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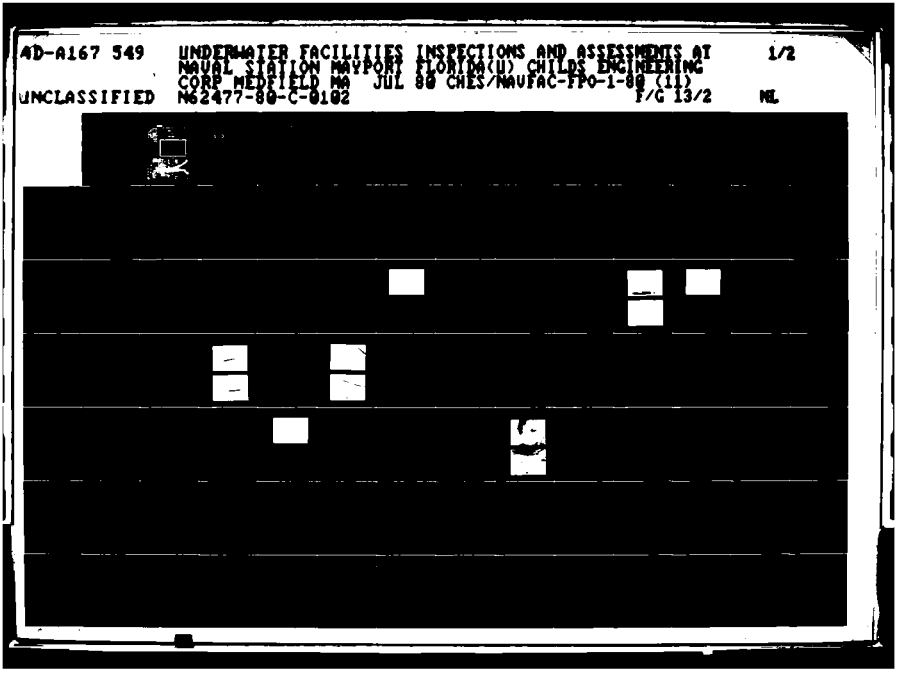

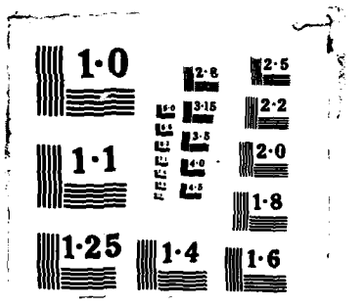
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UNDERWATER FACILITIES INSPECTIONS AND ASSESSMENTS AT

NAVAL STATION

MAYPORT, FLA.

JULY 1980 FPO-1-80 (11)

PERFORMED FOR:
OCEAN ENGINEERING AND CONSTRUCTION PROJECT OFFICE
CHESAPEAKE DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON, D.C. 20374

UNDER:
CONTRACT N62477-80-C-0102
TASK 3

BY:
CHILDS ENGINEERING CORPORATION
MEDFIELD, MASSACHUSETTS 02052

Unclassified
SECURITY CLASSIFICATION OF THIS PAGE AD-A167 541

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION Unclassified	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION AVAILABILITY OF REP. Approved for public release; distribution is unlimited
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER	5. MONITORING ORGANIZATION REPORT # FPO-1-80(11)
6a. NAME OF PERFORM. ORG. 6b. OFFICE SYM Childs Engineering Corp.	7a. NAME OF MONITORING ORGANIZATION Ocean Engineering & Construction Project Office CHESNAVFACENGCOM
6c. ADDRESS (City, State, and Zip Code) Medfield, MA 02052	7b. ADDRESS (City, State, and Zip) Bldg. 212, Washington Navy Yard Washington, D.C. 20374-2121
8a. NAME OF FUNDING ORG. 8b. OFFICE SYM	9. PROCUREMENT INSTRUMENT INDENT # N62477-80-C-0102
8c. ADDRESS (City, State & Zip)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT # / PROJECT # / TASK # / WORK UNIT ACCESS #

11. TITLE (Including Security Classification)
Underwater Facilities Inspections & Assessments at Naval Station Mayport, FLA

12. PERSONAL AUTHOR(S)

13a. TYPE OF REPORT	13b. TIME COVERED FROM	TO	14. DATE OF REP. (YYMMDD)	15. PAGES
			80-07	103

16. SUPPLEMENTARY NOTATION

17. COSATI CODES FIELD	GROUP	SUB-GROUP

18. SUBJECT TERMS (Continue on reverse if nec.)
Underwater inspections, Mooring inspetions, Mayport, FLA; Naval Station Mayport, FLA

19. ABSTRACT (Continue on reverse if necessary & identify by block number)
The objective of the underwater facility assessments conducted at the U.S. Naval Station in Mayport, Florida is to provide a generalized strucutral condition report of selected facilities within the activity. The facilities are Carrier Berth C-A, Carrier Berth-C-2, the Bulkhead East of Carrier (Con't)

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT	21. ABSTRACT SECURITY CLASSIFICATION
SAME AS RPT.	
22a. NAME OF RESPONSIBLE INDIVIDUAL Jacqueline B. Riley	22b. TELEPHONE 22c. OFFICE SYMBOL 202-433-3881

DD FORM 1473, 84MAR SECURITY CLASSIFICATION OF THIS PAGE

BLOCK 19 (Con't)

Berth C-2, Bravo Wharves B-1, B-2 and B-3, Destroyer Berths D-1, D-2, D-3 and D-44 and the Small Craft Berth. Each facility was inspected by a team of engineer/divers using a combination of visual/tactile and ultrasonic techniques. Critical elements were photo-documents.

All facilities inspected appear to be in fair to good condition. No facilitiy was observed to have advanced structural deterioration or damage such that its structural capacity to function should be donwgraded. All facilities inspected exhibited some degree of corrosion. Generally the amount of corrosion observed was directly proportional to age. However, Carrier Berth C-1 experienced some localized high corrosive activity.

Severla facilities experienced structural damage. These are Carrier Berth C-1, Destroyer Berth D-1 and the Small Craft Berth. In each of this three facilities, one hole was observed in the bulkhead below mean low water. The most critical structural problem is the loss of fill through these holes. It is recommended the holes be patched.

With the exception of the above listed deficiencies, the facilities inspected appear to be in a condition predictable for the environment and age of the facilities. All facilities should be protected from further corrosion.

FOREWORD

The scope of the inspection at the Naval Station in Mayport, Florida and the detail to which it was performed and reported was tailored specifically to the conditions at this facility. This report or the procedure associated with its formation is not intended to be a standard for inspections or reports covering other activities. Attempts are being made, however, toward establishing standards for procedures and formats for inspection and assessment reports. Through these standards, inspections performed by different persons, on many facilities and under a wide range of conditions can be effectively compared. It is expected that the inspections and assessments of the Mayport facilities, like previous operations mandated under the underwater portion of the Specialized Inspection Program, will contribute significantly toward achieving that objective.

It should be noted that the choice of the level of inspection and the procedural detail to be employed will be an engineering judgement made separately for each activity/facility to suit its unique situation and needs. Accordingly, the procedures used at Mayport Naval Station, rather than serve as a detailed model for inspections elsewhere, will provide guidance with general applicability to future inspections.

EXECUTIVE SUMMARY

The objective of the underwater facility assessments conducted at the U.S. Naval Station in Mayport, Florida is to provide a generalized structural condition report of selected facilities within the activity. The facilities are Carrier Berth C-1, Carrier Berth C-2, the Bulkhead East of Carrier Berth C-2, Bravo Wharves B-1, B-2 and B-3, Destroyer Berths D-1, D-2, D-3 and D-4 and the Small Craft Berth. Each facility was inspected by a team of engineer/divers using a combination of visual/tactile and ultrasonic techniques. Critical elements were photo-documented.

All facilities inspected appear to be in fair to good condition. No facility was observed to have advanced structural deterioration or damage such that its structural capacity or function should be downgraded. All facilities inspected exhibited some degree of corrosion. Generally the amount of corrosion observed was directly proportional to age. However, Carrier Berth C-1 experienced some localized high corrosive activity.

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With the exception of the above listed deficiencies, the facilities inspected appear to be in a condition predictable for the environment and age of the facilities. All facilities should be protected from further corrosion. Refer to the *following Executive Summary* Table for an overview of each facility's construction and recommendations.

U.S. NAVAL STATION

MAYPORT, FLORIDA

EXECUTIVE SUMMARY TABLE

Facility	Year Built	Length of Facility (LF)*	Structural Type	Recom
Carrier Berth C-1	1951	744.5	Diaphragm cell wall	Repair hole at C Inspect bulkhead Station 20+35 an steel from furth Measure thickness
Carrier Berth C-2	1958	746	Diaphragm cell wall	Protect steel fr sion. Measure t in five years.
Bulkhead East of Carrier Berth C-2	Not Known	326	Anchored bulkhead	No Recommendatio in progress.
Wharves B-1, B-2 and B-3	1968	1986 (Total)	Diaphragm cell wall	Annually inspect CEC Station 36+7
Destroyer Berths D-1, D-2, D-3 and D-4	1959	2085.5 (Total)	Anchored bulkhead	Repair incomplet Station 61+92 (B steel from furth sure thickness o
Small Craft Berthing	1959 (CEC Station 81+83 - 82+83) 1961 (CEC Station 82+83 - 85+83.5)	400.5	Anchored Bulkhead	Repair hole at C Inspect wale fas structural condi from further cor thickness of ste

* Length of Facility based on CEC Stationing.

U.S. NAVAL STATION

MAYPORT, FLORIDA

EXECUTIVE SUMMARY TABLE

Structural Type	Recommendations	Estimated Repair Cost (Dollars)
Diaphragm cell wall	Repair hole at CEC Station 23+70. Inspect bulkhead between CEC Station 20+35 and 21+50. Protect steel from further corrosion. Measure thickness of steel annually.	$470/Hole
Diaphragm cell wall	Protect steel from further corrosion. Measure thickness of steel in five years.	N/A
Anchored bulkhead	No Recommendations. Repair effort in progress.	N/A
Diaphragm cell wall	Annually inspect pavement above CEC Station 36+70 for subsidence.	N/A
Anchored bulkhead	Repair incomplete butt joint at CEC Station 61+92 (Berth D-1). Protect steel from further corrosion. Measure thickness of steel in five years.	$470/Hole
Anchored Bulkhead	Repair hole at CEC Station 82+65. Inspect wale fasteners to determine structural condition. Protect steel from further corrosion. Measure thickness of steel in five years.	$450-500/ Hole

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SECTION 1 INTRODUCTION

This report is a product of the Underwater Inspection Program conducted by the Ocean Engineering and Construction Project Office (FPO-1), Chesapeake Division, Naval Facilities Engineering Command (NAVFACENGCOM) under NAVFAC's Specialized Inspection Program.

Mandated under Contract No. N62477-80-C-0102, this program provides for task oriented engineering services in support of the inspection, analysis and design and monitoring of repairs for the submerged portions of selected Navy Waterfront Facilities. All services required to produce this report were provided by Childs Engineering Corporation of Medfield, Massachusetts under Task No. 3 of this Underwater Inspection Program.

The efforts expended and costs required to perform these underwater facility inspections varies greatly with the number of piles or area of bulkhead selected for scrutiny. It is imperative that this portion be sufficiently representative of the total facility condition to assure that a structural assessment of the overall facility can be made. Costs and efforts also vary greatly with other factors peculiar to each facility or activity such as:

Type and quantity of biofouling to be cleaned for different levels of scrutiny, both visual and with instruments
Pile material, quantity, and distribution
Tidal range - area exposed at low tide for boat inspection
Time and type of last inspection
Local environmental factors - salinity, pollution level, temperature, etc., affecting rates of corrosion and animal and plant life.

1.1 TASK DESCRIPTION

The scope of work required under this portion of the program provides a general structural assessment including repairability, if necessary, of the underwater portion of designated bulkheads located at the Naval Station in Mayport, Florida.

1.2 REPORT CONTENT

In this report the inspection procedures, the results of the inspection and analysis of the findings are addressed. Each facility examined within the Naval Station is described as to its location, function, construction, inspection condition and condition assessment. Recommendations for each facility are also included. Structural assessment calculations and cost estimate breakdowns can be found in the Appendix. Also as supplementary information, a brief description of the Naval Station is provided to define its location, mission, existing and proposed facilities, hydrographic and topographic features and other pertinent data.

SECTION 2.0 ACTIVITY DESCRIPTION

The purpose of this section is to provide a general description of the Naval Station in Mayport, Florida. Included in this section will be brief discussions on the Naval Station's location, mission, history, existing facilities, climatological and meteorological data and hydrology. This information is provided to supplement the later sections of this report and to support all considerations necessary to accurately assess the structural condition of facilities inspected in this survey.

2.1 LOCATION OF ACTIVITY

Naval Station Mayport is located on the Atlantic seacoast approximately 30 miles south of the Georgia border at Latitude 30°24'N and Longitude 81°26'W (see Figure 1). Situated on the south bank of the St. Johns River, the Navy Base lies approximately 16 miles east of downtown Jacksonville in the town of Mayport, Florida (see Figure 2).

2.2 MISSION OF FACILITY

The mission of Mayport Naval Station is "to provide support to its tenant commands. This involves 116 specific tasks which are performed by the station. The more important tasks include:

1) The operation of a harbor for berthing ships under Navy control and visiting ships of friendly powers.

2) The operation of an airfield and air terminal.

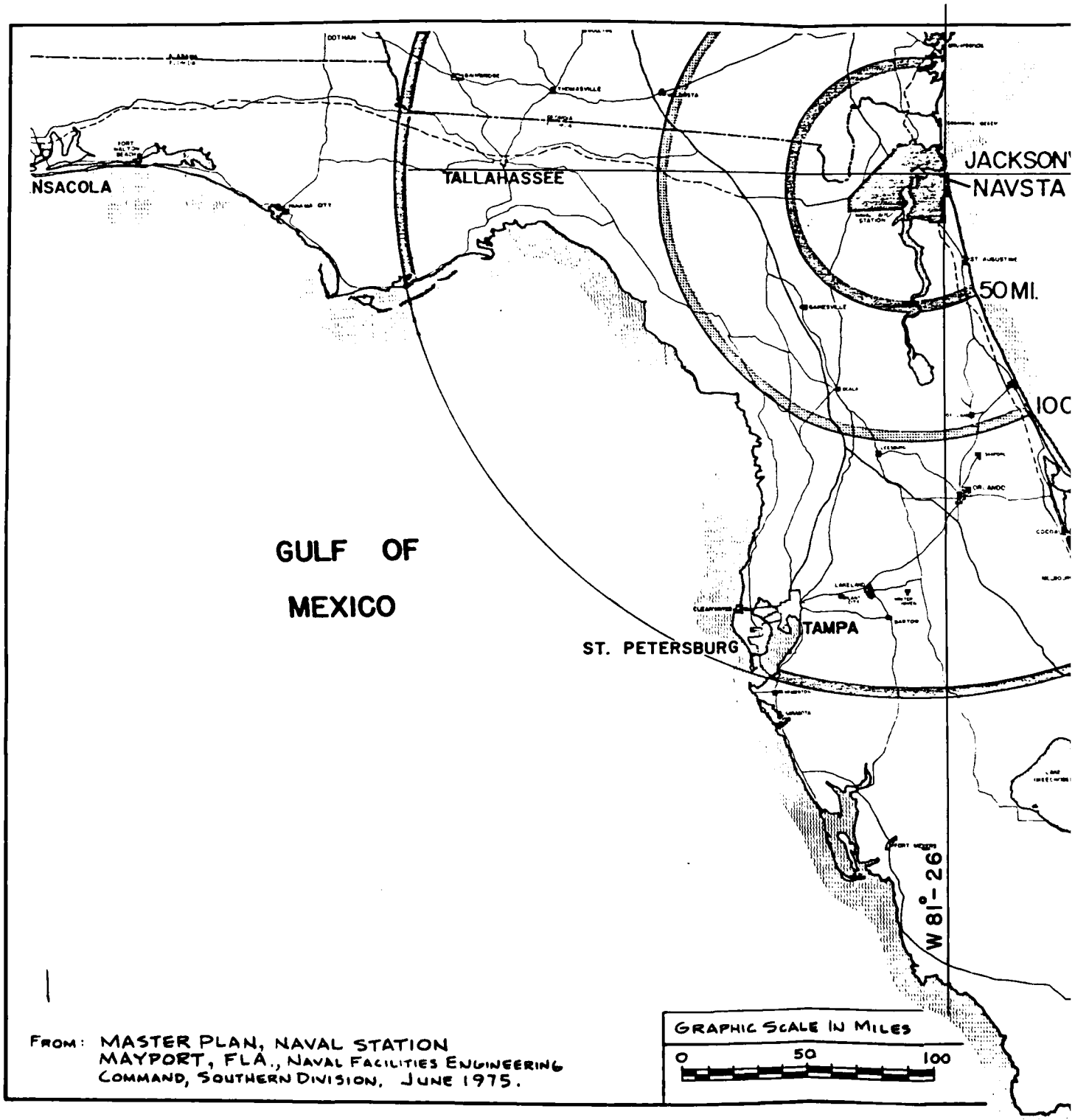
3) The provision of utilities and services in support of berthed ships.

4) The provision of logistic support for assigned ships and units.

5) The provision of operational and personnel support services.

6) The provision of handling assistance and safety supervision to ships receiving or discharging ordnance.

7) The provision for storage and transshipment of ordnance and weapons within station capabilities.



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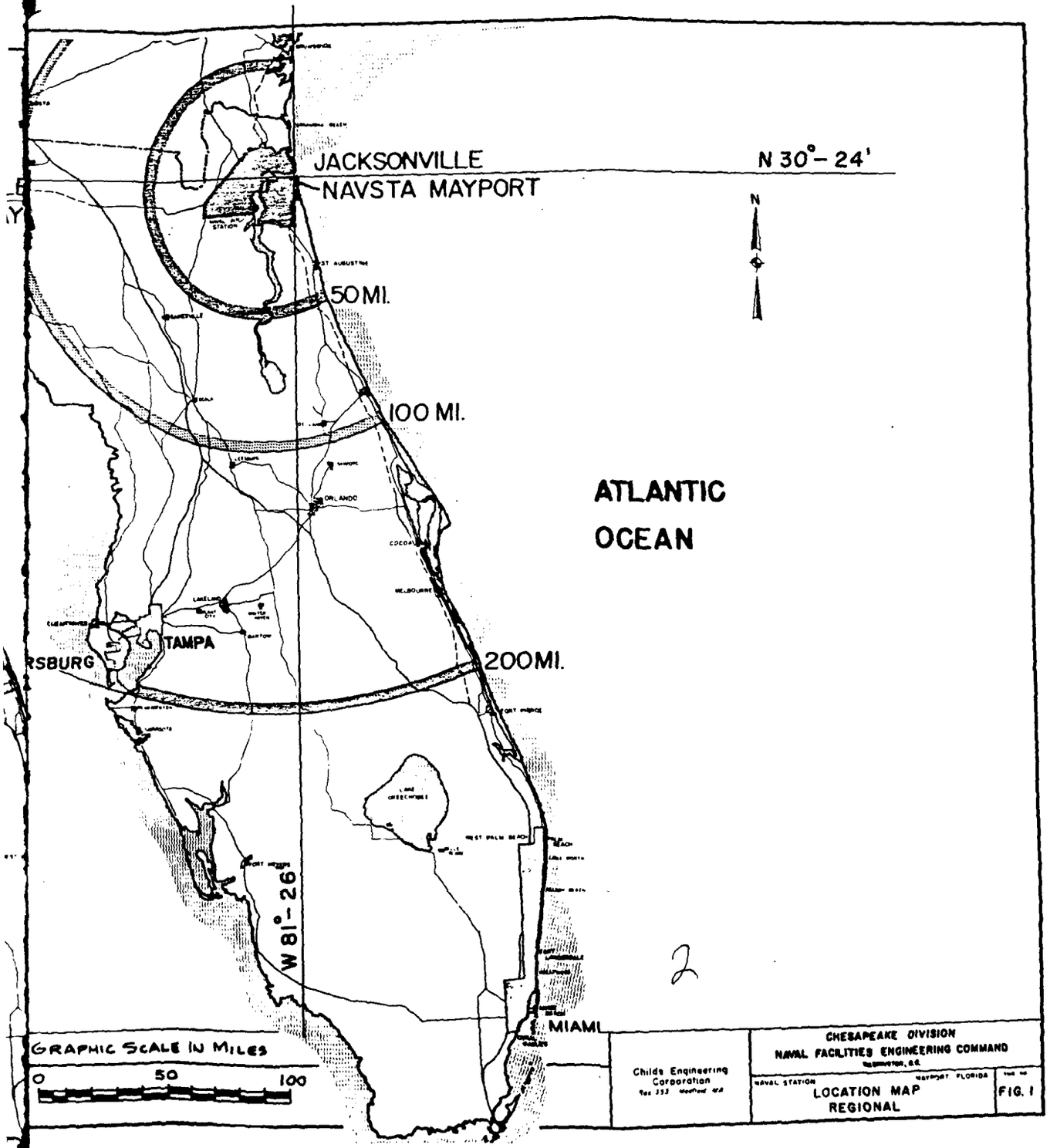
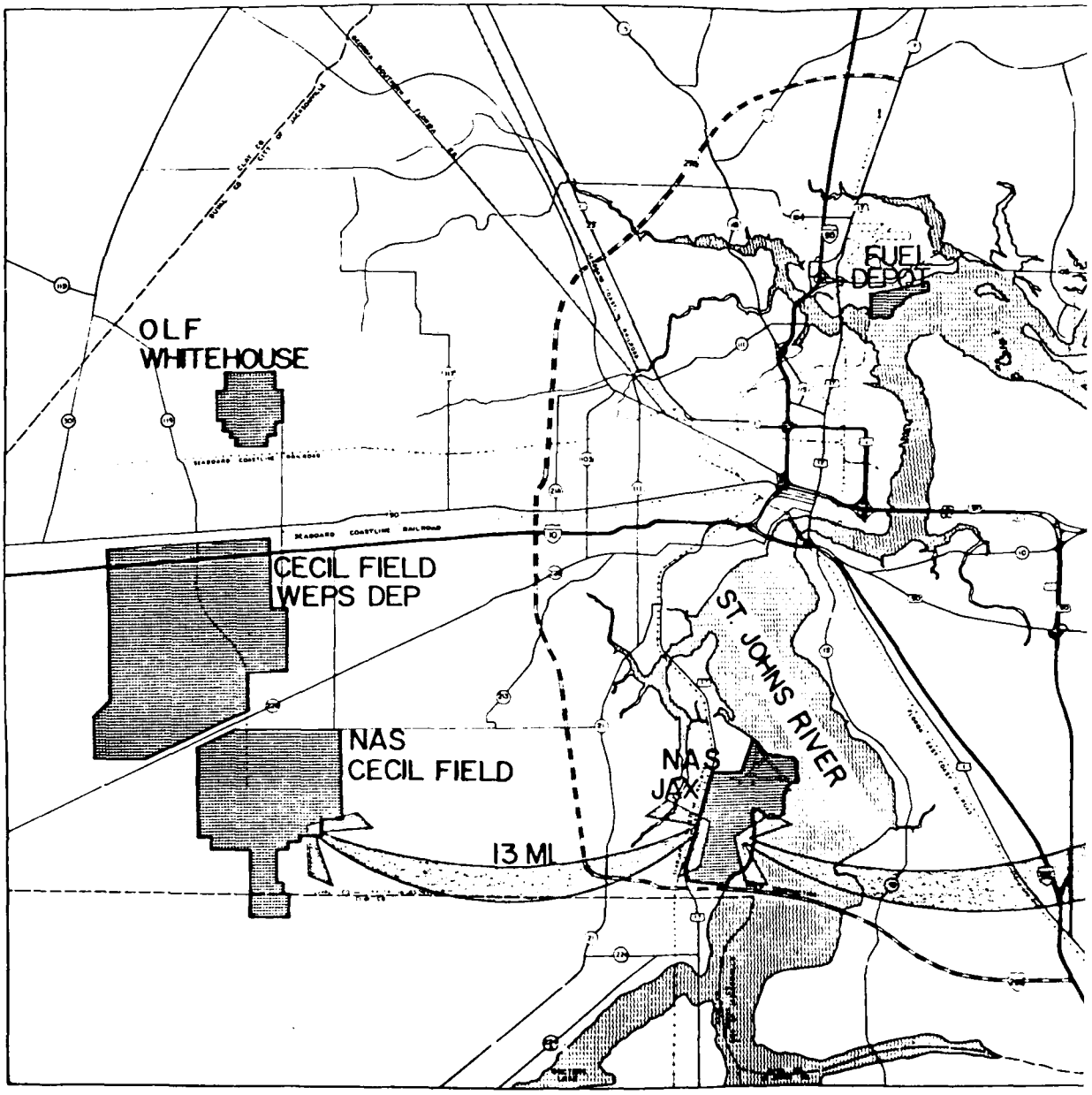

JACKSONVILLE
NAVSTA MAYPORT
N 30°- 24'
N
50 MI.
100 MI.
200 MI.
ATLANTIC
OCEAN
TAMPA
MIAMI
W 81°- 26'
GRAPHIC SCALE IN MILES
0
50
100
Childs Engineering Corporation
CHESAPEAKE DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL STATION
MAYPORT FLORIDA
LOCATION MAP
REGIONAL
FIG. 1

2



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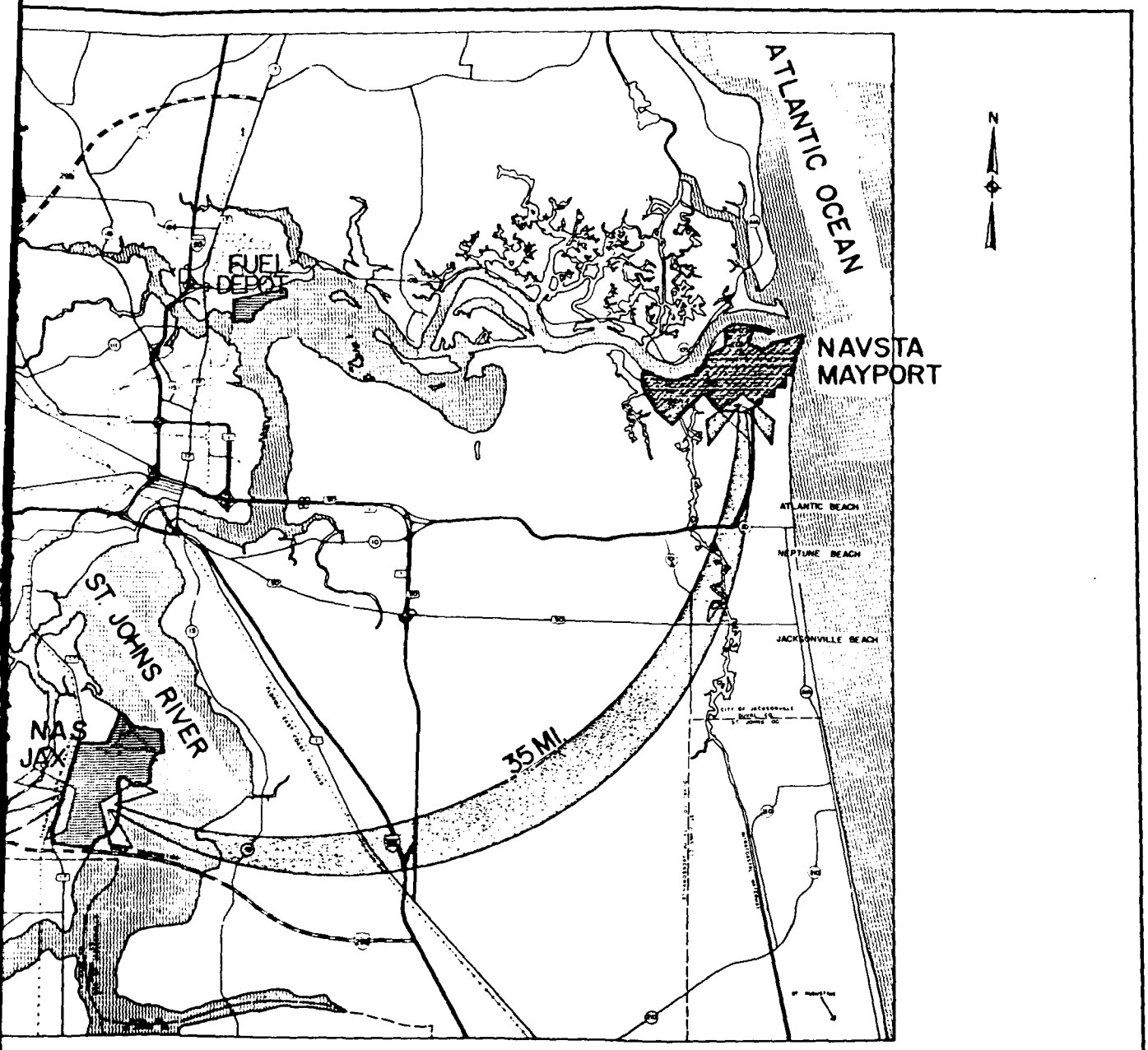
NAVAL FACILITIES ENGINEERING COMMAND, SOUTHERN DIVISION, JUNE 1975.



GRAPHIC SCALE IN MILES	Childs Engineering Corporation	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND
0 ½ 1 2 3 4		NAVAL STATION MAYPORT, FLORIDA LOCATION MAP VICINITY FIG 2

ON, JUNE 1975.

8) The provision of fuel storage.

9) The provision of administrative support to base and tenant operations.

10) The provision of pilot and tugboat services for ship movements to, from, and within Mayport harbor."[1]

2.3 HISTORY OF FACILITY

The Mayport facility was initially conceived as an aircraft carrier basin in 1939 and officially commissioned as a U.S. Naval Section Base in 1942. An aircraft landing field was incorporated in 1943. The facility served as a Sea Frontier Base until it was commissioned in 1944 as a U.S. Naval Auxiliary Air Station. In 1946 NAAS Mayport was decommissioned and placed in a "caretaker" status. It was reactivated in 1948 and used primarily for berthing of crash boats and as a carrier landing practice field. In 1952 the first carrier berth (known as C-1) was completed and in 1955 Mayport became the headquarters for Carrier Division Two. Improvements and expansion were made in the late 1950's and the Base placed under command of the Chief of Naval Operations. The facility functioned as an advanced staging area and provided fleet support during the Cuban missile crisis in 1962. In 1967 the station was assigned to the Commander-in-Chief, U.S. Atlantic Fleet. Currently, Mayport Naval Station is implementing an updated 1975 version of their Master Plan to meet 1972 SER requirements for expansion and improvement of physical and operational characteristics.

2.4 EXISTING ACTIVITIES

Today Naval Station Mayport is the homeport for five major components of the Atlantic Fleet. These are Carrier Group 6, Cruiser-Destroyer Group 12, Destroyer Squadrons 14 and 24, and Service Squadron 2.

Major tenants of the Station are Helicopter Anti-Submarine Wing One (HAS-One), the Fleet Training Center, the Fleet Maintenance Assistance Group (FMAG), and the Supervisor of Shipbuilding, Conversion, and Repair (SUPSHIPS). Figure 3 shows a plan view of the Naval Station.

Currently, there is approximately 7,700 feet of steel sheet pile bulkhead available for the berthing and servicing of a variety of ships, including aircraft carriers, destroyers, escort ships, destroyer tenders and fleet tugs. This does not include the A-1 berthing area which is undergoing reconstruction at this time. The present berthing conditions for the existing facilities are similar to the proposed conditions for these same facilities illustrated on the "Proposed Berthing Plan", Figure 4.

