

**1977**

**Report on Survey of U.S.  
Shipbuilding and Repair Facilities**



U.S. DEPARTMENT OF COMMERCE  
Maritime Administration

\* 1977 \*

REPORT ON SURVEY OF U.S.  
SHIPBUILDING AND REPAIR FACILITIES

\* 1977 \*

Prepared by:

Office of Ship Construction  
Division of Production

Issued December 1977

CONTENTS

	<u>Page</u>
Introduction.....	1
General .....	2
Major Shipbuilding Facilities.....	3
Bath Iron Works Corporation.....	5
Bethlehem Steel Corporation - Sparrows Point Yard.....	6
General Dynamics Corporation - Quincy Shipbuilding Division.....	7
Maryland Shipbuilding & Drydock Company.....	9
Newport News Shipbuilding & Dry Dock Company.....	10
Seatrain Shipbuilding Corporation.....	12
Sun Shipbuilding & Dry Dock Company.....	13
Alabama Dry Dock and Shipbuilding Company.....	14
Avondale Shipyards, Inc.....	15
Bethlehem Steel Corporation - Beaumont Yard.....	17
Galveston Shipbuilding Company.....	17
Ingalls Shipbuilding Division/Litton Industries.....	18
Levingston Shipbuilding Company.....	19
Marathon LeTourneau Company-Gulf Marine Division.....	20
Tampa Ship Repair & Dry Dock Co., Inc.....	21
Bethlehem Steel Corporation - San Francisco Yard.....	22
FMC Corporation - Marine and Rail Equipment Division.....	23
Lockheed Shipbuilding and Construction Company.....	24
National Steel and Shipbuilding Company.....	26

	<u>Page</u>
Todd Shipyards Corporation - Los Angeles Division.....	27
Todd Shipyards Corporation - Seattle Division.....	28
Triple "A" Machine Shop, Hunters Point.....	29
American Ship Building Company - Lorain, Ohio.....	30
American Ship Building Company - Toledo, Ohio.....	31
Bay Shipbuilding Corporation.....	32
Fraser Shipyards, Inc.....	33
Manpower.....	33
Material Shortages.....	34
Shipyard Pollution Abatement.....	35
Ship Repair Facilities.....	36
Major Drydocking Facilities.....	38
Major Topside Repair Facilities.....	38
Exhibit 1 Shipbuilding Industry in United States.....	40
Exhibit 2 Bath Iron Works - Yard Plan .....	41
Exhibit 3 Bethlehem, Sparrows Point - Yard Plan .....	42
Exhibit 4 General Dynamics, Quincy - Yard Plan .....	43
Exhibit 5 Maryland Shipbuilding - Yard Plan .....	44
Exhibit 6 Newport News Shipbuilding - Yard Plan .....	45
Exhibit 7 Seatrain Shipbuilding - Yard Plan .....	46
Exhibit 8 Sun Ship - Yard Plan .....	47
Exhibit 9 Alabama Dry Dock - Yard Plan .....	48
Exhibit 10 Avondale Shipyards - Yard Plan .....	49
Exhibit 11 Bethlehem, Beaumont - Yard Plan .....	50
Exhibit 12 Galveston Shipbuilding - Yard Plan .....	51

e  
.  
)  
)  
1  
2  
3  
3  
4  
5  
6  
8  
8  
0  
1  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21

	<u>Page</u>
Exhibit 13 Ingalls/Litton (East Bank) - Yard Plan .....	52
Exhibit 14 Ingalls/Litton (West Bank) - Yard Plan .....	53
Exhibit 15 Levingston Shipbuilding - Yard Plan .....	54
Exhibit 16 Marathon, Gulf Marine Division - Yard Plan .....	55
Exhibit 17 Tampa Ship Repair - Yard Plan .....	56
Exhibit 18 Bethlehem, San Francisco - Yard Plan .....	57
Exhibit 19 FMC Corporation - Yard Plan .....	58
Exhibit 20 Lockheed (Plant 1) Yard Plan.....	59
Exhibit 21 Lockheed (Plant 2) - Yard Plan .....	60
Exhibit 22 National Steel - Yard Plan .....	61
Exhibit 23 Todd, Los Angeles - Yard Plan .....	62
Exhibit 24 Todd, Seattle - Yard Plan .....	63
Exhibit 25 Triple "A", Hunters Point - Yard Plan .....	64
Exhibit 26 American Ship, Lorain - Yard Plan .....	65
Exhibit 27 American Ship, Todedo - Yard Plan .....	66
Exhibit 28 Bay Shipbuilding - Yard Plan .....	67
Exhibit 29 Fraser Shipyards - Yard Plan .....	68
Exhibit 30 Shipbuilding Program (Title V).....	69
Exhibit 31 Ship Financing Guarantee Construction..... Program (Title XI)	70
Exhibit 32 Major U.S. Private Shipyards - Number of Shipways..... by Maximum Length Capability	71
Exhibit 33 Shipyard Status - Need for New Business.....	72
Exhibit 34 U.S. Shipyard Employment.....	73

	<u>Page</u>
Table I Ship Construction Capability by Ship Type.....	74
Table II Major U.S. Private Shipyards - Number of Shipbuilding Ways by Length.....	86
Appendix A Standard Form 17 - Facilities Available..... for the Construction or Repair of Ships	89
Appendix B Major U.S. Shipbuilding and Repair Facilities.....	98
Appendix C Major Topside Repair Facilities.....	109

## Introduction

ge  
4  
36  
39  
In compliance with the requirements of Merchant Marine Act of 1936, as amended, 1/ the Office of Ship Construction conducts an annual survey to obtain information from the shipbuilding and ship repair industry that is used primarily to determine if an adequate mobilization base exists for purposes of national defense and for use in a national emergency. This report on the 1977 survey of U.S. shipyard facilities was prepared by the Division of Production, Office of Ship Construction, and is for general use within the Maritime Administration (MarAd) and other Government agencies.

98  
09  
The statistical data accumulated by the survey is a major input into the Shipyard Production and Mobilization Model (SPAMM), a quantitative assessment of the nation's ship construction and ship repair capability. This capability is periodically compared with Department of Defense scenarios involving various contingency attrition rates and emergency civilian shipping requirements to determine the adequacy of the shipbuilding mobilization base, including ship repair and

---

### 1/ Section 210

"It shall be the duty of the Secretary of Commerce to make a survey of the American merchant marine, as it now exists, to determine what additions and replacements are required to carry forward the national policy declared in Section 101 of this Act, and the Secretary of Commerce is directed to study, perfect, and adopt a long-range program for replacements and additions to the American merchant marine so that as soon as practicable the following objectives may be accomplished: ... Fourth, the creation and maintenance of efficient shipyards and repair capacity in the United States with adequate numbers of skilled personnel to provide an adequate mobilization base."

### Section 211

"The Secretary of Commerce is authorized and directed to investigate, determine, and keep current records of . . . (g) The number, location, and efficiency of the shipyards existing on the date of the enactment of this Act or thereafter built in the United States."

### Section 502(f)

"The Secretary of Commerce, with the advice of and in coordination with the Secretary of the Navy, shall, at least once each year, as required for purposes of the Act, survey the existing privately owned shipyards capable of merchant ship construction, or review available data on such shipyards if deemed adequate, to determine whether their capabilities for merchant ship construction, including facilities and skilled personnel, provide an adequate mobilization base at strategic points for purposes of national defense and national emergency."

reactivation of the Maritime Administration reserve fleet and the U.S. Navy reserve fleet.

The survey also provides a data base that is used to evaluate the feasibility of proposed shipbuilding programs. Determinations are made as to which existing shipyards might construct proposed ships consistent with ship size and delivery date requirements. The need for construction of new facilities to meet the demands of proposed shipbuilding programs can also be identified. The data gathered by the annual survey is also used extensively in MarAd responses to queries received from a variety of interests, including members of Congress, the Secretary of Commerce, the Department of Defense, and the Office of Management and Budget.

Each year in late spring, Standard Form 17, "Facilities Available for the Construction or Repair of Ships," is mailed to approximately 220 American shipyards and ship repair facilities. The survey form was developed jointly by MarAd and the Navy. A completed Form 17 represents a detailed description of a shipbuilding or ship repair facility. The information requested, and available for official use, can be reviewed on a blank Form 17, shown herein as Appendix A. Beginning with the 1976 survey, a graving drydock characteristics summary and a floating drydock characteristics summary were appended to Standard Form 17 to better identify the facilities characteristics.

Upon receipt of completed Form 17 from industry, MarAd forwards a copy to the Office of the Coordinator for Ship Repair and Conversion which maintains appropriate records of available facilities and capacities of various shipyards and repair plants to enable the Department of Commerce and the Department of Defense to use such facilities to the best advantage. Form 17 also serves as a primary data input to the Industry Evaluation Board Summary Analysis conducted by the Bureau of Domestic Commerce in cooperation with MarAd. The Federal Preparedness Agency in the General Services Administration is also a recipient of this information.

### General

The annual shipyard survey of 1977 has been completed, and the information collected has been organized and condensed in the following narrative, exhibits, and tabulations to focus attention on those elements that are most often requested from this office. Appendix B is an especially valuable statistical abstract of data gathered from those companies responding to the annual survey. It lists the nation's major shipbuilding and ship repair and drydocking yards sorted on a coastal basis. Information is displayed pertaining to the size and type of each building position, drydock, and berth space, employment, and remarks regarding yard activities.



MarAd has examined drydock data submitted by shipyards in the 1977 survey. In preparing Appendix B, the following criteria were developed in order to establish the nominal maximum ship size that could be accommodated in each drydock:

For floating drydocks, the maximum ship length is as given by the shipyard. The maximum width was determined by allowing a 2-foot clearance at each side between the ship and the wing wall.

For graving docks, the maximum ship length was determined by allowing a 2-foot clearance at each end between the ship and the inside of the dock at the floor. The maximum width was determined by allowing a 2-foot clearance on each side between the ship and each side of the dock entrance at the sill.

It is recognized that there are several types of floating drydocks and graving docks, and that under certain circumstances additional clearance would be necessary between the ship and the dock body. Permissible ship sizes requiring additional clearance may be determined by simple calculation from the above criteria.

#### Major Shipbuilding Facilities

A major shipyard is defined for purposes of this report as one having at least one building position, either an inclined way, a side-launching platform or a building basin, with the capability to accommodate a minimum ship size of 475 feet length overall (LOA) and a beam of 68 feet. These dimensions represent the smallest ship size that would be considered for mass production during a mobilization period. There are presently 26 shipyards in this category, which are identified and geographically located in Exhibit 1.

Despite the drastic decline in the shipbuilding market and the continuing uncertainties in the industry, U.S. shipyards plan to spend approximately \$167 million for improvement of facilities during fiscal year 1978. Since enactment of the Merchant Marine Act of 1970, the U.S. shipbuilding industry has expended \$1.3 billion in capital improvements for new building basins, new floating drydocks, cranes of unprecedented lifting capacity, plus a wide range of new or modernized shops and facilities. Emphasis has been on prefabrication of large subassemblies and preoutfitting of components using modular techniques. Exhibits 2 through 29 are general arrangement plans outlining shipbuilding and repair facilities in 26 of the major yards. Detailed descriptions of these exhibits are included in this report.

As of July 1, 1977 (see Exhibit 30), MarAd was subsidizing a construction backlog of 28 large oceangoing ships in nine shipyards, with a total contract value of \$1.9 billion. These were in addition to 37 non-subsidized ships under construction or on order. MarAd was also providing mortgage guarantee insurance for 514 vessels under contract in 37 construction facilities throughout the country (see Exhibit 31). The total Title XI guarantee value of these vessels and barges is approximately \$2.1 billion.

Table I has been prepared to satisfy the frequent question as to how many building positions are available to build a specified ship. 1/ A single shipway or basin may have several building positions depending on the size of the ships being constructed. For example, the 1,200-foot by 192-foot basin at Bethlehem's Sparrows Point shipyard can accommodate one 265,000-dwt. tanker or four of the smaller mobilization ships. The ship types listed, with the exception of the mobilization ships, are those presently under construction or recently delivered to commercial service. The number of building positions varies from 121 for the small mobilization ship to two for the huge 390,770 dwt. tanker. Length overall and beam are given for all ships and, in addition, deadweight tonnage is indicated for the bulk carriers. An important consideration that is ignored in Table I is the common shipbuilding practice of laying a keel on a building position already occupied by another ship. For example, in a 700-foot basin a complete 610-foot containership and the stern section of a second ship could be constructed simultaneously. This production procedure, analyzed periodically by SPAMM, maximizes the use of shipbuilding facilities, minimizes the construction period, and increases the number of ships that can be produced in a given period of time.

Table II is a somewhat different presentation of the data, meaningful to many requesting information from the annual survey. In lieu of actual ships, maximum ship length is used to determine the number of shipways or basins available. In this tabulation, the emphasis is on the number of individual facilities available and not on the number of ships that can be constructed. Again using Sparrows Point as an example, Table II lists the 1,200-foot by 192-foot basin as one facility regardless of what type of ship is constructed in it. Table I indicates that there are six building positions for a ship 475 feet LOA at Sparrows Point, whereas Table II indicates that the yard has three individual shipways capable of constructing a ship 475 feet in length. Exhibit 32 is a histogram displaying the reduction in the number of available shipways as the maximum ship length increases.

---

1/ The usual accompanying questions to this query, e.g., when the ships can be delivered and what effect a new proposal will have on the existing program or work under contract, can be answered from SPAMM output.

There is sufficient U.S. shipyard capacity to handle merchant shipbuilding requirements in the near future. Exhibit 33 indicates when each of the major commercial yards needed new contracts as of mid-1977 in order to utilize facilities and to maintain current rates of employment. Estimates on need for new business are determined by the Maritime Administration based on methodologies developed for the Shipyard Production and Mobilization Model (SPAMM). Many of these yards presently have building facilities available to expand employment levels if new contracts can be secured.

Following is a brief description of major U.S. commercial shipyards capable of constructing oceangoing or Great Lakes merchant ships, with a minimum size of 475 feet by 68 feet.

1. Bath Iron Works Corporation

Bath Iron Works Corporation, a subsidiary of Congoleum Corporation, is located on the Kennebec River in Bath, Me. The small iron foundry which was established on this site in 1826 became Bath Iron Works, Ltd. in 1884, and the first shipbuilding began in 1889. This experienced shipyard has engaged in both Navy and commercial ship construction, as well as Navy overhaul and repair work. The yard has a history of proven diversity, having constructed various types of ships including containerships, tankers, destroyers, and guided-missile frigates. Bath has built a total of 153 destroyers for the Navy. In the late 1960's and early 1970's, six containerships were delivered to American Export Lines; and in 1975, the yard completed a series of five 25,000-dwt. "handy-size" tankers. In June 1977, the company delivered the last of four large sophisticated roll-on/roll-off cargo liners (MA Design C7-S-95a) for States Steamship Company.

Commercial ships currently under contract are a 26,600-dwt. containership for Matson Navigation Company and two 14,600-dwt. containerships (MA Design C5-S-73b) for American Export Lines. Bath Iron Works is the lead shipbuilder for the Navy's Guided-Missile Frigate (FFG-7 Class) program. The lead ship, the USS OLIVER HAZARD PERRY, is under construction at Bath; and the Navy has awarded the company follow-on contracts for the construction of eight additional FFG-7 Class guided-missile frigates, the last of which is scheduled for delivery in 1982. The yard is also currently engaged in the major overhaul of the fast frigates BRUMBY, BEARY, and BROWN.

In 1974, Bath completed a major expansion and modernization program. The upgrading of facilities included the reconstruction of two shipways to accommodate ships of 700 feet in length between perpendiculars (LBP) with a maximum beam of 130 feet, or two ships per way with a beam of 54 feet each; the installation of a 220-ton level luffing crane with sufficient outreach to erect units on all shipways; and new steel fabrication shops and equipment that have increased steel throughput capacity by 50 percent.

With the purchase of a 5-unit, 9,600-ton floating drydock from General Dynamics in 1976, BIW's management decided that overhaul and repair work would no longer be just a stop-gap alternative to fill the production lulls in new ship construction. A fully-staffed Overhaul Division has been established to manage the yard's expansion into this field.

In addition to the two building positions recently upgraded, Bath operates one other shipway that can accommodate a ship 650 feet in length with a beam of 88 feet. Besides the new floating drydock that can handle ships up to 500 feet by 81 feet, there is also a special partial drydock used exclusively for the installation and repair of sonar domes.

Two wharves and a pier provide a total of 2,200 linear feet for outfitting and repair work. One wharf is serviced by two 25-ton rotating cranes, and the other wharf by one 25-ton rotating crane. The pier is serviced by a 94-ton rotating crane.

BIW operates a supporting facility, the Hardings plant, located three miles from the shipyard, where the initial steel fabrication takes place. At this plant, steel is blasted and sprayed, cut, straightened or shaped. The steel is then transported to Bath by truck or rail where it is joined together into subassemblies for final erection at the shipway. The yard is not considered to be automated although some numerically-controlled burning is employed.

At mid-1977, the administrative and production work force totaled 3,340, approximately the same as a year earlier.

Exhibit 2 is a current plot plan of the Bath Iron Works facilities.

## 2. Bethlehem Steel Corporation - Sparrows Point Yard

Sparrows Point, the largest of Bethlehem Steel's seven shipyards, is located on the Patapsco River in the Baltimore, Md. metropolitan area. Established in 1891, the yard became part of the Bethlehem organization in 1916 and served as a major shipbuilder during two world wars. During World War II, Sparrows Point constructed 101 vessels of 16 different classes. During the 1950's and 1960's, it was among the most active yards in the nation, specializing in series construction of standard sizes of Bethlehem-designed tankers, as well as freighters and containerships. Sparrows Point is primarily a ship-building yard, and its building basin, the second largest in the nation, and support facilities are capable of constructing oil tankers of sizes up to about 300,000 dwt.

In November of this year, the yard completed the last of five 265,000-dwt. crude carriers (MA Design T10-S-101b) contracted for in 1972 and 1973. The first of these 1,100-foot VLCC's, the MASSACHUSETTS, was delivered in 1975. The NEW YORK and MARYLAND were completed in 1976, and the AMERICAN SPIRIT and AMERICAN INDEPENDENCE were completed in 1977.

Sparrows Point currently has under construction two 27,340-dwt. container/unitized cargo ships (MA Design C8-S-85d) for Farrell Lines, and an auxiliary repair drydock for the U.S. Navy.

To provide the capability for construction of VLCC's, millions of dollars were invested in facilities improvement: establishing new production and materials-handling methods, installing new and sophisticated systems and equipment, and developing new design concepts and engineering techniques. The major components of this program, which was completed in 1974, are the new building basin for construction of ships as large as 1,200 feet by 192 feet and a 68,000-square-foot panel shop for fabrication of steel. This fabrication shop is capable of constructing panels up to 60 feet square, 4 feet in depth, and weighing up to 200 tons. Other improvements include the structural strengthening of pier No. 1 to accommodate VLCC's, a numerically-controlled gas plate-cutting machine and automated plate and shape blasting-painting equipment.

Complementing the large basin, Sparrows Point has two active building ways which can accommodate a maximum ship size of 900 feet by 108 feet. One of these ways is being used temporarily as a platen area. Two smaller sliding ways are presently being used as platen areas and would require extensive refurbishing to reactivate. The yard does not have drydocking facilities except for the building basin which is currently used for construction work. Four outfitting berths are available with a combined length of 3,970 linear feet of space serviced by four tower cranes ranging in capacity from 30 to 50 tons. Several locomotive cranes of various capacities are also available.

