrous Metals* below for recommendations on attachments. Replace functional attachments with non-corrosive attachments, if problem continues to persist.
3. Remove stain using the gentlest means possible. Test the area first to make sure the base material is not harmed and that significant paint materials are not impacted. Use gentlest cleaning method possible, beginning with water and a bristle brush. Mild detergent or tri-sodium-phosphate solutions should be tried next. Use proprietary chemical cleaners designed for concrete as a last resort only if necessary. Non-liquid products such as "Peel-Away" may be preferred, since they would have fewer environmental impacts.

Failed Coatings

1. Conduct paint analyses to determine original paint colors and presence of lead-based paint. At this time, original colors are believed to be olive drab and gray-green. Where paint analysis cannot occur, match existing color but do not remove existing paint

layers.

- 2. Select a breathable coating material such as latex paint to avoid trapping water or water vapor within the concrete walls.

Recommended Tests:

1. In Situ Tests

- a. Sounding
- b. Mapping reinforcing rod with calibrated metal detectors
- c. Moisture meter mapping

2. Laboratory Tests

- a. Petrographic analysis
- b. Strength testing
- c. Chemical analysis

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MATERIAL DESCRIPTIONS, CONDITIONS AND REPAIRS (continued)

REPAIR PROCEDURES (continued)

Graffiti

Description

Graffiti refers to non-original surface markings. Common media include chalk, ink, pencil, spray paint, and felt-tip pen. Many of the bunker interiors along the Bayside Trail have serious graffiti problems. Some structures also feature painted or penciled markings from the period of significance. These marks may have aided in the use of the structures.

- Graffiti. Examples: Lower Base-End Station at Billy Goat Point, Base End Station Battery McGrath.
- Historic Graffiti. Examples: Markings at the Battery-End and Base-End Stations, Calef & Wilkeson, which presumably marked orientation data.



Figure 40. Transit graffiti at the Base-End Station, Batteries Calef & Wilkeson.



Figure 41. Transit graffiti at the Battery Commander Station, Battery Humphreys.



Figure 42. Graffiti on corrugated metal at Battery Point Loma Bunker Complex.

Recommendations

1. Conduct a survey to locate and determine the extent of graffiti. Retain and preserve significant graffiti.
2. Remove non-historic graffiti using the gentlest means possible. Test the area first to

make sure the substrate is not harmed and that significant paint surfaces are not removed. Begin with tri-sodium-phosphate and water and then try other chemical removers if necessary.

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Last Updated: 06-Apr-2005

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APPENDIX I (continued)

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APPENDIX I (continued)

GLOSSARY

A

AZIMUTH - In plane surveying, a horizontal angle measured clockwise from north meridian to the direction of an object or fixed point. Horizontal direction expressed as the angular distance between the direction of a fixed point (as in the observer's heading) and the direction of the object.

AZIMUTH INSTRUMENT or "SCOPE" - A small device similar in size and power to a wildlife spotting scope used for general observations of the sea and for spotting the splash from the projectiles fired from land. An instrument used to measure the azimuth angle.

B

BARBETTE - A mound of earth or a protected platform from which guns fire over a parapet.

BATTERIES - A term with several technical meanings that generally refers to one or more pieces of artillery under the command of a single individual (the battery commander) intended to concentrate their fire on a single target. The term also describes the structures erected for the emplacement, protection, and service of those guns. In the U.S. Army, the term also refers to the artillery corps unit that was the equivalent of an infantry company.

BATTERY COMMANDER'S STATION - The battery commander was in charge of all operations of a particular gun battery. The battery commander's station resembled a fire control station but usually with the addition of several rooms that housed offices, communication gear and plotting equipment and was located near or at the gun battery.

BASE-END STATION - Base-end stations were part of a remote network that tracked targets and relayed data to their associated guns via a plotting room.

BERM - A continuous bank of earth piled against a structure.

BOMB-PROOF - A structure designed to provide security against artillery fire.

BUNKER - A protective embankment or dugout; a fortified chamber mostly below ground often built of reinforced concrete and provided with embrasures. An erroneous term to describe a fire control station.

C

CASEMATE - A bombproof enclosure, generally located under the rampart, to house cannons, which fired through embrasures in the scarp.

CHECK - A small crack running parallel to the grain in wood and across the rings; usually caused by shrinkage during drying.

CORROSION - The deterioration of metal or of concrete by chemical or electrochemical reaction resulting from exposure to weathering, moisture, chemicals or other agents in the environment in which it is placed.

CORROSION STAINING - Surface stains produced by ferrous metal.

CORROSION JACKING - The expansion of ferrous metals during oxidation due to the presence of moisture. The increase in size exerts great pressure, leading to the rupture of the surrounding materials.

CRACK - A building defect consisting of fissures in a material of random width and length.

D

DEPRESSION POSITION FINDER (DPF) or "RANGE FINDER" - A large telescope with a powerful magnification up to 30x used to fix an extremely precise azimuth bearing on a target and measure the angle of depression looking down towards the target. This vertical angle could also be used to calculate the range (or elevation) of the target. The azimuth of the target is the angular distance measured along the horizon from true north (read as zero degrees) to the east (clockwise direction) to the location of the target.

E

EFFLORESCENCE - An encrustation of soluble salts, commonly white, deposited on the surface of stone, brick, plaster, or mortar; usually caused by free alkalies leached from mortar or adjacent concrete as moisture moves through it.

EMBRASURE - An opening with sides flaring outward in a wall or parapet of a fortification usually for allowing the firing of cannon.

EMPLACEMENT - The gun platform, parapet, and accessories.

ENDICOTT - In 1885, President Grover Cleveland assembled a special joint Army-Navy-civilian Board headed by his first Secretary of War, William C. Endicott, to review and submit recommendations for a coast defense program based upon newly developed weapons, particularly the 8-, 10-, and 12-inch caliber guns, and the disappearing carriage.

EROSION - Loss of surface material caused by the abrasive action of elements such as wind, rain, salt or air spray.

F

FERROUS METAL - Metal in which iron is the principle element.

FERROUS STAINING - Staining of a surface due to the oxidation of ferrous metal adjacent to, or embedded in the stained material.

FIRE CONTROL STATION or "BASE-END STATION" -Typically a small, split-level room constructed of steel reinforced, hardened concrete with walls over one foot thick that housed two spotting scopes- the azimuth and the depression position finder. Two to four soldiers were stationed there usually days or weeks at a time and had two basic duties-to watch for enemy ships and track assigned targets.

G

GALVANIZED METAL - To coat steel or iron with zinc to prevent rusting.

GARRISON - A body of troops stationed in a fort.

H

HYDROSTATIC PRESSURE - The pressure equivalent to that exerted on a surface by a column of water of a given height.

I

INCIPIENT SPALLS - Portions of loose material which have not yet detached from the remainder of the material.

J

K

L

M

MAGAZINE - A place for the storage of gunpowder, arms or goods.

MECHANICAL BREAKDOWN - The physical deterioration of a material caused by abrasion, fatigue, creep, fire, overloading or connection failure.

MORTARS - A muzzle-loading cannon with a short barrel in relation to its caliber capable of firing projectiles with low muzzle velocities at high angles; any of several similar firing devices.

N

O

P

PANAMA MOUNT - A concrete ring about forty feet in diameter with a narrow gauge rail embedded on the top in which the trails of a gun were set to allow for a 360 degree rotation of the gun.

PARAPET - A low guarding wall at any point of sudden drop, as at the edge of a terrace, roof, battlement, balcony, etc. A defense wall.

PRESERVATION - Applying measures necessary to sustain the existing form, integrity, and material of a historic property. Deterioration caused by natural forces and normal use are arrested and retarded. Maintenance and stabilization of the material are means to preserve the structure.

Q

R

RECONSTRUCTION - Depicting, by means of new construction, the form, features, and

detailing of a non-surviving structure to replicate its appearance at a specific period of time and in its historic location. Features within the period of significance are preserved and deteriorated features are repaired, or replicated.

REHABILITATION - Defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.

REPLICATION - Replication creates an exact copy of an element that is missing or damaged beyond repair.

RESTORATION - Restoration accurately presents the form, features, and character of a historic structure as it appeared at a specific period. It may involve the replication of missing historic features and removal of later features, some having cultural value in themselves.

S

SPALLING - The condition of loss of surface material in patches of varying size. Frequently, exposed reinforcing bars are visible in the spall area.

STABILIZATION - Acting to render an unsafe, damaged or deteriorated property stable while retaining its present form.

SUBSIDENCE - The condition of soil settling or falling.

T

TRAVERSE - To move or turn laterally, swivel or pivot.

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APPENDIX II (continued)

CREDITS

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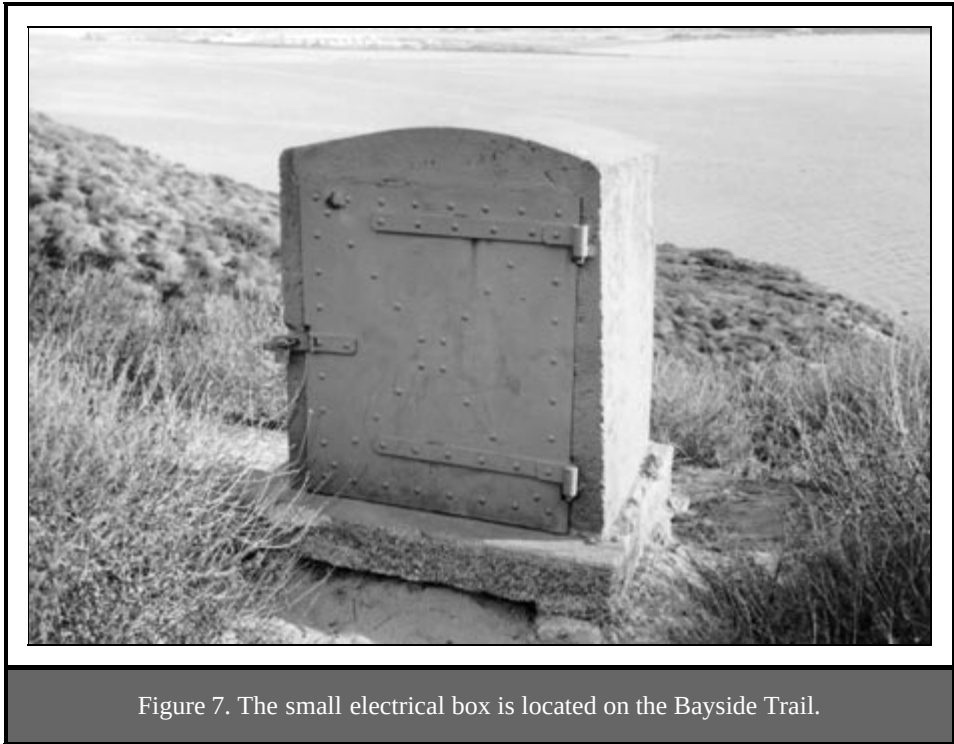


Figure 7. The small electrical box is located on the Bayside Trail.