2.5 CLIMATOLOGICAL AND METEOROLOGICAL DATA

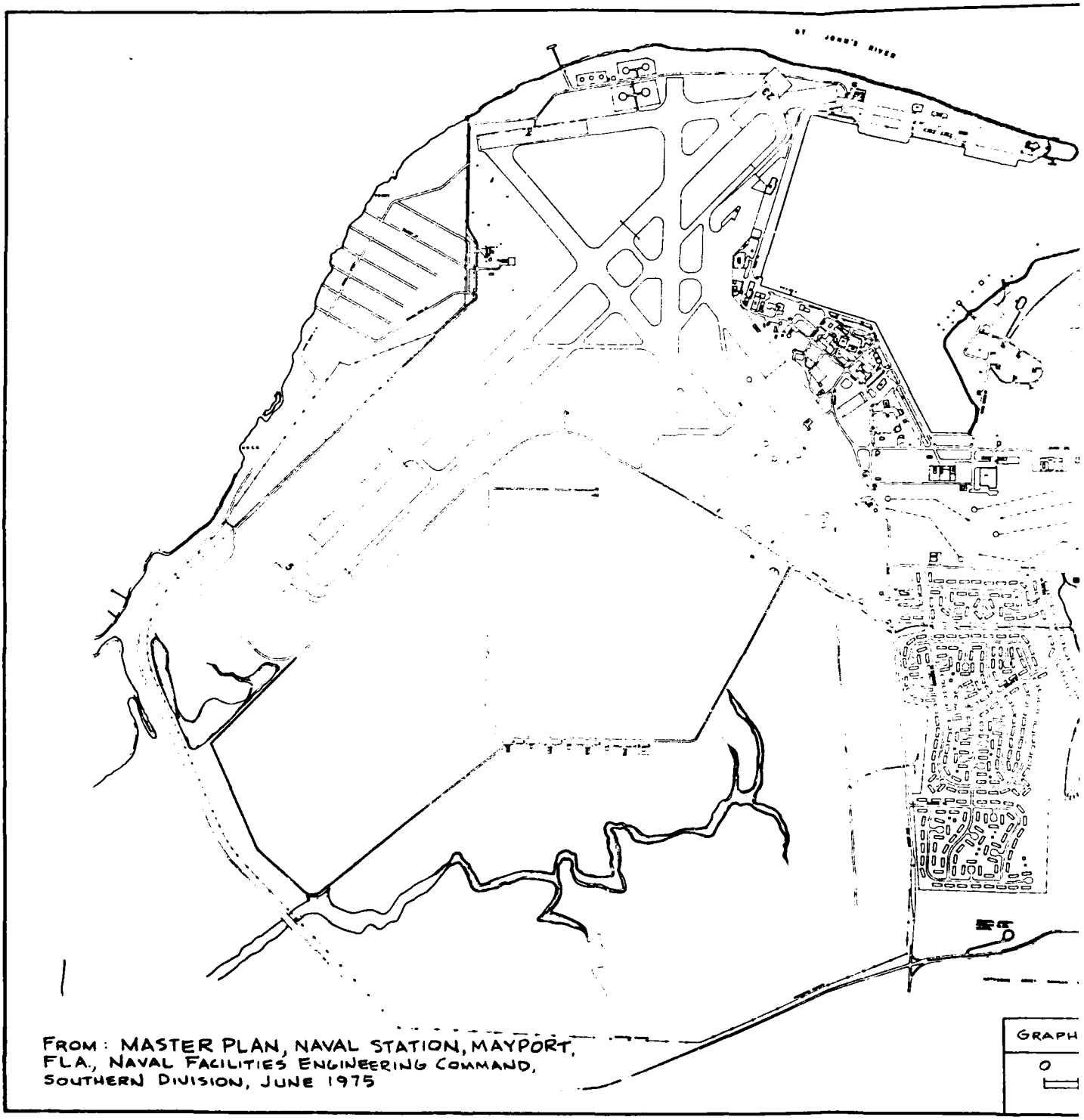
"The Mayport/Jacksonville area lies near the northern limit of the trade winds. Prevailing easterly breezes moderate summer and winter temperatures. The annual mean temperature is 68°-70° with an average summer maximum (during July and August) between 85°-88°. Mean winter temperatures (December through February) range from 52° to 55°.

The area experiences approximately 48 inches of rainfall per year, mostly in the form of summer thundershowers. Relative humidity averages 80 percent. Hurricanes rarely affect the area since, at this latitude, they tend to parallel the coastline at a distance or to dissipate much of their force overland before reaching the Jacksonville vicinity.

Average annual sunshine is 62 percent of maximum. This contributes to excellent flying conditions with "Visual Flight Rules" in effect about 90 percent of the year."[2]

2.6 HYDROLOGY

"The naval station lies in a flat area ranging in elevation from 0 to 20 feet above mean sea level. The land consists of a mixture of hardwood hammocks, coastal beach and dunes, salt water marsh, and dredged fill. Natural drainage follows several tidal creeks on a westward course to Chicopit Bay and the St. Johns River."[3]



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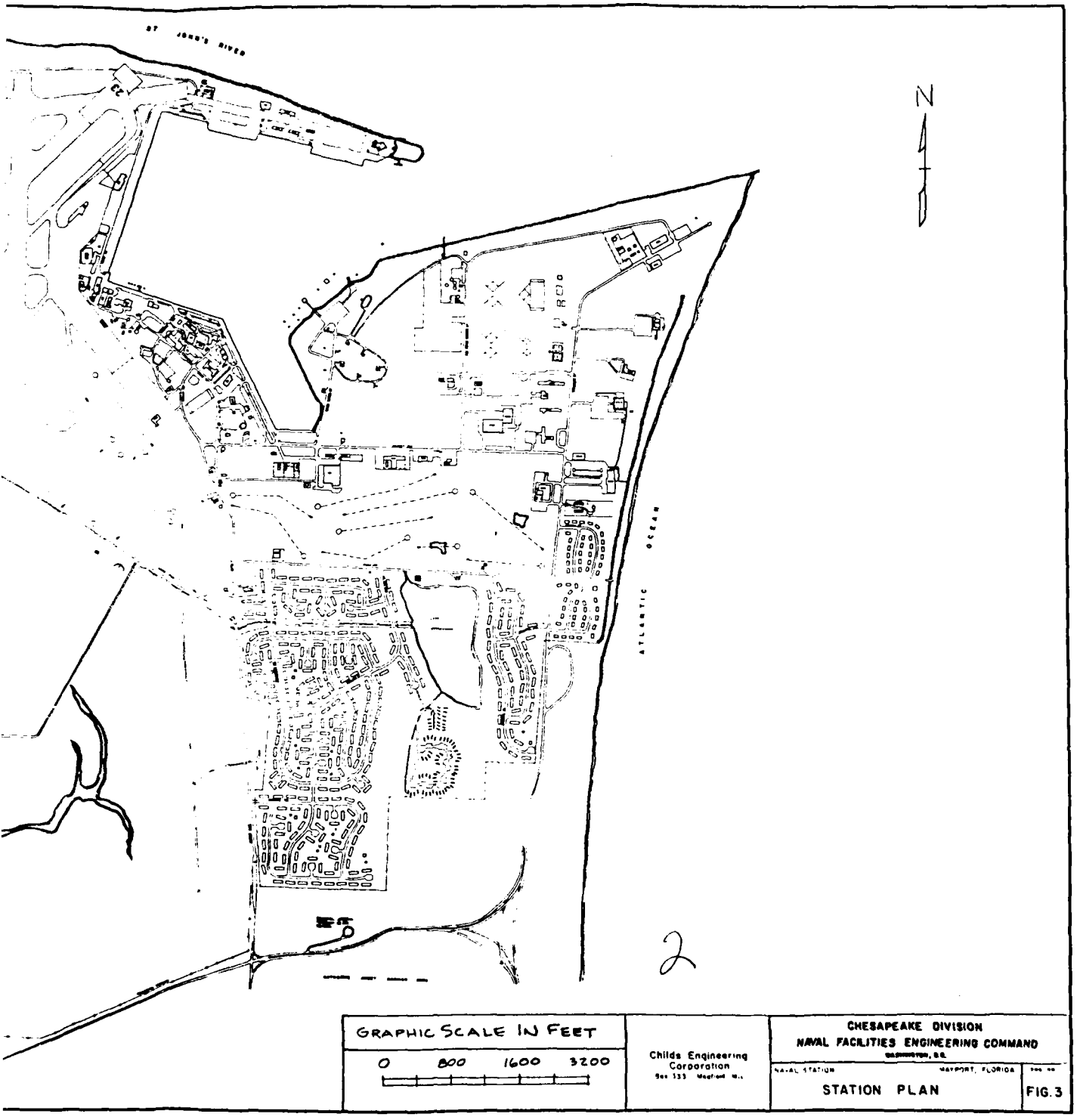

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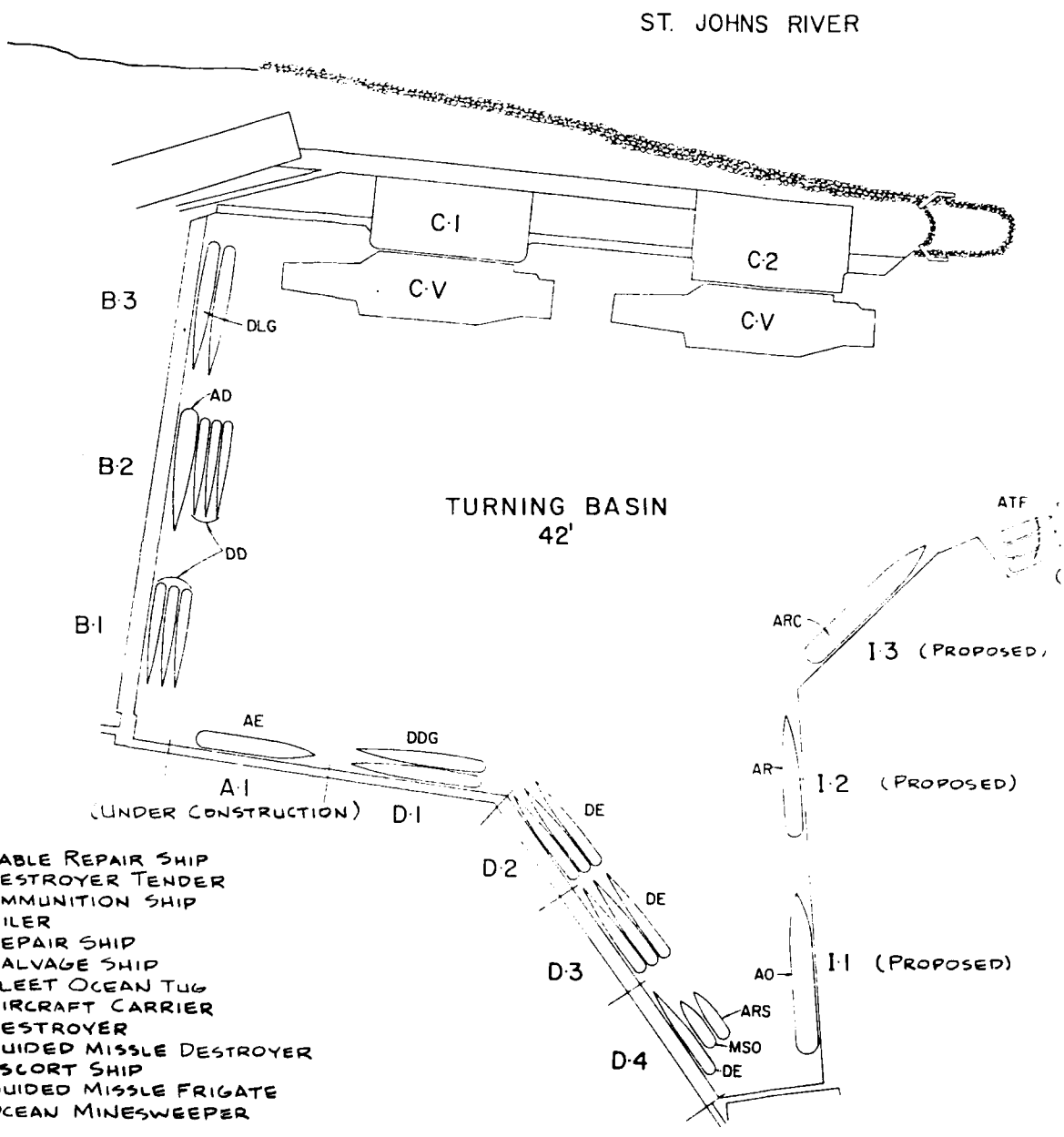
		STATION PLAN
		FIG. 3

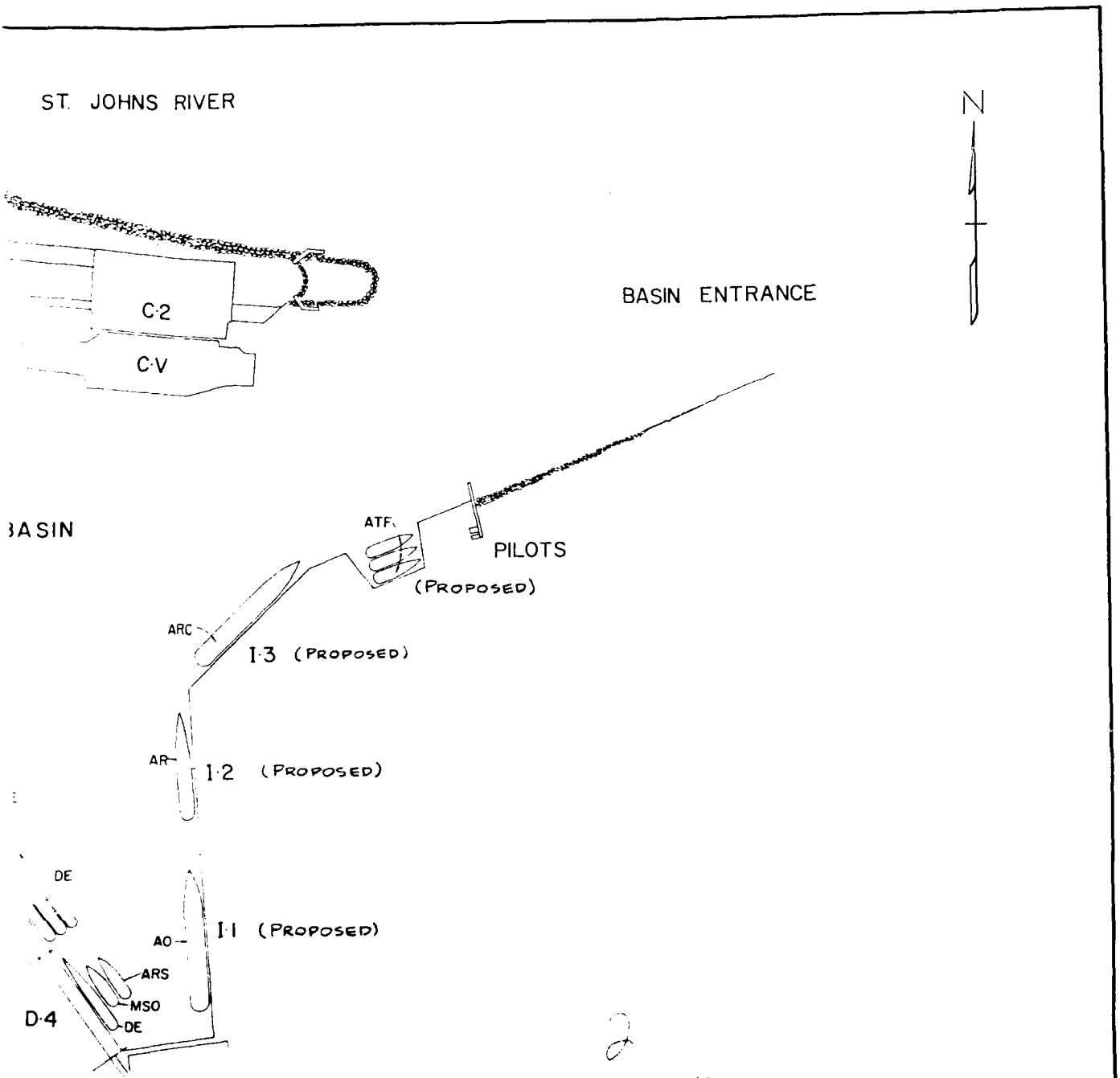


KEY

ARC – CABLE REPAIR SHIP
AD – DESTROYER TENDER
AE – AMMUNITION SHIP
AO – OILER
AR – REPAIR SHIP
ARS – SALVAGE SHIP
ATF – FLEET OCEAN TUG
CV – AIRCRAFT CARRIER
DD – DESTROYER
DDG – GUIDED MISSLE DESTROYER
DE – ESCORT SHIP
DLG – GUIDED MISSLE FRIGATE
MSO – OCEAN MINESWEEPER

FROM: MASTER PLAN, NAVAL STATION, MAYPORT, FLA., NAVAL FACILITIES ENGINEERING COMMAND, JUNE 1975.

GRAPH



GRAPHIC SCALE IN FEET	Childs Engineering Corporation	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND
0 200 400 600 800		PROPOSED BERTHING PLAN — FIG. 4

Although it is directly adjacent to the mouth of the St. Johns River, the Naval Station berthing area is in a basically marine environment. Tide level ranges for the Mayport area are as follows:

	Feet
Mean Low Water	0.0
Mean Tide Level	2.3
Mean Tide Range	4.5
Spring Tide Range	5.3

The Naval Station requires regular dredging due to a considerable inflow of silt. The turning basin is kept dredged to a depth of 42 feet below mean low water. In July, 1980, average depths along the bulkheads inspected varied from 21.4 feet to 31.0 feet, with an overall average depth of 27.2 feet below mean low water.

SECTION 3.0 INSPECTION PROCEDURE

3.1 LEVEL OF INSPECTION

From July 21 through July 30, 1980, a team of engineer/divers and technician/diver performed a Level I on-site underwater inspection of selected bulkheads at the Naval Station in Mayport, Florida. Level I underwater inspections assess the general condition of a structure utilizing visual/tactile inspection techniques. For bulkhead-type structures, visual/tactile observations of the structure's condition at mudline, mid-depth, and splash zone levels are performed. This level of inspection is designed to give a general condition assessment of the structure and should identify any areas that have been mechanically damaged or are in advanced states of deterioration.

3.2 INSPECTION PROCEDURE

Past experience combined with engineering theory, the level of inspection to be performed, the type of structure being inspected and the actual on-site conditions dictate the inspection procedures to be used.

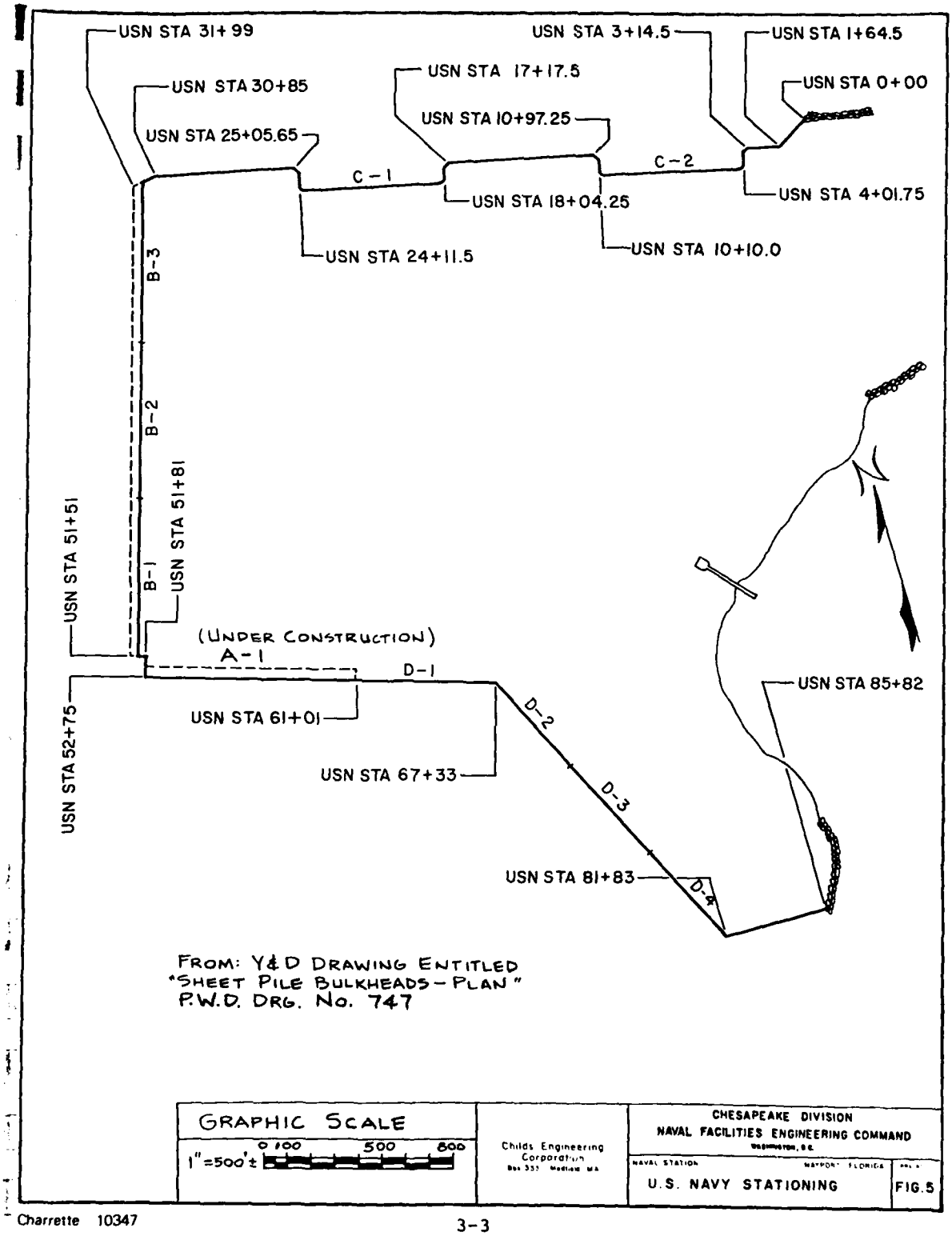
Under Task No. 3 of the Underwater Inspection Program, the scope of work included approximately 6,000 LF of steel bulkhead to be visually and tactilely inspected from the concrete cap or base of the concrete encasement to the mudline for gross structural damage, holes, either corrosion or mechanical, and any loss of fill. The fender and utility systems were beyond the scope of this Level I inspection. Also no inspection was performed on areas made inaccessible by any fender system associated with the structure.

Before each facility was inspected, the bulkheads were first stationed. This was accomplished by using U.S. Navy stationing

at specific reference points as base points, usually corners of berths (see Figure 5). Childs Engineering Corporation (C.E.C.) Stations were then marked every 20' along the centerline of the concrete cap using a 200' steel tape. This stationing, referenced as C.E.C. Stations on the facility sketches located in the appropriate sections of this report, was used to locate any conditions noted during the inspection. Although C.E.C. Stations did not always match with U.S.N. stationing, C.E.C. stations can be translated to U.S.N. stationing by back-tracking to the U.S.N. stations from which they were derived.

A dive team consisting of two divers and one tender/note-keeper performed the on-site inspection. Past experience has proven this arrangement to be efficient as well as safe. With one diver covering the area within 5'-15' of the mudline and the second diver covering the remaining portion of the wall, the inspection was advanced laterally along the bulkhead. Figure 6 shows both divers' inspection path. This approach was chosen for several reasons. First, both divers can progress in the same direction while remaining in close proximity and without interfering with each other. Although the second diver covers a larger area than the first, both divers progress at approximately the same rate. Visibility usually decreases with depth, therefore, with less visibility, the amount of area the first diver can cover, relative to the second diver, is less. Secondly, this procedure decreases the amount of up and down movement of both divers. This minimizes the need to continually equalize body pressures with surrounding hydrostatic pressures.

Starting at a known station, both divers proceeded along the bulkhead for a prearranged distance. Both divers made a mental note of general conditions and did not surface until they had covered this distance or unless specific notes or measurements needed to be relayed to the tender/note-keeper.



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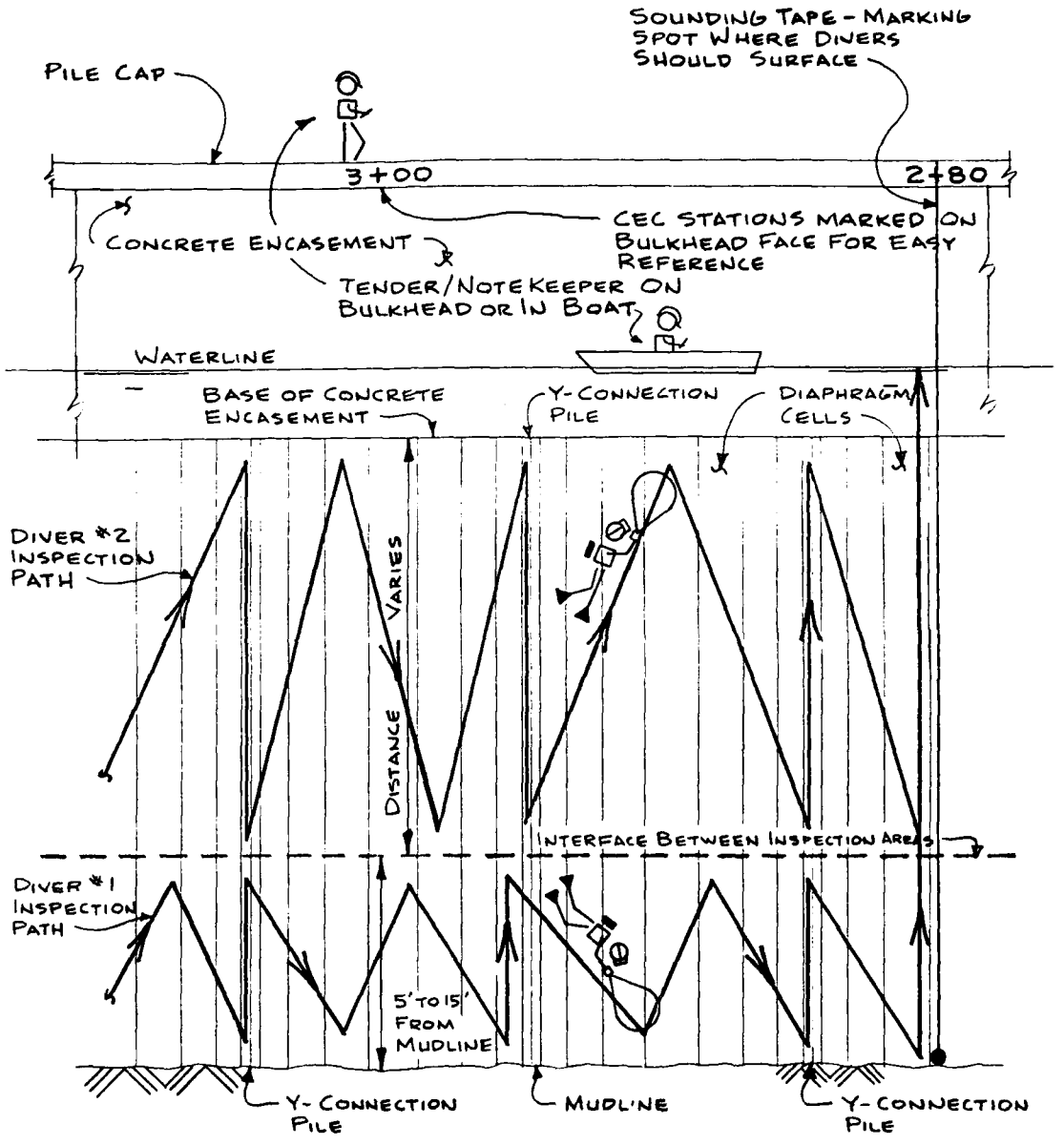


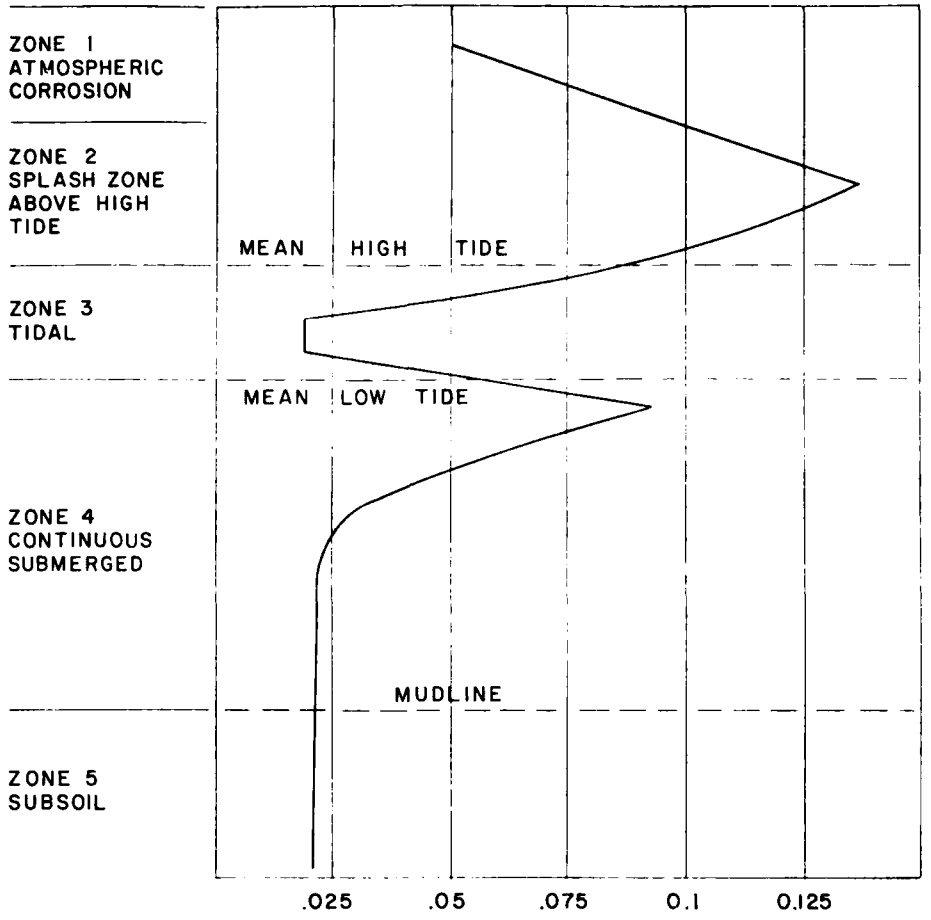
NOTE: FENDER SYSTEM HAS BEEN OMITTED FOR CLARITY. ACTUAL PATH (WIDTH AND HEIGHT) FOR DIVERS VARIES WITH CLARITY OF WATER, AGE OF FACILITY, OBSTRUCTIONS, ETC. ASSURING ALL PORTIONS OF THE BULKHEAD WERE EXAMINED.

GRAPHIC SCALE	Childs Engineering Corporation Box 333 Medfield, MA	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C.
NOT TO SCALE		NAVAL STATION MAYPORT, FLORIDA
		DIVERS' INSPECTION PATH — FIG. 6

Each facility was closely examined in areas where problems might exist. Close examination included removal of marine growth and coating, or corrosion by-products to bare metal in selected areas of the wall. Two common causes of problems are corrosion and failures due to overstressing of the structures. Based on classical corrosion curves, as shown in Figure 7, areas of maximum corrosion usually occur at or around mean low water (MLW), within 2' of the mudline, in the splash zone and in areas where a differential oxygen concentration cell is set up. This latter case can occur at the interface or boundary areas between concrete and steel. As a result, the steel just below the concrete is sacrificed to protect the steel under the concrete.