The total work force at the Sparrows Point yard was 3,225 at mid-1977, down about 800 compared to mid-1976.

Exhibit 3 is a current plot plan showing the company's construction facilities.

### 3. General Dynamics Corporation - Quincy Shipbuilding Division

The Quincy Shipbuilding Division of General Dynamics Corporation is located on the Fore River in Quincy, Mass. This 180-acre shipyard,

which was purchased from Bethlehem Steel Corporation in 1964, delivered 18 ships to the Navy from 1964 to 1973. These included four nuclear submarines, two ammunition ships, six replenishment oilers, two submarine tenders, and four dock landing ships. In 1973, the last of three revolutionary barge-carrying ships (MA Design C8-S-82a) built for Lykes Bros., was completed.

In June 1977, the Quincy yard delivered the LNG AQUARIUS (MA Design LG8-S-102a), the first liquefied natural gas (LNG) carrier built from the keel up in the United States. There are nine more of these 125,000-cubic-meter LNG's in various stages of construction and planning. The intended production rate for these 936-foot-long vessels is four ships per year.

To provide the tools and facilities to efficiently build these LNG tankers in series production, General Dynamics in 1975 completed a major improvement and modernization program. In addition to the conversion of two conventional sliding ways to large building basins, other improvements at Quincy included: a steel fabrication facility, materials-handling equipment, a 200-ton transporter, a plate cleaning and blasting facility, a double-bed flame planer, a double-bed flat bar stripper, a web cutter with 19 torches in tandem, an angle fabricator, two web stiffener welding gantries, a T-beam fabricator, two plate stiffeners, a butt welding gantry, a panel turnover fixture, and two 40-ton cranes. In addition, a 1,200-ton Goliath crane, the largest gantry in the Western Hemisphere, was installed for transferring the 120-foot-diameter spherical LNG tanks from the barge on which they are delivered one at a time to the LNG ships under construction.

The company in 1975 also expended several millions of dollars for tools, machinery and buildings at its newly-acquired Charleston, S.C. facility for fabrication of the 800-ton spherical aluminum tanks for the LNG's at Quincy.

Especially noteworthy is the ingenious construction schedule for the LNG's. Shipways No. 11 and No. 12 have been demolished and new Basins No. 11 and 12 erected to accommodate ships up to 860 feet in length and 144 feet in beam. Since the LNG's are 936 feet LOA, hull erection in Basins No. 11 and No. 12 will exclude the bow. Following float-out from No. 11 or No. 12, the ships will be floated into Basin No. 7 for bow erection and sphere installation. Basin No. 7 can accommodate a maximum ship size of 936 feet by 143 feet. The 900-ton bow units of the LNG's will be constructed at the inboard end of Basin No. 6 and will be lifted by the 1,200-ton Goliath crane over into No. 7 where they will be attached to the hull. The spheres will be barged into the outboard end of No. 6 and lifted into No. 7 for installation. Basin No. 8, presently not in use, and Basin No. 6 can accommodate ships 860 feet LOA and 123 feet in beam.

ed  
ret  
es  
This yard also has extensive capability to do topside and inboard repair work. Four piers and a wet basin are available with a total dockside accessibility of 4,600 linear feet. Each pier and the wet basin are serviced by adequate crane capacity for outfitting and general repair work. The building basins can also be used as drydocks for repair work when not in use for new construction or conversion.

Employment at Quincy has increased from 4,800 at mid-1976 to 5,080 at mid-1977. Total labor force is about 700 at the General Dynamics plant near Charleston, S.C., which is producing the spherical aluminum tanks for the LNG ships.

Exhibit 4 is a current plant layout of the Quincy Shipbuilding Division.

#### 4. Maryland Shipbuilding & Drydock Company

Maryland Shipbuilding & Drydock Company, a subsidiary of Fruehauf Corporation, is located on the south bank of the Patapsco River in Baltimore, Md. Although primarily a repair and conversion yard in recent years, Maryland built the following vessels in the 1960's: two containerships, one oceanographic research vessel, one hydrofoil, and two 195-foot trawler/factory ships, which are the first stern ramp fish-processing trawlers to be built in the United States. The company's Industrial Products Division engages in non-marine work such as (1) the design, manufacture and installation of large steam surface condensers for the utility industry; (2) general machine repairs to pumps, turbines, and other industrial machinery; and (3) heavy structural steel fabrications.

An unusual newbuilding job, completed in August 1976 for Bulk Food Carriers, was the 626-foot-long VALERIE F, the cargo-carrying unit of an integrated tug/barge. The tug was built by Southern Shipbuilding Corporation.

At mid-1977, the Baltimore yard had a \$20 million backlog, comprised of long-term Navy repair and overhaul, commercial ship repair, and the design and manufacture of industrial condensers.

Maryland is completing the final phase of a major modernization and expansion program, the main features of which are:

- Installation of a new floating drydock 827 feet long by 150 feet between wing walls with a lifting capacity of 36,000 long tons. This dock, which can handle ships up to about 125,000 dwt., will be used for launching newly constructed vessels, as well as for ship repair and conversion work;

- Lengthening of the yard's one building way to permit construction of ships up to 850 feet by 110 feet, compared to the previous maximum of 630 feet by 96 feet;
- Modernization of the panel fabrication system;
- Automatic pre-blast equipment and a new building for blasting and painting, and a totally enclosed final-blast building; and
- Computer lofting and a new tape-controlled, automatic burning machine.

In addition to the new floating drydock, Maryland operates two other floating drydocks, primarily for repair and conversion work. The maximum ship sizes that the older drydocks can accommodate are 775 feet by 110 feet and 715 feet by 91 feet. There are 5,650 feet of pier-side berthing available for topside and inboard repair. Each pier and drydock is served by adequate crane capacity.

The total administrative and production work force at mid-1977 was approximately 1,600, up from 1,150 in July 1976.

Exhibit 5 is a current plot plan of Maryland's facilities.

#### 5. Newport News Shipbuilding & Dry Dock Company

Newport News Shipbuilding & Dry Dock Company, located on the historic James River in Newport News, Va., is the largest shipbuilding complex in the world. The company, founded in 1886, is a subsidiary of Tenneco, Inc. Newport News has built 21 aircraft carriers, more than 20 nuclear-powered submarines, and about 120 other surface ships for the U.S. Navy. Commercial vessels delivered by the yard include 71 cargo ships, 81 tankers, 63 passenger ships (most notably the famed superliner UNITED STATES), and more than 50 other vessels.

Newport News is the nation's foremost builder of Navy nuclear warships. The yard, as of October 1, 1977, was at work on 14 nuclear-powered ships for the U.S. Navy - one aircraft carrier, two guided missile cruisers, and 11 attack submarines. These ships are under construction in the old 260-acre South yard which also handles overhauls and repair.

Commercial shipbuilding is now carried out in the entirely new multimillion-dollar North yard, in which six ships are currently in production - three 125,000-cubic-meter liquefied natural gas (LNG) carriers (MA Design LG9-S-94a) and three 390,770-dwt. ultra large crude carriers (ULCC's) (MA Design T11-S-116a), the largest commercial ships ever ordered in the United States.



The new commercial yard, completed in early 1977, is adjacent to the existing South yard on 150 acres of land reclaimed from the James River. The new facility was designed for high productivity and flexibility, with the capacity to handle large components from fabricating areas to final erection. Data storage and retrieval systems control material storage and work flow. The new building basin, the largest in the nation, is 1,600 feet long, 250 feet wide and 44 feet deep. In this graving dock, one ULCC or large LNG and part of a second can be built simultaneously. The new all-weather steel production plant, which includes automated panel lines and supporting equipment, has an annual steel capacity of 200,000 tons. A 900-ton, 23-story Goliath gantry crane, one of the largest in the world, can handle complete subassemblies. This crane services the new graving dock and the 8-acre final assembly platen and has a height of 234 feet overall, a girder clearance of 200 feet and a span between rail centers of 540 feet. The new North yard has one 1,670-foot outfitting berth and one 1,000-foot mooring berth.

Newport News is well into a major expansion of its South yard facilities, scheduled for completion in 1985, to almost double the company's present capacity for repair and modification of commercial vessels. The program involves construction of a new floating dry-dock (or possibly enlarging one of the existing graving docks), rebuilding and extending several piers, and installation of larger capacity cranes.

Currently, all ship construction for the Navy is taking place in the old South yard. Annual steel capacity in the South yard is about 100,000 tons. Major production facilities are a 6½-acre fabrication shop, three foundries, a machine shop complex and outfitting shops. Testing laboratories, a computer center, and a 106,000-square-foot automated material storage facility support yard operations. Newport News has one of the largest foundry capabilities in the United States.

The Newport News South yard has five inclined shipways, two of which can accommodate a maximum ship size of 940 feet by 125 feet, two a ship size of 715 feet by 93 feet, and one a ship size of 447 feet by 93 feet. This last building way can be extended to handle ships of about 649 feet in length. There are also two building basins that can accommodate ships up to 1,100 feet by 136 feet and 960 feet by 124 feet, serviced by a 310-ton gantry crane. In addition, the South yard has three graving docks that can be used for new construction, repair, or conversion. The largest of these can accommodate a maximum ship size of 862 feet by 114 feet. Nine piers for outfitting and topside repair are available with a combined berthing space of approximately 12,400 linear feet. These piers are serviced by cranes with capacities of up to 140 tons and are supplemented by locomotive cranes and floating derricks with capacities of up to 65 tons.

At mid-1977, the total labor force at Newport News was 26,000, compared to 23,600 a year earlier.

Exhibit 6 is a current general arrangement drawing showing major facilities in both the South yard and the new North yard.

6. Seatrain Shipbuilding Corporation

In 1969, Seatrain Shipbuilding Corporation, a subsidiary of Seatrain Lines, Inc., leased the principal facilities of the former Brooklyn Navy Yard, in Brooklyn, N.Y., to build 225,000-dwt. tankers on an assembly-line basis. Construction contracts were signed for five of these VLCC's (MA Design T10-S-92a), and the first, the BROOKLYN, was delivered in 1973. The second ship, the WILLIAMSBURGH, was completed in 1974.

In 1975, the company fell victim to soaring construction costs under fixed-priced contracts and the worldwide depression in the shipping market for large tankers. The contract for one of the five 225,000-dwt. crude carriers was cancelled, and construction was halted on the two tankers under construction. The future of the Brooklyn yard looked grim. The yard closed down completely for seven months during 1975. At this point, the Economic Development Administration (EDA) agreed to guarantee a \$40 million working capital loan from two major banks; and as a result, the yard reopened and resumed work on the two VLCC's. Specially fitted out for its role in the production of massive sections for supertankers, Seatrain proved its flexibility by employing its huge steelwork capability in the construction of a large orderbook of barges for which the yard is ideally suited. In September 1977, the third Seatrain VLCC, the STUYVESANT, was delivered.

As of October 1, 1977, Seatrain's new construction backlog consisted of the following vessels: one 225,000-dwt. crude carrier, the BAY RIDGE; 530-foot barge units for two integrated tug-barge RO/RO vessels (MA Design IB5-MT-121a) for Transway International Corporation; two large oceangoing barges for Union Carbide; and one effluent power plant barge for Consolidated Edison. Early this year, the yard was awarded a \$35 million contract from Union Carbide to rebuild the burned out hulk of the 14,600-dwt. containership SEA WITCH into a chemical carrier.

Although the facilities that existed in 1969 included three large fabricating buildings and two massive graving docks to accommodate a maximum ship size of 1,094 feet by 143 feet, Seatrain has expended several million dollars on facility improvements and modernization. Automation, including AUTOKON 71, is widely used by the yard in steel processing.

Steel handling in this yard is exceptionally efficient and is designed to ensure that substantially all work, except the actual hull erection in the graving dock, is performed indoors in temperature-controlled, protected areas. Raw steel is pre-processed in the plate preparation building where it is shotblasted, coated, and precision cut with automated, numerically-controlled cutting machines. The plate is then transferred to either the flat or curved panel building for fabrication. In the flat panel building, automatic welding machines are used to make up rectangular modules with a maximum weight of 200 tons. Bow and stern shell modules are fabricated in the curved panel building where bending rolls are capable of curving 2-inch plate into cylindrical shapes up to 30 feet in length. The modules are then painted in a temperature-controlled, sheltered building equipped with high volume fans and filters to provide a safe, non-toxic environment for workers. The modules are moved on 200-ton transporters to the graving docks.

A smaller graving dock has been reactivated and has been used for barge construction, bottom painting, and repair work. This dock can accommodate a maximum ship size of 720 feet LOA and 112 feet in beam.

Seatrain Shipbuilding is expanding its operations to include repair, conversion, and overhaul of oceangoing ships. In 1977, the company leased an additional 1,400 feet of berthing space at the former Brooklyn Navy Yard. This is in addition to about 3,190 feet of usable pier space already available. The yard has four 200-ton cranes and also smaller cranes.

Employment at mid-1977 totaled 1,790, substantially the same as a year earlier.

Exhibit 7 is a current general arrangement plan of Seatrain's building basins, piers and shops.

#### 7. Sun Shipbuilding & Dry Dock Company

Sun Ship, located in Chester, Pa., is a complete shipbuilding and manufacturing complex encompassing nearly 200 acres bordering on the Delaware River. In its 60 years of operation, the yard has delivered more than 600 vessels, mainly commercial ships. In recent years, Sun has concentrated on roll-on/roll-off ships and medium-sized tankers of its own design. In addition to its shipbuilding, conversion and repair activities, the company also engages in the manufacture of heavy industrial equipment including welded pressure vessels, plate work, machinery, and oil refinery and chemical works equipment.

In 1977, the yard delivered the WESTWARD VENTURE, a 790-foot-long trailership, and the TONSINA, a large Sun-designed, double-hull "ecology" class crude carrier. Contracts currently underway at Sun Ship consist of a sistership of the TONSINA and two 130,000-cubic-meter LNG's, the last of which is tentatively scheduled for completion in 1982.

In 1976, Sun completed the final phase of a major capital improvement program which enhanced the shipyard's ability to fabricate the larger, more sophisticated ships which are expected to be part of the coming generation of commercial vessels. This expansion and modernization program has provided Sun Ship with a new level "shipbuilding platform", a two-section floating drydock capable of lifting 75,000 long tons, an 1,100-foot outfitting pier, a new plate burning shop, and other shipbuilding support facilities. On the new level shipbuilding slab, which is served by two 250-ton gantry cranes and three 75-ton gantry cranes, two halves of a ship as large as 1,400 feet by 195 feet can be constructed, or two smaller vessels 700 feet in length or less can be built simultaneously. For launching, each half of a large ship is rolled individually to sections of the new drydock and then welded together in the river. The ship is brought to the pier for outfitting completion. Sun's new drydock, which is capable of handling vessels up to 400,000 dwt., is one of the world's largest floating drydocks. It is serviced by two 25-ton gantry cranes, two 10-ton gantry cranes, a 25-ton truck crane, and an 800-ton barge crane.

In addition to the new shipbuilding platform, the company operates two active conventional sliding ways that can handle ships as large as 745 feet by 129 feet. The yard has a total of 3,900 feet of usable berthing space with modern pierside facilities. Sun's 800-ton barge crane is used for both construction and major repair work. Its heaviest lift to date has been a completely outfitted deckhouse weighing 785 tons.

The shipyard's total work force at mid-1977 was 4,480, an increase of 780 over a year earlier.

Exhibit 8 is a current layout of plant and facilities at Sun Ship.

#### 8. Alabama Dry Dock and Shipbuilding Company

Alabama Dry Dock and Shipbuilding Company (ADDSCO) is located approximately 30 miles from the Gulf of Mexico on Mobile Bay. The yard is situated on Pinto Island across the river from the city of Mobile, Ala. Although this shipyard constructed 102 tankers and 20 cargo vessels during World War II, it has since been predominantly a repair and conversion facility. During the past year, the company continued its facility improvements, mainly the upgrading and modernizing of existing drydocks, piers, shops, and equipment.

In 1977, ADDSCO completed a semi-submersible drilling rig for Diamond M Drilling Company and a large semi-submersible pipe-laying barge for service in the North Sea. However, as of September 1 of this year, the company had no other firm construction contracts. In addition to repair work, the yard was engaged in the jumboizing of a T2 tanker.

The shipyard has three side-launching shipways, each of which can accommodate a maximum ship size of 523 feet by 68 feet, and one sliding way which can handle vessels as large as 620 feet by 90 feet. All of these ways are too small to construct today's mammoth ships. ADDSCO also operates three floating drydocks that can handle ship sizes of 750 feet by 100 feet, 620 feet by 83 feet, and 380 feet by 70 feet. There is also 9,370 feet of berthing space available at seven finger piers for topside and inboard repairs. There are 19 revolving gantry cranes with capacities varying from 12 tons to 65 tons available to service the shipways and berthing areas. A 275-ton Goliath bridge crane, which straddles the slip between piers K and L, is used for repair work and for outfitting drill rigs.

ADDSCO, as of mid-1977, employed a labor force of 3,430, down about 300 from the previous year.

Exhibit 9 is a current general arrangement plan of the yard's facilities.

9. Avondale Shipyards, Inc.

Avondale Shipyards, a subsidiary of Ogden Corporation, is located on the west bank of the Mississippi River approximately nine miles upstream of New Orleans, La. Avondale has developed into one of the largest and most diversified shipyards in the country. The yard has constructed dry cargo ships, tankers, Navy ships, Coast Guard cutters, offshore drilling rigs and drillships and has the distinction of being the only U.S. shipyard to have built LASH vessels. Twenty were delivered to various shipowners from 1970 to 1975.

Ships under construction or on order as of October 1, 1977 included three 125,000-cubic-meter LNG carriers (MA Design LG9-S-107a), six 164,000-dwt. tankers for Standard Oil Co. of Ohio and Exxon, and the jumboizing of one Farrell Lines containership (MA Design C8-S-85c). Also in production for CF Industries is a 22,500-dwt. bulk carrier barge, which when joined to the tug JAMIE A. BAXTER under construction at Peterson Builders, will be delivered in November 1977 as an integrated tug/barge unit. This fall, Avondale began construction on three 27,500-ton Navy fleet oilers (AO-177, AO-178 and AO-179).

In late 1975, Avondale completed a multimillion-dollar facilities improvement program primarily to "tool-up" for the construction of large LNG ships. The shipbuilding area previously used for series production of U.S. Navy destroyer escorts was restructured and expanded into two large positions to accommodate vessels of up to 1,050 feet in length by 174 feet in beam. The major part of one ship can be erected along with the stern section of a second ship on position No. 1 while a third hull is being finalized on position No. 2. As presently configured, the new floating drydock is 900 feet long, 260 feet wide and 78 feet high, with 220 feet clear width inside the wing walls. It can accommodate ships as large as 1,000 feet in length by 216 feet wide, and the lifting capacity is 81,000 long tons. The dock is serviced by gantry cranes of 60 and 200 tons capacity which are mounted on the supporting wharf, two 50-ton gantry cranes on the drydock floor, and a 600-ton floating lifting device. In addition to its use as a launching platform for new construction, this drydock has given the company the capability of performing a variety of conversion and major repair work. Additional buildings and equipment to supplement the yard's mechanized material-handling, fabrication and blasting/painting systems are also part of Avondale's recent expansion program.

