

U.S. NAVAL BASE, PEARL HARBOR, MARINE RAILWAY NO. 2
(U.S. Naval Base, Pearl Harbor, Naval Shipyard, Facility No. S777)
Near intersection of Avenue G & Third Street
Pearl Harbor
Honolulu County
Hawaii

HABS HI-513

HI-513

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HI-513

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, MARINE RAILWAY NO. 2 (U.S. Naval Base, Pearl Harbor, Naval Shipyard) (Facility No. S777)

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Location:

Near the intersection of Avenue G and Third Street,
just past Dry Dock 3 heading northwest, next to the crane wharf
Pearl Harbor Naval Base
City and County of Honolulu, Hawaii

This building falls within the UTM coordinates of the Pearl Harbor, Naval Shipyard as defined in the location section of the overview report HABS No. HI-483. This facility's UTM coordinates are: Zone 4 607500E 2361320N.

Significance:

Marine Railway No. 2 was located within the Pearl Harbor National Historic Landmark but has since been demolished. Completed during World War II after the Japanese attack on Pearl Harbor, it played a significant role in the repair of Pacific fleet ships as they were home-ported for repairs. The design of the Marine Railway is significant as well, with rails, cradle, and superstructure of steel beams and steel girder cross members that made it a notable piece of work. Upon its completion, it was recognized as the best marine railway in the world by its builders. The only portion that remains is the metal tracks upon which its cradle ran.

Description:

The Marine Railway No. 2 was a permanent, 24'-0" high, 3000-ton capacity structure. It consisted of a steel superstructure that sat on a large concrete platform (rectangular shaped with angled corners having an overall size of approximately 100' x 65'), which was then supported by wood and concrete pile foundations. The overall length of the rails was 836'-0"; however, more than 50% was submerged in the harbor.

Subsoil conditions were ascertained by ten core borings; pile driving was governed accordingly. Wood piles for the rails were staggered in double rows, spaced from two to five foot intervals.

The 836'-0" long marine railway tracks slope at 7/8": 1'-0" from elevation 108'-0", at the machinery house (HABS HI-501) on shore to elevation 50'-0" at the outboard end. (The Mean Low Water (M.L.W) elevation is designated as 100.0' thus the elevation at the machinery house was about 8' above the water level.) Dredging (under contract Noy-4173) entailed the removal of approximately 50,000 cu. yds. of material; the dredging line extended five feet below the top of the rail line. In the construction of marine railway No. 2, unusually hard limestone, or coral, was met at the inshore end of the excavation. It

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ranged from 5'-0" to 22'-0" in thickness and was covered by a layer of volcanic rock ranging from 3'-0" to 9'-0" thick.

By taking advantage of the availability of a Navy-owned floating crane having a capacity of 150 tons, and an overhang of more than 60'-0", the contractor was able to construct and place great ladder-like sections, of precast reinforced concrete on the pile foundations of the ground-way; and by the use of elements of this length, to produce a bed, for the steel rails, every point of which fell within hitherto unapproached limits of tolerance from the established grades and slope, before the mass of tremie concrete was poured around pile caps below groundway.

The runways are heavy steel strips, imbedded in concrete, supported on piles, over which the cradle moves on rollers. Instead of starting at the foundation and building up, however, the finished runways were first set in place, and the foundation concrete was then poured under and around them. First, large ladder-like sections, 119'-0" long (and including both runways set 16'-0" apart, separated by struts) were constructed of steel and concrete. Each of these precast sections (weigh about 100 tons) was then picked up by a floating crane (Navy) and lowered into place (under water) on top of the previously driven piles. After setting to grade, forms were placed and concrete poured (tremie method) completely imbedding the precast sections. To precast the runway sections, a 90'-0" x 142'-0" casting yard was established on the shore, adjacent to the site, included a timber wharf for the 150-ton floating crane. Five of the underwater sections were 119'-3³/₄" long, the sixth, or outboard section, 100'-0" long (including the back haul sheaves cast in place). The forms provided a 3" cover for all steel; pouring was done continuously in three-section rows, two sections high.

Steel, both for struts and for the 'beams' under the rails, was fabricated from old laced struts salvaged from the coaling plant (HABS HI-517), which was dismantled to allow for the construction of Dry Dock No. 4. A rod-bracing system was used to correct alignment before concreting; short angle-iron spacers were cast into beams, for later tremie-pour forms; also, four pick points were provided on each side of the "ladder" by casting sections of pipe in place. Section ends were equipped with male and female joints, for heavy-steel-pin connection. For lifting the sections, a special frame was constructed; from it, lift pennants were secured to pick points. The clearance, from the end of the crane to the supporting barge- 62'-2"- was only slightly more than half the length of the sections.

Meanwhile, piles were cut off to slope; wood landing caps, spaced twenty feet on centers (except section ends), counter-weighted, were set in place by drivers, to receive the precast sections. Screw jacks, placed on the caps, were used for leveling adjustments (final tolerance: 1/16"); the divers used removable jacks for horizontal adjustments.