To document the corrosive activity, corrosion profiles were taken at selected stations along each berth. These baseline recordings were obtained using an ultrasonic thickness gauge with underwater probe and cable. Small areas of biofouling were removed to expose bare metal at various elevations throughout the height of the bulkhead. Photo #1 shows a typical area cleaned for ultrasonic thickness measurement. The number of readings per station and per facility was based on experience and from corrosion profiles obtained during the inspection.

Besides concentrating the inspection in areas where high corrosive activity exists, efforts were focused in areas where overstressing of anchored bulkheads and diaphragm cell structures can occur. These areas include the portion of the wall near the mudline on both types of structures and the Y-connections on the diaphragm cells. At the mudline, large overburden forces are exerted and at the Y-connections of diaphragm cells, overstressed conditions can usually be first noticed.[4] Figure 8 shows most of the forces acting on sheet pile sections. Structural assessment calculations found in the Appendix show the stress at the Y-connection of a diaphragm cell and the



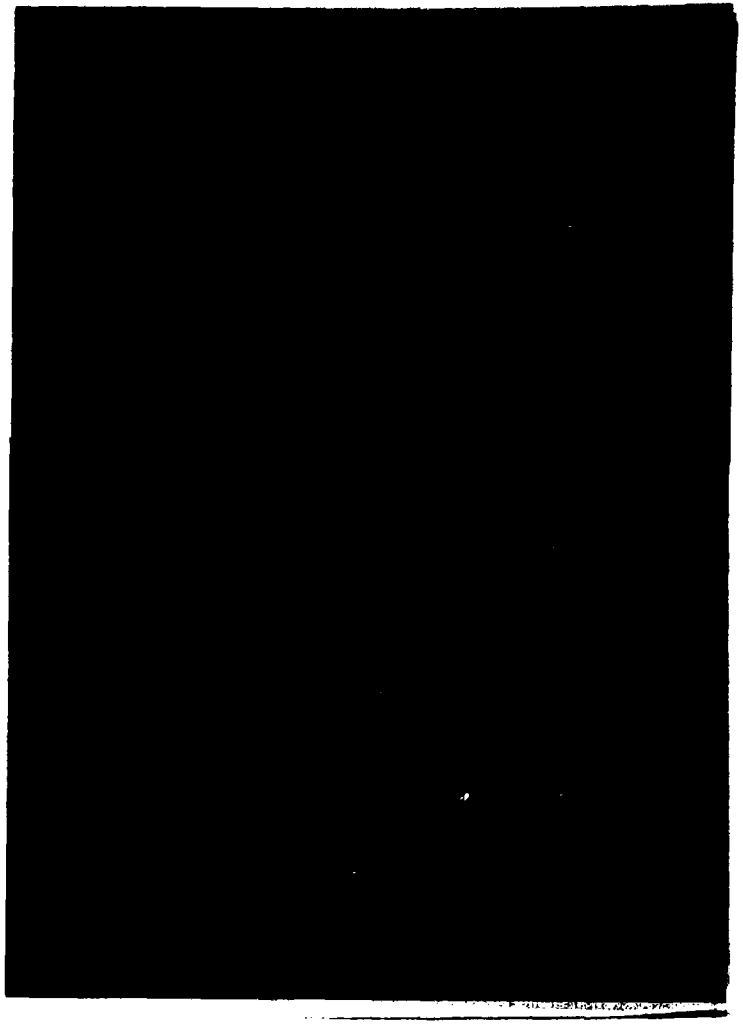
RELATIVE LOSS IN METAL THICKNESS

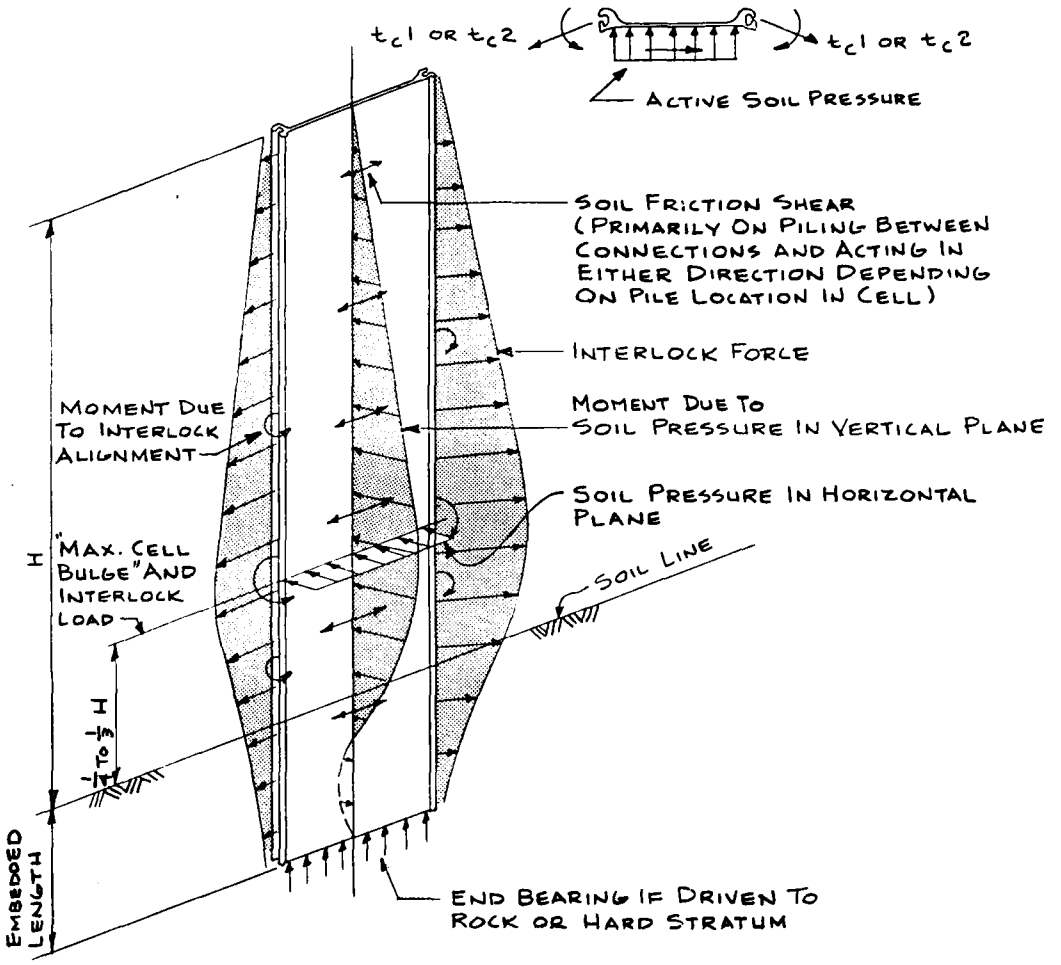
CORROSION PROFILE OF STEEL PILING – FIVE YEARS EXPOSURE IN SEAWATER

FROM: S.C. FYRE, "THE PROTECTION OF PILING" IN DESIGN AND INSTALLATION OF PILE FOUNDATIONS AND CELLULAR STRUCTURES, E.D., HSAI-YOUNG FANG AND THOMAS D. DISMUKE (PENNSYLVANIA: ENVO PUBLISHING CO., INC 1970) PP 191-207.

GRAPHIC SCALE	Childs Engineering Corporation Box 333 Medfield, MA	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C.
N/A		NAVAL STATION MAYPORT, FLORIDA CORROSION PROFILE FOR STEEL PILING
		DWG. NO. FIG. 7

PHOTO #1: Typical Ultrasonic Thickness Measurement Station (Destroyer Berth D-2)





FORCES AND MOMENTS ACTING ON SHEET PILING SECTIONS

ADAPTED FROM T.D. DISMUKE, "STRESS ANALYSIS OF SHEET PILING IN CELLULAR STRUCTURES," IN DESIGN AND INSTALLATION OF PILE FOUNDATIONS AND CELLULAR STRUCTURES, ED., HSAI-YOUNG FANG AND THOMAS D. DISMUKE (PENNSYLVANIA: ENVO PUBLISHING CO., INC 1970) PP 352.

GRAPHIC SCALE	Childs Engineering Corporation Box 333 Medfield, MA	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C.
N/A		NAVAL STATION MAYPORT, FLORIDA FIG. 8

approximate location of maximum stress in an anchored steel sheet pile wall.

Photographic documentation was obtained of typical and irregular conditions when harbor water clarity permitted. Soundings were taken every 100' along each facility.

3.3 INSPECTION EQUIPMENT

Equipment used for inspection purposes included a Krautkramer D-meter ultrasonic steel thickness gauge with DMR probe and 75' of cable, a Nikonos III underwater camera with Oceanic 2001 strobe, dive lights, 100' sounding tape, 200' metal tape, 6' folding rule, chipping hammers and dive knives.

Choice of equipment was made as a result of past experience. Most equipment must be straightforward, easy to handle, carry and use and must prove reliable under hard use.

Ultrasonic thickness gauging is preferred over other techniques (such as drilling test holes) since it is non-destructive, easy to handle, fast and reasonably accurate.

SECTION 4 FACILITIES INSPECTED

Throughout the inspection of Naval Station Mayport, marine growth profiles were noted for each facility. In general, all experienced similar conditions regardless of their age. Marine growth consisted of hairlike algae protruding out a maximum of 2" away from the wall at the water surface and decreasing to 1" near the mudline. Worms with calcareous tubes appeared to be the most prevalent organisms and formed a dense coating over each structure. Photos #2 and #3 show the typical marine growth observed at Naval Station Mayport. Corrosion nodes and patches of orange oxidation were common but sporadically located. These areas were not specifically associated with advanced stages of corrosion. The nodes and patches were also more common within 5' of the base of the concrete encasement. In Photo #4 a typical example of a corrosion node is shown.

In the older structures, such as Carrier Berths C-1 and 2, deposits of hard black corrosion by-product were common behind the outer calcareous layer. In these cases gas pockets were formed next to the steel. Examples of this corrosion buildup and an orange oxidation patch is shown in Figure 9.

Other typical conditions include cosmetic spalling of the base of the concrete encasements and at the expansion joints. In some instances steel reinforcement is exposed.

In the remaining portion of this section, each facility inspected at Naval Station Mayport is referenced separately. A description of its construction, specific observed conditions, an assessment of these conditions and recommendations for repairs are included for each facility.

PHOTO #3: Example of Marine Growth's Extension away from Bulkhead (Wharf B-2)

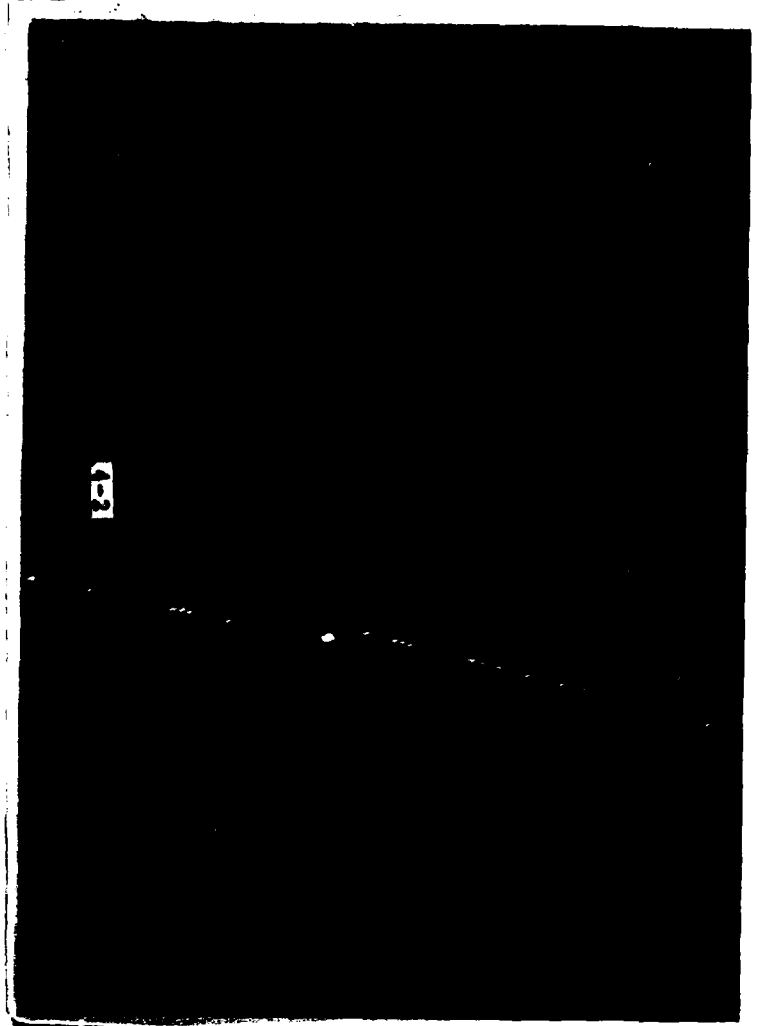


PHOTO #2: Example of Marine Growth Observed at Naval Station Mayport (Destroyer Berth D-2)

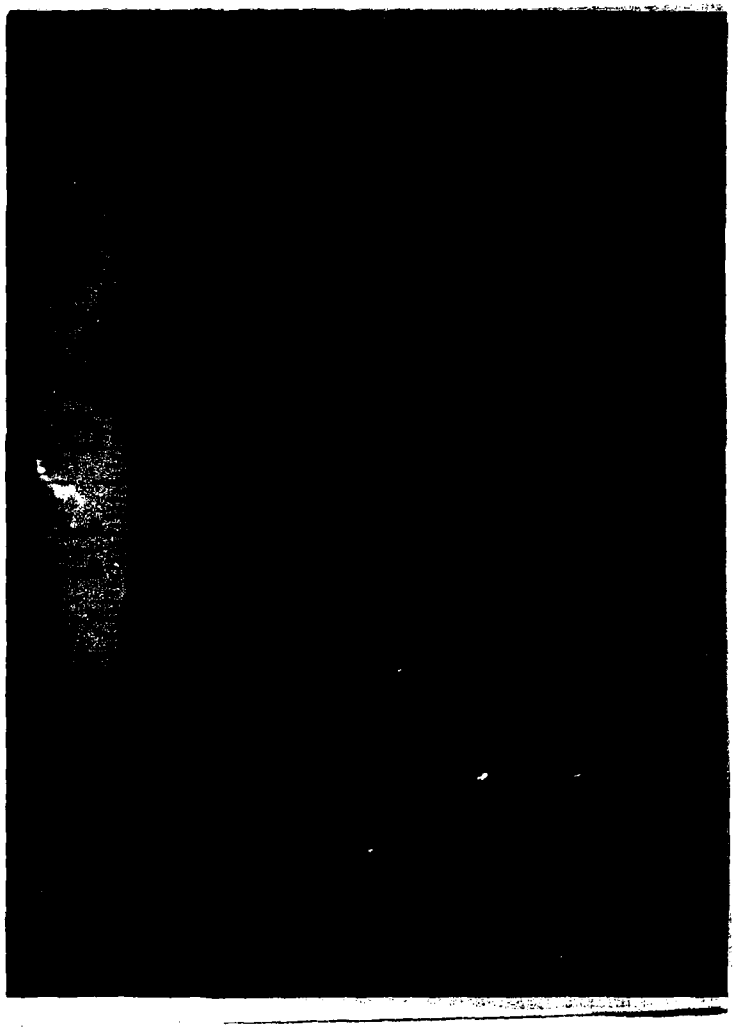
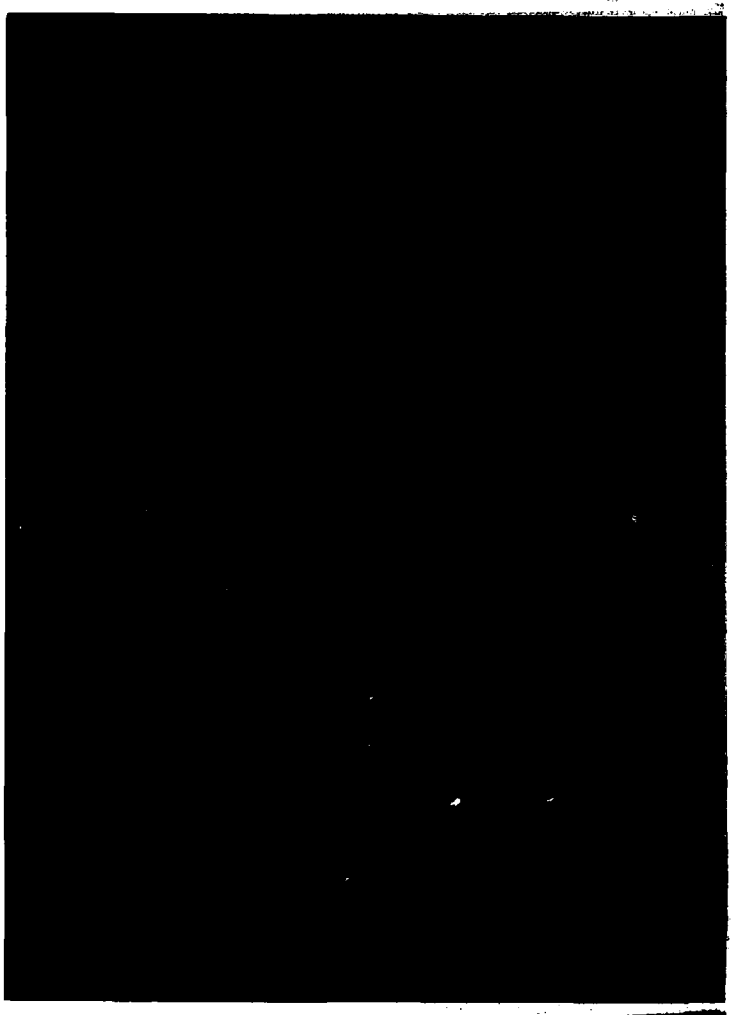
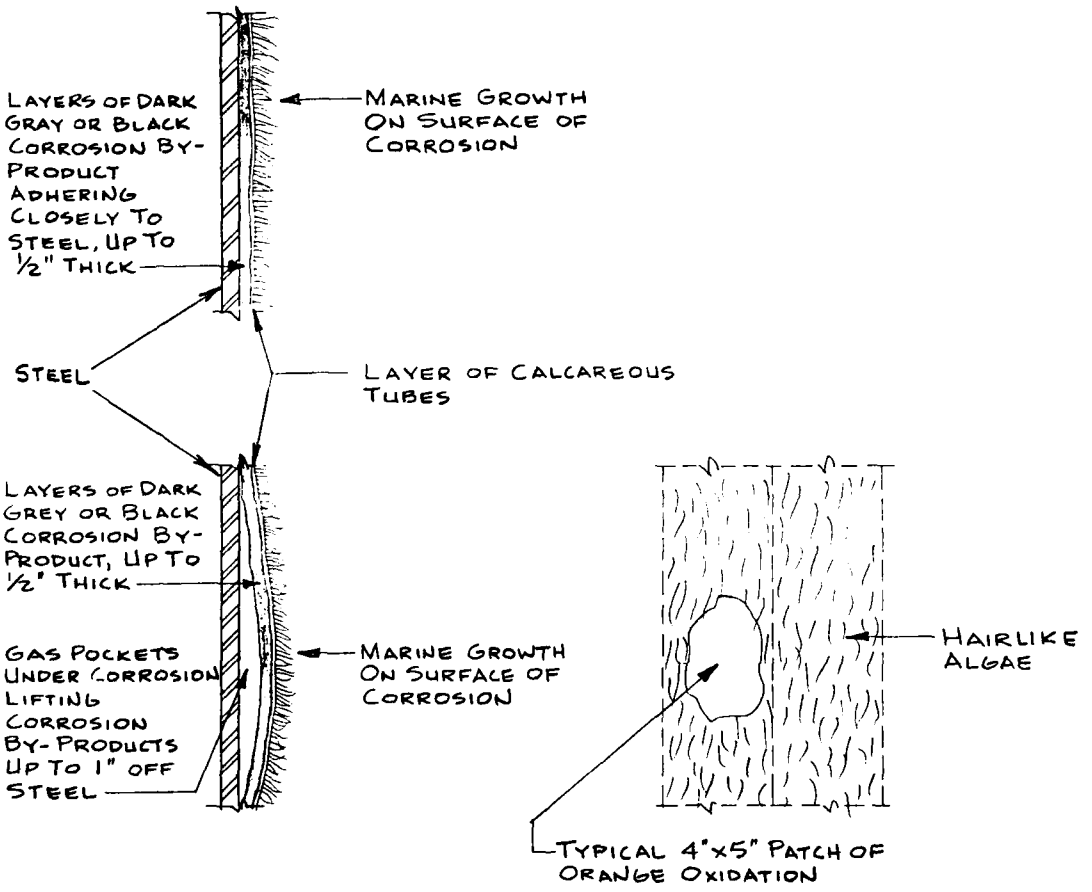


PHOTO #4: Example of Typical Corrosion Node (Small Craft Berthing)





TYPICAL CORROSION BUILDUP

TYPICAL OXIDATION PATCH

GRAPHIC SCALE	Childs Engineering Corporation Box 333 Medfield, MA	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C.	
NOT TO SCALE		NAVAL STATION MAYPORT, FLORIDA	
		TYPICAL CORROSION	FIG. 9

4.1 CARRIER BERTH C-1

4.1.1 Description

This bulkhead is located on the northern edge of the Naval Station turning basin (see Figure 4) and runs from C.E.C. Stations 17+17.5 to 24+62 (see Figure 10). At the time the inspection was performed, a carrier was alongside this facility.

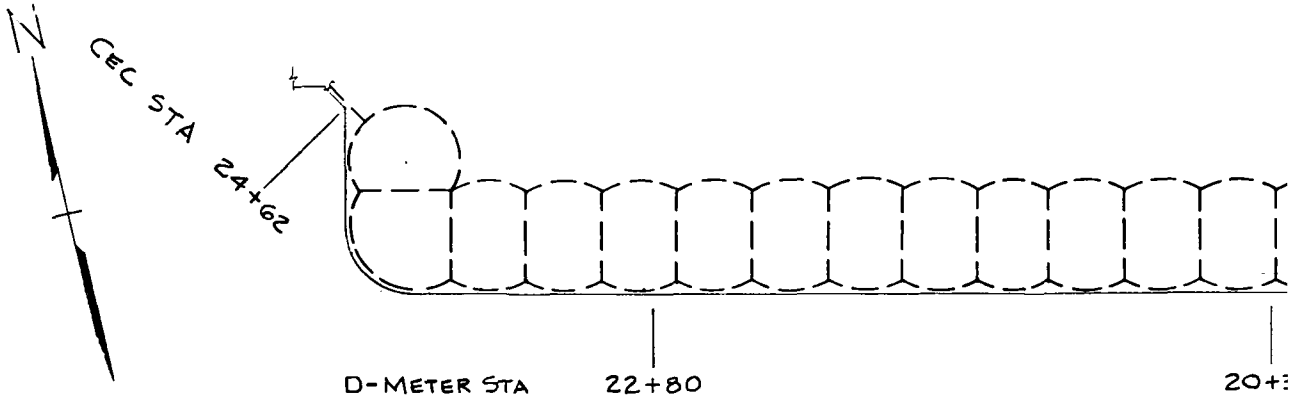
The facility was constructed around 1951 and is a diaphragm cell wall. Y-connections between cells are mechanically fastened. A distance of 30.74'± separates each diaphragm. The front or exposed cell wall consists of PSA-28 steel sheet pile sections while the back and diaphragm wall consist of PSA-23 sheet pile sections. The front steel sheet pile sections were driven to elevation -52.75' and were designed for a dredge depth of elevation -37.0' at the base of the wall and to elevation -42', 11.25' offshore. A reinforced concrete cap and curbing runs the length of the facility. From just below the cap to elevation -4.0', the front cell walls are encased with reinforced concrete. The encasement consists of precast concrete panels of 4,000 psi concrete backfilled in-place with 3,000 psi concrete. The steel reinforcing is 20,000 psi (see Figure 11).

References: Bureau of Yards and Docks
"Mooring Facilities"
Y&D Drawing No. 499243, 499244

Bureau of Yards and Docks
"Sheet Pile Bulkheads Sta. 0+00 to
Sta. 24+11.50 North Bulkhead"
P.W.D. Drawing No. 748

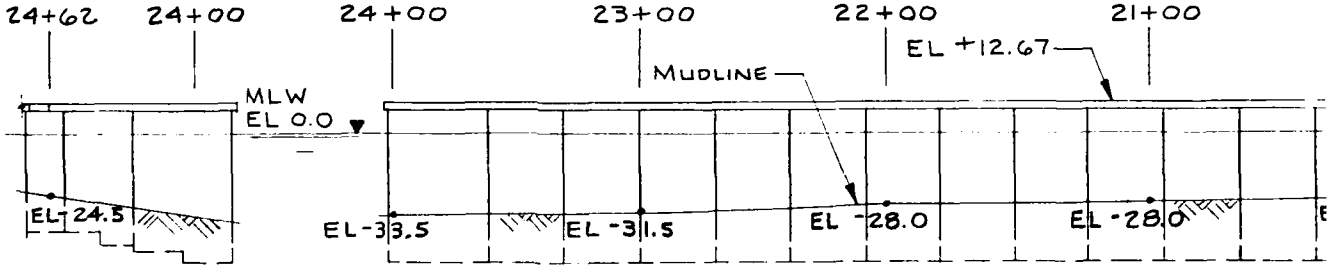
4.1.2 Observed Inspection Condition

Only one hole was found in the bulkhead, a 1'ø corrosion hole, located on the outside corner cell at CEC Sta. 23+70, elevation -5.5' (see Photos #5 and #6). Further west,



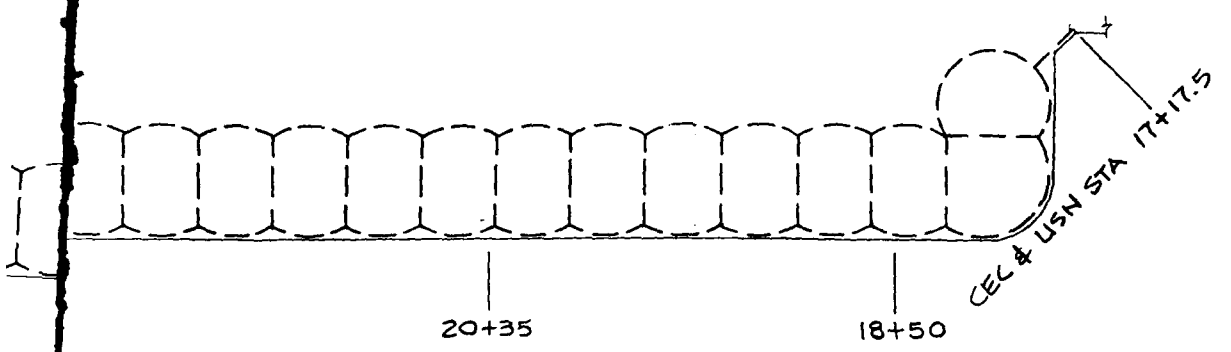
PLAN

SCALE: 1" = 60'



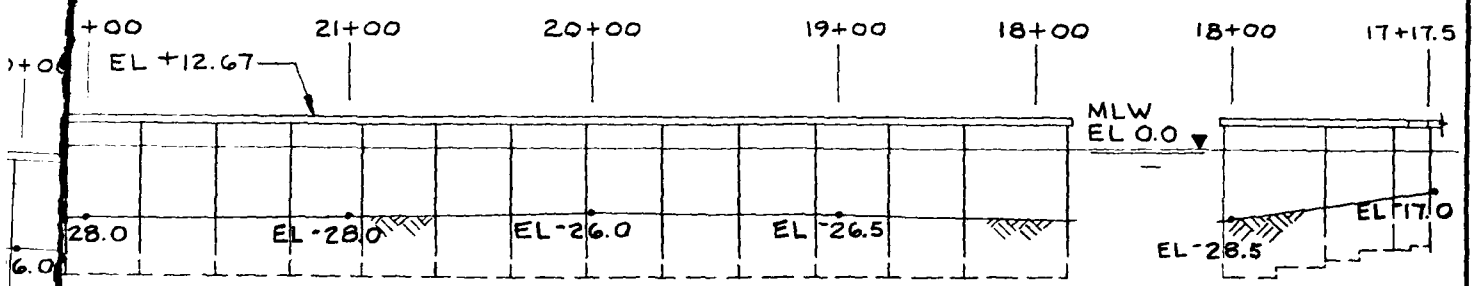
ELEVATION

SCALE: 1" = 60'



PLAN

SCALE: 1" = 60'

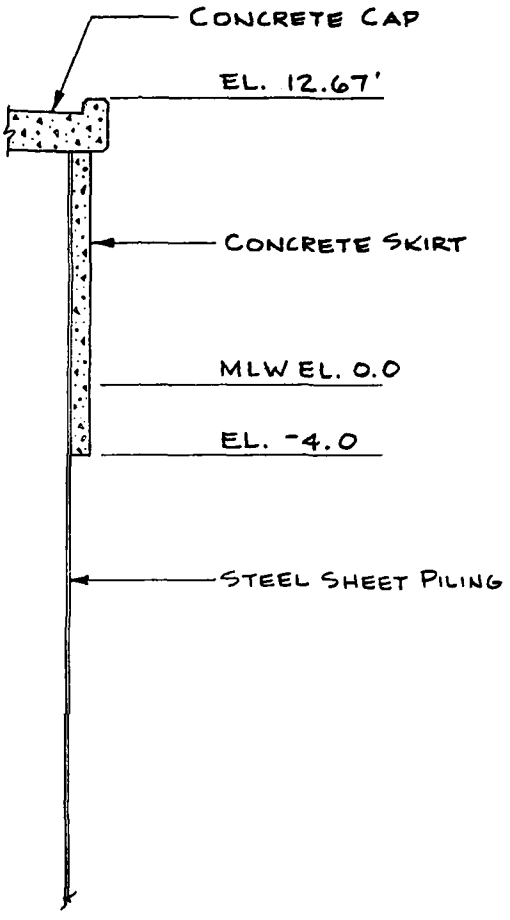


ELEVATION

SCALE: 1"= 60'

2

GRAPHIC SCALE IN FEET 1"=60' 0 10 50 100	Childs Engineering Corporation	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND NAVAL STATION — MAYPORT, FLORIDA CARRIER BERTH C-1 — FIG. 10



CROSS-SECTION

GRAPHIC SCALE NOT TO SCALE	Childs Engineering Corporation Box 353 Medfield, MA	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C. NAVAL STATION MAYPORT, FLORIDA CARRIER BERTH C-1 FIG. 11

Charrette 10347

PHOTO #6: Bottom Partial View of 1' Diameter Corrosion Hole, at CEC Sta. 23+70 at El. -5.5' (Carrier Berth C-1)

