

U.S. NAVAL BASE, PEARL HARBOR, PIER & QUAY WALLS  
(U.S. Naval Base, Pearl Harbor, Naval Shipyard, Facilities Nos. GD  
-3, GD-4 & GD-5)  
Entrance to Dry Dock No. 2 & Repair Wharfs, east & west sides of  
Dry Dock No. 2 & west side of Dry Dock No. 3  
Pearl Harbor  
Honolulu County  
Hawaii

HABS HI-516

HI-516

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HI-516

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN BUILDINGS SURVEY  
PACIFIC GREAT BASIN SUPPORT OFFICE

National Park Service  
U.S. Department of the Interior  
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Oakland, CA 94607

HISTORIC AMERICAN BUILDINGS SURVEY

U.S. NAVAL BASE, PEARL HARBOR, PIER & QUAY WALLS  
(U.S. Naval Base, Pearl Harbor, Naval Shipyard)  
(Facilities Nos. GD-3, GD-4, & GD-5)

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**Location:** Quay walls at east and west sides of Dry Dock No. 2 and west side of Dry Dock No. 3  
Pearl Harbor Naval Base  
City and County of Honolulu, Hawaii  
These facilities' UTM coordinates are 04.607780.2361460.

**Significance:**

Dry Dock No. 2 is HAER HI-66  
Dry Dock No. 3 is HAER HI-67

Facilities GD3, GD4, and GD5 are located within the Pearl Harbor National Historic Landmark. They are integral parts of Dry Dock No. 2 and 3 (~~HAER HI-65A and HAER HI-65B~~). The docks and their walls were built at the time of intense military build-up directly after the bombing of Pearl Harbor and are significant through their association with the expansion of the dry dock facilities during WWII.<sup>1</sup> The integrity of GD3 has been compromised due to the removal of the projecting pier portion.

**Description:**

The general description is as follows: The entrance quay walls and side quay walls were designed and built as part of the facilities of Dry Dock No. 2 and 3 to support the function of ship repair and ship docking. Dry Docks No. 2 and 3 are located adjacent to each other, with a distance of 275'-6" from centerline to centerline between the docks.

Facility GD3 was originally the number assigned to a projecting pier (approximately 120' x 20') located between Dry Docks No. 2 and 3. This was removed by 1962 and the entrance quay walls to Dry Dock No. 2 were then named GD3. The interior sides of the Entrance Quay Walls GD3 hold the caisson of Dry Dock No. 2. The west side of entrance Quay Wall GD3 is used for small boat docking. The east side is shorter in length and does not have a particular function except to frame one side of the dock.

Facility GD4 is a quay wall that is parallel with the long axis of Dry Dock No. 2. It allows for ship docking. A multi-story pump room,

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<sup>1</sup>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 four dry docks in the last year of the war.

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which serves both Dry Docks 2 and 3, is adjacent to the deck of GD4 and is alongside the sidewall of Dry Dock No. 2.

Facility GD5 is one of the entrance quay walls for Dry Dock No. 3. The area in front of the west side Entrance Quay Wall GD5 is used as a docking space for the caisson. A small projecting ramp leads to a small concrete deck that is at a higher elevation than the general deck surface. There is also a memorial plaque with a flagpole for the *USS Shaw* and *Sotoyomo* on the main deck of GD5 (see historical context section for information on these ships).

The quay walls are short concrete deck sections supported by piles. The outer face of the deck borders the ocean (after dredging, about 50 foot depth). All quay wall decks are supported by driven steel or wood piles and/or sheet metal piles. The outside edges of the deck are full concrete walls that are protected by wood fenders. The wearing surface of the deck is 8 feet above M.L.W. level or about 9.5 feet above M.H.W. level...<sup>2</sup>

The general dimensions of the deck are as follows:

The east sidewall of GD3 measures 59'-9" long by approximately 20' wide. The west sidewall of GD3 measures 87'-6" long by 20'-0" wide.

GD4 measures 287'-11" long by 30'-0" wide.

GD5 measures 62'-2" long by 20 feet wide. The projecting ramp off GD5 measures approximately 22'-6" by 5'-0" wide. Its accompanying platform is 5'-6" x 7'-0". A concrete filled metal pole (3'-0" height) stands at the approximate center of the platform.

Quay Walls GD3 and GD4 are supported by steel sheet pilings as well as timber piles. At the ocean end of the corner of Dry Dock No. 2 where GD3 and GD4 meet, circular-shaped sheet piles held together by steel rods intersect each other, supporting the deck above. The steel sheet pilings have a diameter of 45.84 feet with 108 piles per cell. The intersections of the circular sheet piles in plan create the unusual V-shape indentations in the elevation of the deck's walls when looking at it from the ocean side. These exterior walls were once exposed sheet metal piling; however, due to deterioration, these have been repaired and concrete walls, which follow the circular pilings below, have been built. There are 2'-0" diameter drainage pipes within the walls, opening out at the face of the wall to allow water to escape.

