

U.S. NAVAL BASE, PEARL HARBOR, SOUTH QUAY WALL &
REPAIR WHARF
(U.S. Naval Base, Pearl Harbor, Naval Shipyard, Facility Nos. B-1 &
N-2)
L-shaped portion of quay walls starting at east side of mouth of Dry
Dock No. 1, continuing along ocean side of Sixth Street, adjacent to
Pier B-2
Pearl Harbor
Honolulu County
Hawaii

HABS HI-514

HI-514

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HI-514

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, SOUTH QUAY WALL & REPAIR WHARF (U.S. Naval Base, Pearl Harbor, Naval Shipyard) (Facility Nos. B-1 and N-2)

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HABS No. HI-514

Location: L-shaped portion of quay walls that start at east side of mouth of Dry Dock No.1 turning and continuing along ocean side of Sixth Street Adjacent to Pier B-2
Pearl Harbor Naval Base
City and County of Honolulu, Hawaii

This structure is at UTM coordinates 04.608090.2361480 and is within the boundaries of the Pearl Harbor, Naval Shipyard as defined in the location section of the overview report HI-483.

Significance: The South Quay Wall (comprising of Facilities B-1 and N-2) is one of the earliest berthing facilities at Pearl Harbor, built as a connection between Dry Dock No. 1 (HAER HI-65) and the 1010 Wharf. Considering its early construction date and difficult site conditions, the completion of this work was a significant engineering accomplishment. The South Quay Wall is located within the Pearl Harbor National Historic Landmark.

Description: The South Quay Wall was originally constructed as a single facility but has since been divided into two: Facilities B-1 and N-2, and its length has grown to encroach in to B-2. What we presently call Facility B-1 is the single straight run and curved track area of the South Quay Wall. The present Facility N-2 is the small boat berthing dock on the shorter leg perpendicular to Facility B-1. This report will cover these two Facilities as it was built originally, describing the design of the South Quay Wall and its subsequent modifications.

The South Quay Wall was built to support ship docking and repair; it also incorporated an area for small boat berthing adjacent to Dry Dock No. 1. As a connection piece between Dry Dock No.1 and the 1010 Wharf, its shape is slightly organic, suggestive of an L with a thicker short leg that curves at the intersection of the legs. Its organic form follows the curvilinear form of the train tracks that ran along 6th Street curving at the corner of Dry Dock No.1 and the South Quay Wall.

Facility B-1 Portion of the South Quay Wall

The deck, bents, and beams are of reinforced concrete. Both concrete and composite piles were used. The wearing surface of the

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deck is 8 feet above M.L.W. level.¹ Two pairs of tracks run down both sides of the straight length of the quay wall. Sewer, electrical and various other utility lines that support the docked ships are incorporated into the design of the deck.

The general dimensions of the deck are as follows: The straight long leg of the deck (bays 13 to 44) measures 316'-10" long x 69'-10" across. The curve that follows the train tracks (bays 9 to 12) at the intersection of the two legs of the L has a 98'-0", 53-degree radius. The straight shorter leg of the deck (bays 1 to 8) is 55'-0" long and 36'-3" at the widest point. The shorter leg holds the depressed landing for small boats. The small boat landing measures 20'-0" long x 6'-0" across and is 5'-0" below deck level.

The quay wall deck is described as follows: The deck thickness is 1'-0" thick. In transverse section, there are two continuous beams that are located directly under the rail tracks 'A and B'. The centerline of the beam under 'Track A' is located 6'-7" from the outer edge of the deck. Its bell-shaped cross-section is 7'-0" wide the base and 6'-0" in height from the top of the deck. It sits atop a double or triple row of piles. The beam under 'Track B' is 25'-0" from the centerline of the 'Track A' beam and has a cross section, which measures 7'-0" wide and 6'-0" high from the top of the deck. It has a circular opening measuring 2'-6" diameter x 2'-6" in height at every other bay, which is the manhole access. This beam, too, sits atop a double row of piles. There is a retaining wall along the edge of the quay wall that abuts the shoreline that is 6'-6" in height and 1'-2" thick. In 1966, the width of the deck was widened by 14'-6" on the ocean side. Two rows of hexagonally shaped piles support this new edge and the bitts and cleats were moved to the new outer curb. This new addition changed the profile of the quay wall significantly.

In the longitudinal direction, 18" wide bents are located at the centerline of each bay, 10'-0" on-center. Rows of piles are located directly under these bents. In elevation, the bent is not a simple rectangular shape. The bent measures 4'-0" in height from the top of the deck to the underside of the bent in the area between the two beams which support 'Track A and B'. It then decreases in size to only 2'-9" in height from the top of the deck to the underside of the bent between 'Track B' and the retaining wall edge. It then gradually increases in size and strength again at the retaining wall edge where it slants down to reach a height of 6'-0" at the piles in front of the retaining wall.

The quay wall is supported by hundreds of pre-cast square piles that support the deck and tracks. The piles have a cross section that

¹ The Mean Low Water (M.L.W) elevation is designated as 100.0' and the Mean High Water (M.H.W.) elevation is designated as 101.5'. Thus, the height of the deck, shown on 1922 drawing # 95580 as 108.1' elevation, is about 8 feet above the water level.

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measures 18" x 18". The lengths of the piles vary by location, which ranges from 50' to 105' feet in length.

The straight run of the deck (bays 13 to 44) is supported by a total of 31 bents spaced 10'-0" on-center. The piles located directly under the train tracks are dense, with double rows of piles spaced 3'-4" on-center between bays 15 to 29 and triple rows of piles spaced 1'-6" on-center staggered from bays 30 to 44. The piles supporting the rest of the deck are more sparsely spaced, with the piles aligned along each bent, 7'-3" on-center from bays 15 to 29 and 4'-3" on-center from bays 30 to 44.

The curved section of the deck (bays 9 to 12) is supported by four bents spaced at approximately 10' on-center. The piles located directly under the tracks are similar to those of the straight run of the deck between bays 15 to 29, except for the last portion of the curve which is supported by cylindrical piles spaced 1'-6" on-center staggered.

The ocean floor under the quay wall has, at its deepest end, a depth of approximately 38', which slopes up to land at a 1½: 1 slope. The piles were hammered down between 30 to 50 feet past the ocean bottom. The piles pierced a thick stratum of hard material, which serves to materially strengthen and support the piles.

The quay wall was designed primarily for the support of a 15-ton locomotive crane and a 50-ton electric dry dock crane. A 15-ton traveling job crane is supported by a standard rail track. The 50-ton electric dry dock crane runs on eight wheels, with four wheels on 'Track A' and four wheels on 'Track B'.