Besides the new building positions for the LNG's, Avondale has a side-launching construction area that can accommodate ships as large as 1,200 feet by 126 feet with a light weight of approximately 16,000 long tons. Up to five large vessels, greater than 600 feet LOA, can be under construction simultaneously in this area.

A unique transfer method, whereby large sections of a ship, or entire ships, are moved horizontally to different building positions, is employed by Avondale. A ship might be situated and worked on in four different building positions between keel laying and launching. For relatively small vessels, e.g., destroyer escorts, the yard perfected a rotating jig to allow for the maximum use of down-hand welding of the hull. Modern construction methods and steel processing facilities have made Avondale one of this country's most productive shipyards. No U.S. shipbuilder has had more success with series production of commercial ships. The yard offers almost 3,600 feet of berthing space, serviced by 30-ton to 50-ton gantry cranes. Use of the 600-ton floating lifting device is available along the entire length of the berths.

Avondale's nearby Westwego, La., facility is capable of building vessels 600 feet long by 80 feet in beam. A floating drydock, 378 feet by 68 feet, with a lifting capacity of 3,800 long tons, is available at Westwego for repair of small ships, river boats and barges.

Yard employment has increased to 6,900 from 6,300 a year ago. However, the company could be forced to trim its work force beginning in the latter part of 1978 if it does not obtain a major new contract by the end of this year.

Exhibit 10 is a current arrangement plan of Avondale's main plant.

10. Bethlehem Steel Corporation - Beaumont Yard

This shipyard, located on the Neches River in Beaumont, Tex., was established in 1916 by Beaumont Shipbuilding and Drydock Company, which in addition to repair and conversion work, built C1-A cargo ships and Navy minesweepers during World War II. Bethlehem acquired the yard in 1947 and has pioneered in the design and production of mobile oil drilling rigs. The Beaumont plant has been one of Bethlehem's most successful operations and is one of the world leaders in production of offshore drilling rigs and drillships. It is also an experienced builder of ocean-going barges and is capable of producing large merchant ships.

Bethlehem-Beaumont is currently engaged mainly in work for the petrochemical industry. As of October 1, the yard's backlog of new construction consisted of two jack-up rigs and an offshore self-setting production-storage platform for Phillips Petroleum Company. In addition, a drillship, the GLOMAR SIRTE, is being converted to a tender.

The Beaumont facility is highly mechanized. In 1973, the company completed a multimillion-dollar modernization program, including a new panel line and new materials-handling facilities. Bethlehem-Beaumont has one side-launching way that can accommodate ships up to approximately 842 feet by 96 feet, with a lifting capacity of 15,370 long tons. The yard also has a smaller side-launching way which is used for barge and module construction. One floating drydock is available which can handle vessels as large as 650 feet by 84 feet. The Beaumont plant has 4,050 feet of berthing space served by adequate crane capacity for outfitting and general repair work.

Employment at Bethlehem-Beaumont was 1,240 at mid-1977, down from 1,320 a year earlier.

Exhibit 11 is a current layout of the plant and facilities.

11. Galveston Shipbuilding Company

Galveston Shipbuilding Company, formerly a division of Kelso Marine, Inc., covers 25 acres of waterfront on Galveston Island's bay side adjacent to the Intra-Coastal Canal in Galveston, Tex. The yard began operations in 1966 and has been primarily a builder of barges and tugs, although it has the capability of building tankers up to about 35,000 dwt.

In 1974, the shipyard completed construction of a 35,000-dwt. integrated tug/barge (ITB) for Seabulk Tankers, Ltd., and in early 1977, delivered a 40,000-dwt. catamaran tug/barge unit to Hvide Shipping, Inc., for the U.S. coastal trade. In 1976, the company began construction of two 469-foot chemical tank barges which will provide work until the first quarter of 1978.

Galveston Shipbuilding has one building way (side launching) on which oceangoing ships can be built, the maximum vessel size being about 700 feet by 120 feet. A present limitation is that, except at the launch site where the water is approximately 20 feet deep, the water depth on the way to the channel is only about 12 feet. However, by means of pontoons (sectional barges fitted together), a vessel with up to an 18-foot draft could be floated out to Galveston harbor. Launching weights of hulls are kept as low as possible with final installation of equipment done at the Galveston municipal pier. Since the yard is not geared to major machinery installation work, machinery is installed by a subcontractor.

In addition to its large side-launch way, Galveston Shipbuilding has a smaller shipway served by an 800-ton syncrolift. In the absence of a drydock, arrangements must be made to drydock large vessels at Todd-Galveston or Levingston Shipbuilding Company. Since the former Kelso yard does not have an outfitting berth, outfitting is done at the municipal pier in Galveston.

In mid-1977, Galveston Shipbuilding Company's total work force was 280, down from about 400 in 1976.

Exhibit 12 is a current general arrangement drawing of the yard's ship construction facilities.

## 12. Ingalls Shipbuilding Division/Litton Industries

The Ingalls Shipbuilding Division, a wholly owned subsidiary of Litton Industries, Inc., is actually two separate shipyards. Located on the Gulf of Mexico at Pascagoula, Miss., Ingalls is a diversified shipbuilding complex experienced in the construction, conversion and overhaul of commercial ships and Navy combatants and auxiliaries. In addition, the yard participates in ship systems analysis and design, operational effectiveness analysis, logistic system analysis, and ship design concepts.

As of October 1, 1977, the backlog of work at the Pascagoula shipyard consisted of three LHA amphibious assault ships and 22 Spruance-class (DD-963) destroyers. No commercial vessels are currently on order.



The older of the two yards is referred to as the East Bank yard. It has been in operation for 39 years, engaging primarily in new construction of commercial cargo ships and tankers, and in January 1974, completed a series of highly productive containerships. The yard has six inclined shipways. Maximum ship sizes which can be accommodated are: four ways 650 feet by 90 feet, one way 690 feet by 85 feet, and one way 550 feet by 80 feet. The East Bank plant has one small graving dock which has been used for construction of nuclear-powered submarines but is currently being used mainly for repair work. A wharf and four piers serviced by cranes with a 50-ton maximum capacity provide a total of 3,700 feet of berthing space for outfitting and topside repair.

The ultramodern West Bank yard, completed in 1970, was designed and equipped for series production using modular construction methods. The yard is geared to assembly-line construction of large Navy and merchant ships. The West Bank yard does not have conventional inclined shipbuilding ways. Instead, fabricated steel and minor subassemblies are brought from the fabrication, panel and shell shops to the subassembly area where they are erected into major subassemblies, which in turn move to the module assembly area. These areas are divided into five bays, each of which can produce 225-foot-long, 6,000-ton modules. After modules are completed in the module assembly area, they are moved to the integration area where they are erected into a complete ship. The completed ship is then moved onto a launch pontoon which is subsequently floated and moved to a deep water area where it is sunk and the ship launched. The West Bank yard at the present time can launch a maximum ship size of 800 feet by 173 feet. It is estimated that the various assembly and subassembly areas are the equivalent of six conventional inclined ways in terms of the number of ships that could be delivered annually. Approximately 4,400 feet of berthing space, serviced by cranes varying from 25 tons to 200 tons, are available for outfitting.

Ingalls Shipbuilding Division at mid-1977 employed a total labor force of 24,900, a slight increase over a year earlier.

Exhibits 13 and 14 are current general arrangement plans of facilities in the Ingalls East Bank and West Bank yards.

13. Levingston Shipbuilding Company

Levingston, one of the leading producers of offshore drilling rigs, was founded in 1933. The 100-acre plant is strategically located on the Sabine River at Orange, Tex., approximately 30 miles inland from the Gulf of Mexico. Gulfport Shipbuilding, in Port Arthur, Tex., was purchased in 1970 by Levingston to supplement Levingston's construction and repair facilities. In 1975, Levingston became a wholly owned subsidiary of Ashland Oil, Inc.

Since the inception of offshore oil drilling, most of the company's work has been related to this industry, primarily in the construction and repair of offshore drilling rigs and related floating equipment. However, Levingston is not limited to serving the petrochemical industry. To date, the yard has built 65 drill barges, 25 tenders, nine drillships, nine jack-ups, and six semi-submersibles. Levingston has designed a sizeable portion of the rigs constructed in its shipyard.

During the first half of 1977, the company completed one jack-up rig for KS-Norway and a 450-foot drillship, the GLOMAR 40, for Global Marine, Inc. This vessel is the largest self-propelled ship of any design constructed in the history of Levingston, as well as the largest drillship ever built on the Gulf Coast. As of October 1, 1977, the company had in production a sistership of GLOMAR 40, a second jack-up rig for KS-Norway, a 10,000-dwt. tanker for Cleveland Tankers, and four inland drill barges for Tiger Oil Co.

An expansion and modernization program is presently underway at the Orange, Tex. yard. Some of the improvements incorporated in the program are a new panel shop, numerically-controlled cutting equipment, an automatic blasting and paint shop, a new subassembly construction area, and a new gantry crane.

Levingston operates one side-launch building way with a maximum ship size of 700 feet by 100 feet, on which oceangoing ships can be constructed. In addition, there is a small conventional shipway and four floating drydocks, the largest of which can accommodate a vessel 420 feet by 120 feet. Total usable berthing space is about 2,400 feet.

The mid-1977 work force at the Orange plant was 2,100, approximately the same as a year earlier.

Exhibit 15 is a current general arrangement drawing showing construction facilities at Levingston's Orange, Tex. yard.

#### 14. Marathon LeTourneau Company - Gulf Marine Division

Marathon Manufacturing Company, the world leader in production of offshore drilling rigs, launched its new Gulf Coast shipyard, the Gulf Marine Division, in 1972 with a commitment of several millions of dollars. This shipyard is located on a 133-acre tract with a 2,500-foot frontage on the ship channel at the Port of Brownsville, Tex. In addition to the construction of offshore drilling rigs, the yard has the capability of fabricating and launching drillships, barges, work boats, tugs, supply vessels, and large merchant ships. Marathon's Vicksburg, Miss. plant and another in Longview, Tex. serve as support facilities for the Brownsville yard.

As of October 1, 1977, the Gulf Marine Division was building or had firm orders for four new jack-up rigs and a letter of intent for a fifth jack-up rig.

The Brownsville yard operates one shipbuilding way with a maximum ship size of 1,100 feet by 150 feet on which oceangoing ships could be constructed in the event of national emergency. Modular construction techniques are combined with conventional shipbuilding methods. Large module sections are fabricated on a forming and subassembly slab about 400 feet by 200 feet, which is actually an extension of the yard's building way. A 250-ton gantry crane travels on rails which run the full length of the slab and building way. The crane lifts the sub-assembly sections from the slab to the launchway, and the sections are joined to form the completed vessel which is then side-launched. For outfitting purposes, there is one 500-foot-long wharf.

At mid-1977, the total work force at the Brownsville plant was 614, down from about 800 a year earlier.

Exhibit 16 is a plot plan of the yard's construction facilities.

14. Tampa Ship Repair & Dry Dock Co., Inc.

Founded in 1948, Tampa Ship Repair & Dry Dock is the largest ship repair facility on the West Coast of Florida. It is located at Hooker's Point on Tampa Bay in Tampa, Fla. During World War II, the company built Navy auxiliary vessels and C2 cargo ships for the Maritime Commission.

Since World War II, Tampa Ship has been a major Gulf Coast repair yard, serving many of the tanker fleets operating on the Gulf. During the Viet Nam conflict, the yard renovated and re-activated several Victory ships and played a major role in the upgrading of the Military Sealift Command tanker fleet. In 1972, the year the facility was purchased by the American Ship Building Company, Tampa Ship completed the conversion of a C1-M-AV1 cargo ship to a deep sea drillship; and a year later, it built two hulls for a large semi-submersible drilling rig under construction at Bethlehem-Beaumont.

Although Tampa Ship has the capability to construct large oceangoing ships, it is primarily a repair and conversion facility. Since 1975, the yard has been building barges to complement its repair business. Currently under construction is a 13,500-dwt. coal barge, scheduled for delivery to Electric Fuels Corporation by the spring of 1978. The cost of the barge will be in excess of \$5 million.

Tampa Ship operates one sliding way which can accommodate a maximum ship size of about 650 feet by 150 feet. The shipway is serviced by three 40-ton gantry cranes. There is one graving dock that can handle vessels up to 542 feet by 78 feet. However, work began in early 1977 on an additional graving dock 900 feet by 150 feet which will be used for repair and conversion work. This new dock, which will be leased from the Tampa Port Authority and operated by Tampa Ship, will be capable of drydocking tankers up to 125,000 dwt., the largest vessel that can enter into the Tampa Bay area. Work on the dock includes conversion of an old slip which had been used as part of World War II facilities. This new graving dock is expected to go into operation in July 1978. The yard presently has 1,800 feet of usable berthing space.

Mid-1977 employment at the Tampa yard was approximately 640, down slightly from a year earlier.

Exhibit 17 is a current general plan of Tampa Ship's main plant. Since the large building way is located approximately one-half mile north of the main plant, it is not shown on this plan. This building way, like the graving dock presently in operation, is leased from the Tampa Port Authority.

16. Bethlehem Steel Corporation- San Francisco Yard

Bethlehem's San Francisco shipyard, which traces its beginning back to 1849, is the oldest yard in the United States from a standpoint of continuous service. One of the largest repair yards in the country, it offers a complete range of repair and reconditioning services and can handle conversion and jumboizing work, as well as a wide variety of industrial work. It is also capable of constructing large oceangoing ships.

During World War I, as a subsidiary of Bethlehem Steel, the yard delivered destroyers at the rate of three a month. In the huge shipbuilding, repair and conversion programs of World War II, the yard, with the help of facilities leased from the Navy, built 72 ships including 52 Navy combat vessels. In addition, approximately 2,500 Navy and commercial vessels were repaired or converted at the yard during the World War II period.

In the 1950's, ship repairs, conversions and special industrial work were followed by construction of two destroyer escorts, five C4 Mariner class cargo ships, a wine tanker, and four 33,000-dwt. oil tankers.

17. f  
k  
w  
a  
t  
g:  
is  
or  
AF

Bethlehem-San Francisco demonstrated its flexibility in the 1960's. Shipbuilding continued with the construction of four Title V C4 cargo ships, two destroyer escorts, and a number of oil and rail barges; but the yard's management believes its greatest accomplishment was the fabrication of 57 sections of trans-bay underwater tube for the San Francisco Bay Area Rapid Transit (BART), the longest sunken-tube tunnel in the world.

In the 1970's, the yard's specialty was barge design and construction. The 1976 activity was highlighted by the completion of a three-year program to build 22 large 400 foot by 100-foot barges. The company performed 45 drydockings in 1976.

In January 1977, the company signed a contract to convert four lighter aboard-ship (LASH) vessels to full containerships for Pacific Far East Lines. The first ship, the PACIFIC BEAR, was redelivered in July of this year; and the second ship, the GOLDEN BEAR, is scheduled for redelivery in late 1977. The yard has no other major contracts.

Bethlehem-San Francisco has one building way. It is a conventional end-launch type and can accommodate ships up to 550 feet by 90 feet. The yard's mammoth floating drydock (maximum vessel size 950 feet by 144 feet) has a lifting capacity of 65,000 long tons and can handle ships up to about 230,000 dwt. This drydock, designed by Bethlehem and built at the San Francisco yard, is capable of serving the large tankers that will be transporting crude oil from Alaska to West Coast ports. This Bay Area facility also has a second floating drydock (maximum vessel size 700 feet by 94 feet) and about 3,680 linear feet of usable berthing space.

The total work force in July 1977 was approximately 1,000, an increase of 250 compared to mid-1976.

Exhibit 18 is a current plot plan of the Bethlehem-San Francisco plant and facilities.

17. FMC Corporation - Marine and Rail Equipment Division

FMC Corporation's Marine and Rail Equipment Division, originally known as Gunderson Bros. Engineering Corporation, is located on the Willamette River in Portland, Ore. This 75-acre facility, which is also a major manufacturer of rail cars, is an experienced builder of tankers, barges, ferry boats and marine equipment.

In 1972 and 1973, the company contracted to build six 35,000-dwt. gas turbine-powered electric-drive tankers. The first was delivered in 1975, the second two in 1976 and the fourth in July 1977. The contract for one of the six ships was cancelled, and the final ship, the CHEVRON ARIZONA, was scheduled for completion in December 1977. These "handy

size" tankers are being chartered, for use in the domestic trade, to Chevron Shipping Company, a wholly owned subsidiary of Standard Oil Company of California.

Because of the slowdown in the tanker market, FMC is shifting emphasis to construction of large barges during the coming years to take advantage of the demand from a growing West Coast market. Currently, the company is building two triple-deck RO/RO barges, each 580 feet by 105 feet by 57 feet, for Crowley Maritime Corporation. These barges, the largest RO/RO barges ever constructed in the United States, are designed to carry 380 trailers and are scheduled for completion in July 1978.

To expand its shipbuilding capability to include construction of oceangoing ships, FMC in 1970 undertook a major improvement program. Included in this expansion program was the acquisition of 23 acres of land adjacent to its existing facility, the purchase of a 200-ton whirley crane, new types of welding equipment, a 1,000-ton press, and a computer-operated burning machine for cutting steel plates. FMC can fabricate steel modules weighing up to the 200-ton limit of the crane and transport them to the shipway for erection. Modular living quarters complete with interior decor, carpeting and drapes, are erected to reduce outfitting time and cost.

The yard operates one side-launching shipway that can accommodate a maximum ship size of 700 feet by 105 feet. This building position is serviced by one 200-ton whirley crane and one 50-ton gantry crane.

FMC has one 600-foot outfitting dock but no drydocks. Outfitting and drydocking can be done in the nearby Port of Portland facility.

At mid-1977, the labor force involved in marine work totaled 380, down from 1,140 in mid-1976.

Exhibit 19 is a current general arrangement drawing of FMC's ship construction facilities.

18. Lockheed Shipbuilding and Construction Company

Lockheed Shipbuilding and Construction Company, a wholly owned subsidiary of Lockheed Aircraft Corporation, is located in Seattle, Wash. on the southern perimeter of Puget Sound's Elliott Bay. This 87-year-old shipyard was known as Puget Sound Bridge and Drydock Company when acquired in 1959 by Lockheed. In 1975, the yard's name was changed to Lockheed Shipbuilding and Construction Company.

to  
il  
g  
to  
ur-  
h  
.  
ed  
n  
o-  
00-  
eel  
on  
nd  
g  
ed  
e,  
his  
ame

A wide variety of vessels have been constructed, including light cruisers, destroyers, ammunition ships, amphibious transport docks, oil drilling vessels, a hydrofoil, a large bulk carrier, a roll-on/roll-off ship, and several ferries. In 1976 and 1977, Lockheed delivered two U.S. Coast Guard icebreakers, the POLAR STAR and POLAR SEA, the world's most powerful non-nuclear icebreakers.

The Seattle company's prime source of ship repair business is vessels carrying supplies, building modules, machinery and other goods to the fast-growing Alaskan oil industry. The increased traffic to Alaska gave Lockheed's ship repair facility one of its best years since it was put into operation. Some 150 ships, barges, tugs and other marine vessels visit the yard's facilities each year for drydocking or pier-side repairs.

