U.S. NAVAL BASE, PEARL HARBOR, DRY DOCK NO. 4, EAST & WEST QUAY WALLS
(U.S. Naval Base, Pearl Harbor, Naval Shipyard, Facilities Nos. O-2 & O-3)
East & west sides of Dry Dock No. 4
Pearl Harbor
Honolulu County
Hawaii

HABS HI-518
HI-518
HABS
HI-518

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN BUILDINGS SURVEY
PACIFIC GREAT BASIN SUPPORT OFFICE
National Park Service
U.S. Department of the Interior
1111 Jackson Street
Oakland, CA 94607

HISTORIC AMERICAN BUILDINGS SURVEY

U.S. NAVAL BASE, PEARL HARBOR, DRY DOCK NO. 4, EAST & WEST QUAY WALLS
(U.S. Naval Base, Pearl Harbor, Naval Shipyard)
(Facility Nos. O-2 & O-3)

HABS No. HI-518

Location:

Quay walls at east and west sides of Dry Dock No. 4
Pearl Harbor Naval Base
City and County of Honolulu, Hawaii

This facility's UTM coordinates are: 4.607120.2360720

Significance:

Quay Walls O-2 and 0-3 are located within the Pearl Harbor National Historic Landmark. They are integral parts of Dry Dock No. 4, the largest dry dock at Pearl Harbor, capable of accepting CVN class (a class of air craft carrier) ships. Dock No. 4 and its quay walls were built at the time of intense military build-up following the bombing of Pearl Harbor and are significant through their association with the expansion of the dry dock facilities during WWII.[1] Construction of the quay walls and the dry dock is an example of the cooperation between CPNAB[2] and Pacific Bridge Co. contractors.

Description:

The entrance quay walls O-2 and O-3 were designed and built as part of the facilities of Dry Dock No. 4 for the function of ship repair. The interior sides of Quay Walls O-2 and O-3 hold the caisson for Dry Dock No. 4. When the caisson is removed, the area in front of Quay Wall O-2 is used as a docking space for the caisson. Quay Wall O-3 is shorter in length and does not have a particular function except to frame one side of the dock and has an occasional use as a small boat berthing. O-3 sits at the area where the curved section of the former Pier O-1 came in contact with the land.

The quay walls are short concrete deck sections supported by concrete piles. The piers are located at the entrance to Dry Dock No. 4. The outer face of the deck borders the ocean (about 50' depth). Both piers are cast-in-place monolithic reinforced concrete decks supported upon girders and beams running in the transverse direction which are carried by brace foundation cylinders.

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[1]The scope of repair work during the war was phenomenal. The workload continued to increase until the Navy Yard was handling an average of 252 repairs a month at its 4 dry docks in the last year of the war.

[2]Soon after the outbreak of World War II in Europe in 1939, a large contract was signed with a group of construction firms known as Contractors Pacific Naval Air Bases (CPNAB). Their work was not limited to new Navy air bases, but also included additional facilities throughout Oahu, including Navy Yard projects. Another major contract, for facilities to be built mostly in the Navy Yard, was signed with Pacific Bridge Company in 1941. Their scope of work included building three additional dry docks, a bombproof power plant and electrical substations, an additional marine railway, and other facilities. Even before the U.S. entered the war, there was a tremendous build-up of personnel and facilities at the Pearl Harbor Navy Yard.

The deck, beams, girders, cylinders and braces are all made of reinforced concrete. The wearing surface of the deck is 12'-0" above M.L.W. level or about 10.8' above M.H.W. level.[3]

Quay Wall O-2 measures approximately 225' in length by 50'-0" in width. Quay Wall O-3 measures approximately 120' in length by 50'-0" in width. The outer edge of the deck extends approximately 5' beyond the centerline of the supporting piles. The piles are 18" x 18" concrete piles driven into the ocean floor. The concrete piles are spaced at approximately 20' on-center longitudinally and approximately 12' on-center latitudinally, except for the areas where the walls of the capstans[4] are located, in which case, the piles are one pile deep on the ocean side of the capstans and two on the land side of the capstans. These rectangular rooms measure approximately 10' x 20' in plan.

The ocean floor depth at the caisson was dredged to a depth of 70'-0" with the finished floor elevation of the thick concrete floor of Dry Dock 4 at M.L.W 53' (47'-0" from ground plane). The ocean floor under the quay walls have, at its deepest end, a depth of approximately 50', which slopes up to land at a 1: 1½ (y: x) slope. A revetment was built between the longitudinal edge of the quay wall and the natural ground to prevent erosion. Also, on the far end of O-3, beyond the area where the deck is supported by concrete piles, the ground is faced with a revetment retaining wall.