At the underside of the deck are electrical and utility lines that run through and under the beams and bents. Those electrical lines that run through sections of beams and bents are encapsulated in hollow concrete square ducts having wall thicknesses of 6". Manhole openings, with cast-iron frames and covers are located on the deck surface above the concrete ducts for access to the electrical system. Two electrical outlet areas, one 13'-0" and one 18'-0" long, are located on the ocean side of the quay wall between bays 28 and 34. These electrical bays jog into the side of the bay; it is unclear when these were built, but they were in existence at the time of the 1966 renovation.

On the ocean side(s) of the slab is a concrete curb. The concrete curb is 10" high and 16" wide. Cleats and bits are spaced every other one at every other bay or every two bays and sit on trapezoidal concrete pads that match the height of the curb. The bits are paired and are spaced 120'-0" on-center along the edge of the quay wall and are integral to the structure of the deck. 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. When

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the width of the deck was widened in 1966, the profile of the quay wall changed significantly. The bents no longer project beyond the edge of the quay wall, allowing for a well-integrated fender system that connected directly to the projecting bents. Instead, the edge of the bents aligns with the curb face.

Originally, a wood fender assembly of timber piles and horizontal timber planks attached to the concrete bents. Timber piles butted directly up against the concrete bents and were bolted to a 12" x 12" 'wale' piece at the top of the concrete curb with 4" x 12" x 12" blocking pieces between the wale and the concrete. 8" x 12" or 12" x 30" 'chocks' run between the timber piles, giving the piece stability and strength. On the outside face of the timber piles were horizontal wood planks attached. In 1966, when the quay wall was widened, this well-integrated fender, was replaced with intermittently spaced round creosoted timber piles measuring approximately 1'-6" in diameter. The timber piles are supported by a horizontal row of chocks and blocks that is attached to the top of the curb.

Presently, the quay walls are in fair condition. However, the integrity of the deck has been compromised due to the widening of the deck, removal of the tracks, and the repaving of the deck. The fender system is in disrepair, with many of the piles missing completely.

N-2 Portion of the South Quay Wall

The shorter leg of the quay wall that holds the small boat berthing dock is simply designed, with two stairs descending down onto the lower dock platform from both sides. The stair widths are 5'-0". Seven vertical pipe rails standing at regular intervals on a 10" high concrete curb with two steel chains strung through horizontally are all that prevent one from falling into the dock below. The small boat berthing dock does not have a concrete curb at its edge. Originally, the edge was faced with a timber curb that was flush with the top of the dock. However, this curb is now gone, and the edge is left bare. Two cleats are attached to the edge of the small boat berthing dock, one at each end of the dock.

The piles supporting this shorter leg of the deck, which does not have to support any weight except for the deck itself, are spaced in a grid pattern, 7'-3" on-center in the transverse direction and 10'-0" on-center in the longitudinal direction.

Historical Context:

At the time of the completion of Dry Dock No. 1 in 1919, it was said to be one of the largest dry docks in the world, having a length of 1,001'-0" and a width of 114'-0". Soon after the completion of Dry Dock No.1, 1010 Wharf (Fac. B-2 and part of B-3) was constructed under contract number 2178 in 1920. Work on the South Quay Wall began in 1923 and was completed in 1924 at a cost of \$773,886 under

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contract number 4591 (*Property Record Card*). The South Quay Wall was built as a connection between 1010 Foot Wharf (Fac. B-2) and Dry Dock No.1.

During the Japanese attack on Pearl Harbor on December 7, 1941 the submarine *USS Cachalot* was moored at B-1 undergoing scheduled maintenance. Minutes after the attack had begun; the *Cachalot* was firing at enemy planes passing within range with its .30 and .50 caliber machine guns. The *Cachalot* received no damage during the attack, the nearest torpedo to the vessel struck about 100 yards astern, (Christensen, 1941) passing under the *USS Oglala* and striking the *USS Helena*, both were moored side-by-side at 1010 Dock (USS Helena CL-50)

Quay wall facilities at Pearl Harbor are unlike building facilities, due to the fact that they abut one another along the shoreline without clear divisions. Because of this, facility demarcations move, areas are renamed, and facility sizes shorten and elongate over time. Such is the case with the South Quay Wall.

The South Quay Wall was originally built as a single facility that wrapped from the wall of Dry Dock No. 1 to the edge of 1010 Wharf. However, in 1946, this quay wall was divided and renamed into two facilities, B-1 and N-2. When this happened, most of what was considered the east-side wall of Dry Dock No.1 was incorporated into the new N-2 portion along with the small boat landing area of the South Quay Wall. Later, the portion now called B-1 was re-demarcated. When the South Quay wall was built in 1923, it had a length of 348'-0". According to the drawings, by 1965, when B-1 was repaired and upgraded, its length had grown to 400'-0" in length, encroaching into a portion of the original 1010 Wharf. At about the same time, Facility B-3 was also elongated, encroaching into a portion of the original 1010 Wharf. These encroachments have caused the length of the original 1010 Wharf (Facility B-2) to have shortened to less than 800'-0" long.

In 1966, the quay walls along the length of First Street were enlarged, repaired, and upgraded. Under MCN Projects U106-01 and V101-01 Contract No. Nby-50755, Hawaiian Dredging Company reconstructed several portions of quay walls B-1, B-2, and B-3. The work included wharf expansion and upgrading of electrical and water lines. Total cost for the construction of Facility B-1 was \$888,322.00. More upgrades were undergone in 1982 and again in 1997.

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

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Sources:

Christensen, W. N. December 10, 1941 letter to the Commander in Chief, US Pacific Fleet from the Commanding Officer of the USS Cachalot, "*Report of Raid of December Seventh.*"
From website www.history.navy.mil/docs/wwii/pearl/ph28.
accessed May 17, 2005.

Helber Hastert & Fee Planners, Inc.
2002 *Pearl Harbor Naval Complex Integrated Cultural Resources Management Plan*. Prepared by Helber Hastert & Fee Planners under Contract with Pacific Division, Naval Facilities Engineering Command for Commander, Navy Region Hawaii.

National Archives II, Still Photo Collection
Photos in group RG71CA, Box 166 and 171-B and 176C

NAVFACPAC: Plan Files. Drawings for Facility B-1 and N-2. Original drawings dated 1920, 1922, 1923, 1926, 1928, and 1966.