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After alignment of rail sections, concrete forms were placed for tremie concrete, anchored to spacers cast into the runway sections, concrete poured by tremies; thus runway sections, and tops of piling (down to excavated grade), were completely imbedded. Ohia wood chain troughs were anchored in place, spanning struts to the top of which concrete had been poured.

The inboard section of the runways (141'-0") was poured in the dry. (A small construction dam of sheet piling was necessary at the lower end of the section.)

The cradle and superstructure are of steel plate-girder cross members, spanning bearing members which rest on roller nests. The deck, of 3" planking is framed up (from the cradle) to level. Adjustable blocking can be moved into place, in docking a ship, by winches located atop steel framing built up from the edges of the cradle and extending above the water line.

Within the working area for the marine railway, it was necessary to remove several structures, among the more important of them were: paint stores belonging to the Navy Yard paint shop (Shop No. 71); a transformer station, and related electrical facilities, serving floating dry dock YFD-2; a small frame storehouse; a frame latrine.

Historical Context:

Most of the waterfront facilities at Pearl Harbor were developed in the period of 1940-1945, due to the fact that in 1940 the entire Pacific fleet was ordered to remain at Pearl Harbor. In the period following the December 7, 1941 attack, the Navy Yard's repair facilities were expanded to keep up with the ever-demanding needs of the war. The Marine Railway was built in 1943 by the Pacific Bridge Company, who had also completed other important waterfront facilities in this period such as the crane wharf (Facility 1461, HABS HI-510) which was alongside it, and Dry Docks Nos. 2 and 3 (~~HAER HI-05A and HAER HI-05B~~). HAER HI-66 and HAER HI-67

Construction of the marine railway was begun 1 January 1943 and construction was completed 15 September 1943. Because of the urgent need for the railway, the Bureau directed duplication of a purchase order, given to Frederick Snare Corporation, under Noy-4080, for the 3,000-ton Cristobal marine railway. (Since its construction was nearer to completion than the Cristobal railway, the hoist and chain ordered for the latter were diverted to Pearl Harbor even though the substitution required a motor change to adapt them to the power characteristics available.) The same directive instructed that necessary ground way and pier drawings, etc., be prepared in the 14th Naval District.

Pacific Bridge Company was selected for the work of constructing the 3,000-ton marine railway, which included the crane wharf (Facility 1461), as well as several other jobs such as crane construction, substation facilities construction, etc. The company was, at the time,

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engaged in the construction of dry docks No. 2 and 3 at Pearl Harbor (under Noy-3825), which work was nearing completion. It was believed that the experience gained in connection with this work and the continuing availability and use of contractor's equipment already at the site (or in close proximity to it) were factors that would make the selection markedly advantageous to the Government. (Pacific Bridge, 1944)

Although the Marine Railway and the Crane Wharf are not connected and were given two separate facility numbers from its inception, they were built at the same time and worked together. The Crane Wharf facilitated the needs of the marine railway, providing cranes to hoist and move large objects and structures from and to ships as they were being repaired. The services that were integral parts of the Marine Railway such as fresh water, air, steam, and electricity were supplied by the Crane Wharf.

Facility S777 was in use up until 1977. A Historic Resources Inventory was written in October of 1980, and it was dismantled soon after. The "landing craft" was not removed and remained parked on the land next to the Winch House until 1999. All that is left of the Marine railway is the metal tracks upon which the cradle ran.

See HABS No. HI-510 for information on its adjacent Facility 1461, Crane Wharf.

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

Sources:

The original drawings for this building are on microfilm at NAVFACPAC Plan Files. They include:

- Marine Railway No. 2 General Plan (Drawing No. I-N17-119, dated 2/8/1943)
- Dredging Plan, Section, and Elevation (Drawing No. I-N17-120, dated 2/1/1943)
- Street Lighting and Floodlighting Layout and Details (Drawing No. I-N17-127, dated 3/4/1947)
- Marine Railway No. 2 Condition as of July 8, 1949, Soundings and Profile (Drawing No. B-N17-108, dated 8/22/1950)
- Marine Railway No. 2 Condition as of July 8, 1949, Sections through Cradle and Rail in Relation to Crane Wharf and Ocean Bottom (Drawing No. B-N17-110, dated 8/22/1950)
- Marine Railway No. 2 Condition as of July 8, 1949, Sections through Cradle and Rail in Relation to Crane Wharf and Ocean Bottom (Drawing No. B-N17-111, dated 8/22/1950))
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Nakahara, Kenneth. *Historic Resources Inventory Form for Marine Railway No. 2*, 1980. Prepared by Pearl Harbor Naval Shipyard, Facilities Planning & Programming for State Historic Preservation Office.

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.