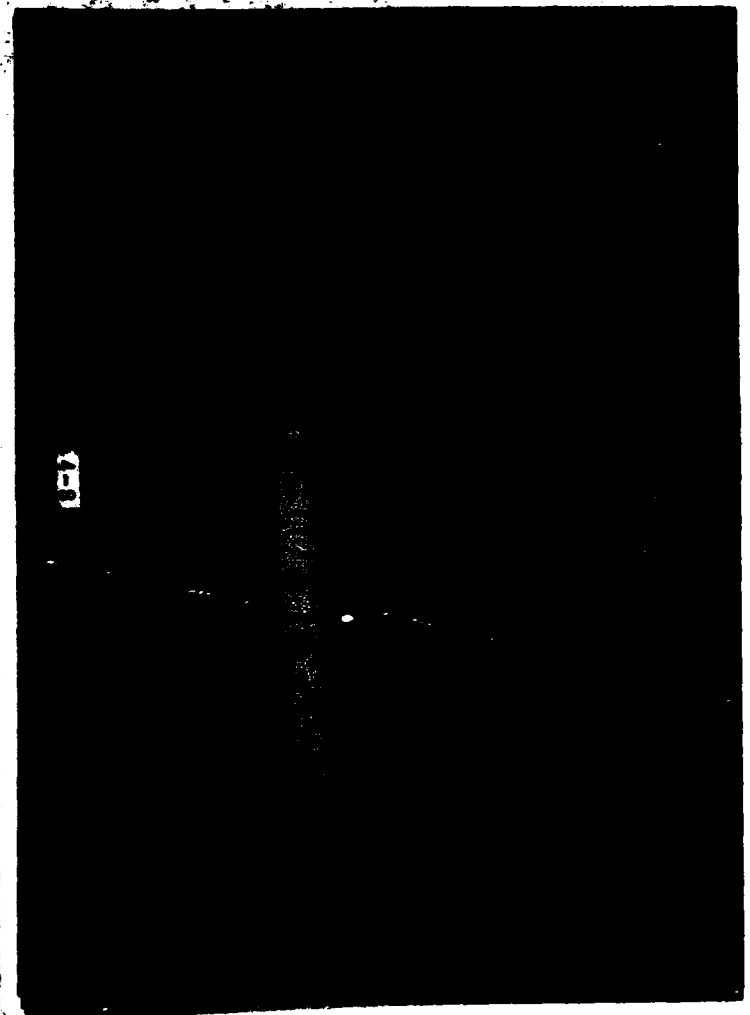
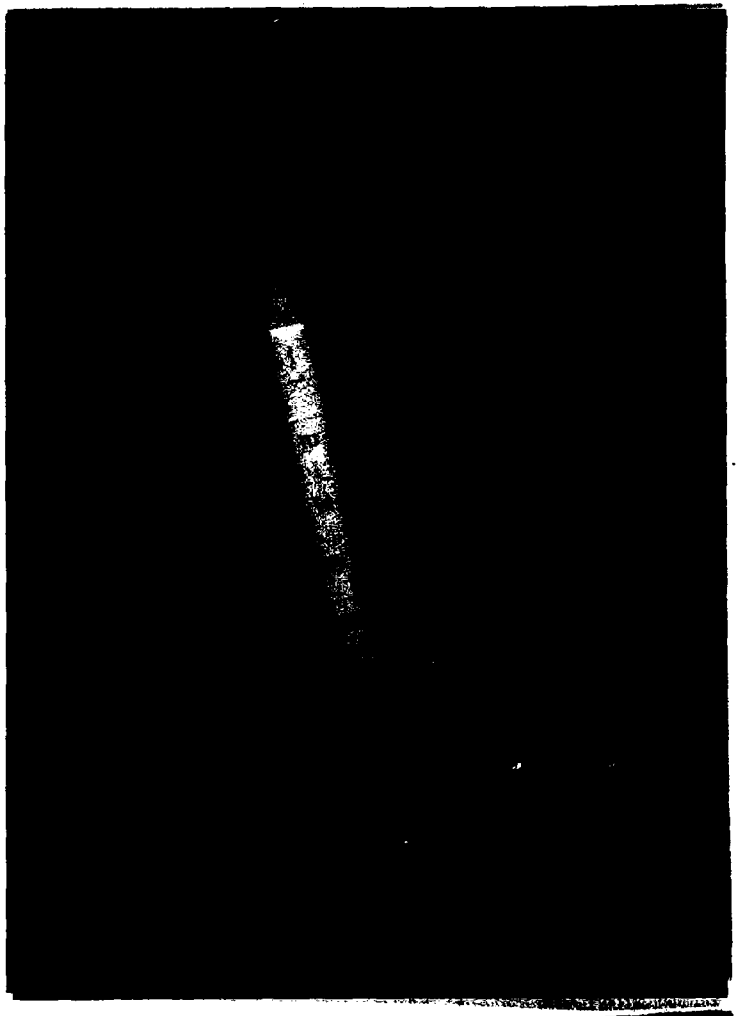


PHOTO #5: Top Partial View of 1' Diameter Corrosion Hole, Observed at CEC Sta. 23+70 at El. -5.5 (Carrier Berth C-1)



at the same elevation on this corner at CEC Sta. 23+97, there is a 3' x 3' steel plate attached with two mechanical fasteners (see Photos #7 and #8). It appears to be the repair for another hole. A substantial amount of fill in the cell has apparently emptied out of the hole as evidenced by a large area of settlement in the pavement on top of the cell.

The worst corrosion was seen within 10' of the base of the concrete encasement. Ultrasonic steel thickness measurements were taken at three (3) locations, indicating a range of metal loss from 21-37% (see Appendix). If there was any coating originally placed on the steel, what remains has been obscured by marine growth and corrosion by-products.

Soundings show a dredge depth of 17.0' to 33.5' below mean low water to exist along the bulkhead face.

No inspection was performed between CEC Sta. 20+35 to 21+50. A 2000 gallons per minute (gpm) fire pump intake was located on the bulkhead within this area. The Chief Engineering Officer aboard the carrier occupying this berth indicated:

- no grate existed on the intake
- the fire pump could not be shut down
- a 50' berth should be given on either side for safety.

4.1.3 Structural Condition Assessment

The purpose of this section is to present a qualitative description of the structural condition of the facility based on the inspection data.

In general, Carrier Berth C-1 is in fair condition. Soundings indicate mudline to be well within the design dredge limits. However, of all the berths inspected at

PHOTO #8: Close-up of Mechanical Fastener on Steel Patch (Carrier Berth C-1)

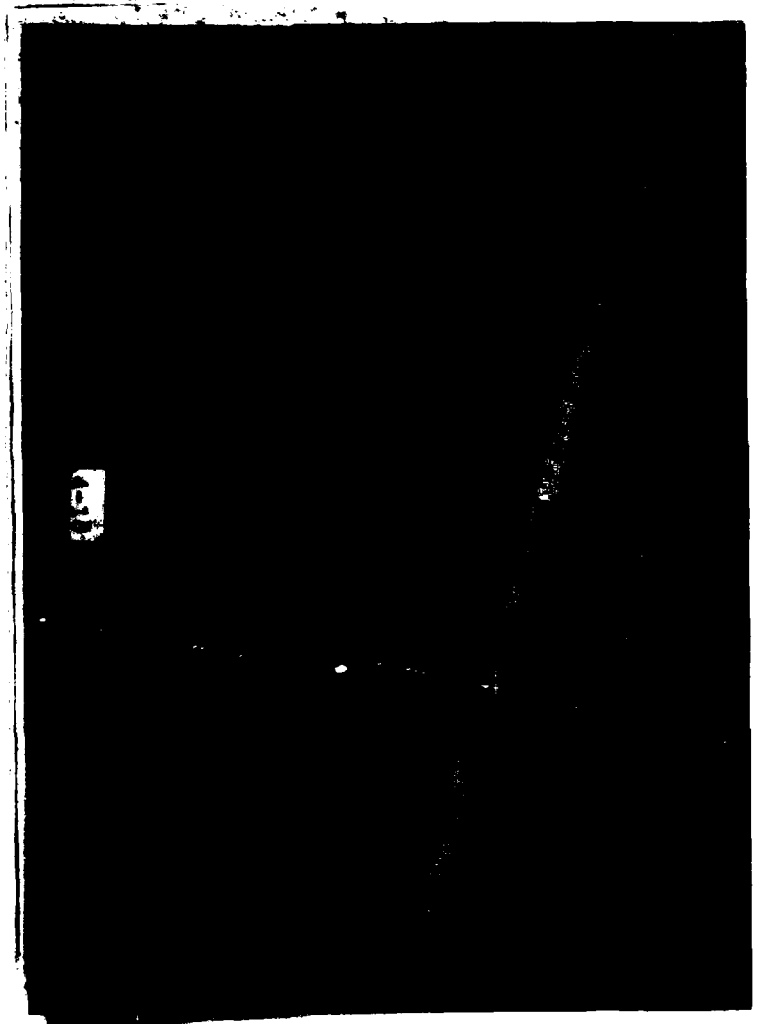
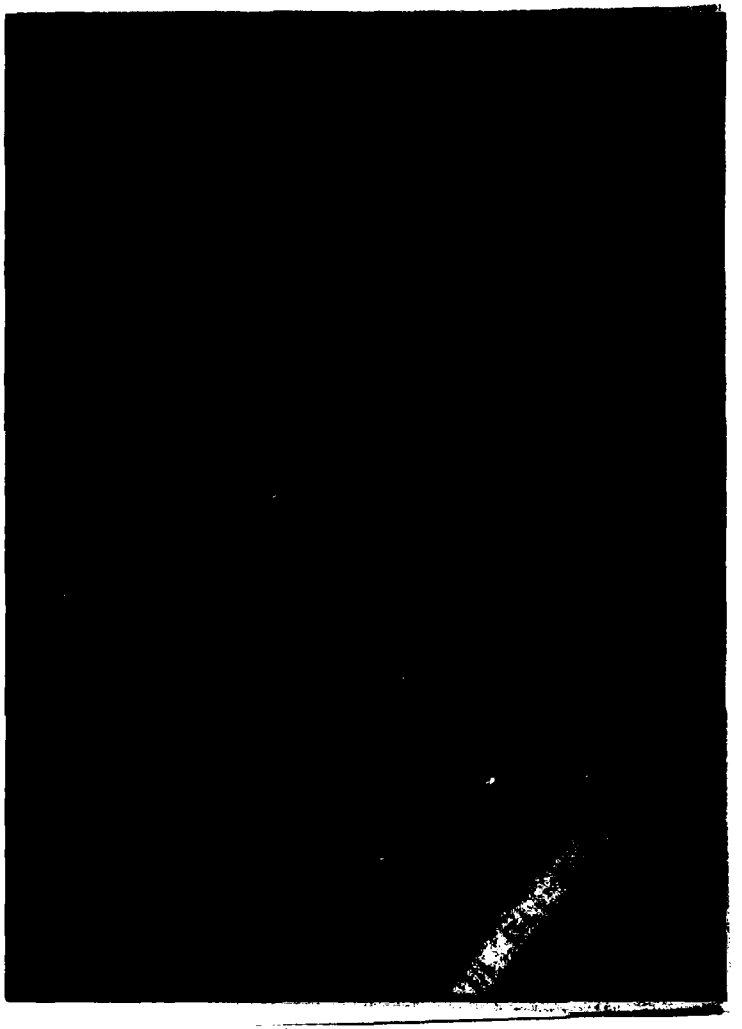


PHOTO #7: Steel Patch, 3' x 3', with 2 Mechanical Fasteners, at CEC Sta. 23+97 at El. -6.0 (Carrier Berth C-1)



Naval Station Mayport, this facility exhibited the greatest amount of corrosion. Since this berth is the oldest facility inspected in this survey, the amount of corrosion observed is not unusual.

Ultrasonic thickness measurements indicate that maximum metal loss has occurred within ten (10) feet below the base of the concrete encasement. A corrosion hole and what appeared to be the repair for another hole were observed within this area. Both holes were located at the west corner of this facility. In addition, ultrasonic thickness measurements indicate the greatest metal loss has occurred at the westernmost portion of this bulkhead. Based on this information, this apparently accelerated corrosion area appears to have been caused by a localized condition. Further investigation indicated that just west of this facility, a discharge from a power plant exists. Effluent released from this discharge is reported to be fairly acidic and could cause this localized high corrosion activity. The fact that corrosion holes were not observed elsewhere supports this assumption.

Settlement of the pavement associated with loss of fill through this hole appears to be the most critical structural problem. Areas of maximum stress occur below the elevation of the hole (see Figure 8). In that area, 70% of the original steel thickness still remains.

4.1.4 Recommendations

The purpose of this section is to recommend actions which should be taken to correct existing problems discovered by the inspection.

The hole located at CEC Sta. 23+70 at el. -5.5' should be patched to stop the loss of fill behind the wall and the corresponding settlement of the pavement. There are several techniques which could be employed to patch this hole and stabilize the backfill. The most cost effective solution is to use a mechanically fastened steel plate similar to the existing patch observed at CEC Sta. 23+97 and shown in Photos #7 and #8. The cost to repair this hole is $470.00. See Appendix for the repair cost estimate. Also, due to the occurrence of this localized high corrosive activity, it is recommended that the steel thickness be measured annually so that preventative actions can be taken prior to the time when the metal loss becomes critical. Protecting the steel from corrosion is an immediate preventive recourse.

Lastly, to complete the overall assessment of this bulkhead, the portion between CEC Sta. 20+35 and 21+50 should be inspected to assess its general condition.

4.2 CARRIER BERTH C-2

4.2.1 Description

The bulkhead is located on the northern edge of the Naval Station turning basin (see Figure 4), and runs from CEC Stations 3+26 to 10+72 (see Figure 12). At the time the inspection was performed, this berth was not occupied.

The bulkhead was constructed around 1958 and like Carrier Berth C-1 is a diaphragm cell wall. A distance of 30.74'± separates each diaphragm. The front cell wall consists of PSA-28 steel sheet pile sections. The front steel sheet pile sections were driven to elevation -56.75' and were designed for a dredge depth of elevation -45.0' at a distance of 5' away from the base of the wall. A reinforced concrete cap and curbing runs the length of the facility. From just below the cap to elevation -4.0', the front cell walls are encased with reinforced concrete. The encasement consists of precast concrete panels of 4,000 psi concrete backfilled in-place with 3,000 psi concrete. The steel reinforcing is 20,000 psi (see Figure 13).

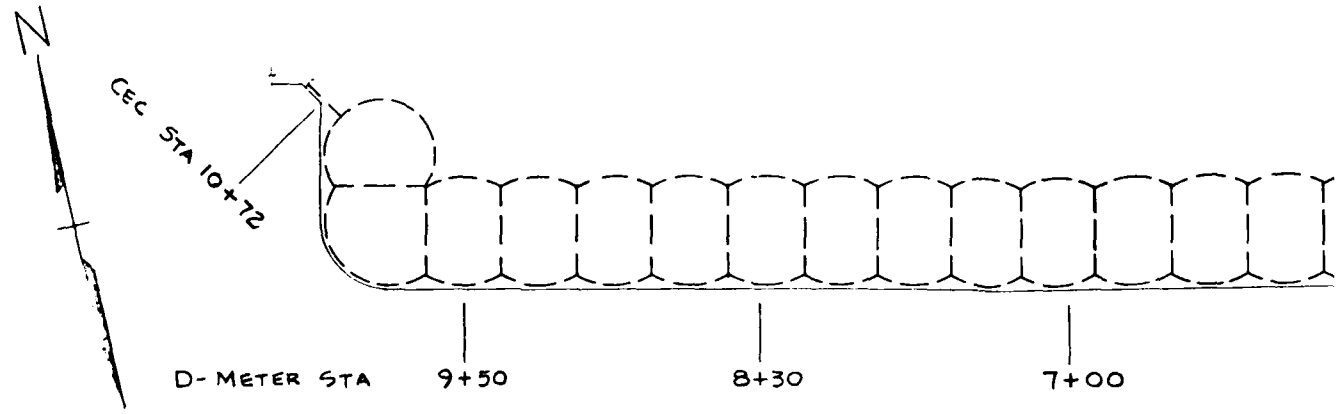
References: Bureau of Yards & Docks, Sixth Naval District
U.S.N. Base, Charleston, S.C.
"Second Carrier Berthing Pier"
Y&D Drawings No. 832778, 832781, 832786

Bureau of Yards & Docks
"Sheet Pile Bulkheads Sta. 0+00 to Sta. 24+11.50
North Bulkhead"
P.W.D. Drawing No. 748

4.2.2 Observed Inspection Condition

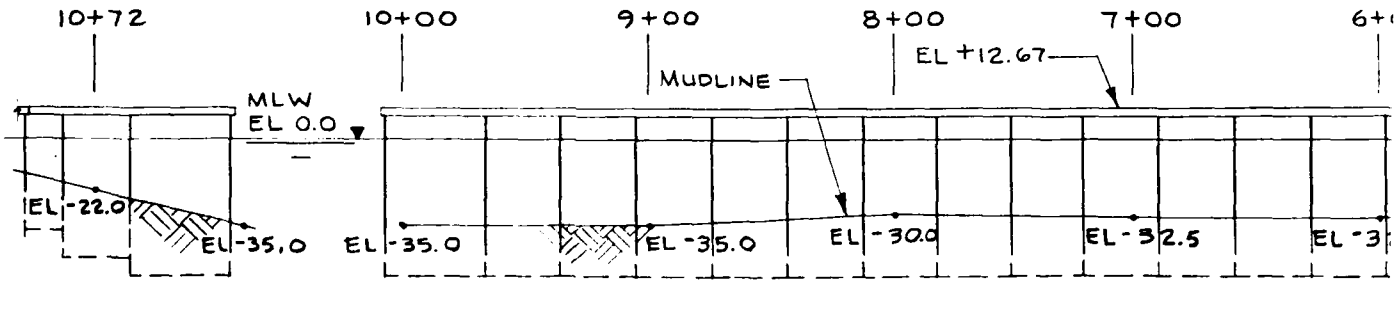
In general, no major structural damage or deterioration was observed. Any coating originally placed on the steel has broken down and varying degrees of corrosion were observed. A concrete encasement protects the wall from the deck down to el. -4.0', and the worst corrosion (6" - 8"ø areas) was seen within 5' of the base of the encasement. There was sporadic occurrence of 1" - 6"ø deposits of hard black corrosion by-product and frequently, gas pockets

57



PLAN

SCALE: 1" = 60'

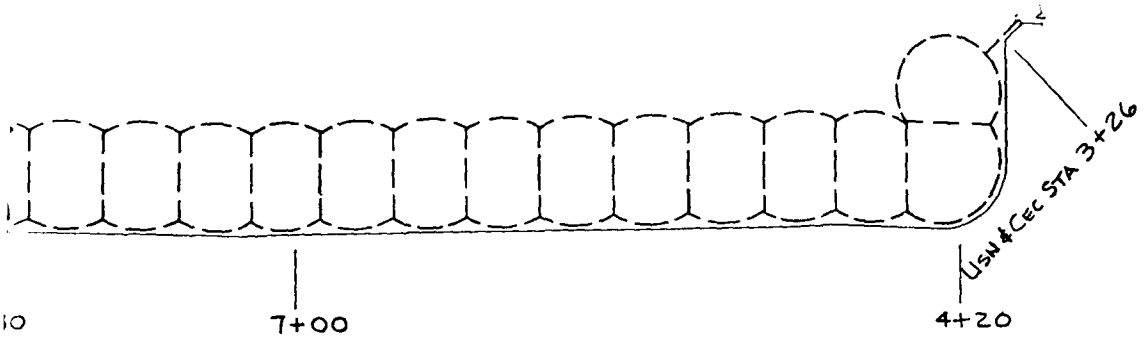


ELEVATION

SCALE: 1" = 60'

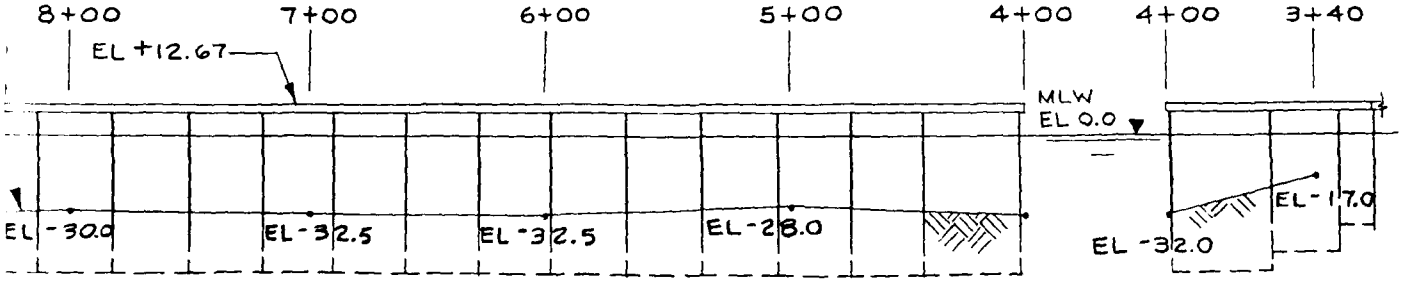
GR

1"=6



PLAN

SCALE: 1" = 60'



ELEVATION

SCALE: 1" = 60'

GRAPHIC SCALE IN FEET

1"=60' 0 10 50 100

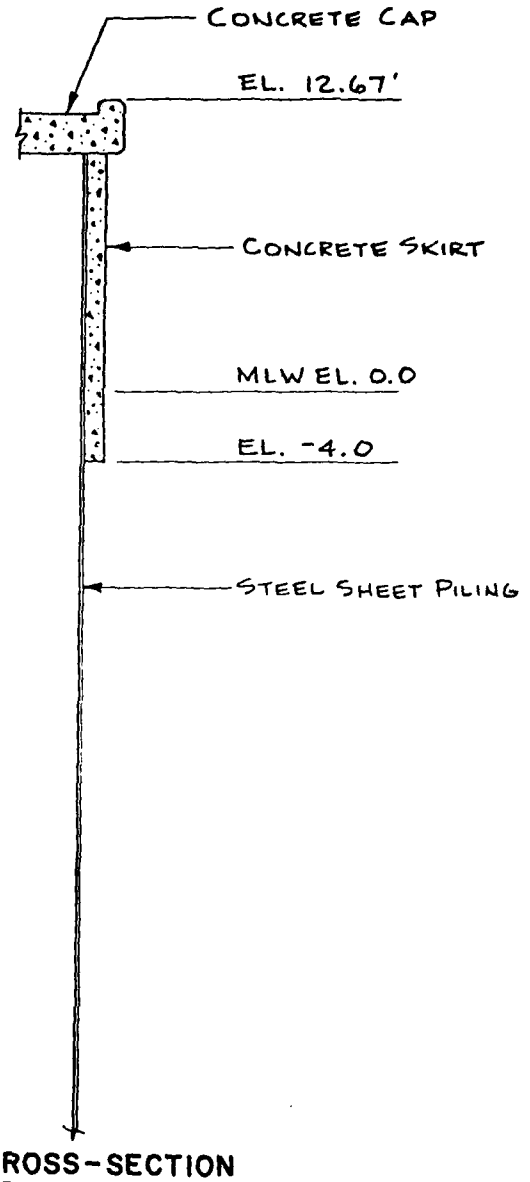
Childs Engineering Corporation

CHESAPEAKE DIVISION
NAVAL FACILITIES ENGINEERING COMMAND

NAVAL STATION MAYPORT, FLORIDA

CARRIER BERTH C - 2

FIG. 12



CROSS-SECTION

GRAPHIC SCALE NOT TO SCALE	Childs Engineering Corporation	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND NAVAL STATION MAYPORT, FLORIDA CARRIER BERTH C-2 FIG. 13

were found under the corrosion and coating. Unlike the other diaphragm cell walls, y-connections appeared to be welded instead of mechanically fastened.

Ultrasonic steel thickness measurements were taken at four (4) locations along the wall, indicating a range of metal loss from 0 - 39%, but averaging around a 12% loss (see Appendix). According to the readings, the worst corrosion occurred within 6' - 8' of the base of the encasement.

Soundings showed depths of 17' - 35' below mean low water at the bulkhead face.

4.2.3 Structural Condition Assessment

Based on the conditions observed at this facility, Carrier Berth C-2 is in fair to good condition. No mechanical damage was noted and only a moderate amount of corrosion has taken place. Ultrasonic thickness measurements indicate moderate corrosion areas are limited to within 6' - 8' below the concrete encasement. These areas are not located in the zone of maximum stress and at this time, the amount of steel remaining is sufficient to withstand the associated stresses. Soundings indicate dredge depths to be within design limits.

4.2.4 Recommendations

The purpose of this section is to recommend actions which should be taken to correct problems discovered by the inspection.

At this time, no repairs are recommended. However, protection of the steel from corrosion is recommended to prolong the life of the structure. Steel thickness measurements should be

taken in five years to document any further metal loss due to corrosion.

4.3 BULKHEAD EAST OF CARRIER BERTH C-2

4.3.1 Description

The bulkhead is located on the northeastern edge of the Naval Station turning basin (see Figure 4) and runs from C.E.C. Stations 0+00 to 3+26 (see Figure 14). It functions as part of the carrier berth and can be used for mooring small craft, barges and the like.

The bulkhead is an anchored steel sheet pile wall constructed of PZ-32 sections, with a reinforced concrete cap and curb. An inside steel wale is fastened to the wall at el. +4.0' at each inside flange and is anchored by a concrete deadman 50' away. Spacing of the tie rods is 10.5' o.c. A fender system consisting of closely spaced timber posts protects the wall from the concrete cap to approximately el. -2.5'.

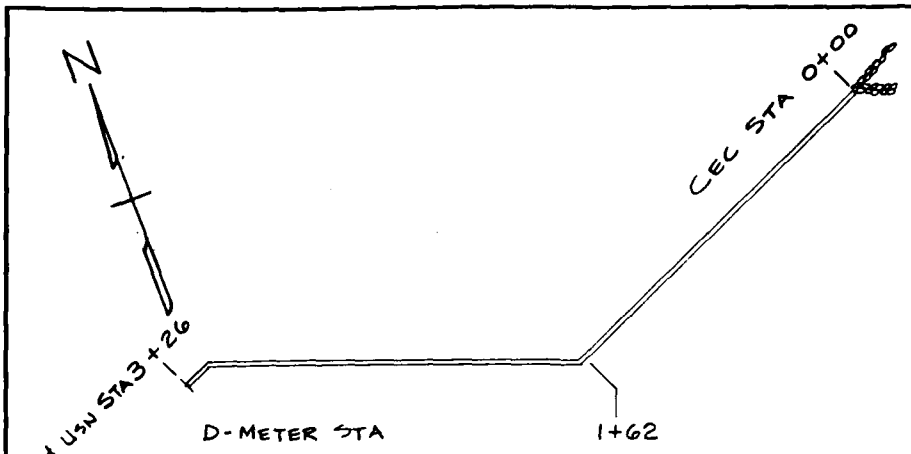
4.3.2 Observed Inspection Condition

The following conditions were observed during our inspection of the bulkhead east of carrier berth C-2 (see Figure 15):

1) At CEC Sta. 2+07, the web of this pile is distorted (bulged out) from the mudline up 12';

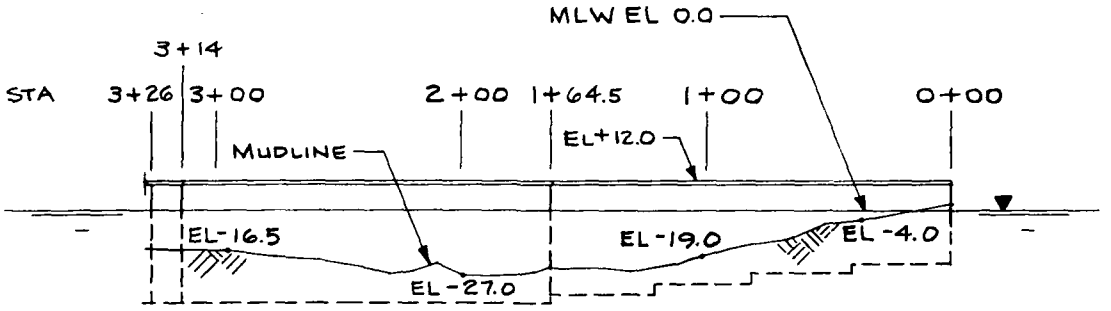
2) At CEC Sta. 1+64, a hole, 8" wide x 4' high (top el. -5.0') was found in the web;

3) At CEC Sta. 1+62, a rip was observed at the web/flange intersection in the first Z section sheet pile just east of the corner pile (see Photo #9). It originated at el. -5.0' and continued to mudline (21' long). A maximum displacement of 64" was measured at the mudline. The side east of the rip was displaced outward with respect to the side west of the rip. Mounding of the sandy granular fill extended 10' away from the wall before the bottom became silty.



