

HAER No. WA-116-E

Puget Sound Naval Shipyard, Drydock No. 3 (Facility 703)
Farragut Avenue
Bremerton
Kitsap County
Washington

HAER
WASH
18-BREM,
4E-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Western Region
Department of the Interior
San Francisco, California 94107

HISTORIC AMERICAN ENGINEERING RECORD

DRYDOCK No.3 (Facility 703)
PUGET SOUND NAVAL SHIPYARD

HAER No. WA-116-E

HAER
WASH
18-BREM,
4E-

Location: Puget Sound Naval Shipyard
Farraget Avenue
Bremerton, Washington

U.S.G.S.
Universal Transverse Mercador Coordinates:
Zone 10 Easting 527928 Northing 5267500

Date of Construction: 1917-1919. Altered 1929-30, 1945

Engineer: Department of Navy
Bureau of Yards & Docks
P.W.O. Capt. L.E.Gregory

Builder: Sound Construction & Engineering, Seattle, WA.

Present Owner: Department of the Defense
United States Navy
Puget Sound Naval Shipyard

Present Use: Nuclear-powered submarine drydock

Significance: Drydock No.3 is located within the boundaries of the Puget Sound Naval Shipyard National Historic Landmark District and is considered by the National Park Service to be a contributing property within the District. Drydocks within the Puget Sound Naval Shipyard were able to accommodate the largest battleships and aircraft carriers during World War II. Thus, the shipyard played an important role in the repair and redeployment of battleships, carriers and smaller warships after the Pearl Harbor attack and for the duration of the war. These accomplishments contributed to the successes of the American task forces in the Pacific. Drydock No.3 is one of six industrial structures within the Landmark District that has been identified as highly significant to the World War II warship repair effort.

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Date: April 1995

PART I. SITE CONTEXT OF DRYDOCK No.3

Physical Setting of Drydock No.3

The Puget Sound Naval Shipyard is a 354 acre shore facility located on the northern shore of Sinclair Inlet and situated to the west of Point Turner within the southern boundary limits of the City of Bremerton in Kitsap County, Washington.(Figure 1 & 2) Drydock No.3 is located along the waterfront in the easternmost end of the industrial area within the Puget Sound Naval Shipyard. Drydock No.3 is one of five historic drydocks located within the industrial area. In the vicinity of each of these drydocks are five historic piers. Drydock No.3 is situated between Pier No.6 and Pier No.7. Historic shop buildings, storehouses and other industrial structures are situated adjacent to or in close proximity to Drydock No.3 and its associated piers.(HAER Photo No.WA-116-E-1)

PART II. PHYSICAL DESCRIPTION OF DRYDOCK No.3

Physical Description

Drydock No.3 is a 926-foot-long by 130-foot-wide pressure relieved type, two-section drydock originally constructed between 1917 and 1919.(Figure 3) It is a concrete graving structure supported directly on soil. A heavy gauge railroad track, utilized for portal crane purposes, surrounds the drydock on the shoreward sides of the facility. The drydock facility includes an underslab hydrostatic pressure relief drainage system, perimeter culverts, and two pumphouses. A connecting tunnel is common to Drydocks No.1 through No.5. These components create a system for flooding, draining, and dewatering this drydock. Other key components of the industrial operation of this facility include the removable steel caisson and the divider bulkhead.(HAER Photos No.WA-116-E-2-10)

A double row of timber sheet piling cut-off walls, spaced approximately 15 feet on center encompasses the shoreward perimeter of the facility. Hydrostatic relief is provided by weep holes in the walls and broken stone drains spaced transversely and longitudinally below the entire floor slab. The floor level within the drydock varies 3'-0" between the north and south sections with the lower south section measuring 33'-6" in depth. The walls are of the counterfort type with counterforts at 10 feet on center and relatively thin wall sections.(Figure 4 & 5) The floor system is constructed in a series of longitudinal strips of varying depth. Originally the wall and floor construction for the full length of the dock was typical of the existing north section construction. The original concrete access stairs located at the head end of the north section remain in place. An addition set of stairs is located to each side of the bulkhead in the south

section, however they are no longer used for access purposes due to safety issues.(HAER Photos No.WA-116-E-13-14)

The entrance caisson is a reversible, hydrometer type floating steel caisson.(Figure 6) It is steel riveted construction with hull plates varying in thickness from 5/16 to 3/4 inch. The caisson is supported internally by horizontal girders spaced 6'-0" on center below the operating deck. The operating deck or main deck is located approximately ten feet below the weather or top deck. Access to the operating deck is through a watertight hatch in the weather deck. Watertight vertical bulkheads and trim tanks are provided near each end of the caisson. Operating equipment and piping within the caisson are arranged so that it can be flooded and dewatered from either side. Within the base of the caisson is a fixed concrete ballast. The caisson was originally built to provide drydock flooding through the caisson. The two 14-inch pipes originally provided for this purpose have been plugged and filled with concrete.(HAER Photos No.WA-116-E-17-22)

A divider bulkhead was constructed as part of the 1945 subdivision of the dock. This bulkhead consists of a facing of 6" tongue and groove planking on timber 6x8 sheathing that spans horizontally between steel wide-flange beams spaced 5'-4" on center. These beams are supported by a concrete sill at their base and a 10-foot wide by 6-foot deep welded steel plate box beam girder situated near the top of the bulkhead. The box girder spans the width of the drydock and is supported at each end by a concrete abutment. The box beam is watertight and can be floated into position or lifted into place by portal crane.(HAER Photos No.WA-116-E-11-12)