ELECTRICAL CONNECTION BOX (Restoration)

Location

The Electrical Connection Box stands on the Bayside Trail, near Searchlight Shelter No. 18 and the Generator Station for Searchlight No. 18 and No. 19.

History

The concrete electrical connection box was installed during WWII as part of the defense modernization activity. The box was part of the artillery fire control system. Two dates appear on the box, "1941, U.S.A." on the exterior and "1909 Engineers Department U.S. Army, Colin Electric Company, New York" on an aluminum box within the metal door. The electrical connection box remains locked.

Description

Exterior

This reinforced concrete, two-foot-by-three-foot-by-four-foot high electrical connection box is rectangular in plan with tapered concrete sides capped by a continuous concrete arched top (figure 7). Painted drab green, the box sits on a six-inch concrete slab foundation. One

painted, one-eighth-inch steel plate metal door with angle iron reinforcing, rivets, and a single latch is attached to the southwest face.

Interior

The interior of the electrical connection box is concrete, except for the one-eighth-inch steel plate door. According to drawings, the box contains a ten-pin controller receptacle, a power terminal box and a junction box. Four, two-inch galvanized iron conduits disappear below ground through the concrete slab base.

Condition

Exterior

Deterioration includes: spalling concrete and exposed reinforcing metal at the north side; a concrete spall at the east face; spalling at the foundation; soil erosion exposing the foundation; metal corrosion at the top left corner of the door; and corroding metal hinges and cross bars.

Interior

The box was locked and could not be opened with the key provided to the survey team.

Structural Analysis

No significant structural concerns were noted. The spalling noted above in the exterior concrete surfaces is relatively minor and does not at this time appear to compromise the structural capacity of the box. The soil erosion at the base of the box appears to be a consequence of the location of the box, on a slope and at the side of a road/path where rainwater run-off will accumulate. The erosion does not appear to compromise the capacity of the foundation at this time.

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ARCHITECTURAL DATA (continued)



Figure 28. An overall view of the Panama Mount looking west toward the Pacific Ocean.

BATTERY POINT LOMA PANAMA GUN MOUNT (Stabilization)

Location

This structure is located on the west side of Point Loma. Nearby structures associated with these mounts include the bunker complexes and the storeroom/sleeping quarters.

History

In 1939, four 155 mm guns were brought to Fort Rosecrans. Emplacements for the guns were begun on the west side of Point Loma in 1941 when funds became available. The mounts were completed in January of 1942. The guns were emplaced on Panama mounts with a traverse of 360 degrees, located 90 feet apart from center-to-center. An underground communications trench connected the four guns. The guns were actively used during 1941-42, staffed by Battery E of the 19th Coast Artillery. This battery served as the examination or "challenge" battery for ships approaching the water areas to the west and northwest of San Diego Harbor. Following Pearl Harbor, they served as the primary anti-submarine battery. The guns were abandoned in 1943 with the completion of the 90mm AMTB Battery Cabrillo installation. Although three of the mounts are no longer visible, archaeologists uncovered the mount of gun number four during the mid-1980s.

Description

This emplacement consists of two concrete rings. An inner, ten feet in diameter circular concrete base banded with iron located at the center of the emplacement seated the gun. The outer ring is three feet wide and 38 feet six inches in diameter. The guns' trails rested and turned on the steel rails embedded in this outer ring. One of the rails is smooth, the other is toothed. The emplacement is approximately three feet high, although only about 12-inches remains visible (figure 28).

Condition

The only visible mount, number four, was stabilized when it was excavated during the mid-1980s. Stabilization included the treatment and painting of metal elements.

The central concrete portion of the mount exhibits cracking at the beveled edge and across the top surface. The steel band encircling this element is delaminated and the bolts are missing. The outer concrete ring is partially covered at the northeast side due to slope erosion. Some concrete erosion and spalling is present. All metal components show signs of corrosion and are in need of paint.

Structural Analysis

No significant structural concerns were noted. The cracking and spalls in the concrete ring structures are relatively minor and do not at this time appear to compromise the structure's capacity.

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MATERIAL DESCRIPTIONS, CONDITIONS AND REPAIRS (continued)

REPAIR PROCEDURES (continued)

Ferrous Metal

Description

Ferrous metals are those containing iron. They are widely used at Cabrillo National Monument, in a variety of applications. These include the following:

- Reinforcing steel. Used as reinforcement for concrete. Examples: all concrete structures.
- Hatch covers. Examples: Calef & Wilkeson.
- Window shutters. Examples: All base-end and battery commander stations, and underground searchlight stations.
- Ladders. Bent reinforcing steel embedded in concrete. Examples: All base-end and battery end stations, and underground searchlight stations.
- Searchlight shelter covers. Steel, hipped roof placed on tracks. Examples: Searchlight Stations No. 15 and No. 19.
- Curved steel roofs covered with concrete and stone with steel anchors for netting. Examples: Battery Commander Station Humphreys, all base-end and battery end stations.
- Metal tracks and rails. Tracks opened and closed the searchlight shelter covers. Metal rails on the Panama Mounts positioned guns. Examples: Searchlight No. 15 and No. 19, Battery Point Loma Gun Mount.
- Metal-covered wood doors. Examples: Searchlight Shelter No. 18.
- Solid metal doors. Examples: Generator Station for Searchlight No. 18 and No. 19.
- Vertical steel bars. Examples: Generator Station for Searchlights No. 18 and No. 19.
- Four-foot steel pipe filled with concrete. Examples: Part of the transit system near Battery Bluff Gun Emplacements.
- Galvanized corrugated iron barrel vault. Examples: Battery Point Loma Bunker Complex.

- Pipe railing. Used for handrails. Examples: Base-End Station Battery Ashburn,
- Piping and conduit. Examples: Most structures.
- Counter-weighted elevator mechanism with chain sprocket drive. Used to raise the searchlight platform above ground. Examples: Searchlight Shelters No. 15 and No. 19.



Figure 36. Coating failure and corrosion at Searchlight Shelter No. 15.



Figure 37. Metal corrosion of hatch at the Battery Commander Station, Battery Humphreys.

Conditions

Surveyed metals display the following conditions: failed or missing coatings, corrosion, mechanical breakdown, connection failure, and missing elements.

Failed or Missing Coatings

The two primary protective coating types used at Cabrillo are paint and galvanization. Coating loss or deterioration exposes the metal, which begins to oxidize or corrode. Missing or failing coatings were observed on hatch covers, window shutters, searchlight shelter covers, and pipe railings. Consequently, these features display varying stages of corrosion.

Corrosion

When ferrous metal oxidizes, a chemical reaction between the metal and oxygen occurs. Contributing to the deterioration are many of the natural salts, including those found in mud, marine plants and salt water, common to the coastal environment. These salts include halides such as fluorides, chlorides, bromides, and iodides, and are a major cause of metal corrosion. When corrosion occurs, the metal begins to break down and return to its natural ore state. In addition, corroding metal expands. In the case of corroding reinforcing rod, this expansion leads to the spalling of adjacent concrete.

Corrosion rates depend not only upon the environment, but also upon material thickness. Thick metal plate, which is typical of the shelter covers, hatch covers and window shutters, may take years to wear through. Deferred maintenance might not appear to cause immediate problems, but in the long run, the metal will eventually corrode away, leaving little or nothing to preserve.

In addition, corrosion products are unsightly. Rust mixed with rainwater washes onto concrete and other surfaces, causing material staining.

Mechanical Breakdown

Metal elements can fail from physical abuse such as abrasion, fatigue, and stress corrosion cracking. Metal piping filled with concrete, as is found at Battery Bluff transit pole, results in mechanical breakdown, in addition to corrosion from moisture build-up in the concrete, when the concrete expands and contracts at different rates than the metal. Protective coatings may also delaminate because of mechanical breakdown.

Connection Failure

Connectors used at Cabrillo include bolts, braces, rivets, pins and welds. Connection failure may result from overloading, fatiguing, and corrosion. Corrosion will also make connectors more susceptible to stress failure, as is the case in some hatch covers.

Missing Elements

Missing metal elements include those which have been misplaced, vandalized, or deliberately removed. These elements include metal shutters, hardware, non-functioning plumbing pipes, flue pipes, etc.



Recommendations

General Metal Repair Methodology:

1. Begin with a field survey to identify and locate all problems. This survey can and should be done in conjunction with the survey of other materials. Missing coatings, corrosion, mechanical breakdown, connection failure, missing elements, and other conditions should be mapped on elevation, floor plan and roof plan drawings.
2. Test metal with a magnet to confirm metal type. Ferrous metal will respond to magnetism, other metals will not.
3. Determine the degree of failure for the element and the degree of repair required. For

example, if a missing coating has caused limited surface corrosion, then only cleaning and replacement of the coating will be necessary. If severe corrosion has worn away sections of pipe railing, then patching or full replacement may be required.

4. On structures where repair work is not immediately scheduled, mark, cover, or rope off dangerous areas to prevent risk to visitors or park staff.
5. Make sure any new metal is physically and visually compatible with surrounding existing metal. Repair material should match the original metal type, composition, dimension, surface texture and coating appearance.

Ferrous Metal Stabilization

The following recommendations are appropriate for structures with designated ultimate treatments of stabilization, preservation, restoration and rehabilitation. For restoration treatments, additional work may be required to return the structure to its appearance during the period of significance.

Missing Coatings and Corrosion

See *Concrete*, above, for more about reinforcing rod. See *Paint*, below, for more about paint analysis and coating selection.

1. Before removing any paint, conduct paint analysis to determine the historic paint sequencing and presence of lead-based paint (see *Paint*, below).
2. Remove rust and most of the surrounding paint. Determine the extent of failure, corrosion and surface detailing before determining the removal method. Potential methods include wire brushing, grit blasting, flame cleaning, or chemical methods. Grit blasting is inappropriate for in situ cleaning at Cabrillo National Monument, but may be appropriate for elements which may be removed for off-site treatment. The presence of lead-based paint will also affect the choice of removal method (refer to the *Paint* section for recommendations).
3. Remove all loose, flaking, and deteriorated paint and corrosion to bare metal.
4. Degrease surface and prime immediately.
5. Paint Selection: Option One - Two coats of Alkyd rust-inhibitive primer, followed by alkyd enamel finish coats. Do not use latex or other water-based paints. Option Two - high-performance coatings, such as zinc-rich primers containing zinc dust, and modern epoxy coatings, should be considered to allow for longer-lasting protection. Note: These coatings typically require highly clean surfaces and special application conditions that can be difficult to achieve at some sites. Flashings or new metal may need three primer coats followed by compatible finish coats.
6. Apply paint. Ensure that all surfaces are dry. Do not paint when temperatures are expected to fall below 50 degrees Fahrenheit within 24 hours or when relative humidity is above 80 percent. Brush apply or use an airless sprayer, being careful to protect adjacent surfaces and landscape from overspray. Do not use rollers for primer coat applications.

