National Park Service
U.S. Department of the Interior

CULTURAL LANDSCAPE REPORT FOR FORD ISLAND CPO BUNGALOWS NEIGHBORHOOD AND BATTLESHIP ROW

Pearl Harbor National Memorial

August 2020

University of Oregon
Cultural Landscape Research Group

University of Oregon

CPO Bungalows Neighborhood and Battleship Row

Pearl Harbor National Memorial

Cultural Landscape Report

August, 2020

Prepared by: Vida Germano, Robert Z. Melnick, FASLA, and Hannah Six

National Park Service

Interior Regions 8, 9, 10 and 12

Cultural Landscapes Program

333 Bush Street Suite 500

San Francisco CA 94104-2828

www.nps.gov

University of Oregon

Cultural Landscape Research Group

Eugene OR 97403

www.uoregon.edu

Table of Contents

Introduction 1
- Purpose and Scope 1
- Project Objectives 1
- Mission and Significance of World War II Valor in the Pacific National Monument 2
- Location and Description of the Project Area 2
- Project Team 3
- Report Methodology 5
- Cultural Landscape Terminology 5

Site History 6
- Introduction 6
- Statement of Significance 6
- Chronology 10
- History 15

Analysis and Evaluation of Existing Conditions 54
- Introduction 54
- Summary 54
- Natural Systems and Features 55
- Spatial Organization 58
- Cluster Arrangement 60
- Views and Vistas 62
- Buildings and Structures 63
- Circulation 67
- Vegetation 71
- Small Scale Features 79
- Archeology 84

Treatment 88
- Introduction 88
- Management Issues, Goals, and Objectives 88
- Recommended Landscape Treatment Approach 92
- Secretary of the Interior's Standards for Rehabilitation 93
- Treatment Concept 94
- Treatment Recommendations 95

Phasing and Implementation 110
- Introduction 110

References 113

Appendices 120
- Appendix A: Analysis of Changes to Site 120
- Appendix B: Plant Palette List 120
- Appendix C: Compatible Site Furnishings 120

Figures

Figure 1. Context showing location of park within Pearl Harbor, Oahu, Hawaii (Source: Park website). 2
Figure 2. Boundary of World War II Valor in the Pacific, Pearl Harbor (Source: Park Foundation Document). . 3
Figure 3. Map "Ford's Island, Oahu, H.T., Sites Desired," prepared by the Corps of Engineers, August 13, 1914 (NARA, RG 77, 12000302). 18
Figure 4. Photograph looking north at the CPO building site on Ford Island, April 17, 1923 (14th Naval District Command Photos, World War II Valor in the Pacific National Monument archives, PHOG_NO 4608). 22
Figure 5. Photograph looking north of the CPO bungalows under construction, October 17, 1923 (NARA II, 71CA-154B-4-PH320). 22
Figure 6. Photograph looking west of the CPO bungalows, September 7, 1924 (NARA II, 71CA-154B-1-PH5287)..... 22
Figure 7. Photograph looking southeast of the CPO bungalows, July 10, 1924 (NARA II, 71CA-152A-9-PH458)..... 22
Figure 8. Portion of a June 30, 1924 map (Ford Island Past & Present. Fleet Intelligence Center, Pacific, March 1969 from EV5 NAVFAC HI Reference Library, Pearl Harbor, Hawaii). 22
Figure 9. CPO Bungalow Neighborhood, between June 1931 and June 1932. (NARA RG-71-CB box 102, folder C, no photograph number). 22
Figure 10. Portion of a June 30, 1932 map (World War II Valor in the Pacific National Monument archives). 23
Figure 11. November 13, 1934. CPO bungalows view from mooring quay 5 (14th Naval District Photos, World War II Valor in the Pacific National Monument, #11314)..... 23
Figure 12. Mooring quay 6 on September 17, 1934. Note CPO bungalows in background (14th Naval District Photos, World War II Valor in the Pacific National Monument, #11198)..... 25
Figure 13. Development associated with the CPO bungalows, June 30, 1940 (World War II Valor in the Pacific National Monument archives). 27
Figure 14. Aerial photograph of Ford Island taken at 17,200 feet altitude, May 3, 1940 (Naval History and Heritage Command, 80-G-411117)..... 28
Figure 15. Photograph of ships along Battleship Row following the Japanese attack on Pearl Harbor, December 10, 1941 (NARA, RG 80, 12009105, 80-G- 387565)..... 33
Figure 16. CPO Bungalow area on June 30, 1943 (World War II Valor in the Pacific National Monument archives). 36
Figure 17. Aerial photograph of the USS Oklahoma in 10 degree position during righting operations, June 18, 1943. Note galley and mess hall building (202) at left and school building (73) at right (14th Naval District Command Photos, PERL Park archives, PH 11914..... 37
Figure 18. Plan dated January 1st, 1946, showing the CPO bungalows area (World War II Valor in the Pacific National Monument archives). 39
Figure 19. Plan dated September 15, 1947 showing CPO Bungalow area (NARA San Bruno, RG 181, Box 7 Folder Waterfront Structures N 15-8). 39
Figure 20. Portion of a drawing showing the USS *Arizona* Memorial planting plan for mooring quays F7S and F7N, 1961 (National Park Service). 42
Figure 21. Plan showing CPO bungalow area on January 5, 1981 and revised September 30, 1982 (EV5 NAVFAC HI Reference Library). 45

Figure 22 Ford Island in Pearl Harbor with the USS *Arizona* Memorial and mooring quays in the midground (NPS photo 2017). 56
Figure 23. Photograph looking northeast of CPO bungalows 32 and 31 (left to right), October 4, 1923 showing the minimal vegetation in the area (NARA II, 71CA-154B-5-PH3095). 57
Figure 24. The shoreline of the CPO Bungalows Neighborhood with bungalow 32 seen through the thick vegetation (NPS Photo 2017). 57
Figure 25. Shoreline erosion at point, with Tennessee memorial in midground and mooring quays and USS *Arizona* Memorial in background (NPS photo 2018)....57
Figure 26. View looking north from an altitude of 1,264 feet toward the site. The red lines denote the site boundary. (Source: Google Earth, 2018). 59
Figure 27. The broad open lawn area enclosed by the roads contrasts with the smaller articulated spaces around the bungalows that are defined by trees, shrubs, and foundation plantings (NPS Photo 2017). ..60
Figure 28. Cluster arrangement of CPO bungalows (lower half of photo) arranged evenly spaced and facing away from shoreline, November 1923 (14th Naval District Command Photos, World War II Valor in the Pacific National Monument archives, P.H. 346-23)....61
Figure 29. The linear arrangement of the mooring quays and the USS *Arizona* Memorial, as seen from Ford Island (NPS Photo 2018). 61
Figure 30. View from USS *Arizona* Memorial over the USS *Arizona* (NPS Photo 2017). 62
Figure 31. View from USS *Arizona* Memorial toward the CPO Bungalows Neighborhood (NPS Photo 2017). .62
Figure 32. Bungalow 90 set amongst the trees with the USS Missouri in the background (NPS Photo 2018). 64
Figure 33. A ferry is docked at the USS *Arizona* Memorial (NPS Photo 2017)....66
Figure 34. Belleau Wood Loop flanked by trees (NPS Photo 2018)....68
Figure 35. This sidewalk is in front of bungalow 32 and is typical of the sidewalks in the neighborhood (NPS Photo 2017). 70
Figure 36. Type of vegetative character that likely would have been present at the CPO Bungalows Neighborhood during the period of significance. No date on this photo (PERL archives, Historic Photos from the 14th District Naval Command, PHOG_NO RV6P104A). 71
Figure 37. Looking toward Cowpens Street, with the canopy of the trees and turf surrounding Belleau Wood Loop (NPS Photo 2018)....72
Figure 38. Plumeria (NPS Photo 2017). 74
Figure 39. Monkeypod tree (NPS Photo 2017). 74
Figure 40. Panax (NPS Photo 2017)....77
Figure 41. Clothespoles between bungalows 31 and 32 (NPS Photo 2017). 81
Figure 42. Utility pole prior to its collapse from termite damage (NPS Photo 2017). 81
Figure 43. Bollards located on shoreline (NPS Photo 2017). 83
Figure 44. Stairs at shoreline (F30) (NPS Photo 2017). 85
Figure 45. Remnant sidewalk (F136) (NPS Photo 2017). 85
Figure 46. Circulation treatment: expose and salvage historic curbing, as in Nob Hill neighborhood. 96
Figure 47. Diagram for treatment 8 and 9: Develop accessible parking near bungalow 32. Add accessible path along loop road from parking to bungalows 31 and/or 32. 99
Figure 49. Treatment 13: Improve pedestrian access to aid in crossing Cowpens Street between bungalow 68 and the eastern portion of the site. 103
Figure 48. Treatment 10: remove parking and replace with lawn. Treatment 12: extend sidewalk. 103

Figure 50. Treatments 14, 28, 35: Narrow width of Belleau Wood Loop at Cowpens Street intersection, remove guardrail and replace with fence. 104
Figure 52. Treatment 26: Selectively thin shoreline vegetation to re-establish views. 105
Figure 51. Treatment 25, 26, and 40: Selectively thin shoreline vegetation to re-establish views and expose key shoreline features 105
Figure 53. Treatment 25: Selectively thin shoreline vegetation to re-establish views. 106
Figure 54. Selectively thin vegetation to re-establish views. 107
Figure 55. Treatment 28 and 35: Remove guardrail at USS Missouri parking lot and replace with unpainted picket fence. 108
Figure 56. Treatment 15 and 36: Add grouping of picnic tables, benches, and trash cans under trees, and remove asphalt parking on Belleau Wood Loop. 109
Figure 57. Treatment 38: Add low signage at the curb in front of each bungalow for interpretive purposes 109

Drawings

Drawing 1. Context Map……4
Drawing 2. 1902-1940 Period Plan……50
Drawing 3. 1941-1945 Period Plan……51
Drawing 4. 1946-1965 Period Plan……52
Drawing 5. 1966-Present Period Plan……53
Drawing 6. Existing Conditions Plan……87
Drawing 7. Specific Treatments by Landscape Characteristics/Features……100
Drawing 8. Overlook Photo Simulation……101
Drawing 9. Interpretive Overlook Plan……102

Tables

Table 1. Implementation Plan……111

Introduction

Purpose and Scope

The purpose of this Cultural Landscape Report (CLR) is to provide a vision for the Ford Island Chief Petty Officer's (CPO) Bungalows Neighborhood and Battleship Row, part of the U.S. Naval Base Pearl Harbor National Historic Landmark (NHL) District. The CLR builds upon the 2018 Cultural Landscapes Inventory for the Ford Island CPO Bungalows Neighborhood and Battleship Row. The CLR is tiered from the current Foundation Document for the park.

Information about the significance, integrity, and condition of cultural landscapes is needed before making planning decisions about treatment and in many activities associated with the future management and preservation maintenance of the site. The CLR is the primary planning document for the treatment of the cultural landscape and provides site managers with a comprehensive understanding of the physical evolution of the cultural landscape, and guidance for the future landscape management.

Part I of the CLR includes the site history, existing conditions, and analysis and evaluation. Part II of the CLR focuses on the treatment of the cultural landscape, including the preservation strategy for long-term management of the cultural landscape based on its significance, existing condition, and use.

This CLR will guide subsequent treatment and management decisions within the CPO Bungalows Neighborhood and Battleship Row. Cultural landscape issues, such a historic land use, the location and historic character of significant resources, are considered in the development of all park plans to avoid adverse effects on cultural landscapes. This CLR is part of the park's planning process, and is a fundamental tool for integrating information and determining relationships within the cultural landscape and other resource types and site objectives.

Project Objectives

Ford Island CPO Bungalows Neighborhood and Battleship Row is a significant component of the NHL. The historic resources within the neighborhood provide the NPS with an opportunity to provide visitor services, housing, office space, and storage, while also interpreting the significance of the neighborhood to visitors. Current and future plans to accommodate visitor services and park operations have the potential to adversely affect the cultural landscape. This CLR has specific objectives associated with the CPO Bungalow Neighborhood in order to meet the goal of avoiding adverse effects to the cultural landscape in upcoming projects, including:

1. Documentation of the physical development of the cultural landscape within the study area.
2. Documentation of the existing condition of the landscape features.
3. Evaluation of the significance and integrity of the cultural landscape.
4. Development of treatment recommendations for managing the cultural landscape within the study area.
5. Development of management recommendations and schematic designs for selected locations within the study area to accommodate current and future needs.
6. Enhance visitor experience by providing information about the history of the development of the cultural landscape to interpreters and site managers.

Mission and Significance of Pearl Harbor National Memorial

Pearl Harbor National Memorial is located in Joint Base Pearl Harbor-Hickam, on the island of O'ahu in the State of Hawai'i. The US Naval Base, Pearl Harbor District including Ford Island was designated a National Historic Landmark in 1964 for its strategic importance related to the United States' rise as a Naval Power in the Pacific, and for the December 7, 1941, Japanese attack during World War II. Within close proximity to downtown Honolulu and the resort area of Waikiki, the Pearl Harbor site is the most visited destination on O'ahu. Pearl Harbor is one of three locations where sites associated with the Pacific War were designated as part of the World War II Valor in the Pacific National Monument to commemorate the heroic sacrifices made in the cause of democracy and freedom during World War II. The monument also includes sites on the Aleutian Islands in Alaska and in Newell, California (Tule Lake Unit). The three locations are managed separately, but together tell the broader story of the Pacific War.

The role of the National Park Service at Pearl Harbor has evolved over time. In 1958, President Dwight D. Eisenhower approved legislation for the establishment of the USS *Arizona* Memorial to commemorate military personnel killed in the Japanese attack on Pearl Harbor. The USS *Arizona* Memorial was constructed over the hull of the sunken USS *Arizona*, and dedicated by the Pacific War Memorial Commission in 1962. Visitation and management of the memorial was the responsibility of the US Navy until 1980, when operations were turned over to the National Park Service through an agreement with the US Navy. The National Park Service and US Navy jointly constructed and opened the USS *Arizona* Memorial Visitor Center in 1980.

On December 5, 2008, President George W. Bush signed the Presidential Proclamation designating Pearl Harbor National Memorial includes the USS *Arizona* Memorial and Visitor Center (now referred to as the Pearl Harbor visitor center); the USS *Utah* and USS *Oklahoma* memorials; six Chief Petty Officer's Bungalows on Ford Island; and mooring quays F6 North and South, F7 North and South, and F8 North and South (part of Battleship Row). The bungalows represent a significant element of the Battleship Row area—namely, these residences are reminders of the presence of nonmilitary individuals (families of Chief Petty Officers assigned to work on aircraft maintenance) in a battle scene. This neighborhood came under fire during the attack and the buildings themselves provided cover for sailors and Marines swimming through burning waters toward safety.

Location and Description of the Project Area

Figure 1. Context showing location of park within Pearl Harbor, O'ahu, Hawai'i (Source: Park website).

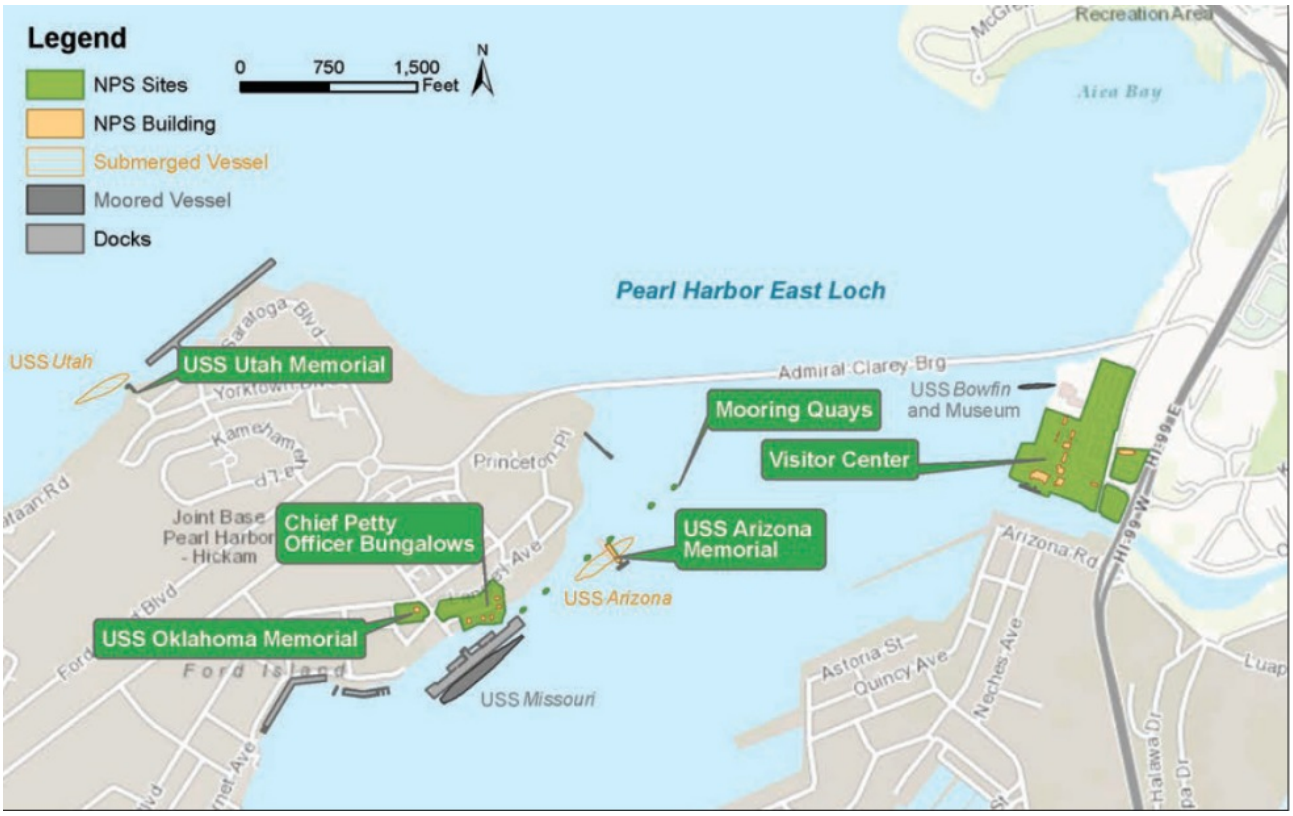


Figure 2. Boundary of Pearl Harbor National Memorial (Source: Park Foundation Document).

The national monument is located within the Pearl Harbor Naval Complex on the central leeward coast of the Hawai'ian Island of O'ahu, at the southeast end of the Wai'chefanae mountain range. This cultural landscape inventory includes Chief Petty Officer's (CPO) bungalows 28, 29, 31, 32, 68, 90, the USS *Oklahoma* Memorial, three sets of mooring quays that constituted part of Battleship Row (F6S, F6N, F7S, F7N, F8S, and F8N), USS *Arizona*, and the USS *Arizona* Memorial. The Ford Island Chief Petty Officer's bungalows and USS *Oklahoma* Memorial are located along the southeast shore of Ford Island, while the mooring quays and USS *Arizona* and USS *Arizona* Memorial are located offshore within the East Loch of Pearl Harbor.

The 4.36-acre National Park Service-owned site is comprised of the CPO Bungalows Neighborhood located on Ford Island at approximately ten feet above mean sea level, while the nearby Battleship Row, USS *Arizona*, and USS *Arizona* Memorial are located in the harbor (Drawing 1). The topography of Ford Island is relatively flat and the center of the island is defined by an airfield with a runway and open grassy spaces. The majority of the island's development is concentrated along the shoreline and includes buildings and structures associated with military operations and residential neighborhoods as well as recreational and community facilities.

Project Team

This CLR has been prepared by:

Vida Germano, Cultural Landscapes Program Manager, National Park Service Regions 8, 9, 10, and 12, Cultural Resources Program

Robert Z. Melnick, FASLA, Director, Cultural Landscape Research Group, University of Oregon

Hannah Six, Graduate Research Assistant, Cultural Landscape Research Group, University of Oregon

Cultural Landscape Report Ford Island CPO Bungalows Neighborhood and Battleship Row

Pearl Harbor National Memorial
Honolulu, Hawaii

Context Map

UNIVERSITY OF OREGON

National Park Service

In partnership with:
University of Oregon
Cultural Landscape Research Group
Department of Landscape Architecture

SOURCES
1. Google Earth Imagery 2018
2. Mapbox + OpenStreetMap

DRAWN BY
Hannah Six, December 2018
Illustrator

LEGEND
NPS Boundary

N↑ 1” = 200’ 0’ 100’ 200’

Drawing # 1

Report Methodology

A thorough investigation and evaluation of the cultural landscape was conducted using the *Secretary of the Interior's Standards for the Treatment of Historic Properties, with Guidelines for the Treatment of Cultural Landscapes* and the NPS *Guide to Cultural Landscape Reports: Contents, Process, and Techniques*. Documentation of historic significance and evaluation of integrity of the landscape serves as a framework upon which treatment recommendations are developed.

The history is documented to focus on the changes to the cultural landscape over time within the previously established National Register eligibility of the cultural landscape under specific contexts and period of significance. These contexts and period of significance were re-examined and expanded upon to provide the full context needed to identify the character-defining features of the cultural landscape. Period plans were prepared to understand change over time.

The historical documentation was utilized to compare existing site conditions to historic conditions. Through this analysis, contributing and non-contributing features and characteristics of the cultural landscape were identified. This information was then used as the basis for the treatment recommendations, with the goal of preserving character-defining characteristics and features, restoring character-defining features important to conveying the historical significance of the cultural landscape, and rehabilitating features to preserve their character-defining qualities to allow for current and future uses within the cultural landscape.

Cultural Landscape Terminology

This section includes definitions of terminology used in the report that may be unfamiliar to the reader.

Historic character - the sum of all visual aspects, features, materials, and spaces associated with a cultural landscape's history, i.e. the original configuration together with losses and later changes. These qualities are often referred to as character-defining.

Landscape Characteristics – tangible and intangible aspects of a landscape from the historic periods; these aspects individually and collectively give a landscape its historic character and aid in the understanding of its cultural importance.

Character-defining feature - a prominent or distinctive aspect, quality, or characteristic of a cultural landscape that contributes significantly to its physical character. Land use patterns, vegetation, furnishings, decorative details and materials may be such features.

Feature - The smallest element(s) of a landscape that contributes to the significance and that can be the subject of a treatment intervention. Examples include a woodlot, hedge, lawn, specimen plant, house, meadow or open field, fence, wall, earthwork, pond or pool, bollard, orchard, or agricultural terrace.

Treatment - work carried out to achieve a particular historic preservation goal.

Site History

Introduction

This chapter presents the site history of the CPO Bungalows Neighborhood, focusing on the development of the neighborhood within the context of the larger development of the US Pearl Harbor Naval Base. Included is a statement of significance, chronology and historical overview. This information builds upon the Cultural Landscape Inventory with additional research conducted at the National Archives and Records Administration, San Bruno, California, to incorporate the scant 14th Naval District, Pearl Harbor records available that demonstrate the physical development of the CPO bungalows, mooring quays, and shoreline adjacent to the bungalows.

Statement of Significance

Summary

The Ford Island CPO Bungalows Neighborhood and Battleship Row are located within the boundaries of the 13,107-acre (4,599 land; 8508 water) U.S. Naval Base Pearl Harbor National Historic Landmark (NHL) District, which is significant for its strategic importance related to the United States' annexation of Hawai'i and for its association with the Japanese attack on Pearl Harbor on December 7, 1941. In part, the statement of significance provided in the NHL nomination form noted that the US possession of Pearl Harbor "and the development of a naval base and headquarters there after 1898 were important factors in the rise of US naval power in the Pacific. The dispute of this power by Japan eventually contributed to the precipitation of war between the United States and Japan, the significant opening shots of which occurred at Pearl Harbor on the morning of December 7, 1941."

The Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report noted that the district is significant under NHL Criteria 1 (National Register Criterion A), 4 (National Register Criterion C), and 6 (National Register Criterion D). Under Criterion 1, the property is significant for its association with four historic contexts, including early development of the Pearl Harbor Naval Base (1902-1939), World War II (1940-1945), the Japanese Attack on Pearl Harbor (December 7, 1941); and the Cold War (1945-1965). Under Criterion 4, the property is significant as a military building landscape that is representative of a diversity and range of periods, functions, architectural design styles and types. Under Criterion 6, the district is recognized as significant for its submerged World War II cultural resources and their potential to yield important information in the future. [1]

NHL Criterion 1/National Register Criterion A

The cultural landscape of the CPO Bungalows Neighborhood and Battleship Row conveys the significance of the early development of the Pearl Harbor Naval Base, the Japanese Attack on Pearl Harbor Naval Base on December 7, 1941, World War II, and early Cold War development. The US Navy developed the CPO bungalow neighborhood and mooring quays of Battleship Row as part of the early development of the naval base. The

[1] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, TEC Inc. – Joint Venture, Honolulu, Hawaii and NAVFAC Pacific, Pearl Harbor, Hawaii, May 2011, 1-7.

neighborhood, like other housing areas on Ford Island, provided housing for military personnel to support operation of facilities on base. The mooring quays of Battleship Row were constructed in this early period as part of the naval base facilities. During the 1941 attack, Battleship Row became the central target of bombing, and the CPO neighborhood, being closest in proximity to Battleship Row on Ford Island, also sustained damage during the attack and sheltered people caught in the attack. During World War II, ships from Battleship Row were righted and those that could be repaired were, while the CPO Bungalows Neighborhood served as housing. After the war, additional bungalows were moved to the CPO bungalow neighborhood, war-era buildings were demolished, and Battleship Row continued to moor naval vessels.

NHL Criterion 4/National Register Criterion 6

The Ford Island Chief Petty Officer's bungalows are significant as a vernacular reflection of Hawai'i's architectural solutions for low-cost housing. Additionally, the bungalows represent the only remaining historic residential development at Pearl Harbor built for enlisted US Navy personnel. Collectively, these buildings serve as powerful reminders of the Japanese attack on Pearl Harbor on December 7, 1941 and its aftermath.

The Ford Island Chief Petty Officer's bungalows is one of three historic housing areas on Ford Island. The five remaining historic CPO bungalows associated with this site were constructed by the US Navy between 1923 and 1938 and represent the only remaining historic residential development at Pearl Harbor built for this rank of US Navy personnel.[2] Notably, the design and location of the CPO bungalows site reflects hierarchy in rank.[3] Not only was the CPO housing area physically separated from the officers' area that was located near the northern tip of Ford Island, but it was characterized by different sizes and designs of houses and open spaces. These differences offered both a physical and symbolic distinction between officers and enlisted personnel. It should be noted; however, that recreation (tennis courts and playgrounds) were found in both locations.[4]

According to Historic American Buildings Survey documentation prepared by Polly Cosson and Ann Yoklavich for CPO bungalow 28, the "buildings are also significant as a group of vernacular houses that reflect Hawai'i's architectural solutions for low-cost housing."[5] Bungalows were popularized in the Hawai'ian Islands in the early twentieth century in part through the contributions of Lewers & Cooke, Limited, the leading residential builder in Hawai'i at that time. Touting its economical construction cost and suitability to the climate, the bungalow was ideal for military housing. Lewers & Cooke, Limited, considered board and batten to be structurally superior to the less expensive tongue and groove (T & G) single-wall houses. All of the CPO bungalows are of board and batten construction with hipped roofs and extended eaves with the exception of CPO bungalow 68. Notably, diagonal tongue and

[2] Polly Cosson and Ann Yoklavich, "U.S. Naval Base, Pearl Harbor, Chief Petty Officer's Quarters (Facility No. 28)," Historic American Buildings Survey, HABS No. HI-440, Mason Architects, Inc., Honolulu, Hawaii, July 2005, 1.

[3] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, TEC Inc. – Joint Venture, Honolulu, Hawaii and NAVFAC Pacific, Pearl Harbor, Hawaii, May 2011, 2-99.

[4] *Ibid*.

[5] Cosson and Yoklavich, 1.

groove exterior siding was used to clad CPO bungalow 68 instead of board and batten.

NHL Criterion 6/National Register Criterion D

Pearl Harbor Naval Complex is widely recognized as having resources that are both known and unknown, likely to be significant under NHL Criterion 6 and National Register Criterion D for the potential to yield information about the prehistoric and pre-military historic occupation and use of the lands. Such significance has been extensively documented. The USS *Arizona* shipwreck was designated an NHL for its role as casualties of the Japanese attack on Pearl Harbor, and as war memorials and graves for those who died during the attack. Additional archeological investigation at the CPO Bungalows Neighborhood and Battleship Row could provide additional information about the historical development and use of Ford Island and Pearl Harbor.

Period of Significance

The period of significance identified in the Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report begins in 1902 when the Navy began initial dredging operations to provide access to the harbor through early base development and World War II. The period of significance ends in 1965 to incorporate Navy achievements associated with the early Cold War at Pearl Harbor.[6] Within the period of significance, 1902-1965, four sub-periods of significance were identified that correlate to the historic contexts: 1902-1939, 1940-1945, December 7, 1941 and 1945-1965. The major development of, and activities within the, CPO Bungalows Neighborhood and Battleship Row occurred during this period (see Drawings 2-5).

Historical Context

The following narrative is excerpted from the *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, TEC Inc. – Joint Venture, Honolulu, Hawaii and NAVFAC Pacific, Pearl Harbor, Hawaii, May 2011, 1-5 – 1-6:

As part of the outcome of the Spanish American War and to offset the growing Japanese influence in East Asia, the US decided to strengthen its naval power in the Pacific and acquired Pearl Harbor in the Hawai'ian Islands. In 1901, Pearl Harbor was chosen as the main Pacific Base for the American naval fleet and by 1902 the first physical modifications to the base were imitated including primarily sand and coral dredging of the entrance channel to the harbor. Following the Russo-Japanese War in 1908, more money was appropriated to transform Pearl Harbor into a major US base in the Pacific with capabilities to repair and outfit the largest war vessels. This support provided the impetus for the initial layout and construction of Pearl Harbor Naval Base. By 1911, dredging of the channel was sufficient to allow passage of the first large vessel. On land, most of the activity revolved around developing the US Navy Yard and by 1913, several ship repair buildings had been constructed.

At the onset of World War I, Pearl Harbor Naval Base had a functioning US Navy Yard, Marine Barracks to provide security, Hospital Reservation with hospital and ancillary facilities, Naval Ammunition Depot, fuel facilities, high-power communications station, and various residential areas for officers and enlisted men. Throughout the 1920s and 1930s, development on the base focused on the establishment of the Submarine Base, creation of the Naval Air Station on Ford Island, major additions to the fuel oil storage

[6] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 1-15 – 1-16.

capacity, the transfer of the Naval Magazine further from Main Base and the US Navy Yard, and extensive waterfront work including dredging, piers, quay walls, a marine railway and battleship mooring platforms. Hawai'i's position in the "American Defense Triangle" of the Pacific assured Pearl Harbor Naval Base would receive the support necessary for such a defense mission.

With the outbreak of war in Europe in September 1939, President Roosevelt declared a National Emergency calling for the strengthening of national defense of the United States. This triggered a "defense boom" at Pearl Harbor Naval Base during which the boundaries of the base were greatly expanded. Large acreage was acquired for housing, fuel facilities and operations. A consortium known as Contractors Pacific Naval Air Bases (CPNAB) erected numerous new buildings in all the established areas of the base including Ford Island, Shipyard, Submarine Base and West Loch Ammunition Depot. One example of the scale of the defense mission during this time is reflected in the construction of the Red Hill Fuel Storage Facility. This consisted of 20 vertical fuel storage tanks designed and built within the lava rock hillside, each 250 feet deep and 100 feet in diameter. In all, Red Hill system was capable of storing and transporting 250 million gallons of fuel through a network of tunnels to Pearl Harbor.

In an effort to weaken US Pacific naval power, the Japanese attacked Pearl Harbor Naval Base on December 7, 1941 as part of their strategy to conquer a large part of Southeast Asia. Although some areas of the base sustained damage, primarily in the drydocks in the US Navy Yard and at the Air Base on Ford Island, the majority of the damage was inflicted on the fleet. During the surprise attack, a total of 21 US vessels were sunk and damaged while casualties numbered 2,403. Recognized as the "worst single naval disaster in American history," this tragedy became a national symbol for World War II, Pearl Harbor became the hub of the newly defined offensive outpost, the Central Pacific Area. As the forward station in the War in the Pacific, Pearl Harbor played a major role as a training, staging and supply, and casualty evacuation area. Kūāhua Island was transformed into a peninsula at this time and became the focal point for all staging and supply for the thousands of troops fighting in the Pacific. Most of the shoreline and waterfront berthing facilities at Pearl Harbor were also built in this period to support the massive amount of ship repair being handled at the US Navy Yard. As an architectural response to the Japanese attack, splinterproof and bombproof designs were adopted for many facilities and structures on the base. Temporary wooden structures and Quonset huts became ubiquitous on the landscape at this time, a response to the need for massive and rapid expansion of facilities.

By the end of World War II, Pearl Harbor was one of the most extensive defense installations in the world containing all land-based US Navy functions. Following the end of World War II, however, there was a precipitous decline in the activity at Pearl Harbor Naval Base, and very little new construction occurred. Instead, existing facilities were reused, renovated, and modernized. As the Cold War threat grew during the 1950s, the role of the Pearl Harbor Naval Complex became critical as the secure anchor in the line of defense of the continental United States. The Pearl Harbor Naval Complex supported several major missions for the US Navy's establishment of a successful Cold War fleet in the Pacific. Many significant Cold War functions such as Command, Control, Communication and Intelligence, Research and Development, Training, and Strategic Material Production took place mostly in World-War-II-era buildings or earlier. The most notable exceptions to this include new buildings built during the Cold War at the Shipyard, the Submarine Base, Makalapa, and West Loch.

Chronology

1800-1850

In the early 1800s, Moku‘ume‘ume (Ford Island) was owned by Don F. Francisco de Paula y Marin. Marin raised rabbits, sheep, goats and hogs on the island for many years.

1865

Caroline Jackson acquired Ford Island. Dr. Seth Porter Ford married Jackson and died on November 19, 1866.

1891

As a result of his father’s death, Seth Ford, Jr., inherited Ford Island.

1899

The John Papa ‘Ī‘ī Estate owned Ford Island. Irene ‘Ī‘ī (daughter of John ‘Ī‘ī) and her husband, Charles A. Brown managed the estate.

1899-1916

The O‘ahu Sugar Company leased a portion of Ford Island from the ‘Ī‘ī Estate and planted an extensive acreage of sugarcane on the island. Circa 1899, an artesian well was drilled on the island to facilitate large-scale cultivation of sugarcane.

1902

The US Government purchased a twenty-five-acre strip of land along the southeast shore of Ford Island for future use as a naval base.

1914

A 1914 map of Ford Island showed several improvements including two primary roads and irrigation ditches across the island as well as a cluster of plantation buildings on the west side of the island.

1915

The US Government purchased three parcels of land on Ford Island from the ‘Ī‘ī Estate on September 7, 1915.

1916

The following year, the remainder of Ford Island was purchased from the ‘Ī‘ī Estate by the US Government.

1917

Batteries Adair and Boyd were constructed on the northeast corner of Ford Island. (The guns were removed in 1925.)

1918

The US Army air squadron relocated to Ford Island after construction of two seaplane hangars with ramps, a warehouse and a shop building had been built. The installation was officially named Luke Field in 1919.

1919-1922

The US Army built twenty-eight craftsman style residential buildings or units (at least five duplexes) along the northern portion of the western shore of Ford Island.

1923

US Navy planes were moved to Ford Island in January 1923.

1922-1936

Dredging activities were undertaken around the southeast shoreline of Ford Island in an effort to create berthing areas deep enough for large ships.

1923-1924

Chief Petty Officer’s bungalows 27, 28, 29, 30, 31, and 32 were constructed.

1924

US Navy maps from 1924 show several small scale features in the CPO bungalow area including street lights and fire hydrants.

1924

Nine 225,000-gallon reserve gasoline tanks were constructed along the southeastern shoreline of Ford Island. A gasoline wharf was also built on fill land. These features were also called aboveground storage tanks (AST). Barricades or fencing was installed around the tanks to provide additional security. Tanks 62 and 63 were located in close proximity to the CPO bungalows.

1925

By 1925, approximately forty US Navy facilities had been constructed on the southern portion of the southeast side of Ford Island.

1928

CPO bungalow 67 was constructed on the end of the L-shape of the first group of bungalows.

1931

CPO bungalow 69 was constructed on the end of the L-shape of the first group of bungalows.

1932

By 1932, CPO bungalow 68 had been constructed on the end of the L-shape of the first group of bungalows.

1934-1935

Six pairs of mooring quays were built offshore on the southeast side of Ford Island.

1935-1939

By the late 1930s, family housing areas on Ford Island had clotheslines in the yards.

1936

Fifteen houses were built in the northeastern part of Ford Island for married officers.

1937

Nine four-plex residential buildings were constructed adjacent to the CPO bungalows on newly reclaimed land that was developed using dredged materials.

1937

CPO bungalow 68 and 69 were moved several hundred feet west between gasoline storage tanks 62 and 63.

1938

Five pairs or sets of mooring quays were built offshore on the northwest side of Ford Island.

1938

Chief Petty Officer's bungalow 90 (formerly facility 70) was constructed along Long Island Street south of CPO bungalow 69. The building was not renumbered to CPO bungalow 90 until circa 1940-1942.

1938

A combined schoolhouse and activity center known as the Kenneth Whiting Building (building 73) was built in close proximity to the CPO bungalows.

1939

Ford Island was utilized by both the US Army and US Navy until October 31, 1939 when US Army facilities were relocated to Hickam Field.

1941

Pearl Harbor was attacked by Japan on December 7, 1941. Several battleships were damaged or destroyed as a result of the attack, including the USS *Arizona* and the USS *Utah*. The CPO

bungalows suffered minor damage as a result of their close proximity to the explosions and fire.

1941

Days after the attack, mooring quays were partially demolished to release the USS *Tennessee*. The battleship was wedged between the mooring quays and the crippled USS *West Virginia*. The USS *Maryland* was directly in front of the USS *Tennessee* and the USS *Arizona* was behind.

1942

Circa 1942, CPO bungalow 27 and 67 were demolished. The buildings were removed in August 1942 to facilitate recovery efforts associated with salvage of the USS *Oklahoma*. Prior to the demolition of bungalow 67, the building served as an annex to the adjacent school (building 73) for a least one year.

1940-1942

Between 1940 and 1942, building 202 (galley/mess hall) was built in the central lawn area associated with the CPO bungalows.

1942

On December 1, 1942, the USS *Arizona* was decommissioned.

1942-1943

Components of the USS *Arizona* were salvaged, which included removal of the foremast, mainmast, stern aircraft crane and the conning tower. When the work was completed the ship had been stripped down to the main deck.

1942-1943

Cables and winches were installed on Ford Island in an effort to salvage the USS *Oklahoma* and USS *Utah*. Salvage operations associated with the USS *Oklahoma* were in close proximity to the CPO bungalows and included modification (reducing height) of mooring quays F5S and F5N.

1943-1945

Circa 1943 and 1945, the F5 berth was converted from mooring quays to a pier and gasoline receiving. This action resulted in the need to relocate CPO bungalows 69 and 90.

1943-1945

Circa 1943-1945, CPO bungalow 90 (formerly facility 70) was moved from its original location to the site of former CPO bungalow 67.

1943-1945

Circa 1943-1945, CPO bungalow 69 was moved from its original location to the site of former CPO bungalow 27.

1943-1945

Circa 1943-1945, CPO bungalow 30 was relocated approximately 1,200 feet northeast to its present location at the northeast end of Langley Avenue in the North End or Knob Hill (also spelled Nob Hill) neighborhood of Ford Island.

1947

By 1947, fill had been added to the north side of the CPO bungalows and was labeled “Public Works Storage Area.”

1947

The roads within the Pearl Harbor Naval Air Station were repaired, including maintenance to coral base and shoulders and pouring a new coat of asphalt on the existing asphalt surface.

1947

Bungalow 68 underwent unspecified renovations.

1947

There was a Pearl Harbor-wide effort to memorialize the December 7, 1941 attack, which resulted in the installation of a USS *West Virginia* and USS *Tennessee* memorial marker located in close proximity to the CPO bungalows.

1947-1948

Circa 1947-1948, the aboveground storage tanks were removed.

1950

In March 1950, Admiral Arthur W. Radford, the Commander in Chief Pacific Fleet, initiated the practice of displaying the flag over the sunken remains of USS *Arizona*. The flagpole was installed on the protruding base of the hull's rear mast. Later that year, a wooden platform was built over the amidships area. On the ninth anniversary of the December 7, 1941 attack, a commemorative metal plaque was installed at the base of the flagpole and another welded to the deck of the wreck.

1952

Before 1952, facility S304 (transformer substation) was constructed in proximity to the CPO bungalows.

1955

In May 1955, the Fleet Intelligence Center, Pacific (FICPAC) was established.

1959

Bungalow 32 underwent unspecified renovations in 1959.

1959

Alfred Preis of the firm Johnson & Perkins, Preis Associates was selected to design the USS *Arizona* Memorial. The partnership was awarded the commission in August 1959.

1960

In October, the Walker-Moody Construction Company won the contract to build the USS *Arizona* Memorial.

1961

In order to construct the memorial over the ship, a section of the boat deck that rested over the galley amidships was cut away. Initially this had been the area that supported the flag and platform that was installed in the 1950s. Eventually, the portion of the *Arizona* that was removed was sent to Waipio Point where it remains today.

1962

The USS *Arizona* Memorial was dedicated in May of 1962 to pay tribute to the 1,177 crewmen who lost their lives with the sinking ship.

1962

Ford Island Naval Air Station (NAS) was closed.

1962

By June 1962, four of the CPO four-plex units located at the northern end of Ford Island had been removed.

1963

Ford Island was selected as the location for a Polaris submarine training facility.

1964

The 13,107-acre (4,599 land; 8508 water) U.S. Naval Base Pearl Harbor was designated an NHL on January 29, 1964.

1967

By 1967, CPO bungalow 69 had been removed from the housing area.

1978

By 1978, the nine four-plex residential buildings that were located adjacent to the CPO bungalows had been demolished.

1978

Ground was broken for the museum-theater visitor complex for the USS *Arizona* Memorial on October 19, 1978.

1979

The U.S. Naval Base Pearl Harbor NHL nomination was updated.

1980

On September 9, 1980, the USS *Arizona* Memorial was established as a unit of National Park System that would be administered by cooperative agreement with US Navy.

1982

The name of the *USS Vestal* (AR-4) was painted on mooring quay F7 prior to memorial services held on 7 December 1982.

1989

The sunken hulls of both the USS *Arizona* and the USS *Utah* were declared NHLs on May 5, 1989.

1994

"National Pearl Harbor Remembrance Day" was designated on December 7 of each year.

1998

The nearly one-mile-long Admiral Clarey Bridge was dedicated. The bridge connected Ford Island to Kamehameha Highway.

1998

The USS *Missouri* arrived at its new berth at F5S and F5N.

2003

In June, the US Navy and Ford Island Properties entered the Ford Island Master Development Plan (MDP) pursuant to the Ford Island Development Legislation (10 USC Section 2814). The plan included numerous island-wide infrastructure improvements as well as housing development, and adaptive reuse of the historic theater (FAC. 89) as a conference center.

2005

Historic American Building Survey (HABS) documentation was completed for the CPO bungalows.

2007

The USS *Oklahoma* Memorial was built adjacent to the CPO bungalows. The memorial stands to honor the 429 servicemen on board *Oklahoma* who lost their lives on December 7, 1941.

2008

On December 5, World War II Valor in the Pacific National Monument was established by Presidential Proclamation. The monument encompasses nine historic sites located in Hawai'i, Alaska and California, including portions of Pearl Harbor and Ford Island.

2012

A fence was constructed as a safety measure blocking access to the USS *Tennessee* and USS *West Virginia* memorial marker.

2009-2012

In August, emergency stabilization work was completed on six CPO bungalows. Work included inspection to fumigate and exterminate termites and structural stabilization. Stabilization activities continued under the direction of the National Park Service through 2012.

2010

On December 7, 2010, the 69th Anniversary of Pearl Harbor commemoration and dedication of the new Pearl Harbor Visitor Center was held.

2010

Naval Station (NAVSTA) Pearl Harbor joined with Hickam Air Force Base to form Joint Base Pearl Harbor-Hickam.

2015-2016

CPO bungalow 28 was demolished by the National Park Service. A new building was constructed in its place that does not meet the *Secretary of the Interior's Standards for the Treatment of Historic Properties*.

2015

In the spring of 2015, Boy Scout Troop 135 painted the USS *Arizona* mooring quay.

2016

An up lighting was installed at the USS *Oklahoma* Memorial to illuminate the flag.

History

Pre-military History of Pearl Harbor and Ford Island

Prior to military use of lands, Pearl Harbor was first settled by Hawai'ians and, later, by ranchers and commercial farmers. All of the past inhabitants of these lands left their mark in various forms. Abandoned stone structures and rock shelters, planting terraces, planting mounds, and graves reveal a time when many of these areas were densely populated. Later, lands were cleared for sugar, pineapple, and sisal production and cattle ranching.

Polynesians are thought to have colonized the Hawai'ian archipelago from an ancestral homeland, most probably the eastern Polynesian islands of the Marquesas or Tahiti, as early as AD 300. This early date for initial colonization is not universally accepted, however, since the credibility of the radiocarbon evidence has been questioned. Proponents of a later arrival date consider AD 800-1000 to be a more likely starting point for traditional Hawai'ian culture.

Toward the end of this period (AD 1000) archeological evidence exists for the occupation of early Hawai'ians on the 'Ewa Plain, and presumably Pearl Harbor. With its rich marine and wetland resources, the Pearl Harbor area would have been an attractive settlement site and differential access to the estuarine and marine resources may have led to economically based social distinctions fairly early on in the socio-political evolution of Hawai'ians. By the late 1200s, the Pearl Harbor area had become a center of agriculture and aquaculture, however, the ruling center of the O'ahu Kingdom remained in the upland plateau in Līhu'e with the Lō Ali'i. Within the next few centuries, the abundance of available resources found in the fishponds and cultivated fields surrounding Pearl Harbor provided the economic base for the emerging chiefly (ali'i) class.