Pearl Harbor Shipyard
1947 Property Record Card, Structures and Miscellaneous Utilities- Navcompt Form 267 (5 pt) (Rev. 8-57). On file with the Pearl Harbor Naval Shipyard Facility Files.

USS Helena CL-50. History of the *USS Helena*.
From website www.multied.com/Navy/Cruiser/Helena.
accessed May 17, 2005.

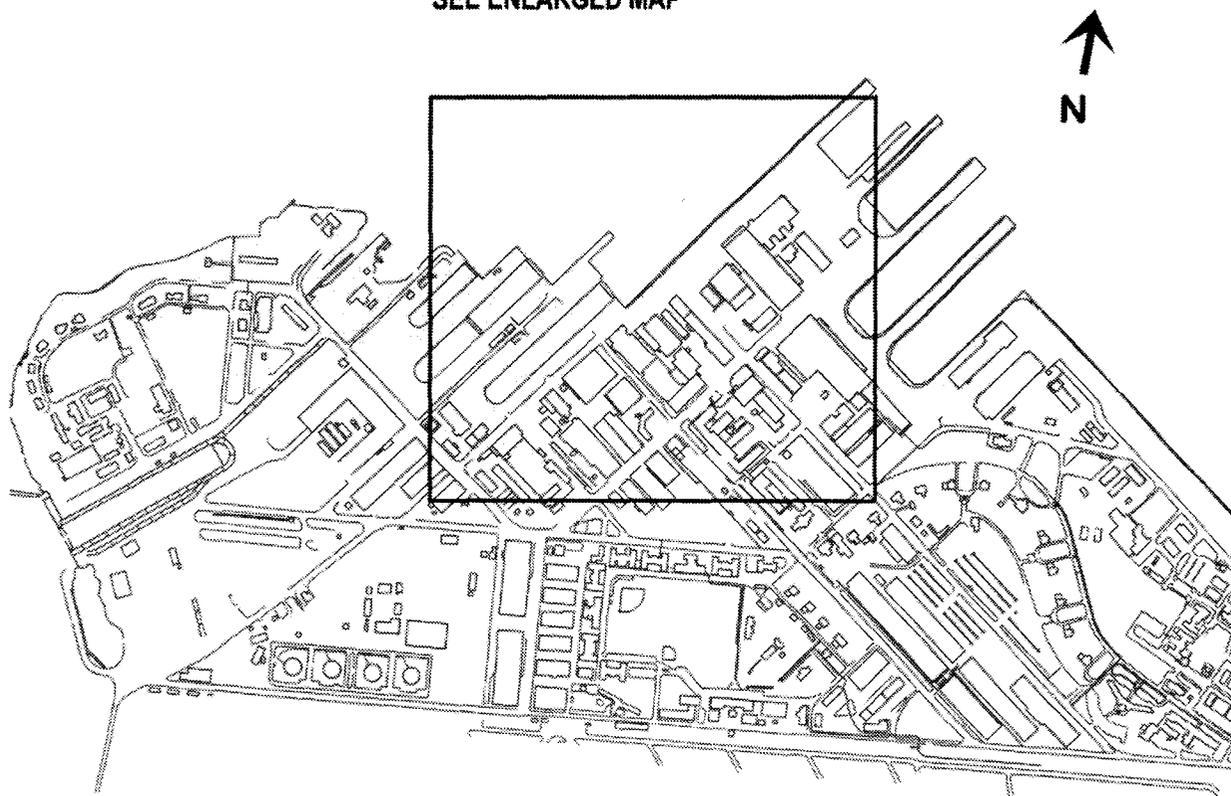
Project Information:

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

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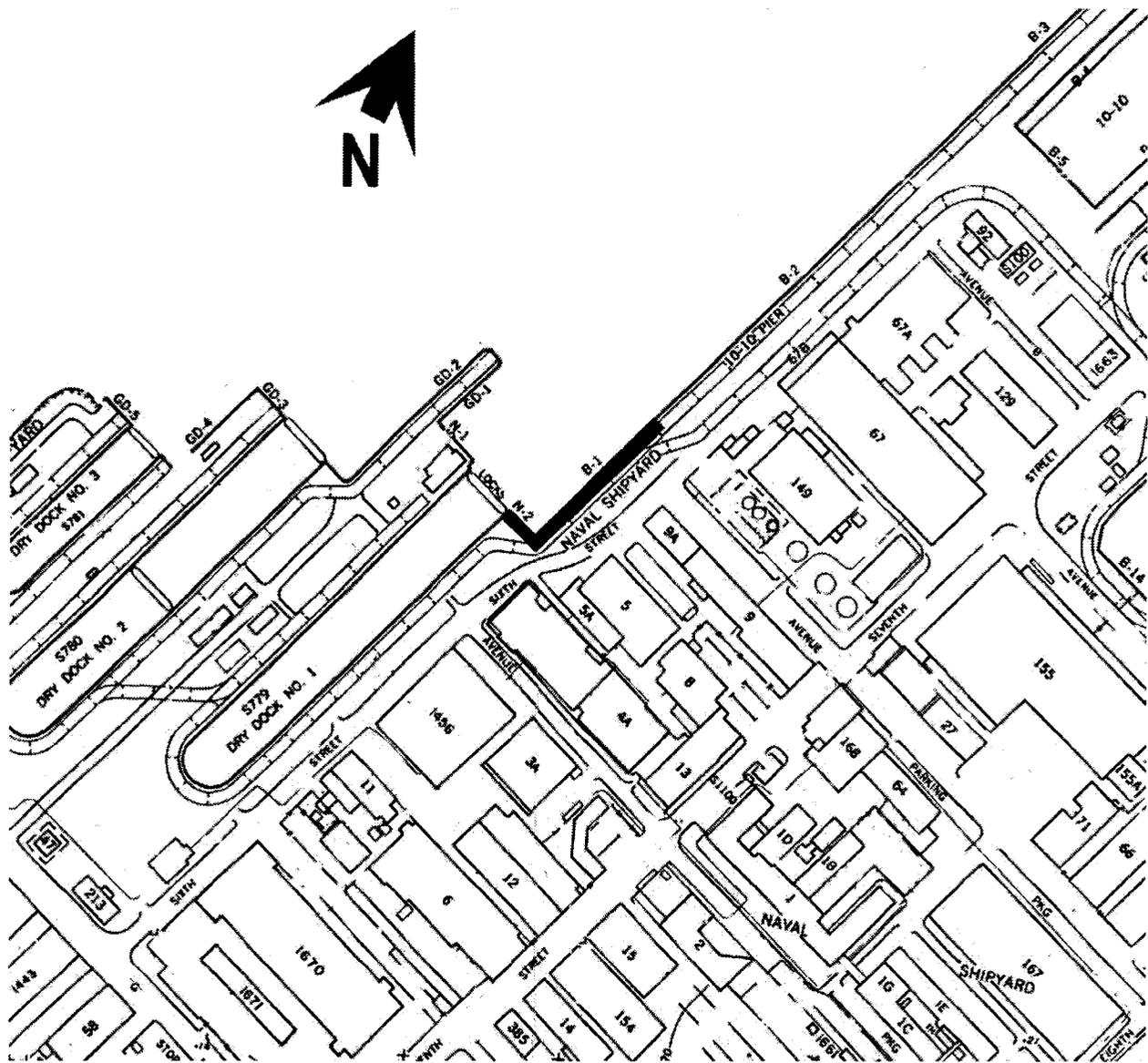
Shipyard Map