Lockheed currently has under construction two 643-foot submarine tenders, the EMORY S. LAND (AS-39) and the FRANK CABLE (AS-40), both of which are scheduled for delivery in 1979. This AS contract, the largest single ship construction contract in Lockheed's history, marked the company's return to Navy shipbuilding, and the yard is hopeful of signing a contract for construction of a third submarine tender, the AS-41. The Navy in 1977 awarded Lockheed a contract for the start-up phase of the construction of this ship.

To improve shipbuilding technology to meet requirements for construction of the submarine tenders, Lockheed has upgraded its production facilities and has accomplished system changes. To handle the increased production rate, Lockheed installed a modernized, numerically-controlled steel cutting system. The automated panel line is another new facility developed following the award of the sub tender contract.

The yard operates three inclined shipways, two of which can accommodate ships up to 650 feet by 90 feet, and one which can handle a ship as large as 700 feet by 100 feet. These building ways are serviced by 10 whirley cranes varying in capacity from 28 tons to 50 tons. Lockheed has three floating drydocks that can accommodate maximum ship sizes of 600 feet by 96 feet, 530 feet by 80 feet, and 400 feet by 46 feet. Also available is 6,500 feet of wharf and pier space that is used for both repair and outfitting. Whirley cranes ranging in capacity from 17 tons to 50 tons service the wharf and pier area.

Lockheed's labor force, at mid-1977, totaled 2,875, the company's highest in several years.

Exhibits 20 and 21 are current general arrangement drawings of the Seattle yard's Plant No. 1 and Plant No. 2.

19. National Steel and Shipbuilding Company

National Steel and Shipbuilding Company (NASSCO), jointly owned by Morrison-Knudsen Company, Inc. and Kaiser Industries Corporation, is located on a 125-acre site in San Diego, Calif. NASSCO, the largest shipbuilding complex on the West Coast, has had experience in both commercial and Navy construction.

The company entered the marine field in 1945 with the construction of small fishing vessels. During the next 12 years, NASSCO produced a series of 65-foot passenger/cargo vessels, tugs, minesweepers, cable tenders, and oceanographic research vessels. Rapid expansion was required in 1957 when the San Diego yard entered the "big ship" market, building 13 C3 and C4 cargoliners, 17 Navy tank landing ships (LST's), and seven combat stores ships (AFS's). 20.

From 1973 through mid-1977, the yard completed two San Clemente class oil/bulk/ore carriers (OBO's), six Coronado class (38,800-dwt.) tankers, and ten San Clemente class (89,700-dwt.) tankers. In 1976, NASSCO delivered a large fleet replenishment oiler, the ROANOKE (AOR-7), to the Navy.

As of October 1, 1977, the following ships were under construction or on order: three San Clemente class (89,700-dwt.) tankers, four San Diego class (188,500-dwt.) tankers, and three Compers class destroyer tenders (AD-41, AD-42, and AD-43). The last of these vessels is scheduled for delivery in November 1981.

Since San Diego is the headquarters of the Eleventh Naval District and home port for the major portion of the Pacific Fleet, NASSCO obtains a great deal of Navy repair and overhaul work.

In early 1976, NASSCO completed a major facilities expansion and modernization program. In the new building dock, the shipyard can now produce ships up to 980 feet by 170 feet, compared to a previous maximum of 900 feet by 106 feet. Also included in the program was a new modern digital-controlled mold loft, a new outfitting pier, and a new semi-automatic panel line that welds steel plate into 40-foot by 40-foot panel sections, additional heavy-duty whirley cranes, land development, and one of the most advanced production control systems in the United States.

In addition to the new building dock, the yard has three inclined shipways, two of which can accommodate a maximum ship size of 900 feet by 106 feet, and one a ship size of 690 feet by 90 feet. These ways and the new building dock are serviced by 11 gantry cranes ranging in capacity from 45 tons to 175 tons. A small 2,800-ton floating drydock is available, and a large graving dock that can accommodate a maximum



ship size of 687 feet LOA by 90 feet is leased on a use basis from the Unified Port District of San Diego. There are ten berths with a total berthing space of approximately 7,075 feet for outfitting and repair. These berths are serviced by mobile and gantry cranes varying in capacity from five tons to 175 tons.

The work force decreased from 6,300 in mid-1976 to 6,050 in mid-1977.

Exhibit 22 is a current NASSCO plot plan.

#### Todd Shipyards Corporation - Los Angeles Division

Todd's Los Angeles Division is a 90-acre complex located on San Pedro Bay. This facility was formerly the Los Angeles Shipbuilding and Dry Dock Company and was purchased by Todd in 1947.

Since re-entering the new construction and conversion field after World War II, the yard has completed the following contracts: conversion of the DIAMOND MARINER to the attack transport PAUL REVERE; construction of five large cargo ships, four 25,000-dwt. tankers for charter to Military Sealift Command, and four 35,000-dwt. tankers for Zapata; construction of two guided-missile frigates and seven destroyer escorts for the U.S. Navy; construction of four forebodies and joining them to reconditioned stern sections for service as Sea-Land container-ships; and jumboizing and upgrading the USS ASHTABULA. In the summer of this year, the yard completed a 475-foot forebody for a 23,000-dwt. anhydrous ammonia carrier for Collier Carbon and Chemical Corporation.

Todd-San Pedro currently has on order or under construction a total of six guided-missile frigates (FFG-7 class) which will provide employment into 1981. With its capacity to deliver four of these FFG's per year, the yard expects to obtain several more of these Navy contracts.

The yard has undergone a major upgrading and expansion of its facilities in recent years. New equipment includes two 175-ton whirley cranes, totally-contained sandblasting facilities, automated cutting and burning operations, and a sophisticated production line for fabrication and movement of modules from automatic welding units to the building ways area. There were also improvements to the existing building ways, drydocks, piers and shops.

The Los Angeles Division presently has two conventional inclined shipways, each capable of launching a ship as large as 800 feet by 84 feet. The panel line, platens and shipways are serviced by two 175-ton, two 50-ton, and four smaller whirley cranes. There are two floating drydocks, one of which can accommodate a vessel 665 feet by 83 feet, and the other a vessel 563 feet by 82 feet. A total of 4,800 feet of berthing space is available at six piers for outfitting and repair.

Total employment at the yard was 1,640 at mid-1977, down from 2,035 a year earlier.

Exhibit 23 is a current plant map of the Los Angeles Division's facilities.

21. Todd Shipyards Corporation - Seattle Division

Todd's Seattle Division is located at the northwest corner of Harbor Island in Elliott Bay, less than 10 minutes from downtown Seattle, Wash. From 1898 until 1916, when the William H. Todd Company of New York bought the shipyard, a variety of vessels were produced, including the world's first six-masted barkentine and (at that time) the world's fastest single-screw steamer.

The yard enjoys an outstanding reputation for building vessels for the U.S. Navy. It also does extensive barge building and ship repair work and a large volume of industrial work for the aircraft, aerospace, and hydro-electric industries. During World War II, the Seattle plant built 46 Navy destroyers and three tenders, in addition to ship repair and conversion work. In 1952, the yard embarked on new vessel construction and industrial production, completing a formidable array of tugs, barges, ferries, dredges, pile drivers, floating cranes, etc. In 1964, the company delivered a series of four guided-missile destroyers to the Navy. In the late 1960's and early 1970's, the Seattle Division was lead yard for building 26 destroyer escorts, seven of which were built in Seattle.

Currently, the yard has under contract five guided-missile frigates (FFG-7 class) two of which are for the Royal Australian Navy. These Navy construction contracts are expected to provide work through most of 1981.

Overall modernization has resulted in vastly improved facilities. Recent yard additions include a numerically-controlled plasma arc burning system that cuts steel plate at five times the speed of gas. A new facility for nondestructive testing was finished in 1976, completely updating the Division's NDT capability. A unique water-bearing system installed in the yard can transport and pivot 250-ton hull sections from the fabrication shop to the assembly area. The system can also move a hull weighing up to 1,200 tons with virtually no friction on a .005 inch film of water from the assembly area to a recently installed side-launching way.

The largest building way at Todd-Seattle can handle a ship up to 550 feet by 96 feet. There is also a dual-end launchway 450 feet by 131 feet. This shipway permits construction of two ships with beams of 50 feet or less simultaneously, or one ship of 60-foot beam or more. A small side-launch building way, maximum vessel size 220 feet by 50 feet, was added in 1974. The shipyard has three floating drydocks capable of accommodating vessels 650 feet by 83 feet, 550 feet by 88 feet, and 420 feet by 62 feet.

Two wharves and four piers provide a total of about 4,850 feet of berthing space for outfitting and repair. The yard is serviced by nine 45-ton whirley traveling cranes, two 35-ton mobile rigs, and a number of smaller portable units.

Total employment at the Seattle plant was up to 1,060 by mid-1977, compared to about 400 in July 1976. The labor force is expected to reach 1,500 by year-end. By the end of 1978, employment is expected to build up to at least 2,000.

Exhibit 24 is a current plot plan of Todd-Seattle's facilities.

22. Triple "A" Machine Shop, Inc.

Triple "A" Machine Shop was in business in San Francisco, Calif. from 1945 to 1976 as a small ship repair facility, engaging in overhaul and topside work on Navy and commercial vessels.

In July 1976, the company leased the shipbuilding and ship repair facilities at the Hunters Point Naval Shipyard which had been closed and idle for almost two years. Triple "A", since leasing the Hunters Point facility, has been awarded repair, conversion and overhaul contracts from commercial and Navy clients, such as repairs to the HUGHES GLOMAR EXPLORER, activation of two Malaysian LST's, and overhaul of five Navy auxiliaries. In February of this year, the company completed reconstruction of four American President Lines containerships (MA Design C6-S-85b).

In the summer of 1977, Triple "A" had the following contracts underway: major overhaul of three frigates of the KNOX (FF-1052) class, the FANNING, HEPBURN, and COOK; overhaul of the combat stores ship MARS (AFS-1); and the first phase of conversion of the Hughes mining barge to OTEC-1, which will be a platform for testing heat transfer characteristics and biofouling for potential OTEC heat exchanger concepts.

The Hunters Point yard sprawls over 860 acres, with pier space totaling about 24,000 linear feet. There are 21 repair berths, 19 deep-water berths, and 40 tie-up berths. The yard has six graving docks with sizes ranging from 420 feet by 60 feet to 1,092 feet by 140 feet. Equipment includes 20 whirley cranes, a 300-ton gantry crane, 19 fully-equipped shop buildings totaling 1,424,000 square feet, and 350,000 square feet of warehouse space.

By mid-1977, employment at the yard had climbed to 1,500, from 900 a year earlier.

Exhibit 25 is a current yard plan showing the Triple "A" facilities at Hunters Point.

23. The American Ship Building Company - Lorain, Ohio

Since it was founded in 1899 in Lorain, Ohio, The American Ship Building Company has been a leader in the design and construction of ships for the Great Lakes. Under its present organization, the company's AMSHIP Division consists of three yards, in Lorain and Toledo, Ohio, and Chicago, Ill. The TAMPA Division consists of only Tampa Ship Repair & Dry Dock Co., Inc., and the NABRICO Division consists of only Nashville Bridge Company. These are the divisions involved in shipbuilding.

During the World War II period, the company built an impressive variety of vessels for the Navy, Army, Maritime Commission, and private interests. Since World War II, American Ship has continued its leadership in the shipbuilding industry on the Great Lakes, specializing in the construction of ore carriers, besides building seven Coast Guard cutters, two naval auxiliaries and a fisheries research vessel.

In 1971, the company completed an extensive modernization and improvement program at its Lorain shipyard, including new computer control programs and management information systems. This yard has large machine shops which can accommodate almost any type of machining operation within the marine industry. These shops can handle industrial as well as marine work. The Lorain plant, which covers 48 acres, is one of two shipyards on the Great Lakes capable of building ships up to 1,000 feet in length. The Lorain yard is the major source for new construction work, with the company's Toledo and Chicago yards supplying various components.

The JAMES R. BARKER, the first of two 1,000-foot self-unloading Great Lakes ore carriers for Pickands Mather and Co., was completed at Lorain in August 1976. The MESABI MINER, a sister ship of the BARKER, was delivered to Pickands Mather in June 1977. Currently in production are two more of these huge bulk carriers, one for National Steel Corporation and one for United States Steel Corporation. These 1,000-footers, designed by AMSHIP, can carry 59,000 tons of iron ore pellets or 52,000 tons of coal, more than twice the capacity of bulk freighters built on the Lakes in the late 1950's. Through closely coordinated efforts among the AMSHIP Division's three yards (Lorain, Toledo and Chicago), the company is in a position to deliver five of such vessels every three years.

Repair and conversion work is also an important source of revenue at Lorain. Repair work on Great Lakes vessels laid up for the winter has been at a high level at AMSHIP's Lorain and Toledo yards.

In the Lorain facility, graving dock No. 3 (maximum ship size 1,021 feet by 121 feet) is used for new construction. The yard's other graving dock, which can handle ships up to 705 feet by 78 feet, is being used for repair and overhaul work. A total of about 1,800 feet of berthing space is available for repair and outfitting.

At mid-1977, the total payroll was approximately 1,000.

Exhibit 26 is a current plot plan of facilities at the Lorain plant.

24. The American Ship Building Company - Toledo, Ohio

In 1947, The American Ship Building Company purchased this shipyard from the Toledo Shipbuilding Company. Like the Lorain yard, the Toledo plant is a complete, modern full-service shipyard, equipped for new construction, conversion, repairs, and general heavy fabrication and machine work.

In addition to repair, overhaul and conversion work, Toledo in the 1960's and 1970's built the following vessels: an oceanographic survey ship, a naval patrol escort, a Coast Guard cutter, and three Great Lakes ore carriers, the last of which was the 26,000-dwt. ROGER M. KYES, delivered in 1973.

Repair and overhaul work on Great Lakes vessels during the winter lay-up is an important source of business. Besides repair and overhaul, the Toledo plant is currently fabricating the 560-foot by 77-foot midbody sections for the 1,000-foot bulk carriers under construction at Lorain.

The AMSHIP Division's Toledo yard utilizes the headquarters engineering staff located at Lorain for all work requiring a technical staff. Toledo, like the Lorain plant, has large machine shops which can accommodate almost any type of machining operation within the marine industry. These shops can also handle industrial work. Complete facilities for repair of ships' propellers are available. Toledo also operates a fleet of repair craft for work away from the shipyard.

There are two graving docks. One can accommodate vessels up to 634 feet by 78 feet, the other vessels as large as 529 feet by 68 feet. Usable berthing space totals about 1,600 feet.

Total employment for 1977 averaged about 475 compared to 400 during 1976.

Exhibit 27 is a current plant layout of AMSHIP's Toledo yard.

25. Bay Shipbuilding Corporation

Bay Shipbuilding Corporation, located in Sturgeon Bay, Wis., is the largest shipbuilder on the Great Lakes. Its parent company, The Manitowoc Company, Inc., purchased Sturgeon Bay Shipbuilding and Dry Dock Co. in 1968 and the adjoining Christy Corporation property in 1970. These two facilities were combined to form the Bay Shipbuilding Corporation. This 36-acre plant has channel access from both Lake Michigan and Green Bay and provides ample dock space for Great Lakes vessel repair and for new construction.

Beginning in 1973, this Sturgeon Bay shipyard completed the following large Great Lakes ore carriers: the CHARLES E. WILSON, H. LEE WHITE, SAM LAUD, ST. CLAIR, JOSEPH L. BLOCK, and in August 1977, the BELLE RIVER, the first 1,000-foot, self-unloading ore carrier delivered by the yard. The BELLE RIVER was constructed in two sections. The 660-foot bow portion of the ship was built from prefabricated sections and side-launched. The stern section was built in the new graving dock and later joined to the bow portion.

Under construction or on order at Bay Shipbuilding are six more ore carriers, four of them 1,000-footers. These contracts are expected to provide employment well into 1980.

Bay Shipbuilding in early 1977 completed the final phase of a major facilities expansion program that has enabled the company to build 1,000-foot Great Lakes bulk carriers. The new graving dock, can accommodate a vessel as large as 1,146 feet by 136 feet and is the largest such dock on the Lakes. It is serviced by a 200-ton traveling gantry crane and a ringer-type crawler crane of about 150-ton capacity. The steel erection capacity for ships to be built in the basin is estimated to be 12,000 to 15,000 tons per year. Also included in Bay Shipbuilding's expansion program was a \$2 million plate fabrication and burning shop, completed in 1975.

Bay operates a side-launching way that can accommodate a maximum ship size of 750 feet by 105 feet, and one floating drydock is available which can handle ships up to 650 feet by 66 feet. There is 7,090 feet of berthing space for repair and outfitting. The 14 available piers are serviced by crawler type cranes of 40 to 100-ton capacity each.

At mid-1977, total employment was 1,540, up from 1,200 a year earlier.

Exhibit 28 is a current general arrangement plan showing Bay Shipbuilding's facilities.

26. Fraser Shipyards, Inc.

The Fraser yard, the only major American shipyard and drydock operation on the Western end of the Great Lakes, is located on Howards Bay in Superior, Wis. Since it was founded in the 1890's by Capt. Alexander McDougall, who built 42 of his famous "whaleback" steamers and barges there, this 63-acre plant has had a succession of owners. From 1900 to 1926, Superior Shipbuilding Co. operated the yard and built more than 50 large Great Lakes ore carriers and oceangoing ships. The yard became a repair facility of American Ship Building Co. from 1926 to 1945 and then became known as Knudsen Bros. Shipbuilding and Dry Dock Co.

Fraser-Nelson Shipbuilding & Dry Dock Co. took over the plant in 1955, and the present name was adopted in 1964. In August 1977, the yard was sold to Reuben Johnson & Son, Inc., a Superior, Wis. contracting and construction firm, but business will continue under the Fraser name.

Since World War II, the yard has specialized in vessel repair and ship modernization including lengthenings, repowering and engine room automation, and self-unloader conversions. In the past five years, Fraser has performed 90 percent of the major ship lengthening work on the Great Lakes.

In the summer of 1977, the only work on hand at Fraser was short term repair. During the winter lay-up of Great Lakes vessels, repair work is expected to more than double.

The yard has two graving docks suitable for ship construction, repair or conversion work. One basin can accommodate a vessel 825 feet by 76 feet, and the other a vessel 621 feet by 56 feet. A small graving-type drydock, 130 feet by 80 feet, was added in 1973 to build new midbody sections for the bulk ore freighters under contract for lengthening at the Fraser plant. There is 4,450 feet of berthing space, in addition to pier space available on the site of the dismantled building slips which are no longer used for ship construction.

The yard's work force averaged about 150 in the summer of 1977. During the winter of 1976/1977, peak employment was approximately 350.

Exhibit 29 is a current plot plan of Fraser's shipbuilding and ship repair facilities.

Manpower

As indicated in Exhibit 34, there were approximately 240,200 employees engaged in the shipbuilding and ship repair industry, including Navy shipyards, as of April 1977. This is an increase

over 1976 of about 11,000 workers. Employment in the 27<sup>1/2</sup> major U.S. commercial shipyards rose to 124,600, or about 71 percent of the work force in all commercial yards, which totaled 175,500.

Current projections of orders for naval and commercial ship construction indicate a continued overall downward trend for 1978 and for the first half of 1979.

Shipyards participating in the Navy's multiyear programs to procure several classes of ships will maintain a full capacity workload, while other yards may be forced to make drastic employment cutbacks unless there is a significant stimulus to generate new contracts. If layoffs become substantial by early 1979, portions of the skilled labor pool will be depleted as workers flow into other construction industries, intensifying the industrywide problem of maintaining an acceptable skills ratio and turnover rate.