The reinforced concrete slab of the quay wall deck is level and flat, and at the same elevation as the surrounding ground line. On the ocean side of the slab is a concrete curb. The concrete curb is 10" in width and 7" in height with beveled corners. Cleats and bollards are spaced at regular intervals and sit on trapezoidal concrete pads that extend out approximately 2' from the concrete curb. There are four cleats spaced at 30'-0" apart on-center of Quay Wall O-2. Quay Wall O-3 accommodates only 2 cleats, due to its shorter length. The cleats are typical of those installed during this time at Pearl Harbor. They are approximately 9.5" high and 10" wide at the base, which is bolted all the way through the concrete curb to the underside of the slab (approximately 17" thick). There is a steel ladder off the deck of Quay Wall O-3 that descends into the ocean, located on the dry dock side of the pier. It is bent but still usable. Utility lines and hook-ups are installed at Quay Wall O-2 but there are no apparent utility lines or connections on or under Quay Wall O-3.

There are few obstructions on either of the decks; however, there are a few elements that exist due to its association with dry dock. At the

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[3] The Mean Low Water (M.L.W) elevation is 100.0' and the Mean High Water (M.H.W.) elevation is 101.5'. Thus, the height of the deck is about 12' above the water level.

[4] A capstan is an apparatus used for hoisting weights, consisting of a vertical spool-shaped cylinder around which a cable is wound.

far end (furthest from the dry dock side) of Quay Wall O-2 is an elevated concrete pad with two 1'-10" diameter manhole openings through it and the concrete deck. These most likely had cast-iron frames and covers being located along the outer waterfront of the deck for access to oil valves and connections (These are no longer extant). A 1'-6" diameter pipe (what appears to be a fuel line) rests along the edge of the concrete slab, with a split pipe extending in the direction of the holes. It appears as though the pipe extended into the hole and below the concrete slab, possibly feeding into the dry dock area to the side. Also, at about the center of the concrete deck of Quay Wall O-3 is a square elevated pad with vent grills on its surface that is an exhaust vent for the east pump room. It is covered when not in use.

Cylindrical wood bumpers/fenders align the water side of the decks and extend beneath the water. The timber fender system at Quay Walls O-2 and O-3 is similar. The fender system is designed to protect the concrete slab of the pier. In the case of O-2, it was designed to protect the concrete slab from damage when the caisson was being moved and parked alongside the pier. The timber piles are spaced at 8'-0" on-center and are supported by two horizontal rows of chocks and blocks: one at the top of the curb and one just above the top of the water line. The timber fenders are of round creosoted timber piles measuring approximately 1'-6" in diameter. The timber pile is bolted to a 12 x 12 'wale' piece[5]. The wale is attached to the concrete curb with 4 x 12 x 12 blocking pieces between the wale and the concrete. The wale is also attached to the sidewalls of the caisson. Eight by twelve 'chocks' run between the timber piles, giving the piece stability and strength.

Presently, the piers are in relatively poor condition, except for the fenders. Because drawings of these piers could not be found in the naval plan files, we can assume that little, if no maintenance of these piers has been carried out in the recent past. The deck is spalling and cracking and the utility lines do not appear to be in use and do not appear to be in operable condition.

Historical Context: In 1940, the year after the outbreak of war in Europe, the entire Pacific fleet was ordered to remain at Pearl Harbor. Because of the fleet's permanent presence, and certainly because of the December 7, 1941 attack that soon followed, the majority of the waterfront facilities at Pearl Harbor were developed in the period of 1940-1945. The war required that an enormous build up of repair facilities take place at the Navy Yard to keep the Pacific fleet at the ready.

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[5] A wale piece is a horizontal timber or beam used to support an upright member, such as sheeting or formwork for concrete, etc.,

Although Quay Walls O-2 and O-3 and Dry Dock No. 4 were built under separate contracts by different construction companies, Quay Walls O-2 and O-3 were elements of the large construction project of Dry Dock No. 4. The dry dock installation included a dry dock (similar to No. 2) that measured 147'-0" wide (at the floor), 1100'-0" long, 47'-0" deep over floor and sill; a floating caisson gate; pumping plant; capstans; blocking; service and track systems; and short quay walls on both sides of the dock entrance (Pacific Bridge Co. 1944:53). Most of the work done during the time of intense military buildup during World War II was contracted to two firms, the Pacific Bridge Company and the Contractors Pacific Naval Air Bases. The quay walls were originally a part of the dry dock contract with Pacific Bridge Co., but were eventually removed from it and constructed under the NOy-4173 contract, awarded to Contractors Pacific Naval Air Bases, due to the latter's better equipment and facilities for casting and driving the concrete piling required (Pacific Bridge Co. 1944:53).