SEE ENLARGED MAP



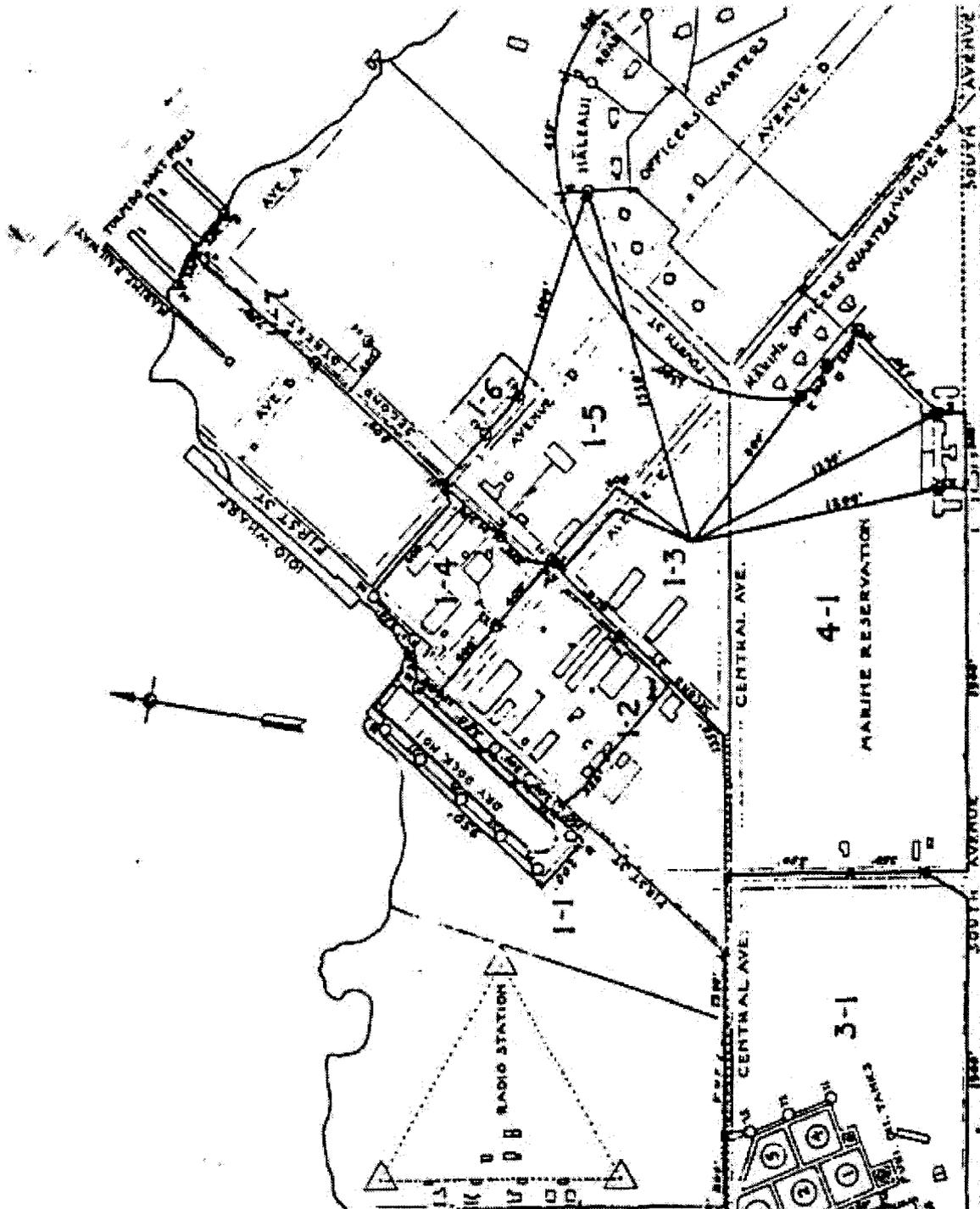
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Enlarged Area Map (reduced, not to scale)