Throughout the Gulf Coast and certain Atlantic Coast areas, there continues to be a skills shortage most persistently in shipyard-qualified welders. Other skills also in short supply include shipfitters, pipefitters, inside and outside machinists, and electricians.

#### Material Shortages

In the fall of 1977, the steel industry was operating at less than 80% of capacity. However, supplies were more than adequate and are expected to continue to be plentiful in the foreseeable future. There were no known shortages of any materials required for ship construction.

According to the Navy Shipbuilding Scheduling Office, manufacturing lead times remained generally stable during the first half of 1977 for ship components and basic materials. However, there was a slight decrease in lead times for castings, forgings, and steel product lines due to a continued reduction in aggregate demands.

MarAd is continuing to request DO-A3 priority ratings for both Title V Construction-Differential Subsidy (CDS) ships and Title XI - Ship Financing Guarantee vessels. The priority rating system, under the Defense Priority System and the Defense Materials System, continues to be an integral part of our national defense-related ship construction program, given the unpredictable nature of material and component procurement in the shipbuilding industry.

---

<sup>1/</sup> Includes General Dynamics, Electric Boat Division, which is engaged solely in ship construction for the Navy.



## Shipyard Pollution Abatement

The U.S. shipbuilding industry, which includes new construction yards, repair yards and drydocking facilities, has established throughout the country programs to comply with Federal, State and local regulations for the control of water, air and noise pollution, and disposal of solid wastes.

To assist in the development of these programs, the Environmental Control Committee of the Shipbuilders Council of America and the Society of Naval Architects and Marine Engineers (SNAME), technical Panel SP-3, Shipyard Environmental Effects, have initiated inhouse studies and have provided the impetus for Government-sponsored research studies designed to establish information which will aid the shipbuilding community in solving the problems associated with effective shipyard pollution control.

Variations in the age, design, construction, operations and conditions of the facilities, as well as variations in operations performed from ship to ship within any given facility, make establishment of uniform standards impractical at this time. Therefore, it has become important for the shipbuilding industry to assist the regulatory bodies in establishing regulations that are meaningful as well as cost effective.

In this regard, a questionnaire has been prepared and sent to all the major shipyards for the purpose of identifying those pollution control areas which require further attention by the shipbuilding industry. As a result of this questionnaire, several studies have been prepared. One such report, prepared by the SNAME Shipyard Environmental Effects Panel, is titled "Water Pollution Control Plan - Shipyard Industry Consensus Standards". This report, which deals with the establishment of guideline standards for floating drydocks and wet slip operations, has been submitted to the Environmental Protection Agency (EPA), for their use in the development of the EPA final pollution control guidelines for drydocks and the associated statement on the economic impact of such guidelines.

These committees have also taken active interest in the EPA-sponsored studies titled "Draft - Development Document for Effluent Limitation Guidelines and Standards of Performance - The Shipbuilding and Repair Industry; Graving Docks and Floating Drydocks", prepared by Wittman Associates and "Effluent Limitation Guidelines and New Performance Standards for Shore Reception Facilities", prepared by Burns and Roe. These studies are also being used by EPA in the establishment of their final effluent guidelines. In both cases, reports have been submitted by these committees to the EPA for their consideration.

Another study, in which both the Environmental Control Committee and the Shipyard Environmental Effects Panel have provided oversight guidance, is the report contracted to Avondale Shipyard, Inc. by the Maritime Administration on the "Disposal of Residue Material from Drydocks". An interim report on this subject was completed in April 1977. This report covers such topics as the source of residue material in graving and floating drydocks, methodologies employed in the removal of residue material, cost of residue removal, and the impact of EPA's restriction of residue discharges. A final report will be completed and issued after EPA has issued its final effluent guidelines, mentioned above.

While the shipbuilding industry has made tremendous progress in combatting pollution, it is continually striving to improve its anti-pollution record. These industry committees meet on a continuing basis to exchange information and to establish programs which are necessary to improve the quality of the shipyard environment and the areas that are affected by shipyard activities. Key individuals from Government agencies, such as the EPA, the U.S. Coast Guard, and the Maritime Administration, are invited to the committee meetings to achieve, by both the marine industry and regulatory bodies, a better understanding of the problems of establishing realistic pollution prevention regulations as well as to establish programs to comply with such regulations.

#### Ship Repair Facilities

The ship repair industry is a composite of many organizations of varying capabilities. About 250 firms repair ships, but only 65 yards are capable of drydocking vessels 300 feet in length or more. For ships this size, the U.S. shipbuilding industry has a total of 73 floating drydocks, 50 graving docks, and five marine railways. However, several of these graving docks are currently committed to new construction. The smaller repair organizations, usually referred to as "topside" yards, have no drydocks and usually have only pier facilities with shops. These yards can perform many types of above-water repairs, and if necessary, can transport labor and material to the work site.

"Topside" yards often employ less than 100. Employment in the major shipyards usually numbers in the thousands; and repair, overhaul and conversion work may be combined with ship construction.

Presently, the Maritime Administration holds master repair contracts with 77 ship repair facilities. Thirty-eight are located on the East Coast, 18 along the Gulf Coast, 20 on the West Coast and one on the Great Lakes.

tee  
ght  
the  
  
ri  
ter-  
he  
act  
be  
e-

There has been an increase in new drydocks acquired by the private ship repair yards over the past several years, geared to the larger types of ships now operating, even if not capable of handling many of the world's larger VLCC/ULCC ships. Such drydocks include those at Sun Shipbuilding & Drydock Company, Jacksonville Shipyards, Ingalls Shipbuilding Division/Litton Industries, Bethlehem Steel Corporation (San Francisco, Baltimore and Hoboken Yards), Todd Shipyards Corporation (San Francisco Division), and Triple "A" Machine Shop's Hunters Point yard.

in  
nti-

Because of the drop-off in opportunities for merchant ship new construction contracts, a number of large yards are presently seeking to increase their ship repair business. Substantial amounts of money are being invested in new drydocking and related facilities. The following are examples of these current expansion programs:

the  
from  
he

- Norfolk Shipbuilding & Drydock Corp.

ter

A 950-foot floating drydock with a clear width of 160 feet and a lifting capacity of 54,250 tons. Completion is scheduled for December 1978.

3

- Tampa Ship Repair & Dry Dock Co., Inc.

A graving dock, 900 feet by 150 feet by 26 feet, which will accommodate tankers up to 125,000 dwt. Completion is scheduled for July 1978.

- Port of Portland (Oregon)

A floating drydock. Dimensions are 902 feet length over pontoons and 192 feet between wing walls. Lifting capacity is approximately 80,000 tons. The drydock is expected to be operational by January 1979.

Expansion is a necessity if a repair yard is to keep pace with the present trend toward larger tankers, bulk carriers, and barges.

ie  
-  
  
d

In some instances, profits on repair work offset ship construction losses. Ship repair yards over the last few years have actively been soliciting business from other industries that use steel fabrication and pipe work, such as petrochemicals, with varying success. The advent of larger ships has affected the ability of some yards with smaller drydocks to maintain their old clients. In general, the ship repair yard often commands excellent prices for urgently needed repairs and can control its overhead more closely. Ship repairing is considered within the industry as generally more profitable than ship construction.

Lack of requirements and capabilities for Ultra-Large Crude Carriers (ULCC's) to operate in the ports of the United States has been one factor that has not forced construction in the U.S. of completely new ship repair facilities with huge drydock capabilities such as those available in foreign yards.

In FY 1978, the naval ship overhaul, conversion and repair workload is expected to continue at about the same level as in FY 1977 when approximately \$2.8 billion was appropriated. About 30 percent of the workload was assigned to private shipyards and the remainder to naval shipyards; the same proportions are expected in FY 1978.

#### Major Drydocking Facilities

Major drydocking facilities are defined as those yards engaging primarily in repair or reconstruction and having at least one drydock that can accommodate vessels 300 feet in length or over. These yards do not usually engage in new construction of large oceangoing vessels, although the capability often does exist if the situation demands it.

Appendix B tabulates information updated through 1977 on 41 of these yards on a coastal basis. Additional data is available in the Office of Ship Construction.

#### Major Topside Repair Facilities

Major topside repair facilities are those that have the capability to provide repair service to oceangoing ships when the work can be accomplished without taking the ships out of the water. The "topside" yards continue to get their share of large ship business. These facilities usually lease pier space on a job basis and do not have any type of drydocking installations. Services rendered by these firms vary from a simple repair job to a major topside overhaul. It is common practice for a shop to send its personnel and equipment to provide voyage repairs while the ship is at anchor or working cargo at a commercial marine terminal. There is an increasing trend worldwide to send ship repairers to the ship rather than to bring the ship to the shipyard, thus calling for greater mobility of ship repair personnel. This is particularly applicable to highly skilled technicians as against the hull trades. Several yards which normally build and repair only smaller vessels and barges are also capable of performing topside repair work on oceangoing ships.

Appendix C is a list of 101 major topside repair facilities, 44 of which are located on the East Coast. No attempt has been made to tabulate their machinery and equipment due to the variance of the type of work an individual firm will engage in. Detailed data for most of the facilities has been obtained during the MarAd annual survey and is available in the Office of Ship Construction.

ging  
dock  
yards  
ssels,  
s it.

of  
the

ability  
be  
pside"  
facili-  
type  
vary  
nmon  
ide  
a  
wide  
to  
per-  
nicians  
and  
orming

# SHIPBUILDING INDUSTRY IN THE UNITED STATES

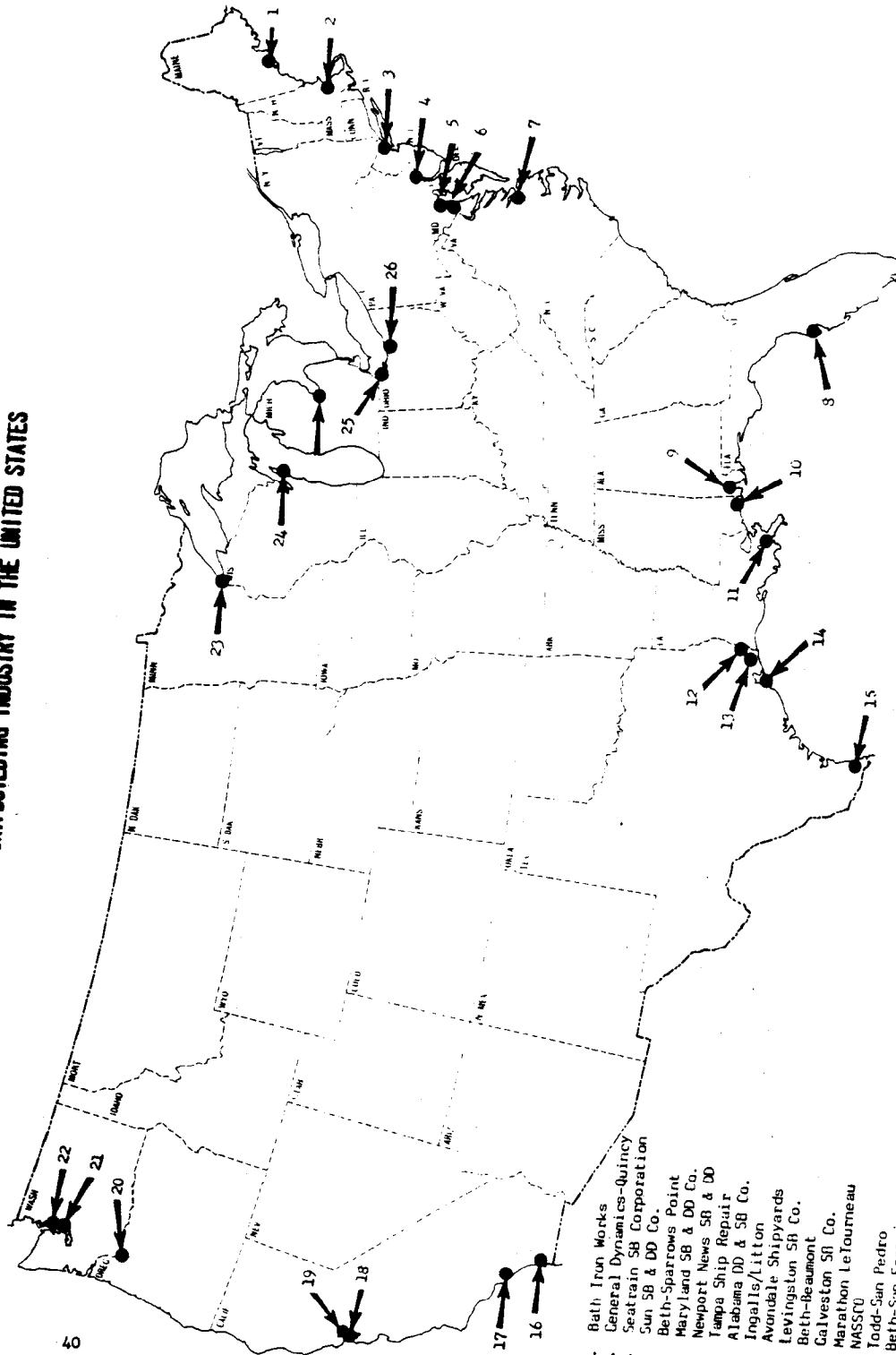


EXHIBIT 1

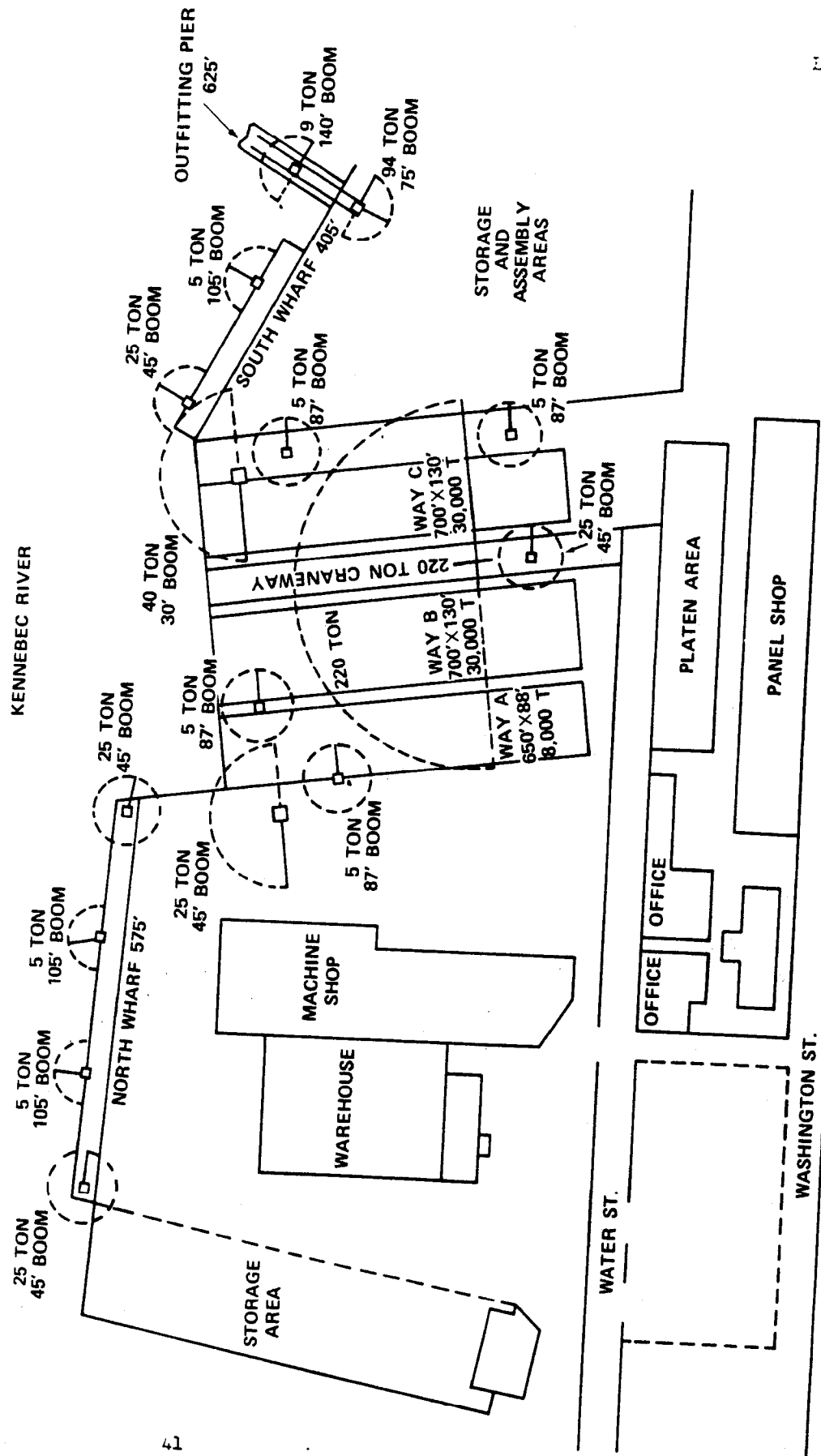
MAJOR AMERICAN SHIPYARDS:  
 BUILDING CAPACITY - SHIPS 475 FEET IN LENGTH OR OVER

1. Bath Iron Works
2. General Dynamics-Quincy
3. Seattain SB Corporation
4. Sun SB & DD Co.
5. Beth-Sparrows Point
6. Maryland SB & DD Co.
7. Newport News SB & DD
8. Tampa Ship Repair
9. Alabama DD & SB Co.
10. Ingalls/Litton
11. Avondale Shipyards
12. Levinston SB Co.
13. Beth-Beaumont
14. Calveston SB Co.
15. Marathon LeTourneau
16. NASSCO
17. Todd-Sun Pedro
18. Beth-Sun Francisco
19. Triple "A"
20. FMC Corporation
21. Lockheed SB
22. Todd-Seattle
23. Fraser Shipyards
24. Bay SB Corporation
25. American SB Co., Lorain
26. American SB Co., Toledo