The south portion of the length of the deck of GD4 is supported by wood piles and buttressed with a sheet pile retaining wall. Above this retaining wall is a short reinforced concrete wall. There are 135 pieces of steel sheet piling spaced at 1'-6" on-center over a length of 202'-6". The steel piles are 42'-0" long. Securing these sheet piles are 2¼" diameter rods tied from the retaining wall at the ocean side to

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<sup>2</sup> The Mean Low Water (M.L.W.) elevation is 100.0' and the Mean High Water (M.H.W.) elevation is 101.5'

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the wall of the dry dock at the other, holding the two walls in tension. Under the deck are two rows of 26 wood piles at 7'-6" on-center for a distance of 195'-0". The wood piles are approximately 33'-0" long on the row closest to the ocean and 50'-0" long in the row closest to the dry dock. This is because the area where Dry Dock No. 2 is built was dredged extensively because of the need to house large ships. Whereas, the adjacent dry dock, No. 3, was designed to house smaller boats which did not need to have as great a depth. The ocean floor gets shallower the closer one gets to Dry Dock No.3. The short concrete wall is 9'-10" tall and 2'-6" wide at its base, angling slightly as it reaches the top. Its base is at an elevation of 99.0' M.L.W.

Facility GD5 is designed and built similar to the south portion of GD4, including the short concrete wall on the exposed side of the deck. There is a single rectangular hole in the face of the wall of GD5, where water is allowed to escape.

The decks of GD3, GD4, and GD5 are now paved in asphalt. However, the original drawings show that these decks were once compacted earth. In transverse section, there are several rows of piles supporting a concrete floor (the elevation of the floor is approximately 102' M.L.W. and the pile cutoff elevation is 101.8' M.L.W.). This 'floor' turns upward and thickens at the deck edge so that the top of the upturned wall is at 108' M.L.W. A six-foot depth of compacted earth is then filled into this deck space. This type of construction may have been brought on by the need for fast construction techniques during wartime efforts.

On the ocean side of the decks of GD3 and GD4 are concrete curbs. The concrete curbs are 10" in width and 7" in height with beveled corners. Cleats are spaced at regular intervals and sit on trapezoidal concrete pads that extend out approximately 2' from the concrete curb. There are three cleats along the edge of the west sidewall of GD3 and six cleats along the edge of GD4. 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 (approx. 17" thick). Facility GD5 does not have permanent concrete curbs. Presently, there are temporary concrete curb sections at its perimeter. Utility and electrical lines and hook-ups are installed along the Quay Walls.

Crane rails run alongside both Dry Docks No. 2 and 3, but these rails are not part of the deck surfaces that are designated as GD4 and GD5. Only the very edge of GD3, where the rail of Dry Dock No. 2 continues all the way down to the ocean edge, supports a rail line.

A brief description of the dry docks is as follows. Dry Dock No. 2 has a length of 1000'-6"; a width of 133'-8"; a depth over sill of 46'-6"; and a depth over blocks of 44'-6". The thickness of the tremie slab is 17'-

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6". The mean tide range is 1.5'. Dry Dock No. 3: has a length of 497'-8"; a width of 84'-0"; a depth over sill of 22'-6"; and a depth over blocks of 20'-0". The thickness of the tremie slab is 13'-0", and the mean tide range is 1.5'.

Cylindrical wood bumpers/fenders line the outboard side of the quay wall decks and extend beneath the water. The fender system is designed to protect the concrete slab of the pier. The timber piles are spaced at 6'-4" on-center and are supported by horizontal rows of chocks and blocks at the curb. 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. 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. Giving the piece stability and strength are 8 x 12 'chocks', which run between the timber piles.

In 1972, the cleats were repaired and some concrete work was performed. In 1981, the electrical system was upgraded. Presently, the quay walls are in relatively poor condition, including the fenders. The exterior walls are cracking in places. The deck is in fair condition.

**Historical Context:**

Quay Walls GD3, GD4 and GD5 were elements of the larger construction project that included Dry Dock No. 2 and 3. See HAER ~~No. HI-65A~~ <sup>HAER HI-66</sup> for information on Dry Dock 2, and ~~HAER No. HI-65B~~ <sup>HAER HI-67</sup> for information on Dry Dock No. 3.

Construction of Dry Dock No. 2 was completed on November 20, 1941. Site clearing and demolition for the construction of Dry Dock No. 3 began a few weeks later, and was completed in March of 1942. The actual completion dates for the quay walls is not clear. The Navy database notes that the adjoining quay walls GD3, GD4, and GD5 were all completed in 1944. However, GD3 and GD4 were shown on historic maps as early as 1943. Also according to a 1943 map, GD5 appears to have been built by this time, but was not given a facility number. The first historic map found with the GD5 facility number on it is dated 1951.

On December 7, 1941, Japanese bombs rendered most of the harbor's dry docks useless; the only dry dock available was Dry Dock No. 2. The extent to which the surrounding quay walls GD3, GD4 and GD5 were damaged on that day is not known. Dry dock No. 2 was technically not yet complete, although the caisson gate was in place and the dock was unwatered, so emergency use was practical (Pacific Bridge Co., 1944: 73-75). A cruiser, the *USS Helena*, was torpedoed during the attack, and brought to Dry Dock No. 2 for emergency docking.