PLAN

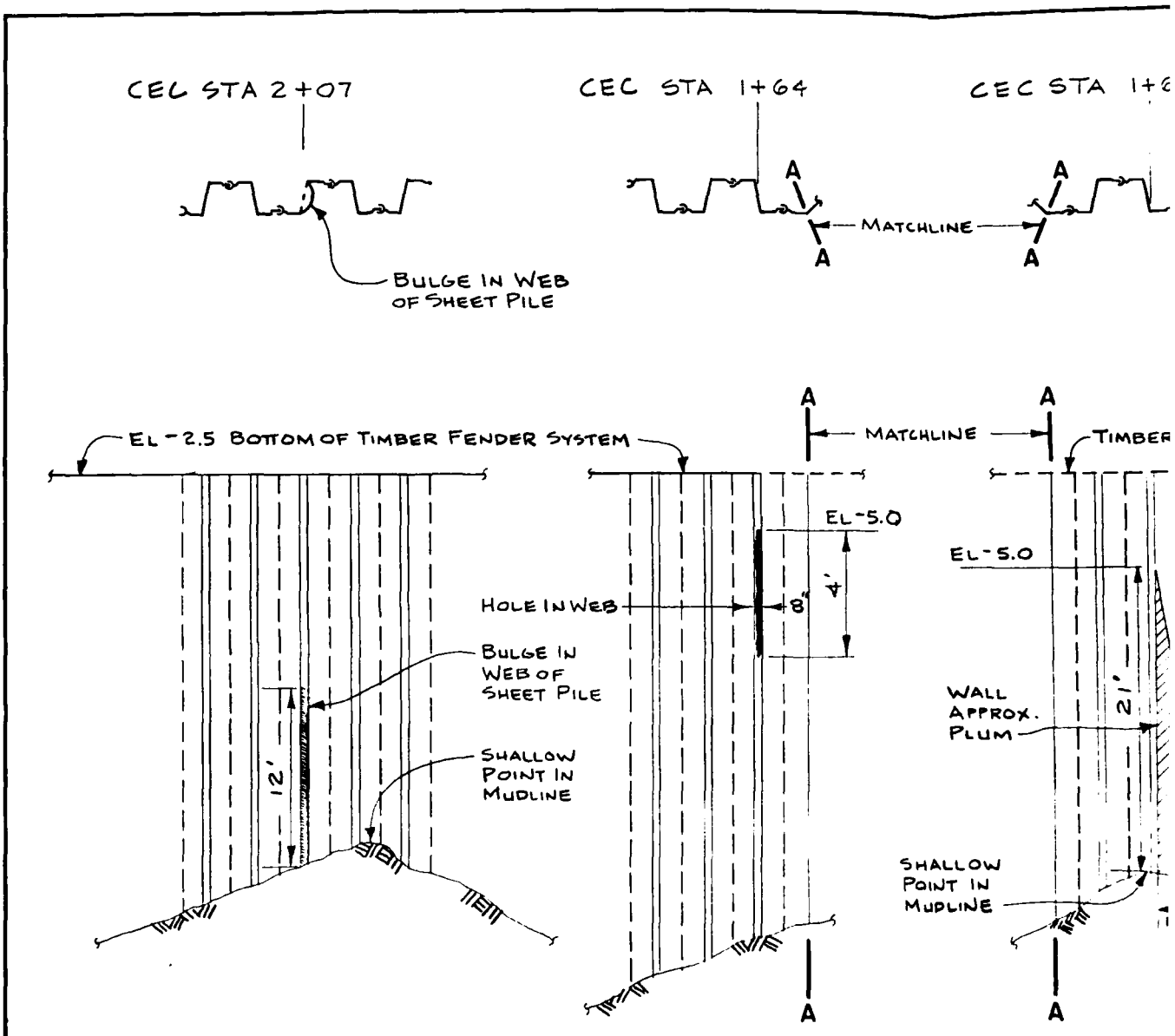
SCALE: 1" = 60'

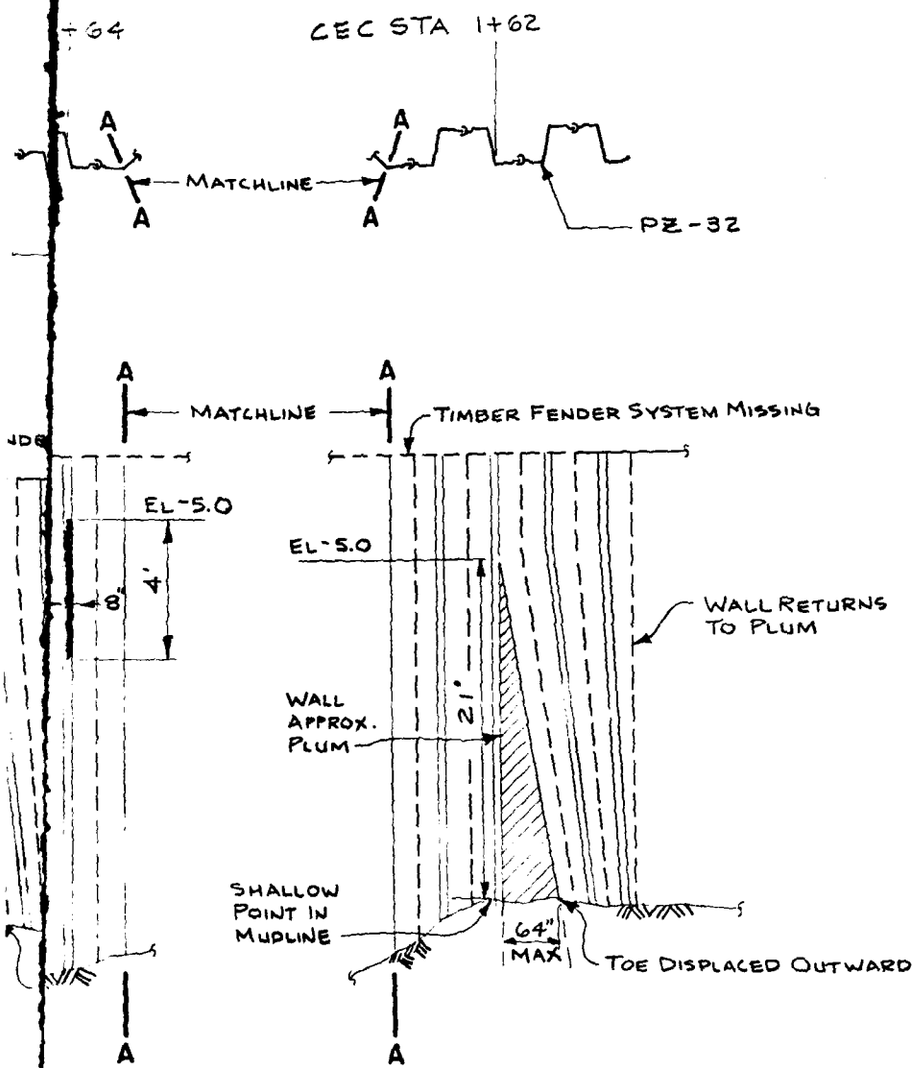


ELEVATION

SCALE: 1" = 60'

GRAPHIC SCALE IN FEET			
1" = 60'	0 10 50 100	Childs Engineering Corporation	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND
			NAVAL STATION — MAYPORT, FLORIDA
			BULKHEAD EAST OF CARRIER BERTH C-2
			FIG. 14

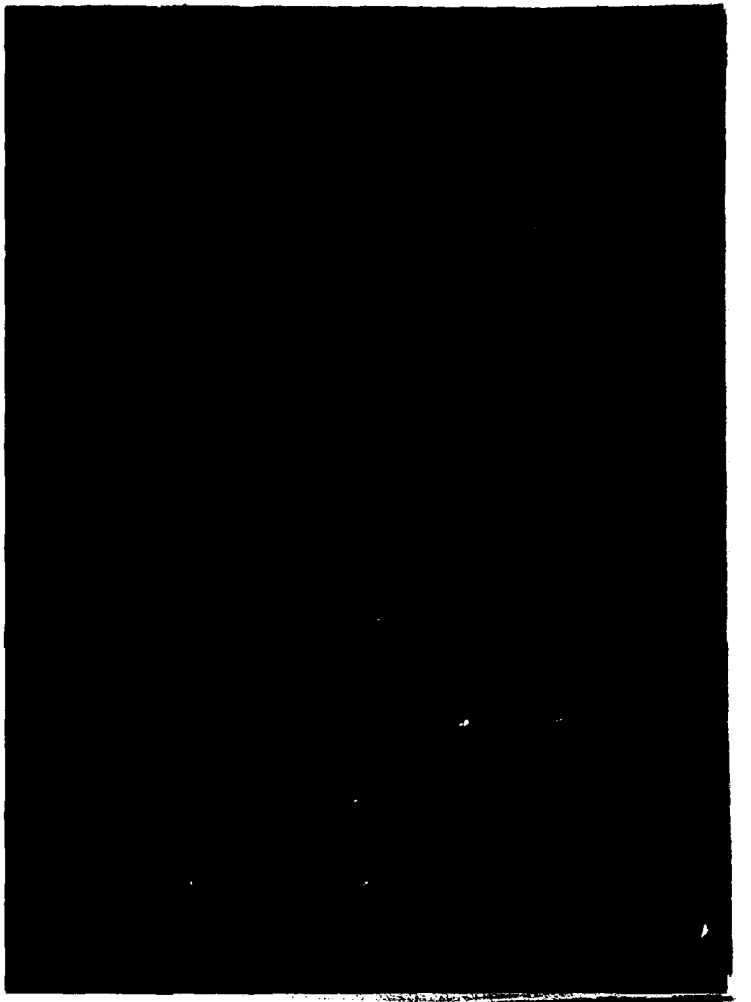

CEC STA 2+07
CEC STA 1+64
CEC STA 1+6
A
A
MATCHLINE
A
A
BULGE IN WEB
OF SHEET PILE
EL -2.5 BOTTOM OF TIMBER FENDER SYSTEM
A
MATCHLINE
A
TIMBER
EL -5.0
EL -5.0
HOLE IN WEB
8"
4'
BULGE IN
WEB OF
SHEET PILE
12'
SHALLOW
POINT IN
MUDLINE
WALL
APPROX.
PLUM
2'
SHALLOW
POINT IN
MUDLINE
A
A
A



J OBSERVED STRUCTURAL DAMAGE

GRAPHIC SCALE	Childs Engineering Corporation	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND
NOT TO SCALE		NAVAL STATION MAYPORT, FLORIDA — BULKHEAD EAST OF CARRIER BERTH C-2 — FIG. 15

PHOTO #9: Top Partial View of Rip in Steel Sheet Pile at CEC Sta. 1+62 at El. -5.0' (Bulkhead East of Carrier Berth C-2)



In addition to the structural damage mentioned above, soundings were taken every 10' along the wall and at 10' intervals (to a maximum of 40' away) away from the wall from CEC Sta. 2+40 to 0+80. The results can be found on Figure 16 and indicate shallow areas at CEC Stations 2+07 and 1+64 and a shallow ridge between 20-30' away from the wall running parallel to the wall.

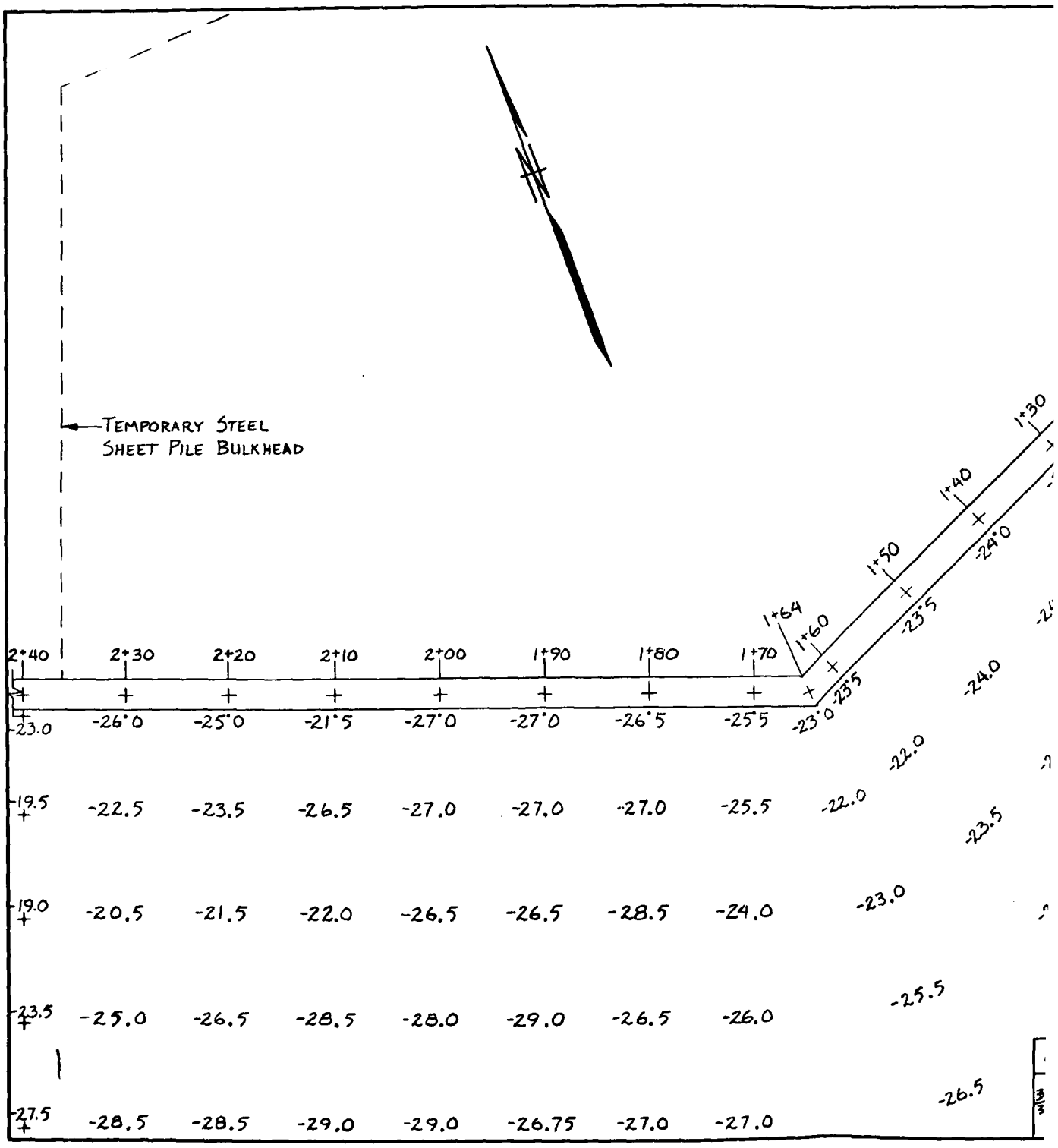
Ultrasonic thickness measurements were taken at one (1) location along the wall (CEC Sta. 1+62), indicating a metal loss of 0-10% on the flanges and 12-50% on the webs.

Photos #10 and #11 show extent of damage to this bulkhead above the water surface.

4.3.3 Structural Condition Assessment

The purpose of this section is to generally assess the cause of the damage observed at the bulkhead east of Carrier Berth C-2, based on information noted in this inspection and contained in Gee and Jenson's report of November 16, 1979 entitled "Report on Bulkhead East of Berth C-2, Naval Station, Mayport, Florida".

From this information, it appears that the damage observed at this bulkhead initially resulted from an outward movement of the toe of the wall. This movement caused by inadequate toe stability, formed a ridge of soil approximately 20'-30' away from the wall parallel to wall (see Figure 16). Once this happened, a rip in the wall at CEC Sta. 1+62 and the bulge at CEC Sta. 2+07 were formed, the fill behind the wall was lost, and the deadman failed resulting in the bulkhead leaning altogether. The order in which these events occured is not known. The hole observed at CEC Sta. 1+64 apparently resulted from impact since ultrasonic thickness readings indicate only moderate corrosion to have occurred.


TEMPORARY STEEL
SHEET PILE BULKHEAD
2+40
2+30
2+20
2+10
2+00
1+90
1+80
1+70
1+64
1+60
1+50
1+40
1+30
-23.0
-26.0
-25.0
-21.5
-27.0
-27.0
-26.5
-25.5
-23.0
-23.5
-24.0
-19.5
-22.5
-23.5
-26.5
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-26.5
-26.5
-28.5
-24.0
-23.0
-23.5
-25.0
-26.5
-28.5
-28.0
-29.0
-26.5
-26.0
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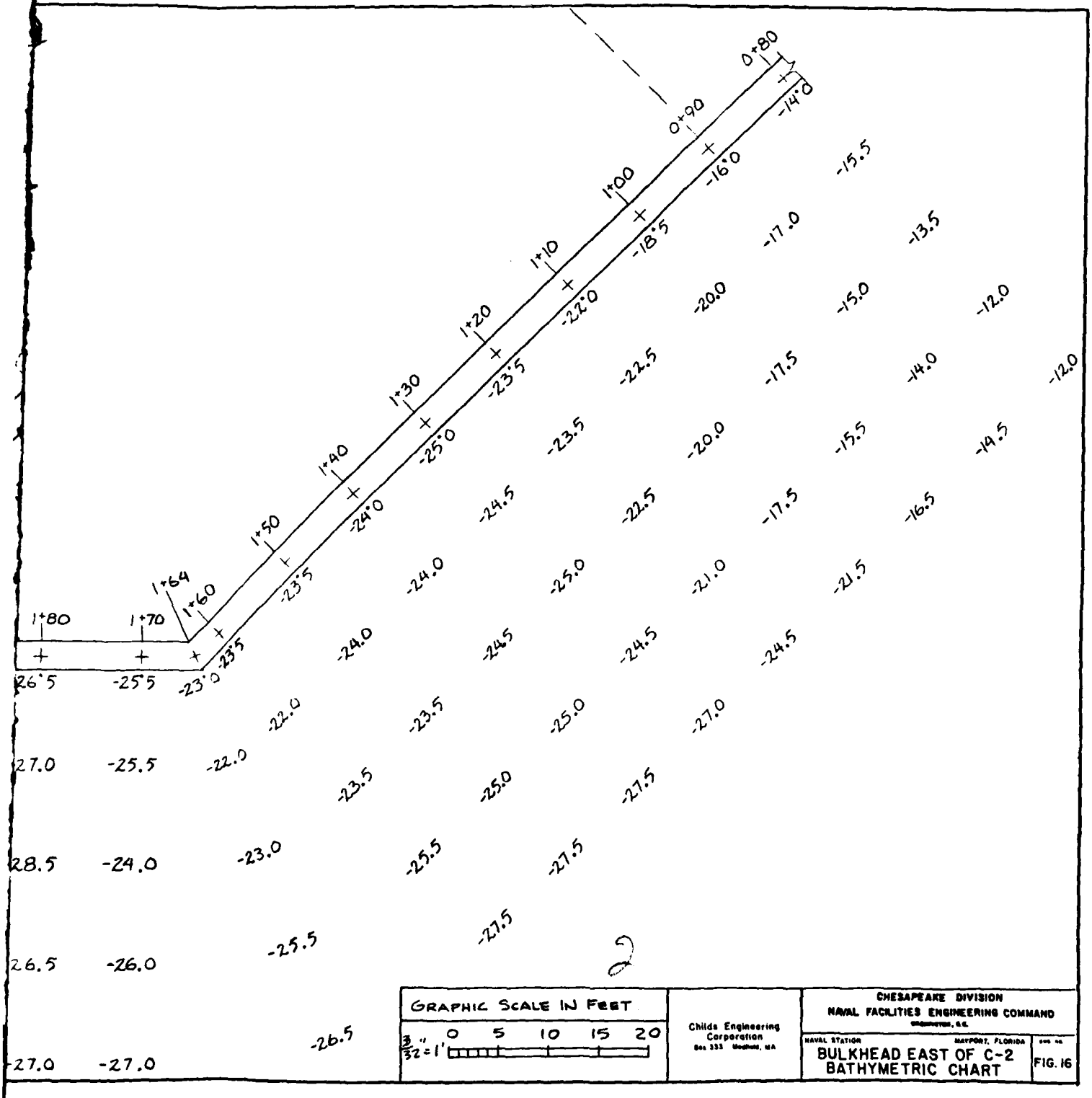
-29.0
-26.75
-27.0
-27.0
-26.5



GRAPHIC SCALE IN FEET

3/32" = 1' 0 5 10 15 20

Childs Engineering Corporation
Box 333 Medfield, MA

CHESAPEAKE DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON, D.C.

NAVAL STATION MAYPORT, FLORIDA

BULKHEAD EAST OF C-2
BATHYMETRIC CHART

DWG. NO. FIG. 16

PHOTO #11: Overall View Looking West at Damaged Bulkhead (Bulkhead East of Carrier Berth C-2)

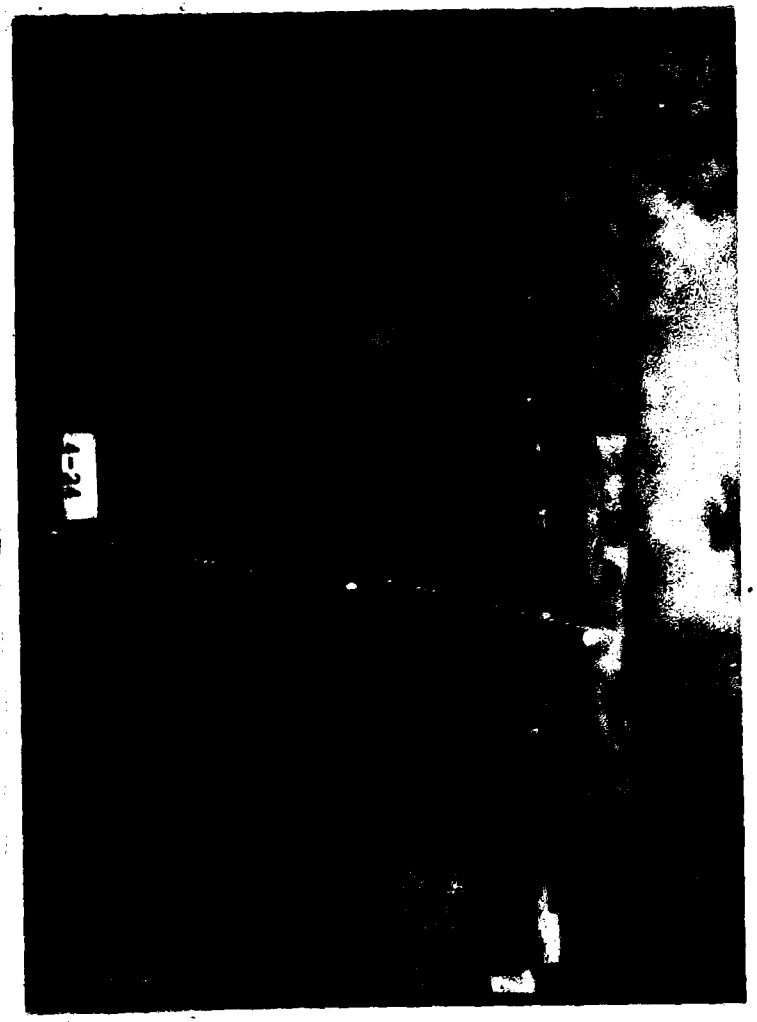


PHOTO #10: Plan View of Damaged Corner Sheet Pile at CEC Sta. 1+64.5 at El. +12.0'. Concrete Cap has completely separated at this point (Bulkhead East of Carrier Berth C-2)

4.3.4 Recommendations

No recommendations are made for this facility since repair efforts are already in progress.

4.4 WHARVES B-1, B-2 and B-3

4.4.1 Description

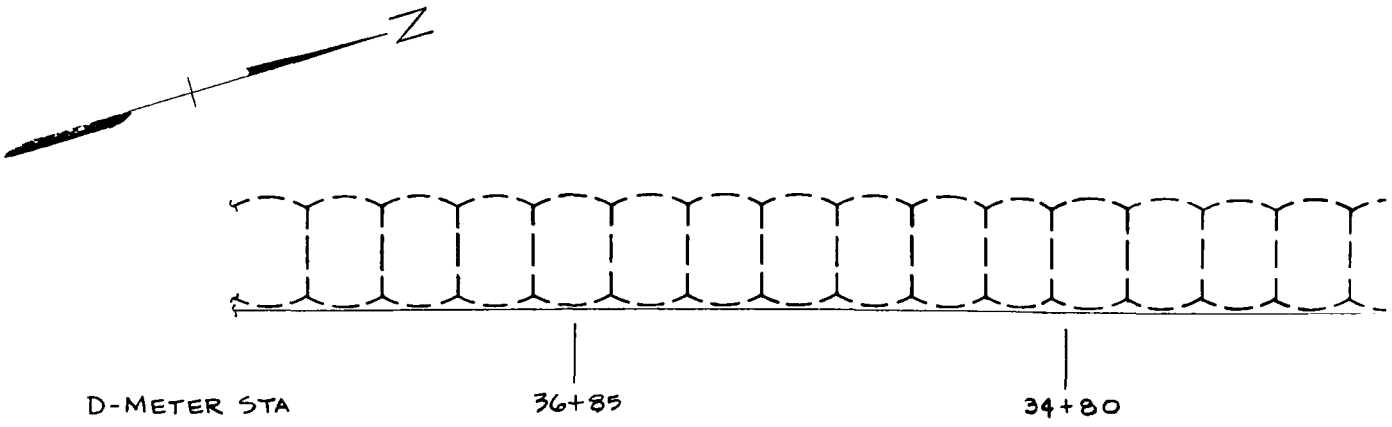
These three wharves form a continuous bulkhead which comprises the western edge of the Naval Station turning basin (see Figure 4). Starting with Wharf B-3 in the north and going south to Wharf B-1, the bulkhead runs from CEC Stations 31+36 to 51+20 (see Figures 17-19). It functions as a berthing area for small craft, destroyer tenders, as well as destroyer squadrons.

The bulkhead was constructed around 1968 and is a diaphragm cell wall. Y-connections between cells appear to be mechanically fastened. A distance of 30.74'± typically separates each diaphragm. The front cell wall consists of PSA-28 steel sheet pile sections with reinforced concrete cap and curbing. A reinforced concrete encasement runs from below the cap to elevation -3.8' on the front cell wall (see Figure 20). The front steel sheet pile sections were driven to elevation -56.75' and were designed for a dredge depth of -42.0', 10' away from the wall. The design live load is equal to 500 psf or HS 20-44 A.A.S.H.O. highway truck load. The concrete has a design compressive strength of 3,000 psi, except that the bulkhead encasement is 3,500 psi and 4,000 psi for precast concrete. Reinforcing steel is intermediate hard or rail steel grade.

References: Southeast Division, NAVFAC,
Constr. Contr. No. N62467-67-C-0462
"Carrier Berthing Wharf"

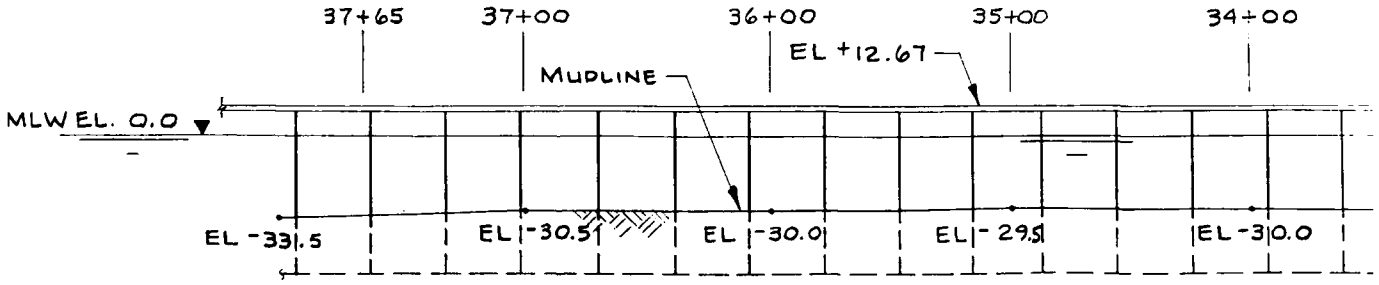
Bureau of Yards and Docks
"Sheet Pile Bulkheads Elevations -
Sta. 24+11.50± to Sta. 57+24.5±"
P.W.D. Drawing No. 749

12



PLAN

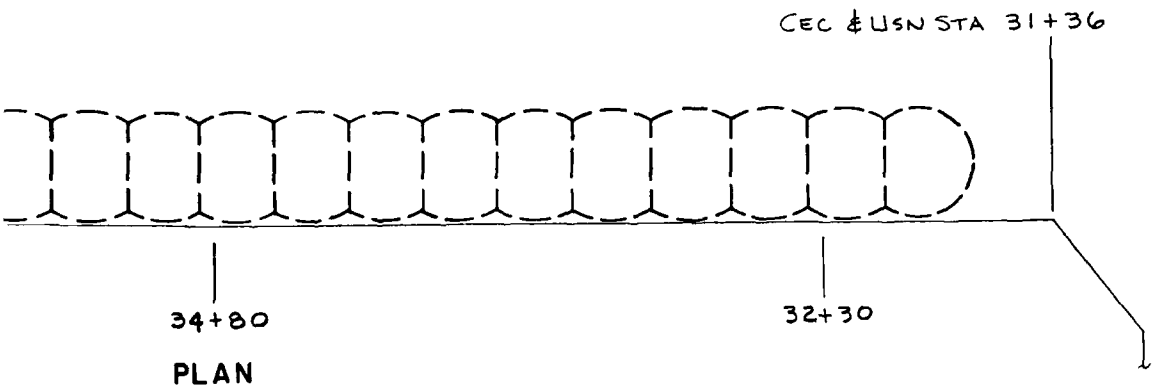
SCALE: 1" = 60'



ELEVATION

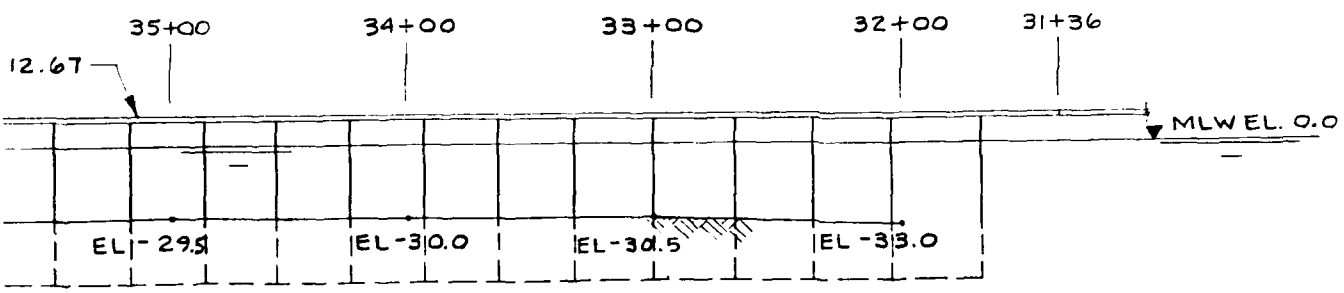
SCALE: 1" = 60'

GRAPH
0.10
1" = 6



PLAN

SCALE: 1" = 60'

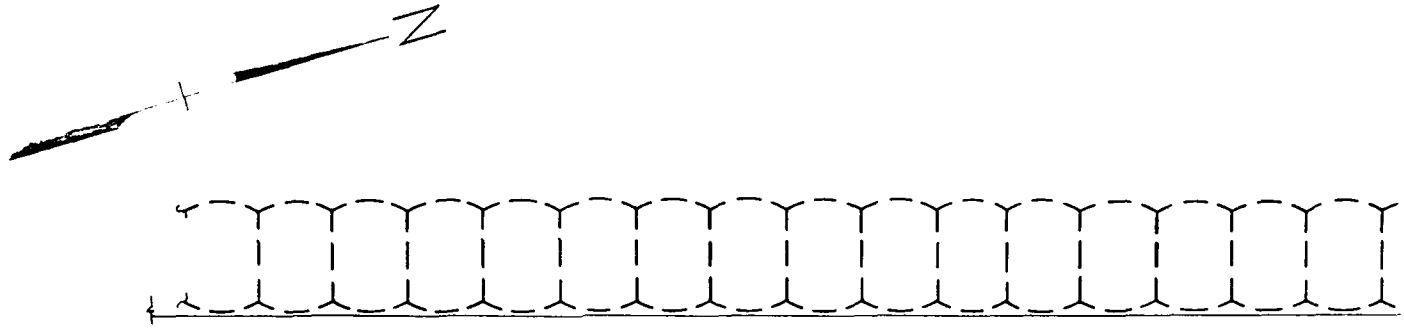


ELEVATION

SCALE: 1" = 60'

2

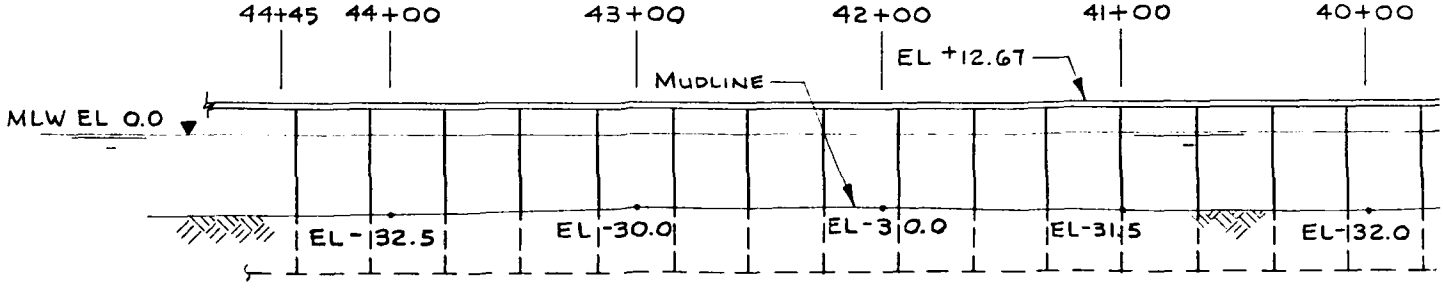
GRAPHIC SCALE IN FEET		CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND
0 10 60 120 1" = 60'	Childs Engineering Corporation	NAVAL STATION MAYPORT, FLORIDA WHARF B-3
		FIG. 17