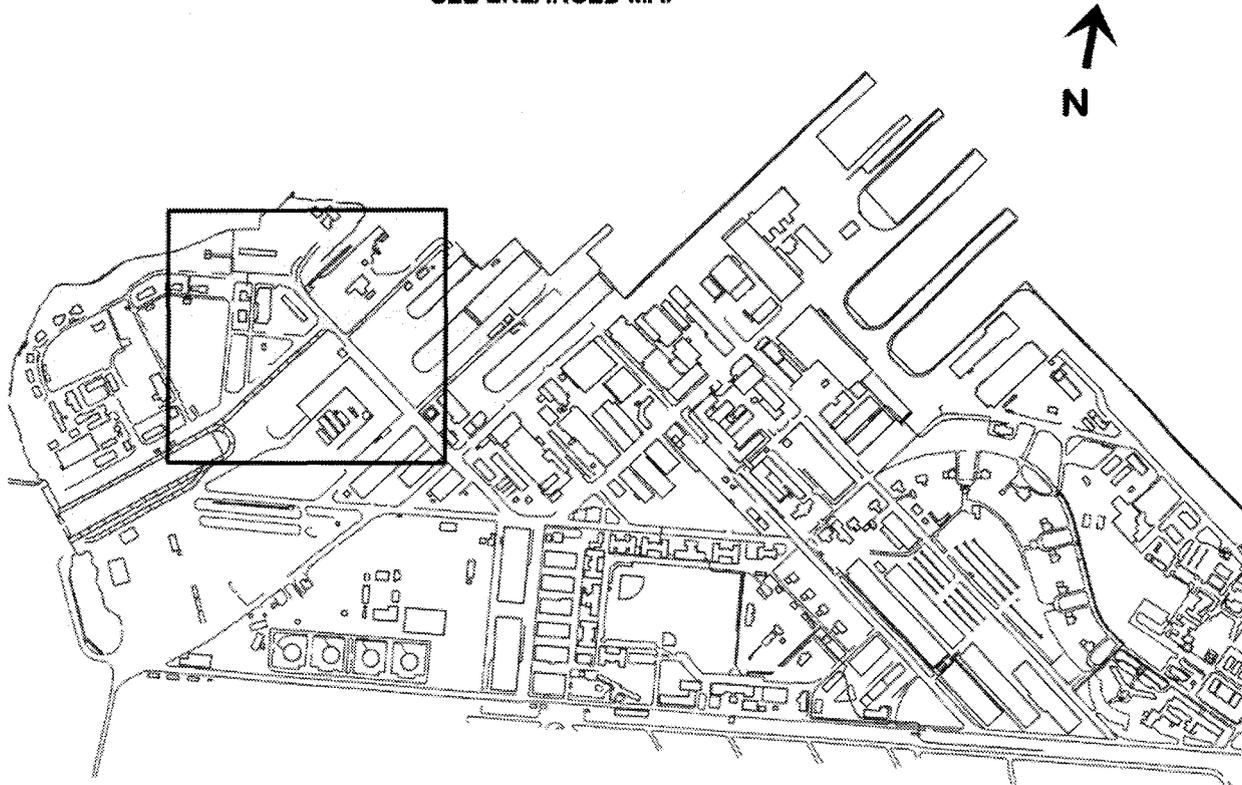
Project Information:

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, 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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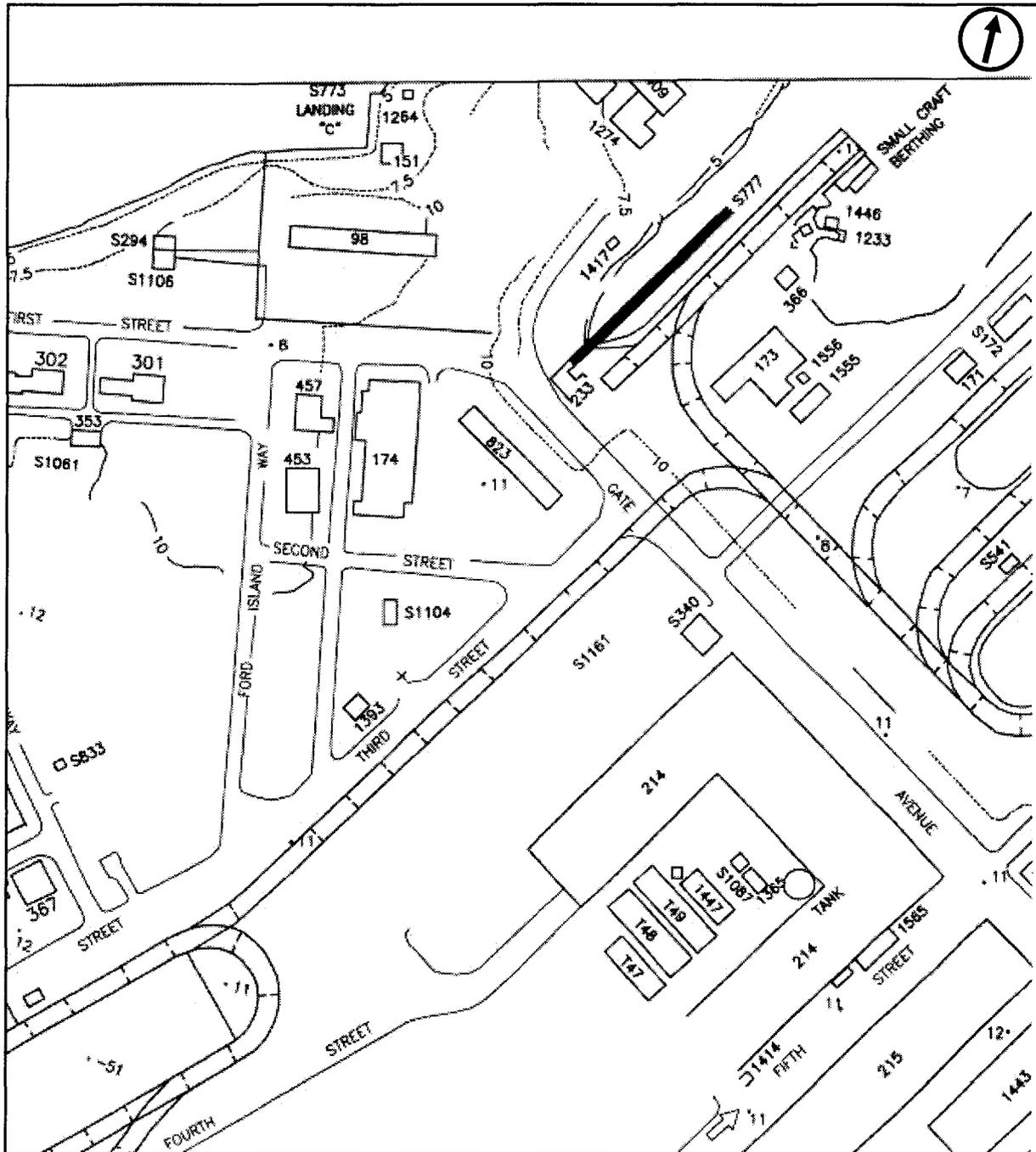
Shipyard Map