The *USS Shaw* and *USS Sotoyomo* were in the nearby floating dry dock YFD-2 when the Japanese attacked. The *Shaw* was set on fire

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by enemy bombs, which caused her forward magazines to explode. This severed her bow and wrecked her bridge area, leaving her midships and stern portions intact. (She underwent a major overhaul, and received a new bow, at the Mare Island Navy Yard in February 1942 and was put back into service.) The *Sotoyomo*, a tug vessel, was located just forward of the *USS Shaw*. After the *Shaw* was bombed, its explosions and fires caused the *Sotoyomo* to sink. (Following careful salvage and ship-raising techniques, the tug was returned to full-time duty at Pearl Harbor in 1942.) The floating dry dock YFD-2 also exploded and sank.

Other dry docks were also blocked on the morning of the attack. The *USS Pennsylvania*, and destroyers *USS Cassin* and *Downes* were in Dry Dock No. 1. All three were bombed and severely damaged. The burning hulks of these vessels blocked access to the dry dock.

After the attack, construction of Dry Docks No. 2 and 3 was completed at a furious pace. All available construction pumps were placed in service in Dry Dock No. 2 and work was begun on the rail connections, which required transferring the 15-ton gantry to the crane track. All available men were set to complete the crane-rail installation; night crews worked in the pumpwell to get drainage pumps into operable condition. On December 9, 1941, twenty-four hour operation on essential work around the dry docks was made possible by a relaxing of the blackout regulations. A ship was put into the dock December 10, 1941, and remained until December 31, 1941. Temporary connections served the ship with air, fresh water, saltwater; steam was supplied from a portable boiler, and the ship's auxiliary generator provided electricity (Pacific Bridge Co., 1944: 74-75).

For an overview of the Naval Shipyard see HABS No. HI-483.

**Sources:**

The original drawings for these facilities are on microfilm at NAVFACPAC Plan Files. They include:

- Dry Dock Nos. 2 and 3 Dredging Plan, Showing Quay Wall and Dock Locations, Drawing No. I-N16-454, dated 3/6/1941
- Dry Dock Nos. 2 and 3, General Layout, Drawing No. 134003, dated 4/28/1942
- Dry Dock Nos. 2 and 3, Plans, Sections, and Details, Drawing No. 134019, dated 4/28/1942
- Dry Dock Nos. 2 and 3, Plans and Cross-Sections, Drawing No. I-N16-258, dated 5/13/1940
- Dry Dock Nos. 2 and 3, Electrical System Safety Improvements, Drawing No. 7027062, dated 5/12/1981

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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:**

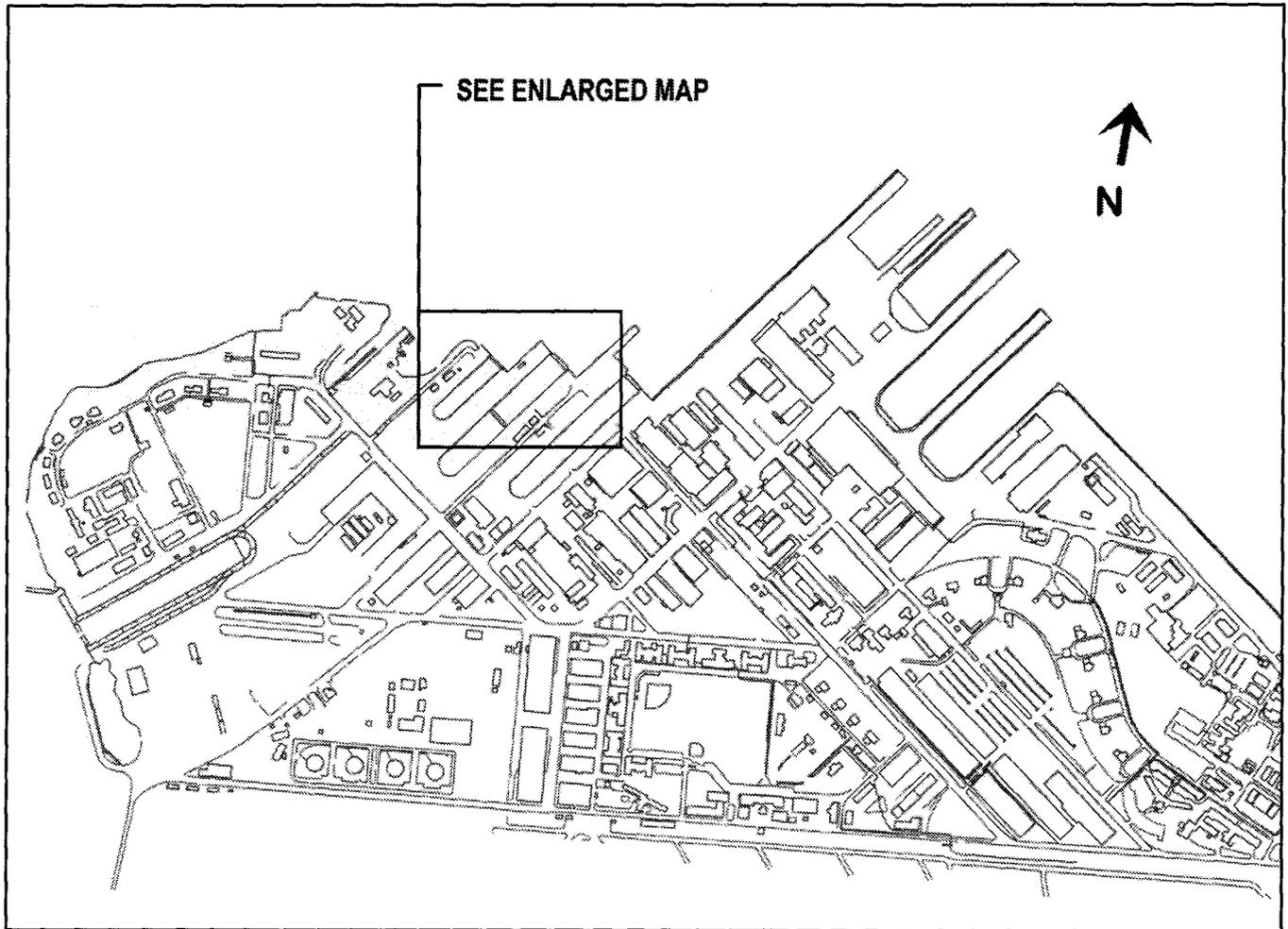
Photo documentation and recordation of this facility by the Navy has been done in anticipation of future alterations or potential demolition of the structure. Photo documentation of historic facilities by the Navy assists in expediting planned undertakings by having the documentation prepared prior to 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 A.I.A., 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