D-METER STA N/A

PLAN

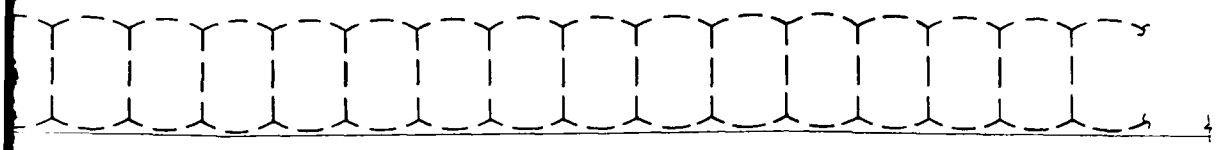
SCALE: 1" = 60'



ELEVATION

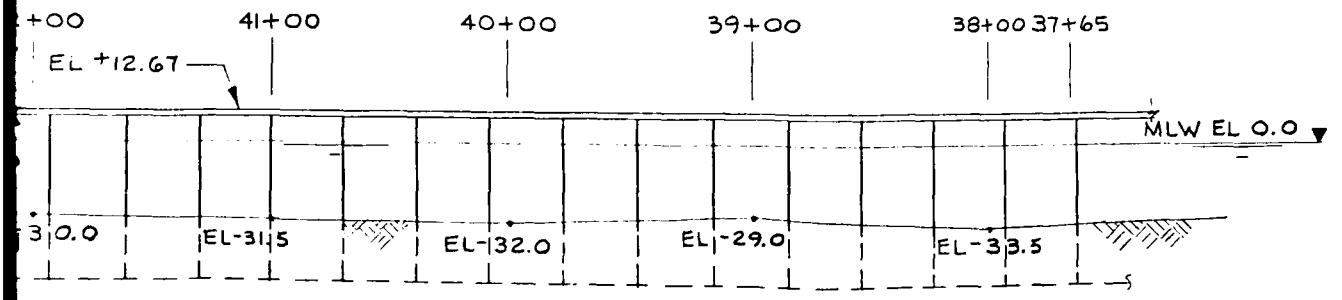
SCALE: 1" = 60'

GRAPHI
1"=60'



PLAN

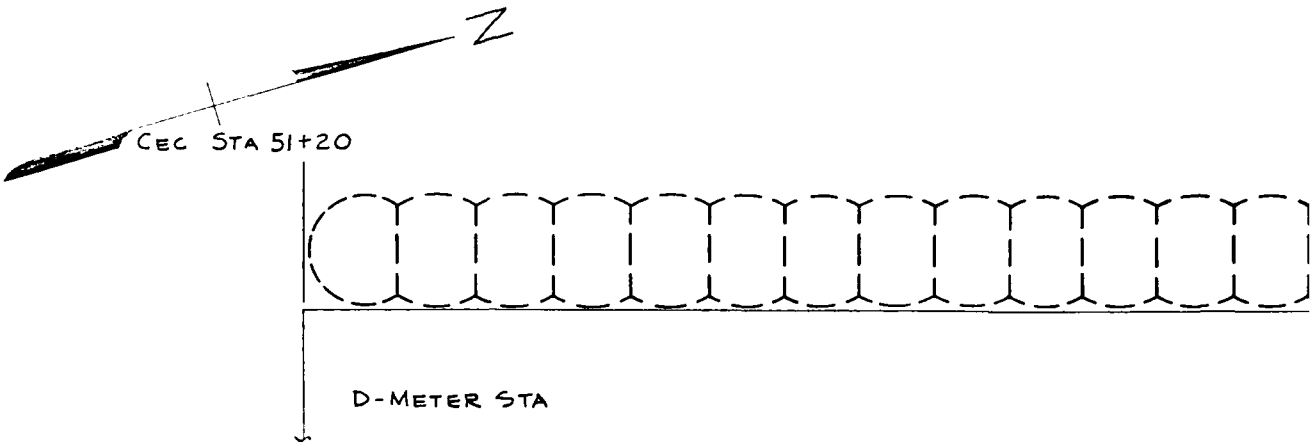
SCALE: 1" = 60'



ELEVATION

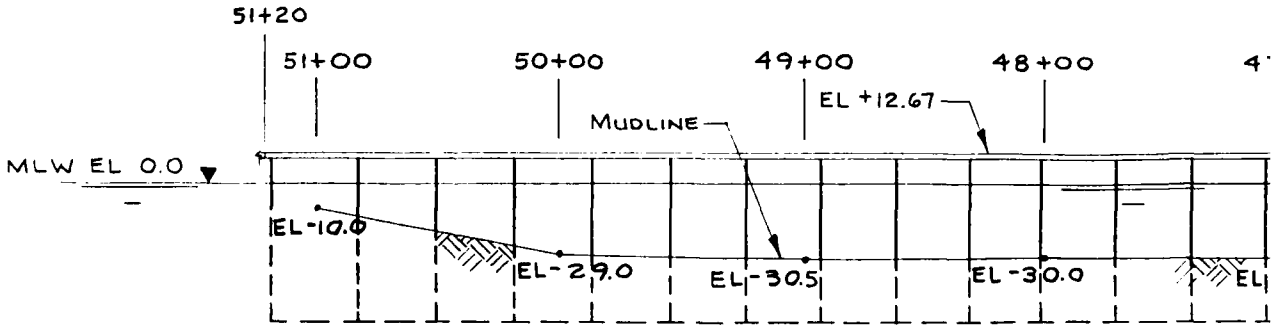
SCALE: 1" = 60'

GRAPHIC SCALE IN FEET 1" = 60' 0 10 50 100	Childs Engineering Corporation Box 333 Medfield, MA	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C. NAVAL STATION MAYPORT FLORIDA WHARF B-2	FIG. 18



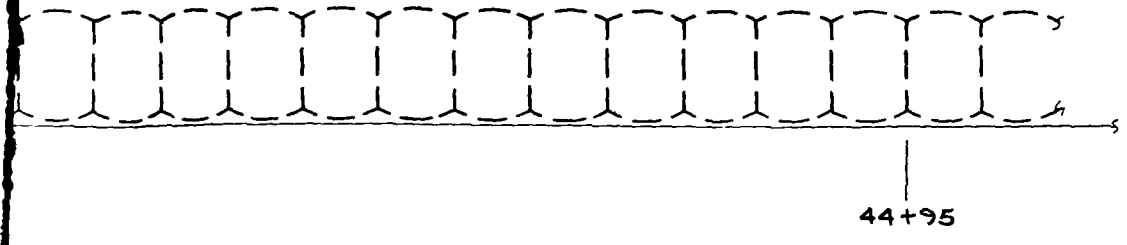
PLAN

SCALE: 1"=60'



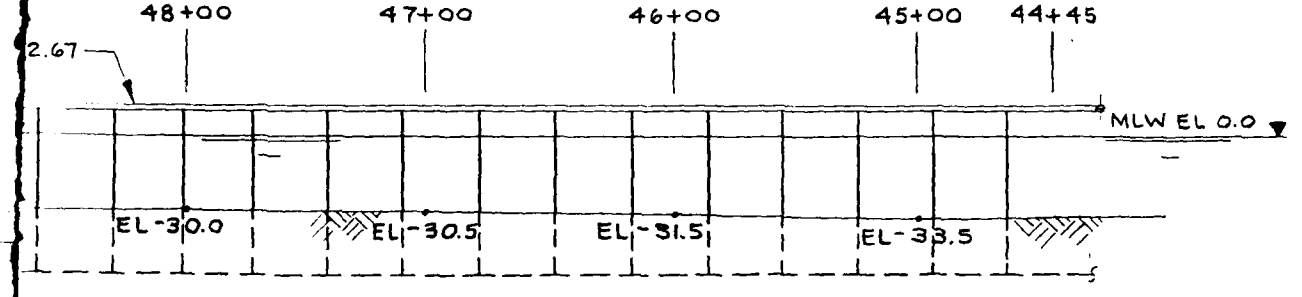
ELEVATION

SCALE: 1" =60'



PLAN

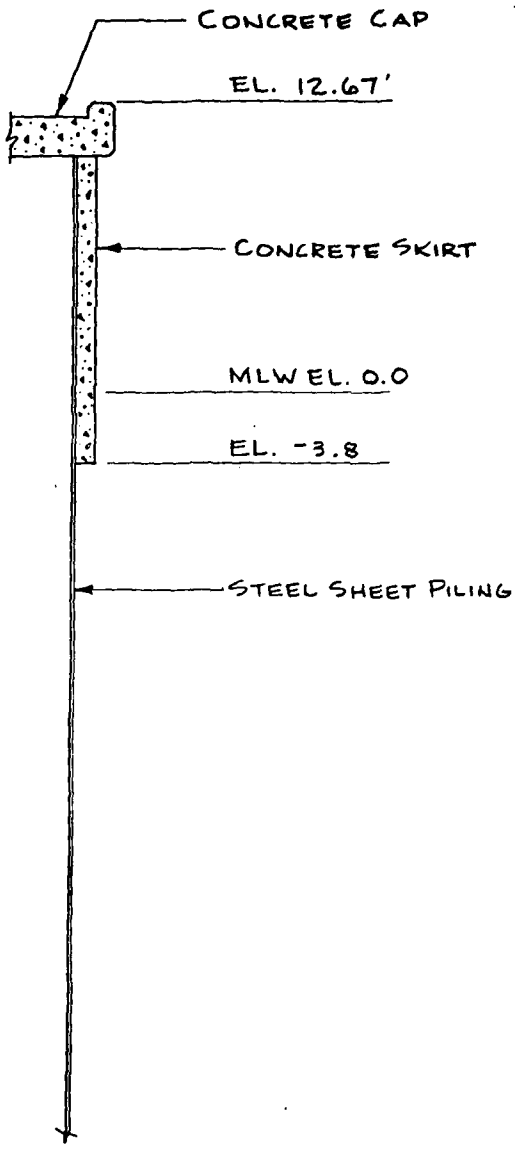
SCALE: 1"=60'



ELEVATION

SCALE: 1" =60'

GRAPHIC SCALE IN FEET		CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND
1" = 60' 0 10 50 100	Childs Engineering Corporation Box 553 Medford, MA	NAVAL STATION MAYPORT, FLORIDA WHARF B-1
		FIG. 19



CROSS-SECTION

GRAPHIC SCALE NOT TO SCALE	Childs Engineering Corporation Box 333 Medfield, MA	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C. NAVAL STATION MAYPORT, FLORIDA WHARVES BRAVO FIG. 20

4.4.2 Observed Inspection Condition

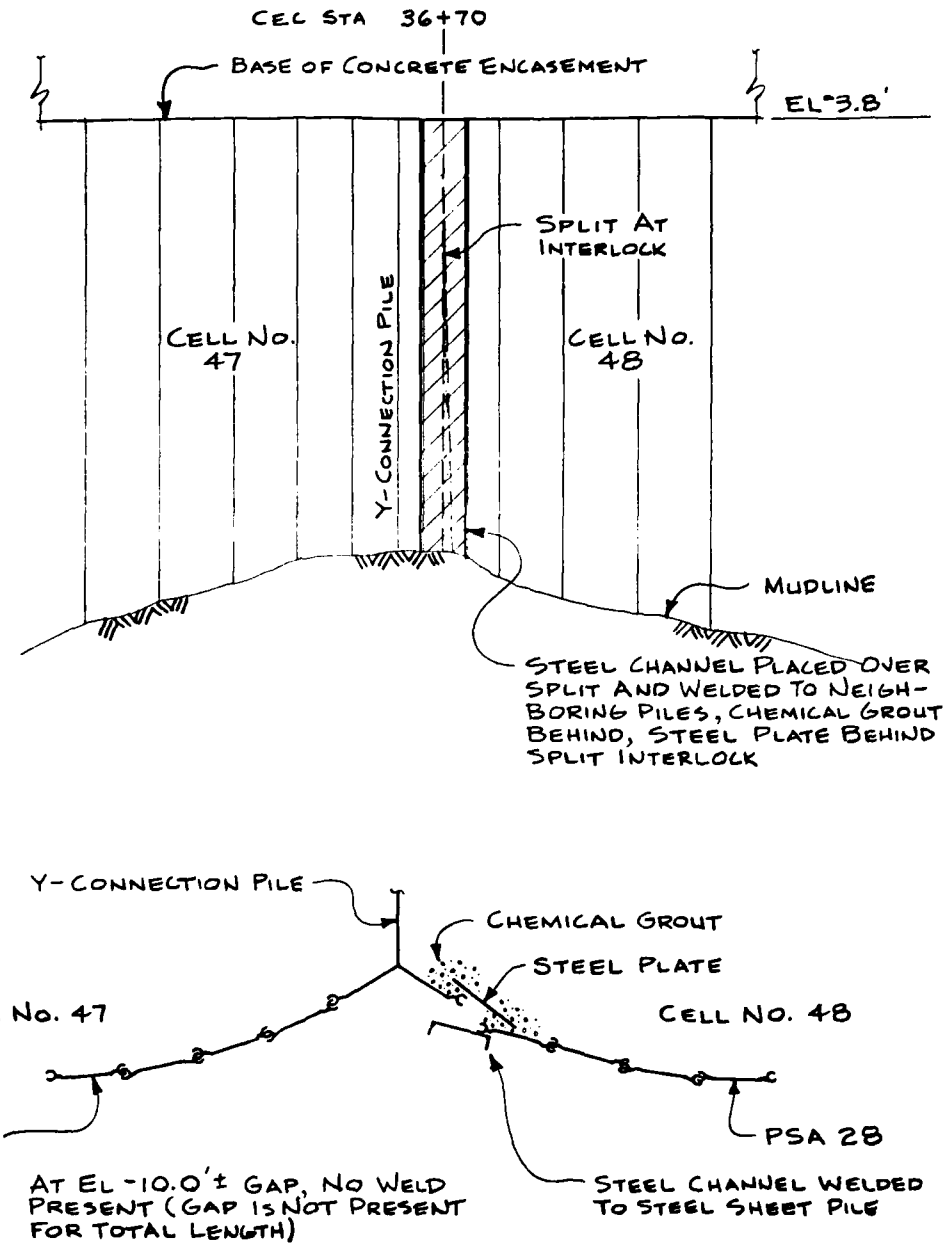
Currents and eddies were strong (approximately 1 knot) at the north end of the bulkhead, with water flowing west from Carrier Berth C-1 and then south along B-3.

At CEC Station 31+60, there is a steel sheet pile column, separate from the bulkhead. There were corrosion nodes throughout its length, and area corrosion and pitting (1/2"ø x 1/16" deep) at elevation -2.0'. In the splash zone, coating was broken down and minor area corrosion was evident.

The coating throughout 95% of the bulkhead itself was intact and strongly adherent to the steel. Ultrasonic steel thickness measurements were taken at four (4) locations, indicating a range of metal loss from 0-4% (see Appendix).

The only structural damage observed occurred at CEC Station 36+70, at a Y-connection between two cells. The Y-connection had split away from the first sheet pile of the northern cell for the full observable distance between the concrete encasement and the mudline. The split was repaired apparently by the addition of steel channels and chemical grout. Although no further damage is evident, gaps were observed between the steel channels and the sheet pile sections (see Figure 21).

Soundings showed the dredge depth to range from el. -33.0' at CEC Sta. 32+00 to el. -10.0' at CEC Sta. 51+00 with a maximum of el. -33.5' at CEC Sta. 38+00.



SPLIT Y-CONNECTION AND REPAIR

GRAPHIC SCALE	Childs Engineering Corporation Box 333 Medfield, MA	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C.
NOT TO SCALE		NAVAL STATION MAYPORT, FLORIDA WHARF B-3 FIG. 21

4.4.3 Structural Condition Assessment

Bravo Wharves B-1 and 2 are in very good condition. No structural damage was observed in these two berths. On all three Bravo Wharves (B-1, 2 and 3), ultrasonic thickness measurements indicate only 4% of the original metal thickness has been lost to corrosion.

Soundings indicate the dredge depth on all these wharves to be within design limitations.

On Bravo Wharf B-3, an unusual condition was observed at CEC Sta. 36+70. Here the Y-connection at cell no. 47 is split away from the next northern cell. Two NAVFAC drawings numbered 5033542(-3) and entitled "Repair Pier Bravo" document our findings. According to the drawings, the failure occurred at the time of construction. Repairs were made by welding and jetting steel channels to and behind, respectively, the damaged connection. Additional repairs were performed at a later date (date unknown). These were accomplished by welding additional steel channels to the damaged connection and chemical grouting behind them.

At the time our inspection was performed, gaps were observed between the steel channels and the steel pile sections (see Figure 21). This condition indicates either some movement has occurred since repairs were made or, the actual repair was not performed in accordance with the drawings. However, no evidence of recent movement was observed, indicating that the repair is adequate to resist the associated stresses at this time.

No other unusual conditions were noted on Bravo Wharf B-3.

4.4.4 Recommendations

No repairs are recommended. However, the pavement surface above the repaired y-connection at CEC Station 36+70 should be annually inspected to determine if any further separation of the connection occurs. Subsidence of the pavement could indicate additional separation requiring an underwater inspection to be performed.

The condition of the coating on the steel at this time is sufficient to provide at least five more years of protection. Additional protection should be provided when the coating breaks down.

4.5 DESTROYER BERTHS D-1, D-2, D-3 AND D-4

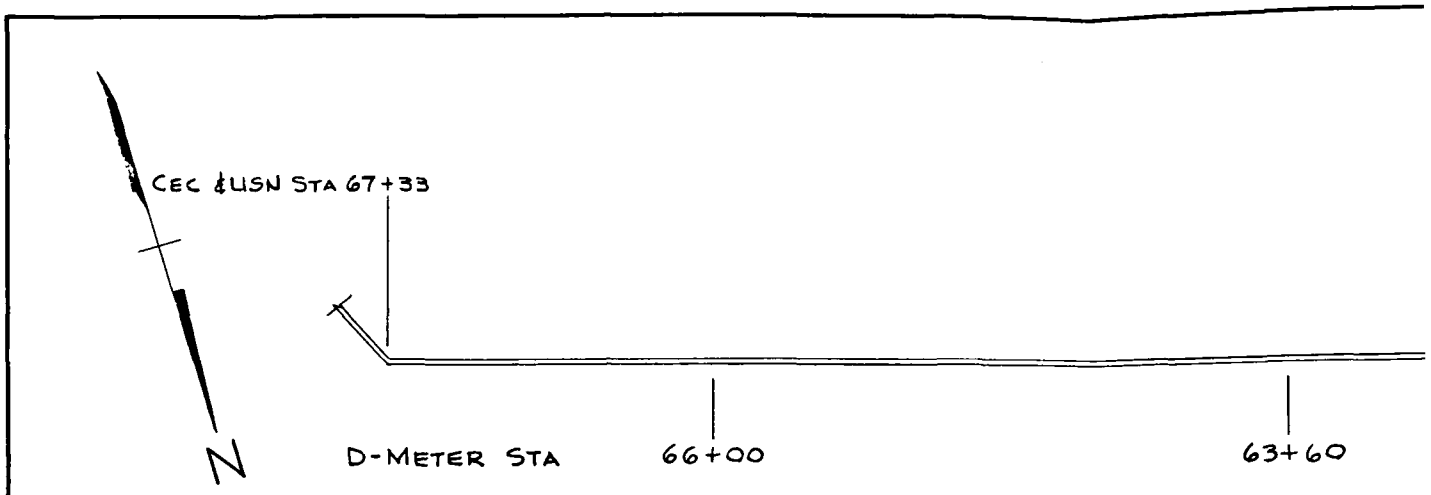
4.5.1 Description

These four berths form a continuous bulkhead which comprises the southern boundary of the Naval Station turning basin (see Figure 4). Starting with westernmost Berth D-1 and going southeast to Berth D-4, the bulkhead runs from CEC Stations 61+13 to 81+86.5 (see Figures 22-25). It functions as a berthing for ships up to destroyer-class in size.

The bulkhead was built around 1959 and is an anchored steel sheet pile wall. It is constructed of PZ-38 sections, with reinforced concrete cap and curbing. Tie rods, spaced 9' o.c. and steel wale, running on the inshore side of the wall, are located at elevation -2.5'. The sheet pile sections were driven to elevation -49.0' and designed for a dredge depth of elevation -30.0' at the base of each berth. The design surcharge for these berths is equal to 400 psf. A reinforced concrete encasement runs from below the cap to elevation -3.5' (see Figure 26). The concrete has a design compressive strength of 3,000 psi, except for the encasement which is 4,000 psi. Design stress for tie rods and wales is 20,000 psi and for sheet piles is 23,000 psi (20,000 + 15% allowable increase).

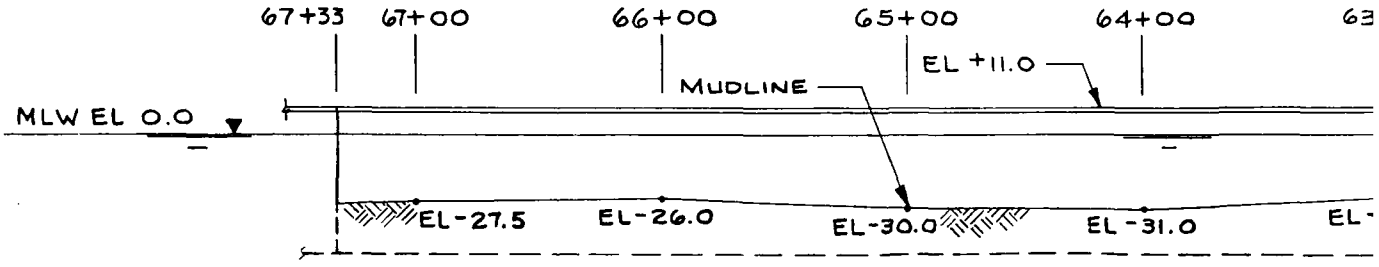
References: Bureau of Yards & Docks
"Destroyer Slips"
Y&D Drawings No. 833160 and 833164

Bureau of Yards and Docks
"Sheet Pile Bulkheads Elevations -
Sta. 57+24.5± to Sta. 86+32.4± South
Bulkhead and D.D. Slips"
P.W.D. Drawing 750



PLAN

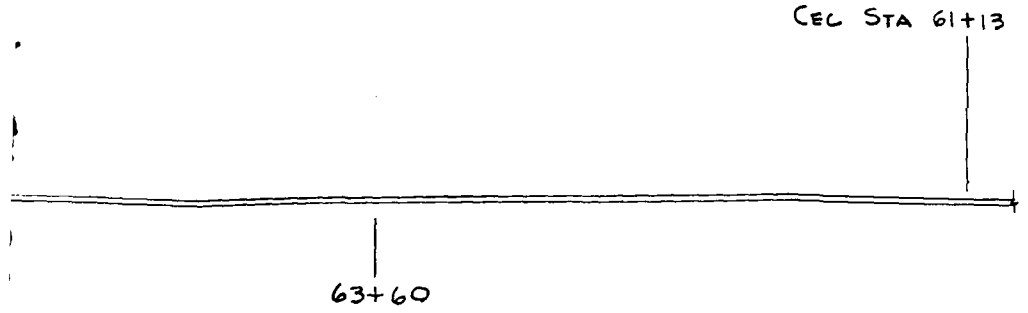
SCALE: 1" = 60'



ELEVATION

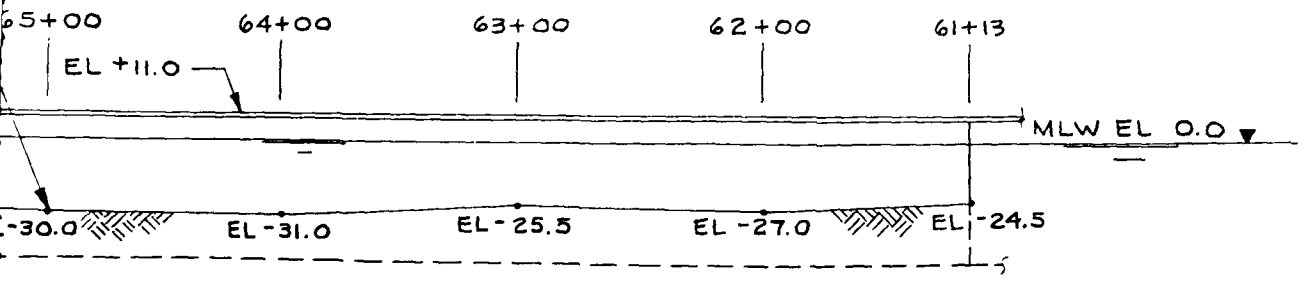
SCALE: 1"= 60'

GRAPH
1"=60'



PLAN

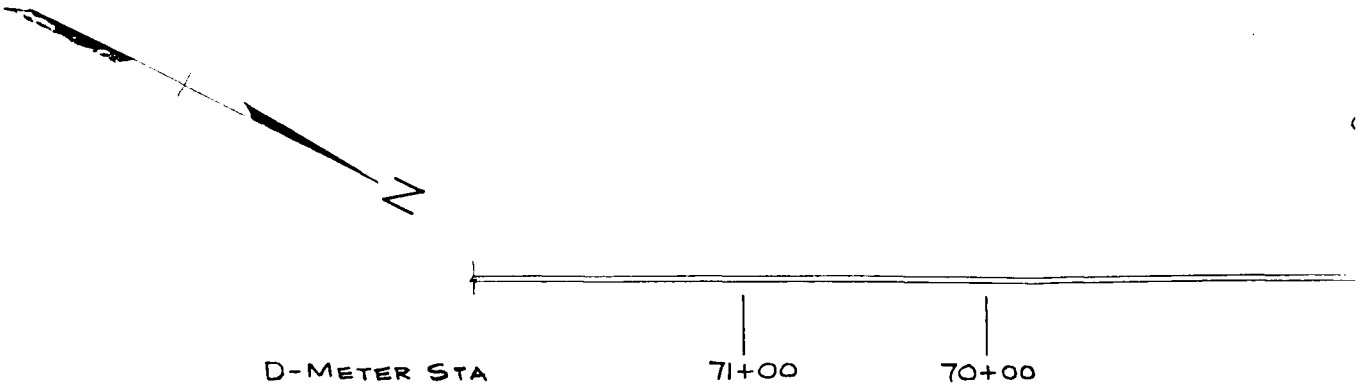
SCALE: 1" = 60'



ELEVATION

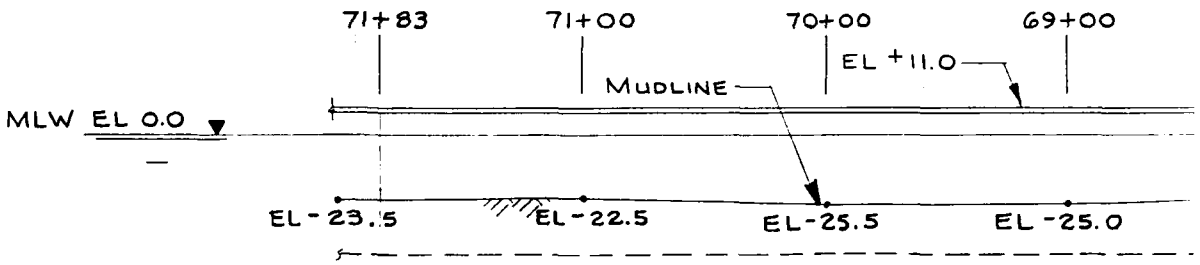
SCALE: 1" = 60'

GRAPHIC SCALE IN FEET		CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C.	
1"=60' 0 10 50 100	Childs Engineering Corporation Box 333 Medford, MA	NAVAL STATION MAYPORT, FLORIDA DESTROYER BERTH D-1	FIG. 22



PLAN

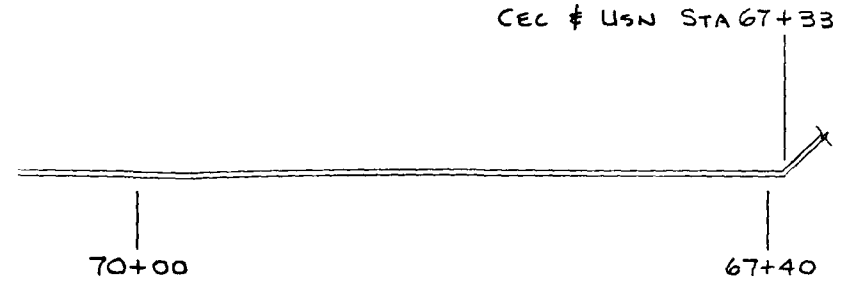
SCALE: 1" = 60'



ELEVATION

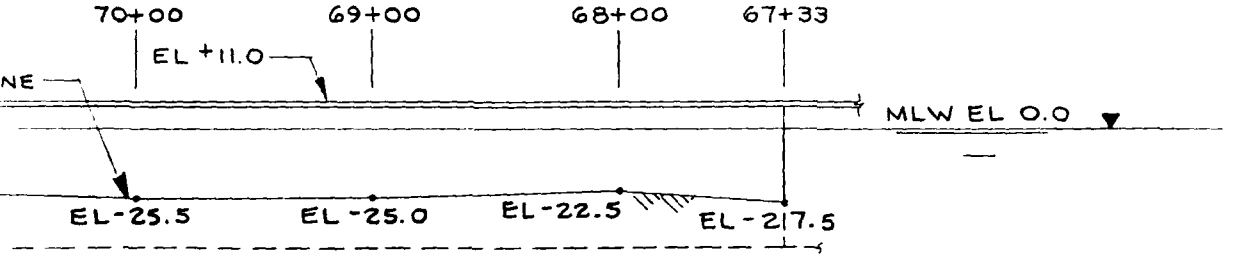
SCALE: 1" = 60'

GRAPH
1" = 60'



PLAN

SCALE: 1" = 60'

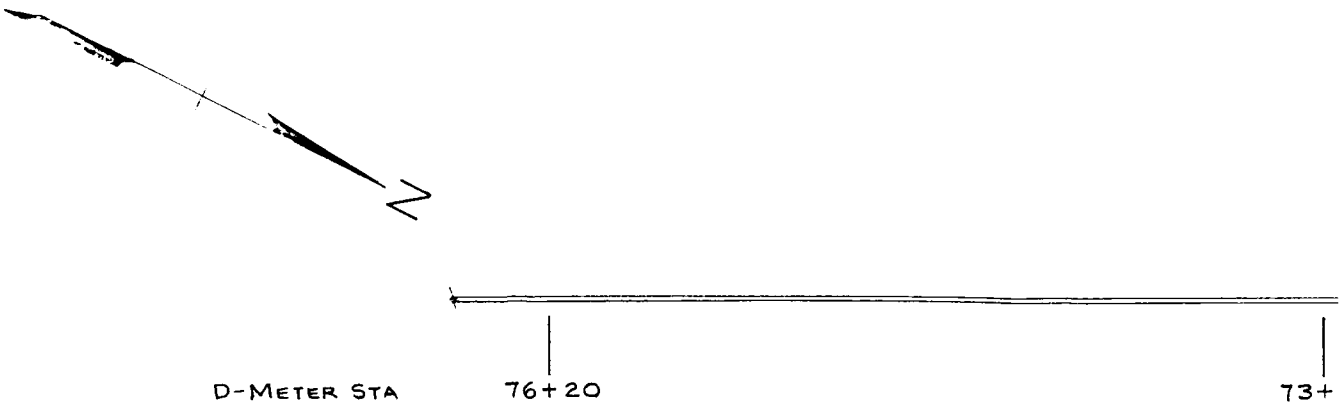


ELEVATION

SCALE: 1" = 60'