Connection Failure

1. Repair failed attachments at hatches, doors, or shutters by tightening or replacing

connectors. Match connector size and type, using stainless steel connectors if possible to avoid future corrosion. Avoid combining dissimilar metals, such as copper and steel. Repair failed riveted connections by spot-welding.

Severe Deterioration and Mechanical Breakdown

1. Severely deteriorated metal: cut out the failed metal and replace with new castings spliced in place by welding or brazing. Use an epoxy-patching compound designed for ferrous metal repairs to patch small voids.
2. Where concrete infill has resulted in mechanical breakdown or corrosion, take apart if possible and remove concrete. Clean away rust, prime the interior, paint elements, and reassemble. If the element is severely deteriorated, replicate the piece with new material.

Missing Elements

1. Locate any elements that may have been put in storage or placed nearby and reattach to structure.
2. Duplicate and attach elements that are missing, such as window shutters. For small elements, such as hardware, these can be used as casting patterns. For large elements, create patterns made slightly larger in size to compensate for 1/8 inches per foot shrinkage during casting.
3. Coat the replaced metal element following the paint procedure described in *Missing Coatings and Corrosion*.
4. Substitute materials, including aluminum and zinc castings, should be considered only as a last resort. These materials may have different expansion and contraction coefficients, and may require different future care than the original iron and steel products.

Recommended Tests

1. Paint Analysis. See *Paint*, below.
2. In situ magnetic analysis.

Ferrous Metal References:

Look, David, Margot Gayle, and John Waite. *Metals in America's Historic Buildings*. U.S. Department of the Interior, National Park Service Cultural Resources, Preservation Assistance, Washington, D.C., 1992.

Ashurst, John, and Nicola Ashurst with Geoff Wallis and Dennis Toner. *Practical Building Conservation: English Heritage Technical Handbook; Volume 4 Metals*. Aldershot, Hants: Gower Technical Press, 1988.

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MATERIAL DESCRIPTIONS, CONDITIONS AND REPAIRS (continued)

REPAIR PROCEDURES (continued)

Paint

Description

Paint is used to protect substrate material as well as to add color for aesthetic or otherwise functional reasons. Many structures at Cabrillo use paint as a means of camouflage. The painted surfaces at Cabrillo are briefly discussed in the *Concrete*, *Metal*, and *Wood* sections.

- Painted concrete. Examples: Searchlight Station 18, Electrical Connection Box, Base End Station Calef & Wilkeson, Base End Station Battery McGrath, Battery Command Station Humphreys, Generator Station for Searchlight Nos. 18 & 19
- Painted metal. Examples: All structures.
- Painted wood. Examples: Army Radio Station, Searchlight Shelter Nos. 15 & 19, Generator Station for Searchlight No. 18 & 19, Base-End Station Calef & Wilkeson, Base-End Station Woodward & Grant.
- Historic paint colors. Examples: Surfaces painted in drab gray and green blended the structures with their surroundings. Most structures had paint of a specific color.

Conditions

Paint Deterioration

In addition to being unstable, deteriorated paint can accelerate the deterioration of the substrate.

Lead-based Paint Health Hazards

Lead-based paint that has flaked or been detached from a structure is a health hazard if inhaled or ingested, especially for small children. Lead-based paint was used widely in interiors and exteriors up until 1978, when it was partly banned by the federal government. Many of the metal surfaces at Cabrillo were given a primer of lead-based paint by the NPS in 1980.

Recommendations

Research original documents to determine what elements were painted and the type of paint used. A general maintenance plan should be created to include inspection of painted surfaces.

The life span of paint can be anywhere from five to ten years, depending upon the type of paint, the application method, and the environment where the structure is located.

1. Survey structures to locate painted surfaces and condition of those surfaces. Locate and protect areas having significant graffiti.
2. Hire a hazardous material consultant to locate and test areas incorporating lead paint.
3. Conduct paint analysis to determine original paint materials and color schemes.

Paint Deterioration

1. Maintain painted surfaces to protect substrates. Refer to specific material sections for repair recommendations.

Lead-based Paint

1. Follow *the Secretary of the Interior's Standards for the Treatment of Historic Properties*. These guidelines will prevent extensive loss or modification of architectural features and finishes on historic properties. Lead-based paint that is not causing a hazard is permitted to remain at a site, therefore retaining important features.
2. Undertake a risk assessment of interior and exterior surfaces to determine the hazards from lead and lead-based paint.
3. Evaluate the options for lead hazard control in the context of historic preservation standards. Encapsulation is often an acceptable option for sound lead paint surfaces. The mitigation plan should be reviewed by a preservation architect.
4. Follow all worker safety standards, *OSHA 29 CFR Part 1926, Lead Exposure in Construction; Interim Final Rule*. Worker safety can include the following issues: respirator use, monitoring blood and dust levels, and protective equipment. Lead abatement work should always be performed by trained abatement technicians.
5. Compliance. Comply with all federal, state and local laws regarding lead-based paint abatement, environmental controls and worker safety. Dispose of all hazardous waste according to applicable laws. Some removal methods can generate lead-contaminated dust, which can be dangerous to workers and residents.

Historic Colors

1. Have a conservator or paint specialist conduct a paint color analysis for all structures to determine original color schemes and paint types. Match colors to the Munsell Color Notation System or other color standard.
2. Maintain buildings and building elements by painting with recommended paint color.
3. Prior to any building repairs, make sure the historic colors are fully documented before any removal is conducted. If paint stripping is to occur, if possible leave an in situ area of historic paint layers intact as documentation for future researchers.

Recommended Tests:

1. Paint Analysis
2. Lead tests

Paint References:

Batcheldor, Penelope Hartshorne. *Paint Color Research and Restoration*. Technical Leaflet 15. Nashville: American Association for State and Local History (undated).

Park, Sharon C., and Douglas C. Hicks. *Preservation Brief No. 37: Appropriate Methods for Reducing Lead-Paint Hazards in Historic Housing*. Washington D.C., U.S. Department of the Interior National Park Service Cultural Resources, Preservation Division, 1995.

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Park, Sharon C. *"What to do about Lead-Based Paint," CRM Bulletin*. Washington, D.C.: U.S. Department of the Interior, National Park Service. Vol. 17, No. 4, 1994.

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ARCHITECTURAL DATA (continued)

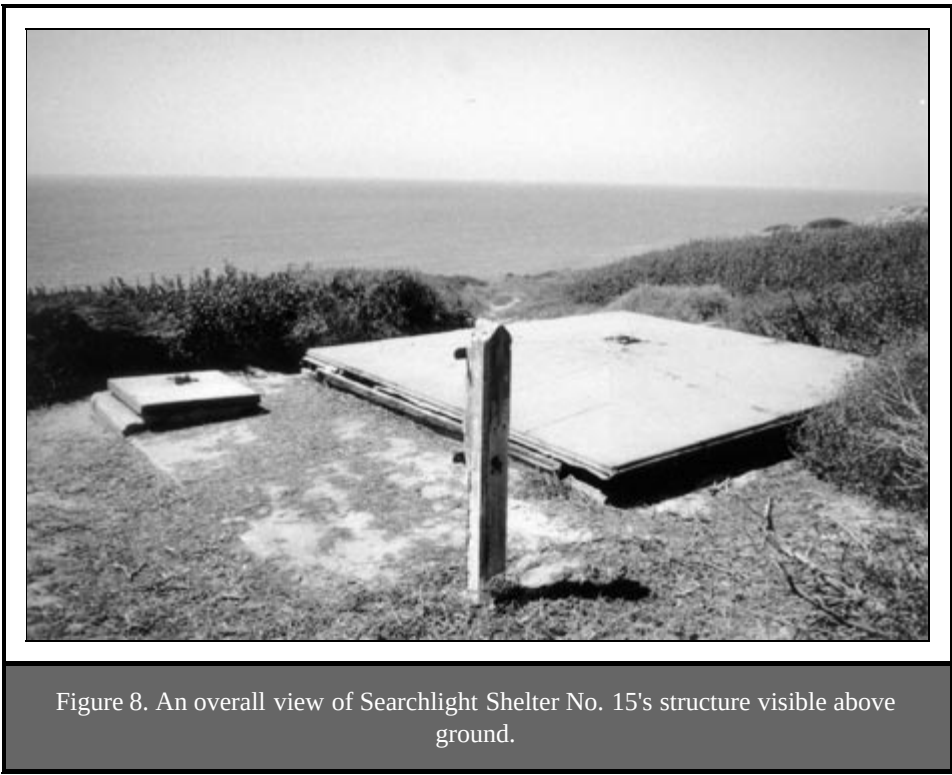


Figure 8. An overall view of Searchlight Shelter No. 15's structure visible above ground.

SEARCHLIGHT SHELTER NO. 15 (Preservation)

Location

This searchlight is located on the west side of Point Loma. The nearby generator that originally supplied power to it is no longer visible or accessible.

History

Constructed during WWII, this structure sheltered a 60-inch coastal searchlight previously mounted on a counterweighted elevator. The structure is similar to other structures at the monument dating c.1916-1921. The searchlight (now missing) and its operating mechanism were salvaged from the defunct, c. 1921 Searchlight No. 4. To prevent vandalism, the metal roof of the shelter was sealed, and the structure remains closed to the public.

Description

Exterior

This is a reinforced concrete, rectangular plan, multi-level underground searchlight shelter. The mechanized, hipped, riveted metal roof (figure 8), painted green, rests on a wooden curb.

Metal rails mounted on concrete extend to the north, originally allowing the retracting roof to slide open, exposing the counterweighted searchlight platform and its searchlight. The interior of the shelter is accessed through a riveted metal hatch, also painted green, located in the southwest corner. An above-ground, concrete post formerly supporting a telephone box stands at the southeast corner of the shelter. The roof operating mechanism is located at grade at the northeast corner.

Interior

This multi-level rectangular space features concrete flooring and walls with visible formwork lines. The ceiling is the exposed underside of the steel roof. The shelter is accessed through a manhole at grade located in the southwest corner. Steel rungs embedded into the concrete wall serve as a ladder leading into the personnel portion of the shelter. Nine-feet-six-inches deep, the operator area contains a cable pit that provided electrical service from the nearby generator. The 15-foot, two-inch deep lower space, containing the counterweighted elevator, is accessed by a metal ladder. The elevator is operated manually with a chain sprocket drive (figure 9).

Condition

Exterior

The metal roof vent is missing from the roof of this structure, as is the original square metal entry hatch which was replaced with the current sheet metal one at some point. The roof exhibits heavy overall corrosion with concentrations at the edges. Corrosion appears at all riveted connections and at the metal half-round trim piece that is also bent. Heavy corrosion damage is present on the north and east sides of the roof. Originally retractable, the roof has been sealed closed. The wood curbs supporting the roof are deteriorated, especially to the south where the curb has split horizontally into two pieces. The concrete at the entry hatch exhibits cracks. Spalls are present along the beveled concrete edge that supports the roof assembly, especially on the west side. Reinforcing rod corrosion stains are visible on all concrete surfaces.