MAJOR AMERIC SHIPS 475 FEET IN LENGTH OR OVER

# BATH IRON WORKS

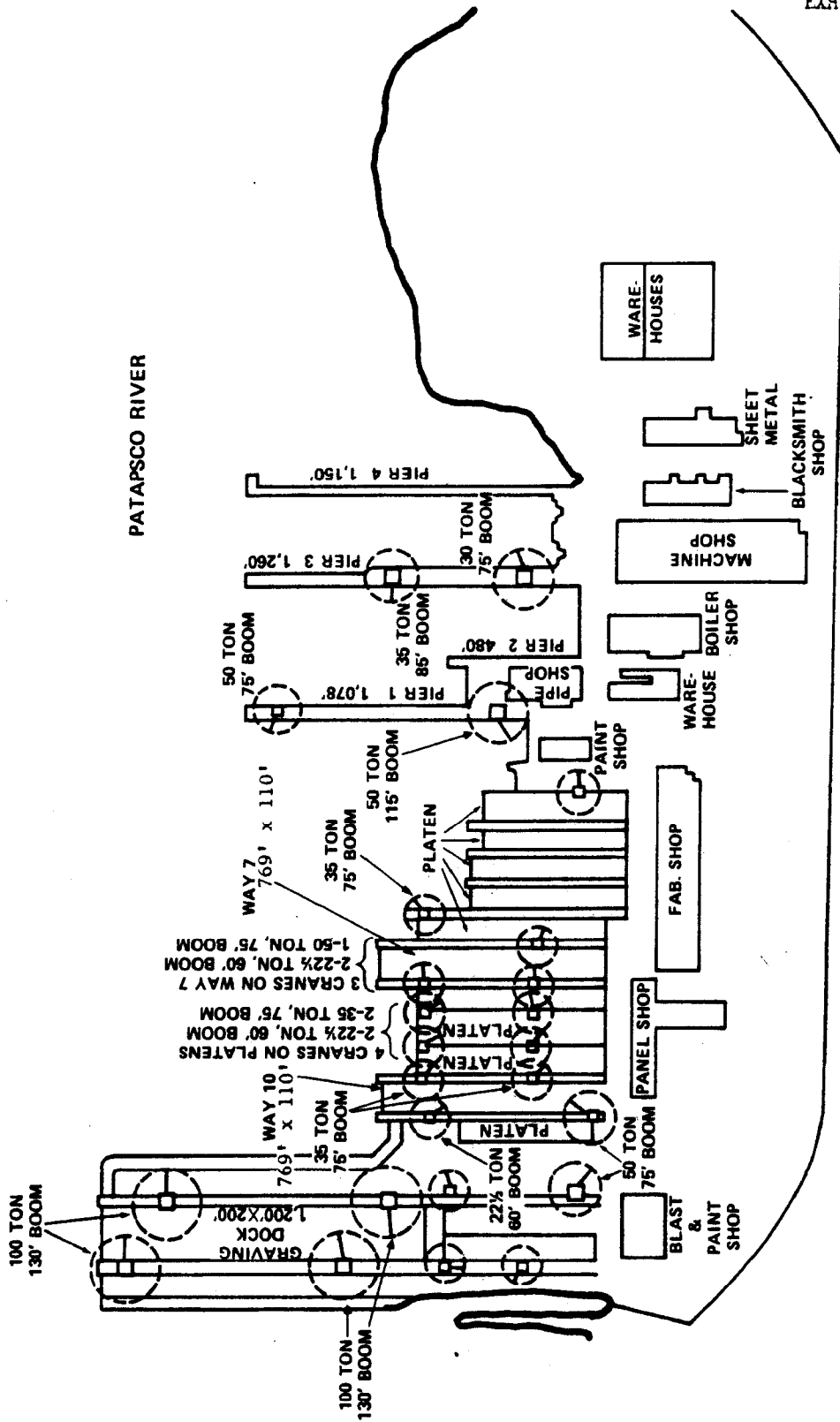
FLOATING  
DRYDOCK  
500' x 81'  
7,600 TON



- 21. Luchford 50'
- 22. Luchford 110'
- 23. Luchford 110'
- 24. Luchford 110'
- 25. Luchford 110'
- 26. Luchford 110'
- 27. Luchford 110'
- 28. Luchford 110'
- 29. Luchford 110'
- 30. Luchford 110'

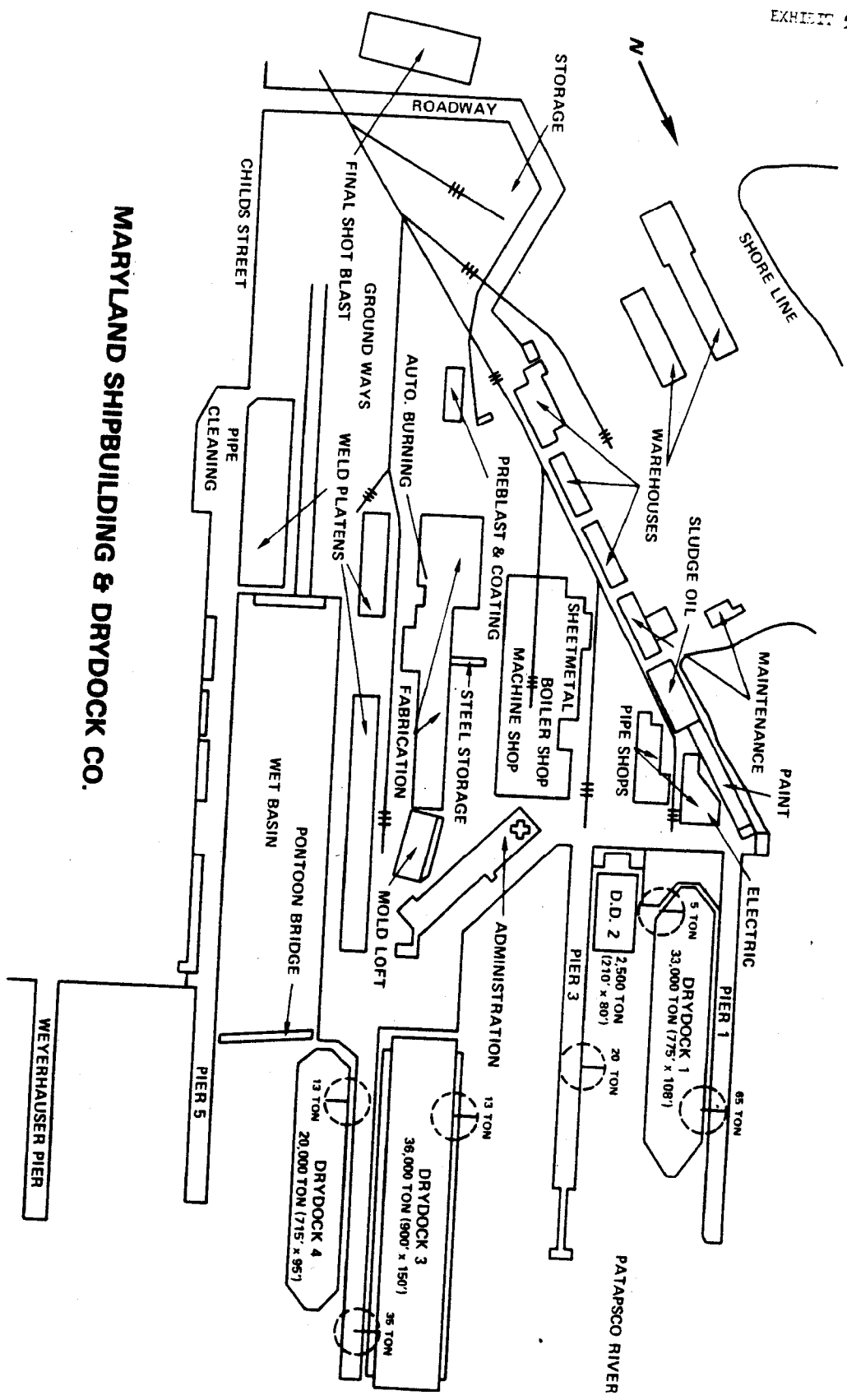
# BETHLEHEM STEEL CORPORATION

## SPARROWS POINT YARD





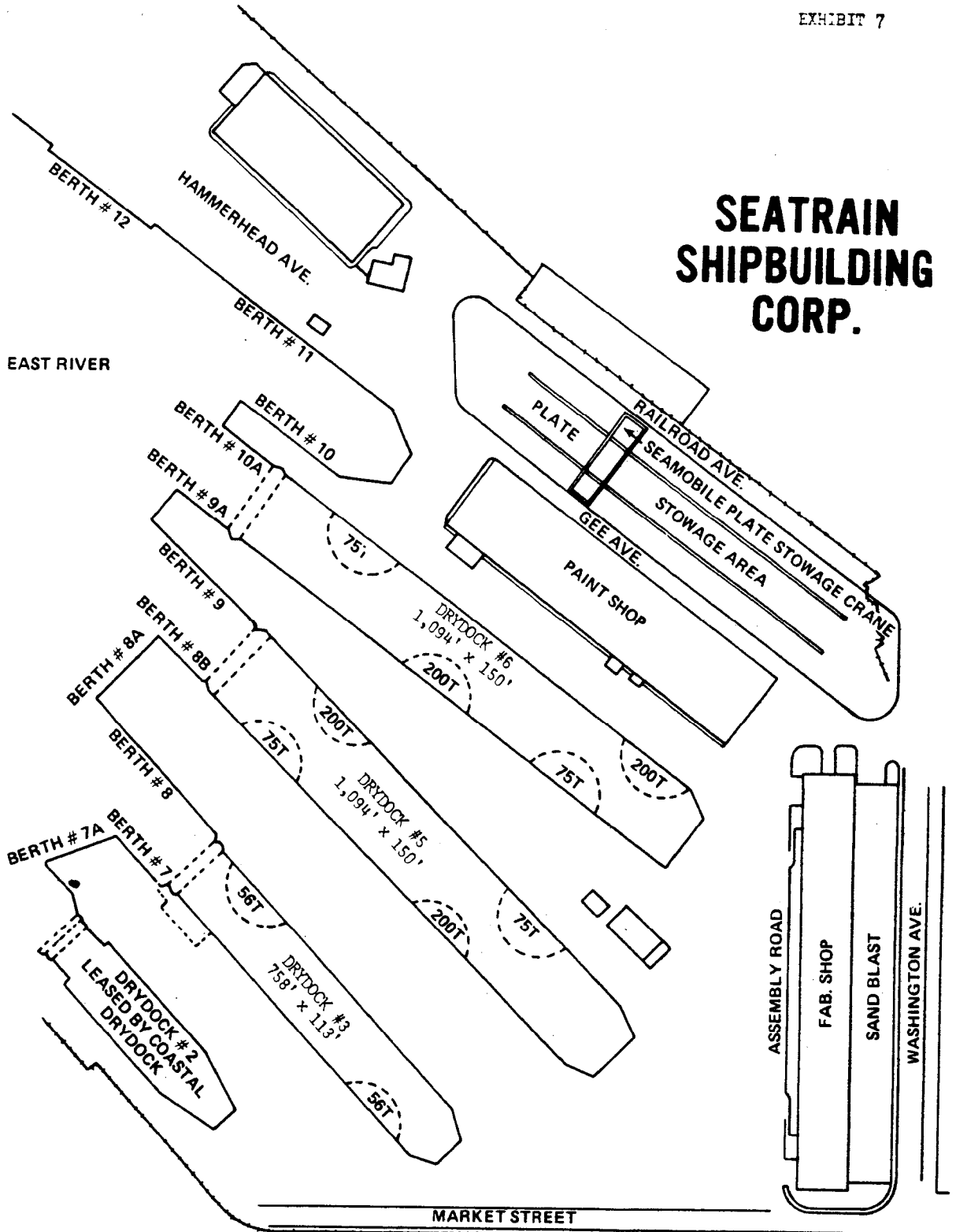




MARYLAND SHIPBUILDING & DRYDOCK CO.



# SEATRIN SHIPBUILDING CORP.



WASHINGTON AVE.

# SUN SHIPBUILDING & DRYDOCK CO.

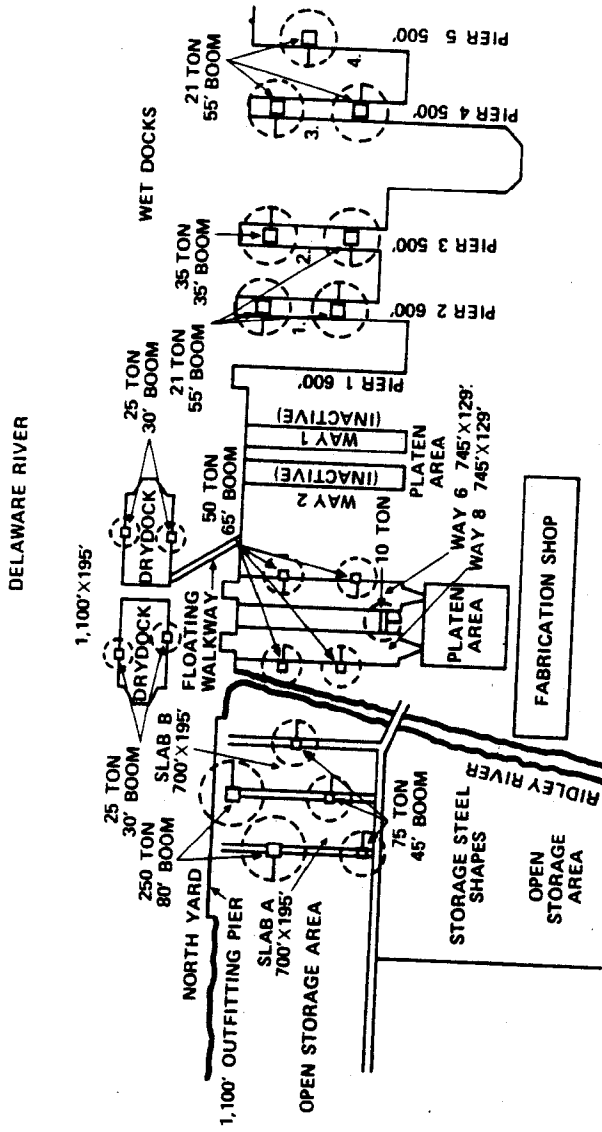
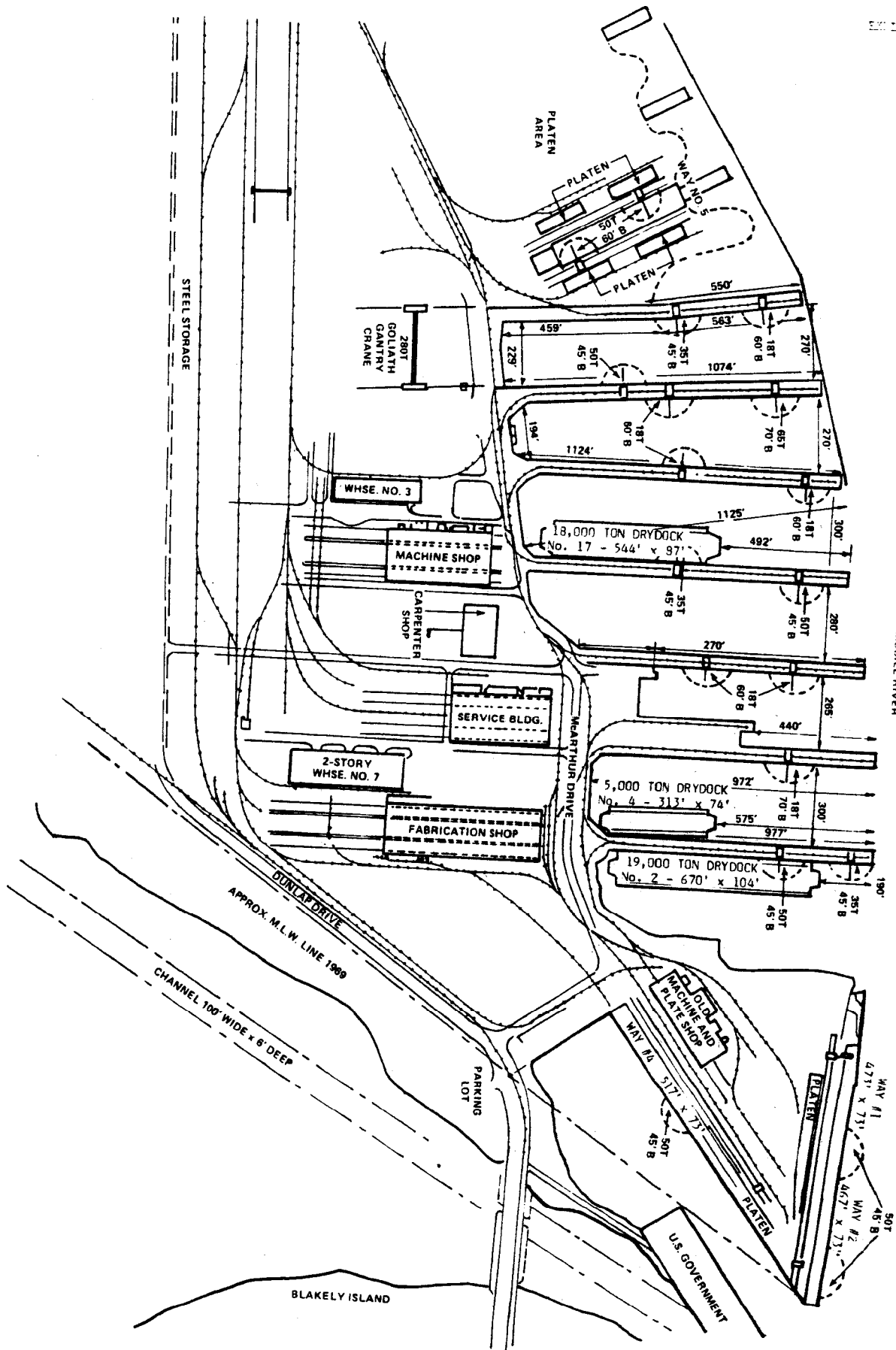


EXHIBIT 8

800 TON BARGE CRANE

ALABAMA DRYDOCK & SHIPBUILDING CO.