After the arrival of Europeans in Hawai'i in the late eighteenth century, the Hawai'ian Kingdom underwent radical changes. Following Kamehameha's (I) conquest of O'ahu in 1795, an increasing number of foreigners were visiting in the Hawai'ian Islands. Visitors brought diseases that led to a considerable decline in the Hawai'ian population. Western influence also had a dramatic effect on traditional culture and technology. In 1848, during the reign of Kamehameha III, the shared ahupua'a system of land division was replaced with a western influenced system of individual land ownership. This radical restructuring was called the Great Māhele (Great Division). The Māhele defined the land interests of the King, the high-ranking chiefs, and the konohiki (those who managed land on behalf of the chiefs) resulting in the division of lands into three categories: Government Lands, Crown Lands, and later, in 1850, Kuleana Lands, also known as Land Commission Awards (LCAs).

LCAs granted fee simple title to tenants who occupied and improved the land. Within what is now the Pearl Harbor Naval Complex, several Kuleana Lands were awarded, particularly in and around McGrew Point and on Pearl City Peninsula.

Extreme economic pressure, both foreign and domestic, during the late 1800s, led to the decline of traditional subsistence pursuits including aquaculture and traditional agriculture; fishponds fell out of use and into disrepair. Traditional lowland agricultural activities were replaced by new agricultural practices, such as rice paddies and watercress farms.[7]

Ford Island

Ford Island was known to early Hawai'ians as Moku'ume'ume. The name translates to "Island of Attraction":

Moku 'ume'ume, the Island of attraction, was the place where the sport of 'Ume [game] was played. No virgin or un-married person was permitted to take part for it was only for the married who were not blessed with offspring… The 'ume was not for chiefs but for the common people.[8]

Alternatively, the "Island of Attraction" was also known as the "Island of Strife" because it served as the center of contention between certain chiefs over fishing rights.[9] See Tara E. Moorman, "Final Report Historical Background Information for the Pearl Harbor Naval Complex," May 2001 for additional information related to traditional land use associated with Ford Island.

Prior to 1778, Ford Island was likely uninhabited as a result of a lack of water. During this period the island supported short-term uses such as fishing, collecting pili grass (*Heteropogon contorus*), and possible seasonal cultivation of dryland crops such as gourds and sweet potatoes.[10] In the early 1800s, Ford Island was owned by Don F. Francisco de Paula y Marin, a companion and interpreter for Kamehameha I.[11] As a result of Marin's activities, it was also called Rabbit Island.[12] In 1826, Lieutenant Hiram Paulding of the USS *Dolphin* may have been the first American naval officer to visit Ford Island. At this time, he documented his experiences in his journal, noting "After breakfast we sat off in our boat to visit a small island near the seashore, it was a half mile long, level, and overgrown with high weeds," and "an old Spaniard, by the name of Menini (Marin) who had settled at Omavoora (Honolulu), put one or more pairs of rabbits upon this small island and prevailed upon the chiefs to taboo them."[13]

In 1865, Caroline Jackson acquired Ford Island. Dr. Seth Porter Ford married Jackson, which led to the modern name of Ford Island. Ford died on November 19, 1866. Seth Ford, Jr., inherited Ford Island and owned the property from 1866 to

---

[7] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-5 - 2-7.

[8] Tara E. Moorman, "Final Report Historical Background Information for the Pearl Harbor Naval Complex," May 2001, 18-20.Document prepared by Ogden Environmental and Energy Services Co., Inc., Honolulu for Helber Hastert and Fee, Honolulu.

[9] Ibid.

[10] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-15.

[11] "Naval Command History," January 1, 1945, 1. EV5 NAVFAC HI Reference Library Pearl Harbor, Hawaii.

[12] Moorman, 18-20.

[13] "Naval Command History," January 1, 1945, 2-3.

1891.[14] During this period, the island supported grazing.[15] By 1899, the John Papa ʻIʻī Estate owned Ford Island. Irene ʻIʻī (daughter of John ʻIʻī) and her husband, Charles [Colby] A. Brown managed the estate.[16] During this period, the Oʻahu Sugar Company (OSC) leased a portion of Ford Island from the ʻIʻī Estate and planted an extensive acreage of sugarcane on the island.[17] Circa 1899, an artesian well was drilled on the island to facilitate large-scale cultivation of sugarcane.[18]

By the late 1800s, Ford Island was well known for its *pili* grass, while later (sometime after 1778) it was known for the production of watermelon by Westerners.[19] A base map provided by the US Navy entitled "Pearl River and Lochs", from the USS Bennington Survey (1897) noted Ford Island was "…covered with algarroba trees and alluvial soil on coral."[20] Reportedly the trees supported raising livestock for provisioning visiting ships.[21] At this time, there were two boat landings—one located along the northwestern shore, directly across the channel from the tip of Pearl City Peninsula and the other, called Kaneana Landing, was situated in the middle of the southeastern shore.[22] A ferry landing had also been constructed along the southwestern shore by the late 1800s. The cable ferry was used to transport sugar cane from the island to the peninsula for processing.[23]

Early Military Development on Ford Island, 1902-1939:

Early US Army and Navy Devlopment Activities

In 1902, the US Government purchased a twenty-five-acre strip of land along the southeast shore of Ford Island for future use as a naval base.[24] As a result of resistance from land owners to sell their property for the purpose of the naval station, the land was condemned and purchased through the eminent domain process.[25] At this time, dredging of the channel to facilitate access for large water craft such as battleships into Pearl

---

[14] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-5 – 2-7.

[15] *Draft Final Historic Context Report: Pearl Harbor National Historic Landmark, Pearl Harbor Naval Complex, Vol. 1*, The Louis Berger Group, Inc., Albany, New York, n.d. 3-17.

[16] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-5 – 2-7.

[17] Moorman, 18-20.

[18] *Historic Asset Management Process Volume II: Dataset (Pearl Harbor Naval Complex)* Binder 2 of 4, TEC Inc. – Joint Venture, Honolulu, Hawaii and NAVFAC Pacific, Pearl Harbor, Hawaii, September 2011, 4-6.

[19] Moorman, 18-20.

[20] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, Figure 2.2-2.

[21] Ibid, 2-15.

[22] Ibid, 2-16.

[23] Ibid, 2-17.

[24] *CNRH Oʻahu Integrated Cultural Resources Management Plan (ICRMP)*, Helber Hastert & Fee, Planners, Inc., October 2008, 5-129.

[25] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-32.

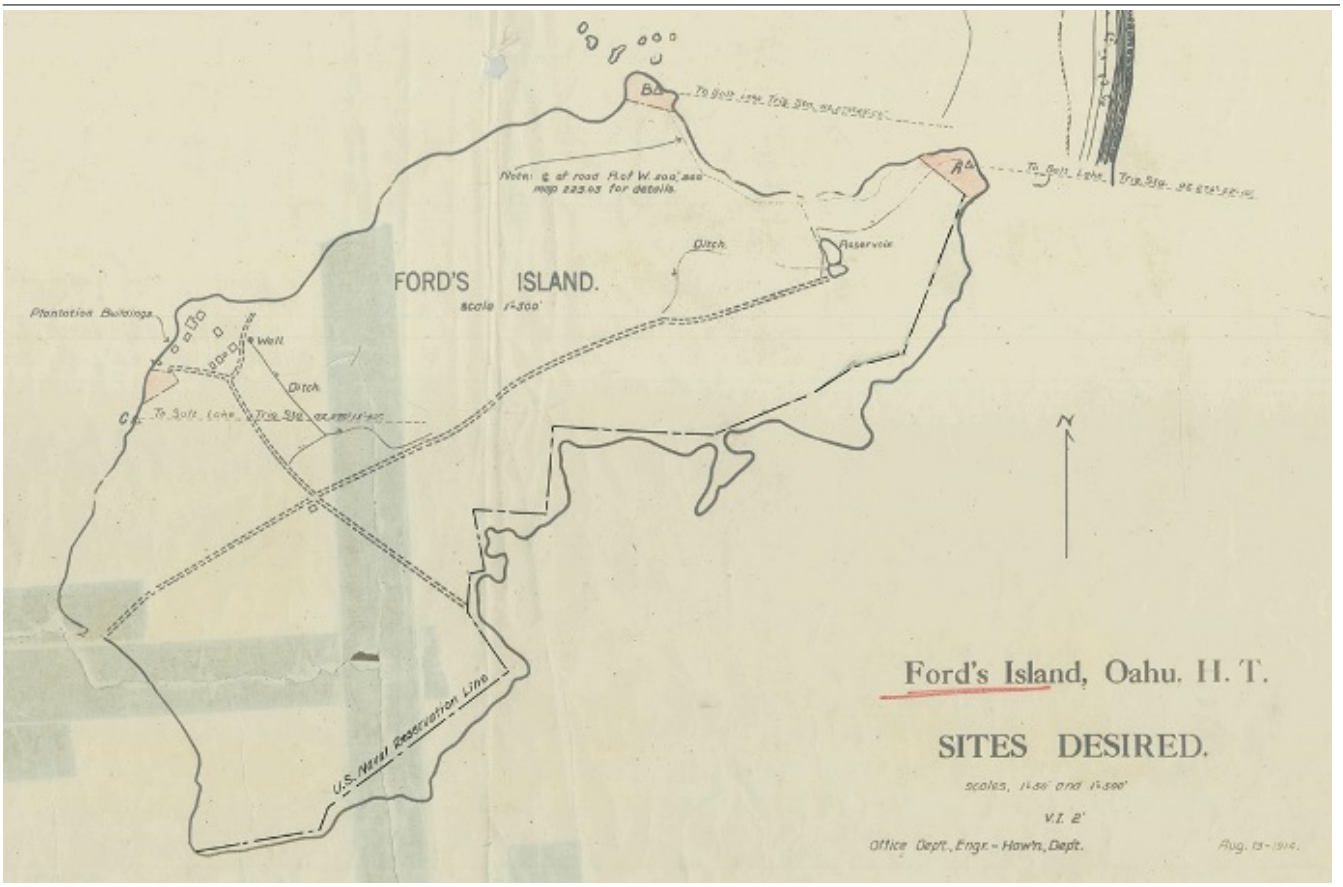


Figure 3. Map "Ford's Island, O'ahu, H.T., Sites Desired," prepared by the Corps of Engineers, August 13, 1914 (NARA, RG 77, 12000302).

Harbor was initiated; however, work was limited to sand removal. Additional dredging was undertaken in 1903 but proved insufficient to create an accessible port.[26]

Remaining privately owned portions of Ford Island were under development during the early 1900s. A 1914 map of Ford Island (Figure 3.) showed the "U.S. Naval Reservation" boundary as well as several improvements including two cane haul roads, irrigation ditches, a reservoir in the northeast corner, and a cluster of plantation buildings with a well on the west side of the island. The US Government purchased three parcels (Plats A, B and C) of land on Ford Island from the ʻIʻī Estate on September 7, 1915.[27] When the parcels were purchased most of the island was in sugar cane cultivation.[28] The following year, in 1916, the remainder of Ford Island was purchased by the US Government.[29] At that time,

[26] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-32.

[27] Ibid, 2-36 - 2-37.

[28] *Historic Context Study of Historic Military Family Housing in* Hawaii, Mason Architects, Inc., August 2003, 5-49.

[29] *CNRH O'ahu Integrated Cultural Resources Management Plan (ICRMP)*, 5-129.

the island measured 304.733 acres.[30] The War Department subsequently determined that both the US Army and US Navy could share the island for use as an aviation installation. At this time, the US Navy already held approximately twenty-five acres of land on the southeast side of the island, so the US Army began the construction of their facilities on the northwest side of the island. The center of the island was retained for a joint-use by the US Army and US Navy as a landing field.

Improvements to the island were undertaken by the US Army in 1917 when Batteries Adair and Boyd were constructed on the northeast corner of Ford Island. (The guns were removed in 1925.) The batteries were built to defend O'ahu's harbors and forts. In 1918, the US Army air squadron relocated to Ford Island after construction of two seaplane hangars with ramps, a warehouse and a shop building had been built.[31] (The installation was officially named Luke Field in 1919.) On October 10, 1918, the Honolulu *Advertiser* described recent changes to Ford Island:

> All the great hangars for housing the Army's planes on Ford Island have been completed, and the men are on duty….Ford Island has developed within six months from an area devoted almost exclusively to the cultivation of sugar cane into a large aviation station for the new Army and Navy.
>
> The men are temporarily occupying headquarters in one of the unoccupied hangars, their own barracks not being yet constructed. Part of the aviation equipment will occupy the area formerly occupied by the summer house of Mrs. Irene ʻĪʻī Holloway, which is one of the most beautiful waterside sites in the Islands. The running field has not been completed and for the present the Army's land plane makes its flights from Fort Kamehameha [now part of Hickam AFB].[32]

On January 31, 1919, the Honolulu *Advertiser* once again reported on early military history of Ford Island:

> While Honoluluans occasionally see an air machine flying over the city, they little realize what a vast aviation station has already risen on Ford Island. A few years ago the island was covered with sugar cane and coral, a group of cottages occupied by the ʻĪʻī Browns, set in a pleasant tropical locality, where the members of the Order of the Chiefs of Hawaiʻi have been initiated the past 20 years.
>
> Today there is a great landing field for land planes, a large steel and wooden hangar to house these machines, two huge concrete hangars for seaplanes and flying boats, a supply warehouse, a machine shop and photograph laboratory; while ground is being broken for a powerhouse which will supply current for lighting, power, and for hauling machines up from the water to

[30] Rick L. Smith, *Phase I Environmental Site Assessment, Ford Island Bungalows, Arizona Memorial, Ferry Reception Buildings, Pearl Harbor, Hawaii,* Hawaiʻi International Environmental Services, Inc., Kailua, Hawaiʻi, November 8, 2004, 3-3.

[31] *CNRH Oʻahu Integrated Cultural Resources Management Plan (ICRMP)*, 5-129.

[32] "Naval Command History," January 1, 1945, 4-5.

> the landing stage and for operating the workshop machinery.
>
> The officers are occupying the old cottages used by the Brown family but these are weather-beaten and hardly habitable. The one fine feature of the location is the big enclosed swimming pool.[33]

Circa 1917-1919, sugar cane cultivation ended on Ford Island and was replaced by military development.[34] During this period, the US Army's 4th and 6th Aero Squadrons began clearing sugar cane from the land.[35] Additionally, it is unclear how long the plantation-era buildings situated on the west side of Ford Island remained extant after the US Army began making improvements in the locale.[36] Between 1919 and 1922, the US Army built twenty-eight craftsman style residential buildings or units (at least five duplexes) along the northern portion of the western shore of Ford Island.[37] During the early 1920s, the US Army would build a couple dozen other facilities on Ford Island to support their aviation activities.

In October 1919, a "Special Board of Inspection of Naval Bases, etc., on the Pacific Coast" recommended, "that a first-class naval base, capable of taking care of the entire US Fleet in time of war, should be immediately developed at Pearl Harbor, as a strategic necessity." Recommendations included dredging a forty-foot-deep-channel around Ford Island, creation of an anchorage area north and west of Ford Island for eight capital ships and development of the whole waterfront associated with Pearl Harbor and Ford Island to encourage national and territorial governments in development of Honolulu harbor.[38] Soon plans were underway to encircle Ford Island with concrete and stone quays to provide berth space for warships.[39]

CPO Bungalows and Associated Development

On December 19, 1919, the first US Navy aviators arrived in Hawai'i and established a temporary base at Pearl Harbor's US Navy Yard.[40] After development on Ford Island, planes were moved to the island in January 1923.[41] Construction of aviation facilities, clustered on the southern tip of the southeast side and housing in two areas of the northeast tip, quickly followed.

On June 15, 1922, a drawing for the "Proposed Quarters for Married C.P. Officers at the Naval Air Station Ford Island" was finalized. Within the year, three Officers' Quarters were built in the North End neighborhood on the northern tip of the island. In October 1923, a location plan for the "Married C.P.O. Quarters, Ford Island" was prepared. Between 1923 and 1924, CPO bungalows 27, 28, 29, 30, 31, and 32 were built for non-commissioned officers on the

---

33 "Naval Command History," January 1, 1945, 5-6.

34 *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-58.

35 *Draft Final Historic Context Report: Pearl Harbor National Historic Landmark, Pearl Harbor Naval Complex, Vol. 1*, 5-49.

36 *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-59.

37 *CNRH O'ahu Integrated Cultural Resources Management Plan (ICRMP)*, 5-129.

38 "Command History: Pearl Harbor Naval Shipyard," compiled by Management Engineering Division, Management Planning and Review Department, July 1959, 7.

39 "Naval Command History," January 1, 1945, 9-10.

40 *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-74 - 2-75.

41 *CNRH O'ahu Integrated Cultural Resources Management Plan (ICRMP)*, 5-129.

southeastern shore (Figure 4, 5, 6, and 7).[42] Subsequent development of the CPO bungalows site would occur in multiple phases.

The board and batten bungalows had hipped roofs with extended eaves. The company of Lewers and Cooke who were the "leading building material establishment for Honolulu" for many decades, considered the board and batten construction technique to be structurally superior to the less expensive tongue and groove (T & G) single-wall houses. It is possible that this company provided the materials for the CPO bungalows; however, US Navy records show that station enlisted personnel built the buildings.[43]

After their construction, all of the CPO bungalows associated with the site were modified during various renovations undertaken by the US Navy over the decades.[44] The most notable change included the construction of a rear addition on each building. Other alterations included: removal of the metal ventilator at the roof ridge, removal of the original wood shingles, enclosure of front screen porches and incorporation into interior living space, addition of an exterior girt, either at sill, or mid-window height (except CPO 90 and 68), and the wooden front and side/rear steps and landings were replaced with concrete.[45]

US Navy maps from 1924 show electric lights along main roads and fire hydrants near the CPO bungalows. A June 30, 1924 CPO Neighborhood Map (portion of Drawing No. V-61, Figure 8) showed the loop road (later known as Belleau Woods Loop as first noted on a 1946 drawing) as an asphalt macadam road. The map also denoted that the buildings were still under construction. "Loose coral fill" was mapped on adjacent lands outside of the CPO bungalow area.[46]

Development on Ford Island continued with the construction of nine 225,000-gallon reserve gasoline tanks, also called aboveground storage tanks (AST), along the southeastern shoreline in 1924.[47] Concrete barricades or fencing was installed around the tanks to provide additional security and safety.[48] Tanks 62 and 63 were located in close proximity to the CPO bungalows. A gasoline wharf was also built on fill land.[49] By 1925, approximately forty US Navy facilities had been constructed on the southern portion of the southeast side of Ford Island.[50]

---

[42] *Historic Context Study of Historic Military Family Housing in* Hawaii, Mason Architects, Inc., August 2003, 5-83.

[43] Cosson and Yoklavich, 6.

[44] *Historic Context Study of Historic Military Family Housing in* Hawaii, 5-88.

[45] *Final Environmental Condition of Property, World War II Valor in the Pacific National Monument, Chief Petty Officer Bungalows and U.S.S. Utah Memorial, Ford Island, Pearl Harbor Naval Complex, Oahu, Hawaii,* Department of the Navy, Naval Facilities Engineering Command, Pearl Harbor, Hawaii, August 2009, 5-5

[46] Cosson and Yoklavich,14.

[47] *Final Environmental Condition of Property, World War II Valor in the Pacific National Monument, Chief Petty Officer Bungalows and U.S.S. Utah Memorial, Ford Island, Pearl Harbor Naval Complex, Oahu, Hawaii,* 5-5.

[48] Ibid.

[49] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-107.

[50] *Historic Context Study of Historic Military Family Housing in* Hawaii, Mason Architects, Inc., August 2003, 5-83.

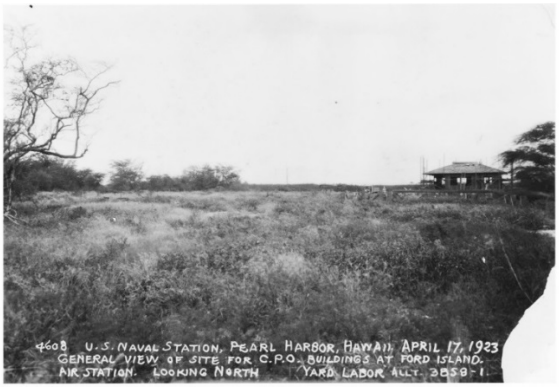


Figure 4. Photograph looking north at the CPO building site on Ford Island, April 17, 1923 (14th Naval District Command Photos, PERL archives, PHOG_NO 4608).

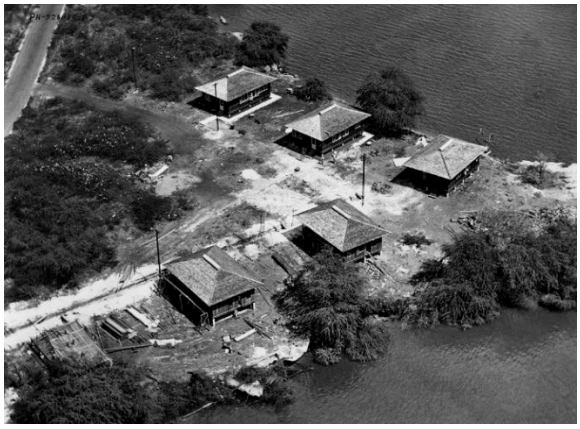


Figure 5. Photograph looking north of the CPO bungalows under construction, October 17, 1923 (NARA II, 71CA-154B-4-PH320).

Figure 6. Photograph looking west of the CPO bungalows, September 7, 1924 (NARA II, 71CA-154B-1-PH5287).

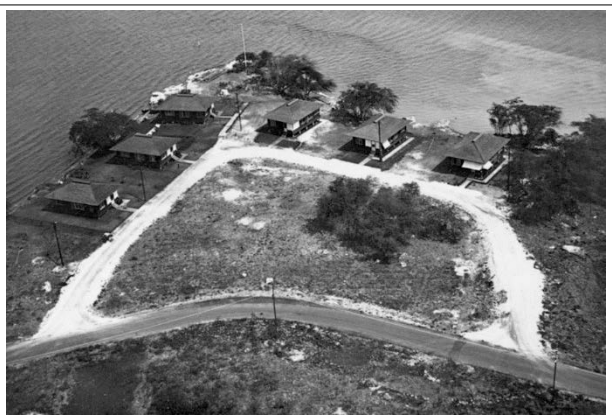


Figure 7. Photograph looking southeast of the CPO bungalows, July 10, 1924 (NARA II, 71CA-152A-9-PH458).

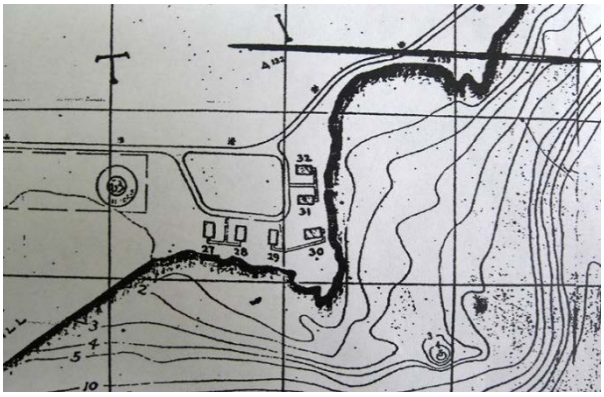


Figure 8. Portion of a June 30, 1924 map (Ford Island Past & Present. Fleet Intelligence Center, Pacific, March 1969 from EV5 NAVFAC HI Reference Library, Pearl Harbor, Hawaii).

Figure 9. CPO Bungalow Neighborhood, between June 1931 and June 1932. (NARA RG-71-CB box 102, folder C, no photograph number).

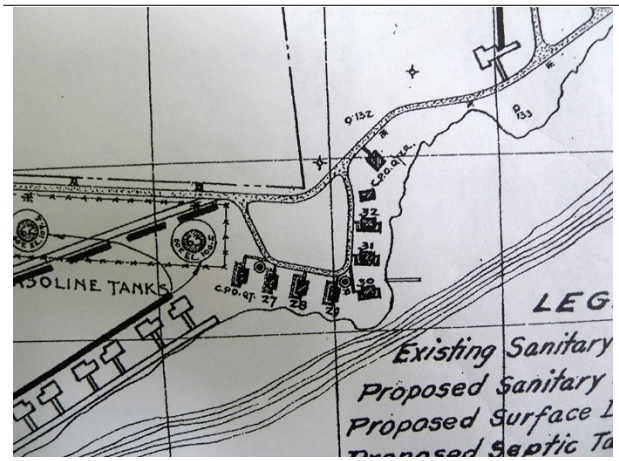


Figure 10. Portion of a June 30, 1932 map (PERL archives).

Figure 11. November 13, 1934. CPO bungalows view from mooring quay 5 (14th Naval District Photos, PERL, #11314).

Construction activities resumed within the existing CPO bungalow site with the construction of CPO bungalow 67 (1200 square feet) in 1928.[51] The building was constructed south of CPO bungalow 27. Two years later, in 1931, CPO bungalow 69 was built near CPO bungalow 32. By 1932, CPO bungalow 68 had also been completed between CPO bungalows 32 and 69 (Figures 9, 10 and 11).[52] Sources suggest that these three buildings were unnumbered until 1936, when they appear on a map as buildings 67, 68 and 69.[53]

By 1932, additional facilities were needed on Ford Island to support both the land-based seaplanes and the large numbers of carrier-based planes that intermittently visited Hawai'i. Fifteen houses were built in northeastern part of Ford Island for married officers in 1936.[54] Additional housing was built in 1937 when nine two-story, four-plex residential buildings were constructed adjacent to the CPO bungalows on newly reclaimed land that was developed using dredged materials.[55] At this time, Monkeypod trees were planted in the 1937 CPO housing area following the orthogonal layout of the buildings.[56] Also in 1937, CPO bungalow 68 and 69 (no longer extant) were moved several hundred feet west between gasoline storage tanks 62 and 63.[57] In 1938, CPO bungalow 90 (formerly facility 70) was constructed along Long Island Street south of CPO bungalow 69. The building was not renumbered to CPO bungalow 90 until circa 1940-1942.[58] (It was moved from its original location to a site adjacent to the former

---

[51] *Final Environmental Condition of Property, World War II Valor in the Pacific National Monument, Chief Petty Officer Bungalows and U.S.S. Utah Memorial, Ford Island, Pearl Harbor Naval Complex, Oahu, Hawaii,* 5-5

[52] Dee Ruzicka, "U.S. Naval Base, Pearl Harbor, Chief Petty Officer's Quarters (Facility 68)," Historic American Buildings Survey, HABS No. HI-##, Mason Architects, Inc., Honolulu, Hawaii, November 2010, 5.

[53] Ibid.

[54] *CNRH O'ahu Integrated Cultural Resources Management Plan (ICRMP)*, 5-127 – 5-129.

[55] *CNRH O'ahu Integrated Cultural Resources Management Plan (ICRMP)*, 5-130.

[56] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-103.

[57] Dee Ruzicka, 5.

[58] Dee Ruzicka, 5.

location of Bungalow 67 in 1943.[59]) Also in 1938, a combined schoolhouse and activity center known as the Kenneth Whiting Building (building 73) (4455 square feet) was built in proximity to the CPO bungalows.[60] Notably, by the late 1930s, US Navy family housing areas on Ford Island contained clotheslines associated with the buildings.[61] Today, several clotheslines remain with the CPO bungalow site.

Dredging and the Construction of Mooring Quays

As development by the US Army and US Navy continued throughout the 1920s space on Ford Island became more limited. While the runway situated in the middle of the island constrained development, additional acreage was added incrementally by filling in the shallow nearshore areas.

Between 1922 and 1936 dredging activities were undertaken around the east and north shorelines of Ford Island in an effort to create berthing areas deep enough for large ships. In 1922, the shoreline of Ford Island was irregular. Circa 1923-1924, reclaimed land was created as part of the fuel system construction. In this location, coral fill extended the shoreline in front of the five eastern-most fuel tanks, providing adequate water depth for the gasoline wharf.[62] Dredging operations expanded in 1936, and in 1937 about 2,000,000 cubic yards of the harbor's bottom were dredged out and work on the concrete moorings along Battleship Row began.[63] The shoreline was also further modified beginning in May 1940 with reports that a total of 13,000,000 cubic yards were dredged. The effort provided a turning channel around the periphery of Ford Island and grew to include the deepening of the West Loch, Middle Loch, East Loch, and Magazine Loch. At this time, the channel to the sea was also deepened.[64] The shoreline has not been substantially altered since 1945.[65] As a result of these activities, the acreage of Ford Island increased to its present day 450 acres.[66]

The US Navy awarded three or more contracts for the construction of fleet moorings in the vicinity of Ford Island.[67] In December 1933, W.P. Thurston Co., Inc. was awarded the contract for construction of one aircraft carrier berth and five battleship berths along the southeast shore of Ford Island.[68] This resulted in the construction of six pairs of mooring quays or berths offshore on

---

[59] *Evaluation of Historic Structures: CPO Bungalows, USS Utah Memorial, USS Arizona Memorial, and Mooring* Quays, *WWII Valor in the Pacific National Monument, Pearl Harbor, Oahu,* Mason Architects, June 2011, C-1.

[60] *Final Environmental Condition of Property, World War II Valor in the Pacific National Monument, Chief Petty Officer Bungalows and U.S.S. Utah Memorial, Ford Island, Pearl Harbor Naval Complex, Oahu, Hawaii*, 5-5

[61] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-109.

[62] Ibid, 2-100.

[63] "Command History: Pearl Harbor Naval Shipyard," 11.

[64] *Building the Navy's Bases in World War II: History of the Bureau of Yards and Docks and the Civil Engineer Corps 1940-1946, Volume II, (*Washington: United States Government Printing Office) 1947, 129.

[65] *CNRH O'ahu Integrated Cultural Resources Management Plan (ICRMP)*, Helber Hastert & Fee, Planners, Inc., October 2008, 5-130.

[66] Smith, 3-3.

[67] J. Michael Wenger, "Evaluation of Historical Resource Materials: Mooring Quay Project," March 18, 2013.

[68] Wenger, March 18, 2013.

the southeast side of Ford Island between 1934 and 1935 (Figure 12). Technically these were known as "interrupted quays," and were characterized by pairs of hexagonal concrete pillars embedded in the harbor bottom. The quays included fenders and timbers situated at waterline level and bollards for the ships' lines topside.[69] During this period, most of the men called them "keys" and the statements of survivors often refer to them as keys, rather than as "quays."[70]

Plans originally included eight berths along Ford Island's southeast shore, including sixteen mooring platforms. Eventually, the plan was modified with three platforms being deleted and three platforms combined and repositioned into one aircraft carrier berth.[71]

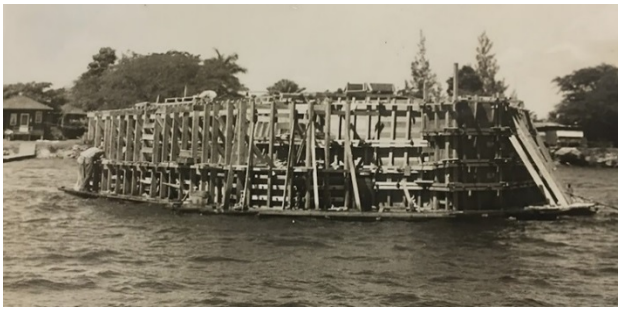


Figure 12. Mooring quay 6 on September 17, 1934. Note CPO bungalows in background (14th Naval District Photos, PERL, #11198).

The mooring platforms are as follows:

Mooring Platform 1: F2 S

Mooring Platform 2: combined into F2 N

Mooring Platform 3: combined into F 2 N

Mooring Platform 4: F3 S

Mooring Platform 5: F3 N

Mooring Platform 6: deleted from plan

Mooring Platform 7: deleted from plan

Mooring Platform 8: deleted from plan

Mooring Platform 9: F5 S

Mooring Platform 10: F5 N

Mooring Platform 11: F6 S (Type A)

Mooring Platform 12: F6 N (Type A)

Mooring Platform 13: F7 S (Type A)

Mooring Platform 14: F7 N (Type A)

Mooring Platform 15: F8 S (Type B)

Mooring Platform 16: F8 S2 (Type B)

See Wenger report for the additional details about the configuration of the mooring quays.[72]

Specifications outlined in the contract indicated that two types of mooring platforms be

[69] Samuel Eliot Morison, *History of United States Naval Operations in World War II: Volume 3: The Rising Sun in the Pacific 1931–April 1942,* (Urbana and Chicago: University of Illinois Press) 2001, 102. Originally printed in 1948.

[70] Vice Admiral Homer N. Wallin, *Pearl Harbor: Why, How, Fleet Salvage and Final* Appraisal, Washington D.C.: United States Government Printing Office, Naval History Division, 1968, 138.

[71] Wenger, March 18, 2013.

[72] J. Michael Wenger, "Evaluation of Historical Resource Materials: Mooring Quay Project," March 18, 2013 and Sonya Cooper, "Vanishing Treasures Trip Report: Valor in the Pacific National Monument," Structural Assessment & Evaluation of Mooring Quays, March 4, 2016, 3–5.

constructed on the southeast shoreline of Ford Island. Mooring platforms 9 to 14 were to be of the Type "A" construction, while mooring platforms 4 to 5 and 15 to 16 were to be Type "B".[73] Characteristics include:

> The Type "A" platform plan is a quasi-hexagon shape consisting of reinforced concrete exterior walls and a grid of interior reinforced concrete walls that form 10 compartments or cells within the plan.
>
> Each cell has a drain in the center of the bottom slab. The plan shows 35 piles, most of which are angled. One bollard cleat, three double bitt cleats, and four horned cleated are mounted on the top of solid concrete piers inset from the exterior walls.
>
> The Type "B" platform plan is a quasi-octagon shape consisting of a concrete shell exterior wall with a grid of interior reinforced concrete walls that form 18 compartments or cells within the plan. Each cell has a drain in the center of the bottom slab. The plan shows 53 piles, most of which are angled. As with the Type A construction, one bollard cleat, three double bitt cleats, and four horned cleated are mounted on the top of solid concrete piers inset from the exterior walls."[74]

While not specified in the contract, Historian Michael Wenger noted that Type "C" mooring platforms were also built for berth F2 and for a berth near the Fuel Pier that was later deleted. The mooring platforms or quays that are managed by the National Park Service represent Type "A" and Type "B" designs. Despite the differences in design, common characteristics of the mooring platforms or quays included fender systems, filling (coral sand and crushed rock), paving of platforms, and mooring fittings.[75]

It is also important to note that while none of the contracts specified painting the platforms, historic photos suggest that the platforms or portions of the platforms were painted white with berth designations painted in black. [76] Other sources suggest that at the time of the attack it is "very likely that the quays were not painted.[77] While

[73] Wenger, March 18, 2013.

[74] Sonya Cooper, "Vanishing Treasures Trip Report: Valor in the Pacific National Monument," Structural Assessment & Evaluation of Mooring Quays, March 4, 2016, 3-5.

[75] Wenger, March 18, 2013.

[76] Ibid.

[77] *Evaluation of Historic Structures: CPO Bungalows, USS Utah Memorial, USS Arizona Memorial, and Mooring* Quays, *WWII Valor in the Pacific National Monument, Pearl Harbor, Oahu*, A-1.

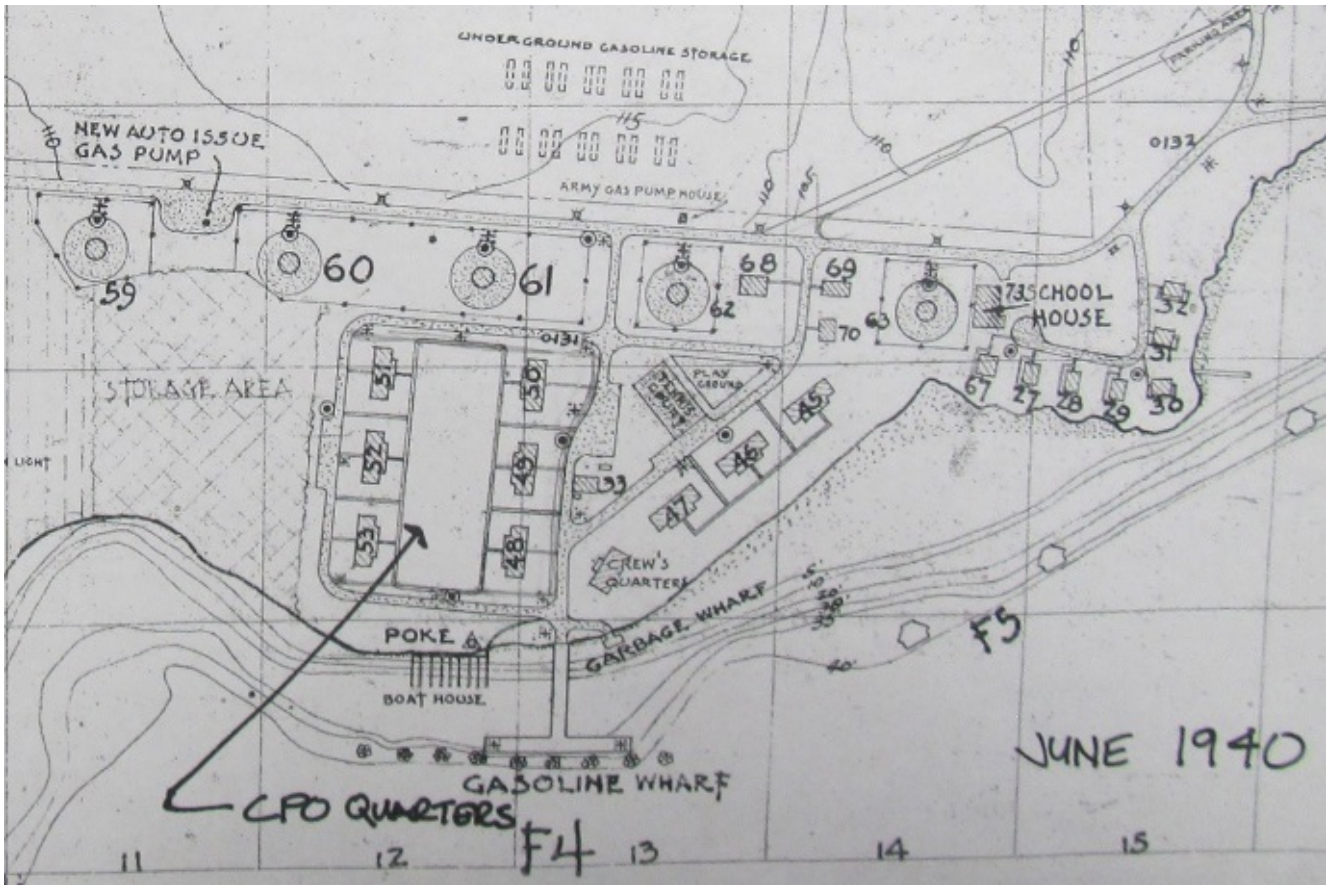


Figure 13. Development associated with the CPO bungalows, June 30, 1940 (PERL archives).

additional research is necessary, a photo of mooring quay F 2 during the December 7, 1941 attack shows the berth designation painted on the platform. Additionally, light colored paint may be evident on a portion of the quay in direct association with the berth number.

By the late 1920s it was determined that Ford Island was too small to accommodate the aviation needs of both the US Army and US Navy.[78] By 1928, a new site had been selected for an US Army airfield.[79] On October 26, 1935, President Roosevelt issued Executive order 7215, which transferred full control of Ford Island to the US Navy.[80] The US Army facilities, were relocated to Hickam Field on October 31, 1939.[81] In 1939, Ford Island was the US Navy's only aviation facility in Hawai'i.[82] The CPO bungalow neighborhood was further developed (Figures 13). The island's development ringed the edge of the landmass, with ships fanned out into the harbor (Figure 14).

[78] *CNRH O'ahu Integrated Cultural Resources Management Plan (ICRMP)*, 5-130.

[79] *Historic Context Study of Historic Military Family Housing in Hawaii*, 5-64, 5-65.

[80] *Draft Final Historic Context Report: Pearl Harbor National Historic Landmark, Pearl Harbor Naval Complex, Vol. 1*, 7-56.

[81] *Building the Navy's Bases in World War II: History of the Bureau of Yards and Docks and the Civil Engineer Corps 1940-1946, Volume II*, 137-138.

[82] *CNRH O'ahu Integrated Cultural Resources Management Plan (ICRMP)*, 5-127 - 5-129.

Figure 14. Aerial photograph of Ford Island taken at 17,200 feet altitude, May 3, 1940 (Naval History and Heritage Command, 80-G-411117).

World War II, 1940-1945:

Pearl Harbor was attacked by Japan on December 7, 1941. After the attack on Pearl Harbor, the airplane revolutionized naval warfare in the Pacific, essentially rendering battleships obsolete. Ultimately, the impact of aviation during World War II would pave the way for an explosion in commercial aviation that would transform tourism into a major support of Hawai'i's economy.[83]

December 7, 1941

On the morning of December 7, 1941, shortly before 8:00 a.m., US Navy families occupying the CPO bungalows on Ford Island were getting ready to start a new day. When they heard the roar of aircraft engines, many supected nothing out of the ordinary. Nearby, the berths along Battleship Row were occupied by USS *Oklahoma* and USS *Maryland* (F5 S and F5 N), USS *West Virginia* and USS *Tennessee* (F6 S and F6 N), and the USS *Arizona* and repair ship USS *Vestal* (F7 S and F7 N).

The air attack on Pearl Harbor by the Japanese began at 7:55 a.m. Japanese dive-bombers first targeted Hanger 6 at Naval Air Station Pearl Harbor before attacking the battleships. Japanese horizontal bombers flying at 10,000 feet also dropped bombs on the battleships.

During the attack, many families occupying homes on Ford Island sought safety at the Rear Adm. Patrick N. L. Bellinger's home (Quarters K), which was a structure built on top of Battery Adair, an ex-Army casemented gun emplacement.[84] At the time of the attack, Charlotte Coe lived with her family in a bungalow located in the North End Neighborhood. The first explosion woke Charlotte from a deep sleep. She recalled her father saying, "Get up! "The war's started." As her family retreated to the old gun emplacement, she, like so many others on Ford Island saw the Japanese

[83] H. Brett Melendy, "The Competition for Trans-Pacific Air Routes to Hawai'i, 1945-1959," *Hawaiian Journal of* History, vol. 37 (2003), 202.

[84] Daniel A. Martinez, "Significance Statement CPO Bungalows, Naval Air Station Pearl Harbor," National Park Service, June 2, 2016.

planes with red circles under its wing fly overhead. Prior to the attack the children played in the bunker, which they had called "the dungeon." Reportedly, explosion of the USS *Arizona* rocked the walls and floors inside the shelter. Soon after, survivors from damaged battleships began making their way ashore and into the bunker. Many of the survivors were coated in oil and some had been strafed and burned.[85]

Also, soon after the attack oil-soaked sailors swam ashore from the destroyed battleship and ended up in the yards of the CPO bungalows. Some survivors described taking clothes off the clotheslines.[86] One account describes the scene:

> By this time the waters lapping at Ford Island swarmed with rescue activity. Amid explosions, strafing, and blazing oil, able-bodied survivors helped their buddies off the burning battleships and into waiting launches, barges, or anything they could muster. These plied back and forth to Ford Island with wounded, burned, and shocked officers and men…Countless others dived from their ships, swam ashore, and scrambled onto the island, soaked with oil, barely clothed, many with varying degrees of burns and wounds. [87]

Another survivor, Don Erwin McDonald, recalled the following events associated with the attack:

> I was asleep [on the USS *Arizona*] when the attack came.
>
> We left the ship and got onto the quay – which the ship was tied to – and jumped into the water which was covered with oil and fire.
>
> While we were swimming we could feel the explosions in the water – it felt like it was enough to tear your flesh off.
>
> I towed Cpl. Nightingale until we got to the hydraulic dredge line that ran out from Ford island. It was above the water on pilings, and he could walk ashore from there. By the time I got ashore on Ford Island – it was about 200 yards or so from where the battleships were – I could see the *Arizona* had settled and was burning fiercely. I also saw the *Oklahoma* and the *Utah* roll over.
>
> All most of us had on was our shorts. We went to a nearby officers' quarters, where we borrowed some of their clothing. We were given rifles and spent the rest of the attack sitting under the trees shooting at the Japanese aircraft. The rest of the day was very busy.[88]

Ultimately, as a result of the Japanese attack on Pearl Harbor, 2,403 Americans were killed and 1,178 were wounded. Five of the eight battleships had been sunk, while the remaining three battleships had been damaged. Eighteen of the

---

[85] Mark Wortman, "The Children of Pearl Harbor: Military personnel weren't the only people attacked on December 7, 1941," *Smithsonian Magazine* < https://www.smithsonianmag.com/history/children-pearl-harbor-180961290/>, December 5, 2016.

[86] "CPO Quarters," Historic Hawai'i Foundation website < https://historichawaii.org/ford-island-background/cpo-quarters/> accessed May 4, 2017.

[87] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-123 - 129.

[88] "Don Erwin McDonald," Oral History WWII Valor in the Pacific National Monument archives.

ninety-six vessels at Pearl Harbor had been either sunk or seriously damaged. Despite the damages, repairs began almost immediately to resuscitate the Pacific Fleet.[89]

Louise Kinsman

At the time of the attack, Louise Kinsman and her family were in their home along Battleship Row.