Dry Dock No. 4 was ready for emergency use by July 19, 1943 and the quay walls were 99% complete by December 1943 (U.S Navy, Bureau of Yards and Docks 1947:126, and Contractors Pacific Naval Air Bases, n.d.: A-999).

For an overview of the Naval Shipyard see HABS No. HI-483. For information on Dry Dock No. 4, see HAER No. HI-15.

Sources:

Original drawings are on microfilm at NAVFACPAC Plan Files. These include:

- Dry Dock No. 4 Dredging Plan, Showing Quay Wall and Dock Locations (Drawing No. B-N22-284, dated 10/19/1941)
- Dry Dock No. 4 Showing Entrance Quay Walls O-2 and O-3 (Drawing No. B-N22-558, dated 2/19/1952)
- Section A-A of Quay Wall and Caisson (Drawing No. 825547, dated 1958)
- General Plan Showing Utilities Layout at Quay Walls and Dry Dock, (Drawing No. I-N16-547, dated 6/18/1947)
- Longitudinal Section- Entrance End of Dry Dock No. 4 (Drawing No. B-N22-284, dated 11/19/1941)

Contractors Pacific Naval Air Bases. *Technical Report and Project History, Contracts NOy-3550 and NOy-4173,* Chapter XXIX – Navy Yard, Pearl Harbor, n.d. Microfilm of report at Pacific Division Naval Facilities Engineering Command Library.

Helber Hastert & Fee Planners, Inc. *Pearl Harbor Naval Complex Integrated Cultural Resources Management Plan*, 2002.

Prepared by Helber Hastert & Fee Planners under Contract with Pacific Division, Naval Facilities Engineering Command for Commander, Navy Region Hawaii.

Pacific Bridge Co. *Technical Report and Project History, Contracts Noy-5049, for Construction of Dry Dock and Power Plant, Moorings and Additional Facilities*, 1944. Prepared for the Navy Department, Bureau of Yards and Docks. Microfilm of report at Pacific Division Naval Facilities Engineering Command Library.

U.S. Navy Bureau of Yards and Docks. *Building the Navy's Bases in World War II, History of the Bureau of Yards and Docks and the Civil Engineering Corps 1940-1946 Volume II*, 1947. United States Government Printing Office: Washington.

Likely Sources Not Yet Investigated:

National Archives II, Text and Cartographic sections, 8601 Adelphi Road, College Park, Maryland 20740, ph. (301) 713-6625.

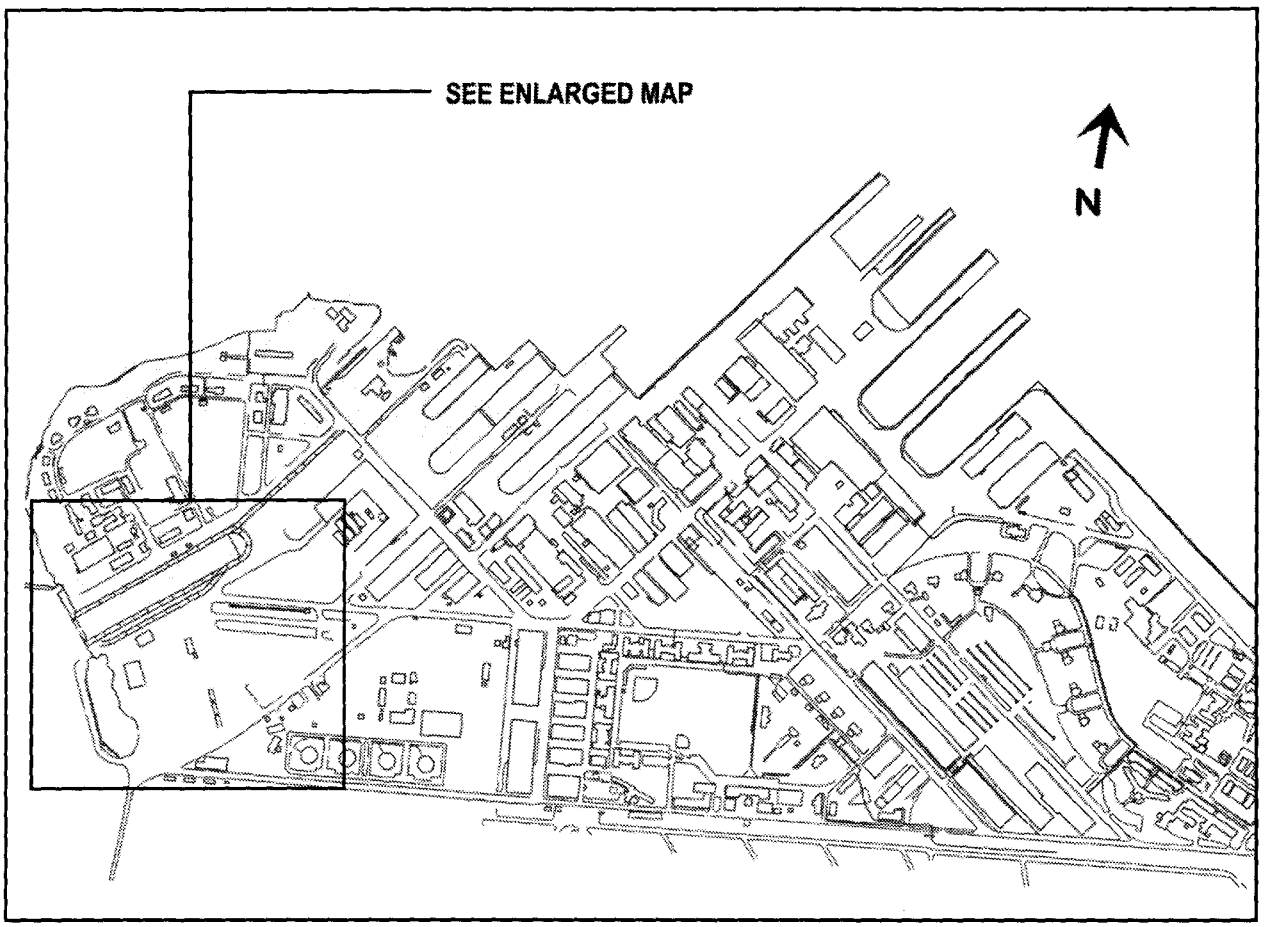
National Archives, Pacific Sierra Region, 1000 Commodore Drive, San Bruno, California 94066, ph. (415) 876-9009.