Significant Physical Changes

Between 1945 and 1949, major modifications to the facility were made. In 1945, the drydock was subdivided into north and south sections, approximately equal in length.(HAER Photos No.WA-116-E-35-36) The south section floor was completely rebuilt at an elevation 3'-0" lower than the north floor level. The walls and their footings in the south section were not altered. The slab hydrostatic relief system provided was similar to that in the original north section. At the interface of the north and south sections, a thickened slab section was built over a transverse (east-west) steel sheet piling cut-off wall, and an abutment was constructed for a removable divider bulkhead. The divider bulkhead allows the south section of the drydock to be flooded separately from the north section. Pumphouse No.3A was constructed on the west side of the drydock at the southerly end of the north section. The southernmost end of the drydock at the caisson sill and entrance wall was not altered by the subdivision.

Chronology of Alterations

Basic structural changes and additions to the facility since its original construction and completion in 1919, include the following:

- 1929 Construction of tracks for 40-ton and 50-ton drydock cranes, with pile supported concrete support girders. (HAER Photo No.WA-116-E-34)
- 1932 Broken stone-filled drydock floor drains were made shallower and covered with 15 inch concrete slab.
- 1941 A 6'-0" diameter dewatering connecting tunnel was constructed between the Drydock No.3 floor and the Drydock No.1 pumphouse suction chamber.
- 1945 Subdivision of the drydock into north and south sections; south section floor level lowered 3'-0". Pumphouse No.3A constructed. New cross culvert for drainage and storm water provided. (HAER Photos No.WA-116-E-35-36)
- 1945 Sewage collection system constructed in south floor. (HAER Photo No.WA-116-E-32)
- 1948 Minor abutment and bulkhead modifications.
- 1949 South Pumphouse No.3 altered. New pump room floor, walls and roof constructed.
- 1949 Large voids in the south face of the entrance area floor slab beneath the caisson seat were filled. (HAER Photos No.WA-116-E-37-38)
- 1953 Alterations made to dewatering tunnel connecting Drydock No.3 to Pumphouse No.2.
- 1967 Crane track replaced at head end & east side of drydock.
- 1968 Crane track replaced at west side of drydock.
- 1969 Railroad track removed at west side of drydock.
- 1979 Repairs made to areas of the drydock walls at the head end to seal cracks and repair unsound concrete.

Equipment and Other Structures Associated with the Operation of
Drydock No.3

Pumphouse No. 2 - This pumphouse provides the primary means by which Drydocks No.1, No.2, and No.3 are dewatered. This pumphouse is located on the east side of Drydock No.2, between Drydock No.1 and No.2. Flow from Drydock No.3 is collected by drainage trenches running the length of the east and west sides of the drydock which feed into a west side center well near the divider bulkhead in the south section of the drydock. Pumphouse No.2 has four main dewatering pumps described as 54-inch Alberger volute type and two drainage pumps described as 15-inch Alberger volute type.

Pumphouse No.3 (South) - As originally constructed Drydock No.3 had a single pumphouse, No.3. At the time the drydock was subdivided in 1945, an additional pumphouse was constructed in the north portion of the dock and the original No.3 pumphouse was refurbished. These pumphouses are designed to handle normal drainage from both the north and south sections of the drydock. However, these pumphouses are normally only used to handle drainage and seepage when Drydocks No.1 and No.2 are being dewatered. Pumphouse No.3 has two drainage pumps identified as 14-inch Wintroth pumps.(HAER Photos No.WA-116-E-23-24)

Pumphouse No.3A (North) - This pumphouse has two wet pit drainage pumps. They are identified as 8-inch Fairbanks-Morse propeller pumps. Pumphouse No.3A also contains a sewage wet well, dry pit pumps, piping, and valves all of which are connected to a collecting sewer system cast in floor of the south section of the drydock.

Flooding system - The flooding system consists of two short culverts, one on the east, and one on the west side of the entrance wall structure. Each culvert is 6'-0" square and is equipped with a single sluice gate. There is no provision for flooding the north section of the drydock independently from the south section. The original construction included through-caisson flooding, however this is no longer feasible since the pipes for this purpose were sealed with concrete.(HAER Photos No.WA-116-E-17-18)

Caisson equipment - Two 14-inch Fairbanks-Morse, two-stage propeller dewatering pumps, two 14-inch Crane sinking valves powered by General Electric Motors, two 14-inch Chapman pump discharge valves powered by Westinghouse Motors, two 14-inch Chapman tilting disk check valves, two hand operated 6-inch trim tank sea valves, two hand operated 6-inch equalizing valves, two capstans manufactured by Pacific Machine Shop & Mfg. and powered by Howell Electric Company Motors.(HAER Photos No.WA-116-E-21-22)

Fittings and Capstans - Bollards are positioned along the east and west sides of the drydock and spaced at approximately 150 feet on center. Cleats are provided along the coping on the west and east walls of the drydock at approximately 40 feet on center. Four powered capstans, two on each side of the drydock, are driven by reversible induction motors. All controls are located below grade in capstan pits. Non-historic removable-pipe guardrails surround the shoreward perimeter of the drydock. (HAER Photo No. WA-116-E-16)