SEE ENLARGED MAP



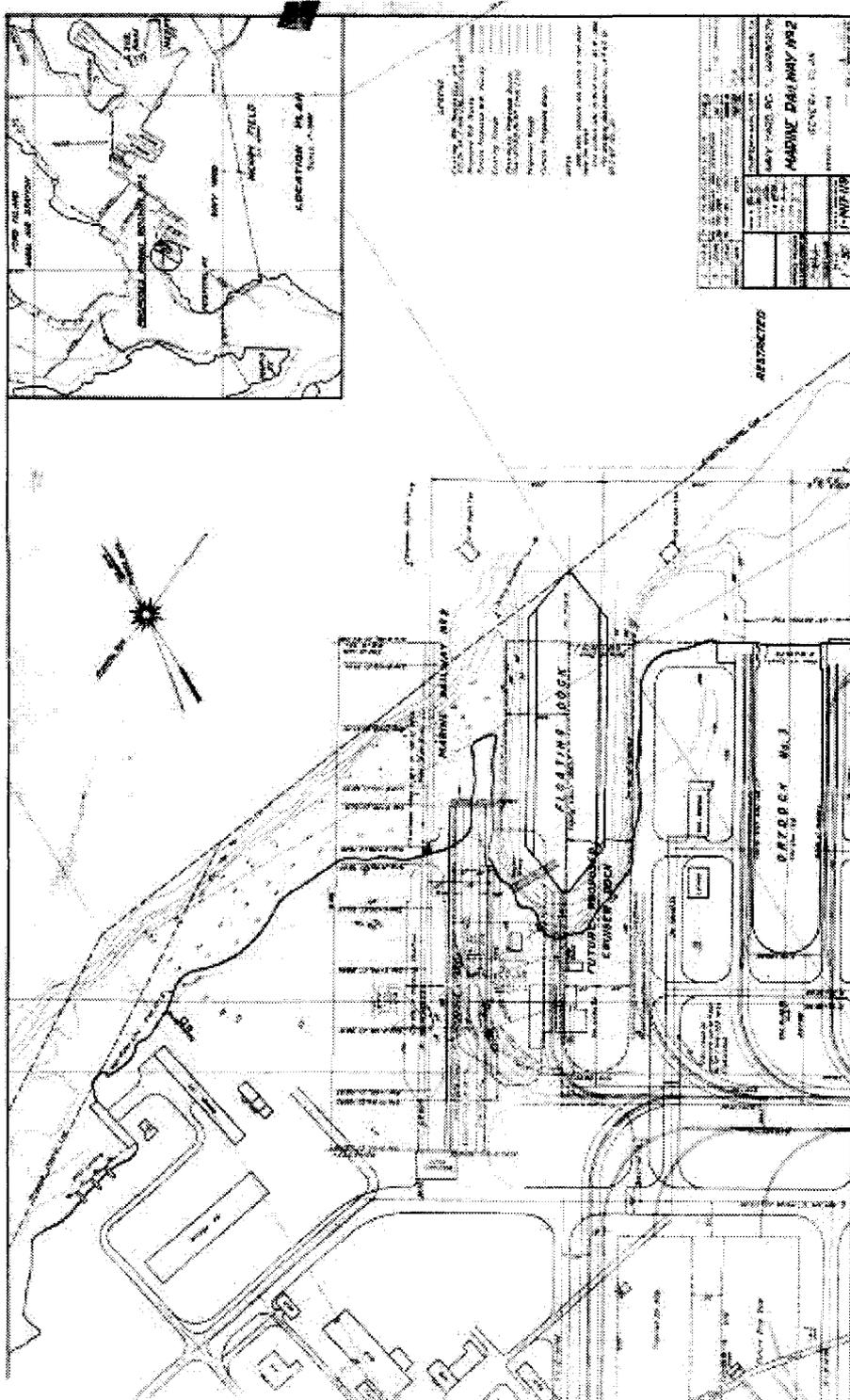
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Enlarged Area Map (reduced, not to scale)