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written documentation. The field work and research was conducted for this report between July 2001 and December 2001.

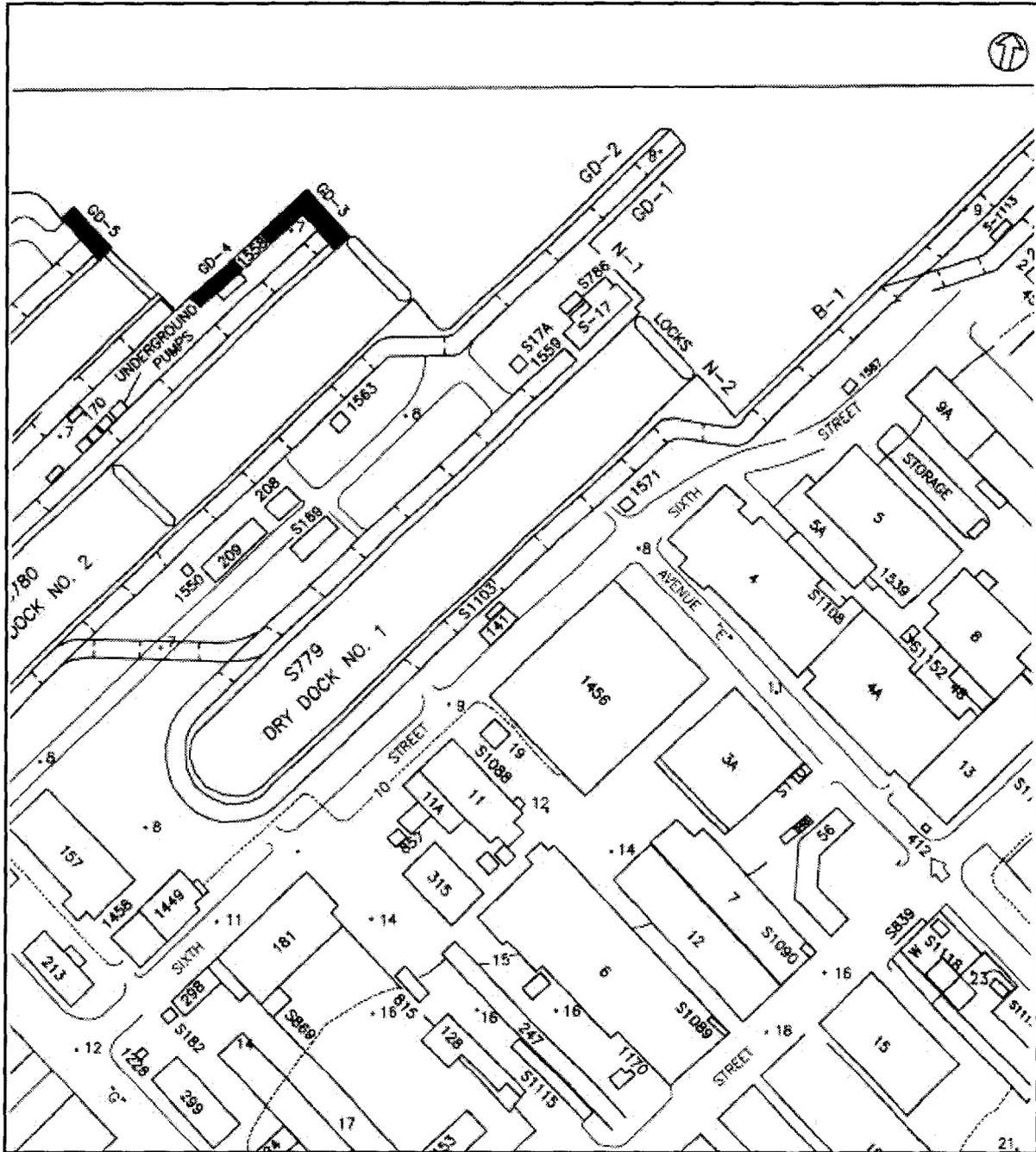
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**Shipyard Map**