Louise Kinsman moved to Ford Island in December 1940. Her father was a Chief Petty Officer in the Navy. Their family had been selected to live in one of the CPO bungalows on Ford Island. Louise recalled that she and her family lived in CPO bungalow 31.[90] Subsequent correspondence suggests that another family, CBM (PA) John and Cota Burnfin, may have lived in Quarters 31 at the time of the attack, while the Kinsman's lived nearby.[91]

Louise had vivid memories where she was and what she was doing during the attack as well as the events after the attack.[92] She recalled that she was getting ready for Sunday school class at the Kenneth Whiting building when she felt a tremor and thought "What are they doing dredging on Sunday?" [93] A few minutes later, her mother informed her that the station was on fire. While fleeing to their vehicle she saw a Japanese plane flying overhead.[94] After the USS *Arizona* had exploded, the family drove past their home while on their way to the air raid shelter near the Admiral's house. She could not see the bungalow through the thick smoke but could see fire engines in the back yard.[95] After the attack, she noticed that her cologne on top a chest of drawers was broken, remarking "Well you know what happened when the *Arizona* blew up, the house jumped too. It smelled really good when we went back." [96] She also reported that there were tons of shrapnel in the house after they returned.[97]

After the Attack

Following the attack, newspaper headlines across the world, including the *Honolulu Advertiser*, reported on the events at Pearl Harbor. On December 8, 1941, Franklin Delano Roosevelt (FDR) responded to the attack with these words:

> Yesterday, December 7, 1941 – a date which will live in infamy– the United States of America was suddenly and deliberately attacked by naval and air forces of the Empire of Japan…The attack yesterday on the Hawai'ian Islands has caused severe damage to American naval and military forces. Very many American lives have been lost…Always we will remember the character of the onslaught against us. No matter how long it may take us to overcome this premeditated invasion, the American people in their

89 *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-123 - 129.

90 Oral History, Interviewer: Daniel Martinez, PERL Chief Historian and Interviewee: Louis Bernhardt Kinsman, December 6, 2011.

91 National Park Service, "Correspondence from Mike Wenger to PERL staff: Daniel Martinez and Scot Pawlowski," August 18, 2014.

92 Oral History, Louis Bernhardt Kinsman, 7.

93 Ibid, 23-24.

94 Ibid, 28.

95 Ibid, 32.

96 Ibid, 8.

97 Ibid.

> righteous might will win through to absolute victory.[98]

Damage resulting from the December 7, 1941 attack in the CPO bungalow area included the presence of fragments from explosions of nearby ships, particularly the *Arizona*, which were blown over the northeasterly end of the island, but caused no serious material damage.[99] A memo from a first lieutenant after the attack noted that around the station's south side there were several houses that had been hit by shrapnel, and blazing objects from the explosion associated with the *Arizona.*[100] Evidence of three delayed-action bombs, which had targeted the ships moored at F6, was also found near the CPO quarters and school house. Luckily, the bombs exploded without causing any damage, dissipating the explosive force in the porous coral formation. Results from the District Bomb Disposal Officer's investigation suggested that they were armor piercing bombs.[101] According to National Park Service historian Daniel Martinez, archeological evidence suggests that a group of five bombs fell wide of their targets, with several of the bombs impacting the ground approximately seventy-five yards (225 feet) northwest of the CPO bungalows.[102] Additionally, "minor damage to station quarters, furniture and the like, was caused by the billeting and treatment therein of casualties coming ashore from ships through oil, fire-covered waters."[103] After Thomas Oliver Powell abandoned the USS *Oklahoma* he jumped down to a mooring quay and eventually into the water and swam to Ford Island. "Just about the time I reached Ford Island the *Arizona* blew up. I ran to and went under a house where I remained for approximately one hour."[104]

The buildings only suffered only minor damage as a result of their close proximity to the explosions and subsequent fires along Battleship Row. At the time of the attack, the USS *Arizona* was moored to the northeast, upwind.[105] Several reports from individuals on the scene noted that a minor fire occurred in one of the CPO bungalows in the early morning of December 8 as a result of floating embers from the burning USS *Arizona*.[106] As a

---

98 Bill Dickinson and Gary Cummins, "USS *Arizona*: The Management Experience," in *Submerged Cultural Resources Study, USS Arizona Memorial and Pearl Harbor National Historic Landmark,* Daniel J. Lenihan, ed., Southwest Cultural Resources Center Professional Papers, Santa Fe Mexico, 1989, Second Edition 1990, 169.

99 *Ford Island Past & Present: A picture story of the United States Navy on Ford Island from 1923 up to the present day*, Fleet Intelligence Center, Pacific, March 1969. EV5 NAVFAC HI Reference Library, Pearl Harbor, Hawaii.

100 Memo from First Lieutenant to Commanding Officer "Air Raid Attack by Japanese – Report for Report on," December 16, 1941, 3. NAS Attack Reports, 1941, EV5 NAVFAC HI Reference Library, Pearl Harbor, Hawaii.

101 *Ford Island Past & Present: A picture story of the United States Navy on Ford Island from 1923 up to the present day*.

102 Daniel A. Martinez, "Significance Statement CPO Bungalows, Naval Air Station Pearl Harbor."

103 *Ford Island Past & Present: A picture story of the United States Navy on Ford Island from 1923 up to the present day*.

104 "Thomas Oliver Powell," Oral History WWII Valor in the Pacific National Monument archives.

105 *Historic Context Study of Historic Military Family Housing in* Hawaii, Mason Architects, Inc., August 2003, 5-85.

106 Ibid.

result of the attack, the sunken hull of the USS *Arizona* hull had crushed the twelve inch main water line, which caused a severe shortage of water on Ford Island. At this time, the danger from fire was serious.[107] The shortage hindered fighting fires as well as for administering medical attention; however, the fire in the CPO bungalow was quickly extinguished.[108] A memo from Captain James Shoemaker reported his role in putting out the fire, noting that he "Attempted to sleep on a cot in my office, but was called about midnight because of a fire in the rear of the enlisted quarters near Berth Fox-6, caused by embers from *Arizona* (which burned for three days.) Fire was minor, easily extinguished. Established a 24-hour watch with pumper, in this area, until *Arizona*'s fire died out."[109] Reportedly, the CPO quarters that started on fire was situated closest to a bomb strike that occurred in the center court area directly across the street.[110]

Earlier in the day there were also other reports of fires in proximity to the CPO bungalows. Ensign G.M. Rice reported on December 7, 1941:

> At about 0830 we could hear bombs dropping again and there was a lot of firing from ships in the harbor. We could not see what was going on outside. At about 0900 Ensign Cosgrove and I took a Clark cab and trailer loaded with fire extinguishers and buckets of sand to the vicinity of the Kenneth Whiting School. There was a building on fire across the playground from the school and a ship was on fire in front of the old BOQ. The fire department was attempting to extinguish the blaze on the building. Enlisted men were swimming ashore from the ship in the harbor. About this time the ships near the Kenneth Whiting School started firing at a group of planes flying at about 20,000 feet coming in from the north. The shells seemed to be bursting about 5000 feet below the planes.[111]

Ensign D.A. Singleton also reported on the threat of fire near the aboveground storage tanks (ASTs), which could have resulted in a catastrophic explosion in the area. It is also significant to note that the ASTs survived the attack with no damage.

> Preparations were in progress to start the salt water pumps to provide a spray on the above ground tanks when the Supply Officer appeared with transportation to the tank farm area. Water valves to the tanks were opened and some fuel division

[107] Memo from Commanding Officer to Commandant, Fourteenth Naval District, "Air Raid Attack by Japanese on 7 December, 1941, report on," n.d. NAS Attack Reports, 1941, EV5 NAVFAC HI Reference Library Pearl Harbor, Hawaii.

[108] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-123 – 129.

[109] Memo from Captain James M. Shoemaker, U.S. Navy, "Japanese Air Raid on 7 December, Statement on," December 22, 1941, 3. NAS Attack Reports, 1941, EV5 NAVFAC HI Reference Library Pearl Harbor, Hawaii.

[110] Cosson and Yoklavich, 6.

[111] Memo from Ensign G.M. Rice to Commanding Officer, "Air raid attack by Japanese on Ford Island," December 14, 1941. NAS Attack Reports, 1941, EV5 NAVFAC HI Reference Library Pearl Harbor, Hawaii.

Figure 15. Photograph of ships along Battleship Row following the Japanese attack on Pearl Harbor, December 10, 1941 (NARA, RG 80, 12009105, 80-G-387565).

> personnel were assigned to assist in fighting a grass fire around tank #63. Four tanks trucks were parked in an area dangerously close to the burning USS *Arizona* and a grass fire under one of the trucks imperiled [sic] the surrounding area. These trucks were moved to a location more distant from the torpedoed battleships.[112]

Notably, eight battleships were damaged or destroyed as a result of the attack, including the USS *Arizona*, USS *Oklahoma* and the USS *Utah* (Figure 15). The *Tennessee* was wedged between the mooring quays and the crippled USS *West Virginia*. The USS *Maryland* was directly in front of the USS *Tennessee* and the USS *Arizona* was behind. Trapped, and unable to move from its berth, during the attack the *Tennessee* was able to force the drifting oil fires from its upwind neighbor, the USS *Arizona,* by turning her screws at five knots and churning water to keep the fire back.[113] Days after the attack, the "forwardmost of *Tennessee*'s two concrete mooring quays" were partially demolished using dynamite until enough of the structure had been removed to get some water between the quay and the hull.[114] By December 14, a week after the attack, approximately sixty percent of the quay had been removed, and there were four to six feet of water between the side

[112] Memo from Ensign D.A. Singleton to Commanding Officer, "Japanese air attack Sunday, Dec. 7, 1941 – report on," December 14, 1941. NAS Attack Reports, 1941, EV5 NAVFAC HI Reference Library Pearl Harbor, Hawaii.

[113] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, TEC Inc. – Joint Venture, Honolulu, Hawaii and NAVFAC Pacific, Pearl Harbor, Hawaii, May 2011, 2-123 – 129. This was confirmed through the "Felix August Grieshaber," Oral History WWII Valor in the Pacific National Monument archives.

[114] Douglas E. Campbell, Ph.D., *Volume I: U.S. Navy, U.S. Marine Corps and U.S. Coast Guard Aircraft Lost During World War II – Listed by Ship* Attached, 2011, 228-229.

> of the vessel and the quay—nearly enough to tow the *Tennessee* clear.[115]

After the attack Pearl Harbor survivor Oscar Tully recalled is experiences on the USS *Tennessee:*

> No further attack came and now we had to find a way to extricate our ship from between the *West Virginia* and the cement quays. Since the *West Virginia* could not be moved, we had to concentrate on the quays. The quays, often called keys, were constructed of cement, built like a large rectangle and filled with sand and supported by pilings. Between the quay and the ship's hull was a buffer supported by pilings. Between the quay and the ship's hull was a buffer supported with heavy springs to protect the ship's side from the cement. The *Tennessee* had been forced in so tightly against the quay that both the buffer and the springs had been ground into the cement. Our ship was tied to two of the quays, one forward and one aft.
>
> The first thing to be done was to remove all of the sand from within the cement box, then demolition crews came in and blew up the quays, thus releasing us from the pressure of the *West Virginia*. Within one week we were free to move from our berth. Since the USS *Oklahoma* had rolled away from the USS *Maryland*, she was the first battleship that was able to move from her berth. Once the quays were removed, we were able to pass through the space that the USS *Maryland* had vacated, then go to the dock and take on fuel and supplies. So, about one week after the attack we were ready to head for the open seas.[116]

There are many other survivor accounts from the USS *Tennessee* that describe the events associated with the attack and subsequent removal of the ship. Henry Herbert Evans noted, that as a result of explosion of the USS *Arizona* he fell in the water and ended up on Ford Island. Eventually he walked back to the *Tennessee* on a pipeline that went to the quay.[117] Also while on board the USS *Tennessee*, Alvin Hubert Christensen recalled,

> …at that time the *Arizona* was hit. It rose out of the water from the explosion and then settled into the water. Oil rose to the surface and started to burn. Since the drift of the water in the harbor was from the *Arizona* to the *Tennessee*, our fantail caught on fire from the numerous layers of paint. Our fantail got so hot that the officer's quarters were on fire.
>
> Since the ship was not seriously damaged, we were able to get away from the quay where we were tired up by blasting it apart, and had tugs pull us out into the stream. We tied up across the bay at a dock where we took on fuel and supplies. We were able to get under way about the 20th of December and we left Pearl Harbor. We headed westward for about two days and then headed northeasterly

[115] Daniel Madsen, *Resurrection: Salvaging the Battle Fleet at Pearl Harbor*, (Naval Institute Press: Annapolis, Maryland) 2003, 57.

[116] "Oscar Tully" Oral History, WWII Valor in the Pacific National Monument archives.

[117] "Henry Herbert Evans," Oral History WWII Valor in the Pacific National Monument archives.

> for Bremerton, Washington. Got to Bremerton on December 30, 1941.[118]

Also as a result of the attack, several buildings and structures were damaged on Ford Island, including the seaplane parking area and Hangar 6.[119] Damages were repaired and wreckage was cleared from the landing field and hangar area. Mildred Bundy, a stenographer in the administration building at Pearl Harbor recalled her impression of Ford Island after the attack:

> Aside from what I saw at the naval hospital, I did not witness the real damage at Pearl Harbor for a week or two. Then I had occasion to go to Ford Island which is in the midst of the harbor and where the ships were based. Despite all I had been hearing, I was shocked at what I saw. I felt as though I were looking at a scene of children's toy ships and planes where a ruthless giant had wantonly taken a hammer, smashing everything in sight. Of course I did not see the worst when people were being pulled from the harbor out of the burning oil. [120]

Subsequently, numerous other improvements were made on the island (Figure 16) including, but were not limited to the construction of revetments, personnel shelters, a bombproof command center, and the installation of splinter-proofing on one of the old hangars that was converted into an emergency barracks.[121] A new sixteen-inch water main was laid across the channel in an effort to repair damages that occurred during the attack. Also, forty-eight 25,000-gallon fuel tanks were built underground, and the existing surface tanks were splinter-proofed.[122] By December 1943, the majority of the initial construction had been completed with attention directed toward the extension and improvement of existing installations.[123] In 1944, a T-wharf was built to replace two former mooring quays (F5 S and F5 N), which was accessed by a new road, that was named Cowpens Street.[124]

Salvage Operations

In the aftermath of the Pearl Harbor attack, the US Navy undertook repair and salvage work and succeeded in raising all of sunken vessels with the exception of USS *Arizona* and USS *Utah*. In 1942, a new battleship berth was constructed on the remains of the *Arizona*. In the years following their construction, the steel and concrete quays were used as landings by the US Navy who raised and lowered the US flag that was flying from a pole affixed to the battleship's mainmast and also

---

[118] "Alvin Hubert Christensen," Oral History WWII Valor in the Pacific National Monument archives.

[119] *Building the Navy's Bases in World War II: History of the Bureau of Yards and Docks and the Civil Engineer Corps*, 136-138.

[120] Mildred V. Budny, "I Wish I Weren't Going to Have This Baby: A Navy Wife Remembers Pearl Harbor," *Hawaiian Journal of History*, vol. 36 (2002), 155.

[121] *Building the Navy's Bases in World War II: History of the Bureau of Yards and Docks and the Civil Engineer Corps*, 136-138.

[122] Ibid.

[123] *Building the Navy's Bases in World War II: History of the Bureau of Yards and Docks and the Civil Engineer Corps*, 136-138.

[124] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-200.

for access associated with memorial services.[125] Of the vessels raised, all were salvaged and returned to duty with the exception of USS *Oklahoma.*[126] During this period, workers raised the USS *California*, USS *West Virginia*, and refloated the USS *Oklahoma*. Salvage was also completed in association with the USS *Arizona*. During these operations the mooring quays served as moorings for salvage ships and barges and legs for ship to shore bridges and cross ship platforms.[127]

On May 5, 1942, the foremast of the *Arizona* was cut away and removed, while the mainmast was removed before August 23. Other features that were removed included the stern aircraft crane as well as the conning tower.[128] On December 1, 1942, the USS *Arizona* was decommissioned. By October 1943, the last salvage work had been completed on the USS *Arizona*. When the work was completed the ship had been stripped down to the main deck.[129] Also, during this period, cables and winches were installed on Ford Island in an effort to salvage the USS *Oklahoma* and USS *Utah*.

As early as May 1942, the US Navy indicated a desire to salvage the USS *Oklahoma*. In cooperation with the Pacific Bridge Company, the US Navy began making plans to salvage the 35,000-ton sunken battleship.[130] The CPO bungalow neighborhood would play an important role in the continued salvage and recovery efforts on the USS *Oklahoma*, which involved an elaborate system of winches and cables that were

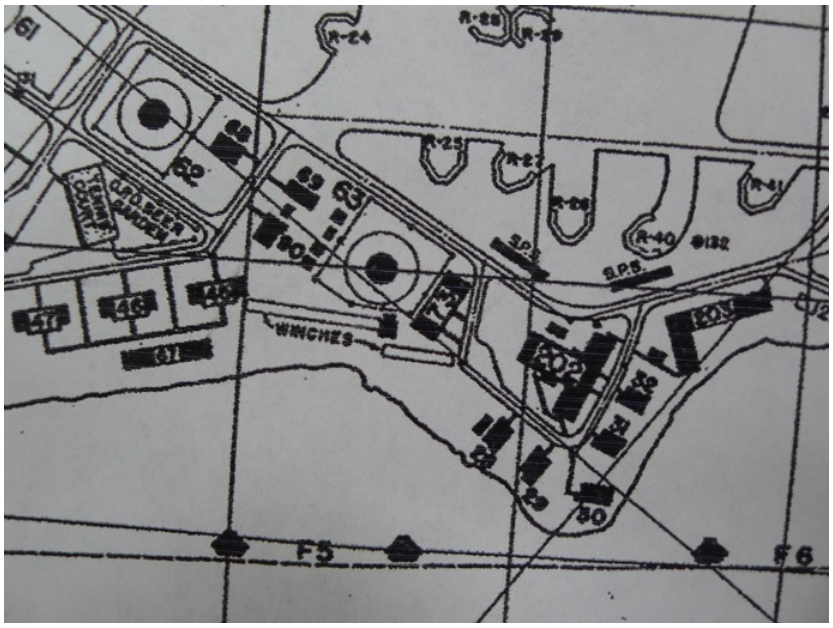


Figure 16. CPO Bungalow area on June 30, 1943 (PERL archives).

[125] James P. Delgado, "USS *Arizona* (BB-39) Wreck," Draft National Register of Historic Places Registration Form, July 9, 1988. Nomination associated with the Maritime Heritage of the United States NHL Study—Shipwrecks.

[126] Ibid.

[127] Draft National Register of Historic Places Amendment Form for the "Battleship Mooring Quays (Battleship Row), prepared by John F. De Virgilio, Pearl Harbor History Associates, May 10, 1993.

[128] Daniel Martinez, "Historical Record," in *Submerged Cultural Resources Study, USS Arizona Memorial and Pearl Harbor National Historic Landmark,* Daniel J. Lenihan, ed., Southwest Cultural Resources Center Professional Papers, Santa Fe Mexico, 1989, Second Edition 1990, 35.

[129] Ibid.

[130] Wallin, 357.

set up adjacent to the houses (Figure 17).[131] Additionally, existing mooring quays also played a significant role in post attack salvage. Winching activities commenced on March 8, 1943.[132] In all, twenty-one electric winches were anchored in concrete foundations on Ford Island, which were operated in unison.[133] At this time it was noted that, "In order to install these winches on Ford Island, two or three of the enlisted men's quarters will have to be temporarily moved clear of their present sites to allow sufficient space for the installation of concrete deadmen as winch anchorages."[134]

Figure 17. Aerial photograph of the USS Oklahoma in 10 degree position during righting operations, June 18, 1943. Note galley and mess hall building (202) at left and school building (73) at right (14th Naval District Command Photos, PERL Park archives, PH 11914

A salvage diary dating from March 1, 1942 through 15 November 15, 1943 summarized salvage operations associated with the USS *Oklahoma* and the USS *Arizona* along the shore of Ford Island. As early as December 23, 1942, the diary reported reduction of the height of mooring quay F5 S by the Pacific Bridge Company. By January 6, 1943 plans were also underway to reduce the height of mooring quay F5 N. The work was completed on mooring quay F5 S by January 13, 1943 and by January 24, 1943 on F5 N. Other activities included the construction of wood platforms over quays F5 S and F5 N and the installation of supports for flood lights on Ford Island. During salvage operations, scrap metal and underwater wreckage from the sunken battleships was temporarily placed the mooring quays before it was picked up for disposal. Amongst the many other activities, temporary wooden quays were constructed near the wreckage of the USS *Arizona* to support the salvage operations, while a temporary floating walkway was constructed from F5 S to the USS *Oklahoma*.[135]

After extensive salvage operations, some eighteen months later, in November 1943, the USS *Oklahoma* had been righted. At the time of the attack, torpedoes hit the battleship, which opened a 130-foot gash in the port side, causing

131 *Historic Context Study of Historic Military Family Housing in* Hawaii, Mason Architects, Inc., August 2003, 5-85.

132 Ruzicka, 5.

133 Wallin, 254.

134 Ibid, 357.

135 "Salvage Diary from 1 March - 1942 through 15 November, 1943" Industrial Department War Diary Collection, National Archives and Records Administration (NARA), San Bruno, California and *USS Arizona* Memorial, National Park Service.

her to list and finally roll over until her masts struck the harbor bottom.[136] In an effort to remove men trapped inside the capsized hull, openings were hastily cut in the exposed bottom. Later divers patched the damage to the ship and was able to right it and float it into a drydock. The battleship was eventually decommissioned and sold for scrap. The buyers negotiated a contract with the Seattle-based Puget Sound Tug & Barge Co. for the ship to be delivered to San Francisco. While being towed the ship sunk approximately 540 miles from O'ahu on May 17, 1947.[137]

Modifications to the CPO Bungalow Neighborhood

Following the attack, a Japanese invasion was seen as an imminent threat. As a result, the CPO bungalows were painted to camouflage the buildings, trenches were dug, and above ground storage tank 63 "was cut out of the gas system and filled with water."[138] Circa 1942, CPO bungalow 27 and 67 were demolished. The buildings were removed in August 1942 to facilitate recovery efforts associated with salvage of the USS *Oklahoma* as mentioned above. Prior to the demolition of CPO bungalow 67, the building served as an annex to the adjacent school (building 73) for a least one year. Between 1940 and 1942, building 202 (galley/mess hall) was built in the central lawn area associated with the CPO bungalows.[139] Circa 1943 and 1945, the F5 berth was converted from mooring quays to a pier and gasoline receiving. This action resulted in the need to relocate CPO bungalows 69 and 90. Also, circa 1943-1945, CPO bungalow 90 (formerly facility 70) was moved from its original location to the site of former CPO bungalow 67. During the same period, CPO bungalow 69 was moved from its original location to the site of former CPO bungalow 27.[140] Also, CPO bungalow 30 was relocated approximately 1,200 feet northeast to its present location at the northeast end of Langley Avenue in the North End or Knob Hill (also spelled Nob Hill) neighborhood of Ford Island circa 1943-1945. After World War II, operations at Naval Air Station (NAS) Pearl Harbor declined, and many of the facilities were vacant or mothballed; however, the CPO bungalows continued to function as residential housing.

Early Cold War Development, 1946-1965:

After World War II ended, the pace of work at

Naval Air Station Ford Island and at Pearl Harbor slowed down as the workload declined. At Pearl Harbor, activities were focused on the demobilization of troops, material, and equipment. Generally, the residential areas on Ford Island experienced relatively little change after World War II ended. Notably, the Ford Island neighborhoods remained desirable housing areas, despite dependence on ferry service for access to and from the island until the bridge was completed in the late 1990s.[141]

Several improvements were made on Ford Island, including reusing buildings to test and refurbish aircraft turbine engines that were used during the

136 Grahame F. Shrader, "The *Oklahoma*'s Last Voyage," *Pearl Harbor-Gram*, July 1972.

137 Ibid.

138 "Naval Command History," January 1, 1945, 16-17.

139 *Final Environmental Condition of Property, World War II Valor in the Pacific National Monument, Chief Petty Officer Bungalows and U.S.S. Utah Memorial, Ford Island, Pearl Harbor Naval Complex, Oahu, Hawaii*, 5-5.

140 *Historic Context Study of Historic Military Family Housing in Hawaii*, 5-85.

141 Ibid, 5-68.

war.[142] In 1947, roads throughout the island were repaired, including maintaining the coral base and shoulders, and repaving the asphalt surfaces with new coats of asphalt.[143] During this period, minor modifications were made to CPO bungalows 31 and 32, which were identified on a drawing entitled "Bldgs. 31 & 32 Alterations and Repairs." In 1947, bungalow 68 underwent unspecified renovations.[144] Fresh vegetables were grown in a victory garden during the war nearby the housing areas on Ford Island, and this operation was transferred to a concessionaire in 1947 to continue to supply the CPO bungalow residents and the rest of the residents on Ford Island with fresh vegetables.[145] Also, by 1947 fill material had been added to the north side of the CPO bungalows and was labeled "Public Works Storage Area" on maps. These modifications to the CPO bungalows ensured the continued use of the neighborhood (Figures 18 and 19).

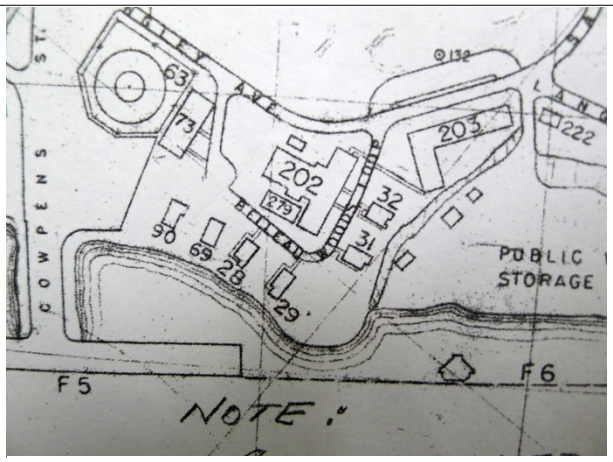


Figure 18. Plan dated January 1st, 1946, showing the CPO bungalows area (World War II Valor in the Pacific National Monument archives).

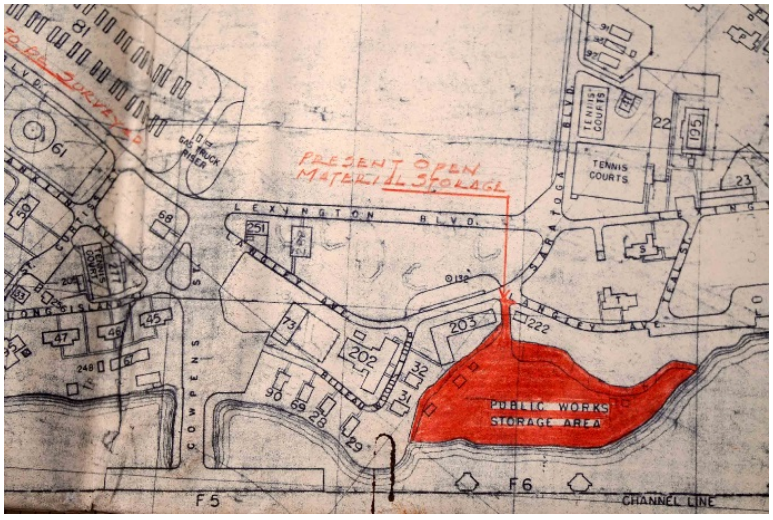


Figure 19. Plan dated September 15, 1947 showing CPO Bungalow area (NARA San Bruno, RG 181, Box 7 Folder Waterfront Structures N 15-8).

Memorialization Activities

In the late 1940s, there was a Pearl Harbor-wide effort to memorialize the December 7, 1941 attack. Several ideas were proposed for the development of a memorial to honor those who were involved in the Pacific War and as well as the Pearl Harbor attack.[146] A total of

[142] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-245 – 2-246.

[143] Memo from Commander, Naval Air Bases, 14th Naval District to the Chief of the Bureau of Aeronautics, Regarding Repairs to Roads-NAS Pearl Harbor, April 12, 1947 (NARA, San Bruno, RG 181, 58-3030-64N, Box 6, Folder Grounds and Land Leases N1-1 & N1-13).

[144] Roster of Families Quartered at NAS, P.H., September 2, 1947 (NARA, San Bruno, RG 181, 58-3030-64N, Box 6, Folder Quarters N 4-1).

[145] Memo from Commanding Officer to the Chief of the Bureau of Yards and Docks, Regarding the Proposed Operation of the Station Vegetable Garden, December 22, 1947. (NARA, San Bruno, RG 181, 58-3030-64N, Box 4, Folder Drawings, Blueprints, and Plans L 2-2).

[146] Michael Slackman, *The USS Arizona Memorial and Visitor Center: An Administrative and Legislative History,"* National Park Service, October 4, 1982, 5-6.

fourteen memorial markers were installed in 1947—eight of which were located on Ford Island. Today, seven of the markers remain.[147] The art deco style marker for the USS *West Virginia* and USS *Tennessee* was designed by the Public Works Center, 14th Naval District and was installed in 1947.[148] Near the memorial marker, a pair of double bit cleat bollards were set into a poured concrete base. Their date of construction remains unknown; however, they were likely constructed in association with the mooring quays along Battleship Row during the period of significance.[149]

Memorialization activities continued at Pearl Harbor and Ford Island during subsequent years. On May 17, 1949, the Hawai'i Legislature established Pacific War Memorial Commission (PWMC).[150] The agency was authorized to plan and raise funds for the erection of war memorials in the territory.[151] In March 1950, Admiral Arthur W. Radford, the Commander in Chief Pacific Fleet, initiated the practice of displaying the flag over the sunken remains of USS *Arizona*.[152] At this time, a flagpole was installed on the protruding base of the hull's rear mast. Later that year, a wooden platform was built over the amidships area. On the ninth anniversary of the December 7, 1941 attack, a commemorative metal plaque was installed at the base of the flagpole and another welded to the deck of the wreck.[153] By August 1956, flag raising ceremonies on board of the deck were halted due to the weakening hull of the ship from rust.[154]

Ongoing construction and development activities were undertaken within the boundaries of the site during the late 1940s and 1950s. Circa 1947-1948, the row of aboveground storage tanks along Lexington Boulevard were removed.[155] (Storage tank 63 was located within the boundaries of the CPO bungalows site.) Before 1952, facility S304 (transformer substation) was constructed in proximity to the CPO bungalows.[156] During this period, sometime between 1950 and 1953, the CPO bungalows (including CPO bungalow 68) were re-designated as enlisted men's quarters.[157]Additionally, by 1953 CPO bungalow 30, had been relocated to its present site on Langley Avenue. Notably, the building was used in the 1965 John Wayne film *In Harm's Way*.[158]

---

147 *Evaluation of Historic Structures: CPO Bungalows, USS Utah Memorial, USS Arizona Memorial, and Mooring* Quays, *WWII Valor in the Pacific National Monument, Pearl Harbor, Oahu,* A-16.

148 National Park Service. *Rehabilitation of Chief Petty Officers Bungalows on Ford Island Environmental Assessment,* 32.

149 Ibid.

150 Captain G.P. Peed, *Arizona Memorial Shoreside Facility Study,* "Highlights Pacific War Memorial Commission, U.S.S. *Arizona* Memorial, War Memorial of the Pacific, Pearl Harbor, Hawaii," United States Navy, 1973, Appendix E-6.

151 Slackman, 7.

152 Historic Context Pearl Harbor Naval Complex, Chapter 3: From the Bayonet Constitution to the Eve of Revolution, 10-100. (Jeff Dodge files, Hart NR Documents)

153 Slackman, 9.

154 Peed, Appendix E-6.

155 *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-277.

156 *Final Environmental Condition of Property, World War II Valor in the Pacific National Monument, Chief Petty Officer Bungalows and U.S.S. Utah Memorial, Ford Island, Pearl Harbor Naval Complex, Oahu, Hawaii,* 5-5

157 Ruzicka, 6.

158 Cosson and Yoklavich, 7.

By 1950, most air activities on Ford Island were relocated to Naval Air Station Barbers Point; however; operations on Ford Island increased due to US involvement with the Korean War.[159] At this time, many of the military activities on Ford Island were associated with intelligence and specialized training that required physical separation or isolation from O'ahu. Also, around 1950, two small memorials were erected on and near the remains of the USS *Utah*. The memorials included a plaque mounted on the wharf north of the ship's remains, and another plaque on the wreck's superstructure deck. The first plaque read: "Near this spot, at Berth Fox 11, on the morning of 7 December 1941, the USS *Utah* was struck on the portside with what is believed to have been three aerial torpedoes and was sunk. She was subsequently rolled over to clear the channel but was left on the bottom." The second plaque read: "In Memory – Officers and Men – USS *Utah* – Lost in Action – 7 December 1941.[160]

Cold War activities helped shaped the development and continued use of Ford Island by the US Navy after World War II. In May 1955, the Fleet Intelligence Center, Pacific (FICPAC) was established on Ford Island and continued operations onsite until 1974.[161] During this period, military construction funding was severely limited after the end of World War II and through the 1950s.[162] These funding constraints resulted in the utilization of existing buildings on Ford Island that had been constructed during World War II or earlier.[163]

USS Arizona Memorial

Memorialization of Pearl Harbor and Ford Island gained momentum in 1957 when John Burns introduced House Report 5809, which would provide the "necessary authority for the US Navy to build the memorial, to accept funds from the PWMC, and to give the commission incidental assistance during the fundraising drive."[164] On August 13, 1957, House Report 84-1125 authorized appropriation for use toward construction of USS *Arizona* Memorial at Pearl Harbor. In January 1958, Senate Report 85-1229 authorized construction of USS *Arizona* Memorial

[159] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-245 – 2-246.

[160] "USS *Utah* Memorial at Pearl Harbor," Naval History and Heritage Command website <https://www.history.navy.mil/our-collections/photography/wars-and-events/world-war-ii/pearl-harbor-raid/remembrance-of--a-date-which-will-live-in-infamy-/uss-*Utah*-memorial-at-pearl-harbor.html> accessed May 4, 2017.

[161] *Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final*, 2-245 – 2-246.

[162] Ibid, 2-280.

[163] Ibid, 2-279.

[164] Slackman, 16.

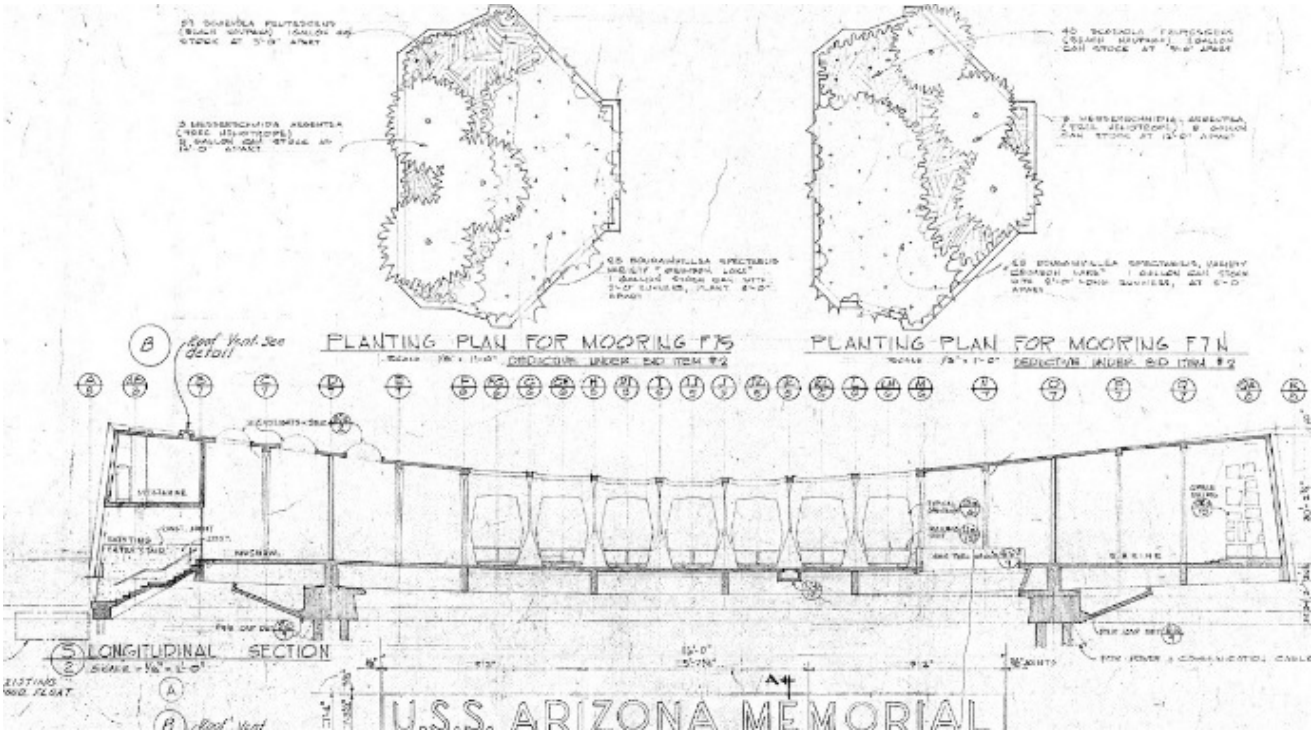


Figure 20. Portion of a drawing showing the USS *Arizona* Memorial planting plan for mooring quays F7S and F7N, 1961 (National Park Service).

at Pearl Harbor.[165] A few months later, on March 15, 1958, the measure was signed into law (Public Law 85-344).[166]

Soon after, in August 1958, Alfred Preis of the firm Johnson & Perkins, Preis Associates was selected to design the USS *Arizona* Memorial. The partnership was awarded the commission in August 1959.

Born and raised in Vienna, Austria, Alfred Preis fled his homeland in 1939 in the face of the German annexation of Austria. He immigrated to the United States and eventually settled in Honolulu, Hawai'i. After the Pearl Harbor attack he and his wife were detained for three months at the Sand Island detention facility. Less than ten years after the attack, Preis had development a preliminary design for a memorial at the *Arizona.*

Conceived as early as 1950, the design included construction of a rock wall on the shore of Ford Island and a floating frame on the hull of the *Arizona*.[167] According to historian Michael Slackman, Preis' first design proposal was rejected and so "Preis offered a second concept calling for a bridge which, in accordance with the US Navy's original specification, spanned the sunken battleship. That idea received a more positive reaction. It envisioned a catenary span over the *Arizona* and, in contrast to the first proposal, created an open and soaring effect."[168] The design, which was almost a flat, parabolic shape was intended to represent "American optimism prior to the war, its decline after December 7, and its rise through the war years," while the

165 "Summary," USS *Arizona* Memorial, Hawaii, LANDS files.

166 Slackman, 21.

167 Ibid, 43.

168 Ibid, 44.

memorial's twenty-openings symbolized a twenty-one-gun salute (Figure 20). [169]

In October 1960, the Walker-Moody Construction Company won the contract to build the USS *Arizona* Memorial.[170] In 1961, after several years of fundraising, Congressional proposals to authorize the use of federal funds for the construction of the USS *Arizona* Memorial were reintroduced by Representative Daniel Inouye. The proposal cleared both the House and Senate and was signed into law (Public Law 87-201) on September 6, 1961.[171]

Construction of the USS *Arizona* Memorial began in 1961 with the aid of both private donations as well as federal funds.[172] In order to construct the memorial over the remains of the *Arizona*, a section of the boat deck, which was comprised of the overhead of a galley and a few bulkheads was cut away.[173] Initially this had been the area that supported the flag and platform that was installed in the 1950s. Eventually, the portion of the *Arizona* that was removed was sent to Waipio Point where it remains today.[174] The USS *Arizona* Memorial was dedicated on Memorial Day 1962 to pay tribute to the 1,177 crewmen who lost their lives with the sinking ship. The 184-foot long structure was slightly peaked at each end with a sag in the center. Bridges "float" over the sunken hull of the ship without touching the historic wreckage. The memorial structure, which spans the mid-portion of the sunken battleship is composed of three main sections, which include the entry and assembly rooms; a central area designated for ceremonies and general observation; and the shrine room, where the names of servicemen killed on the USS *Arizona* are engraved on marble slabs on the wall.[175]

As part of the 1961 design for the USS *Arizona* Memorial, a planting plan was prepared for mooring quays F7 S and F7 N. It is unclear whether or not the planting plan was implemented. A historic aerial photograph from 1963 reveals a thick cover of vegetation within the central portion of mooring quay F7 N; however, it is possible that the vegetation had not been intentionally planted, but rather, had naturalized within the interior of the mooring quay. It should be noted that the 1963 photograph shows no other improvements to the mooring quay, such as the addition of white paint to the exterior of the structure.

Continued Military Operations

Beginning in 1962, facilities on Ford Island were associated with NASA's man-in-space program. Also in 1962, NAS Ford Island was placed on maintenance status and operations were moved

[169] Historic Context Pearl Harbor Naval Complex, Chapter 3: From the Bayonet Constitution to the Eve of Revolution, 10-100. (Jeff Dodge files, Hart NR Documents)

[170] Slackman, 45.

[171] Ibid, 31.

[172] National Park Service, *Environmental Assessment for the Project to Replace the Failing Visitor Center at the USS Arizona* Memorial, U.S. Department of the Interior, February 2007, 2.

[173] National Park Service, *Resources Management Plan: USS Arizona* Memorial, Honolulu, Hawaii, February 1996, 32.

[174] Daniel Martinez, "Historical Record," in *Submerged Cultural Resources Study, USS Arizona Memorial and Pearl Harbor National Historic Landmark,* 35.

[175] *Exhibition Artifact Maintenance Manual, World War II Valor in the Pacific National Monument.* U.S. Department of the Interior, 2010, 5.

to NAS Barbers Point.[176] The change occurred in part because of a restructuring of naval air stations in Hawai'i that had occurred in 1949 as well as due to a technological shift in aircraft design, which meant that planes could not land on the short runway at Ford Island.[177] By June 1962, four of the 1937 CPO four-plex units located at the northern end of Ford Island had been removed.[178] These units were not associated with the CPO bungalows site, but rather in the North End neighborhood of Ford Island.

In 1963, Ford Island was selected as the location for a Polaris submarine training facility and several buildings were remodeled to accommodate the Fleet Ballistic Missile (FBM) Submarine Training Center, which remained active on Ford Island through the duration of the Cold War.[179] While there was no new construction or development associated with these activities located within the site boundaries, the CPO bungalows continued to be utilized during this period, which inevitably supported Cold War-related mission operations.

Subsequent memorialization activities associated with the USS *Utah* were initiated in 1963 as a result of the efforts of Senator Frank E. Moss (D., *Utah*). Moss introduced legislation to have a flag erected over the hull of the USS *Utah* at Pearl Harbor but was unsuccessful for several years.[180] The following year, the historical significance of the US Naval Base Pearl Harbor was confirmed when it was designated an NHL on January 29, 1964.

US Navy Ownership and Use, 1965-2007

Despite continued naval operations on Ford Island, the trend of removing buildings that no longer met mission requirements continued during the late 1960s and 1970s.[181] CPO bungalow 69 had been removed from the housing area by 1967 and the nine four-plex residential buildings that were located adjacent to the CPO bungalows had been demolished by 1978. While residential buildings were being removed on Ford Island, several drawings illustrate that improvements were made to the CPO bungalows during this period, including an electrical rehabilitation plan for the bungalows from 1967, a roof repair and painting plan for the bungalows from 1972 and 1977 as well as drawings from 1981 that show repairs for electrical, kitchen, plumbing, exterior elevations, lighting fixture, mechanical plans. By 1982, the layout of the CPO bungalow neighborhood had changed little since the 1960s, but by 1986, buildings 73 and 202 had been removed from the site (Figure 21).

In 1970, Congress passed a bill for construction of a memorial over the USS *Utah*, which still laid on her side in shallow water on the northwest side of

---

[176] *Draft Final Historic Context Report: Pearl Harbor National Historic Landmark, Pearl Harbor Naval Complex, Vol. 1*, 10-96.

[177] Ibid, 10-96.

[178] Ibid, 10-89.

[179] Ibid, 2-245 - 2-246.

[180] "Bill Introduced for USS *Utah*," *Pearl Harbor-Gram*, April 1967.

[181] *Historic Context Pearl Harbor Naval Complex, Chapter 3: From the Bayonet Constitution to the Eve of Revolution, 10-100*. (Jeff Dodge files, Hart NR Documents). Also see: House Report 91-1527 for S 583, Date: September 29, 1970, Description: Report to authorize USS *Utah* Memorial. Senate Report 91-1010, Date: July 9, 1970, Description: Report to authorize USS *Utah* Memorial. Public Law 91-456, Date: October 15, 1970, Description: Authorized flying of American flag over remains of USS *Utah* in honor of men entombed inside.