Ship Blocking - Three types of blocks are used at the Shipyard: "Old style" two-piece bolted type made of composite concrete and hardwood caps (top and bottom) measuring 4'-0" by 3'-6" in plan and 3'-6" full height, "New style" one-piece type made of composite concrete and hardwood caps (top and bottom) measuring 4'-0" by 3'-6" in plan and 4'-0" high, and a one-piece base block made of composite concrete and hardwood cap (one side only) measuring 6'-0" by 6'-8" in plan and 2'-6" high. Chain rack slots originally provided in the floor of the drydock have been filled and/or abandoned and the original blocking arrangement system is no longer used. All blocks are equipped with steel bar pad-eyes embedded in the concrete core for blocking arrangement by portal crane. (HAER Photos No. WA-116-E-15-16 & 33)

PART III. HISTORIC CONTEXT OF DRYDOCK No.3

Construction History

The Puget Sound Naval Shipyard was initially established in 1891, two years after the Naval Act of 1889. This Act signaled a departure in American naval policy through the construction of a sea-going battleship fleet. Over the following twenty-five years the yard evolved into an important Pacific Coast supply base providing repairs, ammunition and supplies for ships based at the yard or brought in from the Atlantic.

Construction of the earliest drydock, Drydock No.1, began in 1892 but was not completed until four years later in April 1896. Mostly of wooden construction originally, but now concrete, it measured 650 feet in length, 39 feet in depth and varied in width from 69 feet to 130 feet. Drydock No 2 was completed in 1913. Constructed of granite and concrete, it was the largest in the U.S. Navy at that time, measuring 827 feet long by 145 feet wide.

By 1915, the Navy Department had decided to build, as well as to repair, ships at the yard and experimental submarines were under construction there. In 1917, prior to entering World War I, construction was begun on Drydock No.3. It was designed for the specific purpose of multiple-berth ship building.

Drydock No. 3 was constructed according to plans prepared by the Department of Navy Bureau of Yards and Docks in 1917, under the direction of Public Works Officer Capt. L.. Gregory. Prior to the design of this drydock, the traditional means of constructing and launching ships utilized a shipbuilding ways. Drydock No. 3 was designed to provide space for the simultaneous construction of multiple vessels and utilized an innovative flooding launch method.

The design of this "shipbuilding" drydock prototype appears to have been an innovation of the Puget Sound Naval Shipyard. In the book, *Fair Winds of Change, a History of the Puget Sound Naval Shipyard, 1916-1941*, by Louise M. Reh, the concept of a shipbuilding drydock is attributed to Victor Hulteen. Hulteen was a public works department draftsman, who reportedly developed the concept in 1916. The author states that "Captain Luther Gregory, the yards public works officer, convinced the navy department to include this in the navy yards development plan. This dock was the only one of its kind in the United States and the largest shipbuilding dock in the world." The basis for this statement or the extent to which this construction innovation may have served as a prototype for other U.S. Navy facilities has yet to be fully documented.

Technology Utilized in the Construction of Drydock No.3

A substantial collection of historic photographs that document the construction of Drydock No.3 are held in the Public Works records of Puget Sound Naval Shipyard, Bremerton, Washington. The construction process began in early 1917 and was complete by February 1919. Construction required a substantial amount of earthwork and soil removal. An elaborate pier and rail system were constructed in order to undertake the drydock construction. A concrete plant and construction sheds were established on the site and within the drydock floor area itself for construction purposes. The drydock was gradually constructed in stages with the head end and northern section completed prior to the south section. Extensive timber form work was built in order to form the counterfort wall system. Sections of the wall system were completed prior to the construction of the drydock floor sections. Historic photographs indicate that shipbuilding began within the northern section of the drydock prior to the entire completion of its construction. The steel caisson appears to have been constructed on heavy timber form work in place above the caisson sill and entrance wall.(HAER Photos No.WA-116-E-27-31)

Technology Utilized in the Operation of Drydock No.3

Drydock No. 3 was constructed according to plans prepared by the Department of Navy Bureau of Yards and Docks in 1917, under the direction of Public Works officer Capt. L.E. Gregory. Prior to

the design of this drydock, the traditional means of constructing and launching ships utilized a shipbuilding ways. Drydock No. 3 was specifically designed and constructed in order to provide enough space for the simultaneous construction of multiple vessels. It utilized an innovative flooding launch method rather than the traditional shipbuilding ways sliding method. Upon construction, this drydock is believed to have been the only one of its kind in the United States and the largest drydock in the world. The basis for this information or the extent to which this technical innovation may have served as a prototype for other U.S. Navy facilities has yet to be fully documented.

Significant Events Associated with Drydock No.3

Drydock No.3 was constructed between 1917 and 1919 for the purpose of ship building. By the end of World War I, the Shipyard employed some 6,500 workers and had undertaken the construction of 42 vessels, including subchasers, submarines, mine sweepers, ocean tugs, and ammunition ships in addition to 1,700 small vessels. Historic photograph records indicate that ammunition ships were under construction in Drydock No.3 during 1919. Between the two great wars, ship building continued at a reduced rate. It is known that Drydock No. 3 was altered in 1929-1930 in order to accommodate the construction of two new, then-colossal carriers, Lexington and Saratoga, both commissioned in 1927. The cruiser, USS Louisville was also constructed in the drydock sometime prior to 1930.

Drydock No.3 is primarily associated with ship building activity in Puget Sound Naval Shipyard during World War II. The limited photographic record of World War II indicates that four ships were under simultaneous construction in the drydock in August 1944. The location of Drydock No. 3 immediately adjacent to Facility 460, a large shipfitters assembly shop constructed in 1942, allowed for the simultaneous construction of sizable ships. It is assumed that Drydock No. 3 was heavily used during WWII, as the shipyard was the principle repair yard for the battle-damaged battleships, aircraft carriers and smaller warships of the Pacific Fleet throughout the war. More than 30,000 workers built, fitted out, repaired, or overhauled 294 fighting ships between 1941 and 1945. The Shipyard's contribution to the success of the Pacific Fleet was due to its extensive industrial facilities, including Drydock No.3.