Interior

All steel elements exhibit corrosion. The base of the elevator framework is severely corroded. The concrete is generally in sound condition, although efflorescence is visible at the ceiling near the elevator gear traces and rust stains run down the west wall below the entry hatch. Graffiti on the south wall includes some appearing to date from 1946.

Structural Analysis

Similar to Searchlight No. 19, the concrete surfaces exhibit some spalling and cracking, which is relatively minor and does not at this time appear to compromise the structure's capacity. The concrete deterioration at this searchlight appears slightly worse than at Searchlight No. 19. The spalling at the concrete post appears to be the result of inadequate concrete cover to the reinforcing during the original construction.

Also similar to Searchlight No. 19, the steel elevator platform and frame for the searchlight, and the steel roof cover, are corroded. For the most part, this appears to be primarily superficial and is unlikely to have compromised the structural capacity of the main steel members. However the capacity of the bolts and brackets connecting the members together may have been reduced significantly.





Figure 9. Interior view of the elevator platform operating mechanism.

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ARCHITECTURAL DATA (continued)



Figure 26. This concrete gun emplacement is partially buried.

BATTERY BLUFF, NORTH AND SOUTH GUN EMPLACEMENTS (Stabilization)

Location

These gun emplacements, located at the edge of a bluff overlooking San Diego Bay, are reached from the Bayside Trail. Public access is prohibited.

History

Constructed in 1942, this World War II battery consists of two mounts located on the east side of Point Loma, at the edge of a high bluff overlooking the Bay. Serving as an anti-motor torpedo boat battery, it protected the entry channel to San Diego Harbor. Each mount held a 37mm M3E1 gun. An azimuth instrument was mounted on the associated four-foot steel pipe filled with concrete to the north, when the battery was active.

Description

Each semi-circular concrete emplacement is three feet wide and originally two feet high on the inside (figures 26 and 27). Although partially buried, approximately 13-inches of the two-foot high emplacement remains visible. Eight bolts attaching the weapon's base plate are embedded into concrete at the center of the northern emplacement, but if they remain at the

southern emplacement, they are no longer visible. Traces of paint are visible on the inside concrete surface of the south emplacement. Remains from associated wood structures are nearby, in addition to the azimuth instrument pole.

Condition

Due to erosion, these two emplacements are now perched precariously at the cliff edge. Both are partially filled in with sand and vegetation. A fissure present in the soil 12-inches in front of the south gun emplacement jeopardizes the structure. Cracks in the concrete mount are visible signs of ground instability. Plant growth is present in one of the surface cracks, accelerating deterioration. The north gun emplacement remains about three feet from the cliff edge. Site instability limits the life span for these structures.

Structural Analysis

The major concern associated with these emplacements is the stability of the cliff-top where they are located. The edge of the cliff is only two or three feet from the front of the north emplacement, and it is only a matter of time before the cliff erodes back to the face of the emplacement. The south emplacement is further back from the cliff-top, however it appears to have settled at the front side and is now slightly tilted. The concrete ring structures themselves are in reasonable condition, although the south emplacement has large circumferential cracks (up to one-half-inch wide) in the concrete.



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MATERIAL DESCRIPTIONS, CONDITIONS AND REPAIRS (continued)

REPAIR PROCEDURES (continued)

Wood elements

Description

Wood is not used extensively at Cabrillo National Monument, although it is found on some structures. Various applications include the following:

- Wood-framed roof. Examples: Army Radio Station.
- Wood doors. Examples: Army Radio Station.,
- Metal-clad wood doors and frames. (See Ferrous Metal Section)
- Wood windows. Examples: Generator Station for Searchlight No. 18 and No. 19, Army Radio Station.
- Wood curb at searchlight shelter roofs. Examples: Searchlight Shelters No. 15 & No. 18
- Wood furniture. Cabinets, shelves, and benches constructed for use in structures. Examples: Searchlight Shelter No. 15 and No. 19, Base-End Station Calef & Wilkeson, and Base-End Station Woodward & Grant, and bunk beds at Battery Point Loma Bunker Complex.
- Trim. Wood trim used around doors, windows, etc. Examples: Army Radio Station.

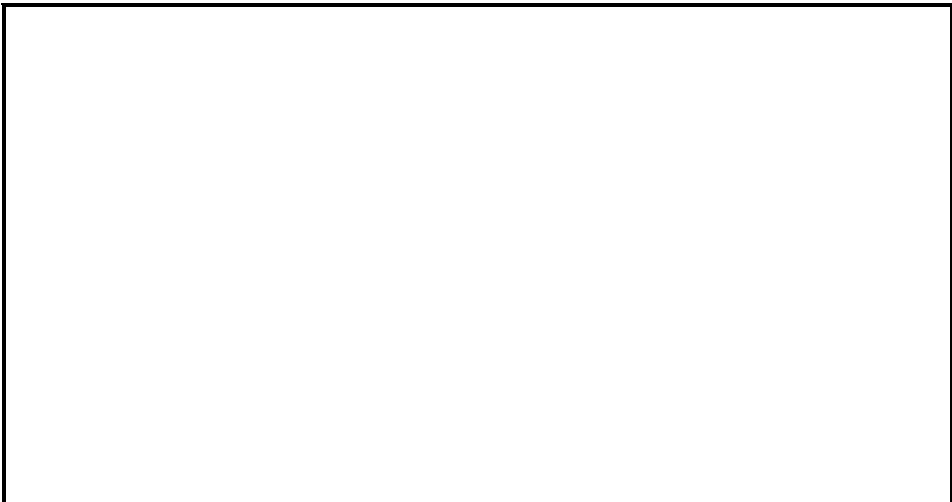




Figure 39. Deteriorated wood curb at Searchlight Shelter No. 15.

Conditions

Weathered Wood, Dry Rot, and Splitting

Wood is vulnerable to biological decay from exposure to moisture. Rapid cycles of wet and dry conditions in poorly protected wood causes cracking and checking that will lead to further decay. Searchlight Shelters No. 15 and No. 19 exhibit this condition at the wooden curbs surrounding the metal roofs. The unpainted curbs are exposed to salt spray and ocean winds, resulting in checking and dry rot as well as detachment.

Missing Elements

Missing wood elements are typically small trim pieces. Although these losses are non-structural, they are an architectural concern. Wood may become detached because deterioration or checking has weakened mechanical fastenings, or through theft or vandalism. Wood elements are easy to detach and if not reattached immediately will be lost.

Missing Paint

Unprotected wood can decay if left exposed. Blistering and peeling paint are the first signs that the structure is in need of maintenance. See *Paint* section, below, for more information.

Insect Damage

Although no insect damage was observed during the survey leading to this report, insect inspections should be a regular feature of periodic maintenance. These inspections would identify any ongoing attacks before they became serious. Insects causing damage to wood include beetles, ants, bees, wasps, and termites. It is important to identify the attacking insect. Relevant information includes type of wood attacked, the age of the wood, the type of damage, and the consistency of the boring dust.

Recommendations

Research original documents to determine whether wood elements were originally painted.

Conduct a paint study to determine color schemes. Since the concrete structures appear to have been originally painted, it is likely that wood elements were likewise painted.

General Wood Repair Methodology:

1. Survey the existing condition of all wood elements.
2. Sample woods and send to a laboratory for identification. (The U.C. Forest Products Laboratory in Richmond, California, performs this service.)
3. Remove all dirt, debris and miscellaneous attachments.
4. Remove any finishes if loose, blistering or peeling.
5. Treat wood elements selectively with fungicide and brush-on consolidant as required.
6. Replace-in-kind or consolidate deteriorated wood elements as required.
7. Treat with wood preservative and finish to match adjacent material.

Wood Windows

In addition to items 1-6 under *General Wood Repair Methodology*, above, perform the following:

1. Restore window to proper operation.
2. Install new hardware, where missing, to match original.
3. Install new glazing where cracked or missing.
4. Replace glazing compound.
5. Prepare wood surfaces, prime, and paint.

Wood Doors

In addition to items 1-6 under *General Wood Repair Methodology*, above, perform the following:

1. Repair splits and separations with waterproof glue as required.
2. Finish to match adjacent, if any, or finish to match original.
3. Recondition hardware, and install new hardware, where missing, to match original.

Recommended Tests

1. Wood identification.
2. Paint analysis (see *Paint*, below).

Wood References:

Myers, John H. *Preservation Briefs No. 9: The Repair of Historic Wooden Windows*. Washington D.C.: Preservation Assistance Division, National Park Service, U.S. Department of the Interior, 1981.

Look, David W. *Preservation Briefs No. 10: Paint Removal from Historic Woodwork*.
Washington D.C.: Technical Preservation Services, U.S. Department of the Interior. 1982.

Ashurst, John, and Nicola Ashurst with Geoff Wallis and Dennis Toner. *Practical Building Conservation: English Heritage Technical Handbook; Volume 5 Wood, Glass & Resins*.
Aldershot, Hants: Gower Technical Press, 1988.

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MATERIAL DESCRIPTIONS, CONDITIONS AND REPAIRS (continued)

REPAIR PROCEDURES (continued)

Bituminous Roofing

Description

The flat roof at the Army Radio Station is covered with composition roll roofing. Roll roofing is a type of built-up roofing that consists of paper or felt saturated with tar, asphalt, or other waterproofing compounds. The material is rolled out parallel to the eaves and lapped one or two inches over the course next to it. Roll roofing is not long lasting and tends to buckle, but it is a quick, inexpensive method of covering structures.

Condition

The composition roll roofing material on the Radio Station was recently replaced. In February of 1999, the old roll roofing was removed, the wood decking beneath was surveyed, new bituminous roll roof was applied, and the seams were sealed.

Recommendations

Survey the roof annually for buckling and leaks, especially at seams, penetrations, and at the edges. Properly applied, this material should have a life expectancy of five to ten years.

Grade and Vegetation Issues

Description

Many of the Cabrillo structures are constructed underground, partially underground, or were historically topped with a camouflage of earth and vegetation. As a result, three conditions occur: hydrostatic pressure, erosion and subsidence, and excessive or out-of-control vegetation.

- Hydrostatic pressure build-up. Examples: Army Radio Station and all underground or partially underground structures.
- Subsidence. Examples: Battery Bluff North and South Gun Placements.
- Excessive Vegetation: Examples: All structures with camouflage roofs.

Conditions

Hydrostatic Pressure

Hydrostatic pressure is lateral pressure exerted by water-saturated soils on an underground or partially underground structure. This condition may cause structural deformation as well as water infiltration.

Water Infiltration

Water infiltration from either standing water or hydrostatic pressure can create moisture-related problems within walls (such as reinforcing rod corrosion), as well as moisture problems at the interiors of the structures.

Subsidence and Erosion

Subsidence refers to the settling or collapse of unstable terrain. Battery Bluff is subsiding and falling into the water below. If this condition is allowed to continue, the Battery Bluff Gun Placements will be lost. Erosion refers to the gradual washing away of loose soils.

Excessive Vegetation

Excessive or out of control vegetation can cause damage from invasive roots and by holding moisture against building materials.