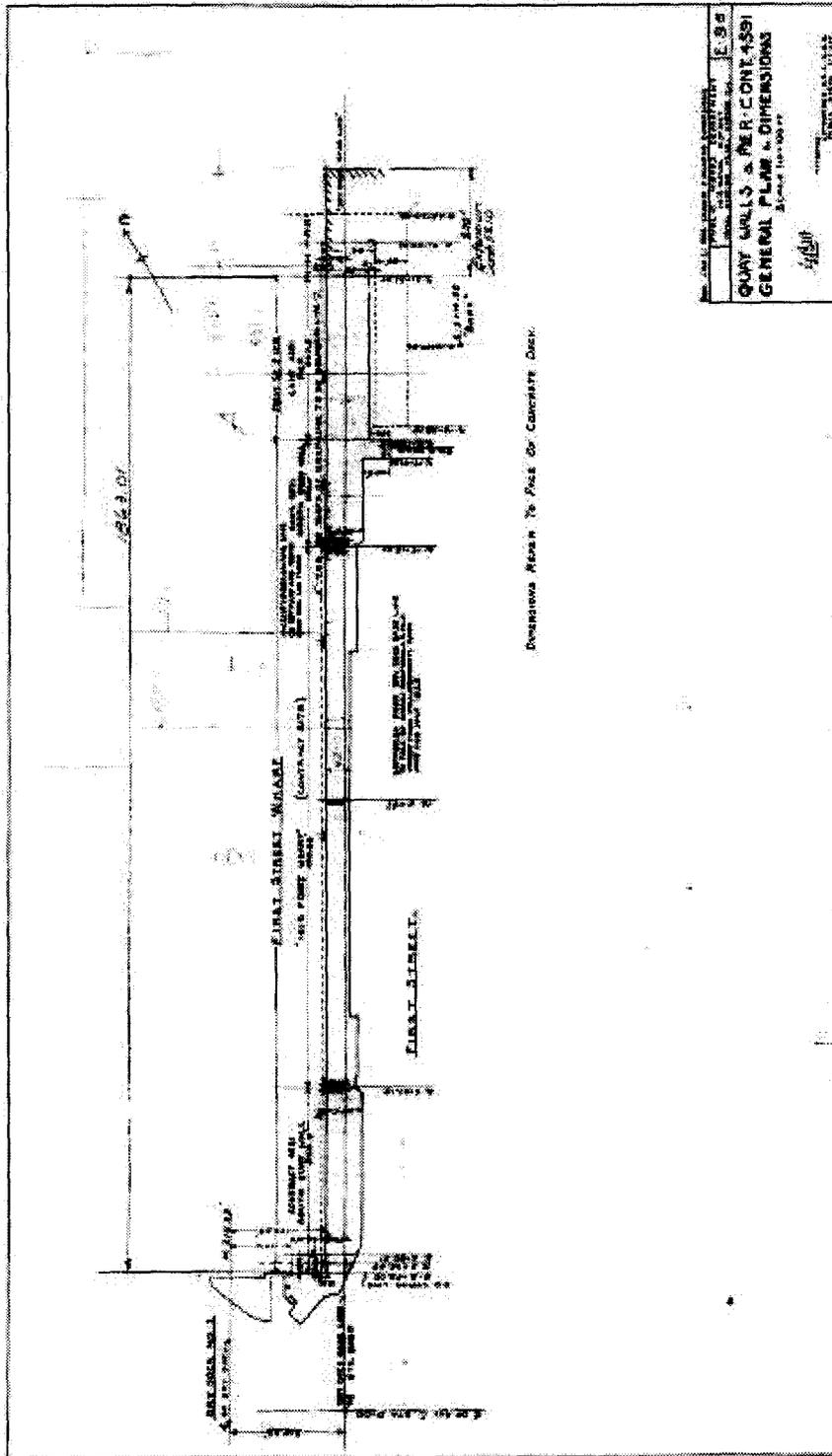
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1920 Map of Shipyard Showing Area Before Construction of South Quay Wall (Jan. 2, 1920 Fire Map of Yard) (reduced, not to scale)



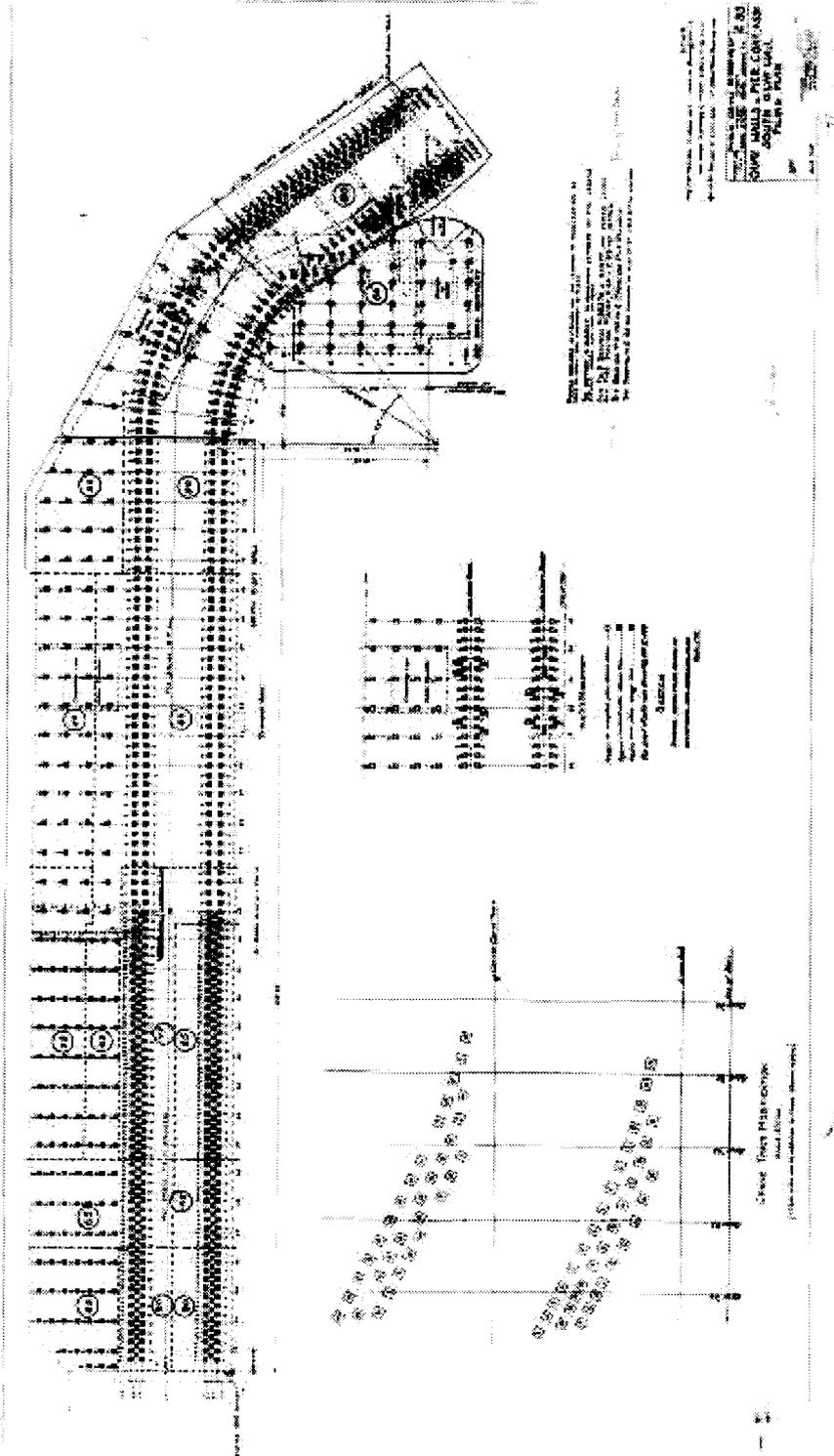
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General Plan and Dimensions of Quay Walls and Pier, including South Quay Wall
 (Drawing No. E-96, dated 1/21/1926) (reduced, not to scale)