Since 1961, Puget Sound Naval Shipyard has been primarily engaged in the repair of nuclear-powered submarines. Drydock No.3 is currently used for submarine repair and decommissioning purposes. (HAER Photos No.WA-116-E-25-26)

PART IV. SOURCES OF INFORMATION

Facility Certification Report, Puget Sound Naval Shipyard, Bremerton, Washington - Drydock No. 3, prepared by Fay, Spoffard & Thorndike, Inc., Boston, 1977. (Source for attached Figures 2-6)

Historic Survey (Report) Puget Sound Naval Shipyard, Bremerton, Washington, prepared by Gurlich Architecture and Planning Services, Tacoma, Washington, April 1986.

Miscellaneous historic photographs. Held by Public Works, Puget Sound Naval Shipyard, Bremerton, Washington.

Miscellaneous historic site plans and engineering drawings. Held by Public Works, Puget Sound Naval Shipyard, Bremerton, Washington.

"Puget Sound Naval Shipyard Historic Survey Inventory Form," prepared by August Gene Grulich, August 1985.

"Puget Sound Naval Shipyard Shore Facility Properties in Bremerton, Washington," National Register Nomination, prepared by Caroline Gallacci and August Gene Grulich, September, 1986.

PART V. PROJECT BACKGROUND

The Department of the Navy (Navy) is planning to undertake a major repair project on Drydock No.3, Puget Sound Naval Shipyard, Bremerton, Washington. It has been determined in consultation with the Washington State Historic Preservation Officer (SHPO) that such a project, if or when undertaken, will have an adverse effect on the subject property which is a contributing resource within a National Historic Landmark District. Based on consultation with the Washington State Historic Preservation Office and the Advisory Council on Historic Preservation, pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470f), a Memorandum of Agreement (MOA) shall be entered into by the interested parties. The Agreement stipulates that prior to undertaking the proposed project, the Navy contact HABS/HAER at the Western Regional Office of the National Park Service, San Francisco, California, to determine the appropriate level and kind of recordation for mitigation purposes. The MOA further stipulates that copies of the documentation be made available to the SHPO and appropriate local archives designated by the SHPO. This recordation has been prepared in order to meet those stipulations.