Recommendations

1. Hydrostatic pressure and moisture penetration can only be completely alleviated by digging around foundations and applying watertight membranes at the exterior of the structures. This is a costly and invasive solution and is recommended only as a last resort. Observing hillside drainage above and around the structures may provide mitigation. Create swales as required to divert water away from structures.
2. Subsidence: Consult a soils engineer to determine the extent and rate of subsidence. The soils engineer may establish a monitoring program, and recommend mitigation procedures. These procedures should be reviewed by a park ecologist. Structures in danger of loss from subsidence should be thoroughly documented.
3. Erosion: Clear away all loose soil and restore pathways around the structures.
4. Monitor the vegetation surrounding the structures. If the vegetation becomes invasive and destructive to the concrete roofs or other adjacent material, survey the plant types, remove the vegetation, repair the roof system, and determine if, and to what degree the vegetation should be replanted. As part of the repairs, provide a watertight membrane at the concrete surface before replacing the earth and vegetation.

Recommended Tests

1. Hire a soils engineer to study subsidence conditions.

Grade and Vegetation References:

Scott, Gary. *Historic Concrete Preservation Problems at Fort Washington, Maryland*. APT Vol. X No. 2, 1978.

Weaver, Martin and Frank Matero. *Conserving Buildings: Guide to Techniques and Materials*. Chapter 12, *Foundations and Footings*. John Wiley & Sons, Inc., New York, 1993.

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ARCHITECTURAL DATA (continued)



Figure 10. Originally 75-feet of narrow-gauge rail extended out, but only five feet remain today.

SEARCHLIGHT SHELTER NO. 18 (Restoration)

Location

This structure is located on the Bayside Trail, near Searchlight Shelter No. 19 and the Generator Station for Searchlight No. 18 and No. 19.

History

Constructed in 1918-1919, this World War I structure sheltered a 60-inch searchlight mounted on narrow-gauge rails. The approximately 75 feet of rails extended from the structure up the Bayside Trail, allowing the searchlight movement to a point overlooking the harbor entry. Originally named Searchlight No. 5, the searchlight shelter was renamed No. 11 in 1936 when additional searchlights were added to the coastal defense system. The searchlight was renamed No. 18 during WWII. This structure currently contains a searchlight, which is not the original. The searchlight is not mounted on the tracks inside the shelter. The shelter remains closed to the public.

Description

Exterior

This single-story reinforced concrete structure is rectangular in plan. Its flat, vegetation-camouflaged roof features a drip edge at the front, and a twelve inch diameter clay ventilation pipe penetrating the roof toward the rear of the structure. Thirteen foot high double access doors are wood-framed, clad in metal, and painted drab green (figure 10). The remains of the narrow gauge rails protrude from underneath these doors, terminating approximately five feet in front of the structure.

Interior

The single, rectangular room features a concrete slab floor, and concrete walls and ceiling with visible formwork lines. A cable pit near the doors provided electrical service from the nearby generator station. Removable two-by-four wood boards cover the cable pit, currently filled with water. Iron narrow-gauge rails, visible from the exterior, are embedded in the concrete floor, stopping halfway into the interior (figure 11).

Condition

Exterior and interior

The building is in good condition. Deterioration includes erosion of the surrounding hillside, minor corrosion at the doors, and damage to the clay vent pipe.

Structural Analysis

No significant structural concerns were noted. The concrete is in good condition with only very minor cracking.



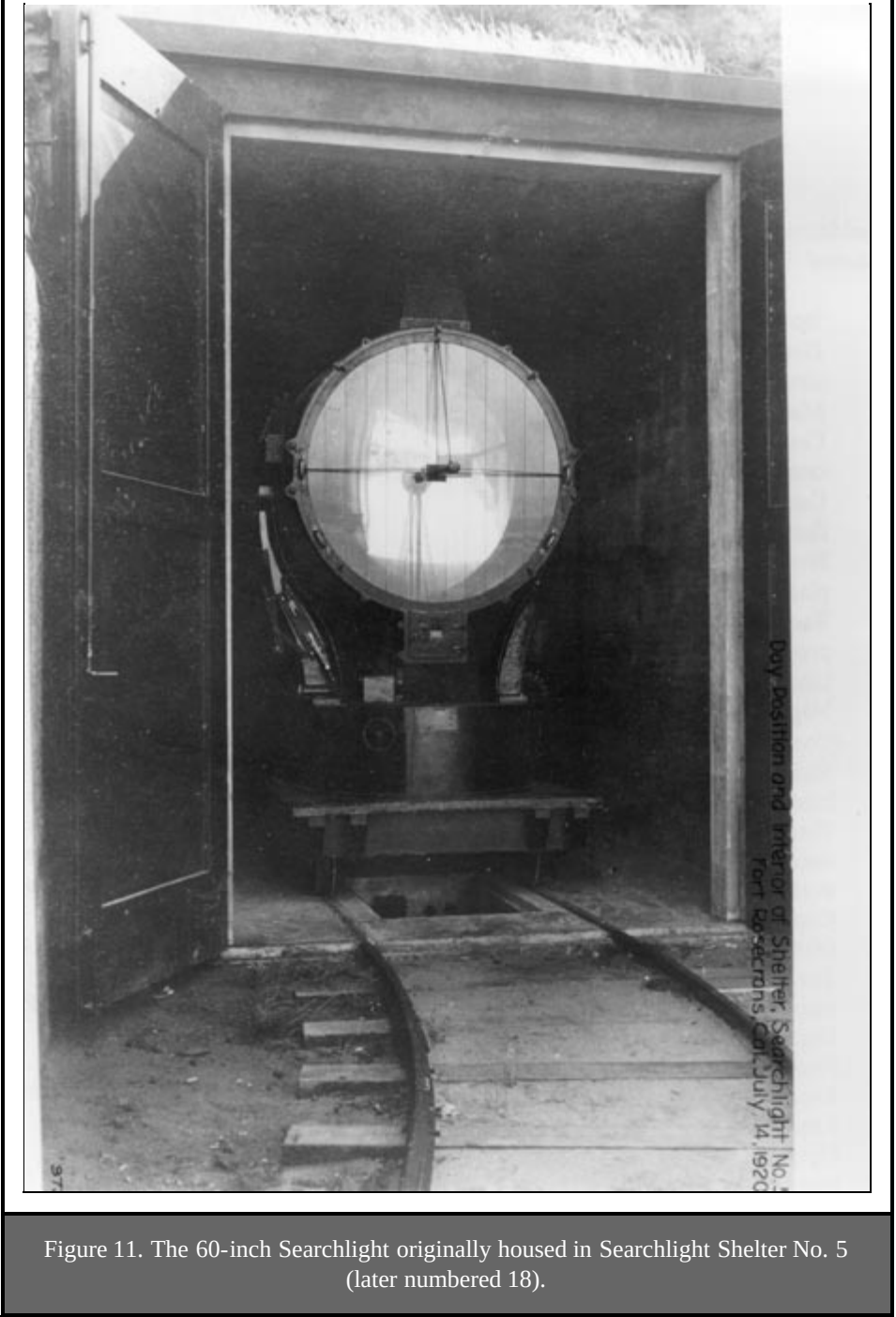


Figure 11. The 60-inch Searchlight originally housed in Searchlight Shelter No. 5 (later numbered 18).

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ARCHITECTURAL DATA (continued)



Figure 24. Rough-textured concrete provides camouflage for this structure.

BATTERY COMMANDER AND BASE-END STATION, BATTERY ASHBURN (Restoration)

Location

This battery commander station and base-end station, one of six for Battery Ashburn, is located west of the Army Radio Station.

History

Constructed c. 1936-1941 for use during WWII, the upper level served as a battery commander's station and the lower level was the base-end station and sleeping area. The five structures associated with the Battery supplied tracking data to Ashburn's two 16-inch coastal guns. The station closed in 1948. Later used as a whale watching station and a darkroom, the structure currently is vacant and closed to the public.

Description

Exterior

Battery commander's station is a multilevel, partially underground battery and base-end station comprising two semi-circular concrete mounds. Constructed with reinforced concrete

using formwork for the foundation walls and rough camouflage techniques for the finish, the half buried structure cascades down the hillside (figure 24). The roof is a continuation of the concrete camouflage walls, formed of large aggregate, rough concrete. Concave voids at the edges appear to have been formed using approximately nine-inch diameter rock-like forms wrapped in burlap, pressed into the wet concrete. Rough drainage grooves penetrate the roof concrete. A stairway with pipe handrails descends to an exterior metal door. Observation slots facing the Pacific Ocean at both levels have six solid metal, rectangular shutters arrayed geometrically. Ferrous metal hook-and-eye hardware allows the shutters to be fixed in either the open or closed position.

Interior

This two-story structure contains three rooms, one on the upper and two on the lower level. All three rooms are rectangular in plan with concrete floors, walls and ceilings. The lower-level rooms are accessed from the battery commander's station through a manhole in the floor with a removable wood trapdoor. Steel rungs embedded into the concrete wall serve as a ladder. This space contains fluorescent light fixtures, plywood shelving, miscellaneous conduit, a circuit breaker and a junction box (figure 25). The space directly below was used for sleeping. This area contains a single-bulb light, miscellaneous conduit, a terminal block and telephone box. The forward lower-level room was the base-end station used for observation, separated from the sleeping area by a single, wood paneled door and five concrete steps. This space contains plywood shelving and drain board, wood two-by-four railings at the steps, water pipes, faucet and a steel sink.

Condition

Exterior

Concrete wall deterioration includes cracked and spalled sills and severely spalled stairway headers. All ferrous metal, including the shutters, shutter hardware and pipe railing, was badly corroded in 1998. Although abated and primed in 1999, it still requires a finish coat. Conduit extends through the base concrete wall at various locations. The staircase is missing its pipe railing.

Interior

The interior of the building features minor concrete spalls and flaking paint throughout. Steel shutters are primed, fixed in place and boarded over. Built in furnishings, including a window and chart shelf at the forward lower level room, are missing. Original conduit feeding holes in the concrete walls have been plugged in most cases.

Structural Analysis

No significant structural concerns were noted during the review this structure.





Figure 25. Embedded metal ladder rungs provide access to both floors of Ashburn's base-end station.

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ARCHITECTURAL DATA (continued)



Figure 12. Only the metal roofs and a concrete post are visible above ground.

SEARCHLIGHT SHELTER NO. 19 (Preservation)

Location

This structure is situated on a bluff above the Bayside Trail, near Searchlight Shelter No. 18 and the Generator Station.

History

Constructed in 1918-1919, this World War I structure sheltered a 60-inch searchlight mounted on a counterweighted elevator. Originally named Searchlight No. 6, the searchlight shelter was renamed No. 12 in 1936 when additional searchlights were added to the coastal defense system. The searchlight was renamed No. 19 during WWII. This structure no longer contains a searchlight. The shelter remains closed to the public.

Description

Exterior

This reinforced concrete, multi-level underground structure features a square, mechanized roof that moves north on metal tracks embedded in concrete curbs. The riveted, metal hipped

roof, painted green, rests on a wooden structure (figure 12). The roof slides north to completely expose the main room of the structure and the counter-weighted elevator platform below. A single, solid, riveted metal hatch, located at the south end provides access to the structure. A cog and chain roof opening mechanism is located at grade, west of the roof. An above-ground, single concrete post situated also to the west of the roof, originally supported a communications control box.