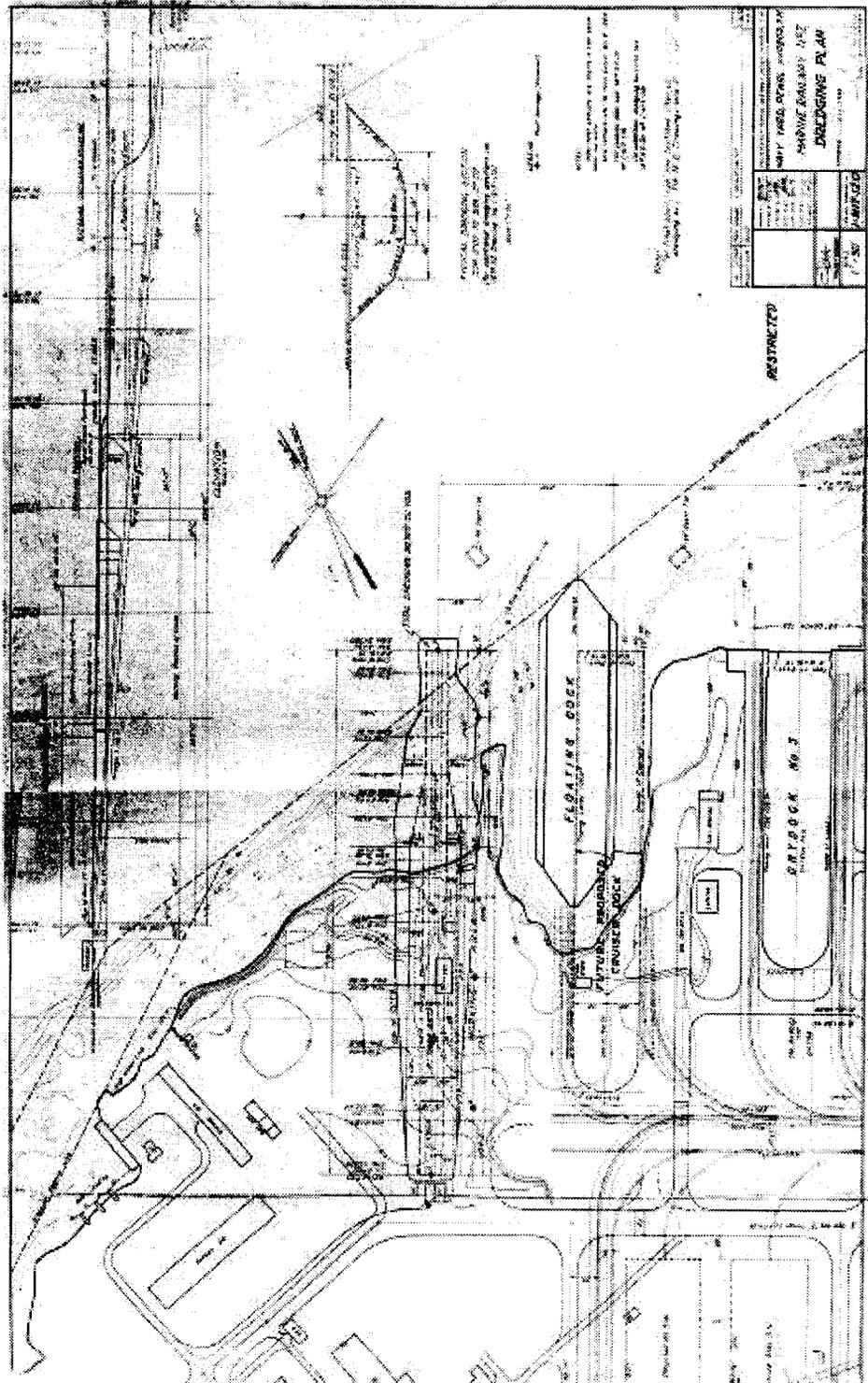
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Marine Railway No. 2 General Plan (Drawing No. I-N17-119, dated 2/8/1943)
 (reduced, not to scale)