Ford Island.[182] Plans included construction of a landing dock, associated white concrete platform, and a forty-foot-high flagpole "…where each day our flag will fly, just as we honor the men of the USS *Arizona* by raising the colors over her memorial at dawn each morning and lowering them at sundown."[183] The land-based USS *Utah* Memorial was dedicated at a ceremony honoring the 54 crewmen entombed in the wreckage of the USS *Utah* on May 27, 1972.[184]

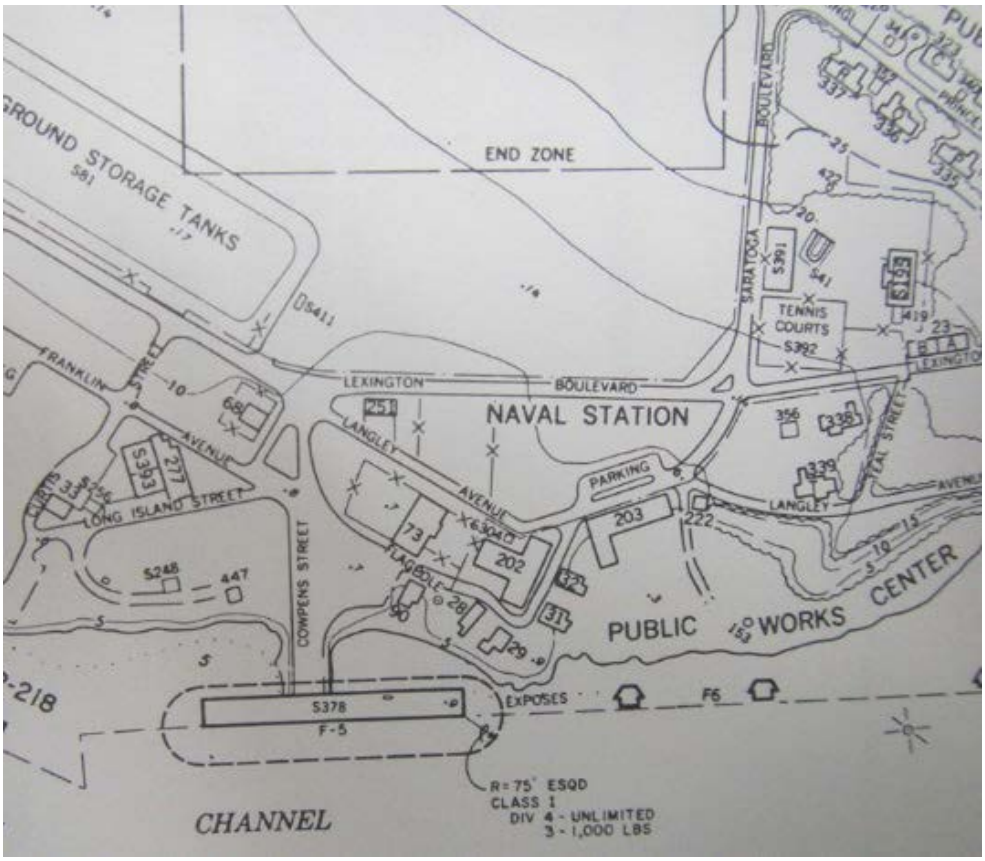


Figure 21. Plan showing CPO bungalow area on January 5, 1981 and revised September 30, 1982 (EV5 NAVFAC HI Reference Library).

In an effort to enhance visitor services at Pearl Harbor, the US Navy began planning for the construction of a new museum-theater visitor complex on the mainland in the late 1970s. The design for the complex was awarded to the architectural firm of Chapman, Cobeen, Desai, Sakata, while the construction contract was awarded to S & M Sakamoto.[185] A site was selected approximately fifty yards from Kamehameha Highway, which had formerly served as a former Fleet Postal Center parking area.[186] Ground was broken for the museum-theater visitor complex on October 19, 1978. The large-scale development project provided much-needed amenities to the ever-growing numbers of visitors who came to the site to see the USS *Arizona* Memorial. As construction neared completion, on March 21, 1980, the US Navy and National Park Service executed a use agreement that formally permitted the National Park Service to manage the visitor center and adjacent grounds that were situated on US Navy property

[182] "Funds Sought for USS *Utah* Memorial," *Pearl Harbor-Gram*, July 1971.

[183] Ibid.

[184] "Stars and Stripes Flies Over USS *Utah*," *Pearl Harbor-Gram*, July 1972.

[185] Slackman, 67-68.

[186] "Geotechnical Peer Review, Expand Restroom Facilities, USS *Arizona* Memorial Park, Hawaii, Final Report," NPS Indefinite Quantity Contract No. 1443200002024, Task Order no. T2000022409. Prepared by URS Corporation, San Francisco, California, July 2003, 4.

at that time. [187] On September 9, 1980, the USS *Arizona* Memorial was established as a unit of National Park System that was administered through a cooperative agreement with the US Navy.

Documentation and Memorialization Activities

Documentation and memorialization activities continued at Pearl Harbor throughout the 1980s. In effort to identify the USS *Vestal's* location in Battleship Row at the time of the Japanese attack on Pearl Harbor, survivors participating in a USS *Vestal* reunion voted unanimously that the name of the USS *Vestal* should be painted on mooring quay F7.[188] At that time, the names of the battleships that were moored on Battleship Row on December 7, 1941 had been painted on the concrete mooring quays lining Ford Island. Since the USS *Vestal* was not a battleship, its name was not originally displayed on the mooring quays; however the Superintendent of the USS *Arizona* Memorial was in support the proposition as it was "…in keeping with the policy where two ships, if moored side-by-side on December 7, are listed on the two adjoining quays."[189] After many months of correspondence with Congressmen, the Department of the Interior, the Naval Historical Center, and Commander, Naval Station, Pearl Harbor, *Vestal* (AR-4) was painted on mooring quay F7 N in anticipation of planned memorial services on December 7, 1982. [190]

In 1983 and 1984, the NPS Submerged Cultural Resources Unit (SCRU) began the process of mapping and photo-documenting the remains of the USS *Arizona*.[191] Subsequent archeological surveys of the wreck were conducted in 1986 and 1987. The underwater surveys were able to develop detailed planview and elevation maps of the ship.[192] In 1988, Pearl Harbor was surveyed for other remains of the attack, including mooring quays and plane crash sites.[193] On May 5, 1989, both of the sunken hulls of the USS *Arizona* and the USS *Utah* were declared NHLs. By 1996, survey efforts had been completed for approximately ninety percent of the exterior hull of the USS *Arizona*.[194]

A *Study/Survey of Historically Significant Army Family Housing* Quarters*, Installation Report, Pearl Harbor Naval Base, Hawaii* was prepared by Mariani and Associates in 1987. The report indicated that CPO bungalow 28 was in poor

187 Slackman, 69-70.

188 "Quay Honoring *USS Vestal* Dedicated in Pearl Harbor," *Pearl Harbor-Gram*, January-April, 1983, 13-14.

189 "Correspondence regarding USS *Vestal* mooring quay," *Pearl Harbor-Gram*, January-April, 1983, 13.

190 "Quay Honoring *USS Vestal* Dedicated in Pearl Harbor," 13-14.

191 Daniel J. Lenihan, ed., *Submerged Cultural Resources Study, USS Arizona Memorial and Pearl Harbor National Historic Landmark,* Southwest Cultural Resources Center Professional Papers, Santa Fe Mexico, 1989, Second Edition 1990, 1.

192 Susan J. Wells and Robert J. Hommon, *An Archeological Survey Plan for the Pacific Islands Cluster, Regions 8, 9, 10, and 12, National Park Service,* U.S. Department of the Interior, National Park Service, Western Archeological and Conservation Center, Publications in Anthropology 76, 2000, 23.

193 Lenihan, 6.

194 National Park Service, *Resources Management Plan: USS Arizona* Memorial, Honolulu, Hawaii, February 1996, 8.

condition and was suffering from a major termite infestation in the walls and also likely in the frame structure. [195] The CPO bungalows were in continuous residential use until the 1990s when they were vacated and decommissioned.[196]

Between 1989 and 1990, several improvements were made to the moorings associated with the USS *Arizona* Memorial. Funded by the National Park Service, the Chesapeake Division, Naval Facilities Engineering Command designed and installed an upgraded mooring and transfer ramp for the floating dock associated with the USS *Arizona* Memorial. The work was completed in two phases. Phase I included the installation of the mooring chains and anchors and was completed in July 1989. The second phase of the project included attaching the mooring chains to the floating dock, removal of worn mooring chain and timber dolphins, replacement of the transfer ramp, and miscellaneous repairs to the floating dock.[197]

Ford Island Development

In 1998, the Ford Island bridge was constructed replacing ferry service to the island, as well as the introduction of the USS *Missouri* Memorial at its new berth at F5S and F5N.[198] The battleship is within the viewshed of the site.

These changes were associated with a larger planning effort that was formalized in 1999 with passage of the Ford Island Development Legislation (10 U.S.C. Section 2814). In June 2003, the US Navy and Ford Island Properties entered into the Ford Island Master Development Plan (MDP). The plan included numerous island-wide infrastructure improvements as well as housing development, and adaptive reuse of the historic theater (FAC. 89) as a conference center for lands leased by Ford Island Properties.[199] Additionally, as part of this effort, Commander, US Navy Region Hawai'i, implemented several development and construction projects on lands retained by the US Navy on Ford Island. These include construction of public-private venture housing projects, restoration and reuse of historic hangars 37 and 39 and the control tower (currently not open) by the Pearl Harbor Aviation

[195] *Study/Survey of Historically Significant Army Family Housing* Quarters, *Installation Report, Pearl Harbor Naval Base, Hawaii*, Mariani and Associates, Washington, D.C., December 1987, 93.

[196] National Park Service. *Rehabilitation of Chief Petty Officers Bungalows on Ford Island Environmental Assessment,* March 2012, 9.

[197] Terri Regin, Steve Buckeridge, Brian deLumeau and Thomas Fulton, "Project Documentation Report for the Installation of Mooring and Repairs for the USS *Arizona* Memorial Floating Dock," Ocean Engineering and Construction Project Office, Chesapeake Division, Naval Facilities Engineering Command, July 1990, 1.

[198] According to a Draft National Register of Historic Places Amendment Form for the "Battleship Mooring Quays (Battleship Row), prepared by John F. De Virgilio, Pearl Harbor History Associates, May 10, 1993: "Since 1992, quay F-5 is longer visible from the channel along battleship row. Although hidden from view, the old F-5 pier still exists. A new mooring pier build for the USS *Missouri* (now mothballed) has been built around and partially over the old F-5 berth."

[199] *CNRH O'ahu Integrated Cultural Resources Management Plan (ICRMP)*, 5-134.

Museum, and reuse of hangars by National Oceanic and Atmospheric Administration (NOAA).[200] The CPO bungalow neighborhood was in poor condition and no notable work was undertaken on the buildings or the landscape in the late 1990s through the early 2000s.

In 2006, the National Defense Authorization Act for Fiscal Year 2006, Section 1017, authorized appropriations associated with establishment of the USS *Oklahoma* Memorial and other memorials at Pearl Harbor (Public Law 109-163). The CPO Bungalows site for the memorial was selected by the Secretary of the US Navy in consultation with the Secretary of the Interior.[201] Ground was broken by fifteen USS *Oklahoma* survivors as well Secretary of the Department of the Interior, Dirk Kempthorne, and the Governor of *Oklahoma*, Brad Henry, on December 7, 2006. The memorial was completed in 2007 and is composed of white marble columns and black granite slabs etched with quotes from *Oklahoma* survivors. Each column is engraved with the name of a of crew member who died during the attack. The columns are arranged in a "V" shape to resemble crew members manning the rails. [202] Collectively, the memorial honors the 429 servicemen on board *Oklahoma* who lost their lives on December 7, 1941.[203] Today, the Secretary of the Interior administers the USS *Oklahoma* Memorial as part of the USS *Arizona* Memorial, "…in accordance with the laws and regulations applicable to land administered by the National Park Service and any agreement between the Secretary of the Interior and the Secretary of the US Navy. The Secretary of the US Navy shall retain administrative jurisdiction over the land where the USS *Oklahoma* Memorial is established."[204]

National Park Service Management, 2008-Present

World War II Valor in the Pacific National Monument was established by Presidential Proclamation 8327 issued by George W. Bush on December 5, 2008. After the National Park Service acquired the CPO bungalows on Ford Island from the US Navy, several actions were undertaken at the site in an effort to promote visitor safety, make site improvements, and arrest deterioration of contributing resources. By 2012, the National Park Service had installed a fence to temporarily limit visitor access to the *USS Tennessee* and *USS West Virginia* memorial.[205] While the installation date of the fence is unknown; it was likely installed between 2008 and 2012. The measure was taken due to hazards associated with coastal erosion, which had resulted in the undercutting of the unstable coral shoreline.[206] Also, circa 2009-2010, a project was

[200] Ibid.

[201] The National Defense Authorization Act for Fiscal Year 2006, Section 1017, "Establishment of the USS *Oklahoma* Memorial and Other Memorials at Pearl Harbor."

[202] "*Oklahoma* Memorial Recognizes 429 Lost Sailors and Marines," *Pearl Harbor-Gram*, November 2008, 16.

[203] Ibid, 16.

[204] National Park Service, *Foundation Document World War II Valor in the Pacific National Monument, Pearl Harbor Hawai'i*, September 2015, 9.

[205] Laurin Huffman, "Issues on Ford Island: Historic Structures under the care of World War II Valor in the Pacific National Monument," Trip Report, September 2012.

[206] Notes from the Chief Petty Officer Bungalows Preservation and Management Plan Section 106 Meeting, June 21, 2010.

undertaken to install down lighting for the USS *Oklahoma* memorial flags.[207]

Stabilization activities were undertaken on the CPO bungalows by the National Park Service between 2009 and 2012. Emergency stabilization was completed on the CPO bungalows by the Historic Preservation Training Center (HPTC) in 2009. The project work consisted extermination and fumigation of termites and emergency stabilization of the six extant CPO bungalows.[208]

Meanwhile, large-scale construction activities associated with the Pearl Harbor Visitor Center were in progress on Pearl Harbor. Groundbreaking for the project occurred in the spring of 2009.[209] The new visitor center was dedicated on December 7, 2010, which was the 69th Anniversary Pearl Harbor Day Commemoration.[210] Also in 2010, the Naval Station (NAVSTA) Pearl Harbor joined Hickam Air Force Base to form Joint Base Pearl Harbor-Hickam. This change consolidated military operations and provided development opportunities for land use on Ford Island as well as in other locations by the US Navy and Air Force.

In 2012, the National Park Service began planning efforts associated with rehabilitation of the CPO bungalows on Ford Island."[211] The project was initiated in November 2015. During rehabilitation of CPO bungalow 28, the historic building was demolished.[212] In May 2016, a new building was completed on top of the existing concrete foundation using contemporary building methods (stud-wall construction finished on the exterior with plywood and vertical wood strips attached to the plywood to simulate board and batten, vinyl windows). [213] The interior of the building was not finished. The demolition and subsequent construction of the new building was not consistent with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (36 CFR 68). These activities resulted in an adverse effect to the U.S. Naval Base Pearl Harbor NHL District.

In the spring of 2015, Boy Scout Troop 135 painted the USS *Arizona* mooring quay, and in 2016 up-lighting was installed at the USS *Oklahoma* Memorial to illuminate the flag. The previous lighting system with a flagpole mounted solar light was dangerous to service, repair, and replace for employees.[214] The Coast Guard and park volunteers re-painted the letter on the mooring quays in November, 2016.

---

[207] PEPC 27979, "Down light flags at USS *Utah* and USS *Oklahoma* memorials."

[208] National Park Service, CPO bungalow "Condition Assessment Update," 2009.

[209] "Survivors Turn the First Dirt at Official Groundbreaking of the New Pearl Harbor Memorial Museum & Visitors Center," *Pearl Harbor-Gram*, February 2009, 14.

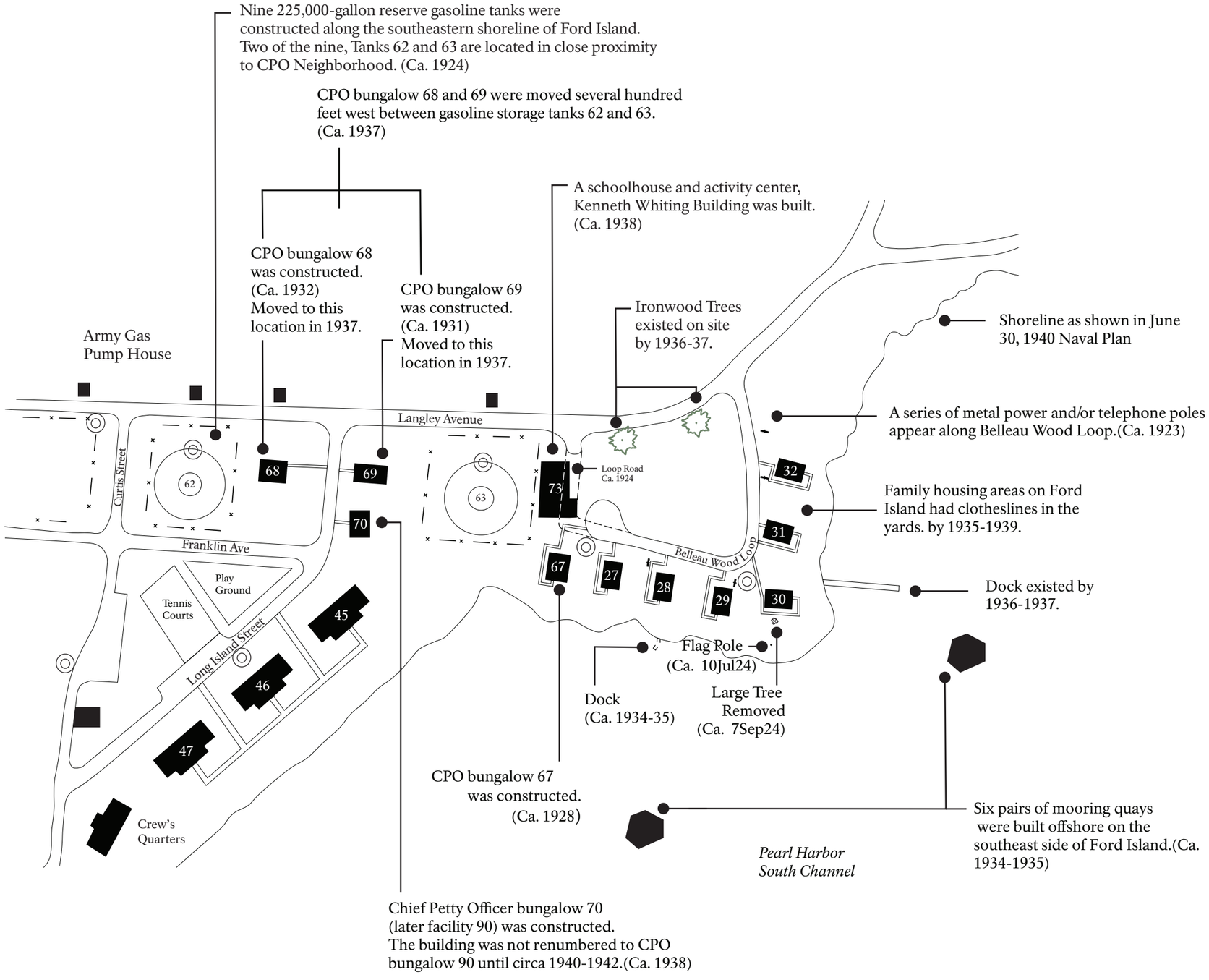
[210] "December 7 – Dedication of Pearl Harbor Visitor Center," *Pearl Harbor-Gram*, February 2011, 14-17.

[211] National Park Service, "Incident Review of Adverse Effect to CPO Bungalow #28, World War II Valor in the Pacific National Monument, Final Report, July 25, 2016, 1-2.

[212] Ibid.

[213] Ibid.

[214] PEPC 64704, "Replace Flag Lighting on USS *Oklahoma* Memorial with up lighting," 2016.



Note: Chief Petty Officer (CPO)bungalows 27, 28, 29, 30, 31, and 32 were constructed. (Ca. 1923-1924)

Cultural Landscape Report Ford Island CPO Bungalows Neighborhood and Battleship Row

Pearl Harbor National Memorial
Honolulu, Hawaii

1902-1940 Period Plan

UNIVERSITY OF OREGON

National Park Service

In partnership with:
University of Oregon
Cultural Landscape Research Group
Department of Landscape Architecture

SOURCES

1.VALR Park Archive
2. Honolulu Regional Archive
3. Naval Air Station Base Plan-
Pearl Harbor, T.H.
14th Naval District Showing Conditions on June 30, 1940.

DRAWN BY

Hannah Six, December 2018
Illustrator

LEGEND

Removed by end of period

Fence

Power/telephone pole

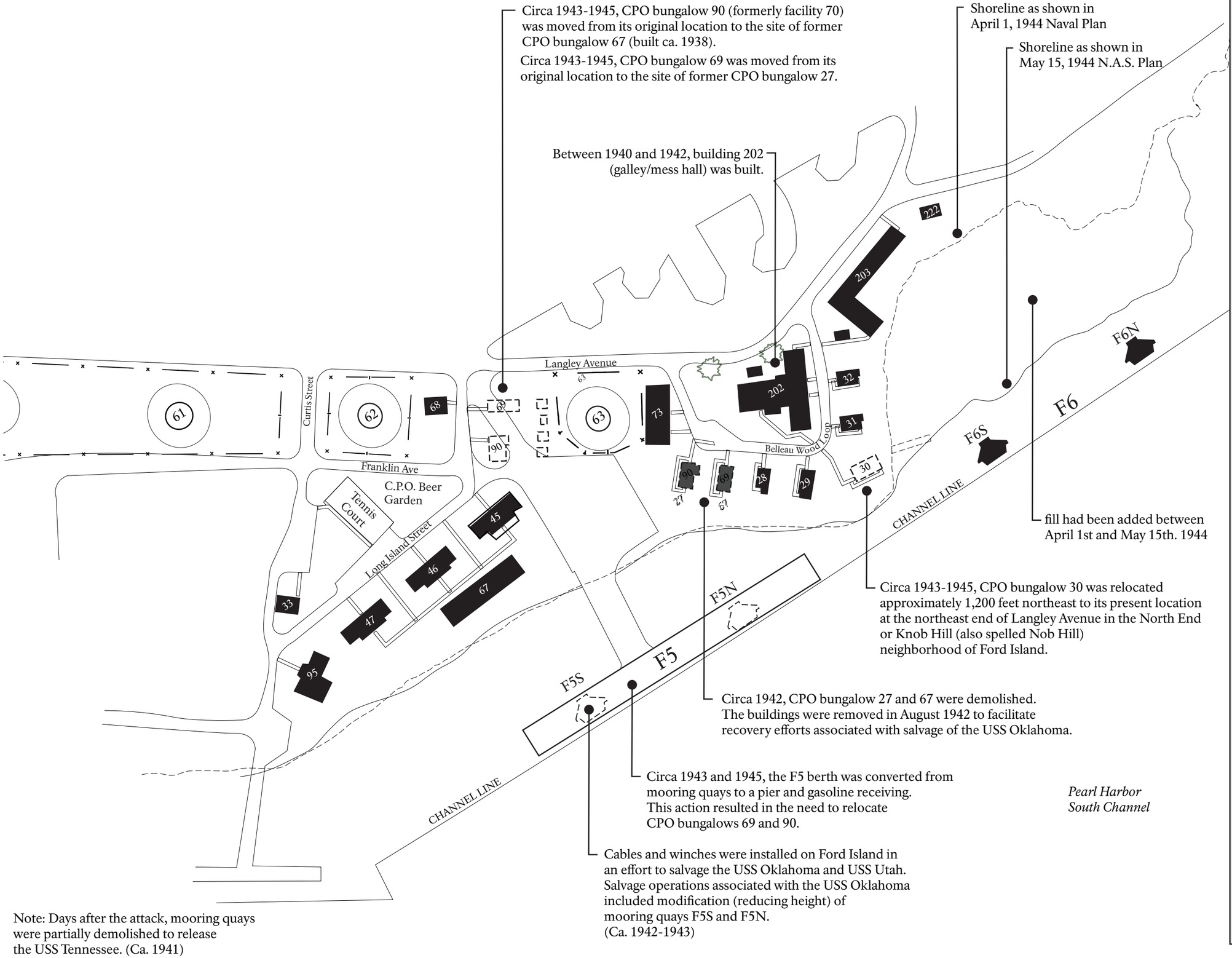
N↑ 1" = 100' 0' 50' 100'

Drawing # 2

Cultural Landscape Report
Ford Island CPO Bungalows Neighborhood and Battleship Row

Pearl Harbor National Memorial
Honolulu, Hawaii

1941-1945 Period Plan



Note: Days after the attack, mooring quays were partially demolished to release the USS Tennessee. (Ca. 1941)

UNIVERSITY OF OREGON

National Park Service

In partnership with:
University of Oregon
Cultural Landscape Research Group
Department of Landscape Architecture

SOURCES
1. Naval Air Station Sewage, Ford Island Sewer System Drwg. No. 1021 November 1st, 1943
2. N.A.S. Drwg. No. 1283, May 15- 1944
3. Naval Air Station, Station Layout Conditions on April 1, 1944 Drwg. No. V-NI-130

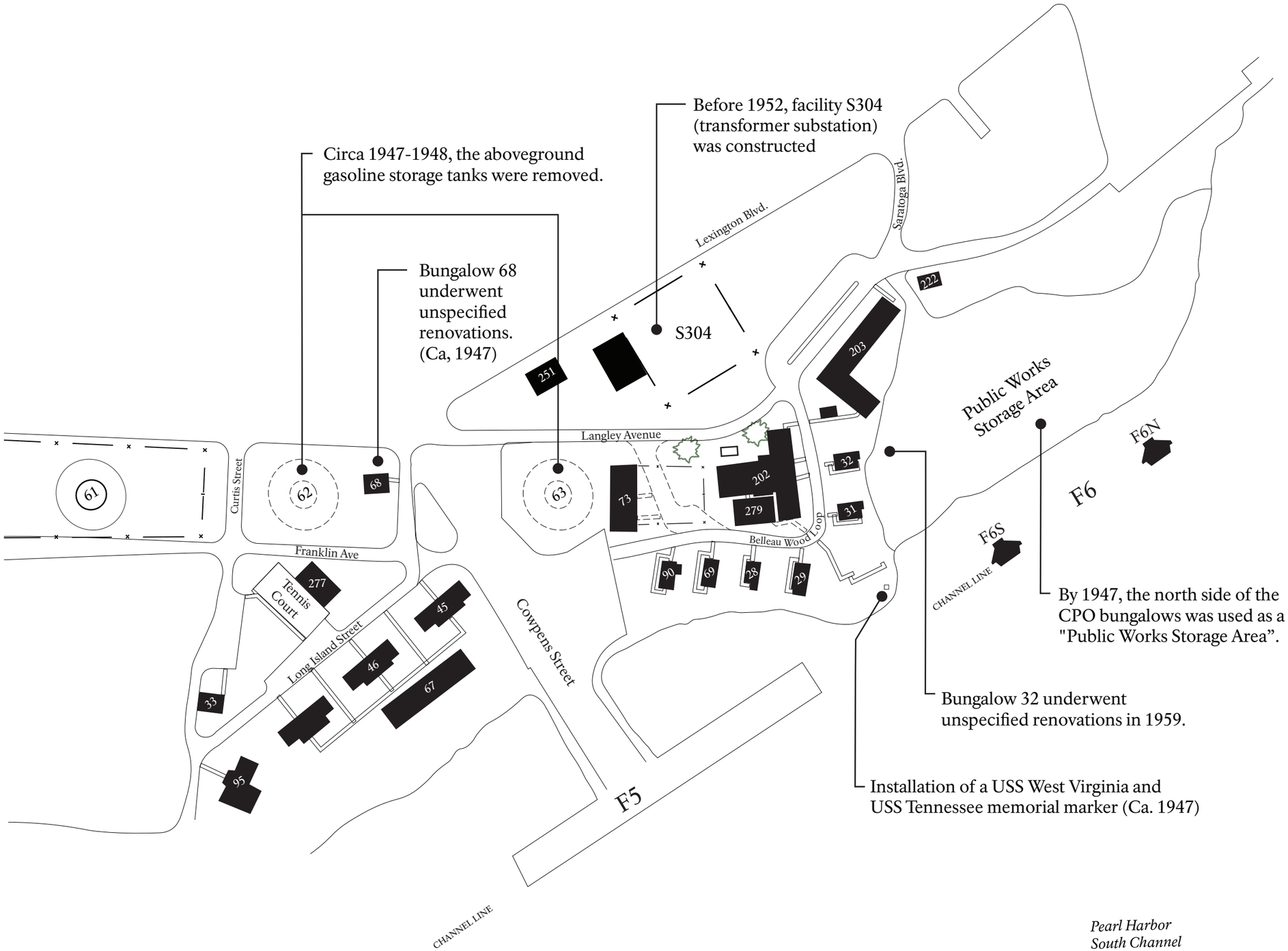
DRAWN BY
Hannah Six, December 2018
Illustrator

LEGEND
Removed by end of period

Fence

N↑ 1” = 100’ 0’ 50’ 100’

Drawing # 3



Cultural Landscape Report Ford Island CPO Bungalows Neighborhood and Battleship Row

Pearl Harbor National Memorial
Honolulu, Hawaii

1946-1965 Period Plan

National Park Service

In partnership with:
University of Oregon
Cultural Landscape Research Group
Department of Landscape Architecture

SOURCES
1. Naval Air Station Pearl Harbor (Ford Island) Conditions as of September 15th 1947
Drwng. No. 2000

DRAWN BY
Hannah Six, December 2018
Illustrator

LEGEND

Fence

Removed by end of period

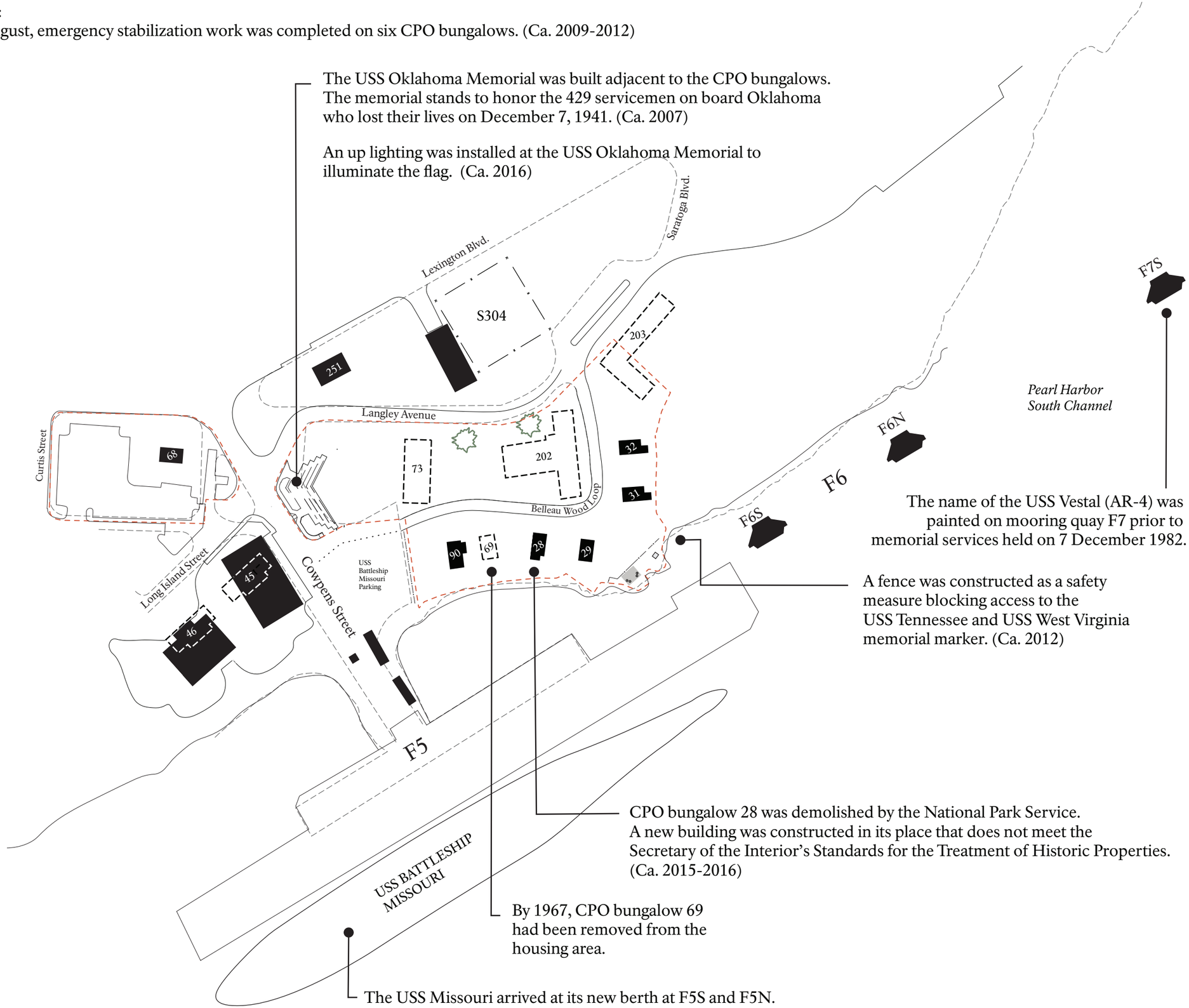
N↑ 1” = 100’ 0’ 50’ 100’

Drawing # 4

Note:
In August, emergency stabilization work was completed on six CPO bungalows. (Ca. 2009-2012)

The USS Oklahoma Memorial was built adjacent to the CPO bungalows. The memorial stands to honor the 429 servicemen on board Oklahoma who lost their lives on December 7, 1941. (Ca. 2007)

An up lighting was installed at the USS Oklahoma Memorial to illuminate the flag. (Ca. 2016)



The name of the USS Vestal (AR-4) was painted on mooring quay F7 prior to memorial services held on 7 December 1982.

A fence was constructed as a safety measure blocking access to the USS Tennessee and USS West Virginia memorial marker. (Ca. 2012)

CPO bungalow 28 was demolished by the National Park Service. A new building was constructed in its place that does not meet the Secretary of the Interior's Standards for the Treatment of Historic Properties. (Ca. 2015-2016)

By 1967, CPO bungalow 69 had been removed from the housing area.

The USS Missouri arrived at its new berth at F5S and F5N. (Ca. 1998)

Cultural Landscape Report Ford Island CPO Bungalows Neighborhood and Battleship Row

Pearl Harbor National Memorial
Honolulu, Hawaii

1966- Present Period Plan

National Park Service

In partnership with:
University of Oregon
Cultural Landscape Research Group
Department of Landscape Architecture

SOURCES

1. Appendix A VALR CLI Site Plan
2. Google Maps Imagery
3. Austin Smith & Assoc., Inc.
Ford Island Sewage Plan (Ca. 1968)

DRAWN BY

Hannah Six, December 2018
Illustrator

LEGEND

- Removed by end of period
- NPS Boundary
- Guardrail
- Fence

N↑ 1" = 100' 0' 50' 100'

Drawing # 5

Analysis and Evaluation of Existing Conditions

Introduction

This chapter summarizes the existing conditions of the CPO Bungalows Neighborhood and analyzes the changes to the landscape over time, concluding with an evaluation of landscape characteristics that retain integrity. Landscape characteristics are the tangible and intangible aspects of an historical place that have either influenced the history of the development of the landscape, or are products of its development, respectively.

For each landscape characteristic and feature, an on-site assessment was made as to the condition of contributing features, and the condition was ranked as Good, Fair, or Poor, based on the following criteria:

Good: indicates the feature shows no clear evidence of major negative disturbance and deterioration by natural and/or human forces. The feature's cultural and/or natural values are as well preserved as can be expected under the given environmental conditions. No immediate corrective action is required to maintain its current condition.

Fair: indicates the feature shows clear evidence of minor disturbance and deterioration by natural and/or human forces, and some degree of corrective action is needed within 3-5 years to prevent further harm to its cultural and/or natural values. If left to continue without appropriate corrective action, the cumulative effect of the deterioration cause the feature to degrade to a poor condition.

Poor: indicates the feature shows clear evidence of major disturbance and rapid deterioration by natural and/or human forces. Immediate corrective action is required to protect and preserve the remaining cultural and natural values.

In addition to condition, an evaluation of the landscape's integrity is included. Integrity is the ability of a property to convey its significance. The landscape analysis and evaluation section compares the changes between the period of significance and the present for each landscape characteristic to determine which landscape characteristics and features retains historical integrity from the period of significance, based on the following criteria:

Contributing features are those individual elements and other characteristics that remain from the period of significance. Individual features that contribute to the significance of the cultural landscape include buildings, structures, remnants of former structures, small scale features, and vegetation installed during the period of significance. Denoted "C" in tables.

Non-Contributing features are those that have been added to the cultural landscape since the end of the period of significance. They do not assist in maintaining the historic character. Some features that are noncontributing are compatible with the historic character of the property. Denoted "NC" in tables.

Summary

The significance of the CPO Bungalows Neighborhood and Battleship Row are conveyed through several landscape characteristics, including the natural systems and features, spatial organization, cluster arrangement, views and vistas, buildings and structures, circulation, vegetation, small scale features, and archeological sites. These characteristics continue to retain integrity and convey the significance of the site

associated with the military development of Pearl Harbor and Ford Island during the early and mid-twentieth century.

There are a variety of buildings, structures, roads, sidewalks, vegetation, small scale features, and archeological sites within the cultural landscape (see Drawing 6). There are six buildings (five contributing) including Bungalows 28, 29, 31, 32, 68, and 90. There are ten structures (eight contributing), including mooring quays F-6S, F-6N, F-7S, F-7N, F-8S, and F-8N, as well as the USS *Arizona* Memorial, USS *Arizona* Memorial dock, the USS *West Virginia* and *Tennessee* Memorial, and the USS *Oklahoma* Memorial. The circulation within the cultural landscape boundary includes the Belleau Wood Loop road, the parking lot adjacent to Belleau Wood Loop, the parking lot near bungalow 68, and the concrete sidewalks leading to each bungalow. The road and sidewalks contribute to the cultural landscape. There are trees, foundation plantings, and turf that have been planted on site to serve both functional and atheistic needs associated with the residential development. The overall character of the trees, shrubs, foundation plantings, and lawn contribute to the cultural landscape. The main types of small scale features within the site boundary are concrete foundation pads, clotheslines, and utilities. Many of the concrete pads and clotheslines also contribute to the cultural landscape. Additionally, there is an assortment of other features, including bollards, light standards, and fencing. Archeological resources associated with the site include concrete foundations and concrete remnants that are associated with development of the site during the period of significance.

The cultural landscape retains its historic integrity through several landscape characteristics and features. The overall site retains its integrity of location, with no change in location of major features since the end of the period of significance. The overall setting of the cultural landscape has been retained, with the only major change to the setting since the end of the period of significance being the addition of parking lots to the west of the neighborhood and the construction of a residential subdivision north of the site. These changes to the setting are largely obscured from the site by vegetation. The majority of the buildings, structures, road, sidewalks, foundation pads, and vegetation display a high degree of integrity of workmanship, materials, and design even though most of these resources are in poor condition. The major changes to the design of the site since the end of the period of significance include the demolition of buildings (69, 73, and 202) in the lawn area north of the bungalows and the addition of the USS *Oklahoma* Memorial. The spatial organization of the site's design has been diminished by these changes, but the overall site retains its integrity of design. Additionally, the loss of foundation plantings around the bungalows has diminished the integrity of the vegetation within the site, but the overall vegetative historic character has been retained. The materials, workmanship, and design of Battleship Row and the USS *Arizona* Memorial are high, with no major changes since the end of the period of significance. The overall feeling of the CPO Bungalows Neighborhood and Battleship Row and its strong association with the military development of Ford Island and Pearl Harbor is evident throughout the site, with very few contemporary elements with the cultural landscape that are not associated with the US Navy's use of the area in the early-to-mid-twentieth century.

Natural Systems and Features

The CPO Bungalows Neighborhood is located on the coast of the east side of Ford Island at the shoreline of Pearl Harbor. Battleship Row is located directly offshore from the neighborhood in the East Loch of Pearl Harbor. The predominant

Figure 22 Ford Island in Pearl Harbor with the USS *Arizona* Memorial and mooring quays in the midground (NPS photo 2017).

features that influenced the development of Ford Island are the dry and windy climate, the lack of fresh water resources, the shallow harbor adjacent to the island, and the jagged corral shoreline (Figure 22).

Harbor

Pearl Harbor defines Ford Island. The harbor's entrance is to the southwest of the island. The harbor contains the Waipio Peninsula and the Manana Peninsula, which define the boundaries of the West Loch, Middle Loch, and East Loch. To the southeast of Ford Island is the Southeast Loch located along Hālawa. During the period of significance, the harbor was reached from the mainland by ferry from Hālawa. In 1998, Ford Island was connected to O'ahu by bridge that carries vehicles between the two islands. The harbor, while strategic for air and sea defenses, limited the amount of development that could easily be accomplished on Ford Island. The CPO bungalow neighborhood, as with all development of buildings on the island, occurred on the island periphery, adjacent to the harbor, in order to maximize the space for the island's airfield. The mooring quays that define Battleship Row, were constructed offshore in an area of the harbor that was dredged to accommodate the size of the battleships. The harbor retains integrity from the period of significance.

Climate

There is little seasonal variation of the climate at this low elevation on the Hawai'ian Island of O'ahu. Average high temperatures range between the mid-70s and 80s Fahrenheit, with winter lows averaging 60 degrees Fahrenheit. On the leeward side of the island, the site is affected by winds, which are predominate ninety percent of the time in the summer and fifty percent of the time in winter. Winds are strongest in the afternoon. Overall, the site, like the rest of the leeward side of the island is dry, with rain predominately occurring in the winter.[215]

The climate had affected the development of the CPO Bungalows Neighborhood in several ways. Limited fresh water supplies on Ford Island resulted in limited development of the locale until fresh water systems were constructed. Before 1899, water was transported from the mainland to Ford Island by boat.[216] Limited water supplies capped the amount of residences on the island. In addition, the hot and dry climate resulted designed architecture in the CPO bungalow neighborhood that utilized the breezes, while

[215] NPS PERL website, 2018.

[216] ICRMP March 2002, page 3-113.

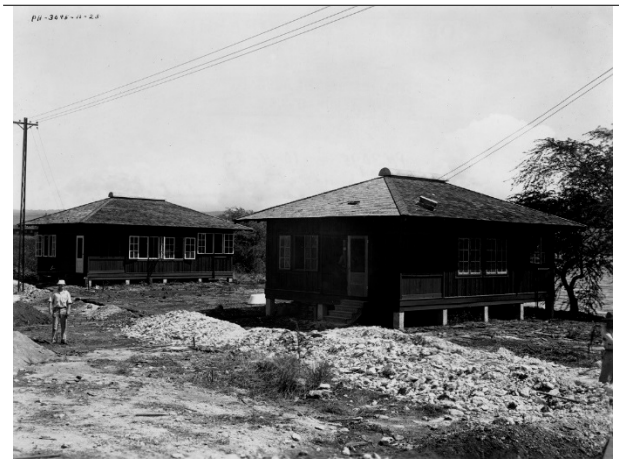


Figure 23. Photograph looking northeast of CPO bungalows 32 and 31 (left to right), October 4, 1923 showing the minimal vegetation in the area (NARA II, 71CA-154B-5-PH3095).

Figure 24. The shoreline of the CPO Bungalows Neighborhood with bungalow 32 seen through the thick vegetation (NPS Photo 2017).

Figure 25. Shoreline erosion at point, with USS *Tennessee* memorial in midground and mooring quays and USS *Arizona* Memorial in background (NPS photo 2018).

trees were planted to shade the buildings from the sun. The neighborhood location was initially rather barren, with limited vegetation. Trees, shrubs, and foundation plantings were incorporated into the neighborhood, with the current species tolerant to heat and drought (Figures 23 and 24).

While no monitoring has been completed for tidal changes, there is antidotal evidence that more frequent and intense king tides are present in Pearl Harbor, which impact the shoreline and facilities in or adjacent to the water. Additionally, changing climate has exacerbated drought and winds, affecting vegetation and built resources on shore and in the water. The climate is changing, but the overall patterns present during the period of significance are present today.

Topography

Ford Island, with its level terrain, provided a large level area that accommodated an airfield. The topography allowed for minimal grading to prepare areas on the island for development. In the shallow waters offshore, the topography was dredged in order to provide anchorages for ships. The dredged material was used to fill the exposed corral shoreline and develop additional buildable land. The mooring quays were constructed by dredging the channel, where long pylons were used to anchor the quays to the harbor floor. Between 1943 and 1947, the shoreline at the CPO bungalow neighborhood was extended to the northeast and southwest, providing additional level topography in place of a jagged shore that was used as material storage during the period of significance. These modifications were made during the period of significance and have not changed markedly since that time. What has changed is the form of the point of the shoreline, which has eroded over time and is being undercut by wave action (Figure 25). It is unclear how quickly the erosion is occurring, but analysis of historic photos shows changes in the shoreline

point, as it gets smaller over time. Overall, the topography retains integrity from the period of significance.

Summary

Important to the development of the site are the harbor, the dry and windy climate, lack of fresh water resources, the level topography, and the shoreline. These natural systems and features remain much as they have since the period of significance and contribute to the cultural landscape.

Spatial Organization

The spatial organization of the site is primarily related to the shoreline. The two primary areas within the site are the CPO Bungalows Neighborhood and Battleship Row, which take advantage of the natural topography (Figure 26). The neighborhood site is organized around the shoreline and the road system, which defines the space for the bungalows, the lawn, and the USS *Oklahoma* Memorial. The mooring quays are organized in a row close to the shoreline where the topography drops off under water.

The US Army constructed housing along the northwestern shore of Ford Island beginning in 1919. The US Navy housing built in the 1920s was located along the northeastern section of Ford Island.[217] During the period of significance, buildings were limited to the periphery of the island in order to accommodate the airfield.

The CPO bungalow neighborhood is located along the southeastern portion of Ford Island, and the housing is organized close to the shoreline, facing the interior of the island, and is connected to the rest of the island by Cowpens Street. Initially, the CPO bungalows were constructed on a natural point with a shoreline of corral and scrub vegetation that was accessible from the mainland via piers and docks. In the 1920s through the 1940s, the shoreline was modified with the placement of fill from the dredging material, in part from the construction of the mooring quays located just offshore of Ford Island. The shape of the shoreline at the end of the period of significance is similar to the configuration that is present today. The topography of the neighborhood is relatively level, providing a uniform ground plane that is broken up only by vegetation. The bungalows are organized in a uniform pattern along Belleau Wood Loop, with lawn surrounding each building and a scattering of trees around the buildings. A thick wall of vegetation along the shoreline has divided the housing from the water's edge. During the period of significance these spaces were open and visually connected due to a lack of shoreline vegetation and the main access to the neighborhood from piers at the shore. The overall spatial organization of the bungalows has been maintained despite the more dense vegetation along the shoreline (see Appendix A changes to site).

The spatial organization of the neighborhood is defined by the curvilinear roads, with the bungalows organized to face Belleau Wood Loop. This serves to separate the space between the bungalows and an expansive lawn that once contained auxiliary buildings and structures related to the military's use of the island, which were organized along and northwest/southwest row that terminated at bungalows 31 and 32. The lawn is defined by Belleau Wood Loop that wraps around the east and south, and Langley Avenue to the north and Cowpens Street to the west. This area, which was divided into smaller spaces defined by buildings and structures during the period of significance is now a broad open area

[217] IRCMP, March 2002, 3-114:3:115.