Interior

The interior is bi-level. The southern third of the space comprises the operator area, while the remainder drops down to house the searchlight lift. The space features concrete slab floors and walls with visible formwork lines. The exposed underside of the steel roof cover forms the ceiling (figure 13). The shelter is accessed through a manhole at grade. Steel rungs embedded into the concrete wall serve as a ladder leading into the upper, personnel portion of the shelter. Nine-feet, six-inches deep, this space contains a cable pit that provided electrical service from the nearby generator station, and a wood tongue-and-groove closet located in the southeast corner. The closet features a five-panel wood door and shelving. The 14-foot deep lower space containing the counterweighted elevator is accessed from the personnel area by a metal ladder. The elevator is operated manually with a chain sprocket drive. Traces of gray-green paint remain on the walls.

Condition

Exterior

Deterioration includes minor cracking at the concrete walls; rotting wood at the roof base; corrosion at the metal roof and platform mechanism; and cracking, spalling and exposed reinforcing rod at the concrete post. The metal cover is sound with some corrosion evident at the edge, although it is no longer firmly attached. Invasive vegetation covers part of the structure and the roof tracks.

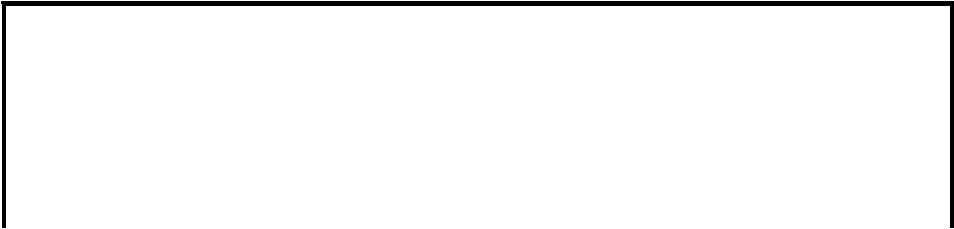
Interior

The concrete walls exhibit minor deterioration including spalling concrete over the control area.

Structural Analysis

As noted above, the concrete surfaces have some spalling and cracking, which is relatively minor and does not at this time appear to compromise the structure's capacity. The spalling and exposed reinforcing rod at the concrete post appears to be the result of inadequate concrete cover to the reinforcing during the original construction.

As noted above, the steel elevator platform and frame for the searchlight, and the steel roof cover, are corroded. For the most part, this appears to be primarily superficial and is unlikely to have compromised the structural capacity of the main steel members. However the capacity of the bolts and brackets connecting the members together may have been reduced significantly.



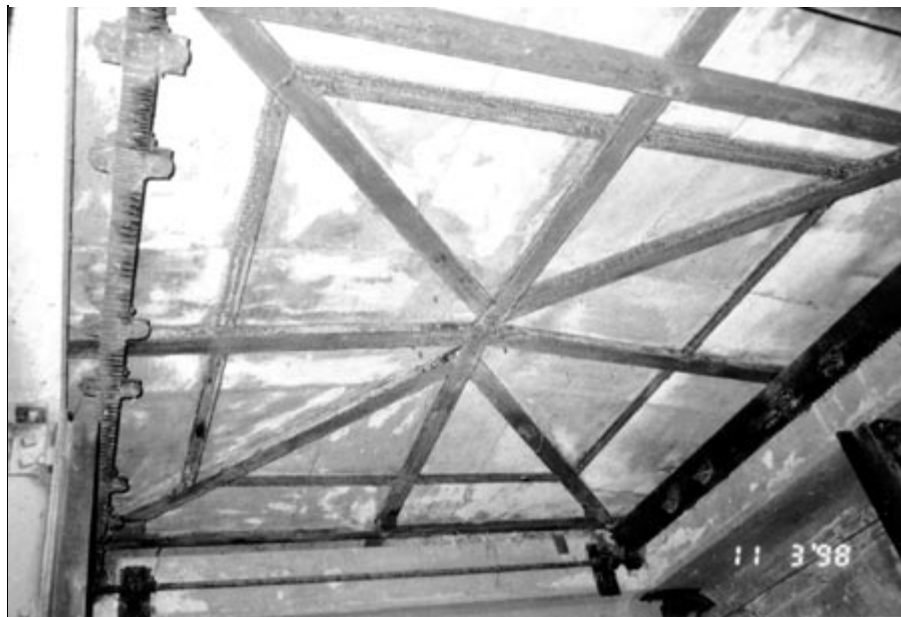


Figure 13. The underside of the elevator platform viewed from the pit.

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Figure 22. Battery commander station and base-end station, Battery Humphreys. Rough-textured concrete roofs provide camouflage for these structures.

BATTERY COMMANDER STATION AND BASE-END STATION, BATTERY HUMPHREYS (Restoration) **BASE-END STATIONS, BATTERIES WOODWARD & GRANT (Restoration)**

Location

Both structures are located on the west side of Point Loma, directly below the whale overlook. The upper structure is the Battery Commander Station and Base-End Station, Battery Humphreys. The lower structure is the Base-End Stations, Batteries Woodward and Grant.

History

This pair of structures was constructed c.1936-1941, for use during World War II. The upper level of the upper structure served as the battery commander's station for Battery Humphreys, which had two six-inch guns, while the lower level served as the base-end station. The upper level of the lower structure served as the base-end station for Battery Woodward, which was located at the north end of Fort Rosecrans, and the lower level served as the base-end station for Battery Grant at Fort Emory. The structures are currently vacant and are not open to the public.

Description

Exterior

These multi-level, partially underground structures are configured roughly by their two mounded semi-circular concrete roofs (figure 22). Rough aggregate concrete with embedded steel rings cover the roofs. The steel rings were used to anchor camouflage covering. Square ferrous metal roof hatches access the interiors. The concrete walls at both levels feature observation slots facing the Pacific, protected by eight solid metal, green-painted, rectangular shutters. Hardware allows the shutters to be fixed open or closed. Miscellaneous PVC pipes are visible, formerly supplying either water or electricity.

Interior

These two-story structures each contain three rooms, one at the upper level and two at the lower. All three rooms are rectangular in plan with concrete floors, walls and ceilings. Access to the structures is through roof-mounted manholes, down steel rungs embedded into the upper-rooms' northern walls. The lower level rooms are accessed from the upper again via manhole and wall-embedded steel rungs. The upper level rooms feature one-inch galvanized pipe railing, plywood shelving, miscellaneous conduit, a telephone box and the remains of a concrete azimuth instrument stand. The rear lower room contains a cable pit in the northeast corner, a metal azimuth instrument stand on the ground, miscellaneous conduit and a fuse box. The forward lower level room was the base-end station used for observation, located two steps up. The room contains an octagonal concrete depression position finder base, a metal azimuth instrument stand and miscellaneous conduit (figure 23).

Condition

Battery Commander Station and Base-End Station, Battery Humphreys

Exterior

Concrete wall deterioration includes minor erosion, spalls, cracks and exposed reinforcing rod ends. Minor cracks and spalls are present at the east end of the structure and a portion of the lower-level roof is missing. A rust hole and overall minor corrosion mars the entry hatch. Corrosion is also present on the shutter hinges.

Interior

Conditions in the upper level room include: a hairline crack along the south wall; missing wall attachments at the north and south walls; peeling paint at the ceiling; a raised, rough spot on the floor where the azimuth instrument stand was removed; debris; and spalling around the three-inch pipe on the east elevation. The azimuth instrument stand, missing from the lower level front room, lays on its side in the lower level rear room. Overall the interior is in good condition.

Base-End Stations, Batteries Woodward and Grant

Exterior

Concrete deterioration includes minor spalls and exposed rebar, especially on the upper portion of the west wall. Some stones are missing from the roof camouflage and others have separated from the roof concrete creating gaps. The access hatch has several rust holes and overall corrosion. One of the hatch cover hinges is severed. Vegetation is encroaching from the rear of the structure.

Interior

The upper level room contains debris, graffiti on the concrete wall surfaces, and minor corrosion on the metal shutters. The lower level front room exhibits minor efflorescence, especially at the wall base, and minor spalling at ferrous metal wall attachments. Corrosion is present on the metal ladder rungs in the lower level rear room, but the rungs are still sound.

Structural Analysis

No significant structural concerns were noted. The cracks and spalling in the concrete walls and roof noted above are relatively minor and do not at this time appear to compromise the structure's capacity.

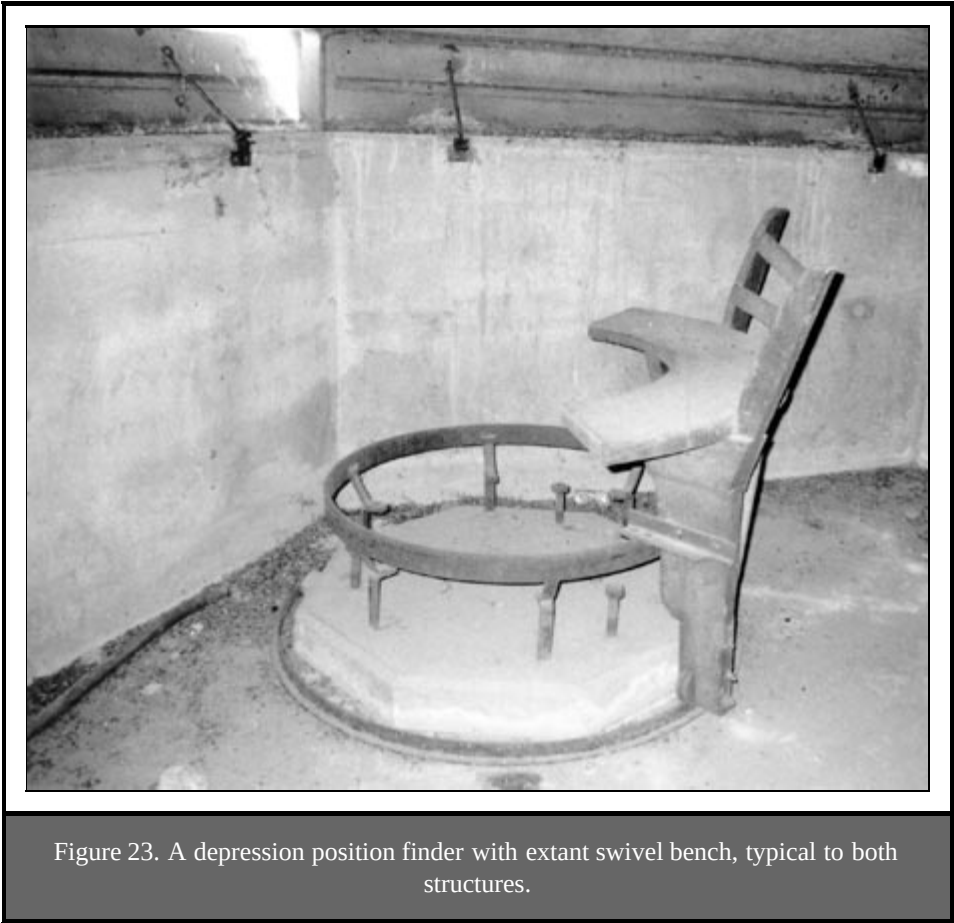


Figure 23. A depression position finder with extant swivel bench, typical to both structures.