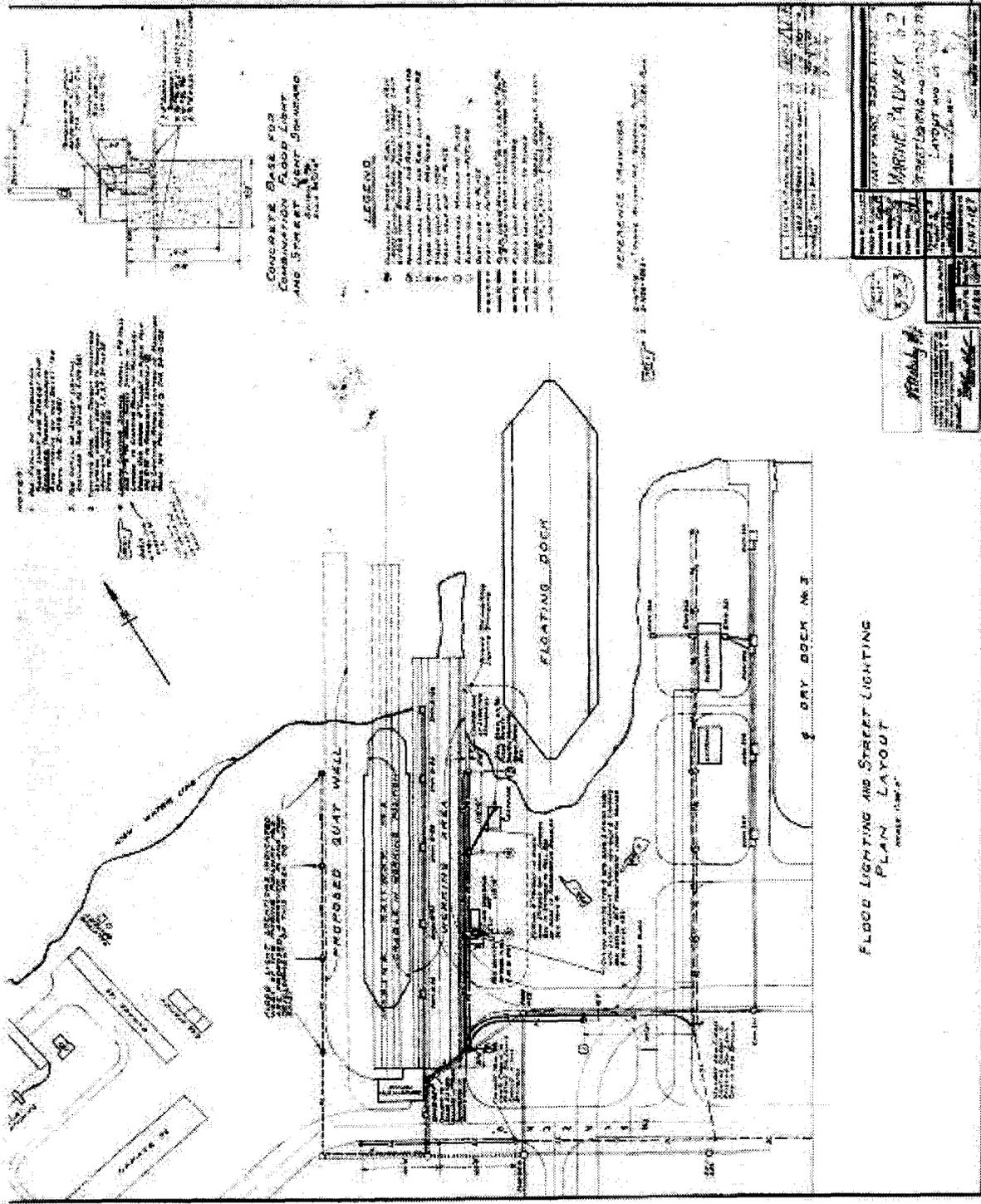
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Dredging Plan, Section, and Elevation (Drawing No. I-N17-120, dated 2/1/1943)
(reduced, not to scale)