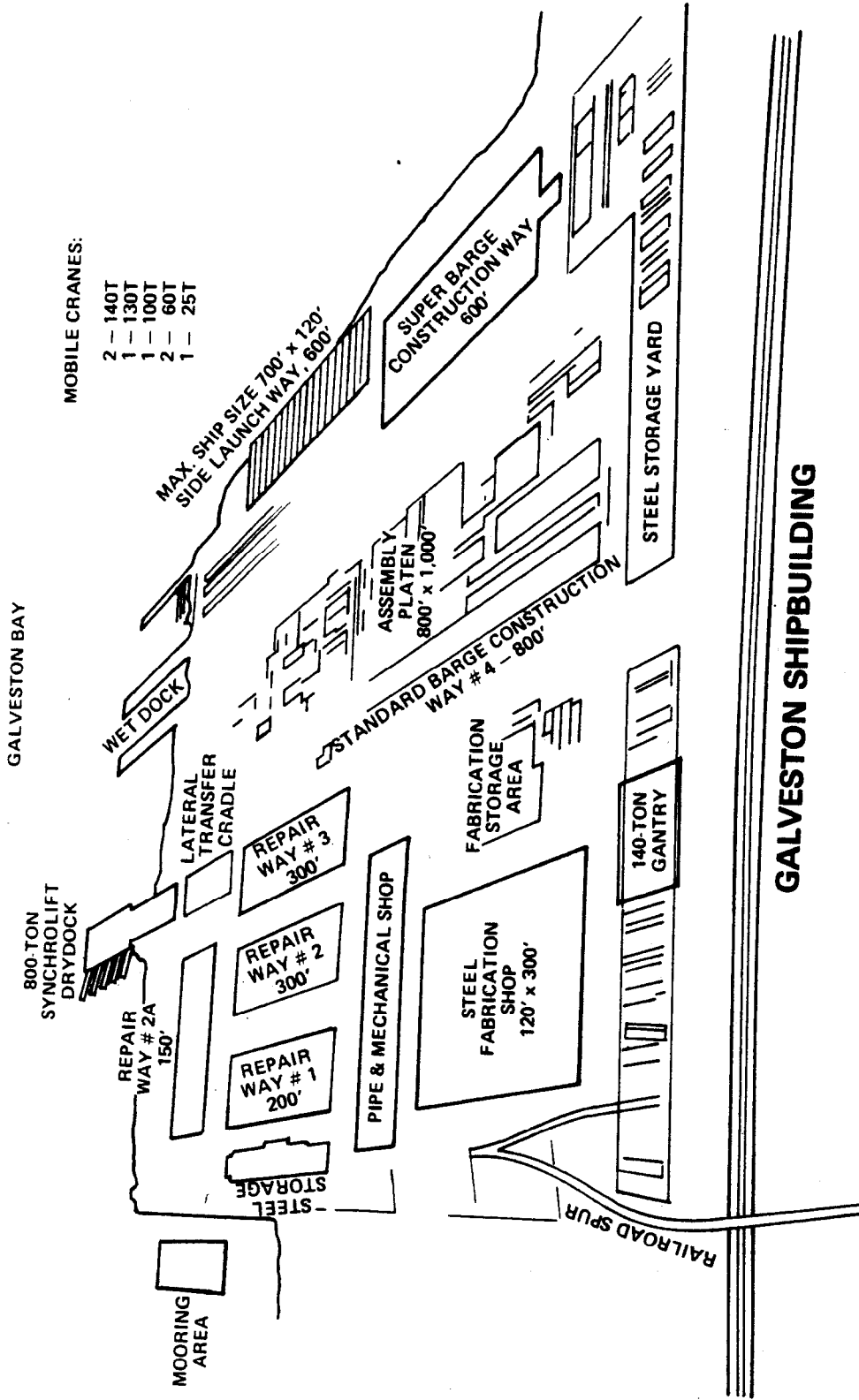
MOBILE RIVER









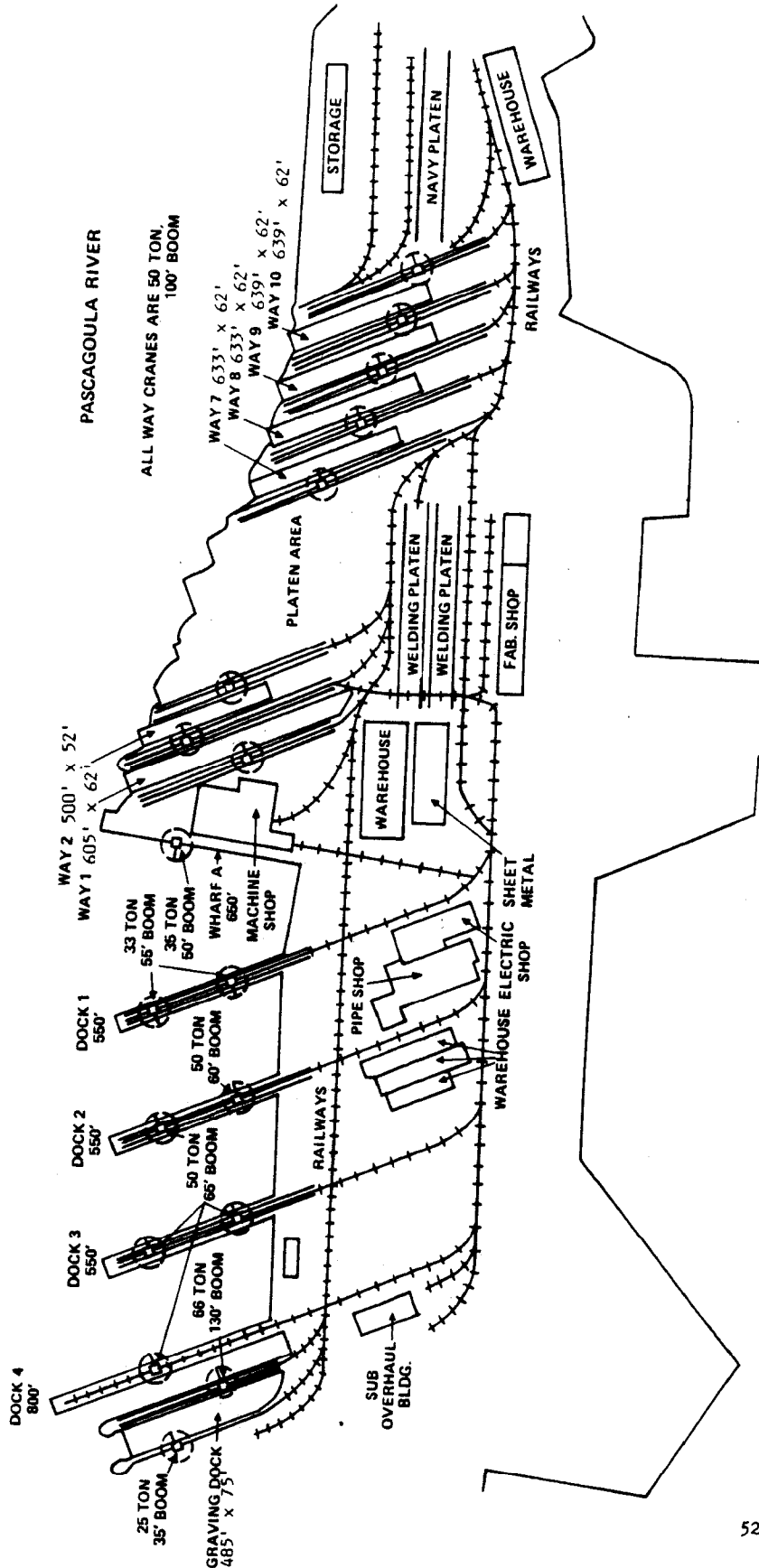


- MOBILE CRANES:**
- 2 - 140T
  - 1 - 130T
  - 1 - 100T
  - 2 - 60T
  - 1 - 25T

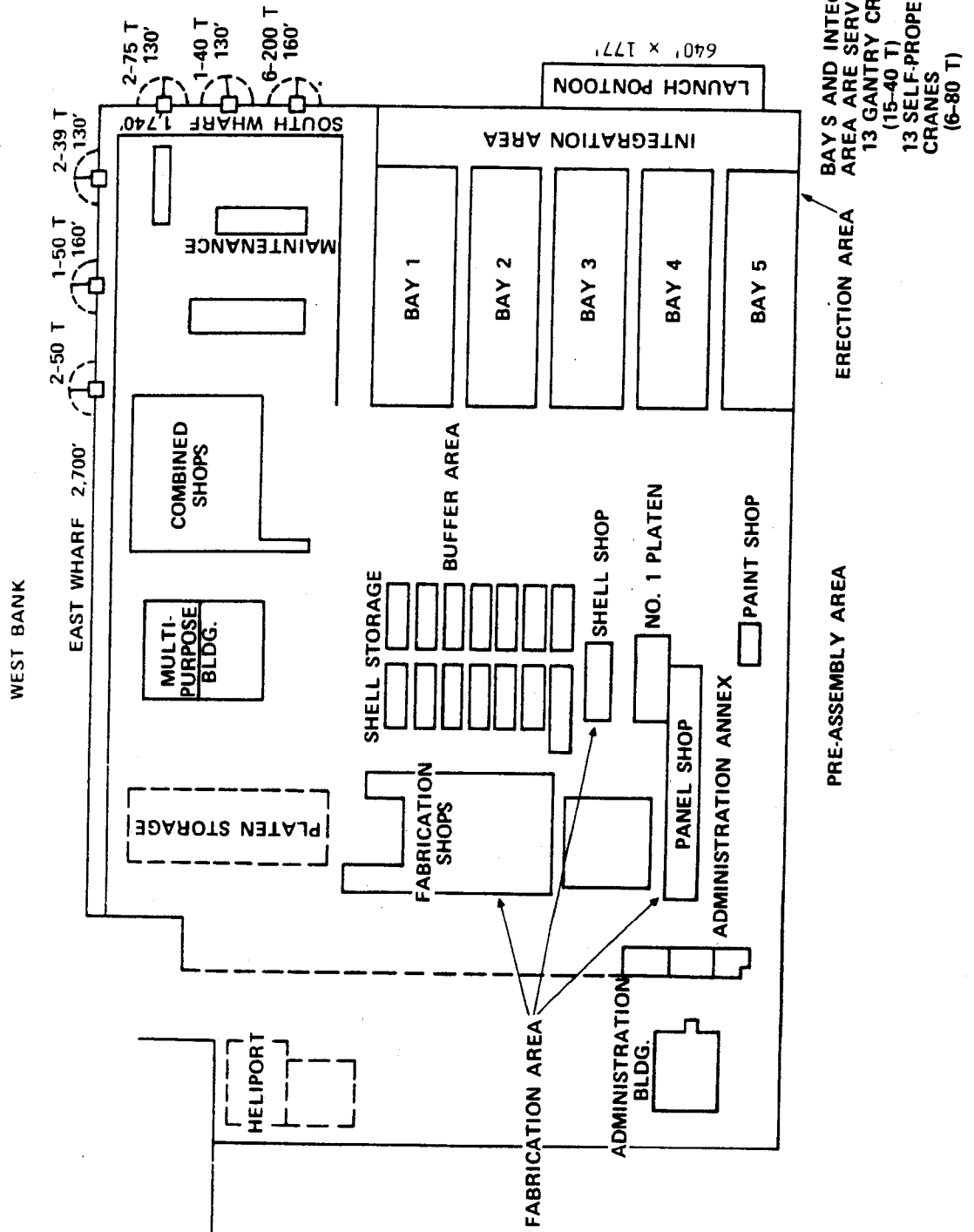
**GALVESTON SHIPBUILDING**

# INGALLS SHIPBUILDING DIVISION OF LITTON INDUSTRIES

EAST BANK FACILITY

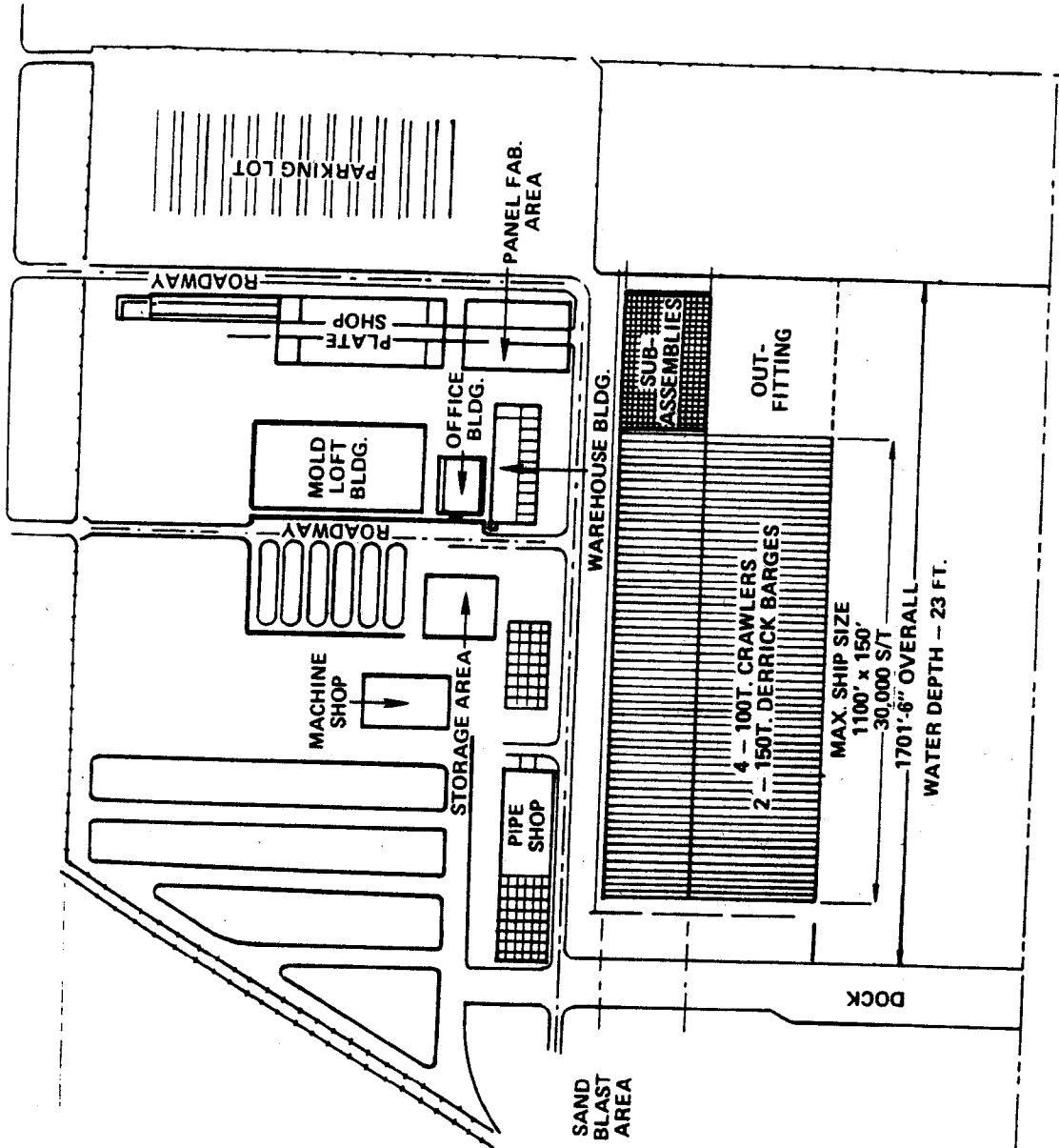


# INGALLS SHIPBUILDING DIVISION OF LITTON INDUSTRIES

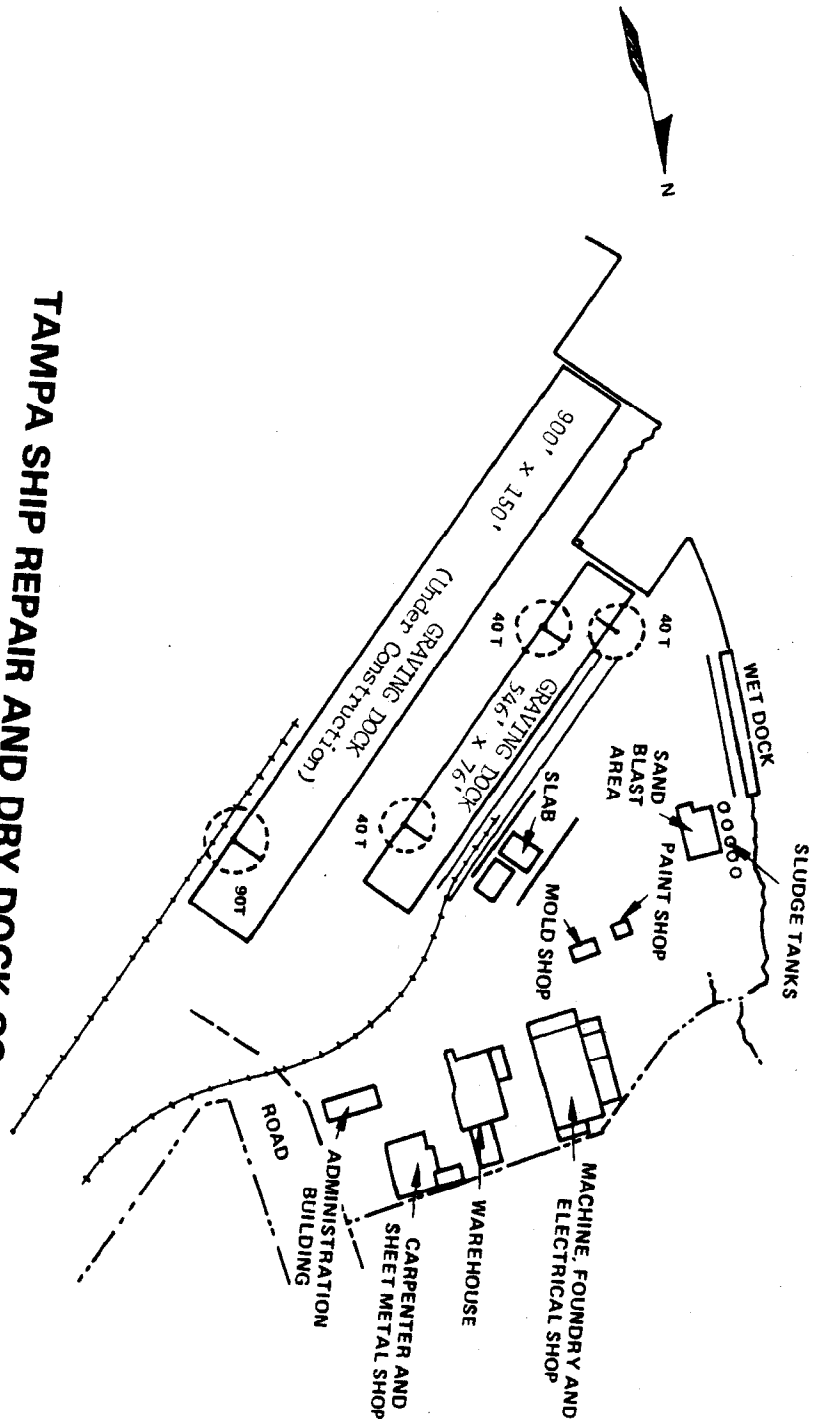


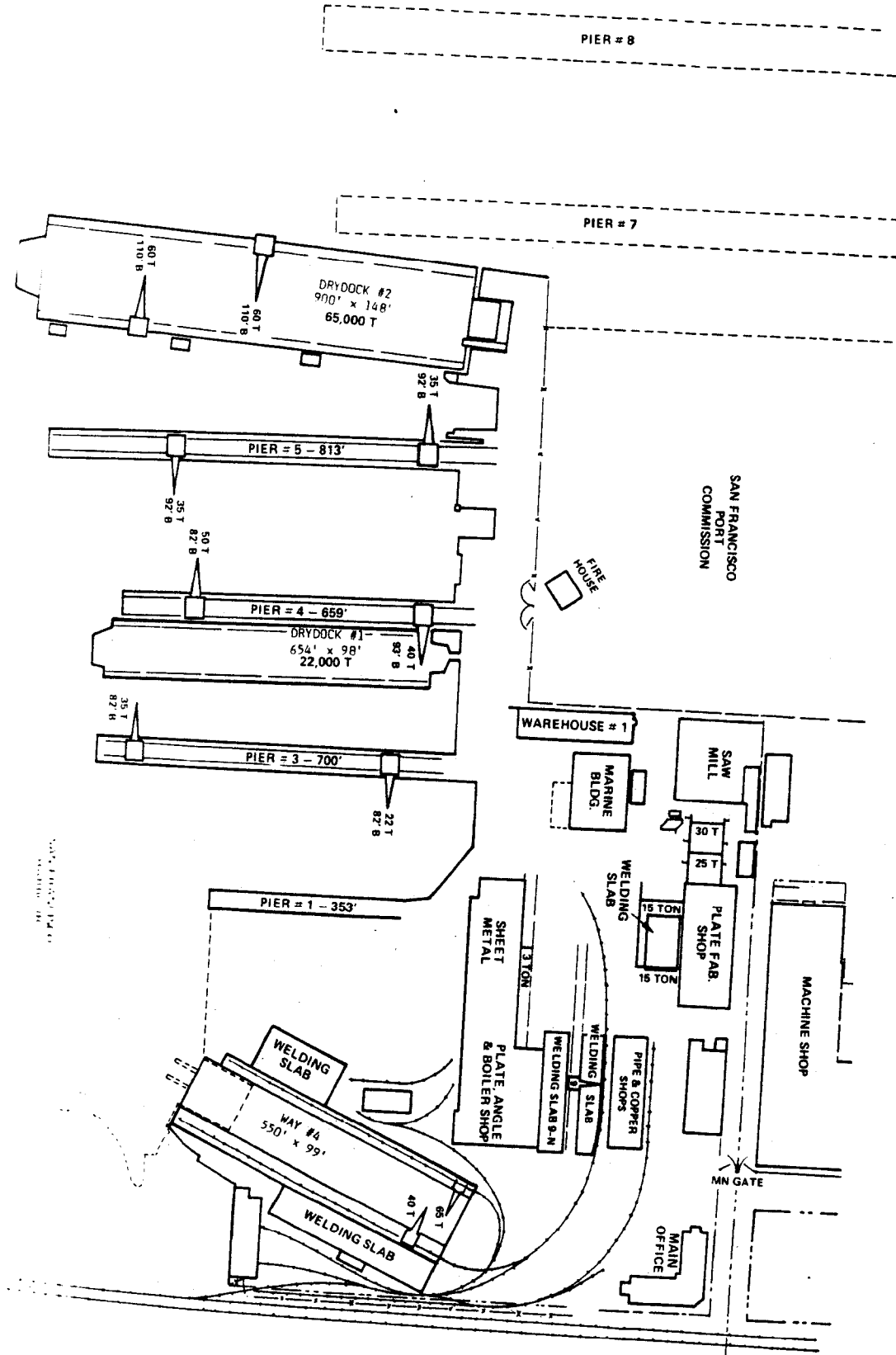


MARATHON LeTOURNEAU SHIPBUILDING  
BROWNSVILLE



**TAMPA SHIP REPAIR AND DRY DOCK CO.  
TAMPA, FLORIDA**





**BETHLEHEM STEEL CORP.  
SAN FRANCISCO YARD**

SCALE 1" = 100'