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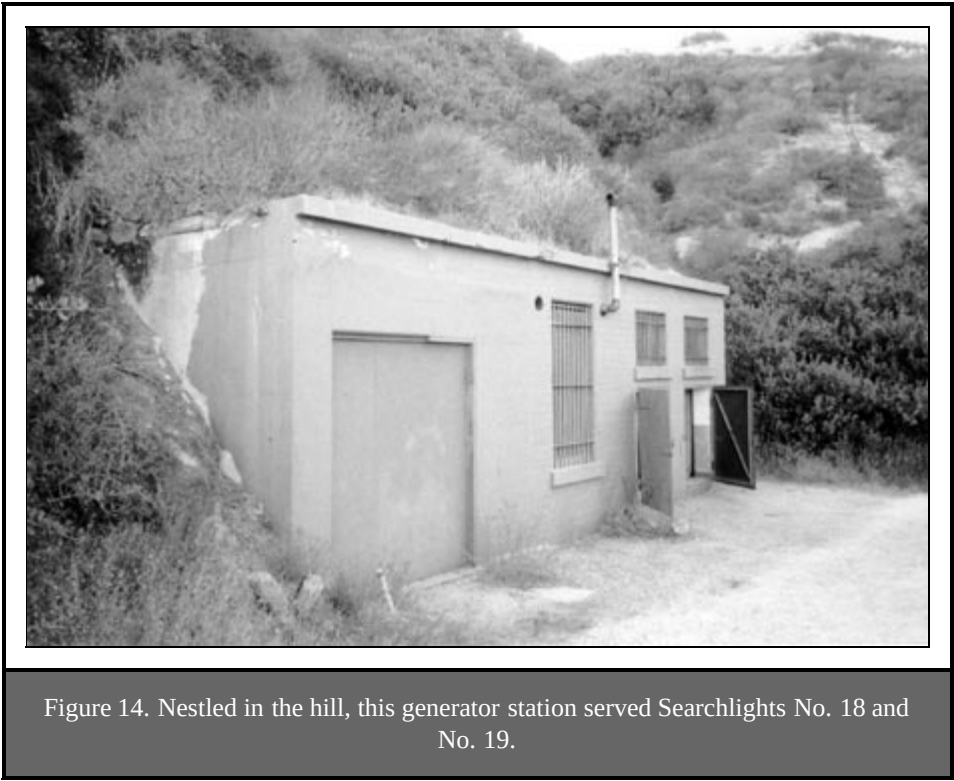


Figure 14. Nestled in the hill, this generator station served Searchlights No. 18 and No. 19.

GENERATOR STATION FOR SEARCHLIGHT NO. 18 & NO. 19 (Restoration)

Location

This structure is situated in a ravine along the Bayside Trail and supplied power to Searchlight No. 18 and No. 19.

History

Constructed in 1918-1919 to serve Searchlights No. 5 and No. 6 (later renamed No. 18 and No. 19), this World War I structure is one of three known stations of its type. When operational, the structure contained two Fairbanks-Morse gasoline-powered 25kw generators. These generators featured four cylinder engines, 560 RPM, 43/54 horsepower and delivered direct current power to the searchlights. Two underground gasoline tanks located in front of the station were removed in 1985. The station remains closed to the public.

Description

Exterior

This single-story flat-roofed reinforced concrete structure is rectangular in plan. The primary

facade features two riveted metal doors with windows above, one large window and a plywood-infilled doorway (figure 14). The three windows feature projecting concrete sills and vertical steel security bars. One exhaust vent protrudes from this wall and the hole remains from another, although the vent is gone. Two vents also penetrate the roof. Alterations include the widening of the larger door, originally a single wood door leading into the engine room; and the infill of a second large window (figure 15). The two smaller windows located above the metals doors, originally glazed, are covered with chicken wire. The remaining larger window, also originally glazed, is now sealed with plywood.

Interior

The two rectangular interior rooms feature concrete slab flooring, and reinforced walls and ceilings. A four-inch wide flat wood surround, partially missing, trims the opening connecting the radiator and the engine rooms. Alterations to the engine room include removal of the generating sets and the widening of the exterior doorway, requiring infill of an original window opening.

Condition

Exterior

Concrete is in good condition with select spalling occurring at the drip edge and at ferrous metal attachments (hinges and vents). Paint has peeled away, especially where vegetation once covered the side facade.

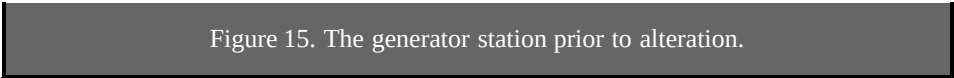
Interior

Corroded reinforcing rod has caused concrete spalling at the metal door header. Numerous impact spalls speckle the walls and ceiling.

Structural Analysis

No significant structural concerns were noted. The minor cracking and spalling in the concrete walls do not at this time compromise the structural capacity of the building. The corroded reinforcing rod at the pockets above the door headers appears to have been left exposed during the original construction. The spalls on the interior walls appear to be the result of impact rather than concrete deterioration.





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Historic Structures Report



ARCHITECTURAL DATA (continued)



Figure 20. These structures are accessed through hatchways or observation slots.

LOWER BASE-END STATION AT BILLY GOAT POINT (Battery White Base-End Station) (Preservation)

Location

This structure is located on the east side of Point Loma overlooking San Diego Bay. Situated below the Bayside Trail, it is the lower of a pair, with the upper structure located on Navy property.

History

The lower of two stations at Billy Goat Point, this structure was first associated with Batteries Whistler and White. Constructed between 1916-1921, this station was part of a remote network which tracked targets and relayed the data to their associated guns via a plotting room. Observers in these stations used sophisticated instruments to collect data which improved the system of aiming for the coastal guns. Originally temporary-type structures, by WWI concrete walls and tar and gravel roofs provided permanence. During WWII the tar and gravel roofs were replaced with earth covered rough aggregate concrete roofs. Cemented boulders on the roof provided additional camouflage. This station was modified in 1925, 1928 and 1934. The station was unassigned after October 1942, when Batteries Whistler and White were decommissioned. The San Diego Urban Corps stabilized the structure in 1993. Accessed

from the Bayside Trail, the station remains closed to the public.

Description

Exterior

This structure is virtually identical to the base-end station and battery commander station for batteries Calef and Wilkeson, and the base-end station for Battery McGrath (figure 20). The roof edge boulders embedded in concrete, the steel window shutters and the access hatch have all been painted.

Interior

The interior is similar to that of the base-end station and battery commander station for batteries Calef and Wilkeson and to the base-end station for Battery McGrath. The interior features a vertical raceway on the west wall descending into a corner cable pit; raceways along the bottom of the south and east walls; a low, concrete, octagonal base for a depression position finder; miscellaneous conduit attachments and an octagonal concrete azimuth instrument stand (figure 21).

Condition

Exterior

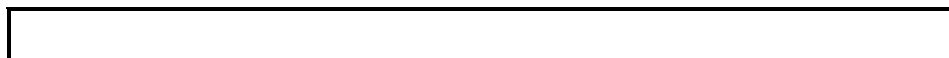
The concrete walls are cracked and spalled, particularly near the entry hatch and at the southeast corner. Exposed, rusting reinforcing steel has created corrosion jacking at this corner, where the structure is literally crumbling and in critical condition. Square reinforcing rod and the power cable wrapping (copper and lead treated with gutta percha) are visible at this corner. The camouflaged roof edges have missing stones, causing corrosion of exposed steel reinforcing bars. The support for the front shutter collapsed, and the shutter, although no longer in place, remains on site. Excessive vegetation covers the roof.

Interior

Due to the remote location, this structure has suffered from illegal entry and vandalism. The concrete interior walls are covered with graffiti and corrosion stains. Electrical, metal and wooden features are either vandalized or missing from their original locations. Evidence suggests that missing wood interior components were used as firewood. The cable pit in the southwest corner was used as a fire pit. Two broken metal observation slot shutters were found inside on the floor. The walls feature several concrete spalls: spalls caused by rusted ferrous metal near the concrete surface; minor spalls at metal attachments; and severe spalling at the southeast corner opening. Minor hairline cracks are present in both the southeast and northwest corners.

Structural Analysis

Similar to the base-end station and battery commander station for batteries Calef and Wilkeson, and the base-end station for Battery McGrath, the spalled concrete and exposed reinforcing rod at the front and side areas of the roof appear to be a consequence of casting the large stones into the face for camouflage. This spalling affects the anchors which support the steel shutters (several of these connections have already failed and the shutters are missing). The cracks and spalls at the interior concrete surfaces are relatively minor and do not at this time appear to compromise the structure's capacity.



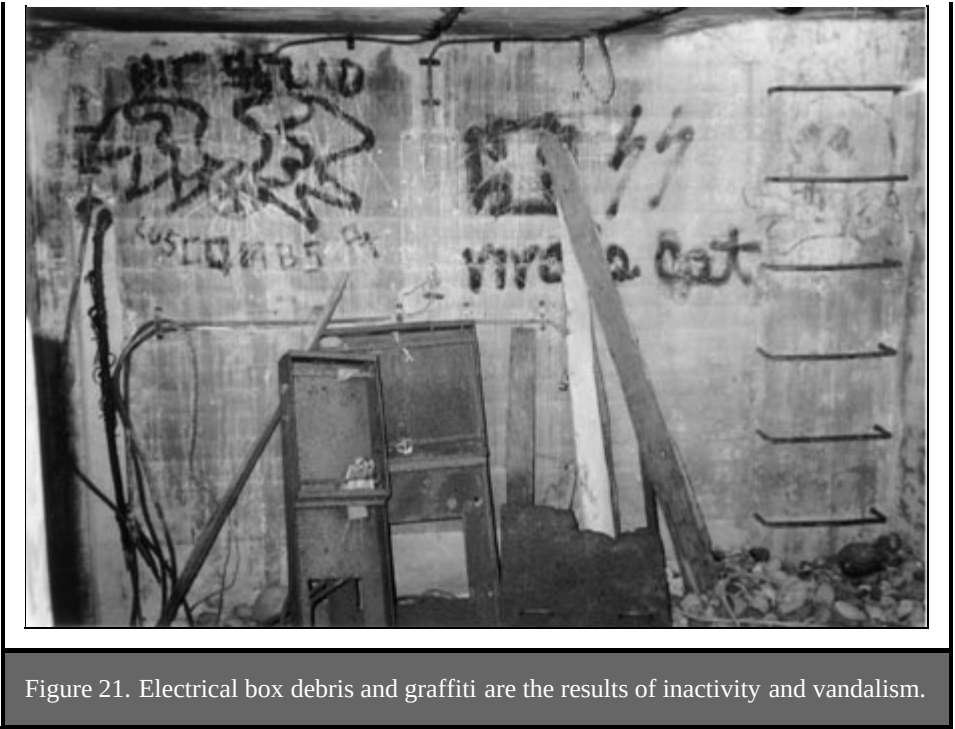


Figure 21. Electrical box debris and graffiti are the results of inactivity and vandalism.