Figure 26. View looking north from an altitude of 1,264 feet toward the site. The red lines denote the site boundary. (Source: Google Earth, 2018).

punctuated by large trees and remnant foundations. The lack of the historic buildings that created smaller spaces, and the lack of vertical definition of the space by the historic buildings, diminishes the historic character of this space (Figure 27).

The USS *Oklahoma* Memorial is at the western edge of the lawn. The memorial is organized to fit into the space along Cowpens Street and Langley Avenue. The overall stature of the memorial is low and wide, providing a large expanse of individual markers that create a sizeable footprint. The memorial, while low to the ground, defines the space between the lawn and bungalow 68, and provides a visual barrier from the lawn toward bungalow 68. During the period of significance, an oil storage tank was located in this location, which would have also divided the spatial plane in a similar way. While the memorial doesn't contribute to the spatial organization of the site, its scale and size are compatible with the historic character.

Bungalow 68 is the only contributing building on the site located to the east of Cowpens Street. The bungalow is oriented east/west with parking lots on the south and west sides of the building. The open ground plane in this area is broken by a large tree at the corner of Lexington Boulevard and Cowpens Street. During the period of significance the bungalow was flanked by an oil storage tank to the west where the parking lot is located today. The overall historic character of the spatial organization of this portion of the site has changed with the parking area creating an open and level space. During the period of significance this portion of the site would have felt more enclosed due to the oil storage tank breaking the vertical plane and views to the west.

Figure 27. The broad open lawn area enclosed by the roads contrasts with the smaller articulated spaces around the bungalows that are defined by trees, shrubs, and foundation plantings (NPS Photo 2017).

The six mooring quays associated with the CPO Bungalows Neighborhood, located offshore to the east from Ford Island, are organized in a uniform row, in pairs of two. The quays rise from the water and are a substantial presence in defining the space in the south channel of Pearl Harbor. The USS *Arizona* and the USS *Arizona* Memorial, at mooring quay F7N, further delineates the space both above and below water. The quays and memorial define the northeastern edge of the site and help to delineate Battleship Row. The mooring quays and USS *Arizona* contribute to the historic spatial organization of the site as defined during the period of significance, while the USS *Arizona* Memorial is a compatible addition to this historic spatial organization. The Battleship *Missouri* Memorial is outside of the boundary of the site and further defines the southern edge of the site, providing a large towering element to the space similar to the vertical wall that limited views out to Pearl Harbor from the bungalows when ships were moored at Battleship Row.

Summary

Overall, the site's spatial organization has been retained since the period of significance. The general organization of the site has been retained, with the organization of the mooring quays, CPO housing, road alignments, and vegetation around the housing retained from the historic period. Changes to the spatial organization since the period of significance include the dense shoreline vegetation, the removal of buildings and structures from the northern side of Belleau Wood Loop, the construction of the USS *Oklahoma* Memorial, and the construction of the parking lot to the west of bungalow 68. Despite these changes, the site remains predominately organized along the historic alignment of the shoreline and road system. The spatial organization contributes to the cultural landscape.

Cluster Arrangement

The site's clusters include the mooring quays and the CPO bungalows.

The mooring quays are arranged in a linear row in pairs. They are arranged in line with the pier where the Battleship *Missouri* Memorial is docked (Figure 28). The arrangement parallels the Ford Island shoreline before extending out into Pearl Harbor, avoiding the shallows of the northeast portion of the harbor as it reaches the island. This arrangement enabled each ship to be moored to two quays, with space in between each ship in the line. Ships could be doubled up when moored. This cluster of mooring quays is among the most evocative historic feature of December 7th, as the arrangement along with the sunken USS *Arizona*, provides a sense of Battleship Row during the

attack. This contributing arrangement retains integrity from the period of significance.

Figure 29. The linear arrangement of the mooring quays and the USS *Arizona* Memorial, as seen from Ford Island (NPS Photo 2018).

The CPO bungalow neighborhood cluster is arranged in a uniform pattern along the curvilinear Belleau Wood Loop, as it was during the period of significance (Figure 29). The bungalows are regularly spaced and setback from the narrow road that follows the curvature of the shoreline. The arrangement resulted in a landward, or *mauka*, orientation, with the backs of the bungalows to the harbor. The bungalows are in pairs, with the last bungalow on the western end being relocated after the period of significance. Expansive lawns surround each residence, and naturalistic plantings of trees dot the yards. Foundation planting remnants at each building demonstrate the density of the vegetation during the period of significance. The canopy of trees diminishes inland further away from the cluster of residences. Hedges arranged around the edges of the lawn around bungalow 68 provide an enclosed space in a more exposed inland area compared to that of the other bungalows.

Changes since the period of significance include the degraded cluster arrangement within the lawn, although the foundation slabs, footings, and sidewalks that remain in the lawn area provide a hint of the building arrangement in this area north of Belleau Wood Loop during the period of significance. The installation of the USS *Oklahoma* Memorial, arranged along the east side of Cowpens Street has further degraded the historic cluster arrangement of this area. In addition, the removal of an oil tank and arrangement of a parking lot to the west of bungalow 68 has diminished the cluster arrangement of this area since the period of significance. Despite these changes, the overall site retains the key cluster arrangement that defined the space during the period of significance (see Appendix A).

Figure 28. Cluster arrangement of CPO bungalows (lower half of photo) arranged evenly spaced and facing away from shoreline, November 1923 (14th Naval District Command Photos, PERL archives, P.H. 346-23).

Summary

The cluster arrangement of the mooring quays and the CPO Bungalows Neighborhood contributes to the cultural landscape.

Views and Vistas

There are three views that contribute to the cultural landscape; the view from the CPO Bungalows Neighborhood toward the harbor, the view from the USS *Arizona* Memorial toward the neighborhood, and the view from the USS *Arizona* Memorial toward O'ahu.

The view from the CPO Bungalows Neighborhood toward the harbor is key in establishing the spatial relationship between these two clusters, while also conveying the significance the CPO Bungalows Neighborhood during the period of significance. Filtered views of the harbor and the Battleship *Missouri* Memorial can be seen from Belleau Wood Loop, the lawn, and the areas behind the bungalows, while an unobstructed view of the southern mooring quays and the USS *Arizona* Memorial can be seen from the point of the shoreline between bungalows 29 and 31. When the bungalows were constructed, the views toward the harbor were largely unobstructed. These views filled in over the decades due to dense shoreline vegetation that is now overgrown. The shoreline vegetation pattern and density is similar to the vegetation at the end of the period of significance, so it is likely that the views toward the harbor were similar as well, although no photographic documentation of the views during the period of significance has been identified at this time.

From the USS *Arizona* Memorial the view toward the mooring quays F-7N, F-8S, and F8N and the mainland of O'ahu are prominent (Figure 30). This key view is defined by the USS *Arizona* protruding from the water's surface. In the background,

Figure 30. View from USS *Arizona* Memorial over the USS *Arizona* (NPS Photo 2017).

Figure 31. View from USS *Arizona* Memorial toward the CPO Bungalows Neighborhood (NPS Photo 2017).

beyond the harbor, development from the mainland is visible. While this development in the background of this view has changed since the period of significance, the key view toward the USS *Arizona* and the mooring quays contributes to the view of Battleship Row.

From the USS *Arizona* Memorial the view toward the CPO Bungalows Neighborhood is defined by the harbor, mooring quays F-7S, F-6N, F-6S, and the Battleship *Missouri* Memorial (Figure 31). The bungalows are obscured by vegetation, but the Ford Island shoreline is evident from this view. This view has been retained since the end of the period of significance.

Summary

Within the CPO Bungalows Neighborhood and Battleship Row are three contributing views, including from the island looking toward the harbor, and the views both south and north from the USS *Arizona* Memorial along Battleship Row.

Buildings and Structures

There are six buildings (five contributing) within the cultural landscape, including Bungalows 28, 29, 31, 32, 68, and 90. There are nine structures (eight contributing) within the cultural landscape, including mooring quays F-6S, F-6N, F-7S, F-7N, F-8S, and F-8N, as well as the USS *Arizona* Memorial, the USS *West Virginia* and *Tennessee* Memorial, and the USS *Oklahoma* Memorial.

Three buildings have been lost since the end of the period of significance, including the schoolhouse and activity center (building 73), bungalow 69 that stood between building 90 and 32, and the galley/mess hall (building 202). The loss of these buildings diminishes the integrity of the CPO Bungalows Neighborhood.

Several buildings were removed from, or moved to, the CPO Bungalows Neighborhood during the period of significance. These changes do not diminish the integrity of the cultural landscape since changes occurred during the period of significance. The changes are noted in the site history, but are not assessed here.

Bungalow 28

This building was constructed in 2016 on the concrete piers of the 1923 building. The building is located to the south of Belleau Wood Loop, in the middle of a row of three bungalows, and is oriented to face north. The footprint measures approximately 34 feet by 22 feet, with a rear addition that measures approximately seven feet by 16 feet. The building has wood skirting around the crawlspace, board and batten siding, and a complex hip roof clad with wood shingles. There are two entrances to the building; a front entrance and a side entrance on the west elevation, both of which are accessed by a concrete sidewalk. This building is non-contributing but compatible.

Bungalow 29

This building is the third bungalow in the row on the harbor side of Belleau Wood Loop on Ford Island. It was constructed in 1923 and altered in 1946. The bungalow is oriented facing north. The one story building has a rectangular footprint that measures approximately 23 feet by 34 feet with a projection at the rear (south) elevation for an enclosed entrance. The building sits on concrete piers, has board and batten siding, and a hip roof with a shed roof over the rear addition that are clad with composition shingles. The building has a front and rear entrance, connected to the road by a concrete sidewalk. For additional details regarding this building description, see the 2018 Historic Structures Report. This building is contributing.

Bungalow 31

This building is located along the eastern end of the Belleau Wood Loop, with bungalow 32 located to the north and the harbor to the south.

Figure 32. Bungalow 90 set amongst the trees with the USS Missouri in the background (NPS Photo 2018).

The building is oriented to face west. It was constructed in 1923 and altered in 1946. The one-story wood-frame building has a rectangular footprint that measures approximately 22 feet by 34 feet, with a rear projection that measures approximately ten feet by 12 feet. The building sits on concrete piers, has board and batten siding, and a hip roof that is clad with composition shingles. The rear addition has a shed roof. The building has two entrances; a front entrance and a side entrance on the south elevation of the building toward the rear. For additional details regarding this building description, see the 2018 Historic Structures Report. This building is contributing.

Bungalow 32

This building is the northern most bungalow on Belleau Wood Loop. It is oriented to face west and was constructed in 1923 and altered in 1946. The bungalow is a one-story wood-frame building that has a rectangular footprint with a rear projection on the east elevation. The building measures approximately 34 feet by 22 feet and the rear addition measures approximately ten feet by 12 feet. The building sits on concrete piers, is clad with board and batten siding, and has a hip roof with a shed-roof addition that are clad with composition shingles. The building has two entrances; a front entrance and a side entrance on the south elevation. For additional details regarding this building description, see the 2018 Historic Structures Report. This building is contributing.

Bungalow 68

This building is located on Cowpens Street and is oriented to face east. The building was constructed by 1932 and relocated in 1936-37 to the present location. The one-story wood-frame building has a rectangular footprint that measures approximately 29 feet by 40 feet. A small water heater closet is attached to the rear elevation. The building sits on concrete piers, has diagonally oriented tongue and groove board siding, and a hip roof clad with composition shingles. The front

entrance is reached by a concrete sidewalk, and there is a concrete patio at the rear entrance. For additional details regarding this building description, see the 2018 Historic Structures Report. This building is contributing.

Bungalow 90

This building is located in a row with three original bungalows on the harbor side of Belleau Wood Loop on Ford Island (Figure 32). It was constructed in 1938 and was moved to this location in 1945. The bungalow is oriented facing northwest. The one story wood-frame building has a rectangular footprint and a projection on the east elevation where the kitchen is located. The footprint measures approximately 29 feet by 40 feet. The building sits on concrete piers, has a board and batten siding, and a complex hip roof clad with wood shingles. The building has two entrances on the sides of the building; one entrance is on the west elevation and the other is on the east elevation. For additional details regarding this building description, see the 2018 Historic Structures Report. This building is contributing.

USS West Virginia Quay F-6S (Mooring Platform 11)

This mooring quay was constructed in 1934-35. It is a "Type A" platform plan, a quasi-hexagon shape with reinforced concrete exterior walls with an interior grid of reinforced concrete walls held in place at the water level by a series of concrete piles. The interior of the quay is filled with a mix of coral and sand. There are cleats and bollards attached to the concrete walls. The fender system is no longer present. The exterior concrete walls are painted white and black with black lettering "USS WEST VIRGINIA BB 48" painted on the side. For detailed information regarding the quays, see the March 4, 2016 Trip Report by Sonya Cooper. This mooring quay is contributing.

USS Tennessee Quay F-6N (Mooring Platform 12)

This mooring quay was constructed in 1934-35. It is a "Type A" platform plan, a quasi-hexagon shape with reinforced concrete exterior walls with an interior grid of reinforced concrete walls held in place at the water level by a series of concrete piles. The interior of the quay is filled with a mix of coral and sand. There are cleats and bollards attached to the concrete walls. The fender system is no longer present. The exterior concrete walls are painted white and black with black lettering "USS TENNESSEE BB 43" painted on the side. For detailed information regarding the quays, see the March 4, 2016 Trip Report by Sonya Cooper. This mooring quay is contributing.

USS Vestal Quay F-7S (Mooring Platform 13)

This mooring quay was constructed in 1934-35. It is a "Type A" platform plan, a quasi-hexagon shape with reinforced concrete exterior walls with an interior grid of reinforced concrete walls held in place at the water level by a series of concrete piles. The interior of the quay is filled with a mix of coral and sand. There are cleats and bollards attached to the concrete walls. The fender system is no longer present. The exterior concrete walls are painted white and black with black lettering "USS VESTAL AR 4" painted on the side. For detailed information regarding the quays, see the March 4, 2016 Trip Report by Sonya Cooper. This mooring quay is contributing.

35204311USS Arizona Quay F-7N (Mooring Platform 14)

This mooring quay was constructed in 1934-35. It is a "Type A" platform plan, a quasi-hexagon shape with reinforced concrete exterior walls with an interior grid of reinforced concrete walls held in place at the water level by a series of concrete piles. The interior of the quay is filled with a mix of coral and sand. There are cleats and bollards

attached to the concrete walls. The fender system is no longer present. The exterior concrete walls are painted white and black with black lettering "USS *ARIZONA* BB 39" painted on the side. For detailed information regarding the quays, see the March 4, 2016 Trip Report by Sonya Cooper. This mooring quay is contributing.

Figure 33. A ferry is docked at the USS *Arizona* Memorial (NPS Photo 2017).

Quay F-8S (Mooring Platform 15)

This mooring quay was constructed in 1934-35. It is a "Type B" platform plan, a quasi-octagon shape with a concrete shell exterior wall and an interior grid of reinforced concrete walls held in place at the water level by a series of concrete piles. The interior of the quay is filled with a mix of coral and sand. There are cleats and bollards attached to the concrete walls. The fender system is no longer present. The exterior concrete walls are painted white and black. For detailed information regarding the quays, see the March 4, 2016 Trip Report by Sonya Cooper. This mooring quay is contributing.

USS Nevada Quay F-8N (Mooring Platform 16)

This mooring quay was constructed in 1934-35. It is a "Type B" platform plan, a quasi-octagon shape with a concrete shell exterior wall and an interior grid of reinforced concrete walls held in place at the water level by a series of concrete piles. The interior of the quay is filled with a mix of coral and sand. There are cleats and bollards attached to the concrete walls. The fender system is no longer present. The exterior concrete walls are painted white and black with black lettering "USS NEVADA BB 36" painted on the side. For detailed information regarding the quays, see the March 4, 2016 Trip Report by Sonya Cooper. This mooring quay is contributing.

USS *Arizona* Memorial

The USS *Arizona* Memorial was constructed in 1961-62 to memorialize the 1,177 servicemen who lost their lives during the attack on December 7, 1941 (Figure 33). The memorial is a 184 feet long and the overall profile of the structure is shaped with curvilinear edges that peak at both ends. There is a door at the southeast end of the structure and openings along the center of both the west and east elevations. The interior is divided into an entry area, an assembly room in the center, and a shrine with a wall with the names of those that died on the USS *Arizona* when it sunk. The assembly room contains an opening in the floor with views to the sunken deck of the USS *Arizona*, as well as windows on the sides of the room that overlook the sunken ship. A dock and ramp are located at the southeast end of the memorial to allow people to disembark from the ferry and enter the memorial. The USS *Arizona* Memorial, while contributing to the cultural landscape, is also individually listed on the National Register of Historic Places. This mooring quay is contributing.

USS *West Virginia* and *Tennessee* Memorial (F27)

The USS *West Virginia* and *Tennessee* Memorial was installed in 1947 as a memorial to the December 7, 1941 attack. The memorial is composed of a bronze plaque attached to a concrete monument that is oriented with the plaque facing the northwest at the point of the shoreline. The concrete base measures four feet six inches by one foot eight inches and is six inches tall. Set on the base is a concrete block that measures three feet, ten inches long by two feet, one inch high with the bronze plaque affixed to the front that measures one foot, nine inches tall by two feet, ten inches long by one-half-inch thick. At the top of this structure is a concrete block that measures two feet, six inches long and four inches tall. The concrete base has large exposed aggregate and is covered by grass. The memorial is contributing.

USS *Oklahoma* Memorial (F162, F165, F166)

The USS *Oklahoma* Memorial was constructed in 2006-07 to memorialize the 429 servicemen on the *Oklahoma* who lost their lives in the December 7, 1941 attack. The memorial is composed of a black granite walls and white marble standards. The granite walls represents the hull of the *Oklahoma*, while the marble standards represents the servicemen "manning the rails." In addition to these main design elements, signs (F165, F166), markers, benches, flagpole (F162), lighting were installed to complete the memorial design. Since the memorial was constructed after the period of significance, it is non-contributing, but compatible with the CPO Bungalows Neighborhood and Battleship Row.

USS Arizona Memorial dock

There was originally a dock at the USS *Arizona* Memorial, but it was replaced with a contemporary structure make of a steel frame and steel deck with chain railing. The current dock is being replaced. The dock does not contribute, but is compatible.

Summary

There are thirteen contributing buildings and structures and three non-contributing buildings and structures. Bungalow 28 is non-contributing but compatible, the USS *Oklahoma* Memorial and the USS *Arizona* Memorial dock are non-contributing.

Circulation

The circulation within the CPO bungalow neighborhood includes the Belleau Wood Loop road, two parking lots adjacent to Belleau Wood Loop, the parking near bungalow 68, and the concrete sidewalks to each bungalow.

Historically, Ford Island was accessed by boat, so piers and docks were the main historic circulation to the site, while simple coral-paved roads provided on Ford Island. No evidence of the piers or docks was identified. However, the alignment of the roads within and adjacent to the CPO bungalow neighborhood has not changed since the end of the period of significance. During the period of significance, Belleau Wood Loop was originally a loop (hence its name) that did not connect to Cowpens Street, but cut through the turf and connected with Langley Avenue. This change in alignment occurred during the period of significance and does not diminish the integrity of the circulation. The parking at Belleau Wood Loop and at bungalow 68 does not appear on any site plans from the period of significance. These added parking lots diminish the integrity of the circulation system.

The sidewalk alignments from the street to the bungalows match the alignments in site plans from the end of the period of significance. Early in the period of significance, the sidewalk alignments are depicted differently on site plans.

Figure 34. Belleau Wood Loop flanked by trees (NPS Photo 2018).

And during the period of significance, portions of sidewalks were widened. None of these changes diminish the integrity of the circulation because the changes occurred during the period of significance. There are several remnant sidewalks, some of which mark the entrances to buildings removed during and after the period of significance. These sidewalks have diminished integrity since they are no longer associated with the entrances to buildings.

Belleau Wood Loop (F127)

Belleau Wood Loop is the primary road through the site, and is a curvilinear drive that connects five of the bungalows to adjacent developments on Ford Island (Figure 34). The loop road is built on a very shallow fill prism and is paved with asphalt. In some sections there are concrete curbs and concrete edging. The width of the road varies. The following widths of the road were measured: at bungalow 90 it is 20 feet seven inches; at bungalow 28 it is 18 feet; at bungalow 29 it is 16 feet; between Buildings 29 and 31 there is three feet of concrete curbing that measures three inches deep; near bungalow 31 it is 17 feet wide; near bungalow 32 it is 17 feet wide. There is asphalt curbing in front of bungalow 28 that ranges from one foot to one foot, six inches wide. The road is in poor condition, with the asphalt cracked and crumbling and grass growing in the cracks and over the edges of the road. Tree roots are also uplifting the asphalt in places. In 1941, the road was identified as a 12 foot wide coral paved road (22 Oct 1941 untitled plan, EV5 NAVFAC HI Reference Library). In 1947, it was noted in US Navy memos that the roads were paved with asphalt with a coral base. It is unknown when the concrete edging was installed. The road is in poor condition and is contributing.

Belleau Wood Loop parking lot (F130)

A small parking lot that can accommodate approximately four cars is located adjacent to Belleau Wood Loop, across from bungalow 90. The lot is at grade and paved with asphalt. Loose remnant wood, including a telephone pole, are

used to edge the lot. The lot is in poor condition with the asphalt cracked and crumbling and grass growing in the cracks and over the edges of the lot. Morning glory is growing in disturbed areas in the lot. Tree roots are also uplifting the asphalt in places. Crushed coral was noted in the parking lot below the asphalt where the tree roots have uplifted the pavement. This parking lot does not appear in a 1968 plan or aerial photo of the site. The parking lot is in poor condition and non-contributing.

Bungalow 68 large parking lot (F168)

Located in the northwest portion of the site, the parking lot near bungalow 68 consists of an "L" shaped lot that wraps around the west and south yard. The parking lot consists of approximately 70 car parking spaces. The parking area is flanked by a lawn strip with a scatter of trees that parallels a sidewalk along the south, west, and north edges of the parking area. The interior of the lot is open with no median or trees. The parking lot was constructed after the period of significance. The parking lot is in good condition and is non-contributing

Bungalow 68 small parking lot (F169)

Located to the east of bungalow 68 is a small, irregular shaped parking lot that connects to Long Island Street. The parking lot is surrounded by lawn. An aerial photo dating to 1968, at the end of the period of significance does not show this parking lot. The parking lot is in good condition and is non-contributing.

Sidewalk to bungalow 28 (F46)

There is a sidewalk leading to bungalow 28 that wraps around the west side of the building. The sidewalk leading from the road to the building was repoured in 2016, while the sidewalk along the west side of the building was parged in 2016. The sidewalk from the street to the front steps of the building measures 13 feet, nine inches long by three feet, five inches wide. There are two steps at either end of the sidewalk. The walk then connects to the west elevation with a sidewalk that is eight feet, ten inches long. There is a triangular section of sidewalk at these two sidewalks that measures five feet, six inches along the diagonal. The sidewalk along the west elevation is poured in two sections with the first section measuring 13 feet, four inches, and a step down in elevation to a section that measures 22 feet, five inches. The sidewalk at the south end is one foot, eleven inches above grade. The entire west elevation sidewalk measures four feet, six inches wide. The sidewalk connects to a set of concrete steps and concrete porch that leads to a door on the building's west elevation. The sidewalk is in good condition and is non-contributing but compatible.

Sidewalk around bungalow 29 (F35)

The sidewalk leading from the front entry to the side entry of bungalow 29 is made of concrete. The "U" shape sidewalk measures two feet, six inches wide, and the front "west to east" "U" measures 13 feet, two inches long, while the "north to south" "U" measures 43 feet, ten inches long. The rear "west of east" segment measures three feet wide and eight feet, three inches long and is composed of two sections. The sidewalk has a few cracks and scour has eroded the soil at the northwest corner of the sidewalk, but overall the sidewalk is in fair condition and is contributing.

Sidewalk to bungalow 31 (F5)

The sidewalk between the road and the entry stairs to bungalow 31 is paved with concrete. The sidewalk measures 12 feet, 11 inches long by two feet, four inches wide and three-and-a-half inches deep. The sidewalk is heaving at the joint with the road concrete curb, and has settled below the level of the joint of the concrete pad that is at the foot of the entry steps. The sidewalk is in the same location as the sidewalk in historic photos and contributes to the historic district. The

sidewalk is in fair condition, with the surface showing only minor wear. The sidewalk is contributing.

Sidewalk around bungalow 31 (F7)

The sidewalk connecting the front entry steps to the entry on the south elevation of bungalow 31 is "L" shaped and made of concrete. The "north to south" running side of the "L" measures eight feet, six inches long by two feet, ten inches wide and is three-and-a-half inches deep. The "east to west" section of the "L" measures 35 feet, seven inches long by two feet, six inches wide and is three-and-a-half inches deep. The apron (added in the 1940s according to plans) on the "east to west" section of the "L" measures seven feet, ten inches by one foot, ten inches. The sidewalk is in the same location as the sidewalk in historic photos and contributes to the historic district. The sidewalk is heaving along the "north to south" section of the "L" and vegetation is growing between the joints of the concrete. The side is in fair condition and is contributing.

Sidewalk to bungalow 32 (F9)

The sidewalk between the road and the entry stairs to bungalow 32 is paved with concrete (Figure 35). The sidewalk is constructed in two sections, with the section adjacent to the road at grade and a step up to the section that connects to bungalow 32. The sidewalk at grade measures two feet, six inches long, and the sidewalk above grade measures 14 feet, seven inches long. Both sections are three feet, seven inches wide. The section above grade is four-and-a-half to five-and-a-half inches deep. The sidewalk is surrounded by turf and is in fair condition. The sidewalk is in the same location as the sidewalk in historic photos and contributes to the historic district.

Sidewalk around bungalow 32 (F10)

The sidewalk connecting the front entry to the side entry on the south elevation of bungalow 32 is made of poured concrete in an "L" shape. The "north to south" section of the "L" measures nine feet, one inch long by two feet, eight inches wide and 3 inches deep. The "east to west" section of the "L" measures 36 feet, six inches by two feet, ten inches by three inches deep. The apron (added in the 1940s according to plans) along the "east to west" section of the "L" measures six feet nine inches long by two feet wide by four inches deep. The sidewalk is in the same location as the sidewalk in historic photos and contributes to the historic district. The sidewalk is in fair condition. The sidewalk is contributing.

Figure 35. This sidewalk is in front of bungalow 32 and is typical of the sidewalks in the neighborhood (NPS Photo 2017).

Sidewalk to bungalow 68 (F61)

The sidewalk to the front door of bungalow 68 measures 23 feet, one inch long by three feet, eleven inches wide and is three inches deep. The concrete sidewalk is in fair condition, with grass

growing over the edges of it. The sidewalk is contributing.

Sidewalk to bungalow 90 (F54)

The sidewalk to the west entrance of bungalow 90 measures approximately 22 feet long by three feet wide. It connects to a concrete pad, a set of two stairs, and a concrete landing that has a metal pipe handrail. The sidewalk and landing are in fair condition and are contributing.

Sidewalk to bungalow 90 (F55, F56)

The sidewalk to the west entrance of bungalow 90 is composed of two main sections (F55 and F56). This sidewalk is of similar dimensions as the other sidewalks in the district and is in fair condition. The sidewalk starts at the road and wraps around the east entrance of the building. The "L" shape sidewalk at the road measure 17 feet, five inches long by two feet, 11 inches wide and seven feet, eight inches long by four feet, seven inches wide. There is a break in the sidewalk before a straight section parallels the building that is 12 feet, two inches long by three feet wide that turns to meet the door landing with a section that is six feet, eight inches long by three feet wide. The sidewalk is in fair condition and is contributing.

Summary

The circulation that contributes to the cultural landscape includes Belleau Wood Loop and the sidewalks to the bungalows. Non-contributing circulation includes the two parking lots, and the sidewalk to bungalow 28.

Vegetation

The cultural landscape contains trees, foundation plantings, and lawn that have been planted on site to serve both functional and atheistic needs associated with the residential development. The overall character of the trees, shrubs, foundation plantings, and lawn contribute to the cultural landscape. It is difficult to identify specific vegetation that contributes to the cultural landscape because of a lack of historic photos of the CPO bungalow neighborhood. However, from the historic evidence that is available it appears that the shoreline was clear of most vegetation, the bungalows had lush foundation plantings, and by the end of the period of significance wide-canopy trees dotted the landscape (Figure 36). In addition, ironwoods and coconut palms appear in historic photos. The mown turf around the buildings was in place during the period of significance. Overall, the vegetation retains the same character as during the period of

Figure 36. Type of vegetative character that likely would have been present at the CPO Bungalows Neighborhood during the period of significance. No date on this photo (PERL archives, Historic Photos from the 14th District Naval Command, PHOG_NO RV6P104A).

significance, with diminished integrity with the foundation plantings and the shoreline vegetation.

Trees

Figure 37. Looking toward Cowpens Street, with the canopy of the trees and turf surrounding Belleau Wood Loop (NPS Photo 2018).

There are a variety of trees dotting the landscape, including several towering specimen trees with broad canopies as well as trees of small stature in the yards and lawns throughout the site (Figure 37). These trees were planted primarily for shade, while also providing for a lush landscape in a sparsely vegetated island. A thick band of trees grows along the shoreline except for along the coral rock outcrop at the point of the shoreline. The trees throughout the cultural landscape have the effect of filtering the views looking out and looking toward the neighborhood.

Shrubs

Shrubs have been planted throughout the neighborhood in both irregular plantings as well as in regular rows. More naturalistic grouping and unkempt forms of shrubs are located around the front and side yards of the bungalows. Rows of shrubs clipped as uniform hedges are located along the back of bungalow 29 and delineate the yard of bungalow 68. The shrubs are primarily for aesthetic purposes, to both create a lush landscape and also define the more intimate yard space around each bungalow.

Foundation Plantings

Foundation plantings of smaller stature shrubs and ground covers are located along the front and sides of the bungalows. In areas where the sidewalks run along the sides or front of the

bungalows, foundation plantings break up the space in between the paths and buildings. The foundation plantings are not clipped and are grouped in clusters of various forms and colors. Many of these plants are missing, although several stumps are located in these spaces to give an indication of where this vegetation once grew.

Planting Beds

Planting beds are also located under several of the larger trees in front of the bungalows. These plantings are a mix of shrubs and groundcovers and are irregular in shape with plantings of various forms and colors tightly grouped. The combination of the foundation plantings and the planting beds provide a lush landscape feel and create more intimate spaces around each of the bungalows.

Turf

The bungalows are surrounded by clipped turf that are accented by shrubs and trees. The turf provide open spaces around each bungalow. Additionally, a large span of turf fills the space to the north of Belleau Wood Loop. The turf is minimally maintained, but is mown, providing an open character around each bungalow that is framed by trees and shrubs.

Below is a list of the main trees, shrubs, foundation plants, and planting beds within the site boundary that contribute to the historic character of the cultural landscape during the period of significance:

Trees

African Tulip *Spathodea campanulata* (Tree 15)

The tree is located between bungalow 31 and bungalow 32 in the middle of turf. The tree has a sparse canopy and dead branches. Vegetation is grown against the base of the tree at the root flare. The tree is in fair condition.

Date Palm *Phoenix dactylifera* (Tree 14)

A mature date palm is located in between bungalow 31 and bungalow 32 in the middle of the turf. Growing over the base of the tree was a banyan (*Ficus* spp.) that has been chopped to a trunk of about three feet high. Within a foot of the palm's base is a century plant (F2). While the trunk of the palm is crooked and the banyan was grown over the trunk, the palm is in good condition.

Umbrella Tree *Schefflera arboricola* (F6)

This umbrella tree is located to the west of bungalow 31, just to the south of the sidewalk (F5) near the road curb. The tree is medium sized and has been pruned at its base. It is surrounded by turf. The canopy of dense foliage is healthy and the tree is in good condition.

Royal Palm *Roystonea regia* (Tree 12)

This royal palm is located to the west of bungalow 31, just to the north of the sidewalk (F5) near the road curb. It is surrounded by turf. The palm is in good condition.

Plumeria *Plumeria spp.* (Tree 11)

The plumeria is located to the southwest corner of bungalow 31, near the curve in the road. The medium-sized tree is surrounded by turf. The tree has been heavily pruned in the past and has an uneven canopy. The tree is in fair condition.

Plumeria *Plumeria spp.* (Tree 10)

A plumeria is located to the east of the plumeria at the southwest corner of bungalow 31. It is roughly the same size as tree 11. The tree is missing large sections of bark along various portions of the trunk and branches and is in fair condition.

African Tulip *Spathodea campanulata* (Tree 18)

An African Tulip tree is located in front of bungalow 32, just south of the sidewalk to the front entry of the building. The tree is surrounded by turf. The tree has a sparse canopy, many dead

branches, and is leaning to the west. The tree is in poor condition.

African Tulip *Spathodea campanulata* (Tree 20)

There is an African Tulip tree located to the northwest corner of bungalow 32, and is closest to the road in a row of four African Tulips. The tree is surrounded by turf. The tree has an uneven canopy, many dead branches, and suckers. The tree is in fair condition.

Figure 38. Plumeria (NPS Photo 2017).

African Tulip *Spathodea campanulata* (Tree 22)

This is the middle of four African Tulips located in a row to the north of bungalow 32. The tree is adjacent to tree 21. It has a straight trunk and a small canopy. The tree's trunk flare is touching tree 21 and is surrounded by turf. The tree is in fair condition.

African Tulip *Spathodea campanulata* (Tree 21)

This is the middle of four African Tulips located in a row to the north of bungalow 32. The tree is adjacent to tree 22. It has a curved trunk, is leaning to the north, and a small canopy with several dead branches. The tree's trunk flare is touching tree 21 and is surrounded by turf. The tree is in fair condition.

African Tulip *Spathodea campanulata* (Tree 23)

This is the eastern most of four African Tulips located in a row to the north of bungalow 32.. The has a small canopy with several dead branches and is surrounded by turf. The tree is in fair condition.

Plumeria *Plumeria spp.* (F14B, Tag #13904)

This Plumeria is located just north of the row of African Tulips, near bungalow 32 (Figure 38). The tree has multi trunks and is surrounded by lawn. The tree is in good condition.

Figure 39. Monkeypod tree (NPS Photo 2017).

Plumeria *Plumeria spp.* (F15, Tag #13903)

This Plumeria is located just north of the row of African Tulips, near bungalow 32. The tree has multi trunks and is surrounded by lawn. The tree is in fair condition.

Plumeria *Plumeria spp.* (F16, Tag #13902-13901)

This Plumeria is located just north of the row of African Tulips, near bungalow 32. The tree has multi trunks and is surrounded by lawn. The tree is in fair condition.

Opiuma *Pithecellobium dulce* (Tree 24)

This tree is located at the edge of the NPS parcel, to the northeast of bungalow 32. It has two trunks, a broad canopy, and droopy leaves. The tree is surrounded by turf. The tree is in good condition.

Umbrella Tree *Schefflera arboricola* (F19, Tag #13905)

This umbrella tree is located to north corner of the NPS parcel in the turf, north of bungalow 32. The tree stands out in the turf. It has a wide canopy and a wide trunk. The tree is in good condition.

Royal Palm *Roystonea regia* (F31, Tag #13923)

There are two royal palm located at the point in the shoreline between bungalow 29 and bungalow 31. Diameter at breast height is 11.46 inches. The palm is begin encroached upon by shoreline vegetation, but is in good condition.

Umbrella Tree *Schefflera arboricola* (F19, Tag #13906)

This umbrella tree is located in the northeast corner of the NPS-owned site. It is a multi-trunk free located in turf. The tree is in good condition.

Tabebuia *Tabebuia spp.* (F21)

This tabebuia is located northwest of bungalow 32 and is surrounded by turf. The tree is in fair condition, with wilted leaves and tips of branches that are dead.

Monkeypod *Samanea saman* (Tree 8, Tag #13925)

This monkeypod tree is located between bungalow 29 and bungalow 31 (Figure 39). The tree has a broad canopy, with no understory, and is surrounded by turf. The tree is in good condition.

Royal Palm *Roystonea regia* (Tree 7, Tag #13927)

This date palm is located at the northwest corner of bungalow 29. It is surrounded by lawn and in fair condition.

Mimosa Tree *Albizia julibrissin* (Tree 5, Tag #13928)

This mimosa tree is located at the northeast corner of bungalow 28, near the road. The mature tree has a broad canopy, but is asymmetrical in form due to sever pruning of the main branches near the building. A planting bed is located around the tree. The tree appears to be in fair condition.

Mimosa Tree *Albizia julibrissin* (Tree 4)

This mimosa tree is located at the northwest corner of bungalow 28, near the road. The mature tree has a broad canopy, but is asymmetrical in form due to sever pruning of the main branches near the building. A planting bed is under the tree. The tree appears to be in fair condition.

Tabebuia *Tabebuia spp.* (F59)

There is a tabebuia located along the western edge of the parcel, just west of bungalow 90. It is one of several trees that line the boundary with the parking area and screens the parking lot from view from bungalow 90. It is a young tree, possibly a sprout from Tree 2) and is in good condition.

Tabebuia *Tabebuia spp.* (Tree 2, Tag #13934)

This tabebuia is a substantial size with a narrow form and sparse canopy. It is one of several trees that line the boundary with the parking area. It appears in good condition.

Banyan *Ficus spp.* (Tree 3, Tag #13935)

There is a large banyan tree located at the southwest corner of the property near the shoreline. It has a broad canopy and is missing

main branches from the interior of the canopy. It is in fair condition.

Plumeria *Plumeria spp.* (F79, Tag #343)

There is a plumeria located to the southwest of bungalow 68, in the corner of the "L" shaped hedge of hibiscus that lines the lawn. The plumeria is in good condition.

Autograph Tree *Clusia rosea* (F80)

There is an autograph tree located in the lawn to the northwest of bungalow 68. The tree is small and has a thick dense canopy and is in good condition.

Monkeypod tree *Samanea saman* (F106, Tag #314)

This tree is located at the western edge of the parking lot in a strip of lawn. It is in good condition.

Monkeypod tree *Samanea saman* (F114, Tag #339)

There is a Monkeypod tree located north of bungalow 68. It is a tower tree with an expansive canopy that sits prominently at the intersection and edges the lawn north of the building. It is in good condition.

Plumeria *Plumeria spp.* (F107)

There is a plumeria located at the southwest corner of the parking lot in the strip of lawn near the road. It is in good condition.

Paperbark trees *Melaleuca quinquenervia* (F123) Non-contributing

There are two paperbark trees at the northwest corner of the parking lot. The trees are in good condition.

Banyan *Ficus spp.* (Tree 34)

This banyan tree is located directly east of the USS *Oklahoma* Memorial in the lawn of the loop road. The tree has a wide canopy and a substantial root flare. The tree appears to be in good condition.

Banyan *Ficus spp.* (Tree 33)

This banyan tree is located in the lawn to the northeast of the USS *Oklahoma* Memorial. It has a wide canopy and a substantial root flare, and appears to be in good condition.

Earpod *Enterolobium cyclocarpum* (Tree 32)

There is an earpod tree located across the street from bungalow 90 in the lawn. The tree has a broad canopy and a large trunk. It appears to be in good condition.

Monkeypod tree *Samanea saman* (Tree 31)

This monkeypod tree is located in the lawn in the center of the loop road. It has a large canopy. It appears to be in good condition.

Umbrella tree *Schefflera arboricola* (Tree 30)

There is a small umbrella tree located in the lawn in the center of the loop road under Tree 31 near the edge of the parking lot on Belleau Wood Loop. It appears to be in good condition.

Ironwood tree *Casuarina spp.* (F143, Tag #13938)

There is an ironwood tree located at the edge of Langley Avenue in the lawn. It is tall and narrow in form with a sparse canopy. The tree appears to be in good condition.

Ironwood tree *Casuarina spp.* (F144)

There is an ironwood tree located at the edge of Langley Avenue in the lawn near the intersection with Belleau Wood Loop. It is tall and narrow in form with a sparse canopy and several dead limbs and severely pruned branches. The tree appears to be in fair condition.

Banyan *Ficus spp.* (Tree 9)

This banyan is located at the 90 degree bend in Belleau Wood Loop in the lawn across the street from the bungalows. It has a rather tall and

narrow canopy for a banyan due to pruning. It appears to be in fair condition.

Umbrella tree *Schefflera arboricola* (Tree 29)

There is a small umbrella tree located in the lawn across the street from the bungalows near the 90 degree bend in the road. The tree appears to be in good condition.

Shoreline vegetation

Along the shoreline at the back of Buildings 90, 28, and 29 is a strip of dense vegetation that includes predominately milo (*Thespesia populnea*), with an interspersed mix of other trees including banyan (*Ficus spp.*). The shoreline vegetation has grown very dense since the period of significance and does not have the same character as it did during the end of the period of significance. The shoreline vegetation is in good condition.

Shrubs and Low-growing plants

Century Plant *Agave attenuata* (F2)

The century plant is located at the eastern base of the Royal Palm. It is more than six feet tall and is surrounded by turf. Vegetation of various types including vines are growing at its base. The plant is in good condition.

Croton *Codiaeum Variegatum* (F36)

The shrub is located at the foundation of the east elevation of bungalow 29. It is in good condition.

Panax *Polyscias guilfoylei* (F39)

There are two panax on the north and west sides of the concrete pad (F34) associated with bungalow 29. These plants have been heavily pruned and topped to form a hedge. They are in fair condition.

Panax *Polyscias guilfoylei* (F41)

This panax has been heavily pruned and topped to form a hedge. This plant is located at the south elevation of bungalow 29. It is in fair condition.

Panax *Polyscias guilfoylei* (F42)

This panax has been heavily pruned and topped to form a hedge and is located at the south elevation of bungalow 29 and is dead.

Bougainvillea *Bougainvillea spp* (F43)

There is an unpruned bougainvillea located in the lawn in front of bungalow 28, to the east of the sidewalk. It appears to be in good condition.

Figure 40. Panax (NPS Photo 2017).

Hibiscus *Hibiscus laevis* (F45)

There is a hibiscus located in the planting bed under Tree 4. It appears to be in good condition.

Hibiscus *Hibiscus laevis* (F47)

This hibiscus is located in the lawn to the west of bungalow 28. It appears that this multi-trunk hibiscus is actually two different plants with pink and orange flowers. The plant is in good condition.

Hibiscus *Hibiscus laevis* (F49)

This hibiscus is located in the lawn to the west of bungalow 28 and north of the clothesline. The plant is under the canopy of Tree 4, and is in good condition.

Hibiscus *Hibiscus laevis* (F54)

This hibiscus is located in front of bungalow 90. It is the only plant along the front foundation planter. The plant is in good condition.

Panax *Polyscias guilfoylei* hedge (F67-78)

There are twelve panax plants located to the southwest of bungalow 68. They form an "L" shaped hedge along the lawn and delineate the space between the building and the parking lot. There are in fair condition.

Panax *Polyscias guilfoylei h*edge (F81-105)

There is a panax hedge located along the edge of the lawn paralleling the road to the north of bungalow 68. The hedge is in fair condition.

Foundation plants

Dracaena *Dracaena fragrans* (F14A)

This dracaena is located at the foundation of the south elevation of bungalow 32. It is approximately two feet fall and has narrow leaves. It is the only foundation planting at bungalow 32. It is in good condition.

Croton *Codiaeum Variegatum* (F37)

This foundation planting is located at the north elevation of bungalow 29, next to the stairs to the main entry. The plant is in good condition.

Dracaena *Dracaena fragrans* (F38)

The dracaena is located in the foundation plantings at the northwest corner of bungalow 29. The plant is in good condition.

Morning Glory *Ipomoea spp*. (F60)

There is a morning glory attached to the porch railing to the west elevation entrance of bungalow 90. The morning glory has grown in after the period of significance. The morning glory is in good condition.

Stumps near bungalow 68 (F115-120)

There are several stumps of foundation plantings along the north elevation of bungalow 68. These are the remnants of hedges that date to the period of significance.

Planting beds

The planting beds do not contribute to the cultural landscape because they were established after the period of significance. They are not compatible with the character of the formal military landscape.

Planting bed under tree 5 (F40)

There is a planting bed under Tree 5 at the northeast corner of bungalow 28 that contains aloe, haole koa, opunia, and morning glory and is surrounded by lawn. The plants surround the base of Tree 5. The vegetation and extent of the planning bed is similar to that under Tree 4. The vegetation is in good condition.

Planting bed under Tree 4 (F44)

There is a planting bed under Tree 4 at the northwest corner of bungalow 28 that contains aloe, haole koa, opunia, and morning glory and is surrounded by lawn. The plants surround the base of Tree 4. The vegetation and extent of the planning bed is similar to that under Tree 5. The vegetation is in good condition.

Small Scale Features

The main types of small scale features within the site boundary are concrete foundation pads, memorials, clotheslines, and utilities. There are also an assortment of other features, including bollards, light standards, and fencing.

During the period of significance there were clotheslines and utilities that dotted the landscape. These features remain from the period of significance and contribute to the integrity of the cultural landscape. There were also several docks that extended from the shoreline behind the bungalows to the water. These have been lost, which diminishes the integrity of the cultural landscape. Additionally, there are foundation pads that date from the period of significance that may demonstrate the locations extensions of the bungalows. These foundations have yet to be dated, so it is unclear if they contribute to the integrity of the cultural landscape.

Foundations

The foundations are made of concrete and date to during and after the period of significance. These foundations articulate the way in which space was used in the past and may help to convey the spatial organization of the site during the period of significance.

Concrete Pad (F1)

Located to the northeast of bungalow 31 is a concrete pad that measures eight feet, four inches by 14 feet, 11 inches and three-and-a-half inches deep. The pad has an inscription that reads "Rob –N– Kim 4EVER and "♥ Amanda 1992" on the surface of the concrete. The concrete pad sits above grade and is surrounded by turf on the north and east sides. The pad is in good condition. Based on the date of the inscription it appears that this concrete pad dates to after the period of significance and is non-contributing.