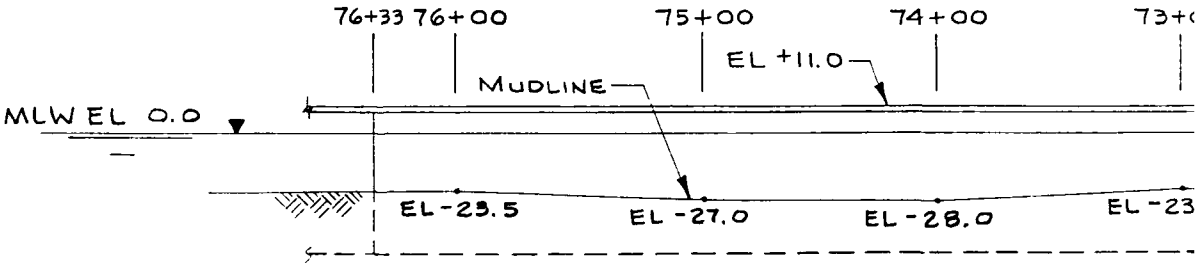
2

GRAPHIC SCALE IN FEET			CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C.	
1" = 60'	0 10 50 100	Childs Engineering Corporation Box 333 Medford MA	NAVAL STATION MAYPORT FLORIDA	FIG 23
			DESTROYER BERTH 0-2	



PLAN

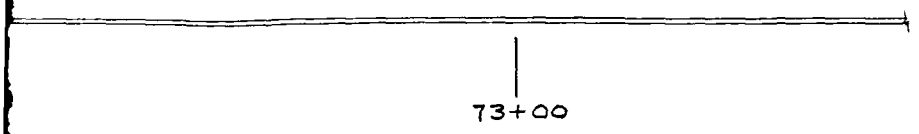
SCALE: 1" = 60'



ELEVATION

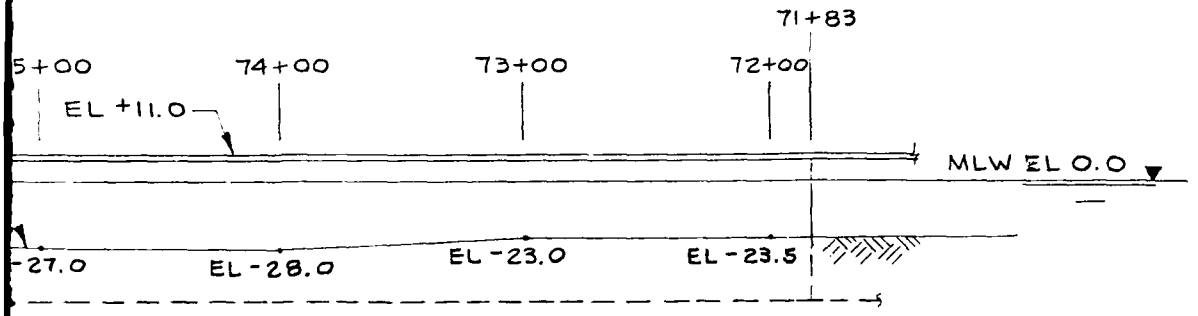
SCALE: 1" = 60'

GRAPH
1" = 60'



PLAN

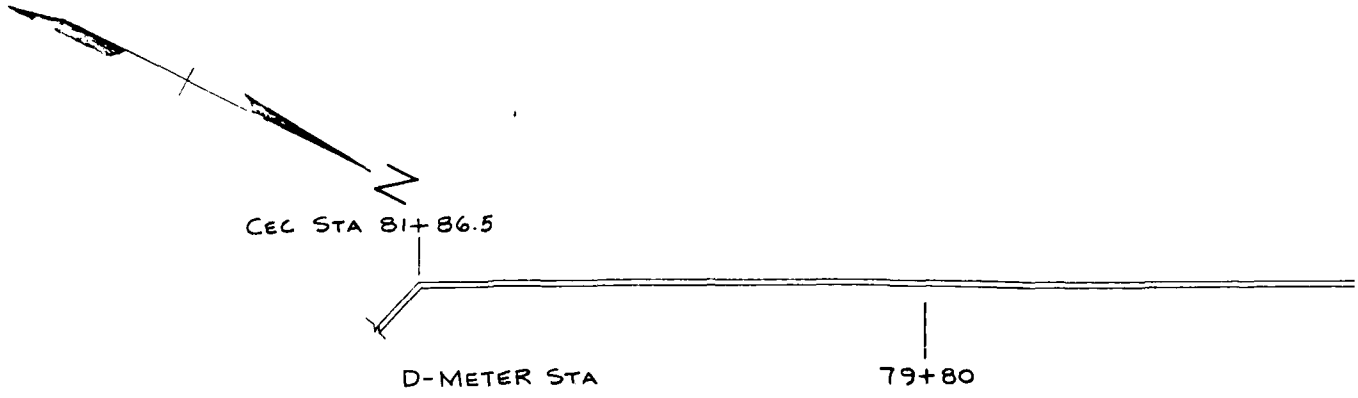
SCALE: 1" = 60'



ELEVATION

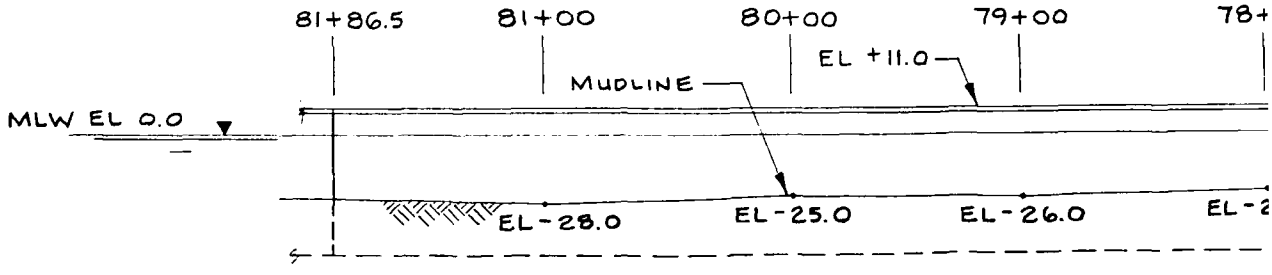
SCALE: 1" = 60'

GRAPHIC SCALE IN FEET 1" = 60' 0 10 50 100	Childs Engineering Corporation Box 353 Medford, MA	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C. NAVAL STATION MAYPORT, FLORIDA DESTROYER BERTH D-3 FIG. 24



PLAN

SCALE: 1" = 60'

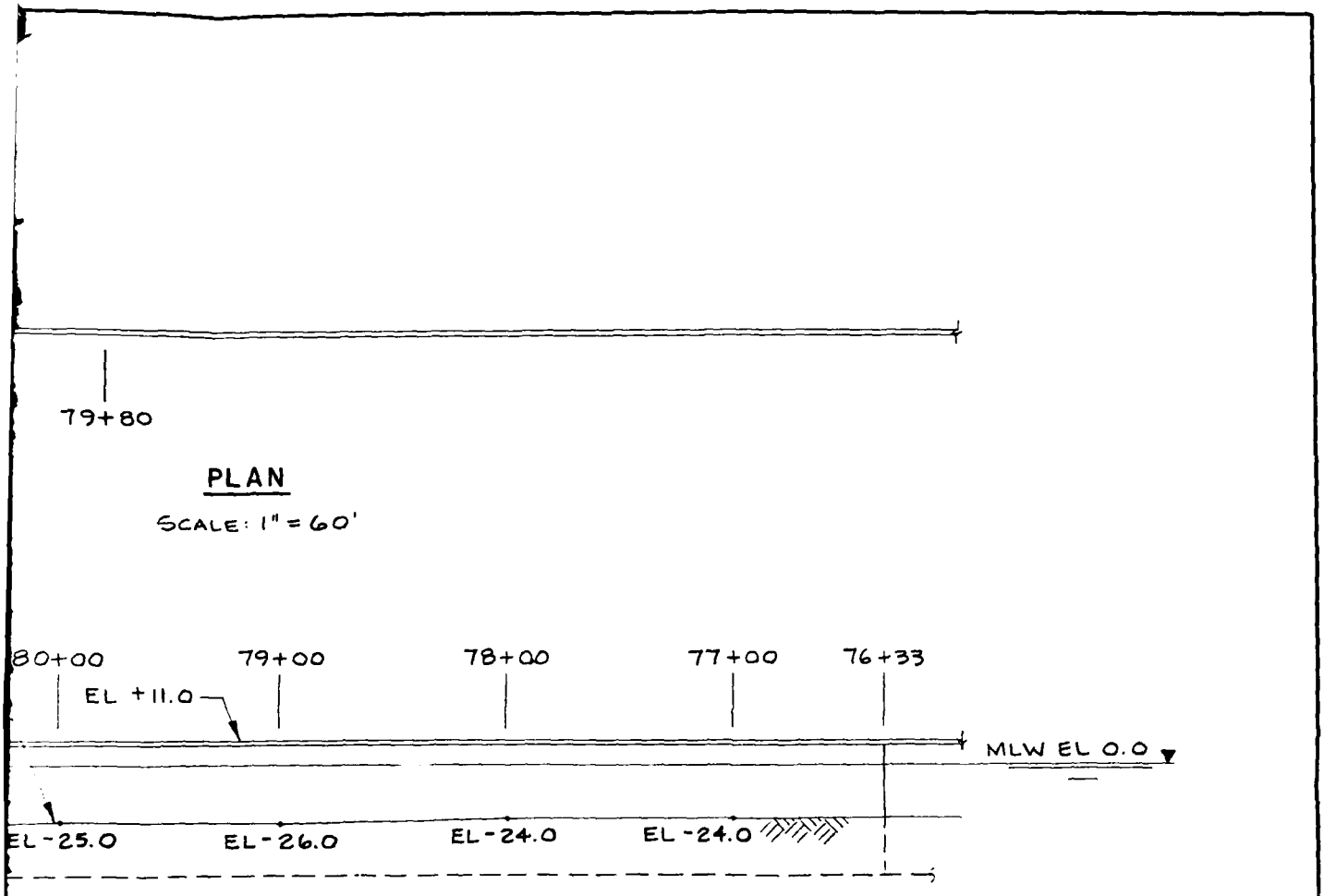


ELEVATION

SCALE: 1" = 60'

GRA

1"=6



PLAN

SCALE: 1" = 60'

ELEVATION

SCALE: 1" = 60'

GRAPHIC SCALE IN FEET

1" = 60' 0 10 50 100

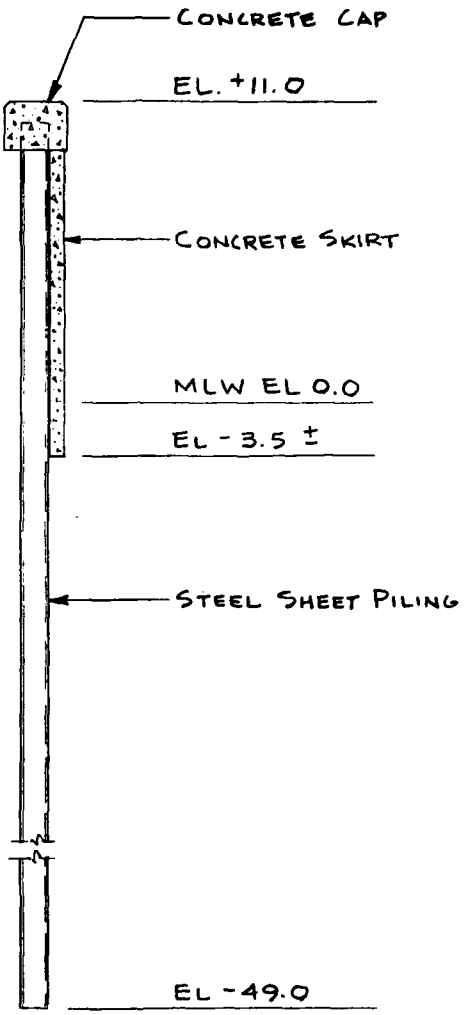
Childs Engineering Corporation

CHESAPEAKE DIVISION
NAVAL FACILITIES ENGINEERING COMMAND

NAVAL STATION MAYPORT, FLORIDA

DESTROYER BERTH D-4

FIG. 25



CROSS-SECTION

GRAPHIC SCALE NOT TO SCALE	Childs Engineering Corporation Box 333 Medfield, MA	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C. NAVAL STATION MAYPORT, FLORIDA DESTROYER BERTHS FIG. 26

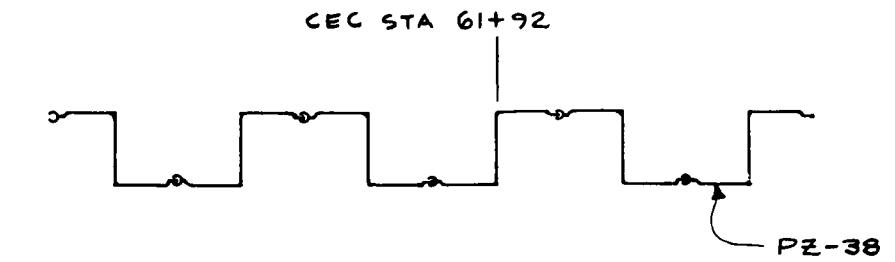
4.5.2 Observed Inspection Condition

For the Destroyer Berths D-1, -2, -3 and -4, no major structural damage or deterioration was observed. The coating on the pile sections appears to be fairly intact throughout 80% of the bulkhead. However, there are sporadic occurrences of corrosion nodes and area corrosion (6"-8"ø) throughout, with the heaviest concentration just under the concrete encasement. There is also sporadic occurrence of gas pockets between the steel and a black corrosion buildup on the surface. Pitting of the steel was common, with a maximum size of 1/2"ø x 1/16" deep. Ultrasonic thickness measurements on steel sheet piling were taken at eight (8) locations, indicating a range of metal loss for the flange of 0-23% and for the web of 0-29% (see Appendix).

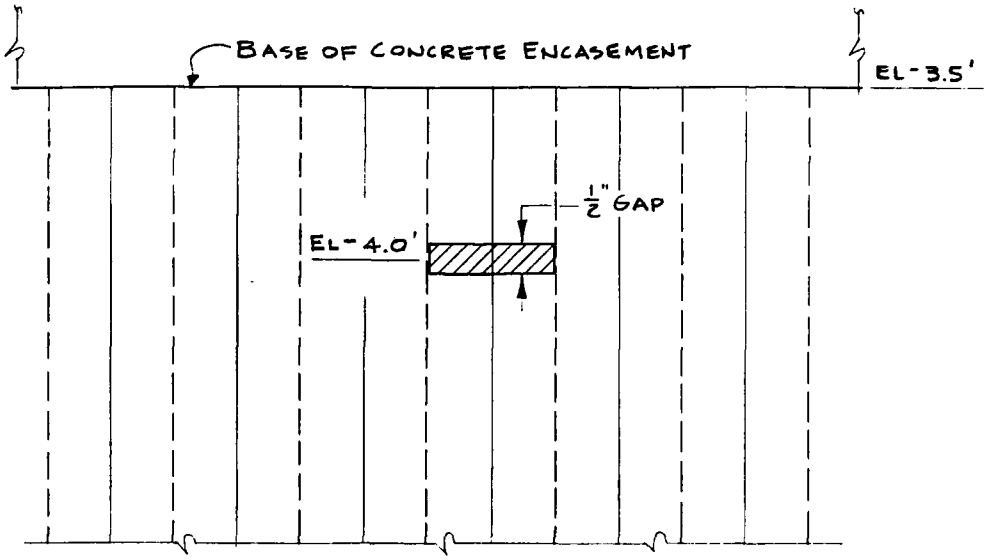
One structural anomaly was observed at D-1. At CEC Sta. 61+92, a 1/2" gap at a butt joint between two sheet piles was observed at elevation -4.0'. The tide was receding at the time and water was escaping through this gap. It appeared that the gap had been there since construction of the wall (see Figure 27).

Some deterioration of the base of the concrete encasement was seen between the north corner of Berth D-2 and CEC Sta. 70+00. The base of the encasement showed cosmetic spalling throughout its length. More severe spalling occurred at the expansion joints in this area, to the point that reinforcing steel and the steel sheet piling behind the encasement were exposed.

Soundings along the destroyer berths ranged from el. -22.6' to el.-31.0'.



PLAN



ELEVATION

INCOMPLETE BUTT JOINT

GRAPHIC SCALE NOT TO SCALE	Childs Engineering Corporation Box 333 Medford, MA	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C. NAVAL STATION MAYPORT, FLORIDA DESTROYER BERTH D-1 FIG.27

4.5.3 Structural Condition Assessment

Destroyer Berths D-1, -2, -3 and -4 all appear to be in good condition. No major structural damage was observed in any of these four berths. Minor corrosion has occured, but ultrasonic thickness measurements indicate a maximum of only 29% of the original metal has been lost. The greatest amount of metal loss was not located in the maximum stressed areas (see Appendix).

At CEC Sta. 61+92, an unusual condition was observed at elevation -4.0'. Here a 1/2" gap existed at a butt joint between two pile sections. No evidence of recent failure was noted. Apparently, this anomaly occurred during construction and resulted from the upper pile not being driven far enough down to meet the lower pile. A joint of this type is usually made with a full penetration weld covering the full length of the joint. However, any loss of fill behind the wall would be the most critical problem resulting from this condition. The joint is not in an area of maximum stress for this type of wall (see Structural Assessment Calculations in Appendix).

Dredge depths along the destroyer berths were within design limits.

4.5.4 Recommendations

It is recommended that the incomplete joint observed at CEC Sta. 61+92 (Destroyer Berth D-1) at el. -4.0' be repaired to prevent any further loss of fill and subsequent subsidence of the pavement. The cost to repair this gap with epoxy compound covering welded wire fabric is $470.00. See Appendix for the repair cost estimate computation.

In addition, the steel bulkhead should be protected from further corrosion. Steel thickness measurements should be taken in five years to document any further metal loss due to corrosion.

4.6 SMALL CRAFT BERTHING

4.6.1 Description

This 400' long section of bulkhead is located at the southeasternmost edge of the Naval Station turning basin (see Figure 4). Running east from the southern edge of Berth D-4, from CEC Stations 81+83 to 85+83.5, the bulkhead functions as a small craft berthing area (see Figure 28).

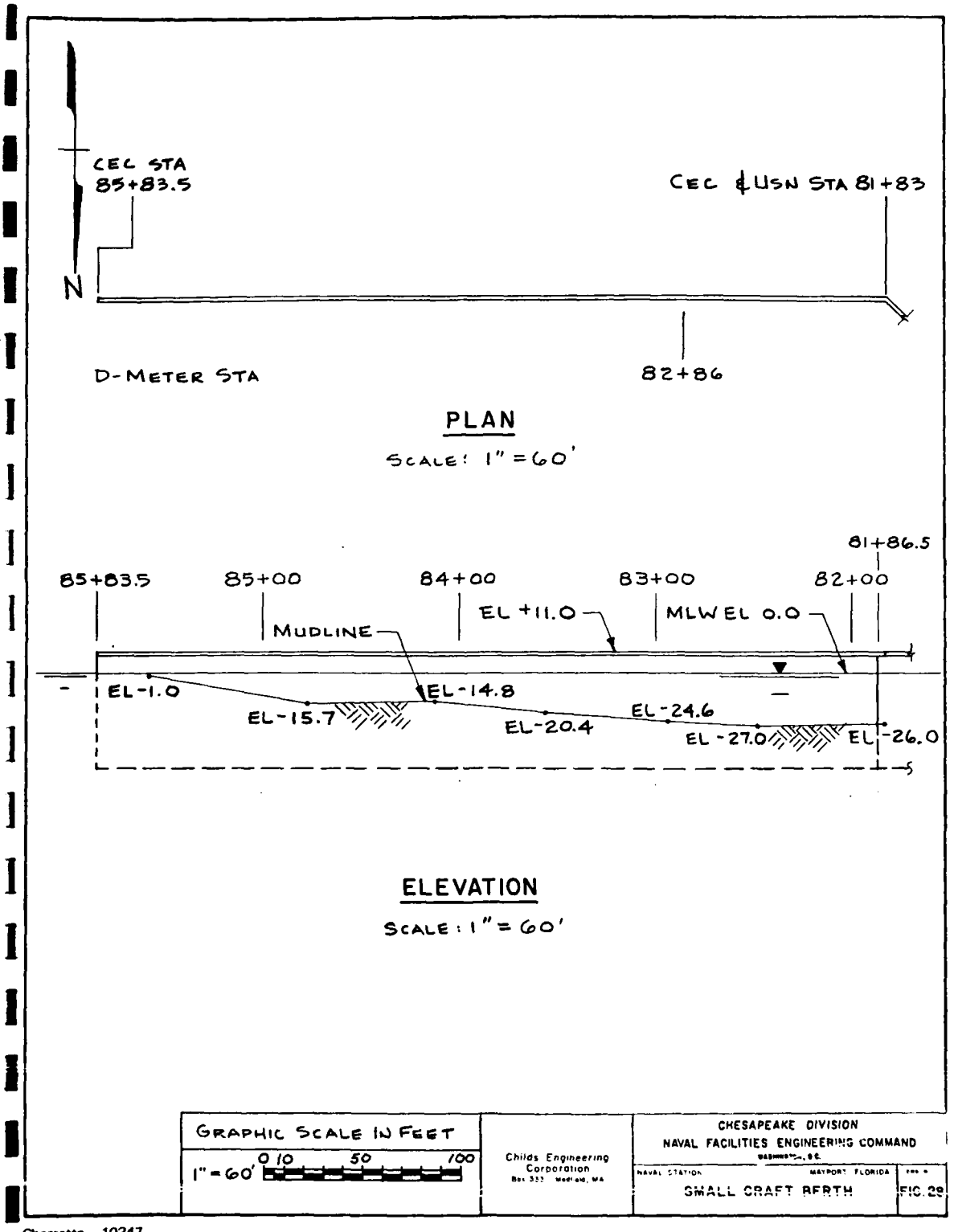
The bulkhead is an anchored steel sheet pile wall, with reinforced concrete cap and curbing. From CEC Stations 81+83 to 82+83±, there is a reinforced concrete encasement that runs from below the cap to elevation -3.5'. This part of the wall was built around 1959 along with the destroyer berths. There is no encasement on the remainder of the bulkhead, which appears to have been built around 1961. The entire bulkhead is comprised of PZ-38 sections with an inside anchoring wale fastened to the wall with 1½" bolts on each inner flange at elevation -2.5'. The sheet pile sections were driven to elevation -49.0' and designed for a variable dredge depth not to exceed -30.0' at the base of the bulkhead (see Figure 29).

References: Bureau of Yards & Docks
"Sheet Pile Bulkhead and Revetments"
Y&D Drawings No. 912981 and 912983.

Bureau of Yards & Docks
"Sheet Pile Bulkheads Elevations -
Sta. 57+24.5± to Sta. 86+32.4± - South
Bulkhead and D.D. Slips"
P.W.D. Drawing No. 750

4.6.2 Observed Inspection Condition

The coating was intact throughout most of the bulkhead. In the splash zone section of the wall without a concrete encasement, the coating



PLAN

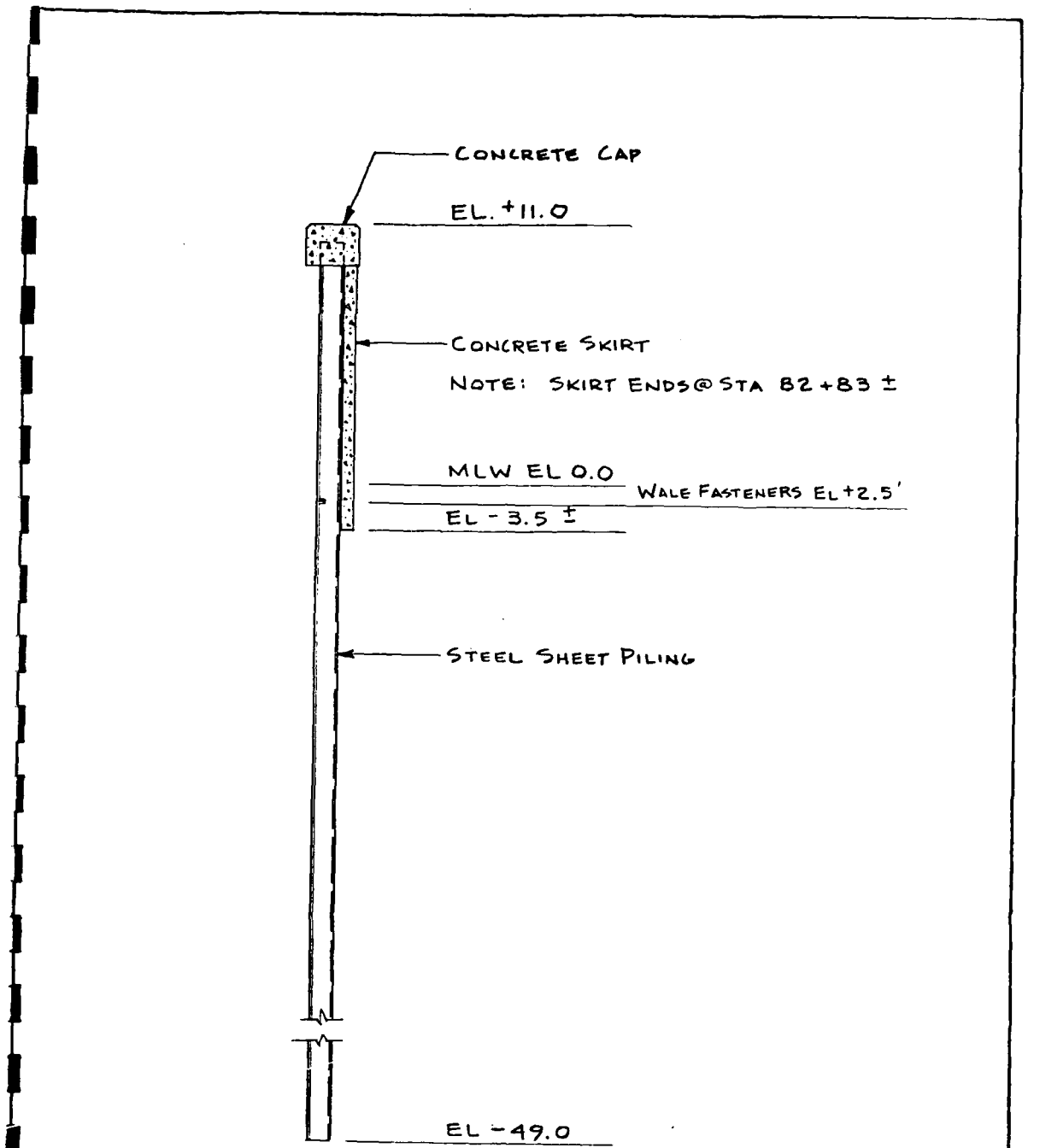
SCALE: 1" = 60'

ELEVATION

SCALE: 1" = 60'

GRAPHIC SCALE IN FEET 1" = 60' 0 10 50 100	Childs Engineering Corporation Box 333 Medford, MA	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C. NAVAL STATION MAYPORT FLORIDA SMALL CRAFT BERTH FIG. 29

Charrette 10347



CROSS-SECTION

GRAPHIC SCALE	Childs Engineering Corporation	CHESAPEAKE DIVISION NAVAL FACILITIES ENGINEERING COMMAND WASHINGTON, D.C.	
NOT TO SCALE		NAVAL STATION MAYPORT, FLORIDA SMALL CRAFT BERTH	FIG. 29

Charrette 10347

exhibited some cracking and about 10% of the steel surface was exposed. The most severe corrosion, which was minor, was found at or just below mean low water if there was no encasement, or just below the concrete encasement, if it was present. Ultrasonic steel thickness measurements were taken at one (1) location, indicating a range of metal loss of 0-6% for the flange and 0-11% for the web (see Appendix). However, the wale to bulkhead fasteners, where visible, showed signs of moderate corrosion. Bolt nuts exhibited pitting, edges were rounded and the threads appeared smooth. Hexagonal nut heads measured 3" in diameter from face to face.

Depths along this bulkhead ranged from el. -26.0' at CEC Sta. 81+83 to el. -1.0' at CEC Sta. 85+83.5.

In this berthing area, the only structural damage observed occurred at CEC Sta. 82+65 at elevation -6.5'. Here a 6"ø hole in the web was found with a piece of timber extruding from the hole. No subsidence in the pavement behind the hole was observed.

4.6.3 Structural Condition Assessment

Like most of the berthing areas inspected, the small craft berthing bulkhead appeared to be in good condition. Only small areas of the pile coating had broken down with just minor deterioration of the steel occurring (see ultrasonic thickness measurements in Appendix). An assessment of the wale fasteners, however, cannot be made. Visual observation indicates moderate corrosion has taken place, yet no documentation of original bolt head sizes was found to assess the degree.

In the area where the hole was noted, loss of fill is the most critical problem that could occur since its location is not in an area of maximum stress.

Depths along the face of this berth were measured to be less than its design depth.

4.6.4 Recommendations

The purpose of this section is to recommend actions which should be taken to correct problems discovered in the inspection.

To prevent the continual loss of fill and eventual subsidence of the pavement, the hole at CEC Sta. 82+65 at el. -6.5' should be patched. There are several techniques which could be employed to patch this hole and eliminate the loss of fill. The range in costs for the repairs is estimated between $450.00 and $500.00, depending on the repair technique employed.

A more detailed inspection of the wale fasteners is recommended. This inspection should document the degree of corrosion that has occurred so that the structural condition of these fasteners can be assessed.

Protect the steel bulkhead from further corrosion. Measure steel thickness in five years to document any additional metal loss.

TABLE OF CONTENTS FOR APPENDIX

AD-A167 549 UNDERWATER FACILITIES INSPECTIONS AND ASSESSMENTS AT NAVAL STATION MAYPORT FLORIDA(U) CHILDS ENGINEERING CORP MEDFIELD MA JUL 80 CHES/NAVFAC-FPO-1-80 (11) 2/2

UNCLASSIFIED N62477-80-C-0102 F/G 13/2 NL

END
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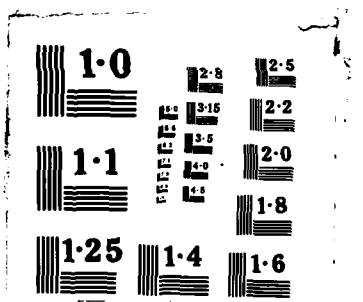
1·0
1·1
1·25
1·4
1·6
2·8
3·15
3·5
4·0
4·5
2·5
2·2
2·0
1·8

FOOT NOTES

1. Naval Facilites Engineering Command, Southern Division, MASTER PLAN, NAVAL STATION, MAYPORT, FLORIDA, June 1975, pp.10.

2. MASTER PLAN, NAVAL STATION, MAYPORT, FLORIDA, pp.6.

3. MASTER PLAN, NAVAL STATION, MAYPORT, FLORIDA, pp.6.

4. Terzaghi, K., "Stability and Stiffness of Cellular Cofferdams", ASCE Transactions, Vol. 110, 1945. pp. 1083-1119. Disc. pp. 1120-1202.

REPAIR COST ESTIMATE

CARRIER BERTH C-1

1) Patch hole in wall by mechanically fastening steel plate over hole.

Material Cost = $50 (113 sq. in. hole)

Diver clean hole, place plate and fasten @ 2 holes/day

Diver, Tender and Gear $840/day

Total Cost/hole repair = $\left(\frac{840}{2} + 50\right)$ = $ 470/hole*

DESTROYER BERTH D-1

1) Patch hole in wall with epoxy compound and welded wire fabric.

Material Cost = $50 (15 sq. in. hole)

Diver clean hole, install mesh and place epoxy @ 2 holes/day

Diver, Tender and Gear $840/day

Total Cost/hole = $\left(\frac{840}{2} + 50\right)$ = $470/hole*

SMALL CRAFT BERTHING

1) Patch hole in wall by mechanically fastening steel plate over hole.