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Ellensburg, WA. 98926

Date: April 1995

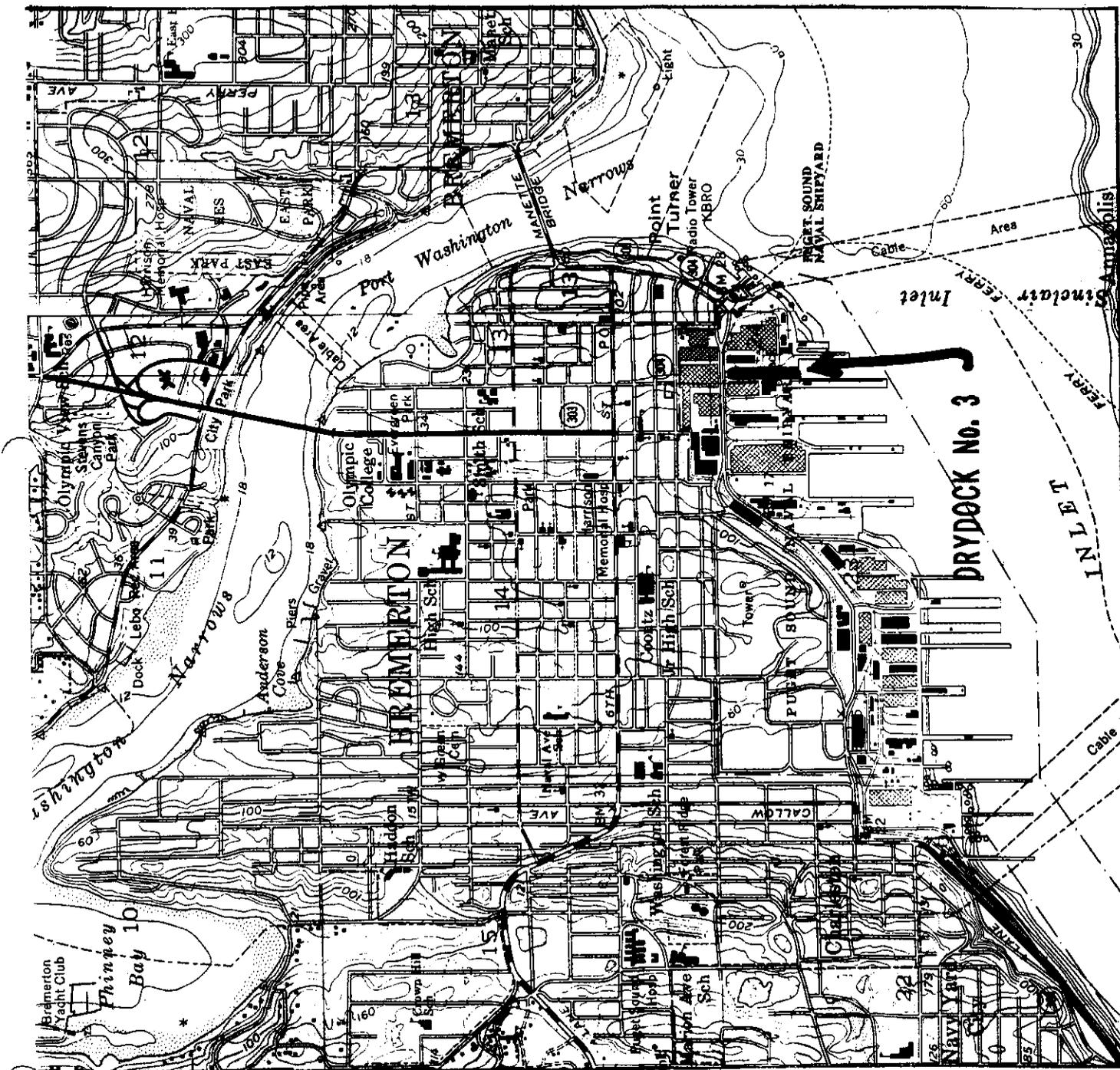
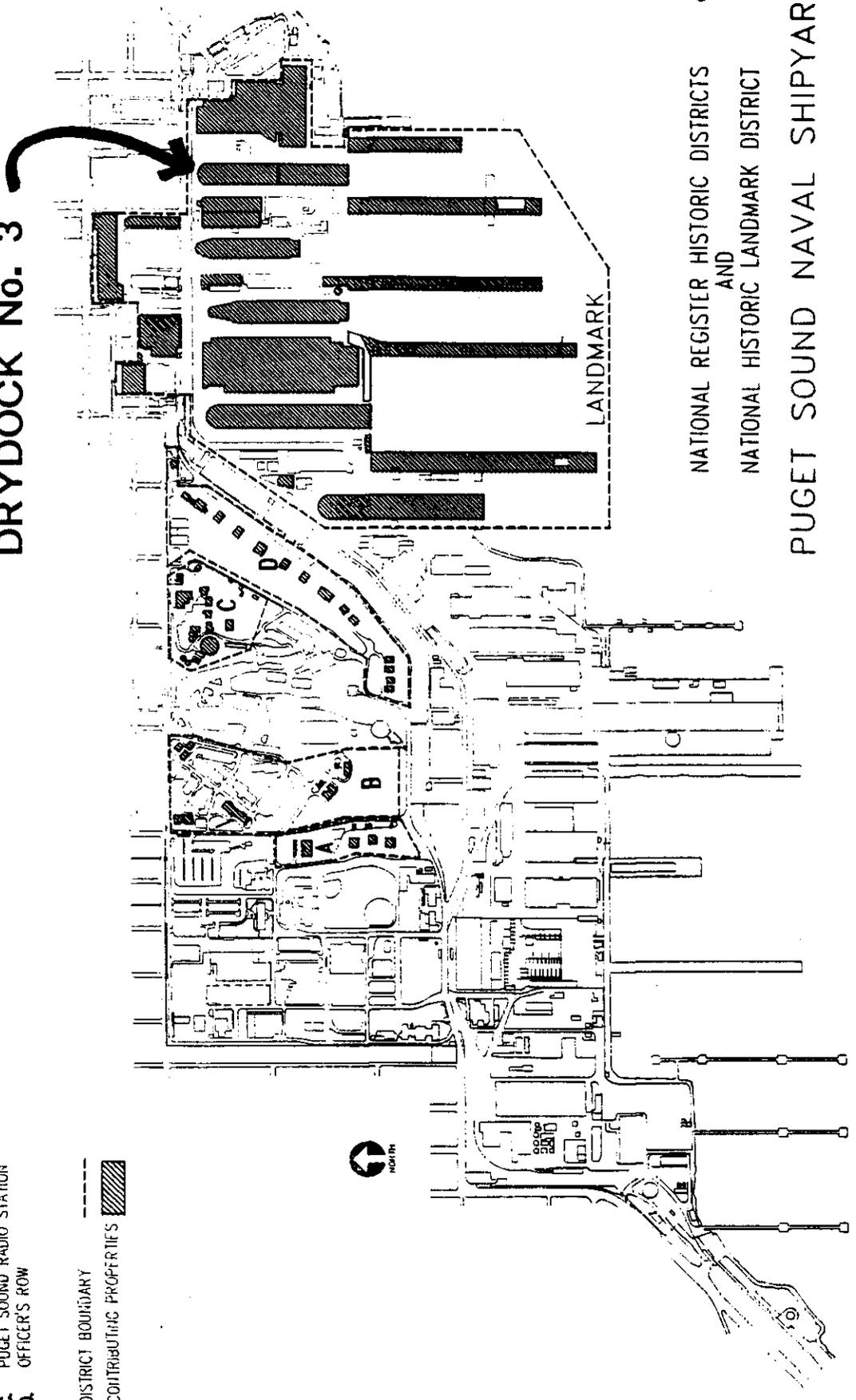


FIGURE 1

DRYDOCK No. 3

- NATIONAL HISTORIC REGISTER DISTRICTS
- A. MARINE RESERVATION
 - B. HOSPITAL RESERVATION
 - C. PUGET SOUND RADIO STATION
 - D. OFFICER'S ROW