Concrete Slab – Flagpole Base (F8) Contributing

There is a concrete slab located adjacent to the sidewalk around bungalow 31 (F7) within the turf. The slab measures two feet, three inches by two feet, one-half inch. There is a sawn-off pipe in the center that measures three feet in diameter. The slab is in fair condition with turf growing around the edges of the slab.

Concrete Slab – Flagpole Base (F11)

There is a concrete slab located adjacent to the sidewalk around bungalow 32 (F10) within the turf. The slab measures two feet, ten inches by two feet, ten inches. There is a pipe in the center that measures four feet in diameter and approximately under 24 inches tall. The slab is in fair condition with turf and weeds growing around the edges of the slab and is contributing.

Concrete Piers (2) (F12)

There are two concrete piers at the south elevation of bungalow 32 that used to support posts for a porch. The piers measures one foot, five inches square with a five-and-a-half inch square concrete located on top of the base. The pier closest to the stairs has an inscription of "1946" on it. The piers are in good condition. They contribute to bungalow 32.

Concrete Slabs (3) (F13)

There are three small concrete slabs located along the north elevation of bungalow 32. Two slabs are next to each other and measure seven-and-a-half inches by one foot, six inches each and are spaced seven inches apart. They are located one foot, six inches from the building. There is a third slab located one foot, four inches from the building and measures one foot, three inches by one foot, six inches. It is unclear how these three slabs were used. They are in fair condition. It is unclear of the age of these slabs.

Concrete Pad Adjacent to bungalow 29 (F34)

There is a concrete pad attached to the southwest corner of bungalow 29. The pad is composed of

two sections of concrete slabs that are poured on top of concrete masonry unit blocks that are mortared. The pad abuts the sidewalk that connects the front and side entries of the building. The overall dimensions of the pad are 16 feet, six inches long, eight feet wide adjacent to the building, and 13 feet wide at the western side of the pad. The pad surface is approximately one foot above grade. The overall condition of the pad is poor, with major cracks in the concrete surface and missing CMU blocks around the perimeter. Vegetation is growing in the surface joints and cracks. It is unclear when this pad was poured.

Concrete pad (F23)

Located in between Buildings 29 and 31 is a concrete pad that measures three feet by six feet ten inches by four inches deep. The pad is in poor condition, and is cracked, heaving, and covered in grass. It is unclear when this pad was poured.

Concrete Slab at bungalow 90 (F52)

There is a concrete slab located at the southeast corner of bungalow 90. The slab measures 11 feet seven inches by 11 feet, seven inches. There is a metal storage container located on a concrete slab at the southeast corner of bungalow 90. The container is contemporary and non-contributing. The slab is in fair condition and is of unknown age.

Concrete pad (F62)

There is a concrete pad located to the west, rear, of bungalow 68 at the base of the stairs. The concrete pad measures one foot, ten inches by four feet, two inches. It has three tic tac toe games inscribed into it as well as a number of illegible letters. The pad is in fair condition. The pad is of unknown age.

Concrete pad behind bungalow 68 (F63)

There is a large concrete pad behind bungalow 68. It encloses the smaller pad (F62). The overall dimensions of F63 are 17 feet, seven inches by 13 feet. In the corner of the pad near the building there is an inscription that reads “RBG 1960.” The concrete is in fair condition with grass overgrowing the edges and several cracks in sections of the slab. It is unclear when this pad was poured.

Concrete pad (F134)

There is a concrete pad with a manhole cover in it located in the northeast section of the lawn in the center of the loop road. The pad measures 26 feet long by 18 feet wide. The pad is in fair condition. This pad is of unknown age.

Concrete pad (F140)

There is a small concrete pad located to the east of the *Oklahoma* Memorial in the lawn. The pad is in fair condition. This pad is of unknown age.

Clotheslines

Clotheslines were originally constructed by the 1930s, based on historic aerial photographs of the site. Although it is unclear when the current clotheslines were installed, the clotheslines are an important feature in demonstrating the residential qualities of the neighborhood. The clothesline poles that remain in the neighborhood contribute to the historic character of the cultural landscape.

Clothesline (F3 and F4)

There is a clothesline to the south of bungalow 32 (Figure 41). It most likely dates to the period of significance based on historic photographs that show a clothesline in this location. There are two steel clothesline poles that measure 23 feet, six inches apart, and no clothesline. The steel pole (F3) is nine inches in diameter and slightly larger at the base. The pole measures six feet, six inches tall, measured at grade, and the top cross pole is six feet long. The pole is painted yellow, but the paint is faded and heavily chipped. The steel is rusting. Evidence of dark green paint is visible underneath the yellow paint. The stamped “T”

joint reads “Crane.” The steel pole (F4) measures six feet, four inches tall, measured at grade, and the cross pole measures six feet, one inch long. This pole is also painted yellow, is heavily faded, chipped, and the steel is rusting. The poles are in fair condition. The clothesline contributes.

Clothesline (F50 and F51)

Figure 41. Clothespoles between bungalows 31 and 32 (NPS Photo 2017).

There is a set of poles for a clothesline located in the lawn between buildings 90 and 28. The poles are oriented north/south. The northern pole (F50) measures seven feet tall at grade and is four inches in diameter. The top cross pole is five feet long and the diameter of the pipe is two-and-a-half inches. The pole is secured by a rounded, poured concrete base that measures one foot three inches in diameter with the inscription “James H Laverne Dennis J Foster’s 1953” in the concrete. The second pole (F51) measures six feet, eight inches tall at grade and is three inches in diameter. The top cross pole is six feet long and two inches in diameter. The pole is set in a concrete base that is covered in grass. The pole is leaning. Both poles are painted yellow and the paint is chipped and faded and the metal is pipped and rusted in places. The poles are in fair condition. The clothesline contributes.

Clothesline (F65, F66) Contributing

There is a clothesline that consists of two poles located in the lawn to the south of bungalow 68. F65 is a metal pole that measures six feet, four inches tall at grade and is two inches in diameter. The top cross pole is five feet long and two inches in diameter. The metal is not painted. F66 is six feet four inches tall at grade and two inches in diameter. The top cross pole is five feet long and two inches in diameter. The pole is leaning. The foundations of the poles are not visible. The poles are in fair condition. The clothesline contributes.

Figure 42. Utility pole prior to its collapse from termite damage (NPS Photo 2017).

Utilities

Utility pole (F48) Contributing

There is a utility pole located to the southwest of bungalow 28 in the lawn (Figure 42). The pole measures 9.87 inches in diameter. The pole has three brown ceramic insulators attached to a metal bracket at the top and insulated wire that is attached at the top that is bunched up at the base of the pole. The pole appears in good condition. There is a metal pipe protruding from the ground a few feet away from the pole. The pole is depicted in this location in a 1941 plan of the site (22 Oct 1941 untitled plan, EV5 NAVFAC HI Reference Library). The pole is in fair condition.

Manhole Covers (3) (F32-F33)

Three sewer manhole covers are located to the southwest of bungalow 29. The covers measure two feet, two inches in diameter and are surrounded by turf. The covers are in fair condition. It is unknown when this feature was installed.

Underground utility vault (F20)

Located in the turf at the northeastern portion of the NPS-owned site near the road is an underground vault. The vault is poured in place concrete with a steel lid. The vault measured three feet, eight inches by three feet seven-and-a-half inches. The concrete rim of the vault is three-and-a-half in height above grade. The above grade portion of the vault appears to be in fair condition, with the concrete heavily chipped and the steel lid badly rusted and flaking. It is unknown when this feature was installed.

Underground utility vault (F22)

Located in between Buildings 29 and 31 is an underground utility vault. The vault measures five feet, two inches by four feet, two inches by three inches deep. The vault is in fair condition. It is unknown when this feature was installed.

Water valve (F24)

The water valve is located next to the utility vaults. The valve measures one foot, eight inches tall at grade and is one foot, eight inches long. The pipe is three inches in diameter and is painted yellow, with red paint underneath the yellow coat. The stamp on the pipe reads: 2009 2 ½ 400 WOG 3" diameter steel. The valve is in fair condition. It is unknown when this feature was installed.

Electrical vault (F25)

The vault cover is concrete and measures two feet, eight inches by two feet, three inches and is three inches tall. The vault is in fair condition. It is unknown when this feature was installed.

Pole (F64)

There is a pole with a cross member behind bungalow 68 that measures eight feet, four inches tall. The pole and cross pole are made of metal. It is unknown what purpose this feature once served. The pole is in fair condition. It is unknown when this feature was installed.

Utility vault (F131)

There is a contemporary utility vault located in the northeast section of the lawn in the center of the loop road. The concrete vault top measures four feet, eight inches by three feet, two inches and is covered with a steel plate. The vault is in good condition and is contemporary, non-contributing.

Utility vault (F132)

There is a contemporary utility vault located in the northeast section of the lawn in the center of the loop road. The concrete vault top measures three feet, two inches by two feet and is covered with a steel plate. Grass is growing over the edges of the vault. The vault is in fair condition and is contemporary, non-contributing.

Utility vault (F133)

There is a contemporary utility vault located in the northeast section of the lawn in the center of the loop road. The concrete vault top measures two feet, two inches by two feet, two inches and is covered with a steel plate. The vault is in good condition and is contemporary, non-contributing.

Utility vault (F135)

There is a contemporary utility vault located in the northeast section of the lawn in the center of the loop road. The concrete vault top measures two feet, two inches by two feet, two inches and is covered with a steel plate. The vault is in good condition. It is unknown when this feature was installed.

Water valve (F141)

A contemporary water main valve and vault is located in the lawn near the USS *Oklahoma* Memorial. The vault is in good condition and is contemporary, non-contributing.

Manhole cover (F156)

There is a manhole cover located at the edge of the shoreline behind bungalow 28. The cover is in fair condition and is contemporary, non-contributing.

Utility covers (F167)

There is a group of utility covers located to the north of the USS *Oklahoma* Memorial that are non-contributing. The covers are in good condition and is contemporary, non-contributing.

Fences

Fence (F26)

The contemporary chain link fence is located along the point near the shoreline and acts as a barrier to the shoreline. The fence measures four feet, two inches tall and is painted green. It is in good condition and is contemporary, non-contributing.

Fence around bungalows 31 and 32

The chainlink fence around bungalows 31 and 32 was installed by the NPS as a safety measure to barricade access to the buildings that are severely deteriorated. The fence is in good condition and is contemporary, non-contributing.

Figure 43. Bollards located on shoreline (NPS Photo 2017).

Other features

Bollards (F28)

There are two pairs of bollards located on a concrete pad at the point of the shoreline (Figure 43). They were likely installed as part of the 1942-43 salvage effort of the USS *Oklahoma* and USS *Utah*. The concrete pad measures 15 feet wide by 20 feet, nine inches long. At both corners of the pad closest to the shore are two bollards. The iron bollards are painted black. The pair at its base measures two feet, eight inches wide and six feet, seven inches long. Each bollard is two feet, two inches tall and feet two inches in diameter. The top measures two feet, three inches long and one foot, 11 inches wide. Aloe and Haole Koa are encroaching on the southern extent of the

concrete pad. The concrete pad and bollards are in fair condition and contribute.

Small-scale features at parking lot (F108, F109, F110, F111, F120, F121, F124, F125)

The stop signs (F108, F124, F125, F163), light poles (F109, F121), parking sign, (F110, F111), and speed limit sign (F120) were installed with the construction of the parking lot near bungalow 68 after the period of significance. These features are in good condition and are non-contributing.

Light poles (F128 "H2", F129 "H1")

There are two light poles along Belleau Wood Loop. One is located across the street from bungalow 32 and the other is located across the street from bungalow 28. Both are metal light standards with a single arm and a downward facing light. These date from after the period of significance. These features are in fair condition and are non-contributing.

Interpretive panel (F164)

The interpretive panel at the USS *Oklahoma* Memorial was installed by NPS and is non-contributing. The panel is in good condition and is non-contributing.

Archeology

The project area has not been surveyed for archeological resources. There is one contributing archeological resource within the cultural landscape: the USS *Arizona*. There are several remnant features associated with former structures within the bungalows neighborhood that contribute to the cultural landscape's spatial organization and convey the landscape's significance. Although they have not been evaluated for eligibility as archeological resources under Criterion D, the resources, including concrete foundations and concrete structure remnants, are associated with development of the neighborhood during the period of significance and are important to the spatial organization of the cultural landscape. However, none of these features have been dated. It is likely that piers associated with docks are extant, but have not yet been identified. An archeological survey and evaluation of these resources is needed.

USS *Arizona* (BB-39) NRIS #89001083, Contributing

Built in 1915, the USS *Arizona* is a steel-hulled battleship that measured 608 feet long. The USS *Arizona* was modernized between 1929 and 1931. The *Arizona* received the most serious damage of the ships during the December 7, 1941 attack, and is the tomb for 1,102 sailors and Marines killed during the attack. Most of the superstructure was salvaged from the ship during World War II. The battle-damage hull of the *Arizona* is submerged except for the sub of the mainmast and barbette for turret 3 with rise above the surface of the water.

Stairs to Water (F30)

There is a set of five concrete steps that are resting on the shoreline with a number of large concrete blocks (Figure 44). The stairs have been dislodged from their original position at the edge of the shoreline that drops off to meet the water level. The stairs appear in photographs from the period of significance. Even though the stairs have been dislodged from their original position and no longer function, they are an important feature in demonstrating the connection between Battleship Row and the neighborhood on Ford Island. It is unknown when this feature dates to.

Figure 44. Stairs at shoreline (F30) (NPS Photo 2017).

Figure 45. Remnant sidewalk (F136) (NPS Photo 2017).

Concrete remnant (F53)

There is a concrete remnant feature located in the lawn between Buildings 28 and 90. It is unknown what this feature is or the extent of it as it is covered in grass. It is unknown when this feature dates to.

Concrete remnant (F57)

There is a concrete remnant feature that may have been used as a flagpole footing located along the east elevation of bungalow 90. It is unknown when this feature dates to.

Concrete sidewalk remnant (F136)

There is a remnant concrete sidewalk that measures 3 feet 8 inches wide and is partially buried under grass located at the edge of Langley Avenue (Figure 45). It is unknown when this feature dates to.

Concrete pad remnant (F137)

There is a rectangular concrete pad remnant that is made of concrete and asphalt that measures approximately 20 feet long by 19 feet wide that is covered with soil and grass making the edges difficult to discern. It is located in the lawn at the edge of Langley Avenue. It is unknown when this feature dates to.

Concrete pad remnant (F138)

There is a concrete pad remnant of undetermined dimensions under a thick mat of grass in the center of the lawn at the loop road, near the parking lot on Belleau Wood Loop. It is unknown when this feature dates to. It is unknown when this feature dates to.

Concrete sidewalk remnant (F139)

There is a concrete sidewalk remnant that measures 3 feet 8 inches wide and is an undetermined length because it is covered by soil and grass. Tree roots have heaved sections of the sidewalk. It is unknown when this feature dates to.

Concrete footers (F142)

There are several concrete footers with sawn-off metal pipe in their centers located in a row under the banyan (tree 33) in the center of the loop road lawn. The footers are buried at grade and

are spaced approximately nine to 10 feet apart. It's unclear how many of them there are because the lawn has overgrown most of the concrete. It is unknown when this feature dates to.

Pipe (F145), Undetermined

There is a pipe located near Tree 9 in the lawn. It is unknown when this feature dates to.

Concrete slab remnant (F148)

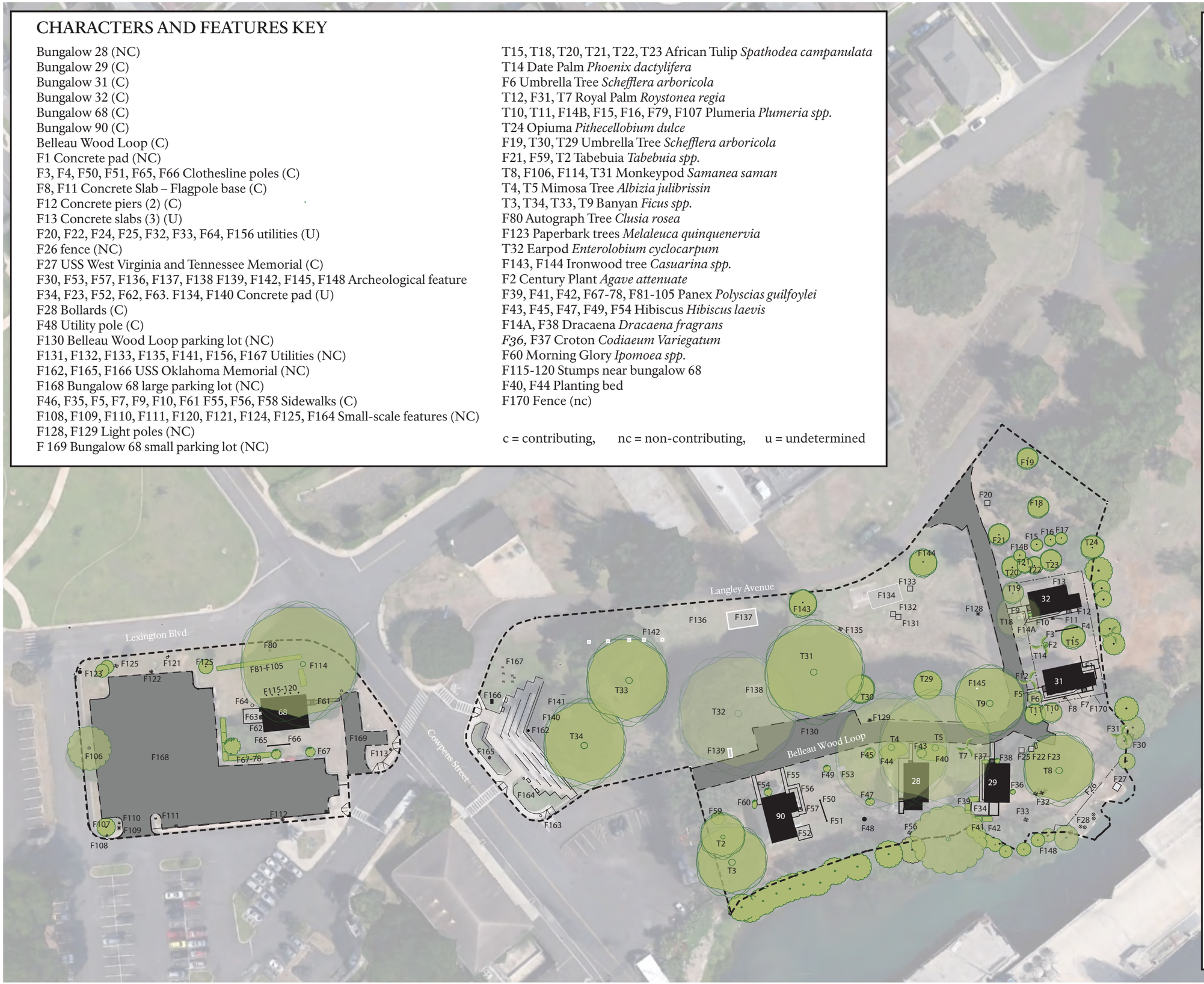
There is a concrete slab at the point of the shoreline that is badly spalding. The grade has eroded and it is being held in place by a banyan tree. It is unclear what other features may be associated with the slab as it is located over the water. It is unknown when this feature dates to.

CHARACTERS AND FEATURES KEY

Bungalow 28 (NC)
Bungalow 29 (C)
Bungalow 31 (C)
Bungalow 32 (C)
Bungalow 68 (C)
Bungalow 90 (C)
Belleau Wood Loop (C)
F1 Concrete pad (NC)
F3, F4, F50, F51, F65, F66 Clothesline poles (C)
F8, F11 Concrete Slab – Flagpole base (C)
F12 Concrete piers (2) (C)
F13 Concrete slabs (3) (U)
F20, F22, F24, F25, F32, F33, F64, F156 utilities (U)
F26 fence (NC)
F27 USS West Virginia and Tennessee Memorial (C)
F30, F53, F57, F136, F137, F138 F139, F142, F145, F148 Archeological feature
F34, F23, F52, F62, F63. F134, F140 Concrete pad (U)
F28 Bollards (C)
F48 Utility pole (C)
F130 Belleau Wood Loop parking lot (NC)
F131, F132, F133, F135, F141, F156, F167 Utilities (NC)
F162, F165, F166 USS Oklahoma Memorial (NC)
F168 Bungalow 68 large parking lot (NC)
F46, F35, F5, F7, F9, F10, F61 F55, F56, F58 Sidewalks (C)
F108, F109, F110, F111, F120, F121, F124, F125, F164 Small-scale features (NC)
F128, F129 Light poles (NC)
F 169 Bungalow 68 small parking lot (NC)

T15, T18, T20, T21, T22, T23 African Tulip *Spathodea campanulata*
T14 Date Palm *Phoenix dactylifera*
F6 Umbrella Tree *Schefflera arboricola*
T12, F31, T7 Royal Palm *Roystonea regia*
T10, T11, F14B, F15, F16, F79, F107 Plumeria *Plumeria spp.*
T24 Opiuma *Pithecellobium dulce*
F19, T30, T29 Umbrella Tree *Schefflera arboricola*
F21, F59, T2 Tabebuia *Tabebuia spp.*
T8, F106, F114, T31 Monkeypod *Samanea saman*
T4, T5 Mimosa Tree *Albizia julibrissin*
T3, T34, T33, T9 Banyan *Ficus spp.*
F80 Autograph Tree *Clusia rosea*
F123 Paperbark trees *Melaleuca quinquenervia*
T32 Earpod *Enterolobium cyclocarpum*
F143, F144 Ironwood tree *Casuarina spp.*
F2 Century Plant *Agave attenuate*
F39, F41, F42, F67-78, F81-105 Panex *Polyscias guilfoylei*
F43, F45, F47, F49, F54 Hibiscus *Hibiscus laevis*
F14A, F38 Dracaena *Dracaena fragrans*
F36, F37 Croton *Codiaeum Variegatum*
F60 Morning Glory *Ipomoea spp.*
F115-120 Stumps near bungalow 68
F40, F44 Planting bed
F170 Fence (nc)

c = contributing, nc = non-contributing, u = undetermined



Cultural Landscape Report Ford Island CPO Bungalows Neighborhood and Battleship Row

Pearl Harbor National Memorial
Honolulu, Hawaii

CLI Site Plan 2

National Park Service

In partnership with:
University of Oregon
Cultural Landscape Research Group
Department of Landscape Architecture

SOURCES

1. 2017 NPS GPS Data
2. 2017 Aerial Photograph
3. 2009 AutoCAD

LEGEND

- CPO Bungalow
- road and parking
- vegetation
- concrete foundations
- fence
- utility vault
- clothesline
- memorial
- utility pole
- light pole
- CLI Boundary/NPS Boundary
- manhole
- sign post
- drainage inlet

Scale: 1 in. = 60 ft 0’ 30’ 60’ N ↑

Drawing # 6

Treatment

Introduction

This chapter of the Ford Island CPO Bungalows Neighborhood and Battleship Row CLR presents guidance and recommendations for the short and long-term treatment and management of the site's cultural landscape, based on the objective of preserving the character defining features that help convey its historic significance. Cultural landscape treatment guidelines in this chapter address the entire CPO Bungalows Neighborhood and Battleship Row, as well as treatments for specific character-defining features based on documentation and analysis work completed by the NPS and University of Oregon.

The treatment recommendations presented in this document are based on previous park planning efforts and the findings outlined in this report's site history, and analysis and evaluation of existing conditions. The intent of this preservation treatment chapter is to establish a framework for decision-making for treatment of the cultural landscape. This framework includes both broad philosophical guidelines and site-specific recommendations for managing the landscape characteristics and features that contribute to the significance of the property. This framework also addresses other management objectives associated with contemporary use, public accessibility and safety. Discussions with NPS staff helped guide the identification of issues addressed in this chapter.

The treatment recommendations are identified actions for specific issues that have been raised and need attention and resolution. The treatments are split up by site-wide treatment tasks, and specific treatment tasks by individual feature. The information in this chapter provides both a guiding framework and specific tasks that are needed to address current and future planning, design and management activities affecting the Ford Island Chief Petty Officer's Bungalows Neighborhood and Battleship Row.

The treatment plan is organized into six sections, including Management Issues, Goals, and Objectives; Recommended Landscape Treatment Approach; Treatment Concept; General Management and Design Guidelines for Treatment; and Treatment Recommendations.

Management Issues, Goals, and Objectives

The CLR addresses specific management issues, goals, and objectives that have been identified by the NPS in several venues, including the park's 2015 Foundation Document, the 2012 Environmental Assessment for the Rehabilitation of the Chief Petty Officer Bungalows on Ford Island, and a 2018 CLR workshop with park management in order to inform appropriate long-term management and interpretation of the cultural landscape.

The 2012 Environmental Assessment for the Rehabilitation of the Chief Petty Officer Bungalows on Ford Island identifies that the preferred alternative for the bungalows site is rehabilitation in order provide a high level of preservation of historic fabric while also providing both interpretation and education opportunities for visitors, as well provide administrative use of the site. Interpretation opportunities envisioned in the 2012 EA included internal and external exhibits and ranger-led programming. Additionally, the EA identified "preserving the historic scene" with additional plantings or plant removal to enhance the setting of the neighborhood, while providing accessible access to structures and throughout the grounds. And, finally, the EA provided for administrative use of the buildings as either offices, storage, or residences.

The 2015 Foundation Document identified that the park's fundamental resources and values included, in part, the historic structures of Battleship Row, of which the CPO bungalows and

mooring quays are included. Additionally, the sense of place, or physical access to the landscape, was identified as a fundamental resource and value.

Based on the information presented in these planning documents, the CLR team held a treatment workshop with NPS staff to identify the current goals, challenges, and opportunities for the CPO Bungalows Neighborhood and Battleship Row as it relates to historic preservation of the cultural landscape. A CLR treatment workshop was held on September 14, 2018 at the park that was attended by park and regional staff, including:

Jacqueline Ashwell, Superintendent, Pearl Harbor National Memorial, National Park Service

Katie Bojakowski, Chief of Natural and Cultural Resources, Pearl Harbor National Memorial, National Park Service

Sueann Brown, Historical Architect, Regions 8, 9, 10, and 12, National Park Service

Joe Fuller, Integrated Resources Specialist, Pacific Historic Parks

Vida Germano, Cultural Landscapes Program Manager, Regions 8, 9, 10, and 12, National Park Service

Elizabeth Gordon, Regional 106 Coordinator Regions 8, 9, 10, and 12, National Park Service

Elaine Jackson-Retondo, Preservation Partnerships Program Manager, Regions 8, 9, 10, and 12, National Park Service

Dave Louter, Chief of Cultural Resources, Regions 8, 9, 10, and 12, National Park Service

Robert Z. Melnick, Director, Cultural Landscape Research Group, University of Oregon

Hannah Six, Research Assistant, Cultural Landscape Research Group, University of Oregon

At the September 14, 2018 workshop, the following challenges and opportunities were identified:

Challenges:

•Comprehensive views

Views to other areas of Ford Island and the park are difficult to establish and maintain.

•Sense of landscape

Understanding of larger landscape context is obscured due to vegetation growth and visual enclosure.

•Wayfinding

Visitors may have difficulty knowing where to go and what to view.

•Ford Island Trail

There is difficulty linking to the Ford Island Trail due to land ownership and security concerns.

•Visitor impacts

Visitor overuse and presence may have negative impacts on the neighborhood due to wear and tear, trash, unsupervised access.

•Water access points

Access to the water may be dangerous due to erosion, lack of access clarity.

•Area connections

Connections to other Ford Island areas are complicated by land ownership and security concerns.

•Climate change, especially sea level rise and changing tides

Projected impacts of climate change, especially sea level rise and changing tides, may result in shoreline erosion, flooding, and loss of vegetation.

•Vandalism and security

Defacing of, and damage to, historic resources (buildings and landscape) is a concern and will require added security.

• US Navy enclaving

Since the neighborhood is surrounded by USN land, access and security are a concern.

•Access to Ford Island

Visitor access to Ford Island is limited to shuttles from the Pearl Harbor Visitor Center, restricting ready access to the neighborhood.

•Base security

Base security is of utmost importance and needs to be considered when enabling visitor access to CPO Bungalow Neighborhood.

•Clutter

The site is often used for informal or inappropriate storage of non-historic materials.

•Parking

Parking for staff and visitors is very limited, often in inappropriate locations, and needs to be increased and managed to enable better site access.

•Staff

NPS staff housing, office and storage need to be accommodated on site.

•Operations capacity

NPS operations are not adequately supported on site, and will require adequate location and resources.

•Funding

Funding for staff, office space, visitor interpretation, and maintenance is severely limited.

•Resource degradation, especially buildings

Contributing resources are in poor repair from long term lack of maintenance.

•Coordination with Historic Structures Report

There is a need to coordinate Cultural Landscape Report goals, objectives and treatments with those of the Historic Structures Report.

•Visitor and staff safety

Visitor and staff safety require regular and consistent oversight as well as resource maintenance.

•Accessibility

Accessibility was not a concern during the period of significance, but needs to be addressed now to meet federal requirements. Exposed roots and topography, especially in the central area, are a challenge to ADA access.

•Lack of utilities

In order to facilitate visitor and staff use, site utilities need to be added and/or upgraded, including lighting, potable water, air conditioning, and online access.

•Tripping hazards

There are many tripping hazards, including roots, upheaved steps and sidewalks, lack of clarity between walkways and grassy areas.

•Erosion

Coastline erosion threatens the site's stability, visitor safety, and visual access to the USS *Arizona* Memorial and the USS Missouri.

•Vegetation management coordination with US Navy

US Navy and NPS lack coordinated vegetation management goals, procedures, and oversight.

•Tree maintenance and pruning

Trees and other contributing vegetation, such as ornamental shrubs, have been poorly and inadequately maintained.

•Pest Control

Various rodents present a hazard to contributing buildings, landscape features and potentially staff and visitors.

Opportunities:

•Telling the story

Develop an interpretive plan to convey the neighborhood history during the entire period of significance, not only December 7, 2941.

•Personal connection and stories of everyday life

Develop an interpretive plan that conveys daily neighborhood life so visitors can understand what it was like for military personnel and families during this period.

•Connect park sections and areas

Provide clarity and ease of connections to other areas of Pearl Harbor. Support development of Ford Island Trail by US Navy, so visitors can explore Ford Island.

•Visitor amenities and services

Provide visitor amenities, such as interpretive opportunities, visitor contact points, views to USS Missouri and USS *Arizona* Memorial.

•Historic patterns

Reestablish historic landscape patterns, including vegetation, circulation, and views so visitors can understand and appreciate totality of this cultural landscape.

•Involve neighbors

Cooperate with island neighbors and include them in decision-making.

•Landscape interactions/contemplation

Provide opportunities for visitor interaction with this significant landscape and personal

contemplation about life during the period of significance.

•Historic Preservation Field School

Cooperate with UH Mānoa and other institutions to sponsor historic preservation field schools for NPS employees and others.

•Building and Landscape restoration

Accurately and appropriately restore and rehabilitate historic buildings, structures, landscape features, and vegetation based on Secretary of Interior Standards and Guidelines.

•Adaptive use

Consider and investigate opportunities for adaptive use of historic structure and landscape features to preserve historic integrity and provide for contemporary use.

•Explore NPS site

Provide opportunities or visitor exploration, understanding and discovery of NPS site through open and safe access. Consider guided interpretive tours of the CPO Bungalow Neighborhood.

•Links to surroundings

Consider visual links to surrounding, non-NPS, area to reestablish views during period of significance. Open views and visual connections to Pearl Harbor, reducing the sense of visual isolation. Consider easements to surrounding landscape to minimize visual differences in landscape boundaries between USN and NPS.

•Boundary edges

Clearly identify boundaries of NPS responsibility

•Improve road and sidewalk

Rehabilitate circulation features to historic condition.

•Open views to water / spatial connection

Reestablish visual connection to the harbor for visitor understanding of neighborhood context.

Recommended Landscape Treatment Approach

The Secretary of the Interior currently recognizes four primary treatment alternatives for historic properties: preservation, rehabilitation, restoration, and reconstruction. These are defined and discussed in Director's Order Number 28: Cultural Resource Management Guidelines, as well as *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*, as follows:

> **Preservation** is the act or process of applying measures necessary to sustain the existing form, integrity, and materials of a historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction. New additions are not within the scope of this treatment; however, the limited and sensitive upgrading of mechanical, electrical and plumbing systems and other code-required work to make properties functional is appropriate within a preservation project.

Rehabilitation is 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.

Restoration is the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time by removing features from other periods in its history and reconstructing missing features from the restoration period. The limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a restoration project.

Reconstruction is the act or process of depicting, by means of new construction, the form, features, and detailing of a non-surviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time and in its historic location.[218]

Based upon the park's need to meet future interpretive and functional goals, rehabilitation is recommended as the most appropriate overall treatment approach for the CPO Bungalows Neighborhood and Battleship Row. The goal is to have all treatment decisions consistently match the character of the site as it existed during the period of significance of 1902 to 1965, with the acknowledgement of December 7, 1941 as a significance date.

Under the rehabilitation treatment approach, stabilization, protection, and preservation of historic and natural resources occurs even as limited new uses are accommodated. As part of the treatment plan, those resources and systems that will be the focus of stabilization, protection, and preservation, such as the mooring quays at Battleship Row, as well as the sites of known and potential archeological resources, are noted.

Review of the other treatment alternatives recognized by the Secretary of the Interior for the park landscape concluded these alternatives to be inappropriate. Preservation was dismissed as overly restrictive because it does not allow for the enhanced interpretation and use changes that are expected to be needed to meet the park's vision for management of the site and visitor experience goals. Restoration and reconstruction were also found to be inappropriate because there is not sufficient documentation that exists to accurately portray a lost historic condition.

Secretary of the Interior's Standards for Rehabilitation

The Secretary of the Interior's Standards for Rehabilitation indicate ten basic principles to be followed in managing a historic property under this approach. The standards (36 CFR Part 67) apply to historic properties of all periods, locations, sizes, conditions, and uses. They create a baseline of guidance to which intended changes to the historic landscape must be compared. These standards are neither technical nor prescriptive, but promote responsible preservation practices as follows:

1. A property will be used as it was historically or be given a new use that maximizes the retention of distinctive materials, features, spaces and relationships.

218. National Park Service, *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes.*

2. The historic character of the property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces and spatial relationships that characterize the property will be avoided.

3. Each property will be recognized as a physical record of its time, place and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other history properties, will not be undertaken.

4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.

5. Distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize a property will be preserved.

6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new materials will match the old in composition, design, color, texture, and where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.

7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.

8. Archaeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.

9. New additions, exterior alterations or related new construction will not destroy historic materials, features and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale, proportion and massing to protect the integrity of the property and its environment.

10. New additions or related new construction will be undertaken in such a manner, that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

Treatment Concept

Guided by the park's planning documents and the information collected in the CLR workshop, the treatment plan for the CPO Bungalows Neighborhood and Battleship Row provides a vision for the cultural landscape as a whole, as well as site-specific guidance for managing individual resources. The overarching concept for the cultural landscape treatment is to balance the protection and enhancement of the park's cultural landscape resources and values with contemporary interpretation and uses. Specific landscape treatment recommendations are intended to help convey the changes to the site during the period of significance, 1902-65, and convey the character-defining features of the site that existed on December 7, 1941. Through rehabilitation, the focus is to preserve extant historic resources, creatively interpret missing features, manage views, rehabilitate historic vegetation, and allow for park use of the buildings on the site.

Both the site-wide treatments and specific treatments are based on the broad vision for the site as identified in the 2012 Environmental Assessment. As the vision of the CPO Bungalows Neighborhood and Battleship Row is refined under the guiding principles of the park planning

documents, future site-specific projects should be designed within the constraints identified in the treatment recommendations in order to meet rehabilitation objectives to preserve historic fabric and allow for administrative and visitor uses.

Treatment Recommendations

Overall Approach

The overall approach for treatment of the Ford Island CPO Bungalow Neighborhood is *rehabilitation*, with several treatment goals:

•Preserve in good condition the character-defining features of this cultural landscape to better reflect and represent the period of significance.

•Provide support and amenities so visitors can gain safe access to the site, understand its story and significance in American history, and recognize and appreciate the specific contributing features of this cultural landscape.

•Provide support for NPS staff to fulfill their role as stewards of this significant cultural landscape.

•Provide guidance for cooperation between NPS and the US Navy to collaborate to preserve and manage this cultural landscape.

Both the site-wide treatments and specific treatments are based on the broad vision as identified in previous park planning documents with the goal of rehabilitating the site to accommodate visitor interpretation and provide for park administrative use of the site. The treatment recommendations address this broad vision with varying levels of specify in order to allow for flexibility in how the cultural landscape is rehabilitated. These treatment recommendations are group by priority in the implementation plan that follows this chapter.

Site-wide Treatments

Natural Systems and Features

Goal: The cultural landscape's natural systems and features provide setting and context for the landscape's development, as well as an understanding of its history. These systems and features should be protected to ensure that they continue as defining features.

G-1. Maintain shoreline vegetation in order to inhibit erosion.
G-2. Monitor erosion rate.

Buildings and Structures

Goal: The buildings and structures represent the main activity areas during the period of significance and should be preserved, rehabilitated or adaptively used.

G-3. Preserve, restore, or rehabilitate all bungalows following the Historic Structures Report guidelines.
G-4. Preserve mooring quays following the Historic Structures Report guidelines.
G-5. Non-contributing buildings and structures should be compatible with the cultural landscape by following these guidelines:
    •Infill locations: Construction of new buildings and structures should be minimized within the district, especially near historic structures. Any new buildings should be located in discrete areas that do not obscure historic features.

Figure 46. Circulation treatment: expose and salvage historic curbing, as in Nob Hill neighborhood.

•Scale: New buildings and structures should be constructed to a scale that is compatible with and comparable to historic features in the vicinity both extant and non-extant.
•Height: New structures should not exceed the height of adjacent historic structures.
•Material: Building materials should be vertical wood panel in the style of board and batten with asphalt shingle for roofing material.
•Colors: New buildings and structures should be compatible with the bungalow color. This palette is intended to minimize visual intrusion.

Spatial Organization

Goal: The overall spatial organization of the cultural landscape provides a sense of the site during the period of significance. All attempts should be made to convey this characteristic by preserving historic features and limiting new additions.

G-6. Remove existing exterior storage.
G-7. Do not install exterior storage containers within the CPO Bungalows Neighborhood.
G-8. Do not add fencing, new sidewalk alignments, or new road alignments, in order to maintain historic spatial organization.

Cluster Arrangement

Goal: Maintain and, where appropriate, enhance the cluster arrangements to support the sense of place in smaller areas of the site.

G-9. Keep new buildings and structures to a minimum. If needed, arrange using the footprints of former buildings (see Drawings 2, 3, 4, and 5 for locations).
G-10. Group picnic tables and trash cans in the central lawn away from the historic bungalows.

Views and Vistas

Goal: Provide views and vistas to Pearl Harbor to support a sense of context and surroundings for visitors, while enhancing historic character of neighborhood.

G-11. Open historic views to the USS *Arizona* Memorial, mooring quays, and USS Missouri from the CPO Bungalow neighborhood through selective thinning of shoreline vegetation (Figures 53, 54, 55, and 56).

Circulation

Goal: Enable pedestrians and vehicles to move safely through the site, limiting visitors to

pedestrian use only, and allowing vehicular use for NPS staff as needed.

G-12. Preserve and retain all existing road alignments.
G-13. Preserve historic sidewalks where sidewalks are not rehabilitated for accessibility.
G-14. Minimize the visual impact of all universally accessible routes by using materials and styles that are compatible with the historic character and preserve contributing features as much as possible.
G-15. Preserve Belleau Wood Loop: expose historic curbing currently under asphalt, regrade and re-pour asphalt road neatly between the curbing (Figure 46). If curbs are deteriorated and cannot be preserved, replace in kind. Per certified arborist recommendation, proceed with root pruning, or raise grade of road within dripline of trees to accommodate roots.

Vegetation

Goal: Provide a better sense of the neighborhood during the period of significance by maintaining historic vegetation, and planting historically appropriate new vegetation.

G-16. Preserve existing vegetation that contributes to, or is compatible with, the cultural landscape. Compatible vegetation is defined as any plant material that was established during the period of significance and can be reliably dated to that time period, or any plant material established after the period of significance, but that is representative of the historic character of the cultural landscape.
G-17. Rehabilitate or restore foundation plantings around all bungalows, per planting palette. Maintain planting beds on a cyclic schedule. See plant palette in Appendix B.
G-18. On an annual basis, a certified arborist should inspect and prune all trees, as needed.
G-19. On a cyclic basis, mow turf.
G-20. As trees die or are identified as hazard trees by a certified arborist and have to be removed, replace in kind.

Small Scale Features

Goal: Preserve contributing small scale features, and add new features, to enhance the sense of place of the neighborhood. Provide modern small scale feature for safety and visitor amenities.

G-21. Keep new small-scale features to a minimum, including interpretive waysides and trash cans.
G-22. Preserve and maintain all existing contributing small-scale features, including clothesline poles, and historic utility poles.
G-23. Avoid adding new commemorative features and memorials into the park landscape.
G-24. Consider durability to coastal conditions including sun exposure, humidity, salty sea air, and temperature fluctuations:
- Durability to visitor use.
- Features should comply with universal accessibility.
- Appearance should be compatible with historic setting yet discernible from contributing features.
- Furnishings should be a consistent style throughout the cultural landscape.

Bench Styles: There are limited benches currently available near the site. Additional benches should be grouped at the overlook and the central turf area. Specific recommendations on bench locations is provided in treatment recommendation plan. Seating throughout the site should be compatible with the historic setting. Benches should be a sturdy and durable material; while natural wood is preferred, recycled plastic

composite will likely withstand greater weathering with minimal maintenance (see Appendix C).

Picnic Tables Styles: Tables should be compatible with the historic setting. Additional picnic tables should be installed in recommended area in turf (see treatment recommendation plan). Tables should be sturdy and durable material; while natural wood is preferred, recycled plastic composite will likely withstand greater weathering with minimal maintenance (see Appendix C).

Archeological Sites

Goal: Preserve archeological sites to provide for potential additional information on site history.

G-25. Preserve archeological features throughout the site, including the foundations in the lawn and the remnant features along the shoreline.
G-26. Remove grass and soil from remnant historic foundations and sidewalks throughout the site.
G-27. Undertake archeological investigations for proposed projects in advance of any other work on the project, including demolition.
G-28. Integrate archeological investigations with all construction activities.

Specific Treatments

All specific treatments are identified on the treatment plan (Drawing 7) and described below under each landscape characteristic for the CPO Bungalows Neighborhood.

Circulation

Goal: Provide easy, convenient and safe pedestrian and vehicular access, while maintaining the historic character of the circulation. Include appropriate materials, alignment, and grading.

1. Redesign area and install pedestrian barrier at shoreline point to provide safe access to contributing resources and enhanced views (see Drawing 8 for location). Engage civil engineer to evaluate shoreline erosion and recommend treatment for installation of pedestrian barrier.
2. Bungalow 90: regrade and reset historic sidewalk that leads from street to door on west side. Re-pour cracked portion closest to the street; match color, dimensions, and aggregate size.
3. Bungalow 90: regrade and reset historic sidewalk on east side, from front sidewalk to building.
4. Bungalow 90: grind down stump to grade and restore sidewalk at northeast corner.
5. Bungalow 28: Engage certified arborist to investigate root pruning. Regrade and reset historic sidewalk at northwest corner. If root is not cut, jog sidewalk around root to avoid the tree. Regrade and reset historic sidewalk on west side. Remove uplifted curb under tree.
6. Bungalow 29: regrade and reset historic sidewalk to entrance. Fill in hole in turf on east side where the sidewalk intersects with the road.
7. Remove asphalt and install accessible concrete pedestrian path to shoreline. Alignment to be determined in further design analysis, and outside the dripline of the existing tree (see Drawing 9).
8. Install accessible entry to bungalows 31 and/or 32 (Figure 47).
9. Install accessible parking stalls (Figure 47).
10. Bungalow 68: remove parking lot asphalt and curbing on the east side (F169) replace with lawn (Figure 48).
11. Bungalow 68: install accessible entry path and ramp from parking west of building to west door. The ramp should be wood painted to match building color.
12. Bungalow 68: retain existing historic sidewalk that extends from east door. Extend east to connect with a new sidewalk that follows the curvature of the

road to meet existing sidewalk to the north and south (along Cowpens Street) (Figure 48).

13. Reconfigure pedestrian access across Cowpens Street between Bungalow 68 and the eastern portion of the site, to improve clarity and safety (Figures 49).
14. Narrow width of the approach to Belleau Wood Loop from Cowpens Road to 14'- 4" to match interior road width (Figure 50).
15. Remove asphalt parking on Belleau Wood Loop across from bungalow 90 and replace with lawn (Figure 56).