Material Cost = $30 (28 sq.in. hole)

Diver clean hole, place patch and fasten

Diver, Tender and Gear $ 840/day @ 2 holes day

Total Cost/hole repaired = $\left(\frac{840}{2} + 30\right)$ = $450/hole*

2) Patch hole with epoxy covering weld wire fabric

Material Cost = $75 (28 sq.in. hole)

Diver clean hole, install resin and place epoxy at 2 holes/day

Diver, Tender and Gear $840/day

Total Cost/hole repaired = $\left(\frac{840}{2} + 75\right)$ = $495/hole*

*These costs are based on repairing 2 holes of similar size per day.

CHILDS ENGINEERING CORPORATION
Box 333
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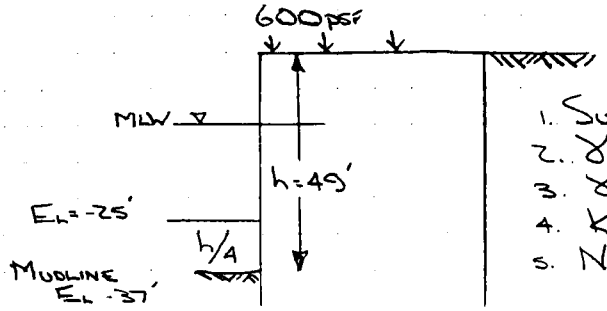
JOB UNDERWATER FACILITY ASSESSMEN
SHEET NO. 1 OF 3
CALCULATED BY CLB DATE 10/80
CHECKED BY DRC DATE 11/5/80
SCALE **STRUCTURAL ANALYSIS**

NAVSTA MAYPORT

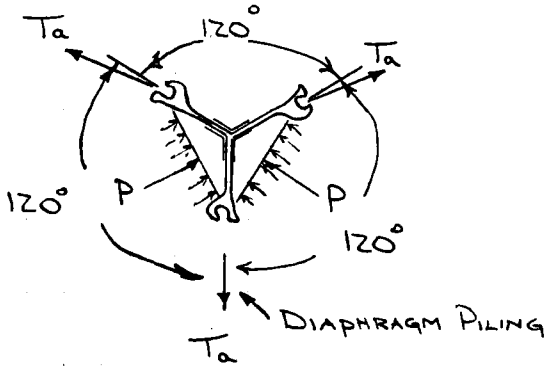
FACILITY: DIAPHRAGM CELL BULKHEAD



ASSUME
1. SURCHARGE = 600 psf
2. γ_d = 120 pcf
3. γ_s = 70 pcf
4. K_a = .38
5. NO BOLLARD FORCES

POINT OF MAXIMUM STRESS OCCURS AT $h/4$ TO $h/3$ ABOVE MUDLINE

SOIL PRESSURE @ E_L = -25' P = 1490 psf - LATERAL UNIT SOIL PRESSURE



FORCES ON A 120° WYE FOR DIAPHRAGM CELLS[1].

THEORETICALLY THE 120° WYE CONNECTION HAS APPROXIMATELY EQUAL LOADS ON ALL THREE LEGS[1].

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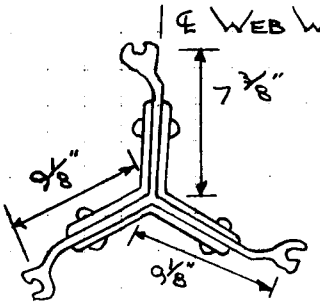
JOB UNDERWATER FACILITY ASSESSMENTS
SHEET NO. 2 OF 3
CALCULATED BY CLB DATE 10/80
CHECKED BY DRC DATE 11/5/80
SCALE **STRUCTURAL ANALYSIS**

WYE CONNECTION ON DIAPHRAGM CELL



DIMENSIONS TAKEN FROM NAVFAC DRWG # 1278275

INTERLOCK FORCE (lbs/linear ft) : $T_a = \frac{1}{12} P \times r$

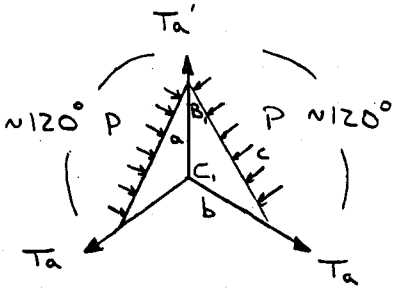
$= 1/12 \times 1440 \text{ psf} \times 30.74 \text{ ft}$

$T_a = 3.69 \text{ K/in}$

P = LATERAL UNIT SOIL PRESSURE (psf)
r = CELL RADIUS (FT)

FORCE ON WYE CONNECTION = T_a'

$T_a' = T_a$ + SOIL PRESSURE ON WYE CONNECTION



a = 7.375"
b = 9.125"
$C_1 = 120°$

1. DISMUKE, T.D. (1970), STRESS ANALYSIS OF SHEET PILING ON CELLULAR STRUCTURES," PROCEEDINGS, CONFERENCE ON DESIGN AND INSTALLATION OF PILE FOUNDATIONS AND CELLULAR STRUCTURES, ENVO PUBLISHING CO., LEHIGH VALLEY pp 339-365. FANG, H.Y. AND DISMUKE, T.D. (ESS.)

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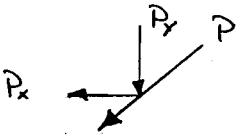
MEDFIELD, MA 02052

JOB UNDERWATER FACILITY ASSESSMENTS
SHEET NO. 3 OF 3
CALCULATED BY CLB DATE 11/80
CHECKED BY DRC DATE 11/5/80
SCALE STRUCTURAL ANALYSIS

$c^2 = a^2 + b^2 - 2ab\cos C_1$ $\quad b^2 = a^2 + c^2 - 2ac\cos B_1$

$\therefore C = 14.32''$ $\quad \therefore B_1 = 33.5^\circ$

BREAKING INTO COMPONENTS AND SUMMING FORCES



$P_y = P\cos 56.5^\circ$

$= \left(\frac{1}{12} \times 14.32 \times 1440\right)\cos 56.5^\circ$

$= .95\ ^K/_{IN}$

$T_a' = T_a + 2P_y = 3.69 + 2(.95) = 5.59\ ^K/_{IN}$*

FORCE ON WYE CONNECTION = $5.59\ ^K/_{IN} > 3.69\ ^K/_{IN}$ INTERLOCK FORCE

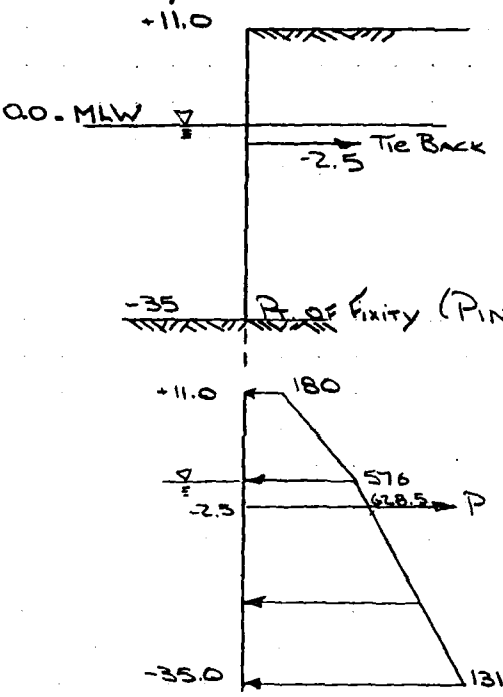
* T_a' AS CALCULATED MAY NOT REPRESENT THE ACTUAL MAXIMUM STRESS ON A 120° WYE-CONNECTION. STRESSES MAY BE HIGHER DUE TO BENDING AND REALIGNMENT OF FORCES DUE TO BULGING OF THE CELL.

CHILDS ENGINEERING CORPORATION
Box 333
MEDFIELD, MA 02052

JOB UNDERWATER FACILITY INSPECTION
SHEET NO 1 OF 1
CALCULATED BY CLB DATE 8/80
CHECKED BY DRC DATE 9/80
SCALE STRUCTURAL ANALYSIS

NAVSTA MAYPORT

FACILITY: ANCHORED BULKHEAD



Assume:
1. Surcharge = 600 psf
2. γ_d = 120 pcf
3. γ_s = 70 pcf
4. K_a = .3
5. Neglect Passive Earth Pressures

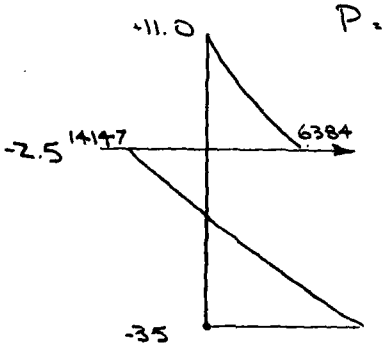
Soil Pressure – per FT^2

600(.3) = 180 lbs
120(.3)11.0 + 180 = 576 lbs
70(.3)35.0 + 576 = 1311 lbs

Anchor Pull

$180(11)[11/2 + 35] = 80190$
$396(11/2)[11/3 + 35] = 84216$
$576(35)[35/2] = 352800$
$735(35/2)[35/3] = 150063$
667269

$P = 667269/32.5 = 20531$ lbs



Shear Diagram

Max Moment occurs at point of Zero Shear

$20531 - 6384 - 628.5y - \frac{21y^2}{2} = 0$

$\therefore y = 17.4'$ or $E_L = -19.9'$

*Based on Tschebotiaroff Method

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JOB NAVSTA MAYPORT, FLA.
SHEET NO. 1 OF 3
CALCULATED BY BWL DATE 7-29-80
CHECKED BY _____ DATE _____
SCALE _____

ULTRASONIC STEEL THICKNESS MEASUREMENTS

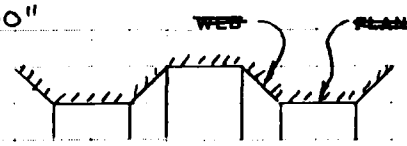
FACILITY C-1 LEVEL OF INSPECTION 1

STATION 18+50 (CEC)

READINGS IN INCHES

ORIGINAL THICKNESS: .500"

~~Flange~~
~~web~~



Base of Concrete Encasement -4.0'

ELEVATION	THICKNESS
-4.0'	.355
-6.0'	.395
-8.0'	.335

MUDLINE

FORM 204-1 Available from NEBI Inc., Groton, Mass 01450

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Box 333
MEDFIELD, MA 02052

JOB NAVSTA MAYPORT, FLA.
SHEET NO 2 OF 3
CALCULATED BY BWL DATE 7-29-80
CHECKED BY _____ DATE _____
SCALE _____

ULTRASONIC STEEL THICKNESS MEASUREMENTS

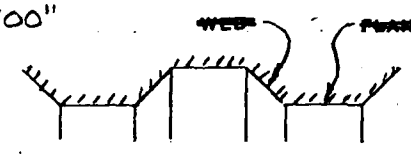
FACILITY C-1 LEVEL OF INSPECTION 1

STATION 20+35 (LEC)

READINGS IN INCHES

ORIGINAL THICKNESS: .500"

~~Flange~~
~~web~~



Base of Concrete Encasement -4.0'

ELEVATION	THICKNESS
-4.0'	.345
-6.0'	.320
-8.0'	.360

MUDLINE

FORM 200-1 Available from NDT Inc., Green, Mass. 01450

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Box 333
MEDFIELD, MA 02052

JOB NAVSTA MAYPORT, FLA.
SHEET NO 3 OF 3
CALCULATED BY BWL DATE 7-29-80
CHECKED BY _____ DATE _____
SCALE _____

ULTRASONIC STEEL THICKNESS MEASUREMENTS

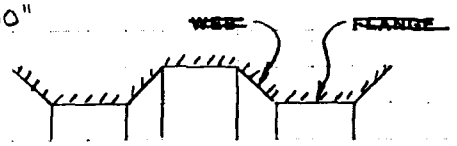
FACILITY C-1 LEVEL OF INSPECTION 1

STATION 22+80 (LEC)

READINGS IN INCHES

ORIGINAL THICKNESS: .500"

~~Flange =~~
~~web =~~



Base of Concrete Encasement -4.0'

ELEVATION	THICKNESS
-4.0'	.355
-6.0'	Too pitted
-8.0'	Too pitted
-13.0'	Too pitted
-18.0'	.315
-23.0'	.320
MUDLINE	.350

FORM 204-1 Available from [illegible] Inc., Groton, Mass. 01450

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Box 333
MEDFIELD, MA 02052

JOB NAVSTA MAYPORT, FLA.
SHEET NO 1 OF 4
CALCULATED BY BWL DATE 7-23-80
CHECKED BY _____ DATE _____
SCALE _____

ULTRASONIC STEEL THICKNESS MEASUREMENTS

FACILITY C-2 LEVEL OF INSPECTION 1

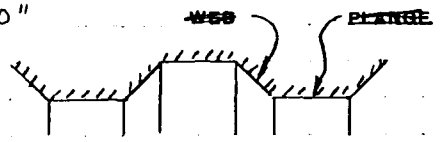
STATION 9+50 (CEC)

READINGS IN INCHES

ORIGINAL THICKNESS: .500"

~~Flange=~~

~~web=~~



Base of Concrete Encasement -4.0'

ELEVATION	THICKNESS
-4.0'	.340
-6.0'	.375
-8.0'	.305
-13.0'	.455
-18.0'	.470
-23.0'	.485
-29.0' MUDLINE	.465

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MEDFIELD, MA 02052

JOB NAVSTA MAYPORT, FLA.
SHEET NO 2 OF 4
CALCULATED BY BWL DATE 7-23-80
CHECKED BY _____ DATE _____
SCALE _____

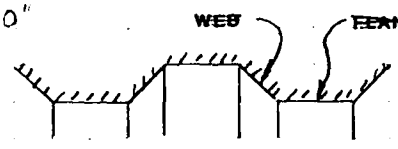
ULTRASONIC STEEL THICKNESS MEASUREMENTS

FACILITY C-2 LEVEL OF INSPECTION 1

STATION 8+30 (CEC)

READINGS IN INCHES

ORIGINAL THICKNESS: .500"
~~Flange =~~
~~web =~~



Base of Concrete Encasement -4.0'

ELEVATION	THICKNESS
-4.0'	.490
-6.0'	.460
-8.0'	ORIGINAL THICKNESS
-13.0'	ORIGINAL THICKNESS

MUDLINE

FORM 204-1 Available from NESS Inc., Groton, Mass 01450

CHILDS ENGINEERING CORPORATION
Box 333
MEDFIELD, MA 02052

JOB NAVSTA MAYPORT, FLA.
SHEET NO 3 OF 4
CALCULATED BY BWL DATE 7-24-90
CHECKED BY _____ DATE _____
SCALE _____

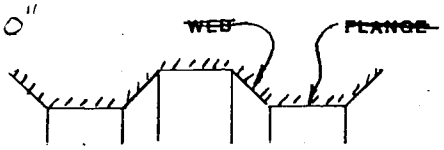
ULTRASONIC STEEL THICKNESS MEASUREMENTS

FACILITY C-2 LEVEL OF INSPECTION 1

STATION 7+00 (CEC)

READINGS IN INCHES

ORIGINAL THICKNESS: .500"
~~Flange =~~
~~web =~~



Base of Concrete Encasement -4.0'

ELEVATION	THICKNESS
-4.0'	.475
-6.0'	.430
-8.0'	.435
-13.0'	.445
-18.0'	.470
-23.0'	ORIGINAL THICKNESS
-29.0' MUDLINE	ORIGINAL THICKNESS

FORM 204-1 Available from MESL Inc., Groton, Mass 01450

CHILDS ENGINEERING CORPORATION
Box 333
MEDFIELD, MA 02052

JOB NAVSTA MAYPORT, FLA.
SHEET NO 4 OF 4
CALCULATED BY BWL DATE 7-24-9[illegible]
CHECKED BY _____ DATE _____
SCALE _____

ULTRASONIC STEEL THICKNESS MEASUREMENTS

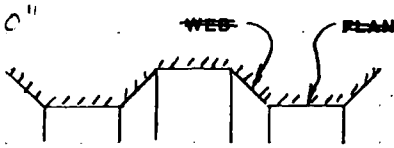
FACILITY C-2 LEVEL OF INSPECTION 1

STATION 4+20 (CEC)

READINGS IN INCHES

ORIGINAL THICKNESS: .500"

~~Flange =~~
~~web =~~



Encasement -4.0'

ELEVATION	THICKNESS
-4.0'	.480
-6.0'	.485
-8.0'	ORIGINAL THICKNESS

MUDLINE

FORM 204-1 Available from NES Inc. Groton, Mass. 01450

CHILDS ENGINEERING CORPORATION
Box 333
MEDFIELD, MA 02052

JOB NAVSTA MAYPORT, FLA.
SHEET NO 1 OF 1
CALCULATED BY BWL DATE 7-24-90
CHECKED BY _____ DATE _____
SCALE _____

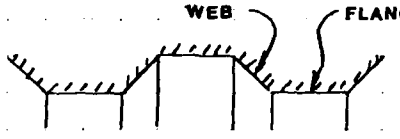
ULTRASONIC STEEL THICKNESS MEASUREMENTS

FACILITY Bulkhead East of Carrier Berth C-2 LEVEL OF INSPECTION 1

STATION 1+62 (CEC)

READINGS IN INCHES

ORIGINAL THICKNESS:
flange = .500"
web = .375"



ELEVATION			THICKNESS	FL	WEB
-1.1'	•	•		.455	.330
-3.1'	•	•		ORIGINAL THICKNESS	.325
-5.1'	•	•		ORIGINAL THICKNESS	.320
-7.1'	•	•		.460	3/16" (calipers)
-9.1'	•	•		Not accessible	3/16" (calipers)

MUDLINE

CHILDS ENGINEERING CORPORATION
Box 333
MEDFIELD, MA 02052

JOB NAVSTA MAYPORT, FLA.
SHEET NO 1 OF 1
CALCULATED BY BWL DATE 7-23-80
CHECKED BY _____ DATE _____
SCALE _____

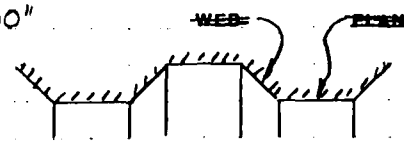
ULTRASONIC STEEL THICKNESS MEASUREMENTS

FACILITY B-1 LEVEL OF INSPECTION 1

STATION 44+95 (CEC)

READINGS IN INCHES

ORIGINAL THICKNESS: .500"
~~Flange =~~
~~web =~~



Base of Concrete Encasement - 3.8'

ELEVATION	THICKNESS
-3.8'	ORIGINAL THICKNESS
-5.8'	ORIGINAL THICKNESS
-7.8'	ORIGINAL THICKNESS
-12.8'	.490
-17.8'	.490
-22.8'	ORIGINAL THICKNESS
-27.8'	ORIGINAL THICKNESS
-32.8' MUDLINE	.485

FORM 204-1 Available from NEESS Inc., Groton, Mass. 01450

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JOB NAVSTA MAYPORT, FLA.
SHEET NO 1 OF 3
CALCULATED BY BWL DATE 7-22-90
CHECKED BY _____ DATE _____
SCALE _____

ULTRASONIC STEEL THICKNESS MEASUREMENTS

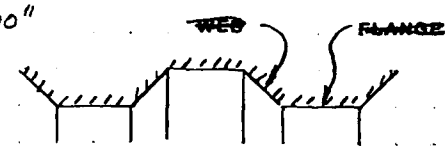
FACILITY B-3 LEVEL OF INSPECTION 1

STATION 32+30 (CEC)

READINGS IN INCHES

ORIGINAL THICKNESS: .500"

~~Flange~~
~~web~~



Base of Concrete Encasement -3.8'

ELEVATION	THICKNESS
-3.8'	.480
-5.8'	.490
-7.8'	.485
-12.8'	.485
-17.8'	ORIGINAL THICKNESS
-22.8'	ORIGINAL THICKNESS
-27.8'	.485
MUDLINE -33.8'	ORIGINAL THICKNESS

CHILDS ENGINEERING CORPORATION
Box 333
MEDFIELD, MA 02052

JOB NAVSTA MAYPORT, FLA.
SHEET NO 2 OF 3
CALCULATED BY BWL DATE 7-22-80
CHECKED BY DATE
SCALE

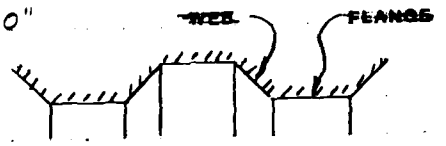
ULTRASONIC STEEL THICKNESS MEASUREMENTS

FACILITY B-3 LEVEL OF INSPECTION 1

STATION 34+80 (CEC)

READINGS IN INCHES

ORIGINAL THICKNESS: .500"
~~Flange~~
~~web~~



Base of Concrete Encasement -3.8'

ELEVATION	THICKNESS
-3.8'	.495
-5.8'	.495
-7.8'	.495
-12.8'	ORIGINAL THICKNESS
-17.8'	.495
-22.8'	.495

MUDLINE

CHILDS ENGINEERING CORPORATION
Box 333
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JOB NAVSTA MAYPORT, FLA.
SHEET NO 3 OF 3
CALCULATED BY BWL DATE 7-22-80
CHECKED BY DATE
SCALE

ULTRASONIC STEEL THICKNESS MEASUREMENTS

FACILITY B-3 LEVEL OF INSPECTION 1

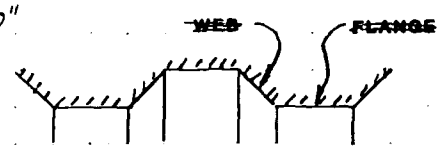
STATION 36+85 (CEC)

READINGS IN INCHES

ORIGINAL THICKNESS: .500"

~~Flange=~~

~~web=~~



Base of Concrete Encasement -3.8'

ELEVATION	THICKNESS
-3.8'	ORIGINAL THICKNESS
-5.8'	ORIGINAL THICKNESS
-7.8'	ORIGINAL THICKNESS
-12.8'	ORIGINAL THICKNESS
-17.8'	ORIGINAL THICKNESS
-22.8'	.495
-28.8' MUDLINE	.490

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JOB NAVSTA MAYPORT, FLA.
SHEET NO 1 OF 2
CALCULATED BY BWL DATE 7-25-80
CHECKED BY _____ DATE _____
SCALE _____

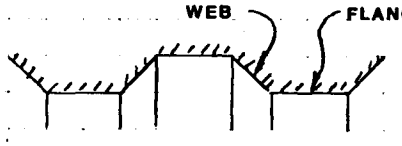
ULTRASONIC STEEL THICKNESS MEASUREMENTS

FACILITY D-1 LEVEL OF INSPECTION 1

STATION 66+00 (cec)

READINGS IN INCHES

ORIGINAL THICKNESS:
Flange = .500"
web = .375"



Base of Concrete Encasement -3.5'

ELEVATION	THICKNESS			
			℄ WEB	
-3.5'	•	•	ORIGINAL THICKNESS .370	
-5.5'	•	•	TOO PITTED	TOO PITTED
-7.5'	•	•	ORIGINAL THICKNESS	ORIGINAL THICKNESS
-12.5'	•	•	TOO PITTED	TOO PITTED
-17.5'	•	•	ORIGINAL THICKNESS .335	
-22.5'	•	•	TOO PITTED .365	
-27.5' MUDLINE	•	•	.470	TOO PITTED

CHILDS ENGINEERING CORPORATION
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SHEET NO 2 OF 2
CALCULATED BY BWL DATE 7-25-80
CHECKED BY DATE
SCALE

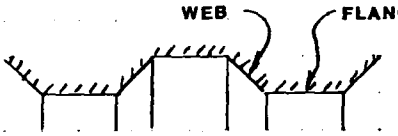
ULTRASONIC STEEL THICKNESS MEASUREMENTS

FACILITY D-1 LEVEL OF INSPECTION I

STATION 63+60 (CEC)

READINGS IN INCHES

ORIGINAL THICKNESS:
Flange = .500"
web = .375"



Base of Concrete Encasement -3.5'

ELEVATION	THICKNESS	FL	WEB
-3.5'	• •	.415	.270
-5.5'	• •	.490	.300
-7.5'	• •	.475	.270

MUDLINE

CHILDS ENGINEERING CORPORATION
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JOB NAVSTA MAYPORT, FLA.
SHEET NO. 1 OF 3
CALCULATED BY BWL DATE 7-21-80
CHECKED BY _____ DATE _____
SCALE _____

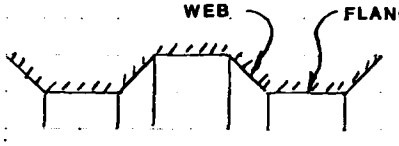
ULTRASONIC STEEL THICKNESS MEASUREMENTS

FACILITY AREA OF D-2 LEVEL OF INSPECTION 1

STATION 71+00 (CEC)

READINGS IN INCHES

ORIGINAL THICKNESS:
Flange = .500"
web = .375"



Base of Concrete Encasement -3.5'

ELEVATION	THICKNESS			
			℄	Web
-3.5'	•	•	.475	.320
-5.5'	•	•	ORIGINAL THICKNESS	.335
-7.5'	•	•	.460	.310
-12.5'	•	•	ORIGINAL THICKNESS	.315
-17.5'	•	•	Too Pitted	.315
-25.5' MUDLINE	•	•	ORIGINAL THICKNESS	Too Pitted

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JOB NAVSTA MAYPORT, FLA.
SHEET NO. 2 OF 3
CALCULATED BY BWL DATE 7-21-80
CHECKED BY DATE
SCALE

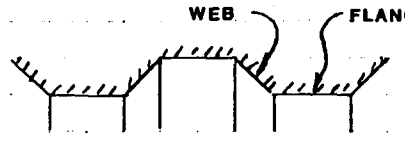
ULTRASONIC STEEL THICKNESS MEASUREMENTS

FACILITY AREA OF D-2 LEVEL OF INSPECTION 1

STATION 70+00 (CEC)

READINGS IN INCHES

ORIGINAL THICKNESS:
flange = .500"
web = .375"



Base of Concrete Encasement -3.5'

ELEVATION	℄	WEB THICKNESS
-3.5'	.495	.330
-5.5'	ORIGINAL THICKNESS	Too Pitted
-7.5'	ORIGINAL THICKNESS	ORIGINAL THICKNESS

MUDLINE

CHILDS ENGINEERING CORPORATION
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JOB NAVSTA MAYPORT, FLA.
SHEET NO 3 OF 3
CALCULATED BY BWL DATE 7-21-80
CHECKED BY _____ DATE _____
SCALE _____

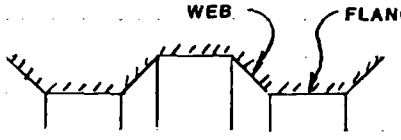
ULTRASONIC STEEL THICKNESS MEASUREMENTS

FACILITY AREA OF D-2 LEVEL OF INSPECTION 1

STATION 67+40 (CEC)

READINGS IN INCHES

ORIGINAL THICKNESS:
Flange = .500"
web = .375"



Base of Concrete Encasement -3.5' ELEVATION

℄ W: E

ELEVATION	THICKNESS		
-3.5'	•	•	Too Pitted — Original Thickness
-5.5'	•	•	Original Thickness .365
-7.5'	•	•	Too Pitted .305

MUDLINE

CHILDS ENGINEERING CORPORATION
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JOB NAVSTA MAYPORT, FLA.
SHEET NO 1 OF 2
CALCULATED BY CLB / BWL DATE 7-28-83
CHECKED BY DATE
SCALE

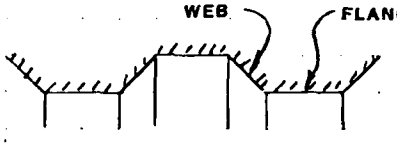
ULTRASONIC STEEL THICKNESS MEASUREMENTS

FACILITY D-3 LEVEL OF INSPECTION 1

STATION 73+00 (CEC)

READINGS IN INCHES

ORIGINAL THICKNESS:
Flange = .500"
web = .375"



Base of Concrete Encasement -3.5'

ELEVATION		THICKNESS	
-3.5'			
	460	N/A	N/A - TOO PITTED
-5.5'			
	425	335	
-7.5'			
	495	360	
-12.5'			
	ORIGINAL THICKNESS	370	
-17.5'			
	ORIGINAL THICKNESS	310	
MUDLINE			
	ORIGINAL THICKNESS	345	

CHILDS ENGINEERING CORPORATION
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JOB NAVSTA MAYPORT, FLA.
SHEET NO 2 OF 2
CALCULATED BY CLB DATE 7/28/80
CHECKED BY DATE
SCALE

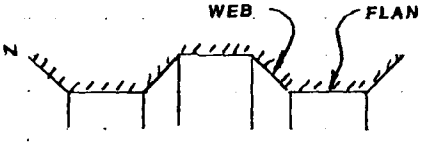
ULTRASONIC STEEL THICKNESS MEASUREMENTS

FACILITY D-3 LEVEL OF INSPECTION 1

STATION 76+20

READINGS IN INCHES

ORIGINAL THICKNESS:
flange = .500 IN
web = .375 IN



Base of concrete Encasement -3.5'

ELEVATION			THICKNESS
-3.5'	•	•	
	.385		.295
-5.5'	•	•	
	.495		.335
-7.5'	•	•	
	.475		.345

MUDLINE

CHILDS ENGINEERING CORPORATION
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JOB NAVSTA MAYPORT, FLA.
SHEET NO 1 OF 1
CALCULATED BY CLB DATE 7/28/80
CHECKED BY DATE
SCALE

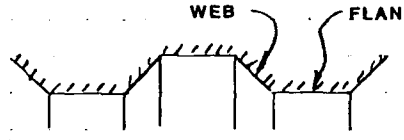
ULTRASONIC STEEL THICKNESS MEASUREMENTS

FACILITY D-4 LEVEL OF INSPECTION 1

STATION 79+80

READINGS IN INCHES

ORIGINAL THICKNESS:
flange = .500 IN
web = .375 IN



Base of concrete Encasement -3.5'

ELEVATION	THICKNESS		
-3.5'	N/A	.350	N/A - TOO PITTED
-5.5'	ORIGINAL THICKNESS	.280	
-7.5'	.495	.265	

MUDLINE

FORM 204-1 Available from NES Inc., Groton, Mass. 01450

CHILDS ENGINEERING CORPORATION
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MEDFIELD, MA 02052

JOB NAVSTA MAYPORT, FLA.
SHEET NO 1 OF 1
CALCULATED BY BWL DATE 7-21-92
CHECKED BY _____ DATE _____
SCALE _____

ULTRASONIC STEEL THICKNESS MEASUREMENTS

FACILITY South Bulkhead LEVEL OF INSPECTION 1

STATION 82+86 (CEC)

READINGS IN INCHES

ORIGINAL THICKNESS:
flange = .500"
web = .375"

ELEVATION	FLANGE THICKNESS	WEB THICKNESS
	TOO PITTED	ORIGINAL THICKNESS
0.0'		
-2.0'	ORIGINAL THICKNESS	.365
-4.0'	ORIGINAL THICKNESS	ORIGINAL THICKNESS
-6.0'	.495	.365
-11.0'	ORIGINAL THICKNESS	.365
-16.0'	ORIGINAL THICKNESS	.340
-21.0'	.470	.335
-26.0' MUDLINE	.495	.375

FORM 204-1 Available from NEBI Inc., Orleans, Mass 01650

END

DATE
FILMED

6-86