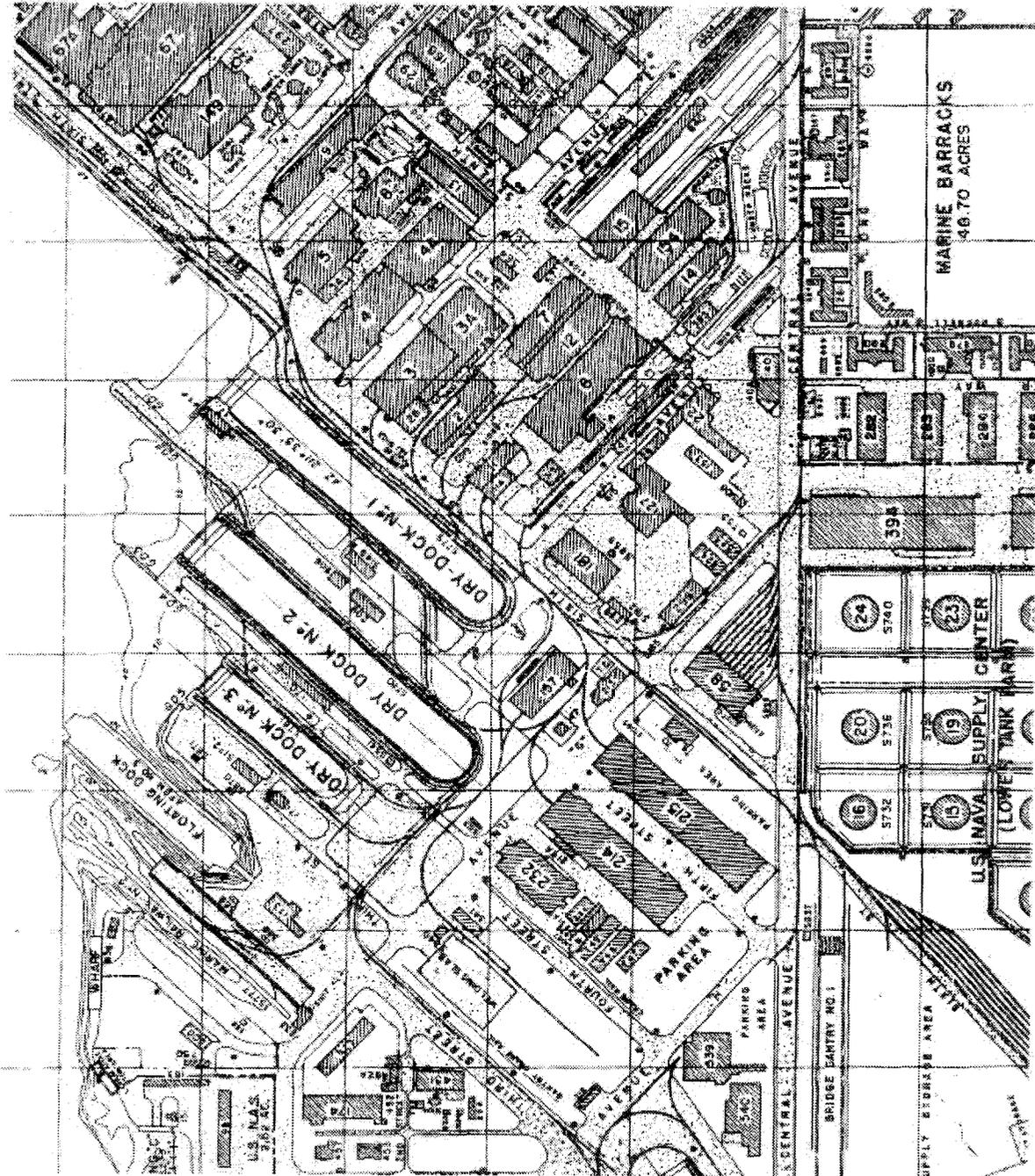
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Enlarged Area Map (reduced, not to scale)