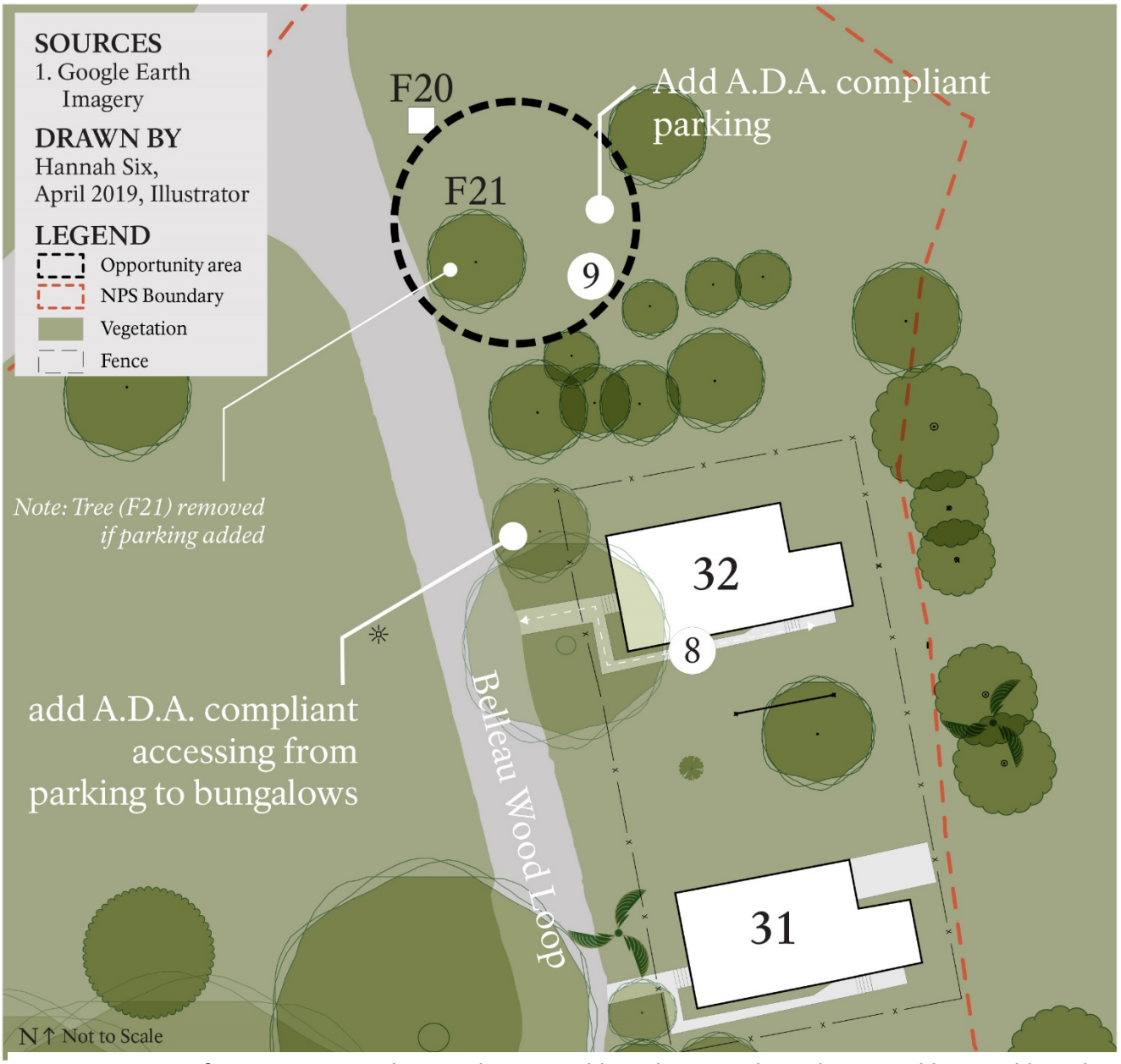


Figure 47. Diagram for treatment 8 and 9: Develop accessible parking near bungalow 32. Add accessible path along loop road from parking to bungalows 31 and/or 32.

CIRCULATION

1. Monitor shoreline erosion and redesign pedestrian barrier. See plan detail A.
2. Reset historic sidewalk. (F172)
3. Reset historic sidewalk. (F55, F56)
4. Grind down stump to grade. Restore sidewalk. (F55, F56)
5. Reset historic sidewalk. (F173)
6. Reset historic sidewalk. (F35)
7. Install accessible concrete path.
8. Install accessible entry to bungalows 31 and/or 32. (F9, F10)
9. Develop accessible parking.
10. Remove parking. (F169)
11. Install accessible entry path
12. Retain existing historic sidewalk, extend East. (F61)
13. Establish clear crosswalk.
14. Narrow width.
15. Remove asphalt parking. (F130)

VEGETATION

16. Maintain and prune trees (T2, T3, F59)
17. Grind stump
18. Remove vegetation (F60), including root ball, on rail and landing
19. Reestablish foundation planting (F54)
20. Balance tree canopies (T4, T5)
21. Remove aloe and morning glory. Retain bougainvillea and hibiscus.
22. Replant missing or dead hedges.
23. Retain and infill hedge (F67-78, F81-105).
24. Add fill to cover exposed roots.

VIEWS + VISTAS

25. Thin vegetation. Reestablish views to the water and USS Missouri.
26. Prune and thin vegetation reestablish views to Battleship Row.
27. Screen utility station (F171)

SMALL SCALE FEATURES

28. Replace fence
29. Re-set clothesline pole (F51)
30. Replace historic utility/power pole in kind (F48)
31. Maintain memorial and bollards, treat for rust, inspect annually (F27, F28)
32. Treat clothesline poles (F3, F4)
33. Reuse shelter
34. Re-set clothesline poles (F65, F66)
35. Remove parking guardrail and replace with fence
36. Add movable picnic table and benches
37. Maintain existing light poles (F128, F129)
38. Add low signage at the curb of each bungalow
39. Remove fence (F170) surrounding bungalow 31 and 32

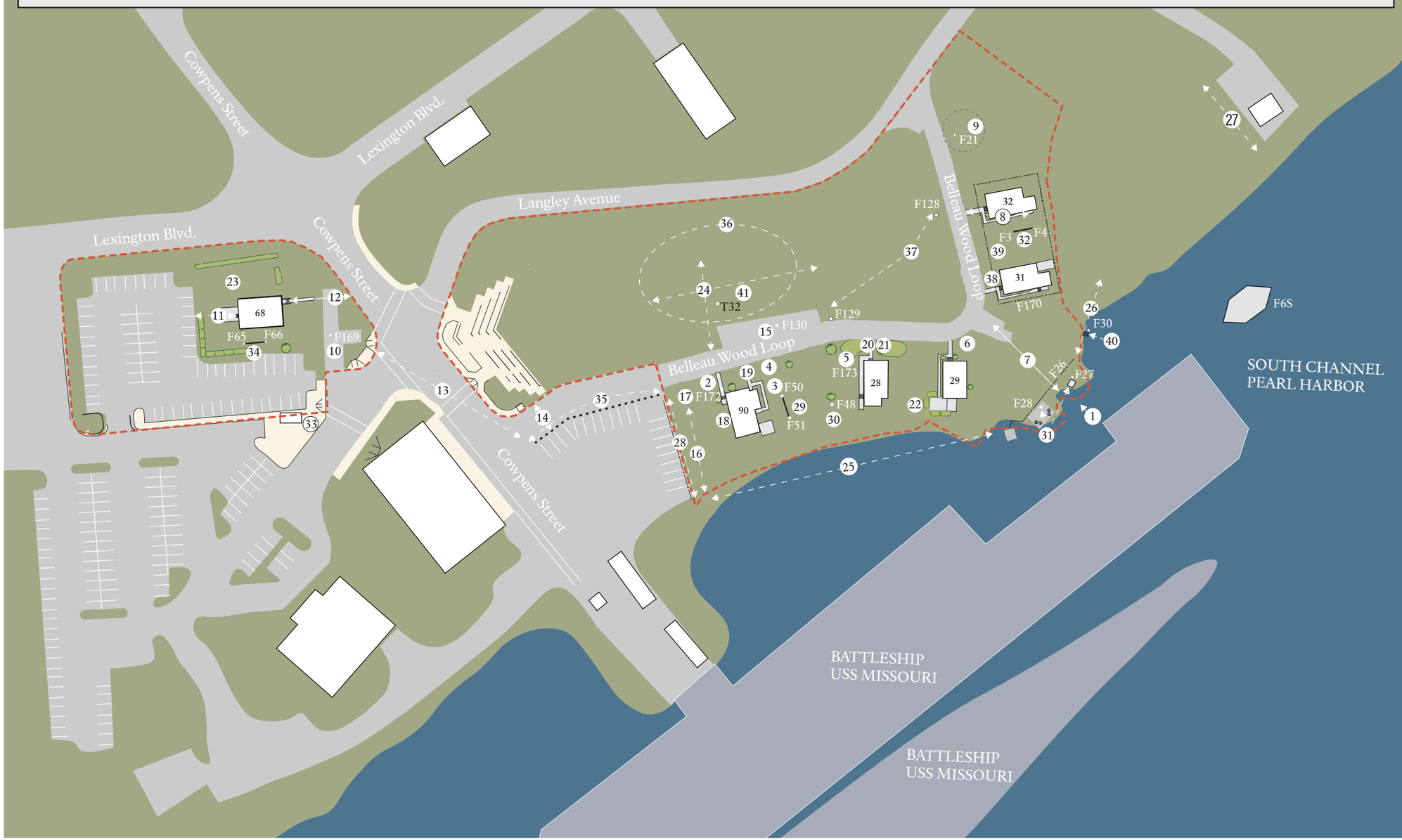
ARCHAEOLOGY

40. Thin vegetation to expose stairs (F30)
41. Flush cut protruding pipe (T32)

CHARACTERISTICS AND FEATURES KEY

Bungalow 68, 90, 28, 29, 31, 32 (C)
Belleau Wood Loop (C)
F6S USS West Virginia Quay (C)
F3, F4, F50, F51, F65, F66 Clothesline poles (C)
F9, F10, F35, F46, F55, F56, F61, F172, F173 Sidewalks (C)
F26 Fence
F27 USS West Virginia and Tennessee Memorial (C)
F28 Bollards (C)
F30 Archaeological feature
T32 Earpod Enterolobium cyclocarpum
F48 Utility pole (C)
F67-78, F81-105 hedge Panax Polyscias guilfoylei
F128, F129 Light poles (NC)
F130 Belleau Wood Loop parking lot (NC)
F 169 Bungalow 68 small parking lot (NC)
F170 Fence

NC = non-contributing, C = contributing



Cultural Landscape Report Ford Island CPO Bungalows Neighborhood and Battleship Row

Pearl Harbor National Memorial
Honolulu, Hawaii

Speci ic Treatments by Landscape Characteristics/ Features

National Park Service

In partnership with:
University of Oregon
Cultural Landscape Research Group
Department of Landscape Architecture

SOURCES

1. Appendix A VALR CLI Site Plan
2. Google Maps Imagery

DRAWN BY

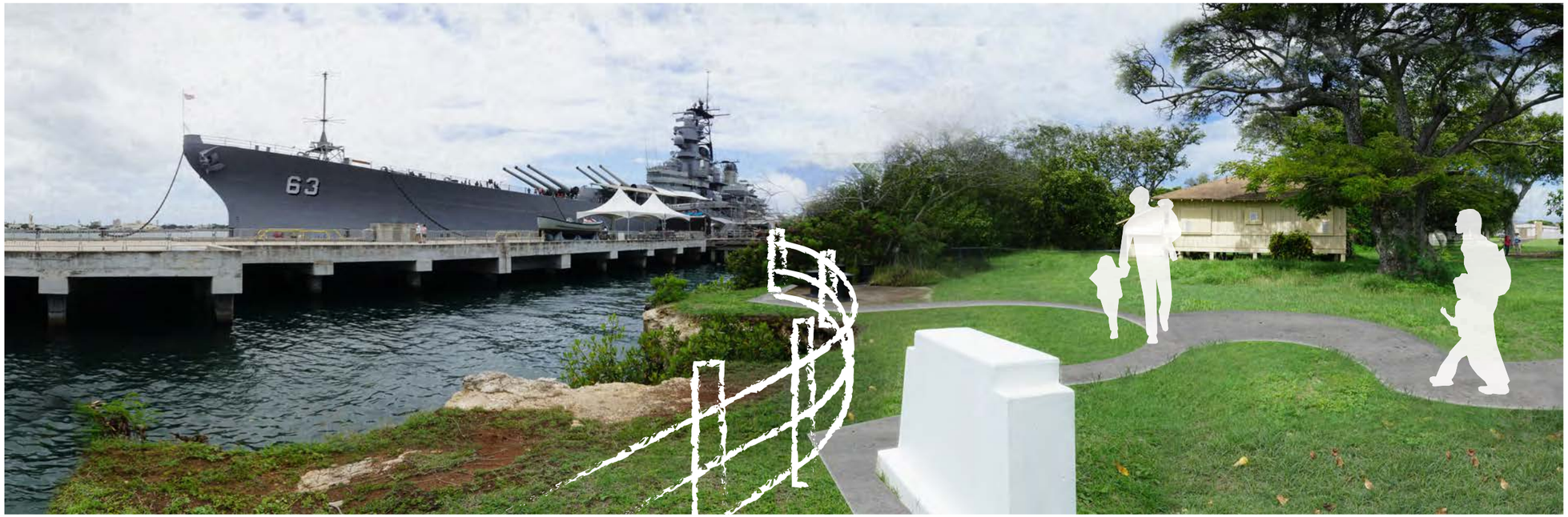
Hannah Six, December 2018
Illustrator

LEGEND

- Vegetated
- NPS Boundary
- Guardrail
- Fence

N↑ 1” = 100’ 0’ 50’ 100’

Drawing # 7



Circulation Treatment #1
Redesign pedestrian barrier (see Detail Plan A). Remove chain-link fence, install safety barrier. Have civil engineer evaluate shoreline erosion and recommend treatment. Monitor erosion progress and rate. Thin vegetation from viewing platform back to bungalow 29.

Current Conditions
View Southwest toward Bungalow 29 and USS Battleship Missouri

Cultural Landscape Report Ford Island CPO Bungalows Neighborhood and Battleship Row

Pearl Harbor National Memorial
Honolulu, Hawaii

Pedestrian Barrier Redesign

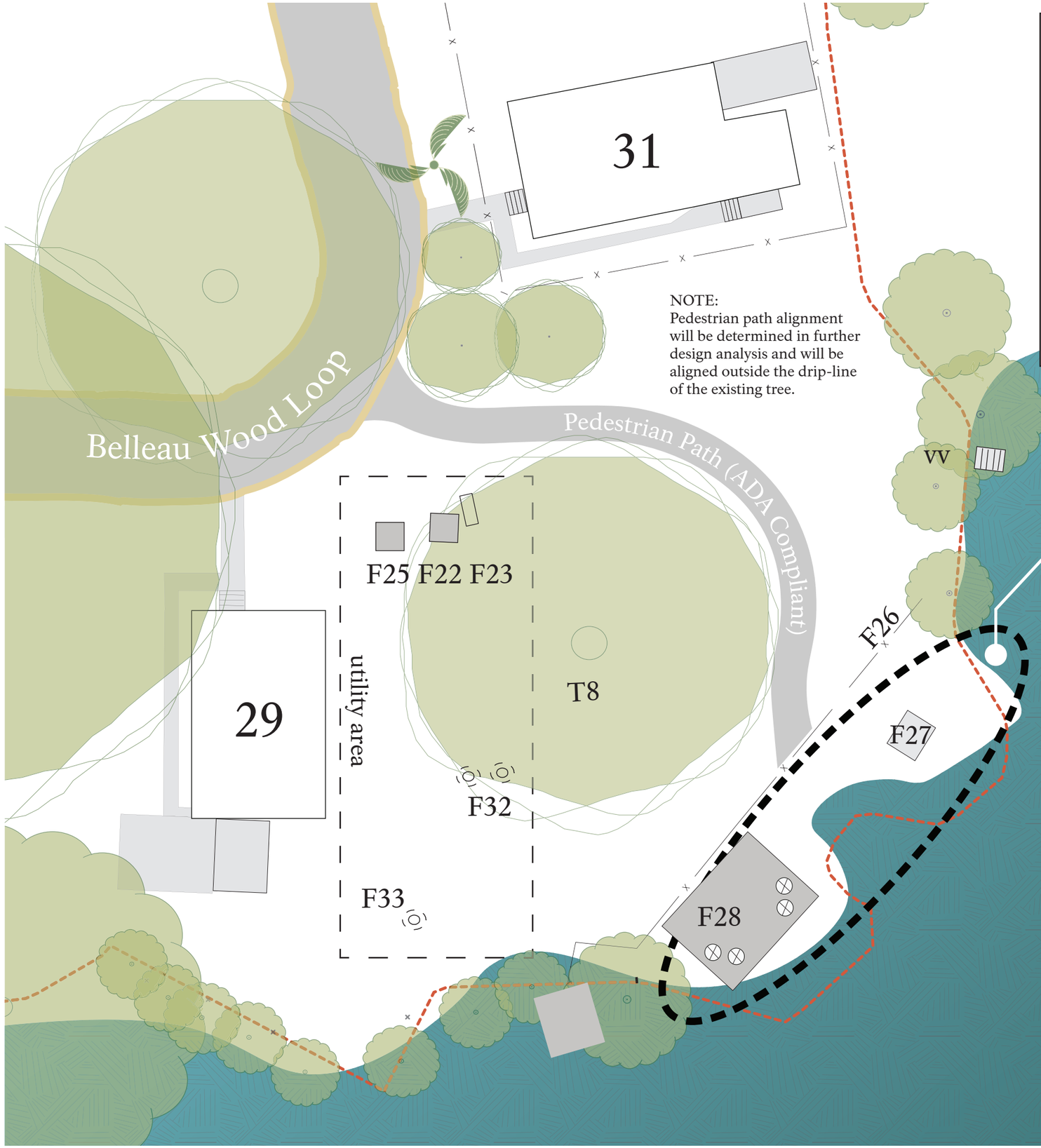
National Park Service

In partnership with:
University of Oregon
Cultural Landscape Research Group
Department of Landscape Architecture

SOURCES
1. Site photos taken by Hannah Six

DRAWN BY
Hannah Six, April 2019
Photoshop

Drawing # 8



CHARACTERISTICS AND FEATURES KEY

F22, F23, F25 - Utilities (U)
F26 - Fence (NC) (to be removed)
F27 - USS West Virginia and Tennessee Memorial (C)
F28 - Bollards (C)
F30 - Archaeological feature
F32, F33 - Utilities (U)
T8 - Monkeypod *Samanea*
29, 31 Bungalows (C)

Cultural Landscape Report Ford Island CPO Bungalows Neighborhood, and Battleship Row

Pearl Harbor National Memorial
Honolulu, Hawaii

Interpretive Opportunity Plan

UNIVERSITY OF OREGON

National Park Service

In partnership with:
University of Oregon
Cultural Landscape Research Group
Department of Landscape Architecture

SOURCES
1. Appendix A VALR CLI Site Plan

DRAWN BY
Hannah Six, April 2019
Illustrator

LEGEND
Interpretive Opportunity
Fence
NPS Boundary

N↑ 1” = 18’ 0’ 18’

Drawing 9

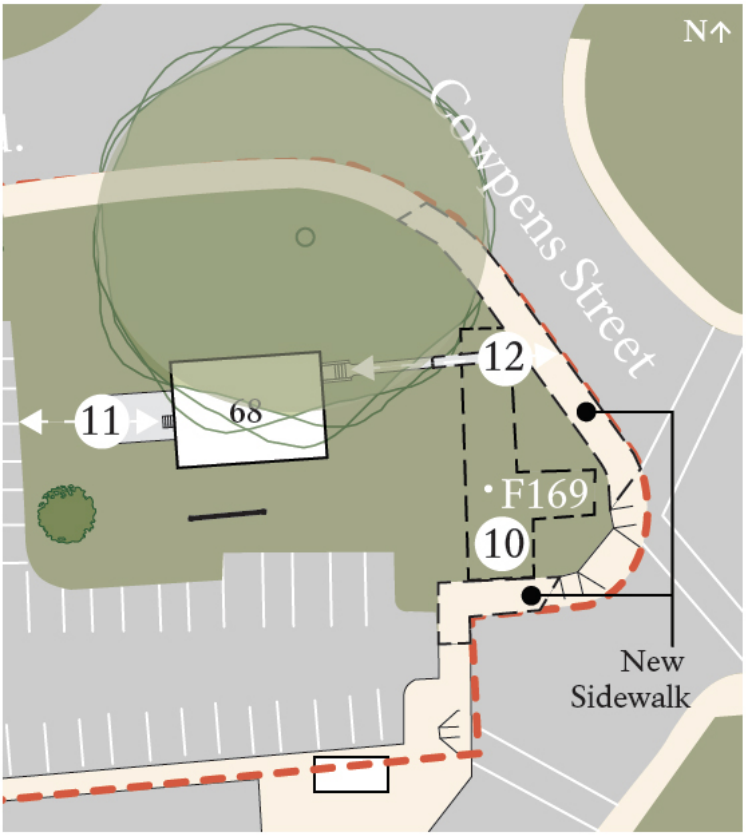


Figure 49. Treatment 10: remove parking and replace with lawn. Treatment 12: extend sidewalk.

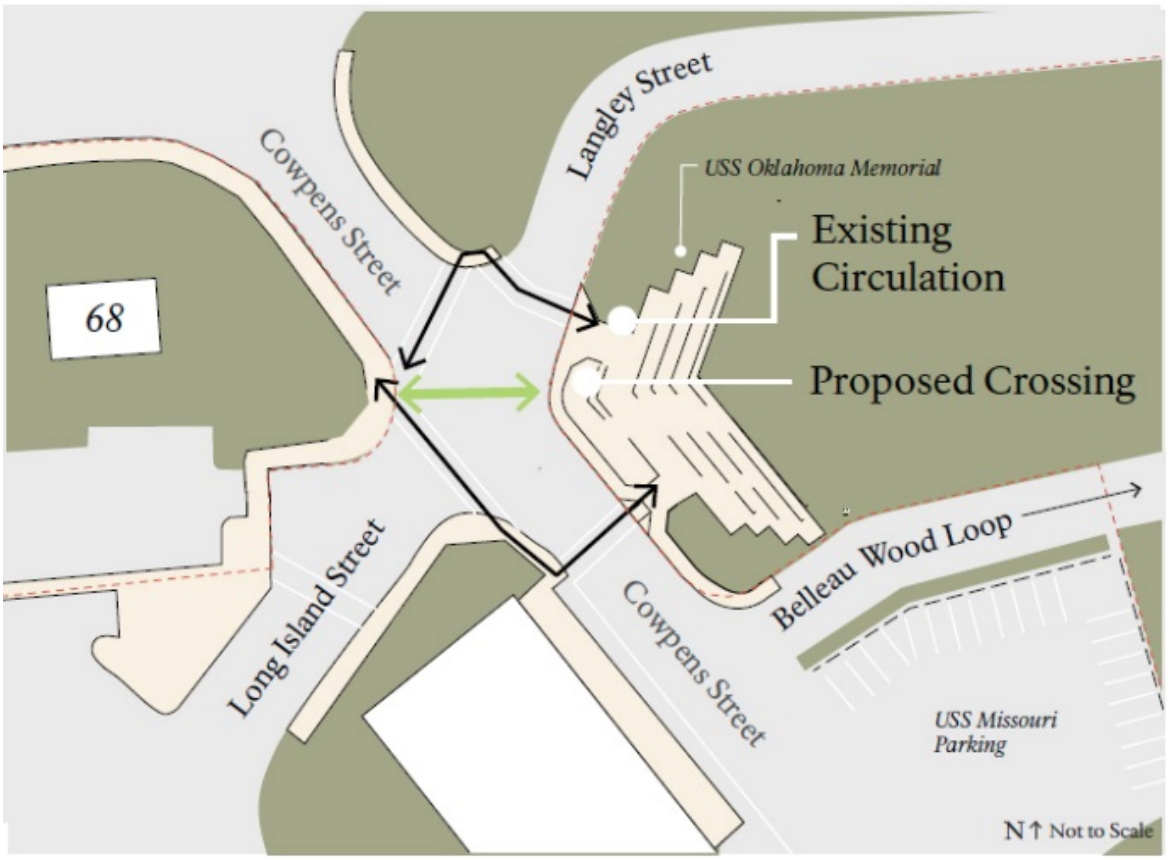


Figure 48. Treatment 13: Improve pedestrian access to aid in crossing Cowpens Street between bungalow 68 and the eastern portion of the site.

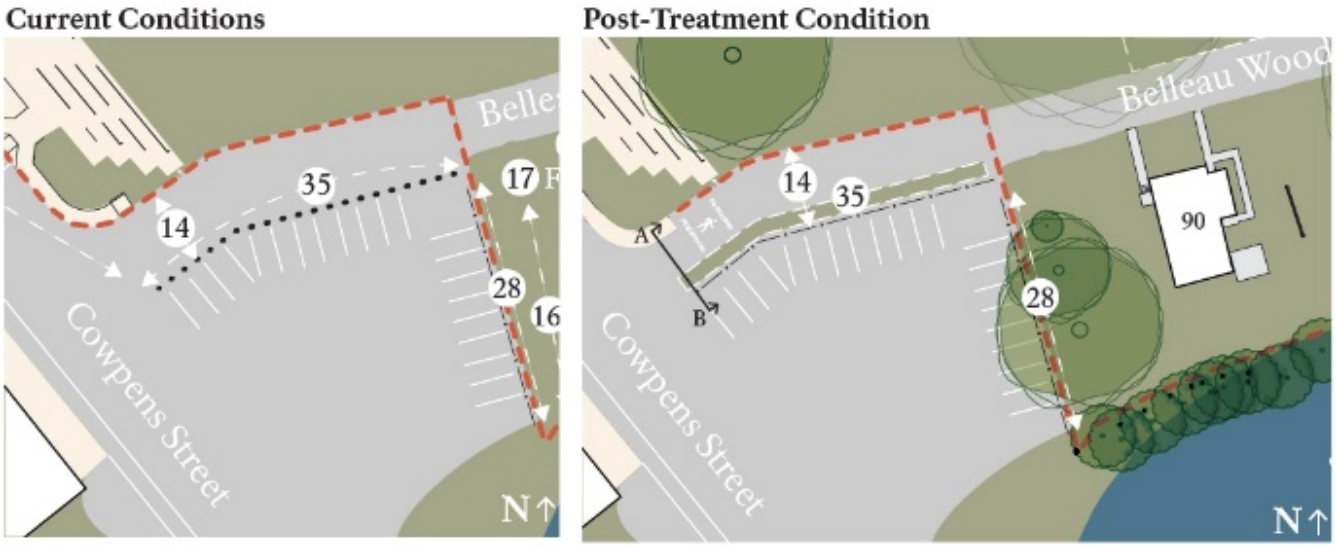


Figure 50. Treatments 14, 28, 35: Narrow width of Belleau Wood Loop at Cowpens Street intersection, remove guardrail and replace with fence.

Vegetation

Goal: Manage and maintain vegetation to convey sense of cultural landscape during period of significance, while planning for cyclical maintenance with professional arborist and horticulturalist guidance.

16. Between USS Missouri parking lot and bungalow 90: maintain and prune trees along current fence line running north-south.
17. Between USS Missouri parking lot and bungalow 90: grind stump to grade.
18. Bungalow 90: remove vegetation, including root ball at landing outside west door.
19. Bungalow 90: reestablish foundation planting 2 feet from north elevation. See Appendix B for plant palette.
20. Bungalow 28: Preserve and retain trees by engaging certified arborist to balance tree canopies, remove branches reaching toward roof, and conduct root investigation for the two large trees that frame front walkway. Treat as necessary based on arborist recommendations.
21. Bungalow 28: Restore turf under trees (T4 and T5). Remove aloe and morning glory from both sides of front (north) sidewalk. Retain bougainvillea on north side and rejuvenate through reduction pruning. Retain hibiscus on northwest side.
22. Bungalow 29: at southwest corner, replant missing or dead hedges in-kind, filling in gaps around concrete pad F34; prune existing hedge on cyclic basis. Propagate from plant clippings. Maintain hedge at three to five feet in height.
23. Bungalow 68: retain and infill hedge buffering yard, replanting in-kind as necessary. Maintain hedge at three to five feet in height. Keep section clear on west side for accessible path from parking lot.
24. Add fill to cover exposed roots within central open space.

Views and Vistas

Goal: Maintain views and vistas to convey the sense of place during the period of significance, while maintaining shoreline stability.

25. Open views to the USS *Arizona* Memorial, mooring quays and Battleship Row from the CPO Bungalow neighborhood through selective thinning of shoreline vegetation (Figures 53, 54, 55, and 56).
26. Selectively thin vegetation on south side of waterfront to reestablish views to the water and the USS Missouri (Figures 53 and 54).
27. Screen utility station with vegetation.

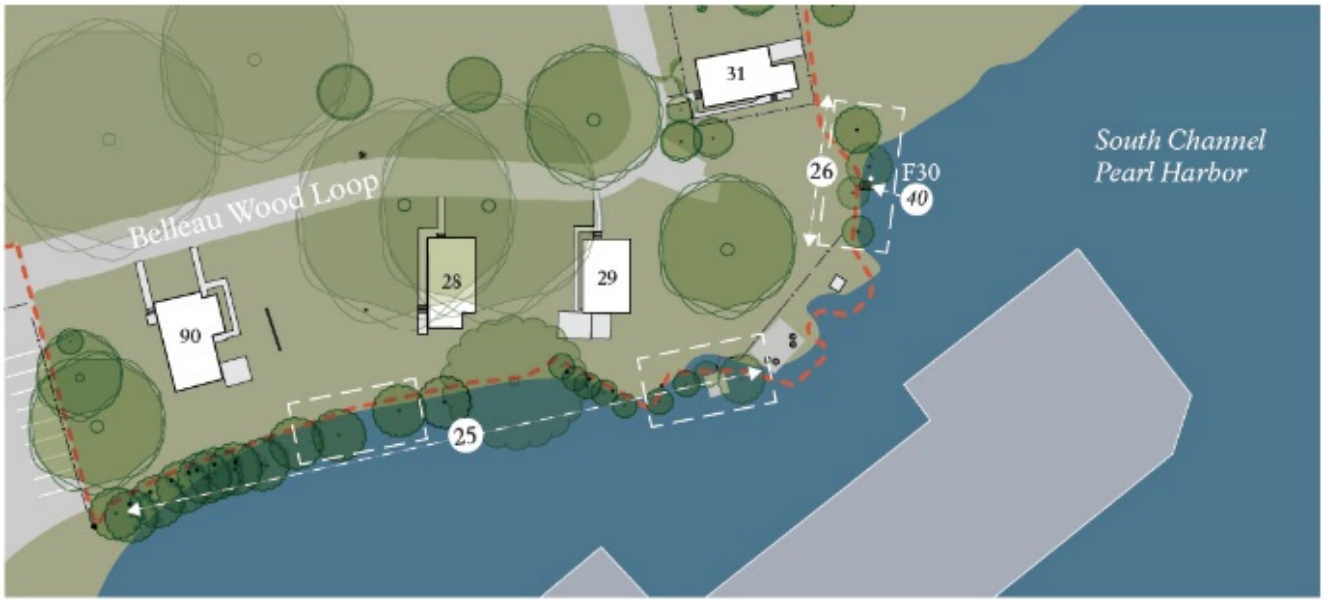


Figure 52. Treatment 25, 26, and 40: Selectively thin shoreline vegetation to re-establish views and expose key shoreline features.

Figure 51. Treatment 26: Selectively thin shoreline vegetation to re-establish views.

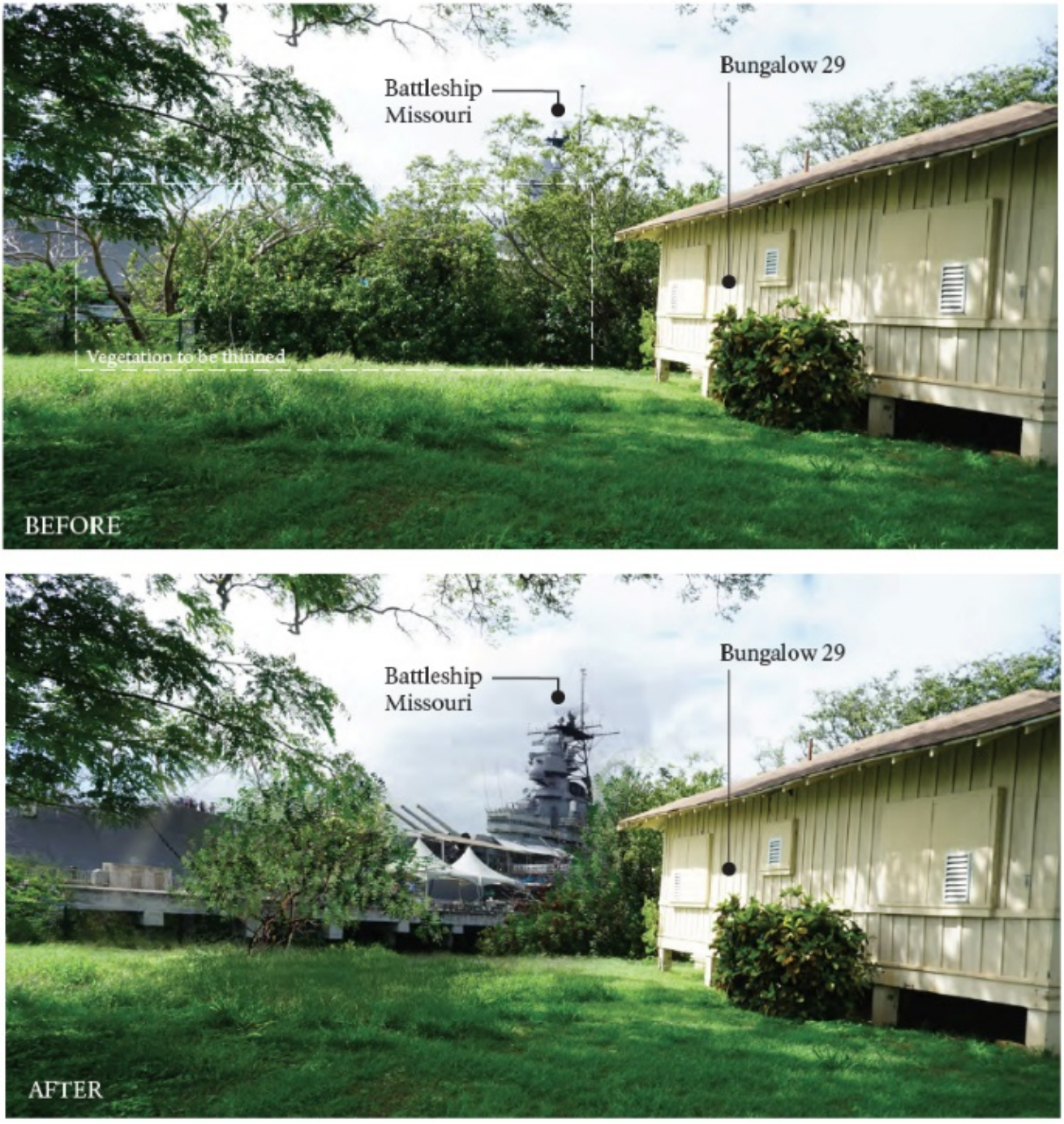


Figure 53. Treatment 25: Selectively thin shoreline vegetation to re-establish views.

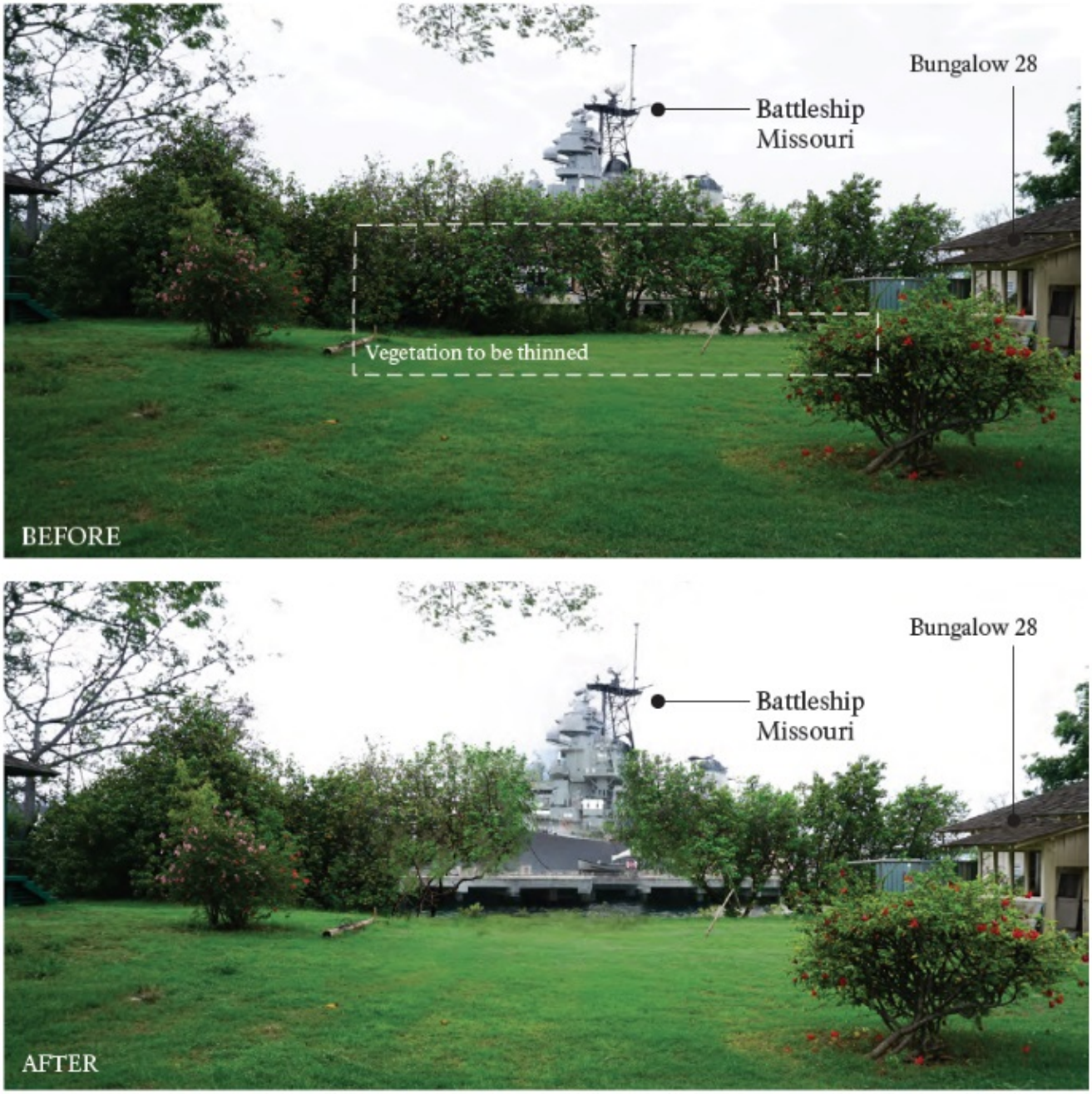


Figure 54. Selectively thin vegetation to re-establish views.

Small Scale Features

Goal: Incorporate small scale features into interpretive opportunities and visitor services, through rehabilitation and cyclical maintenance.

28. Between USS Missouri parking lot and bungalow 90: replace fence running north-south with three foot, treated wooden rectangular vertical picket fence (Figures 50 and 55).
29. Between Bungalow 90 and Bungalow 28: re-set clothesline pole (F51) in new foundation, treat for rust, and re-string with wire.
30. Between Bungalow 90 and Bungalow 28: replace historic power pole in kind, remove and re-install hardware in wood post, set post upright in ground in existing location.

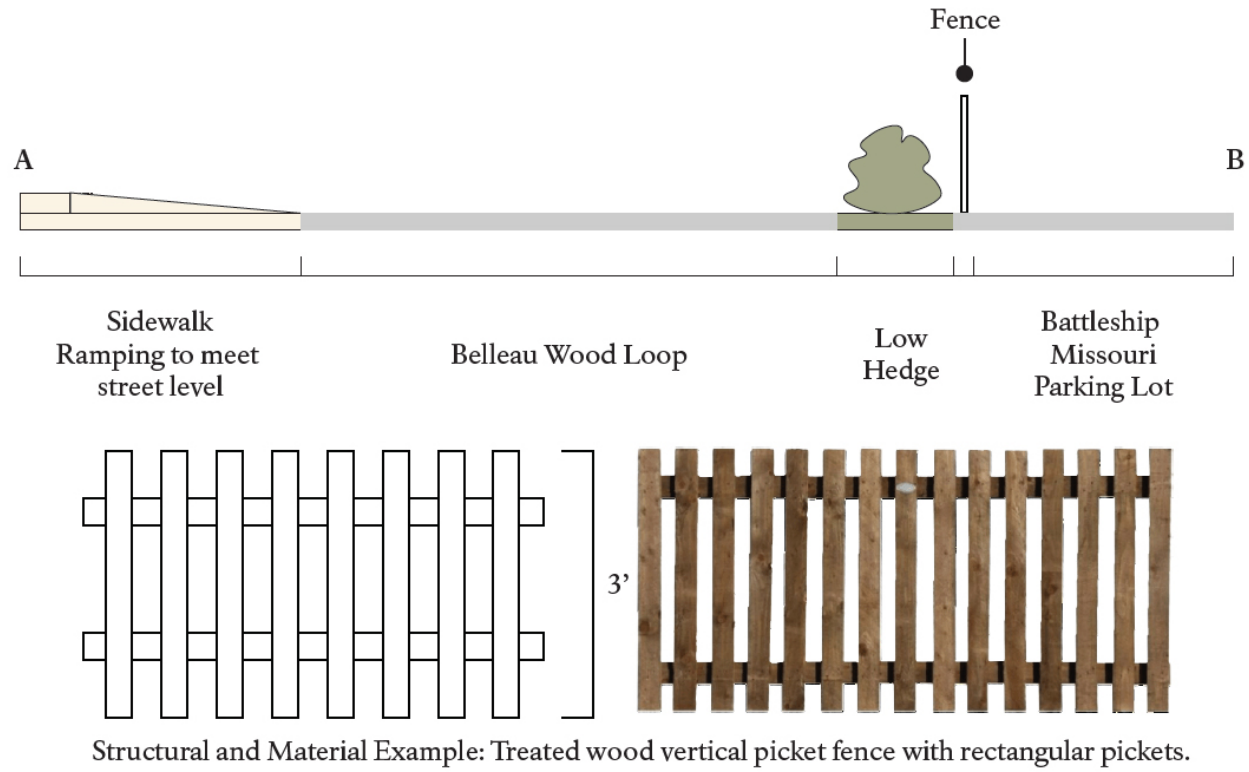


Figure 55. Treatment 28 and 35: Remove guardrail at USS Missouri parking lot and replace with unpainted picket fence.

31. Point that includes F27 USS West Virginia and USS *Tennessee* Memorial and F28 Bollards: Preserve and maintain memorial and bollards. Maintain bollards by removing aloe and grass around concrete pad, treating for rust, repainting, and inspecting annually.
32. Between bungalows 31 and 32: treat clothesline poles for rust and repaint in-kind. Restring with wire.
33. Reuse shelter south of bungalow 68 for interpretative panels. Use one side of the panel to interpret USS Missouri and the other side to interpret CPO bungalows. Treat rust and repaint shelter.
34. Bungalow 68: Re-set clothesline poles on south side, treat for rust, pour new foundations and re-string line with wire.
35. Remove parking guardrail between Belleau Wood Loop approach and USS Missouri parking lot. Replace with fence and hedge (see treatment number 24 and Figures 50 and 55).
36. Add moveable picnic table and benches for maximum capacity of forty people and trash cans in open space (see Drawing 7). Accessible picnic bench with firm and stable surfacing to be added within former Belleau Wood Loop parking lot (F130), which is to be removed (Figure 56).
37. Keep and maintain existing light poles.
38. Add low signage at the curb in front of each bungalow to display names of bungalow residents at time of December 7, 1941, attack. See figure 57 for details on scale and type.
39. Remove the chain link fence around bungalows 31 and 32

Archeology

Goal: Protect long term stability of archeological features.

40. Thin vegetation to expose stairs at water's edge (Figure 53).
41. Flush cut protruding pipe under tree T32.

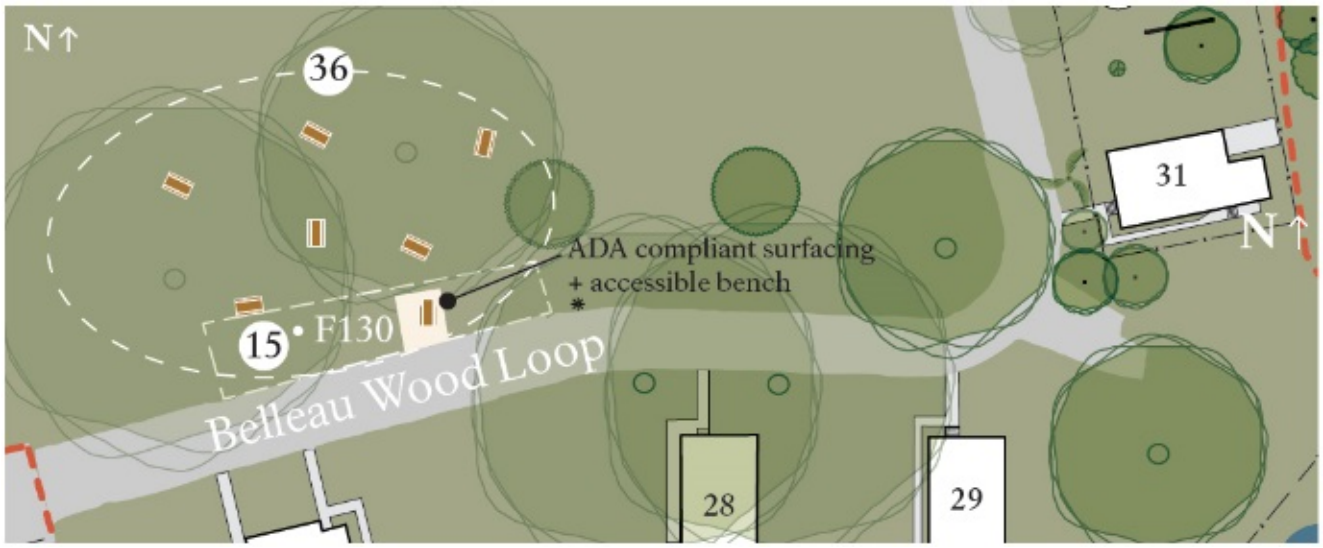


Figure 56. Treatment 15 and 36: Add grouping of picnic tables, benches, and trash cans under trees, and remove asphalt parking on Belleau Wood Loop.