Navy Historical Center, Washington Navy Yard, 805 Kidder Breese, S.E., Washington, D.C. 20734, ph. (202) 433-4131.

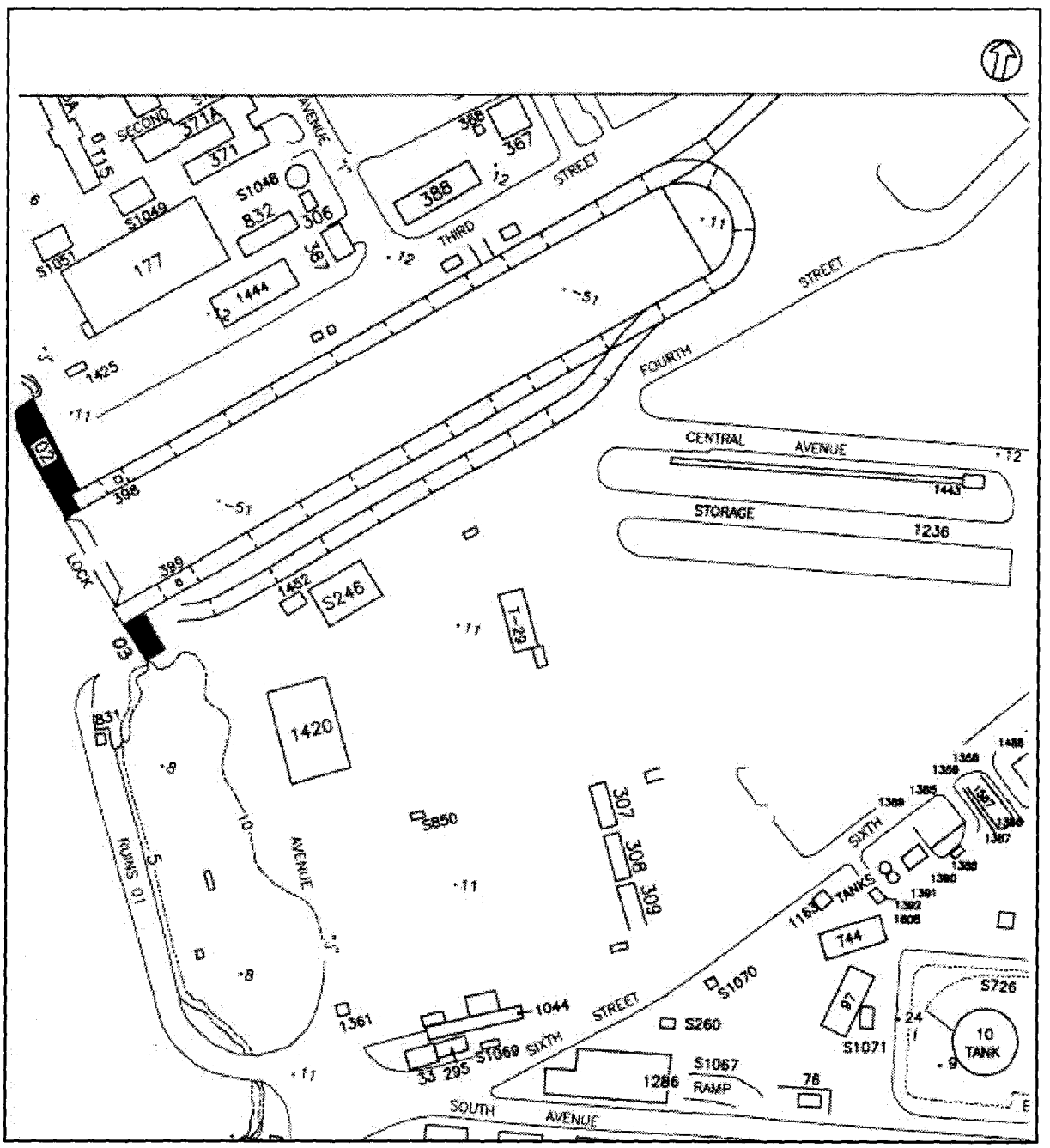
Port Hueneme NAVFAC Archives, 621 Pleasant Valley Road, Port Hueneme, California 93043, ph. (805) 982-5563.