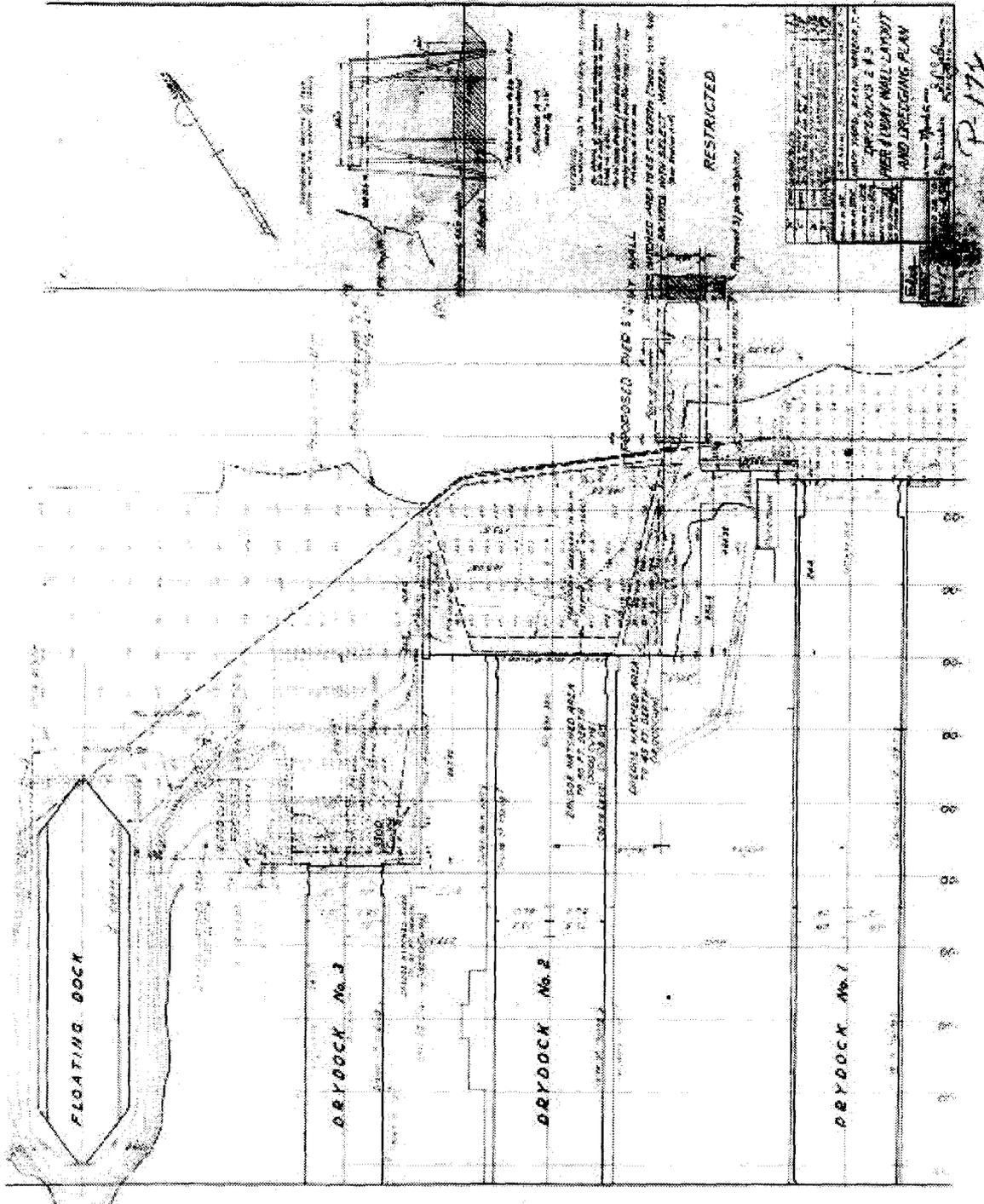
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**1951 Map Showing Dry Dock Area including the original GD3 Pier before its Demolition**  
(Pearl Harbor, Oahu, T.H. Fourteenth Naval District, 30 June 1951)



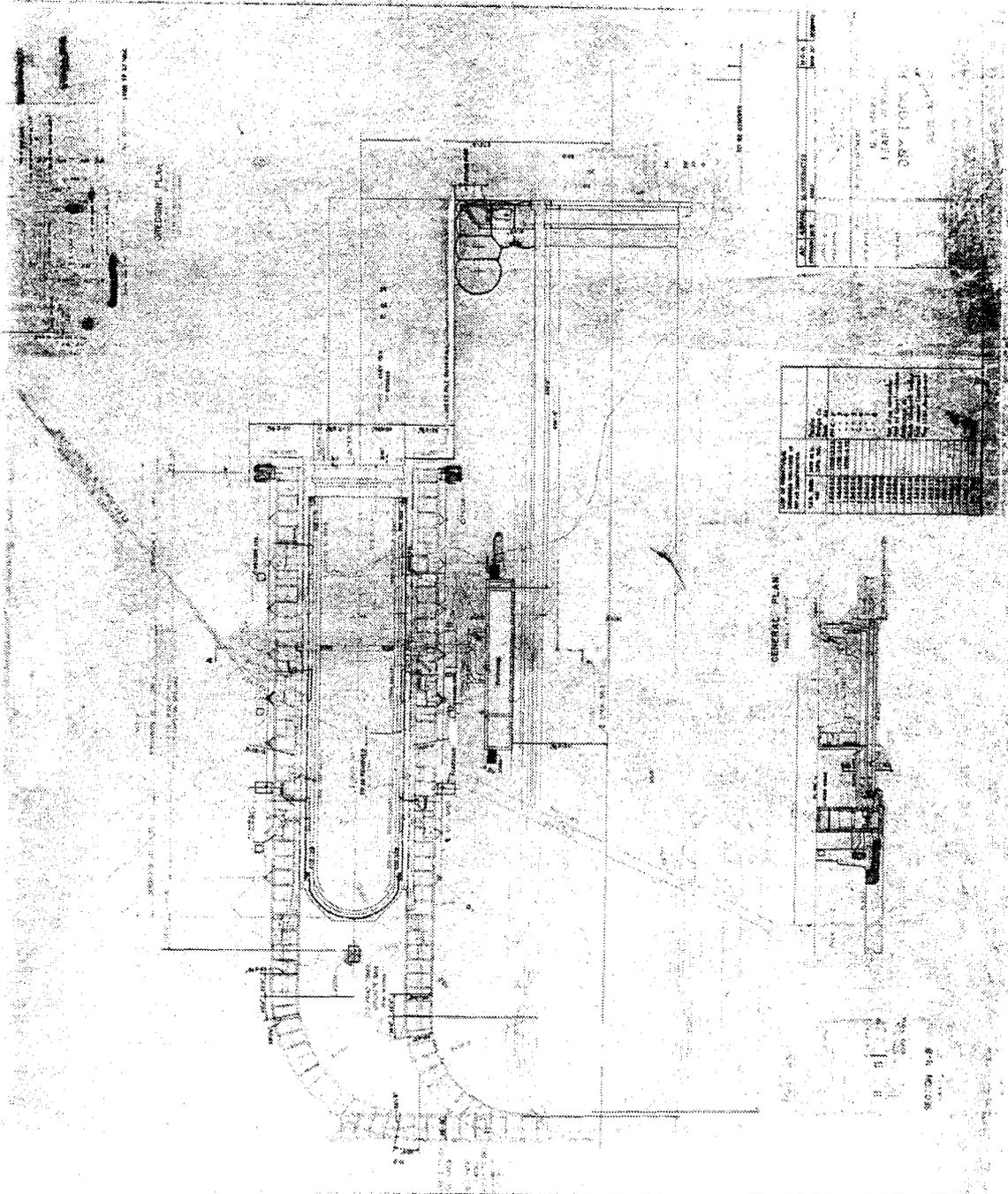
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**Dry Dock Nos. 2 and 3 Dredging Plan, Showing Quay Wall and Dock Locations  
 (Drawing No. I-N16-454, dated 3/6/1941) (reduced, not to scale)**