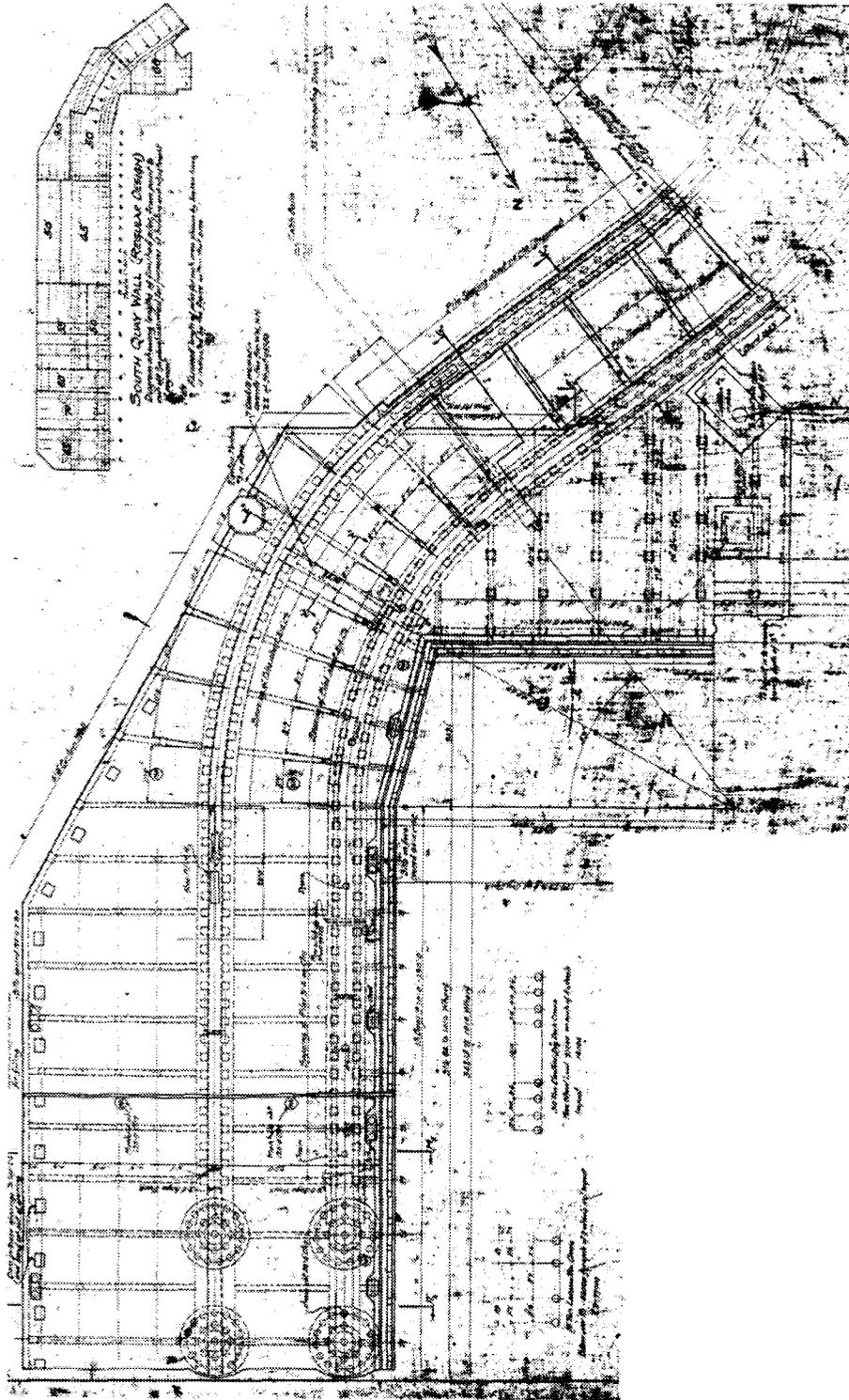
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South Quay Wall Piling Plan (Drawing No. E-93, dated 3/29/1923) (reduced, not to scale)



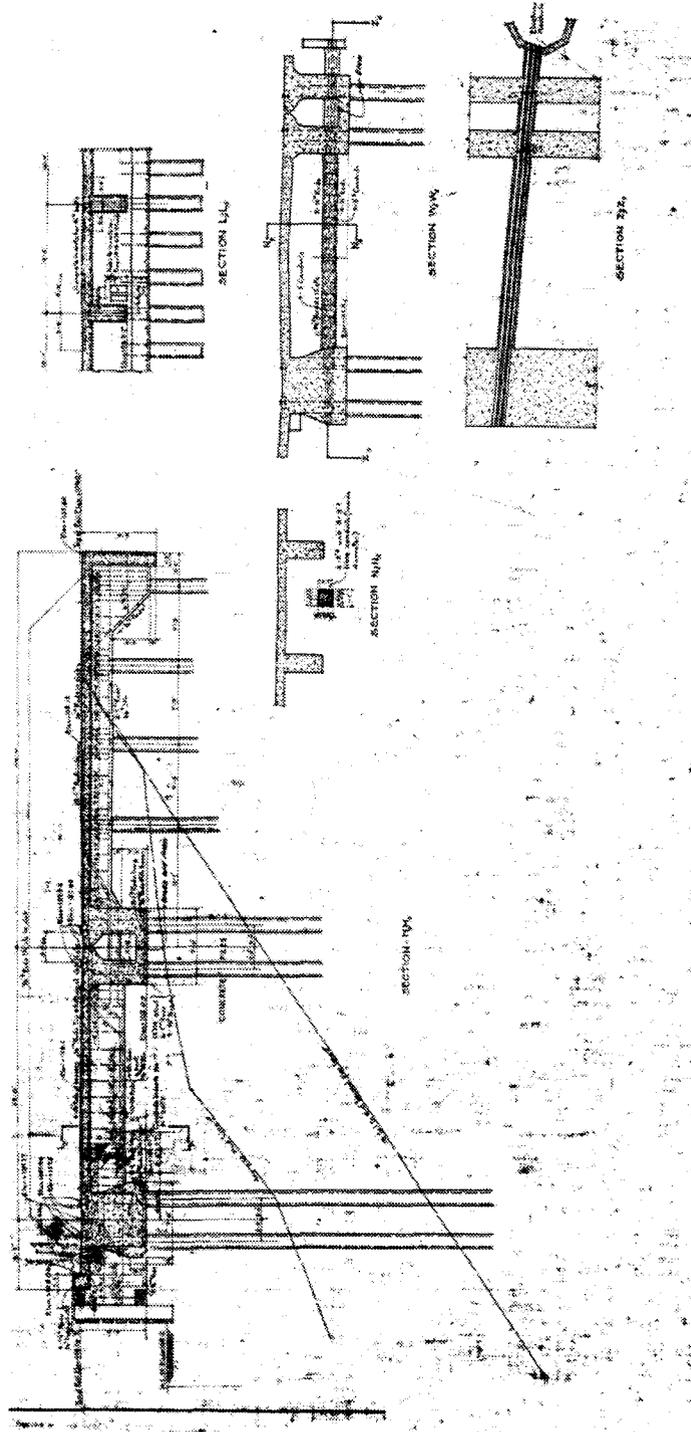
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General Layout of South Quay Wall (portion of Drawing No. 95577, dated 6/6/1922)
(reduced, not to scale)