Project Information: Photo documentation and recordation of this facility by the Navy has been done in anticipation of future alterations or potential demolition of the structure. Photo documentation of historic facilities by the Navy assists in expediting planned undertakings by having the documentation prepared prior to taking actions. Also, photo documentation assists the Navy in gaining more information about its historic facilities to assist in making proactive management decisions. This project is being supervised by Jeffrey Dodge, Historical Architect, NAVFAC Hawaii. The photographic documentation was undertaken by David Franzen, photographer. Lorraine M. Palumbo, Ph.D. Architectural Historian, of Mason Architects, Inc. prepared the written documentation. The field work and research was conducted for this report between July 2001 and December 2001.

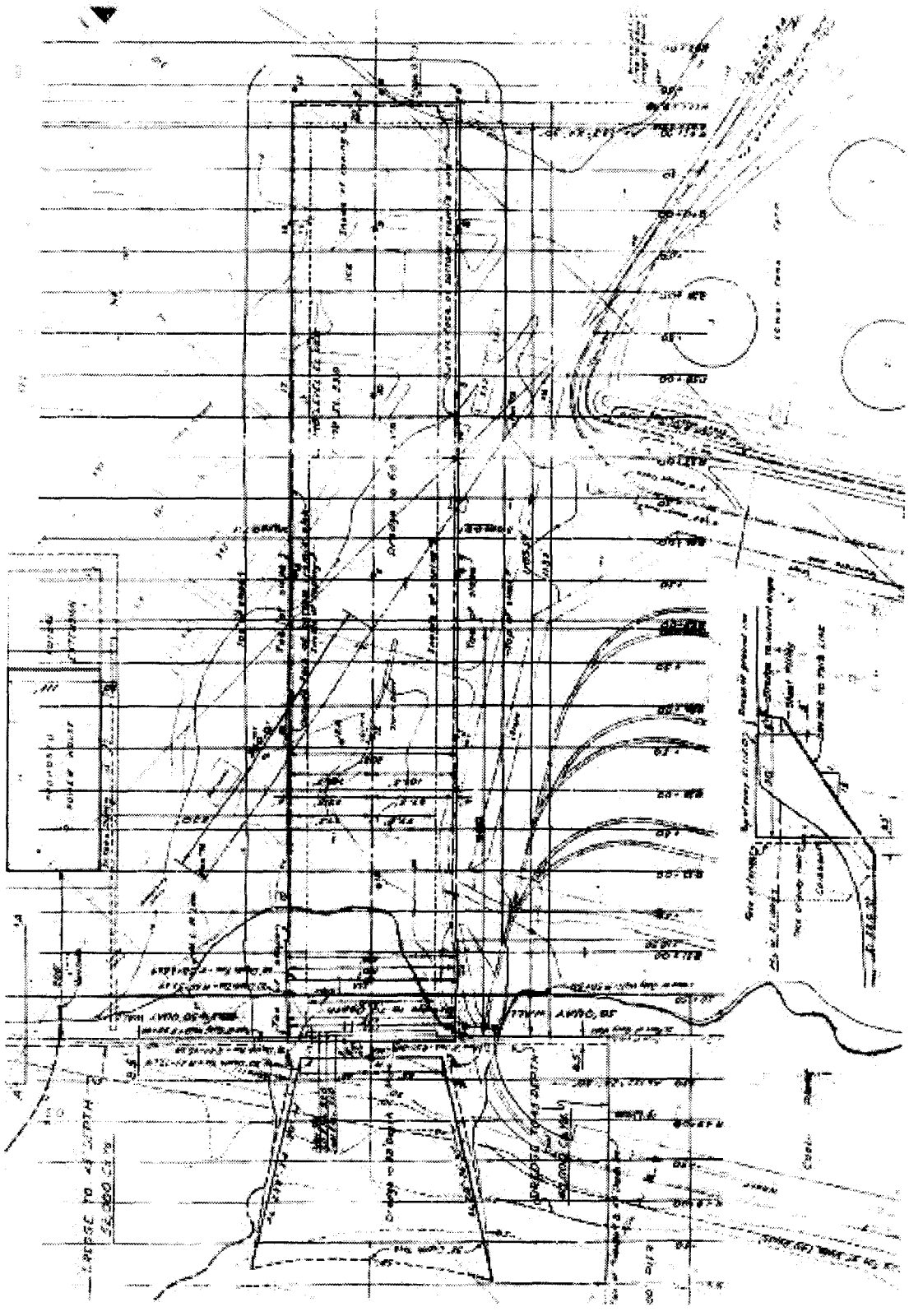
Shipyard Map



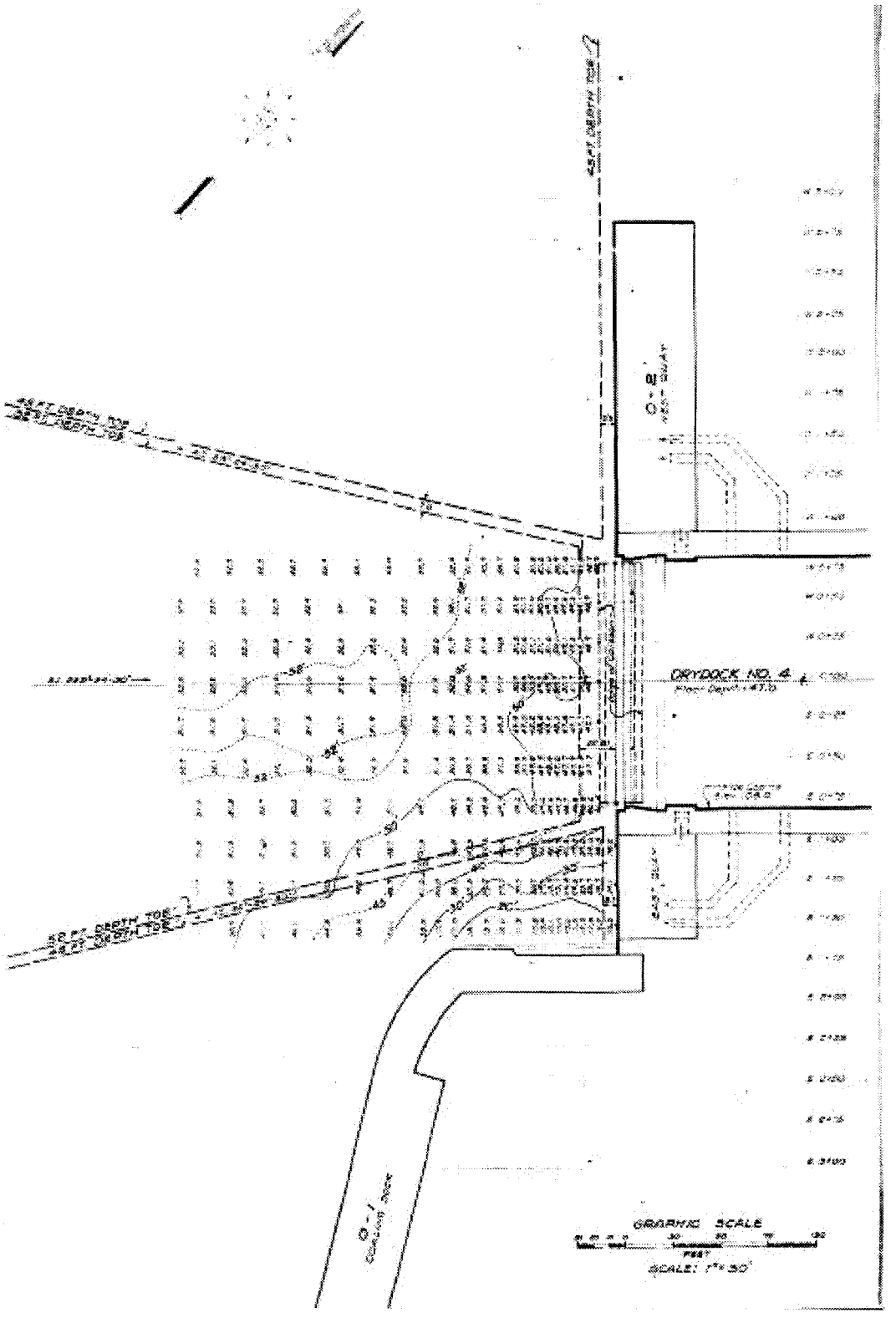
Enlarged Area Map (reduced, not to scale)