- DISTRICT BOUNDARY
- CONTRIBUTING PROPERTIES

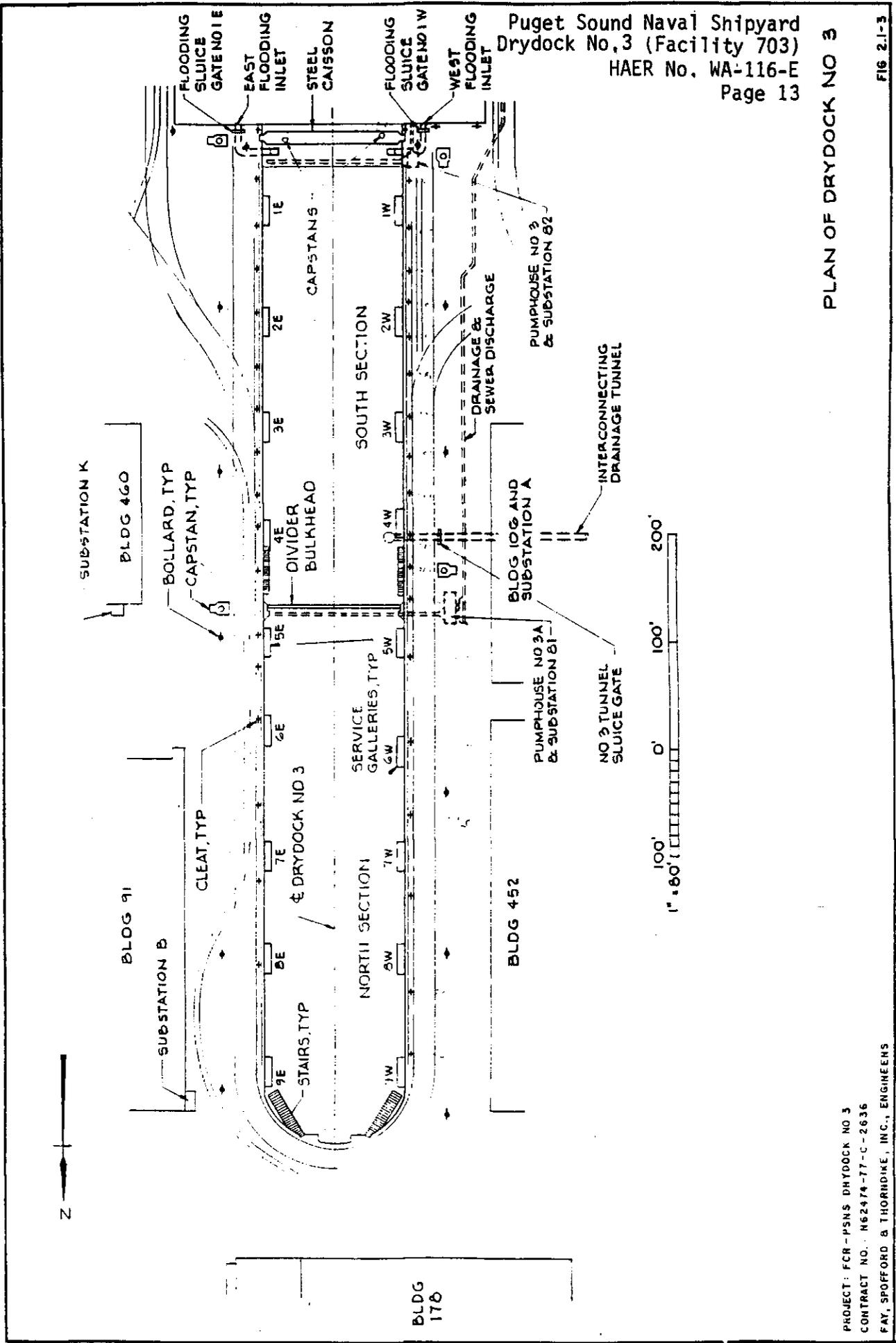


LANDMARK

NATIONAL REGISTER HISTORIC DISTRICTS
AND
NATIONAL HISTORIC LANDMARK DISTRICT

PUGET SOUND NAVAL SHIPYARD

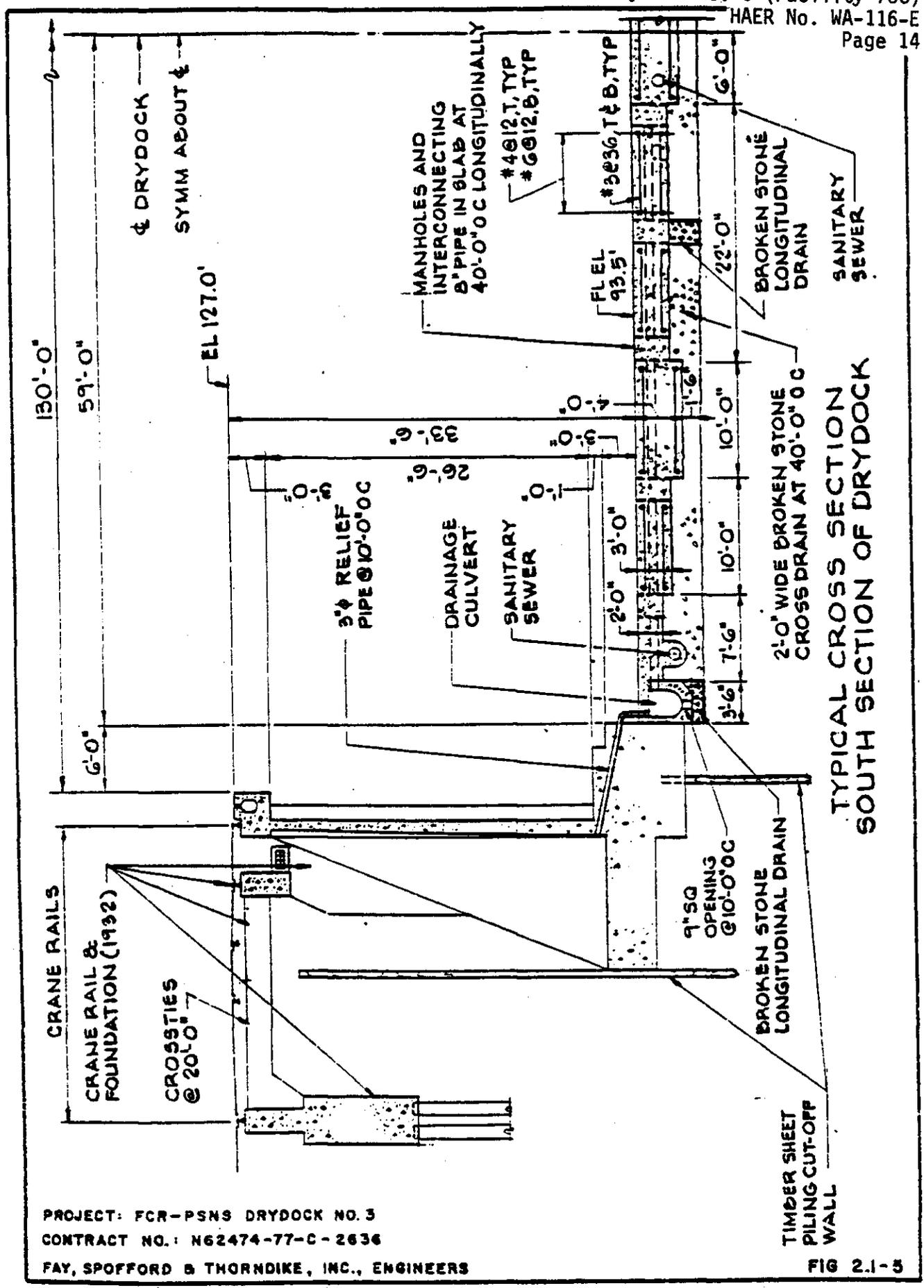
FIGURE 2



PLAN OF DRYDOCK NO 3