Figure 57. Treatment 38: Add low signage at the curb in front of each bungalow for interpretive purposes.

Phasing and Implementation

Introduction

This chapter provides guidelines on prioritizing treatment tasks identified in the treatment chapter. The treatment tasks are divided by essential and desirable tasks. The essential tasks are those that are necessary to ensure the preservation and maintenance of cultural landscape characteristics and features, address life and safety deficiencies, and address universal access deficiencies. Desirable tasks are those that further the rehabilitation of the site by restoring or rehabilitating landscape characteristics and features or adding new compatible features for interpretive purposes and to ensure that the overall historic character of the cultural landscape is rehabilitated.

The essential and desirable treatment tasks are organized by time frame to provide a general schedule for phasing and implementing projects. The phasing schedule is flexible to allow for additional collaboration, identification of funding, design development, project review, and other factors that impact phasing and implementation. As additional information is available, the phasing plan should be revised to account for changes to priorities, funding, and on-going projects. Prior to implementation of any project, environmental compliance needs to be completed.

The following phasing and implementation table (pages 110-111) organizes the treatment tasks by essential and desirable and provides the task identification number that corresponds to the number of the treatment recommendation provided in the treatment chapter. The task is summarized in the table. For a full description of all tasks, reference the treatment chapter and corresponding diagrams.

Note that treatment recommendations that provide general guidance that should be followed throughout any project development are not included in the phasing and implementation table. As specific projects are developed based on the general treatment recommendations, the phasing and implementation plan should be revised. Revisions to this plan should take into account future priorities at the site.

On-going projects may need to be revised in scope and methods based on the input from appropriate professionals.

Table 1. Implementation Plan

Priority	Landscape Characteristic	Time Frame	Task	Task Identification
Essential	Vegetation	Ongoing	On an annual basis, a certified arborist should inspect and prune all trees as needed.	G-18
Essential	Vegetation	Ongoing	As trees die or are identified as hazard trees by a certified arborist, replace in kind.	G-20
Essential	Vegetation	Ongoing	On a cyclic basis, mow turf.	G-19
Essential	Vegetation	Within one year	Preserve and maintain vegetation throughout site.	G-16, Task 16-18, 20-21, 24
Essential	Natural Systems and Features	Within one year	Maintain shoreline vegetation in order to inhibit erosion and monitor erosion rate.	G-1, G-2
Essential	Archeological Sites	Within one year	Flush cut protruding pipe in central lawn for safety.	Task 41
Essential	Small Scale Features	1-2 years	Preserve and maintain all existing contributing small-scale features, including clotheslines, power pole, light poles, memorials, and bollards.	G-22, Task 29-32, 34, 37
Essential	Archeological Sites	1-2 years	Preserve archeological features throughout the site.	G-25
Essential	Circulation	2-5 years	Preserve historic sidewalks where sidewalks are not rehabilitated for accessibility.	G-13, Task 2-6, 12
Essential	Circulation	5-10 years	Preserve historic road alignments.	G-12, G-15
Essential	Circulation	2-5 years	Redesign shoreline saftey pedestrian barrier near USS *Tennessee* marker.	Task 1, 7
Essential	Circulation	2-5 years	Rehabilitate site to meet current accessibility standards. Minimize the visual impact of all universally accessible routes.	Task 8-11
Essential	Circulation	2-5 years	Establish safe crossing at Cowpens Street and Belleau Wood Loop.	Task 13-14
Desirable	Views and Vistas	5-10 years	Open historic views to the USS *Arizona* Memorial, mooring quays, and USS Missouri from the CPO Bungalow neighborhood through selective thinning of shoreline vegetation.	Task 25-26
Desirable	Archeological Sites	5-10 years	Remove grass and soil from remnant historic foundations and sidewalks throughout the site.	G-26
Desirable	Archeological Sites	5-10 years	Thin vegetation to expose stairs at water's edge.	Task 40
Desirable	Small Scale Features	5-10 years	Remove chainlink fence around bungalows once the buildings are stable.	Task 39

Priority	Landscape Characteristic	Time Frame	Task	Task Identification
Desirable	Vegetation	5-10 years	Rehabilitate or restore foundation plantings, hedges, and turf.	G-17, Task 19-23
Desirable	Circulation	5-10 years	Remove asphalt parking on Belleau Wood Loop.	Task 15
Desirable	Small Scale Features	5-10 years	Add low signage at the curb in front of each bungalow to display names of bungalow residents at time of December 7, 1941.	Task 38
Desirable	Small Scale Features	5-10 years	Rehabilitate fencing at USS Missouri parking lot.	Task 28, 35
Desirable	Spatial Organization	5-10 years	Remove existing exterior storage.	G-6
Desirable	Small Scale Features	5-10 years	Consider reusing shelter south of bungalow 68 for interpretative panels.	Task 33
Desirable	Small Scale Features	5-10 years	Add moveable picnic table and benches as necessary.	Task 36
Desirable	Views and Vistas	5-10 years	Screen utility station with vegetation.	Task 27

References

References Cited and/or Consulted

Budny, Mildred V. "I Wish I Weren't Going to Have This Baby: A Navy Wife Remembers Pearl Harbor." Hawaiian Journal of History 36, (2002): 155.

Building the Navy's Bases in World War II: History of the Bureau of Yards and Docks and the Civil Engineer Corps 1940-1946, Volume II. Washington D.C.: United States Government Printing Office, 1947.

Campbell, Douglas E., Volume I: U.S. Navy, U.S. Marine Corps and U.S. Coast Guard Aircraft Lost During World War II – Listed by Ship Attached, 2011.

"Command History: Pearl Harbor Naval Shipyard." Management Engineering Division, Management Planning and Review Department, Hawaii, July 1959.

Cooper, Sonya. "Vanishing Treasures Trip Report: Valor in the Pacific National Monument." Structural Assessment & Evaluation of Mooring Quays, March 4, 2016.

Cosson, Polly and Ann Yoklavich. "U.S. Naval Base, Pearl Harbor, Chief Petty Officer's Quarters (Facility No. 28)." Historic American Buildings Survey, HABS No. HI-440, Mason Architects, Inc., Honolulu, Hawaii, July 2005.

CNRH O'ahu Integrated Cultural Resources Management Plan (ICRMP). Helbert Hastert & Fee, Planners, Inc., October 2008.

Draft Final Historic Context Report: Pearl Harbor National Historic Landmark, Pearl Harbor Naval Complex, Vol. 1. The Louis Berger Group, Inc., Albany, New York, n.d.

Exhibition Artifact Maintenance Manual, World War II Valor in the Pacific National Monument. U.S. Department of the Interior, 2010.

Evaluation of Historic Structures: CPO Bungalows, USS *Utah* Memorial, USS *Arizona* Memorial, and Mooring Quays, WWII Valor in the Pacific National Monument, Pearl Harbor, Oahu. Mason Architects, Honolulu, Hawaii, June 2011.

Final Environmental Condition of Property, World War II Valor in the Pacific National Monument, Chief Petty Officer Bungalows and USS *Utah* Memorial, Ford Island, Pearl Harbor Naval Complex, Oahu, Hawaii. Department of the Navy, Naval Facilities Engineering Command, Pearl Harbor, Hawaii, August 2009.

Ford Island Past & Present: A picture story of the United States Navy on Ford Island from 1923 up to the present day. Fleet Intelligence Center, Pacific, March 1969. Document located at the EV5 Naval Facilities Engineering Command (NAVFAC HI) Reference Library, Pearl Harbor, Hawaii.

Ford Island Plan. September 15, 1947. NARA San Bruno, RG 181, Box 7 Folder Waterfront Structures N 15-8.

"Ford Island Oklahoma Memorial Tree Assessment." Steve Nimz and Associates Inc., 2011.

"Geotechnical Peer Review, Expand Restroom Facilities, USS *Arizona* Memorial Park, Hawaii, Final Report." NPS Indefinite Quantity Contract No. 1443200002024, Task Order no. T2000022409. Prepared by URS Corporation, San Francisco, California, July 2003.

Historic Asset Management Process, Volume II: Dataset. Binder 2 of 4, TEC Inc. – Joint Venture, Honolulu, Hawaii and NAVFAC Pacific, Pearl Harbor, Hawaii, Draft, September 2011.

Historic Context Report and Historic Preservation Plan for World War II Defensive Accessory Facilities, Building Types Assessment: Splinterproof Shelters and Gun Emplacements." Mason Architects, Inc. and Helber Hastert & Fee Planners, November 2004.

Historic Context Study of Historic Military Family Housing in Hawaii. Mason Architects, Inc., August 2003.

Homes in Hawaii: Suggestions for the home-builder. Honolulu, Hawaii: Lewers & Cooke Limited, circa 1925.

Huffman, Laurin. "Issues on Ford Island: Historic Structures under the care of World War II Valor in the Pacific National Monument." Trip Report, September 2012.

Kamakau, S.M. *The Works of People of Old, Na hana a ka Po'e Kahiko*. B. P. Bishop Museum Special Publication 61. Bishop Museum Press, Honolulu, 1976.

Klobuchar, Richard P. *The USS Ward: An Operational History of the Ship That Fired the First American Shot of World War II.* Jefferson, North Carolina and London: McFarland & Company, Inc., Publishers, 2006.

Lenihan, Daniel J., ed., *Submerged Cultural Resources Study, USS Arizona Memorial and Pearl Harbor National Historic Landmark.* Southwest Cultural Resources Center Professional Papers, Santa Fe, Mexico, 1989, Second Edition 1990.

Madsen, Daniel. *Resurrection: Salvaging the Battle Fleet at Pearl Harbor.* Naval Institute Press: Annapolis, Maryland, 2003.

Makalapa Neighborhood Cultural Landscape Assessment. Helber Hastert & Fee, July 2002.

Martinez, Daniel A. "Significance Statement CPO Bungalows, Naval Air Station Pearl Harbor." National Park Service, June 2, 2016.

Melendy, H. Brett. "The Competition for Trans-Pacific Air Routes to Hawai'i, 1945-1959." *Hawaiian Journal of* History 37, (2003): 202.

Memo from Commander, Naval Air Bases, 14th Naval District to the Chief of the Bureau of Aeronautics. Regarding Repairs to Roads- NAS Pearl Harbor, April 12, 1947. NARA, San Bruno, RG 181, 58-3030-64N, Box 6, Folder Grounds and Land Leases N1-1 & N1-13.

Memo from Commanding Officer to the Chief of the Bureau of Yards and Docks. Regarding the Proposed Operation of the Station Vegetable Garden. December 22, 1947. NARA, San Bruno, RG 181, 58-3030-64N, Box 4, Folder Drawings, Blueprints, and Plans L 2-2.

Moorman, Tara E. "Final Report Historical Background Information for the Pearl Harbor Naval Complex." Ogden Environmental and Energy Services Co., Inc., Honolulu, Hawaii for Helber Hastert and Fee, Honolulu, Hawaii, May 2001.

Morison, Samuel Eliot. *History of United States Naval Operations in World War II: Volume 3: The Rising Sun in the Pacific 1931-April 1942.* Urbana and Chicago: University of Illinois Press, 2001. Originally printed in 1948.

Murphy, Larry E. and Matthew A. Russell, eds. *Long-Term Management Strategies for USS Arizona, A Submerged Cultural Resource in Pearl Harbor*. National Park Service, Submerged Resources Center, Santa Fe, New Mexico, 2008. Prepared for the Department of Defense, Legacy Resources Management Program.

"NAS Attack Reports, 1941." EV5 NAVFAC HI Reference Library, Pearl Harbor, Hawaii.

National Park Service. Project Management Information Systems (PMIS) component completion reports.

National Park Service. Planning, Environment and Public Comment (PEPC) project descriptions.

National Park Service. Notes from the Chief Petty Officer Bungalows Preservation and Management Plan Section 106 Meeting, WWII Valor in the Pacific National Monument, June 21, 2010.

National Park Service. *Foundation Document World War II Valor in the Pacific National Monument, Pearl Harbor Hawai'i.* September 2015.

National Park Service. "Incident Review of Adverse Effect to CPO Bungalow #28, World War II Valor in the Pacific National Monument, Final Report." July 25, 2016.

National Park Service. *Environmental Assessment for the Project to Replace the Failing Visitor Center at the USS Arizona* Memorial. U.S. Department of the Interior, February 2007.

National Park Service. *Resources Management Plan: USS Arizona* Memorial, Honolulu, Hawaii, February 1996.

National Park Service. "Correspondence from Mike Wenger to PERL staff: Daniel Martinez and Scott Pawlowski." August 18, 2014.

National Park Service. Various documents from the WWII Valor in the Pacific National Monument archives.

National Park Service. "CPO Bungalow Condition Assessment Update." 2009.

National Park Service. "Historic Preservation Training Center (HPTC) Field Report #1 FY-09." World War II Valor in the Pacific National Monument, PMIS 148801: Emergency Stabilization Repairs to 6 Pre-WW2 Bungalows, October 7, 2009.

National Park Service. *Development Concept Plan USS Arizona Memorial, Honolulu, Hawaii.* February 1999.

National Park Service. *Rehabilitation of Chief Petty Officers Bungalows on Ford Island Environmental Assessment.* WWII Valor in the Pacific National Monument, Pearl Harbor, Oahu, Hawaii, March 2012.

National Register of Historic Places draft amendment nomination form for the "Battleship Mooring Quays (Battleship Row). Prepared by John F. De Virgilio, Pearl Harbor History Associates, May 10, 1993.

National Register of Historic Places nomination form for "Pearl Harbor." 1974. Amended by Benjamin Levy, and signed February 13, 1979.

National Register of Historic Places nomination form for "USS *Utah* (BB-31 and AG-16) Wreck." Prepared by James P. Delgado, July 9, 1988. Nomination associated with the Maritime Heritage of the United States NHL Study—Shipwrecks.

"Naval Command History." January 1, 1945. Item located at Naval Facilities Engineering Command EV5 NAVFAC HI Reference Library, Pearl Harbor, Hawaii.

"Officers Quarters Condition Assessment for the USS *Arizona* Memorial." September 2002.

"Operational Agreement for WWII Valor in the Pacific National Monument between Commander, Navy Region Hawaii and the National Park Service United States Department of the Interior." 2012.

Packham, Jeff. "USS *Oklahoma* Memorial to gain sizeable donation." *Journal Record Legislative Report*, *Oklahoma* City, OK, May 22, 2006.

Pearl Harbor Naval Complex (PHNC) Cultural Landscape Report Final. TEC Inc. – Joint Venture, Honolulu, Hawaii and NAVFAC Pacific, Pearl Harbor, Hawaii, May 2011.

Pearl Harbor Naval Complex: Design Guidelines & Evaluation Criteria for Memorials. Helber Hastert & Fee, Planners, Inc., April 2005.

Peed, Captain G.P. *Arizona Memorial Shoreside Facility Study.* United States Navy, 1973.

Pukui, Mary Kawena. *Ke Awa Lau o Pu'uloa*. Hawaiian Historical Society 52nd Annual Report. Hawaiian Printing Co., Ltd.: Honolulu, 1943.

Rader, Frank J. "The Works Progress Administration and Hawaiian Preparedness, 1935-1940." *Military Affairs* 43*,* no. 1 (Feb., 1979): 14.

Regin, Terri, Steve Buckeridge, Brian deLumeau and Thomas Fulton. "Project Documentation Report for the Installation of Mooring and Repairs for the USS *Arizona* Memorial Floating Dock." Ocean Engineering and Construction Project Office, Chesapeake Division, Naval Facilities Engineering Command, July 1990.

Roster of Families Quartered at NAS, P.H. September 2, 1947. NARA, San Bruno, RG 181, 58-3030-64N, Box 6, Folder Quarters N 4-1.

Ruzicka, Dee. "U.S. Naval Base, Pearl Harbor, Chief Petty Officer's Quarters (Facility 68)." Historic American Buildings Survey, HABS No. HI-##, Mason Architects, Inc., Honolulu, Hawaii, November 2010.

"Salvage Diary from 1 March – 1942 through 15 November, 1943." Industrial Department War Diary Collection, National Archives and Records Administration (NARA), San Bruno, California and *USS Arizona* Memorial, National Park Service.

Slackman, Michael. *The USS Arizona Memorial and Visitor Center: An Administrative and Legislative History."* National Park Service, October 4, 1982.

Smith, Rick L. *Phase I Environmental Site Assessment, Ford Island Bungalows, Arizona Memorial, Ferry Reception Buildings, Pearl Harbor, Hawaii.* Hawai'i International Environmental Services, Inc., Kailua, Hawai'i, November 8, 2004.

Study/Survey of Historically Significant Army Family Housing Quarters*, Installation Report, Pearl Harbor Naval Base, Hawaii*. Mariani and Associates, Washington, D.C., December 1987.

Tuggle, David H. and M.J. Tomonari-Tuggle. "A Study of Potential Native Hawaiian Traditional Cultural Practices, Navy Region Hawaii." Department of Navy, Pacific Division, April 2004.

Wallin, Vice Admiral Homer N. *Pearl Harbor: Why, How, Fleet Salvage and Final Appraisal*. Washington D.C.: United States Government Printing Office, Naval History Division, 1968.

Wells, Susan J. and Robert J. Hommon. *An Archeological Survey Plan for the Pacific Islands Cluster, Regions 8, 9, 10, and 12, National Park Service.* U.S. Department of the Interior, National Park Service, Western Archeological and Conservation Center, Publications in Anthropology 76, 2000.

Wenger, J. Michael. "Evaluation of Historical Resource Materials: Mooring Quay Project." March 18, 2013.

Wenger, J. Michael. "Whitepaper No. 12—CPO Bungalow Project: Resources, Historical Background, and Documentation." ***Confidential***, January 6, 2014.

Newspapers and Newsletters

"$4.2 Million Visitors' Center Planned at Pearl Harbor." *Pearl Harbor-Gram*, January 1980.

"7 December 1941: A Day That Will Live in Infamy." *Pearl Harbor-Gram*, May 1995.

"Aerial Photograph." Pearl Harbor-Gram, October 1965.

"*Arizona* Memorial Gets Facelift." Pearl Harbor-Gram, January-April, 1984.

"Bill Introduced for USS *Utah*." Pearl Harbor-Gram, April 1967.

"Building the new Pearl Harbor Memorial Museum & Visitors Center at the USS *Arizona* Memorial." Pearl Harbor-Gram, August 2009.

Bunk, Robert. "USS *Utah* Memorial Closed in October." National Park Service, WWII Valor in the Pacific National Monument Press Release, September 30, 2012.

Burlingame, Burt. "War & Remembrance: Battle to keep history alive can be grueling." Honolulu Star Bulletin, October 28, 2001.

"Correspondence regarding USS Vestal mooring quay." Pearl Harbor-Gram, January-April, 1983.

"Correspondence regarding USS Vestal mooring quay." Pearl Harbor-Gram, January-April, 1983.

"December 7 – Dedication of Pearl Harbor Visitor Center." Pearl Harbor-Gram, February 2011.

"Flag for USS *Utah*." Pearl Harbor-Gram, July 1969.

"Ford Island." Pearl Harbor-Gram, May 1994.

"Funds Sought for USS *Utah* Memorial." Pearl Harbor-Gram, July 1971.

Grahame F. Shrader, "The Oklahoma's Last Voyage." Pearl Harbor-Gram, July 1972.

"History of Plaque Presentation." Pearl Harbor-Gram, July 1987.

Kakesako, Gregg K. "Farewell to Ford Isle ferries." Honolulu Star-Bulletin, April 13, 1998.

Kakesako, Gregg K. "Ford Island has a checkered, colorful past." Honolulu Star-Bulletin, April 13, 1998.

"Oklahoma Memorial Recognizes 429 Lost Sailors and Marines." Pearl Harbor-Gram, November 2008.

"Once Again I Turn to God." Pearl Harbor-Gram, July 1980.

"Phase One of New Pearl Harbor Memorial Museum & Visitor Center Opened." Pearl Harbor-Gram, May 2010.

"Pu'uloa: Long Mountain" Shad Kane. Blog: Cultural Kapolei. The Honolulu Advertiser, February 13, 2009.

"Quay Honoring USS Vestal Dedicated in Pearl Harbor," Pearl Harbor-Gram, January-April, 1983.

"Stars and Stripes Flies Over USS *Utah*." Pearl Harbor-Gram, July 1972.

"Survivors Turn the First Dirt at Official Groundbreaking of the New Pearl Harbor Memorial Museum & Visitors Center." Pearl Harbor-Gram, February 2009.

"USS Memorial Located Off Limits." Pearl Harbor-Gram, January-April, 1984.

"USS Oklahoma Memorial Groundbreaking December 7th." Pearl Harbor-Gram, February 2007.

Walsh, James. "Veteran Has No Trouble Remembering Pearl Harbor." Pearl Harbor-Gram, July 1986. Reprinted from The Journal –News Local, Rockland County, N.Y.

Online

"Battleship Row During the Attack." Naval History and Heritage Command website <https://www.history.navy.mil/our-collections/photography/wars-and-events/world-war-ii/pearl-harbor-raid.html> accessed May 4, 2017.

"USS *Utah* Memorial at Pearl Harbor." Naval History and Heritage Command website <https://www.history.navy.mil/our-collections/photography/wars-and-events/world-war-ii/pearl-harbor- raid/remembrance-of--a-date-which-will-live-in-infamy-/uss-*Utah*-memorial-at-pearl-harbor.html> accessed May 4, 2017.

"USS *Arizona* Memorial at Pearl Harbor." Naval History and Heritage Command website <https://www.history.navy.mil/our-collections/photography/wars-and-events/world-war-ii/pearl-

harbor-raid/remembrance-of--a-date-which-will-live-in-infamy-/uss-*Arizona*--bb-39--memorial- at-pearl-harbor.html> accessed May 4, 2017.

Wortman, Mark. "The Children of Pearl Harbor: Military personnel weren't the only people attacked on December 7, 1941." *Smithsonian Magazine* <https://www.smithsonianmag.com/history/children-pearl-harbor-180961290/>, December 5, 2016.

"CPO Quarters." Historic Hawai'i Foundation website <https://historichawaii.org/ford-island-background/cpo-quarters/> accessed May 4, 2017.

Oral History

National Park Service. WWII Valor in the Pacific National Monument oral history collection.

Cecil Camp

Louis Bernhardt Kinsman, December 6, 2011

Ralph Warren Cote' Sr. Family

Oscar Tully

Henry Herbert Evans

Alvin Hubert Christensen

William Edward Bohuslaw

Felix August Grieshaber

Jesse Thormond Betts

Raymond Lewis Beck

Thomas Oliver Powell

Don Erwin McDonald

Jim Green

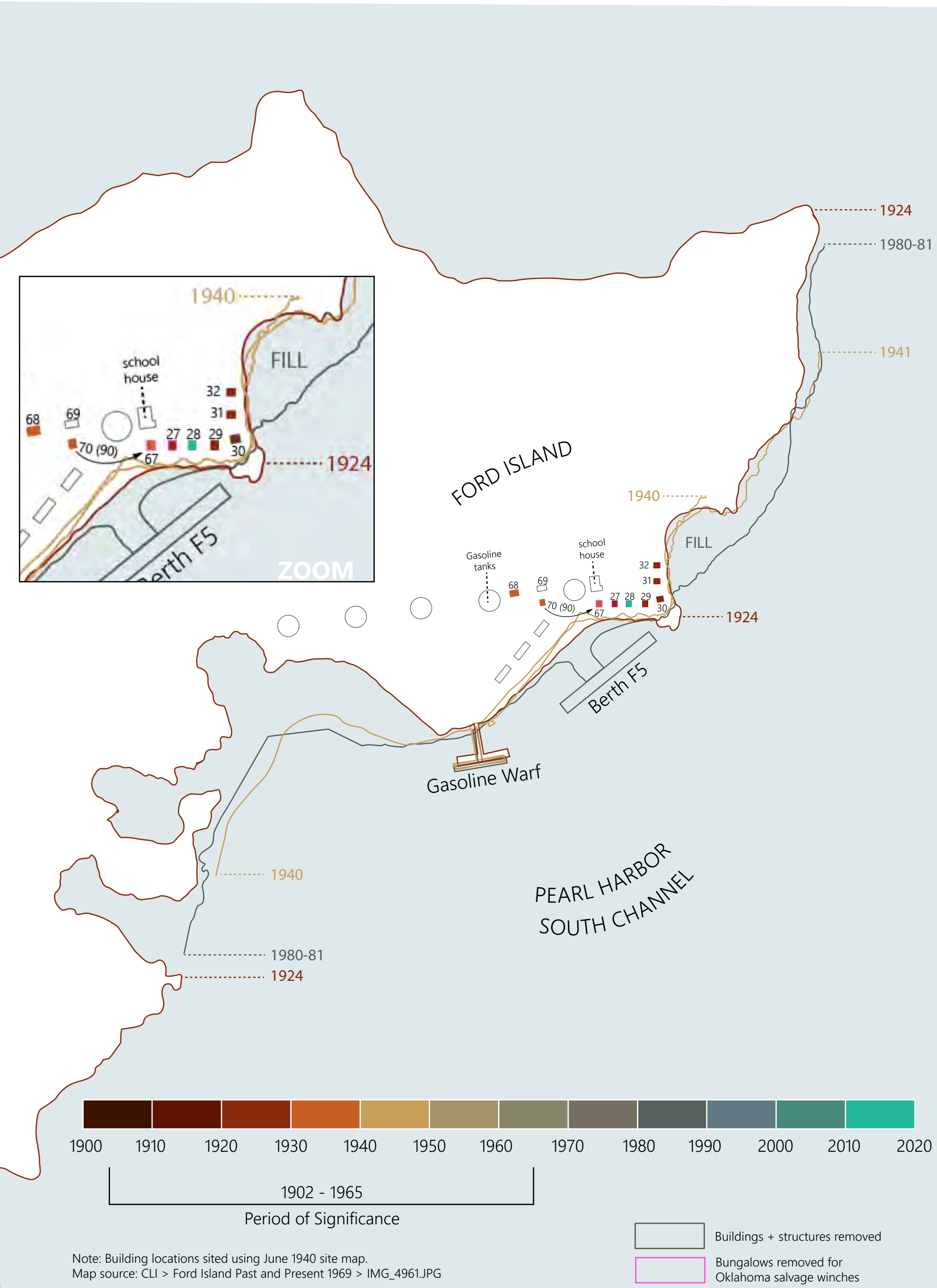
Appendices

Appendix A: Analysis of Changes to Site

Appendix B: Plant Palette List

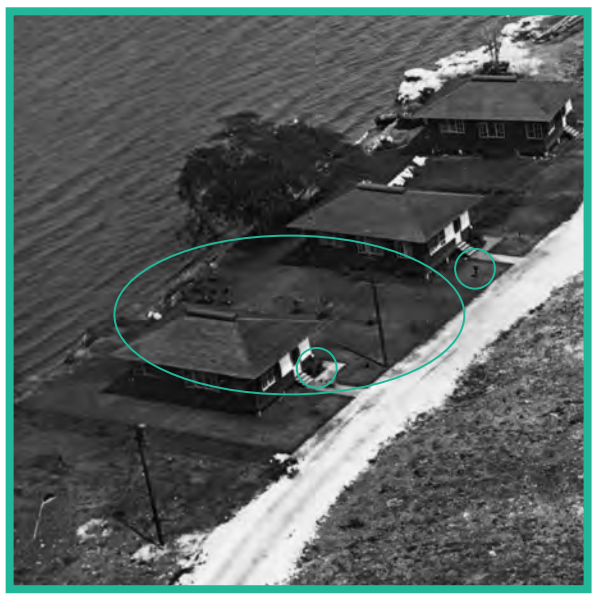
Appendix C: Compatible Site Furnishings

Appendix A:
Shoreline Analysis | October 2018
Ford Island CPO Bungalows Neighborhood



Note: Building locations sited using June 1940 site map.
Map source: CLI > Ford Island Past and Present 1969 > IMG_4961.JPG

Appendix A:
Vegetation Analysis | October 2018
Ford Island CPO Bungalows Neighborhood

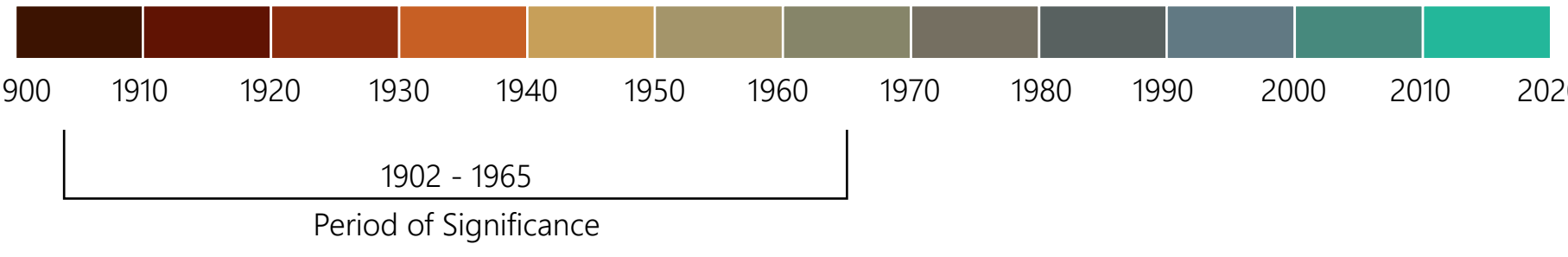


80-G-410533 USS Oklahoma (BB-37)
Naval History and Heritage Command
CPO Neighborhood | 29 March 1943

Current Vegetation
CPO Neighborhood | Sept. 2018

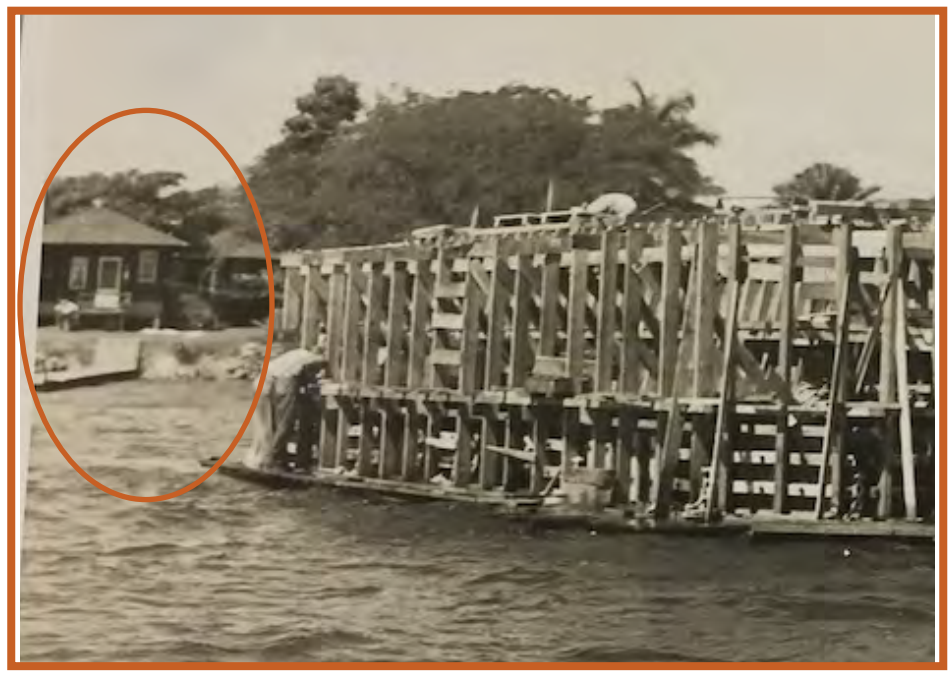
Photo taken from Mooring #10, looking Northrly
Historic Vegetation
CPO Neighborhood | Nov. 13, 1934

Photo taken from open lawn space, looking Southernly
Current Vegetation
CPO Neighborhood | Sept. 2018
(bungalow 29 left, bungalow 28 right)



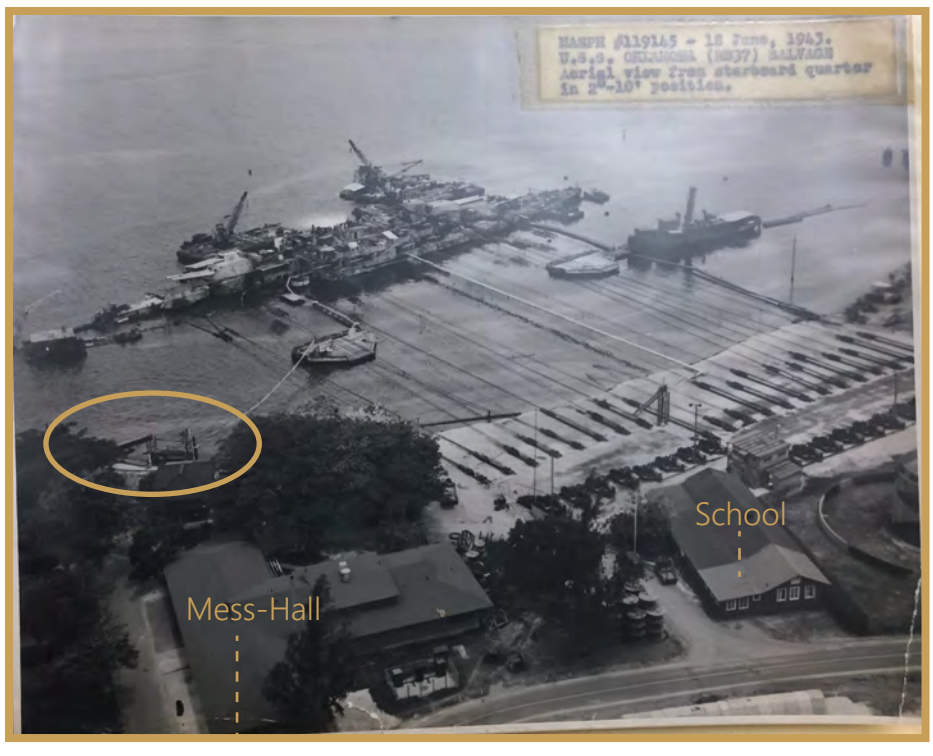
Appendix A:
Circulation Analysis| October 2018
Ford Island CPO Bungalows Neighborhood

71CA_152A_9_PH458_NASPH_CPO_Bungalows_LkgSE_10-Jul24_CROPPED.jpg Park Data, Histric Photo Imagesv
Historic Circulation | CPO Neighborhood | 1924



Mooring #12, looking Northwesterly
Historic Circulation | CPO Neighborhood | Sept. 17, 1934
Park Archives, 14th navel district photos

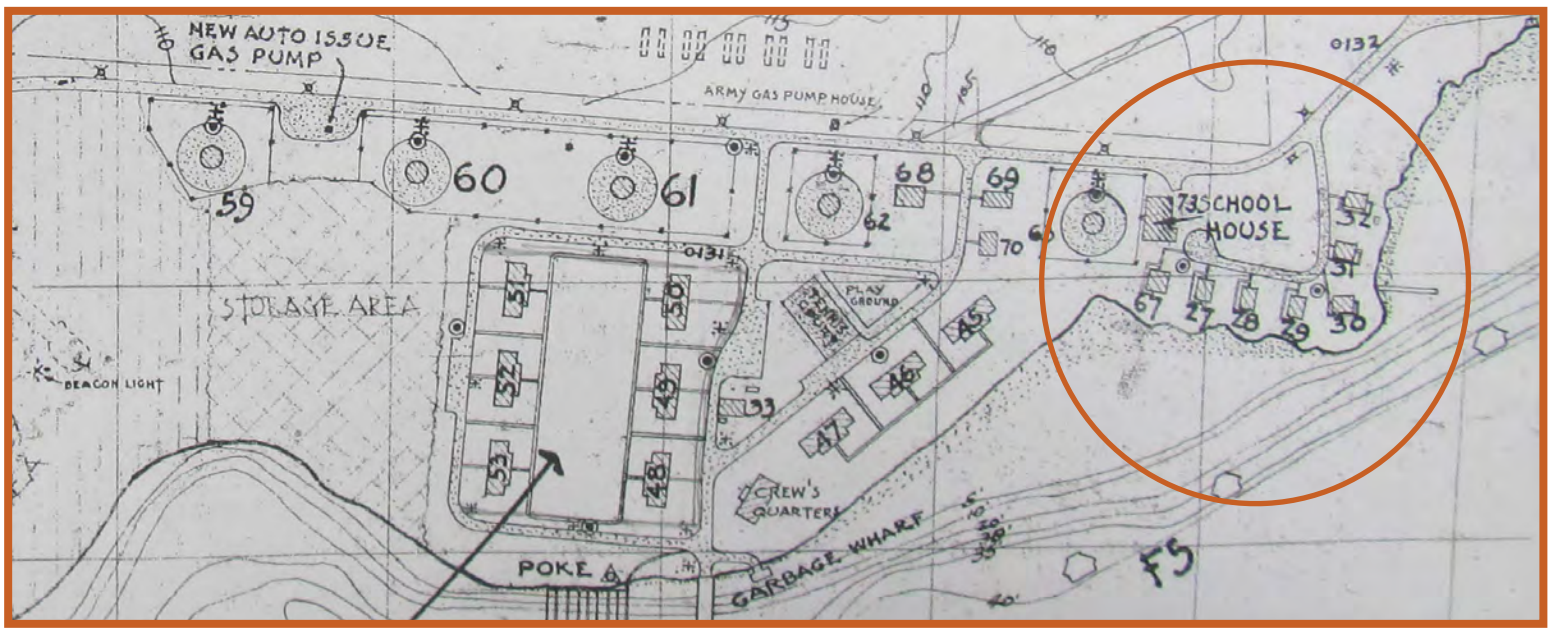
Historic Circulation
CPO Neighborhood | 1924
CPO Bungalow neighborhood, October 1924 (NARA RG-71-CA box 154 folder B, #PH528)

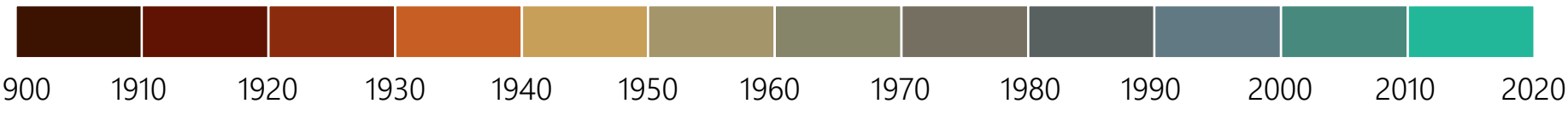


Historic building Circulation
CPO Neighborhood | 1943
USS Oaklahoma Salvage

Historic Circulation
CPO Neighborhood | June 1940

note: School house, one way loop terminates into a turnaround





1902 - 1965
Period of Significance

Appendix A:
Vegetation Analysis continued... | October 2018
Ford Island CPO Bungalows Neighborhood

HAWAII SPIDER LILY (Crinum asiaticum)
Street Planting
Nob Hill Neighborhood | Sept. 2018

Bldg 28 366846pv_1998.jpg
CPO Neighborhood | 1998

S-082 Captain F.H. Whitaker Collection
CPO Neighborhood | April 20 1943

Panax (Polyscias guilfoylei)
Structural planting around concrete pad
Nob Hill Neighborhood | Sept. 2018

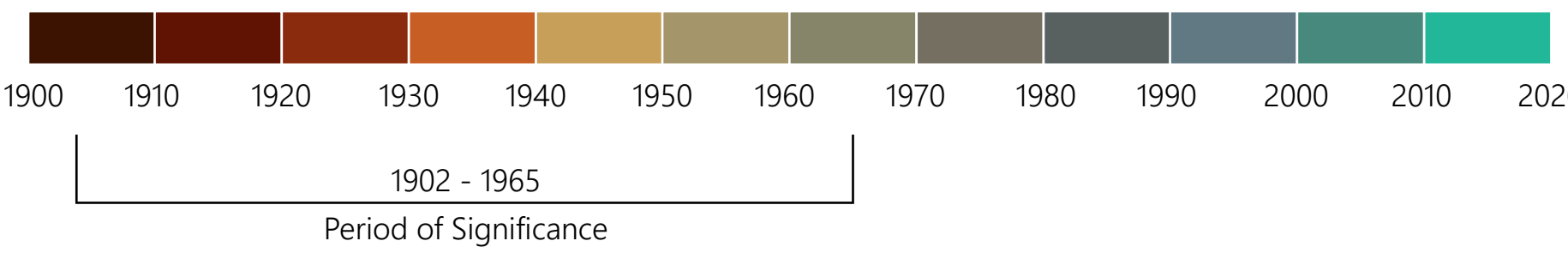
Hibiscus Foundation Planting
Nob Hill Neighborhood | Sept. 2018

Bougonvillea Street Edge Planting
(Pruned)
Nob Hill Neighborhood | Sept. 2018

Remniant Panax Structural Planting
CPO Neighborhood | Sept. 2018
Bungalow 29

Remniant Hibiscus Foundation Planting
CPO Neighborhood | Sept. 2018
Between Bungalow 28 & 90

Bougonvillea Street Edge Planting
(Unpruned)
CPO Neighborhood | Sept. 2018
Bungalow 28



Appendix B: Ford Island CPO Neighborhood Planting Palette

Produced December 2018

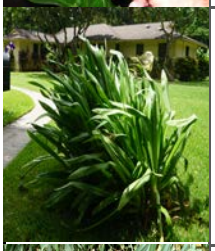
Image	Common Name	Botanical Name	Code	Currently Located	Notes	Source
	Panax	*Polyscias guilfoylei*	POGU	CPO and Nob Hill Neighborhoods	Panax can be easily propagated by cuttings. Cuttings should be 1 inch in diameter and at least 18" long ensure a successful planting. Panax can be used for in-field and main windbreaks systems.	https://plants.usda.gov/factsheet/pdf/fs_pogu.pdf
	Hawaiian Ti	*Cordyline fruticosa*	COFR	Nob Hill Neighborhood	Possessing moderate drought tolerance, poor to fair salt tolerance; it does not tolerate salt spray on its foliage. it requires windbreaks.	https://www.ctahr.hawaii.edu/oc/freepubs/pdf/of-33.pdf
	Brackenridge's rosemallow, Maʻo hau hele	*Hibiscus brackenridge*	HIBR		Hawai'i native, tolerant of drought and heat.	http://nativeplants.hawaii.edu/plant/view/Hibiscus_brackenridgei_brackenridgei
	Zz Plant	*Zamioculcas zamiifolia*	ZAZA	Nob Hill Neighborhood		
	Spider Lily	*Crinum asiaticum*	CRAS	Nob Hill Neighborhood		https://plants.usda.gov/core/profile?symbol=CRAS6
	ʻUkiʻuki	*Dianella sandwicensis*	DISA	Nob Hill Neighborhood	Native. Lilly like foliage. Tolerant of standing water, drought and wind.	https://www.ctahr.hawaii.edu/uhmg/news/V2-Koob-NativeGC.pdf
	Paper flower; pukanawila, kepalō, kiapolō, pua kepalō	*Bougainvillea spp.*	N/A	CPO and Nob Hill Neighborhoods	Bougainvillea is drought tolerant, salt tolerant, and wind resistant.	https://www.ctahr.hawaii.edu/oc/freepubs/pdf/OF-38.pdf

Image	Common Name	Botanical Name	Code	Currently Located	Notes	Source
	Croton	*Codiaeum variegatum*	COVAP	CPO and Nob Hill Neighborhoods	Tolerates short periods of drought. Propogation from cuttings.	http://sfyl.ifas.ufl.edu/orange/home-lawns-landscapes-and-gardens/residential-horticulture/plant-profiles/
	Hibiscus	*Hibiscus laevis*	HILA	CPO and Nob Hill Neighborhoods		https://plants.usda.gov/core/profile?symbol=hila2
	Dracaena	*Dracaena fragrans*	DRFR	CPO and Nob Hill Neighborhoods	Salt and wind tolerant.	https://www.ctahr.hawaii.edu/oc/freepubs/pdf/L-13.pdf
	Slender Goldshower	*Galphimia gracilis*	GAGR	Nob Hill Neighborhood	Drought tolerant. Commonly used as foundation hedge.	http://hear.its.hawaii.edu/Pier/wra/pacific/galphimia_gracilis_htmlwra.htm

Additional Sources:

Palms for Hawaii Landscapes	https://www.ctahr.hawaii.edu/oc/freepubs/pdf/L-19.pdf
Salt and Wind Tolerance of Landscape Plants for Hawai'i	https://www.ctahr.hawaii.edu/oc/freepubs/pdf/L-13.pdf

Appendix C: Compatible Site Furnishings

Manufacturer: Belson
Product: Recycled Plastic A-Frame Picnic Table (http://www.belson.com/Recycled-Plastic-A-Frame-Picnic-Tables)

Manufacturer: Pilot Rock RJ Thomas Mfg. Co.
Product: AFT End Accessible Traditional A-Frame Picnic Table using recycled plastic (https://www.pilotrock.com/aspx/Shop/Series.aspx?seriesid=242#prod-desc)

Manufacturer: Belson
Product: 8' Recycled Plastic ADA Picnic Table (http://www.belson.com/Universal-Access-A-Frame-Picnic-Tables-with-Recycled-Plastic-Frames)

Manufacturer: Bright Idea Shops
Product: Wheelchair Accessible Picnic Table (http://www.brightideashops.com/Wheelchair-Accessible-Picnic-Table-Prodview.html)

Appendix C: Compatible Site Furnishings

Manufacturer: Anova
Product: Recycled Plastic 6' wide Plank Bench
(https://www.anovafurnishings.com/product/rcptc6-recycled-plastic-6-wide-plank-bench)

Manufacturer: Anova
Product: Wainwright 6' Contour Bench
(https://www.anovafurnishings.com/product/rcpwc6-wainwright-6-contour-bench)

Manufacturer: Belson
Product: Recycled Plastic Malibu Bench
(http://www.belson.com/Recycled-Plastic-Malibu-Park-Bench-Portable-Mount)

Manufacturer: Santa & Cole
Product: Neoromantico Bench
(https://www.landscapeforms.com/en-US/product/Pages/Santa-Cole-Neoromantico-Bench.aspx)