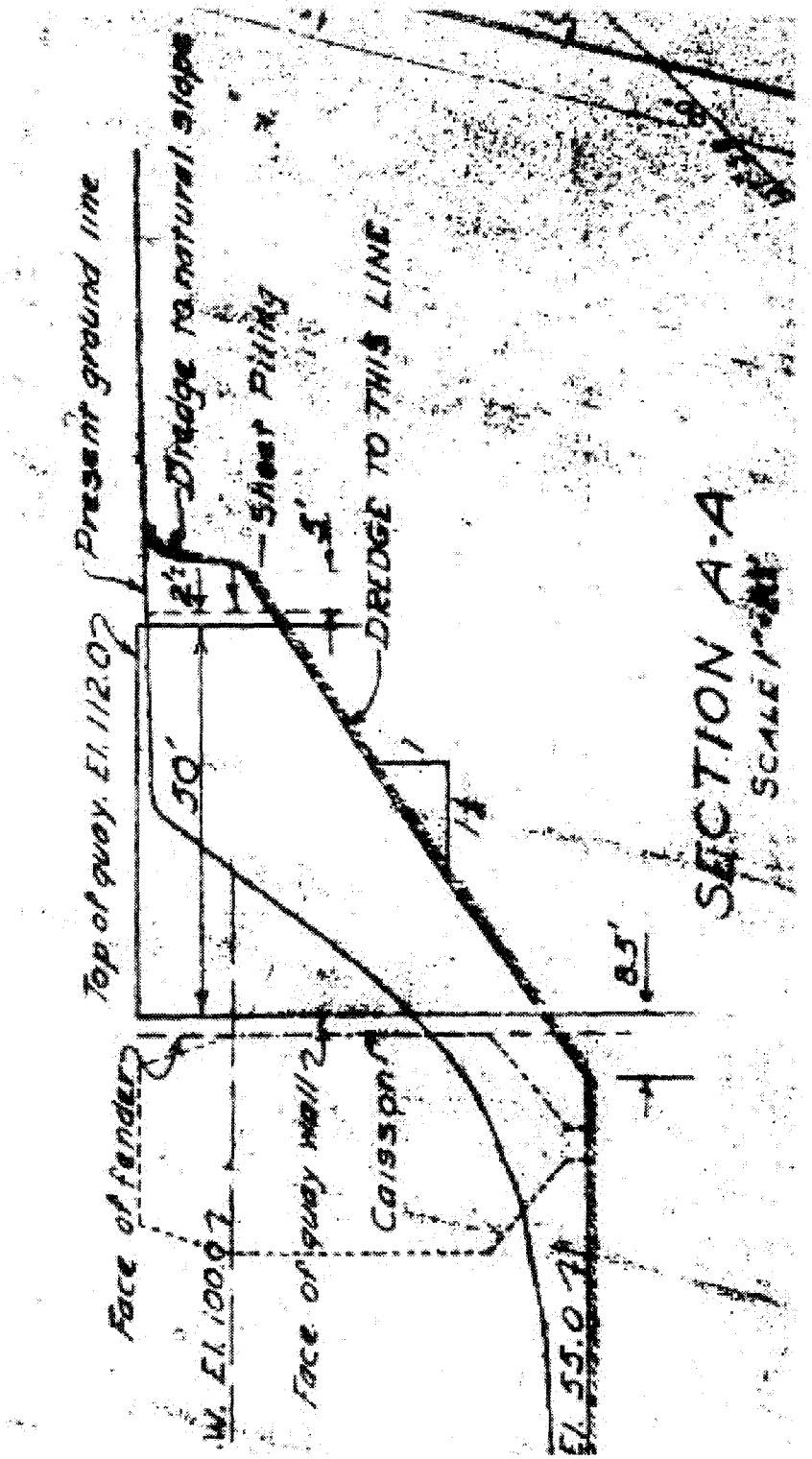
Dry Dock No. 4 Dredging Plan, Showing Quay Wall and Dock Locations
(Drawing No. B-N22-284, dated 10/19/1941) (reduced, not to scale)