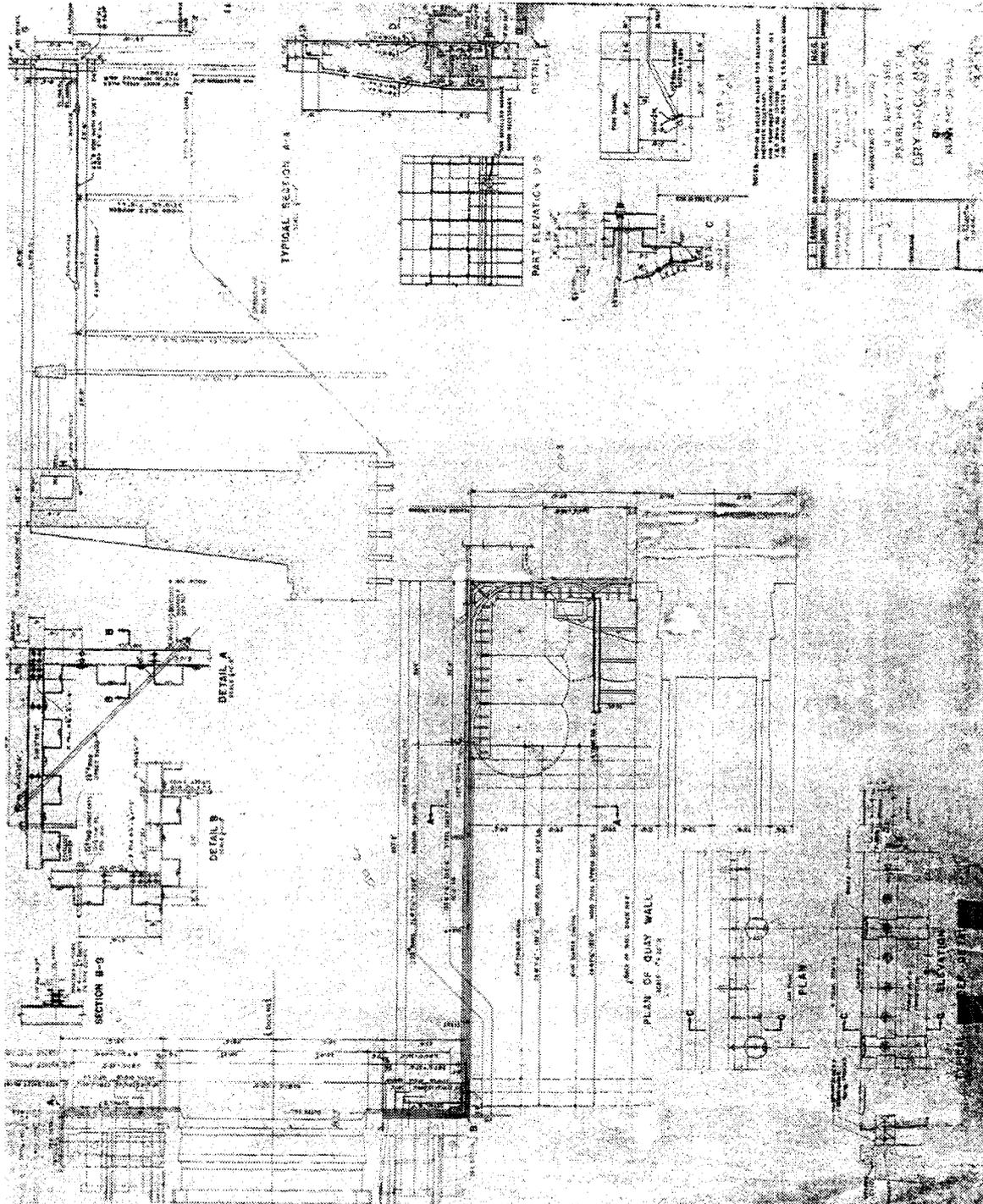
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Dry Dock Nos. 2 and 3, General Layout (Drawing No. 134003, dated 4/28/1942)  
(reduced, not to scale)