FIG 2.1-3

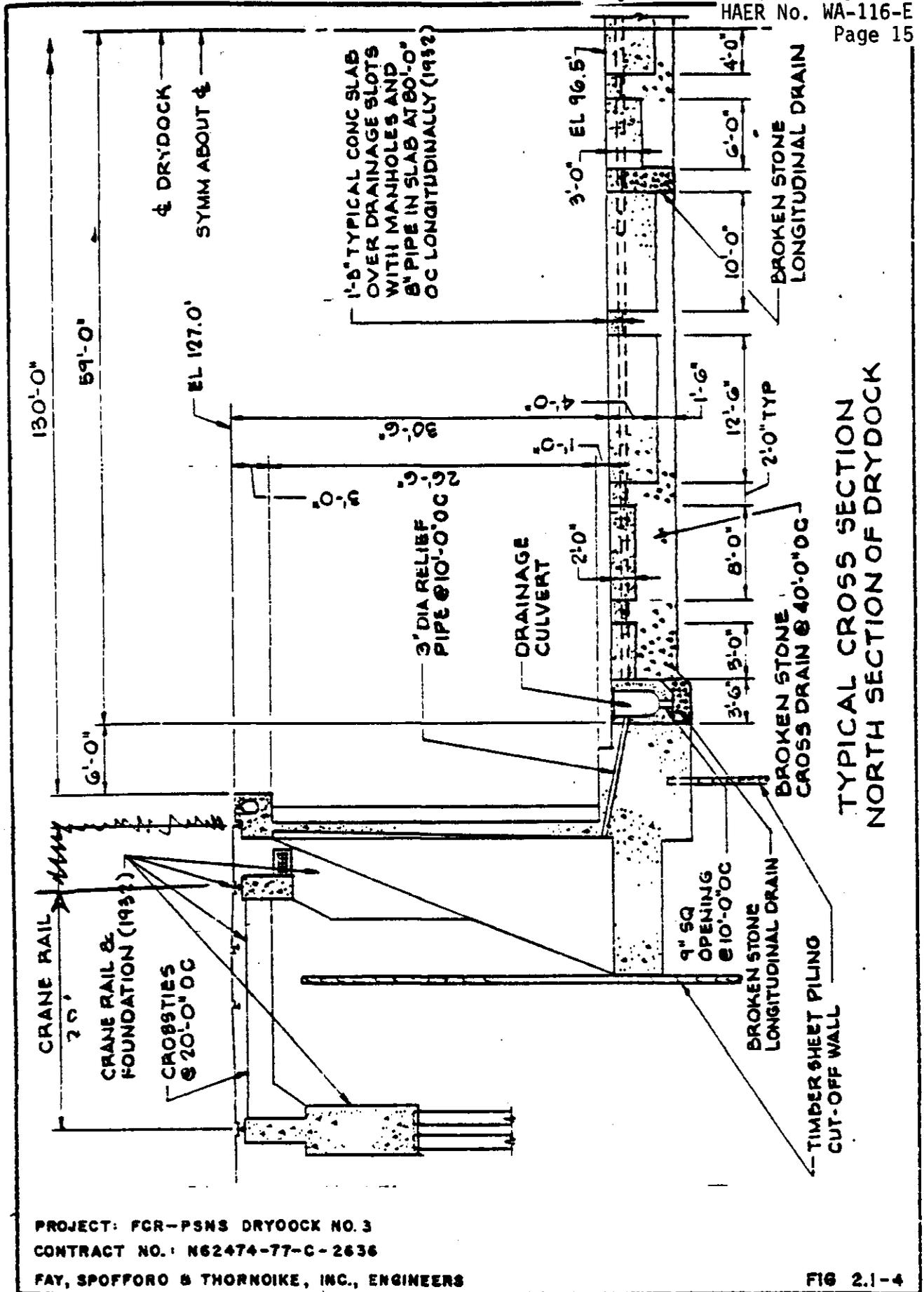
FIGURE 3



PROJECT: FCR-PSNS DRYDOCK NO. 3
 CONTRACT NO.: N62474-77-C-2636
 FAY, SPOFFORD & THORNDIKE, INC., ENGINEERS

FIG 2.1-5

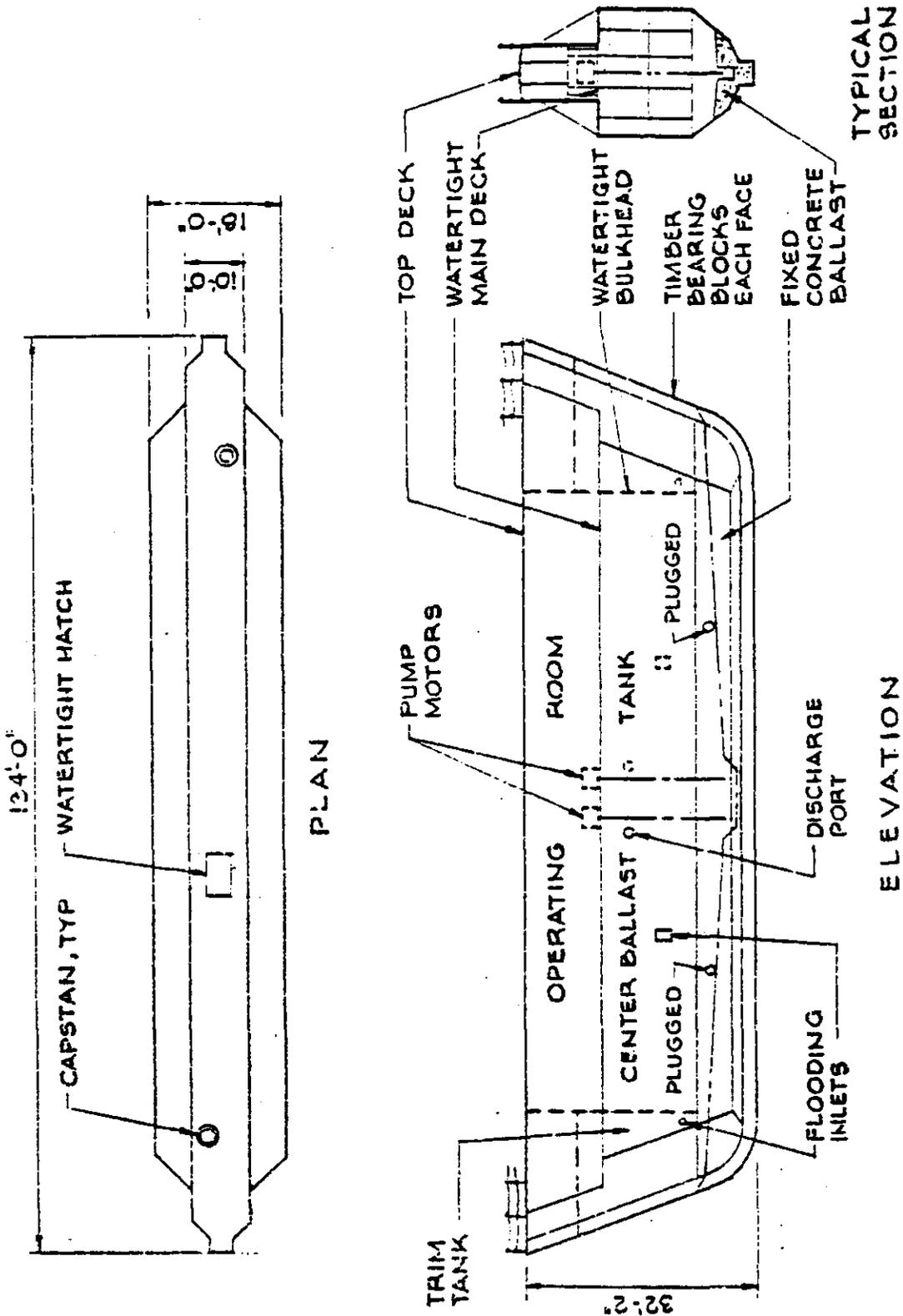
FIGURE 4



PROJECT: FCR-PSNS DRYDOCK NO. 3
 CONTRACT NO.: N62474-77-C-2636
 FAY, SPOFFORD & THORNOIKE, INC., ENGINEERS

FIG 2.1-4

FIGURE 5



PROJECT: FCR-PSNS DRYDOCK NO. 3

CONTRACT NO.: N62474-77-C-2636

FAY, SPOFFORD & THORNDIKE, INC., ENGINEERS

CAISSON NO 3

FIG 2.7-2

FIGURE 6

STEEL CAISSON

ELEVATION

PLAN