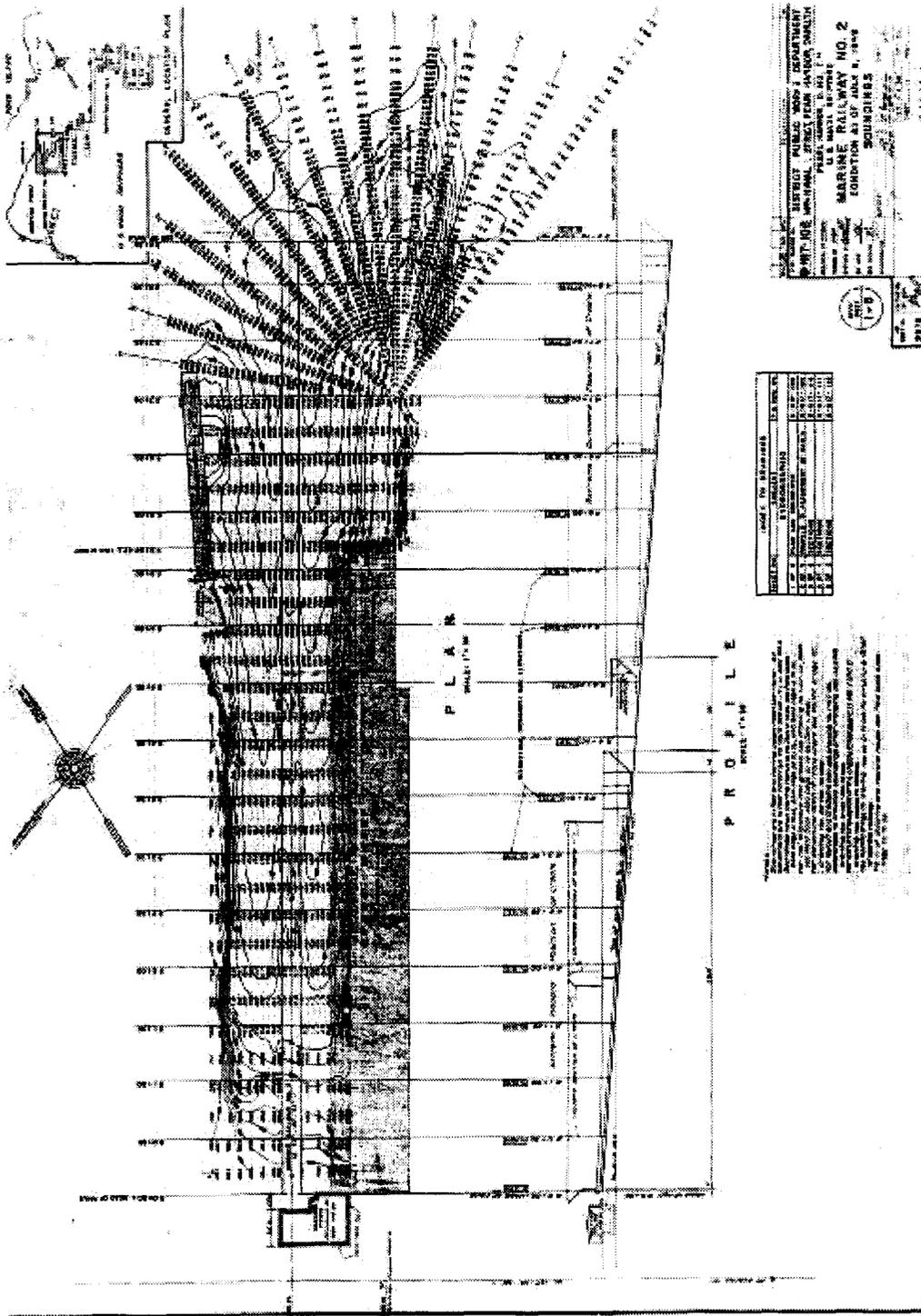
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Street Lighting and Floodlighting Layout and Details (Drawing No. I-N17-127, dated 3/4/1947)(reduced, not to scale)



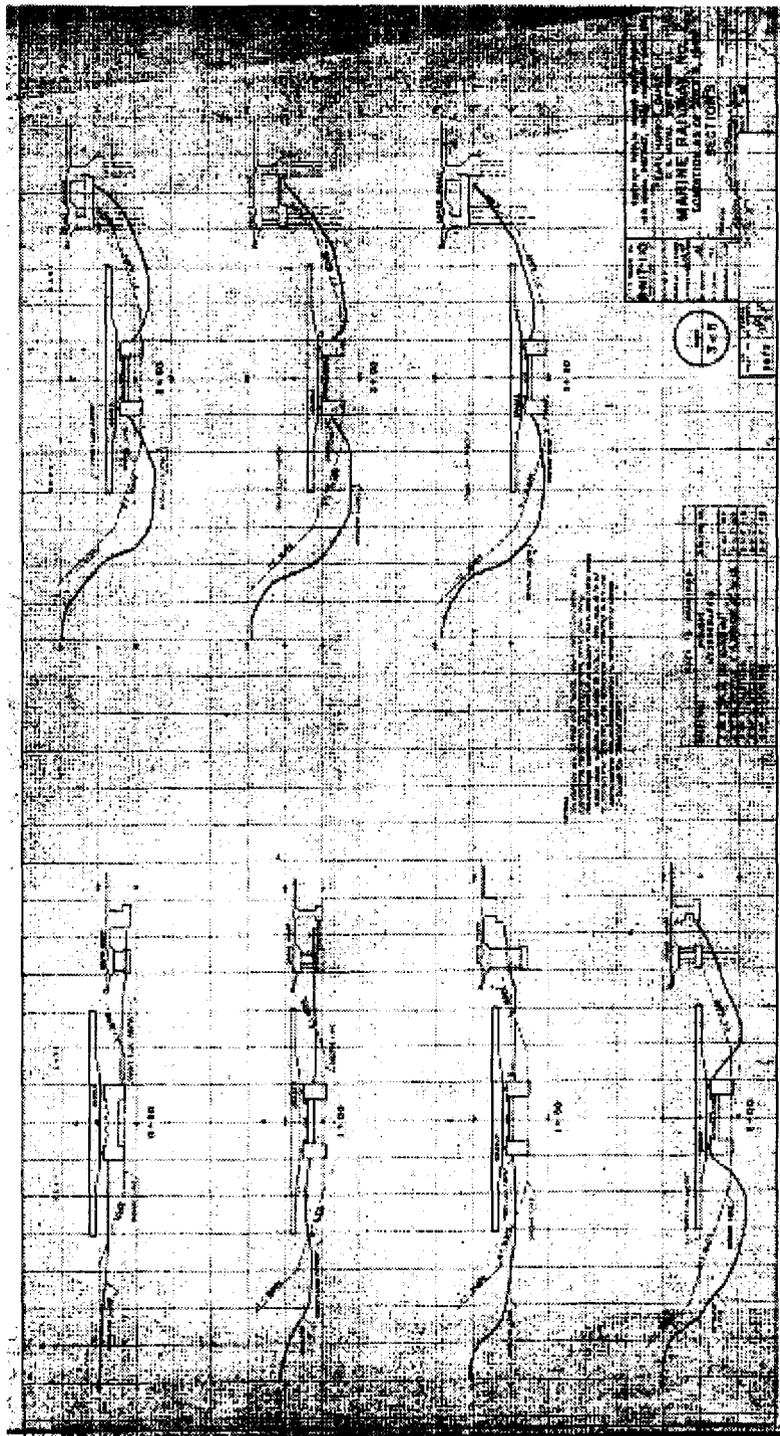
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Marine Railway No. 2 Condition as of July 8, 1949, Soundings and Profile
 (Drawing No. B-N17-108, dated 8/22/1950)(reduced, not to scale)