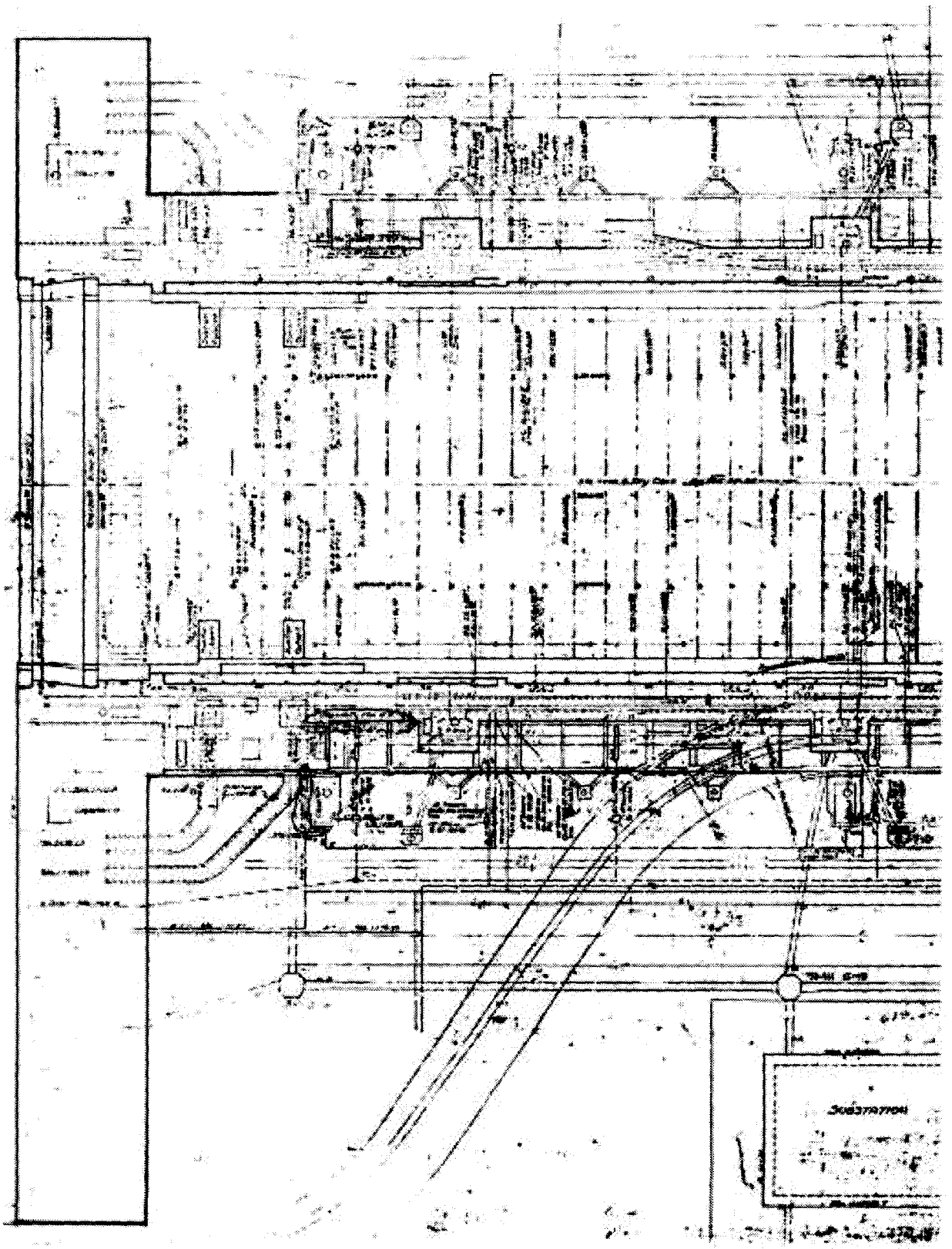
Dry Dock No. 4 Showing Entrance Quay Walls O-2 and O-3 (Drawing No. B-N22-558, dated 2/19/1952) (reduced, not to scale)



Section A-A of Quay Wall and Caisson (Drawing No. 825547, dated 1958) (reduced, not to scale)



**General Plan Showing Utilities Layout at Quay Walls and Dry Dock,
(Drawing No. I-N16-547, dated 6/18/1947) (partial drawing, reduced, not to scale)**



Longitudinal Section- Entrance End of Dry Dock No. 4
(Drawing No. B-N22-284, dated 11/19/1941) (partial drawing, reduced not to scale)