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ARCHITECTURAL DATA (continued)



Figure 16. The missing metal observation slot shutters are located inside this structure.

BASE-END STATION, BATTERY MCGRATH (Preservation)

Location

This structure is located just below the Cabrillo statue, on the east side of Point Loma.

History

This structure served as the sole fire control point for Battery McGrath, the only Endicott battery incorporated into the updated harbor defenses. Constructed c.1920, this station was part of a remote network that tracked targets and relayed the data to their associated guns via a plotting room. Observers in these stations used sophisticated data collection instruments that improved the coastal gun aiming system. Originally temporary structures, by WWI concrete walls and tar and gravel roofs provided permanence. During WWII the tar and gravel roofs were replaced with earth-covered rough aggregate concrete roofs. Cemented boulders on the roof provided additional camouflage. The station was abandoned in 1942.

Description

Exterior

The base-end station for Battery McGrath is identical to the base-end station and battery commander station for batteries Calef and Wilkeson, except that the structure has a steeper roof slope (figure 16). The structure was also painted a drab yellow at one time.

Interior

The interior is identical to that of the base-end station and battery commander station for batteries Calef and Wilkeson, except that it has a small storage compartment built into the rear wall (figure 17). The steel plate door for this compartment is missing, although the hardware remains. Olive drab paint once covered the interior concrete. A speaking tube running to the nearby 'old restrooms' remains in place, although the restrooms are now in ruins.

Condition

Exterior

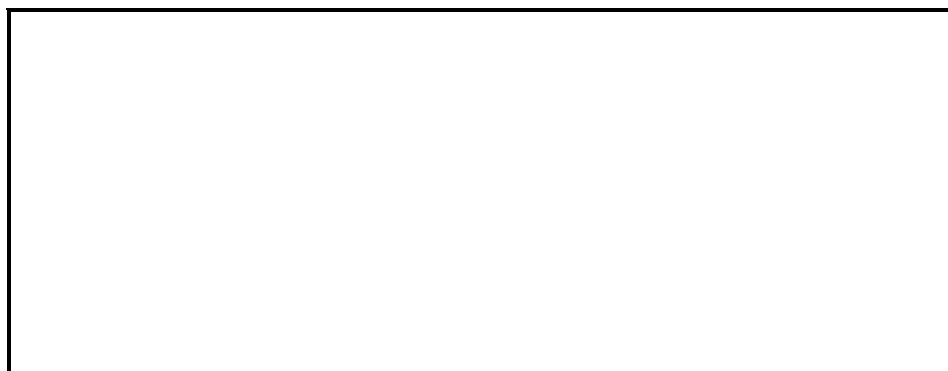
The concrete is in good condition with some cracks and exposed reinforcing bar. The steel surface hatch is extremely corroded with holes and missing parts. The asphalt waterproofing is worn and stones have dislodged, leaving voids. Exposed reinforcing rod and spalls mar the main observation slot. Covered with temporary wooden slats, its removed metal shutter is stored inside. At the south observation slot, the header is cracked and the metal shutters corroded. Vegetation has rendered the hatch inoperable.

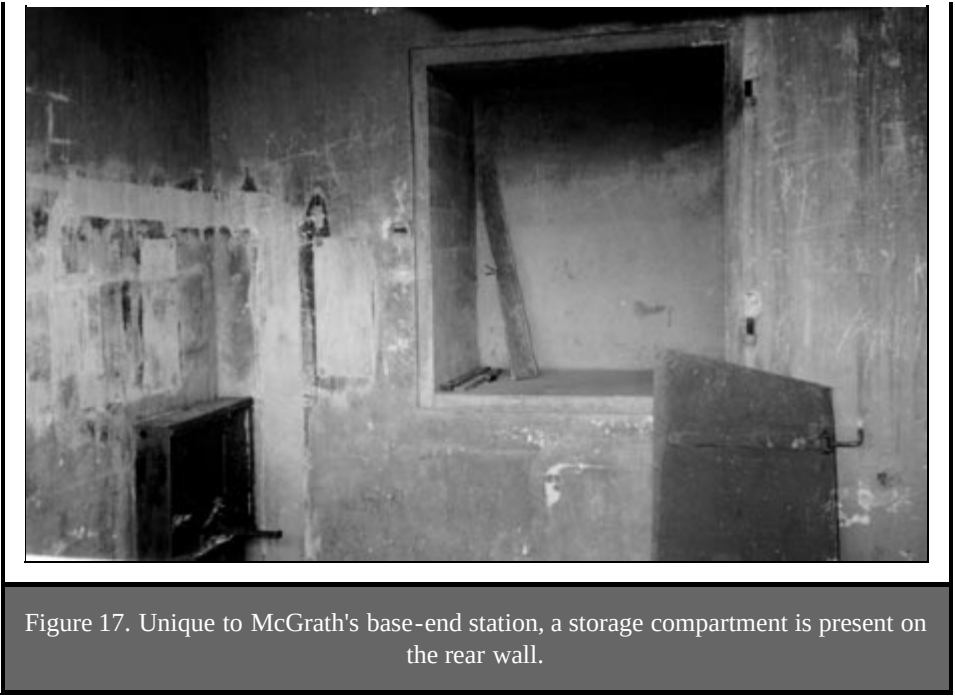
Interior

The interior walls feature several concrete spalls: spalls caused by rusted ferrous metal near the concrete surface; minor spalls at metal attachments; and a severe spall at the southeast corner opening. These walls were originally painted, but only fragments of the paint remain. Graffiti and corrosion stains from metal attachments are present on the walls. Ghosts of items no longer present on the south wall are apparent.

Structural Analysis

The spalled concrete and exposed reinforcing rod at the front and side areas of the roof appears to be a consequence of casting the large stones into the face for camouflage. The deterioration at the front and sides of the roof appears primarily as a result of shrinkage over time of the concrete surrounding the large stones. This shrinkage would have caused cracks around the stones, which would have then allowed water, salts and air to penetrate down to the rebar. The reinforcing rod would have then begun to corrode, and the resulting expansive forces would then have spalled the stones. The only structural concern is that this deterioration reduces the capacity of the anchors that support the steel shutters. The cracks at the interior concrete surfaces are relatively minor and do not at this time appear to compromise the structure's capacity.





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ARCHITECTURAL DATA (continued)



Figure 18. Metal shutters in the open position allow visual access through observation slots.

BASE-END STATION, BATTERIES CALEF & WILKESON (Preservation) BATTERY COMMANDER STATION, BATTERIES CALEF & WILKESON (Preservation)

Location

These structures are located on a bluff above the Bayside Trail. The base-end station is the lower of the two structures, while the battery commander's station is the higher.

History

These structures were among the first base-end stations built at Fort Rosecrans. Base-end stations were part of a remote network that tracked targets and relayed data to their associated guns via a plotting room. Recommended in 1914, they first appear on a 1915 map of the fort's defenses. The original temporary structures were replaced c.1920 with concrete walls and tar and gravel roofs. During World War II the tar and gravel roofs were replaced with earth-covered rough aggregate concrete roofs. Cemented boulders on the roofs provided additional camouflage. The stations were abandoned in 1942.

Description

Exterior

These one story, eight foot square reinforced concrete structures sit partially into the hillside (figure 18). The rough concrete roofs are camouflaged with earth and edged with eight inch diameter stones embedded into the concrete. On each structure, four metal awning shutters cover observation slots which pierce the smooth concrete walls on three sides. Square roof hatches with metal covers resting on concrete curbs access the structures. Lush vegetation conceals these structures from view.

Interior

The single, square rooms each feature a concrete slab floor, and reinforced concrete walls and ceilings with visible formwork lines. Steel rung ladders, embedded into the concrete walls, lead from the roof hatches into the spaces below. These spaces contain corner cable pits; low, concrete, octagonal DPF (depression position finder) bases with surmounting wood swivel benches; and miscellaneous conduit attachments (figure 19). The survival of the wood swivel benches is rare. The base-end station features a vertical electrical raceway at the south end of the west wall, and a horizontal chase in the south and east walls. The battery commander's station has a metal raceway at the east and south walls connecting to an electrical box in the southwest corner. Military graffiti remaining on the base-end station walls presumably marked orientation data for the operators.

Condition: Base-End Station

Exterior

Curing cracks from the initial construction and corrosion jacking mar the camouflage roof. Weather and exposure has widened these cracks, causing additional damage. Concrete spalling is typical at the concrete headers. Metal corrosion covers the top hatch hardware, especially the bolts and edges. The concrete hatch curb is badly spalled. The metal shutters have surface corrosion and all hardware is deteriorated. Vegetation covers the roof drainage channels.

Interior

Concrete walls and ceilings are solid. Water seepage has contributed to failing paint and small attachment spalls at the south wall. The wooden bench and concrete DPF base are in good condition.

Condition: Battery Commander Station

Exterior

The large aggregate concrete walls are cracked and spalled. The camouflaged roof edges have missing stones, which have resulted in corroding exposed rebar. The top hatch, overgrown with vegetation, features minor metal corrosion and a seriously spalled and cracked concrete curb. The observation slot sills and headers are in good condition, but the metal shutters have spot corrosion. The south shutter is severely corroded at the east end. Light lichen growth covers some of the roof.

Interior

The interior features numerous concrete spalls: spalls caused by rusted ferrous metal near the concrete surface; eight minor spalls at metal attachments at the south wall; and ceiling spalls where conduit is attached. The ladder rungs at the west wall are corroded and are staining the

adjacent wall. Hairline cracks and efflorescence occur at the north concrete wall. The wooden bench and concrete DPF base are in good condition.

Structural Analysis

As noted above, the concrete surfaces have significant cracking and spalling, particularly at the front and side areas of the roof, where the large stones were cast into the concrete. The square reinforcing rod is exposed in several places. This deterioration does not appear to compromise the capacity of the structure at this time, however it does reduce the capacity of the anchors which support the steel shutters. The deterioration at the front and sides of the roof appears primarily as a result of shrinkage over time of the concrete surrounding the large stones. This shrinkage would have caused cracks around the stones, which would have then allowed water, salts and air to penetrate down to the rebar. The reinforcing rod would have then begun to corrode, and the resulting expansive forces would then have spalled the stones. As noted above, the cracking at the hatch curb at the battery commander station is reasonably advanced. Other than supporting the hatch, this curb does not have a significant structural function. The remaining cracks and spalling at the interior concrete surfaces are relatively minor and do not at this time appear to compromise the structure's capacity.



Figure 19. Embedded metal ladder rungs provide access from the hatch opening above.

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