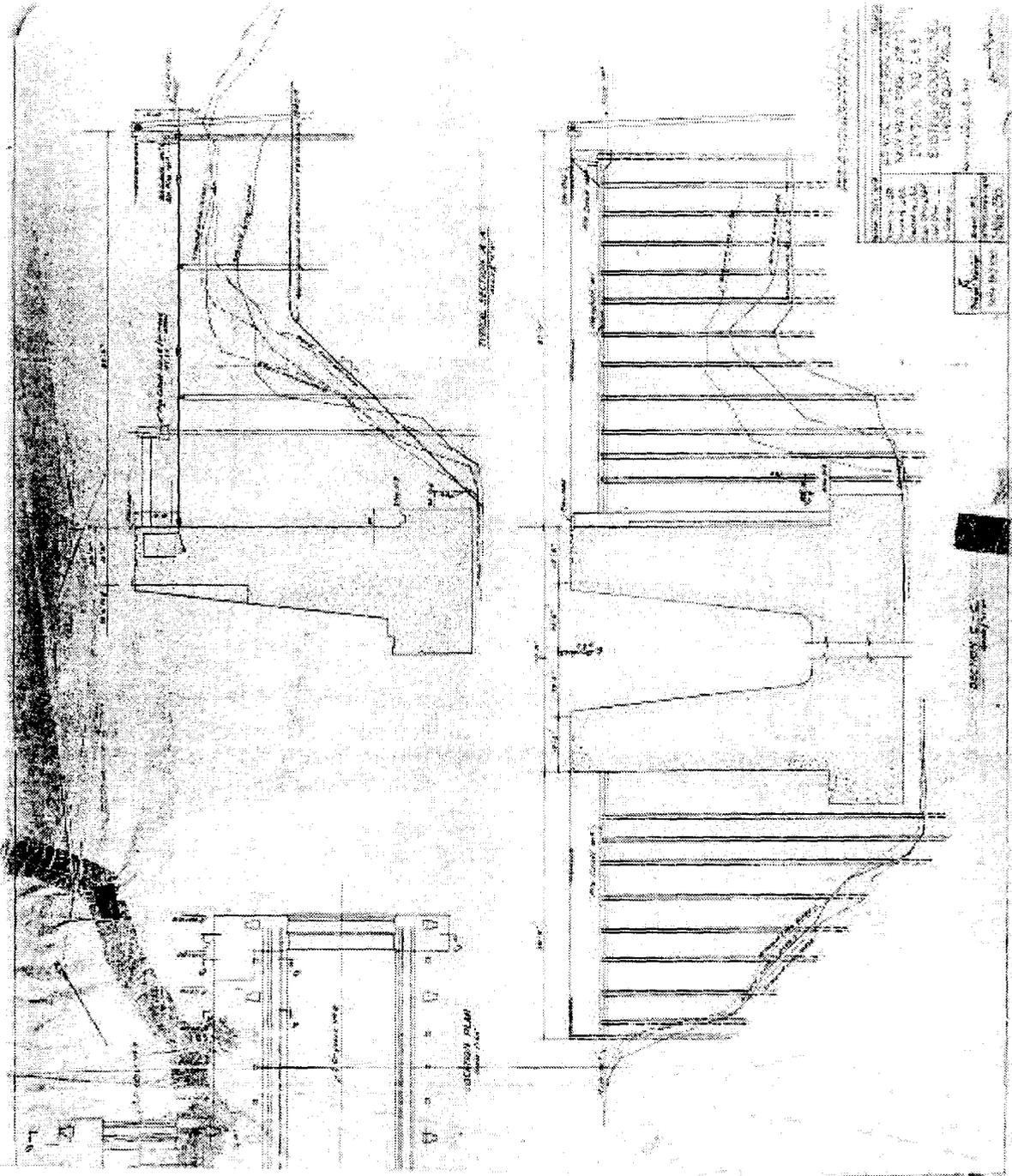
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**Dry Dock Nos. 2 and 3, Plans, Sections, and Details (Drawing No. 134019, dated 4/28/1942) (reduced, not to scale)**



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**Dry Dock Nos. 2 and 3, Plans and Cross-Sections (Drawing No. I-N16-258, dated 5/13/1940) (reduced, not to scale)**



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**Dry Dock Nos. 2 and 3, Electrical System Safety Improvements (Drawing No. 7027062,  
 dated 5/12/1981) (reduced, not to scale)**