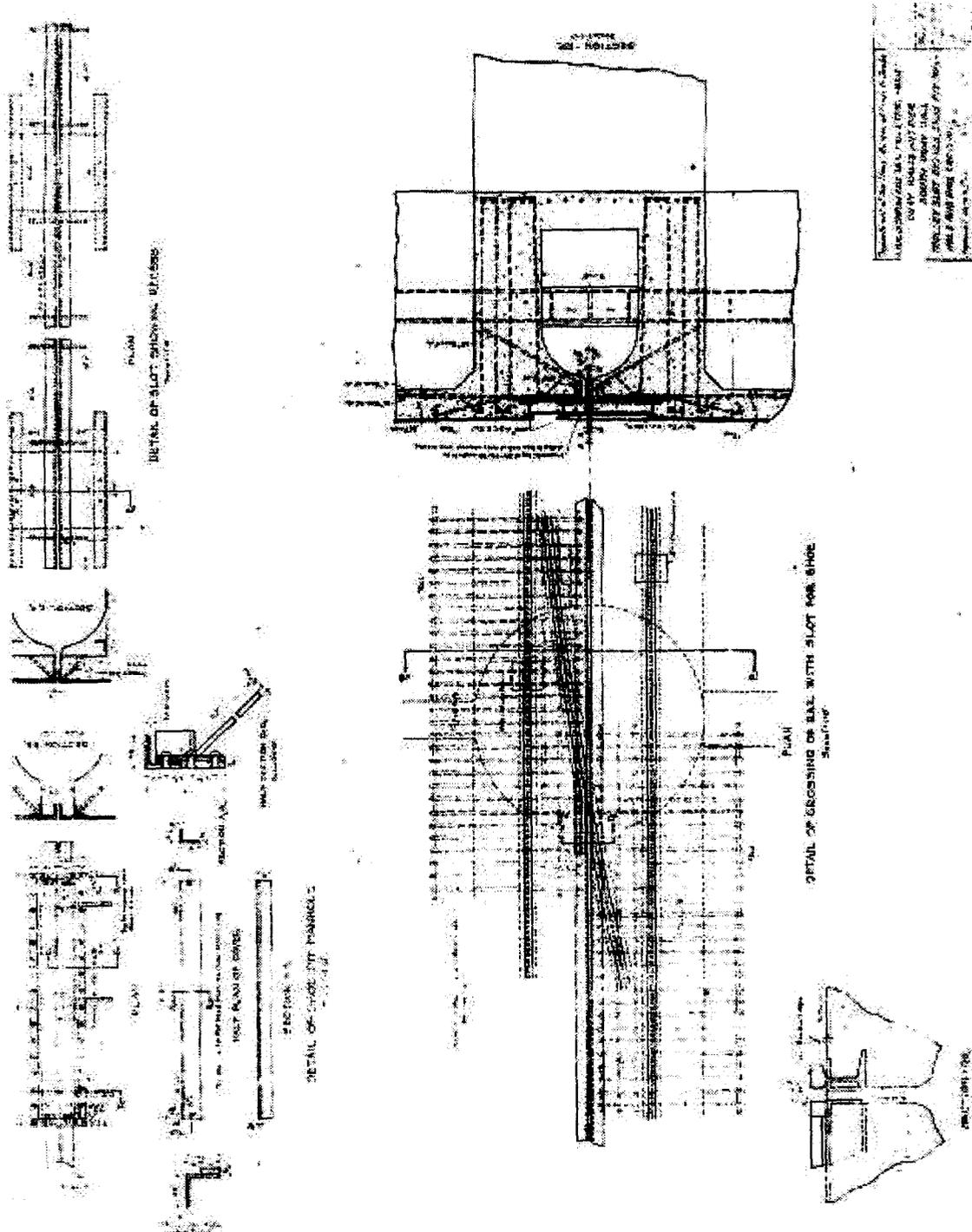
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Plans and Sections of South Quay Wall (portion of Drawing No. 95580, dated 6/6/1922)
(reduced, not to scale)