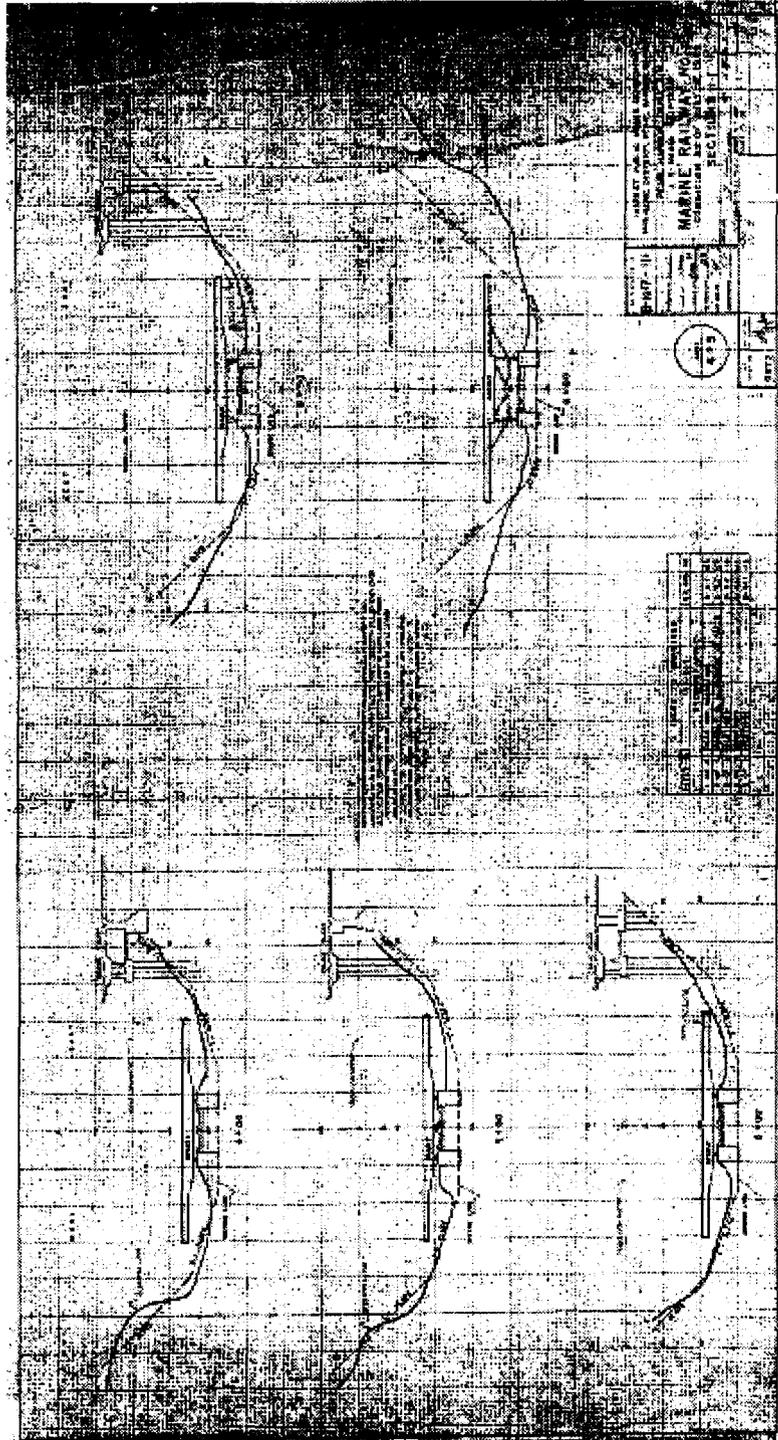
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