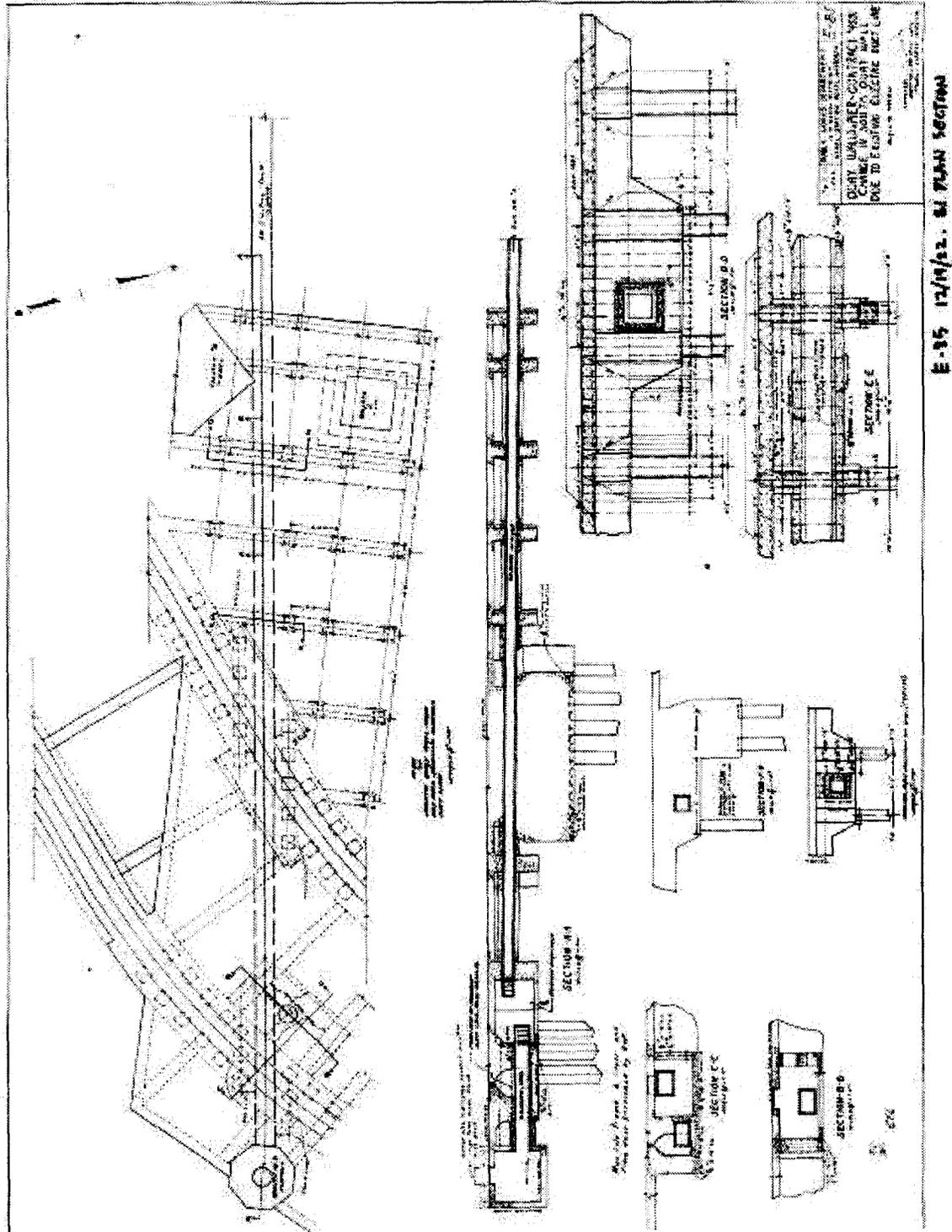
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Trolley Slot Details, Shoe Pit Manhole and Rail Crossing (Drawing No. 95596, dated 6/6/1922) (partial drawing, reduced, not to scale)



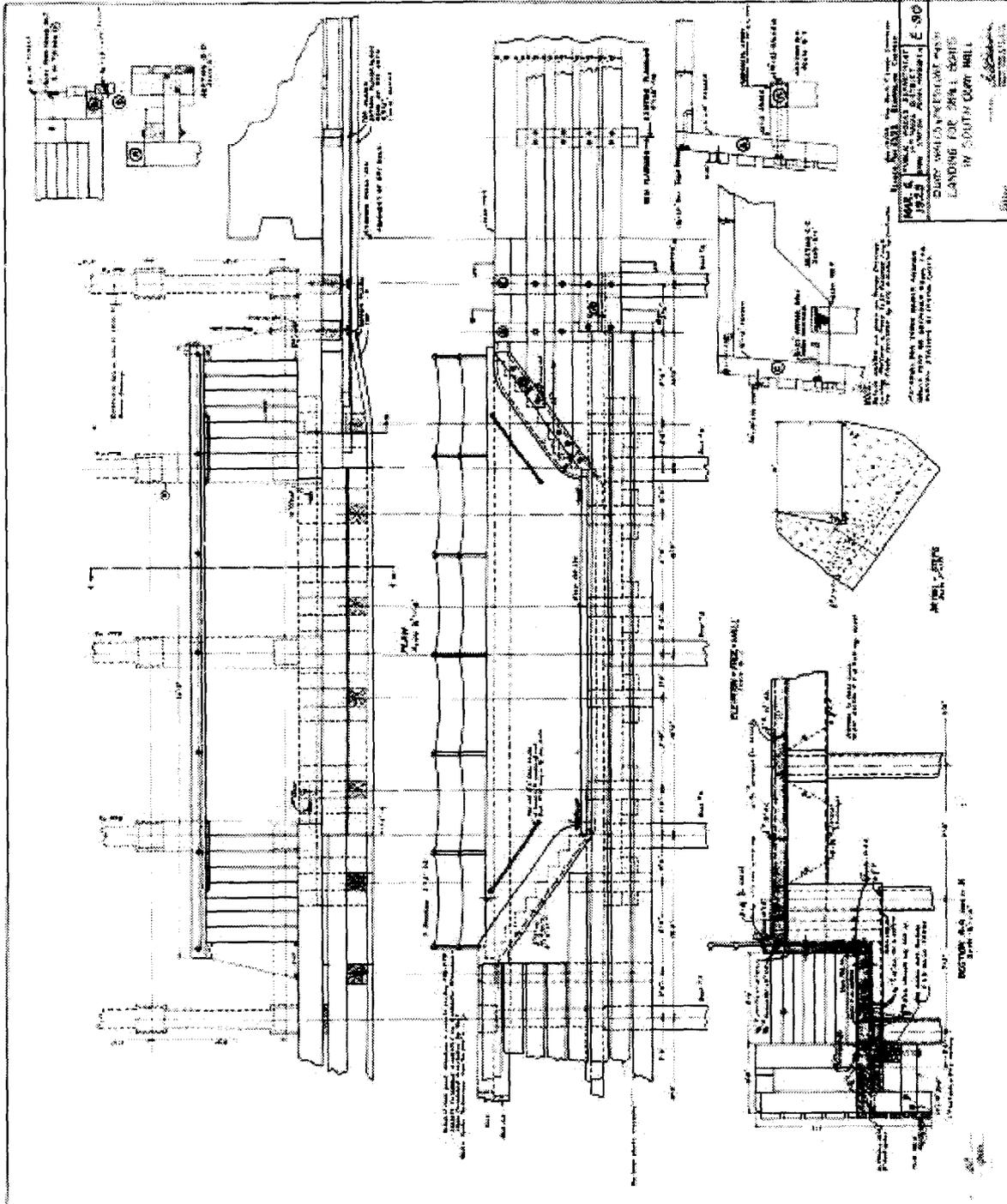
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Change in South Quay Wall due to Existing Electric Duct Line
(Drawing No. E-85, dated 12/19/1922) (partial drawing, reduced, not to scale)



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Landing for Small Boats in South Quay Wall (Drawing No. E-90, dated 3/6/1923)
(reduced, not to scale)



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Framing Plan and Section of Reconstruction of Pier B-1
(Drawing No. 1084259, dated 6/17/1966) (reduced, not to scale)