**FMC CORP.**

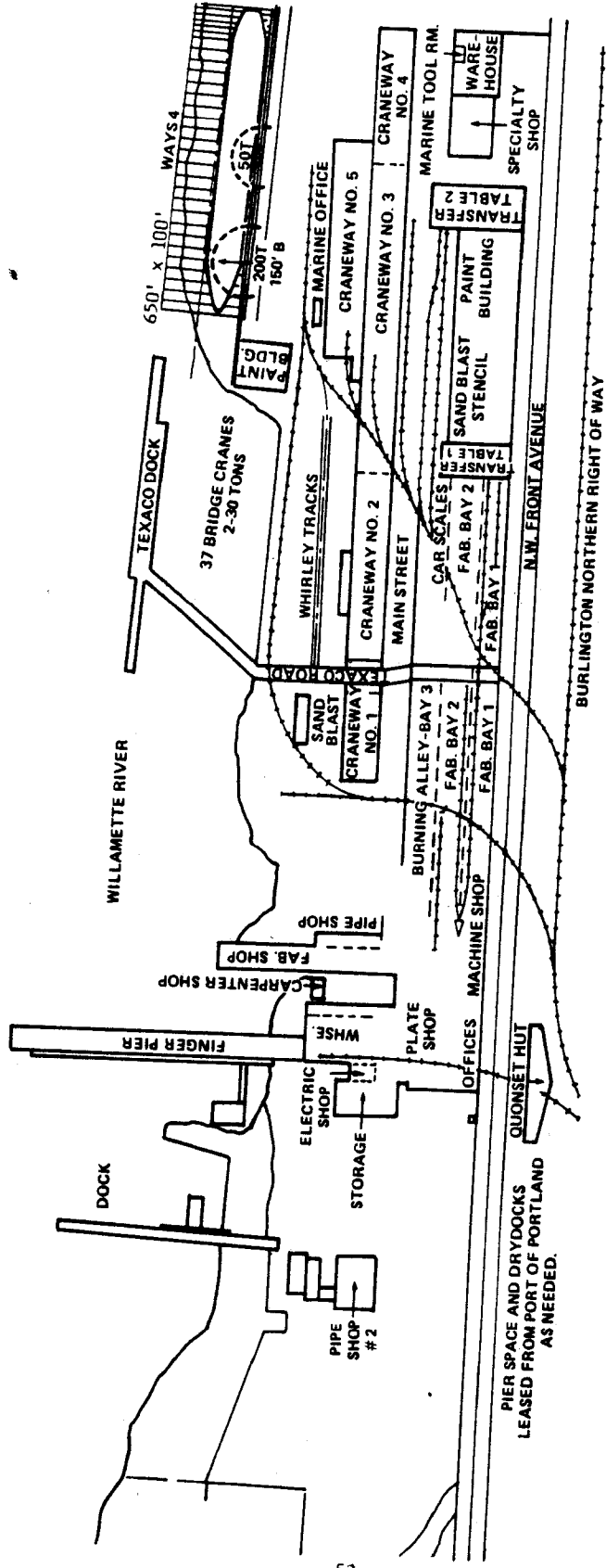
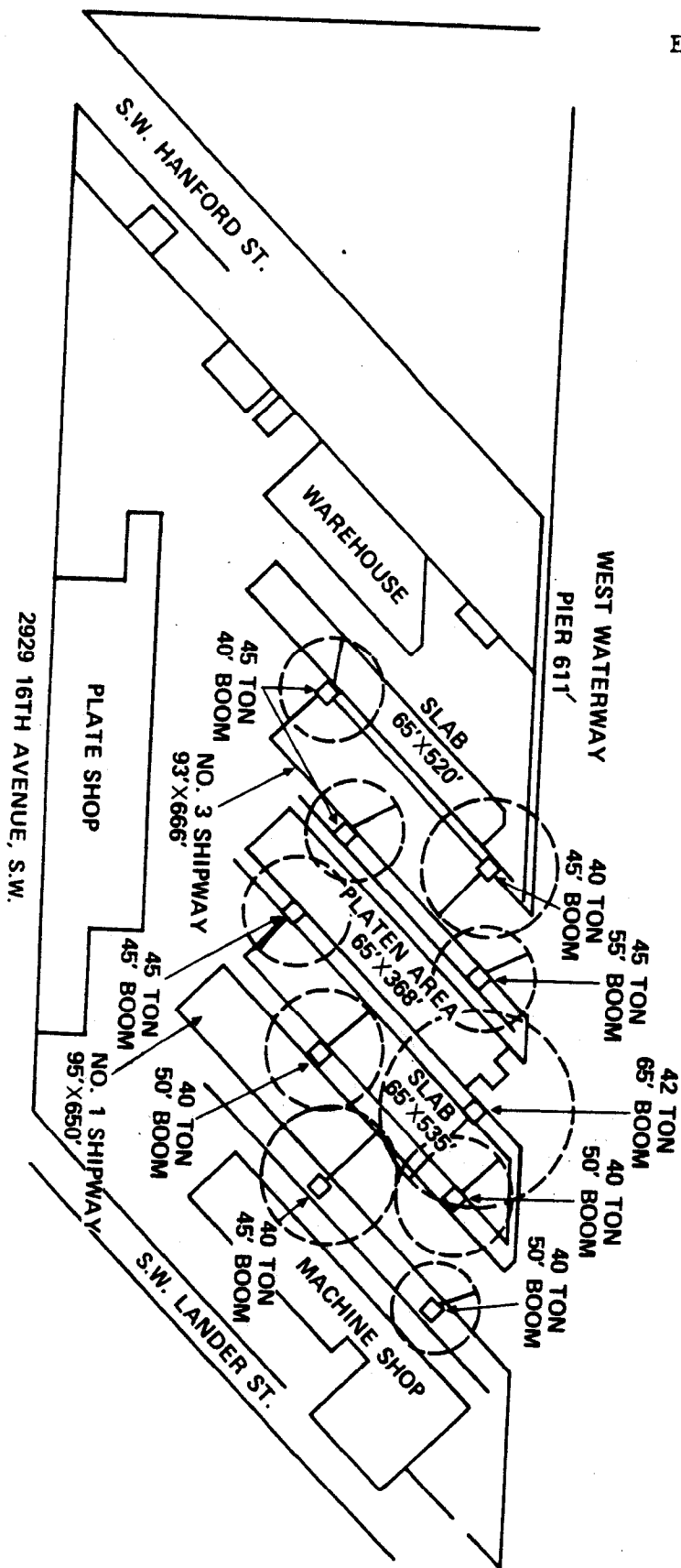


EXHIBIT 19



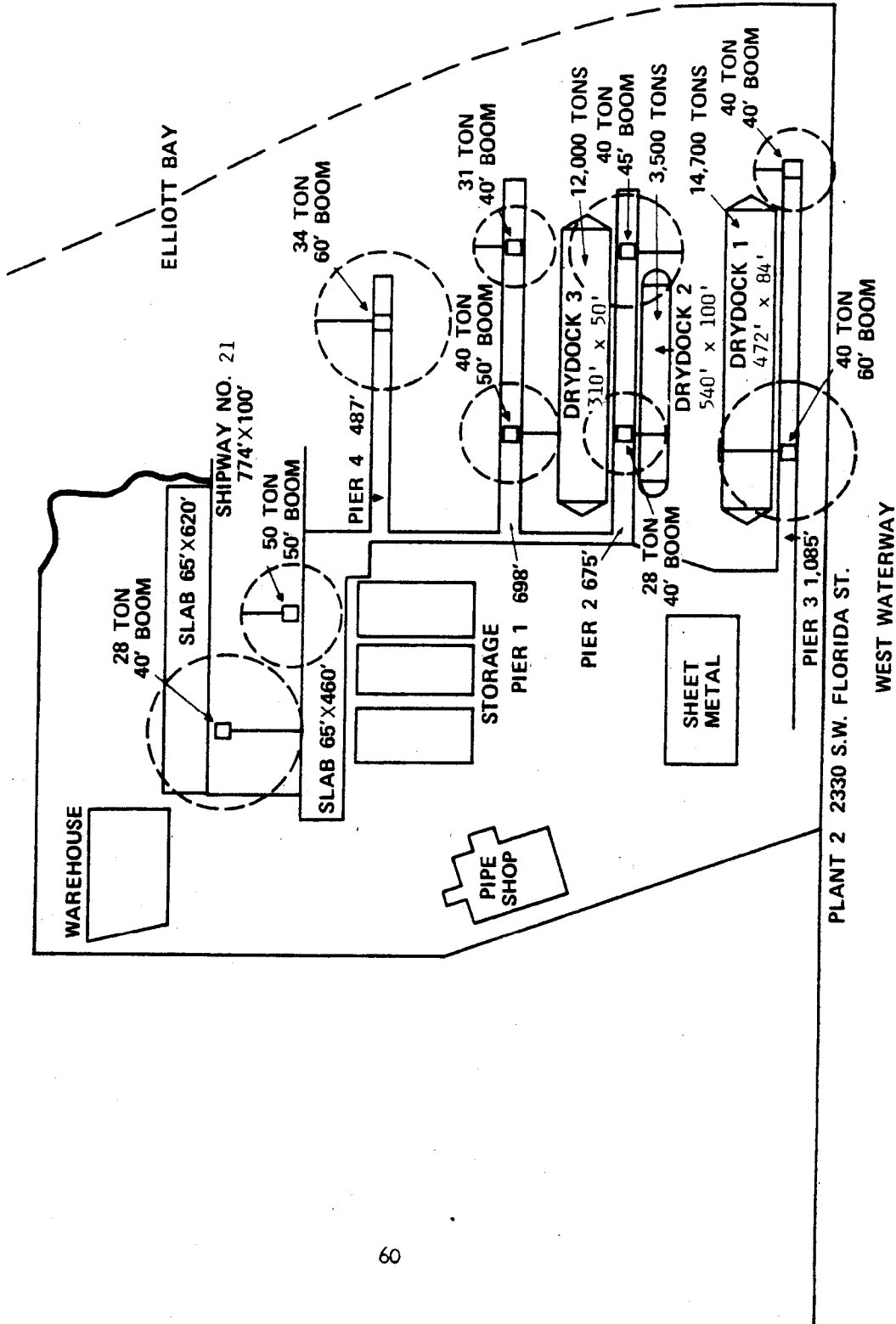
# LOCKHEED

PLANT 1

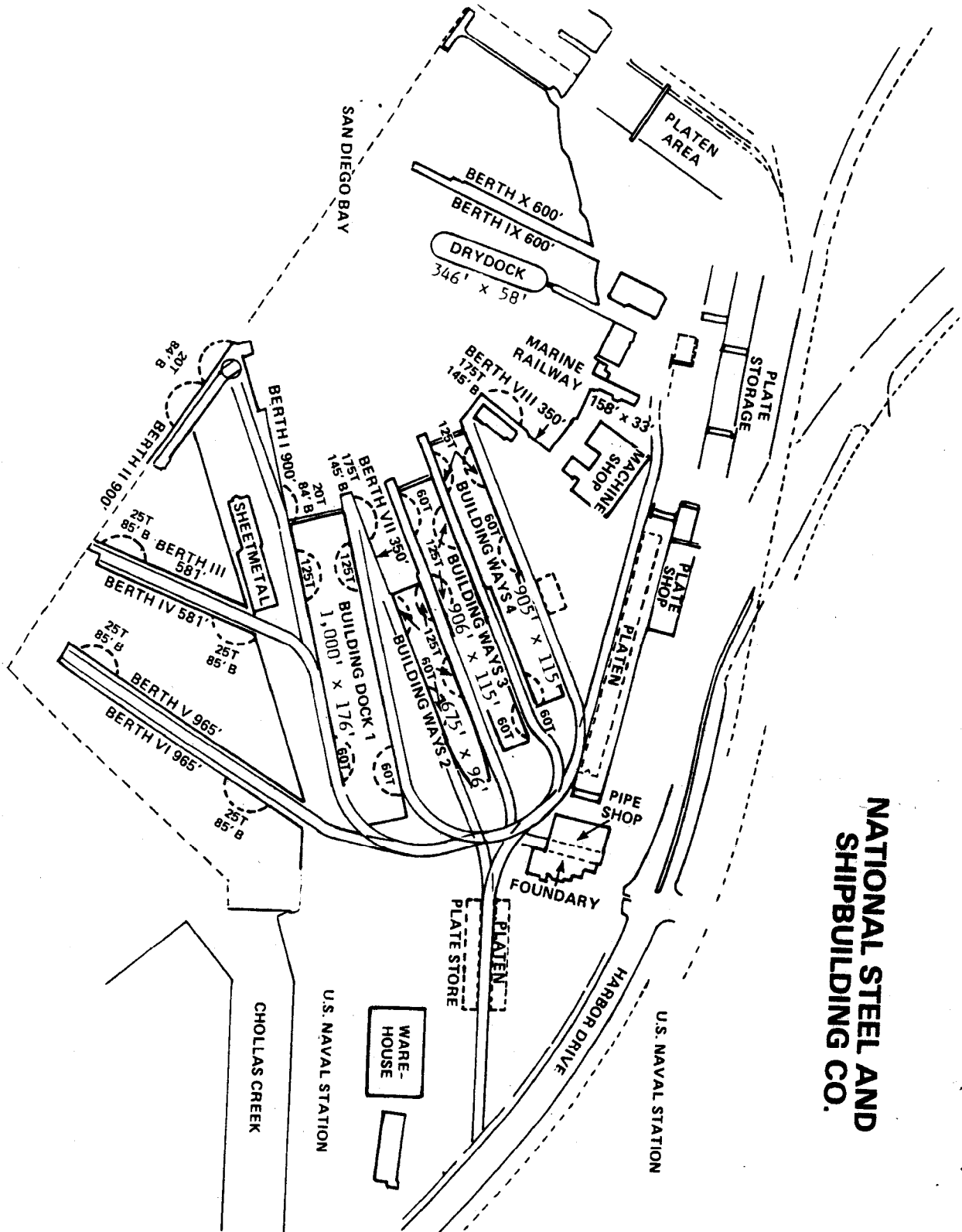


# LOCKHEED

PLANT 2

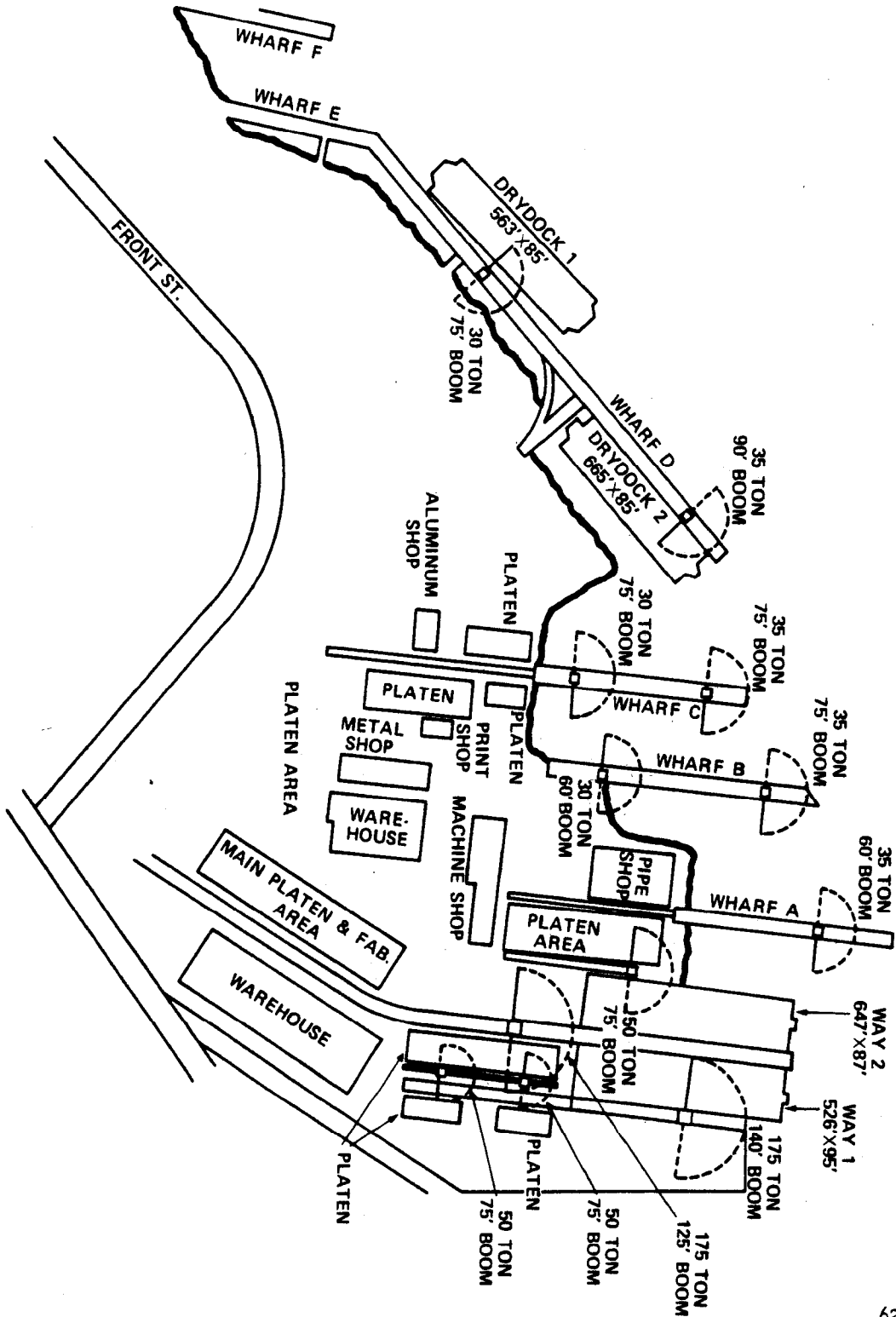


WEST WATERWAY



**NATIONAL STEEL AND SHIPBUILDING CO.**

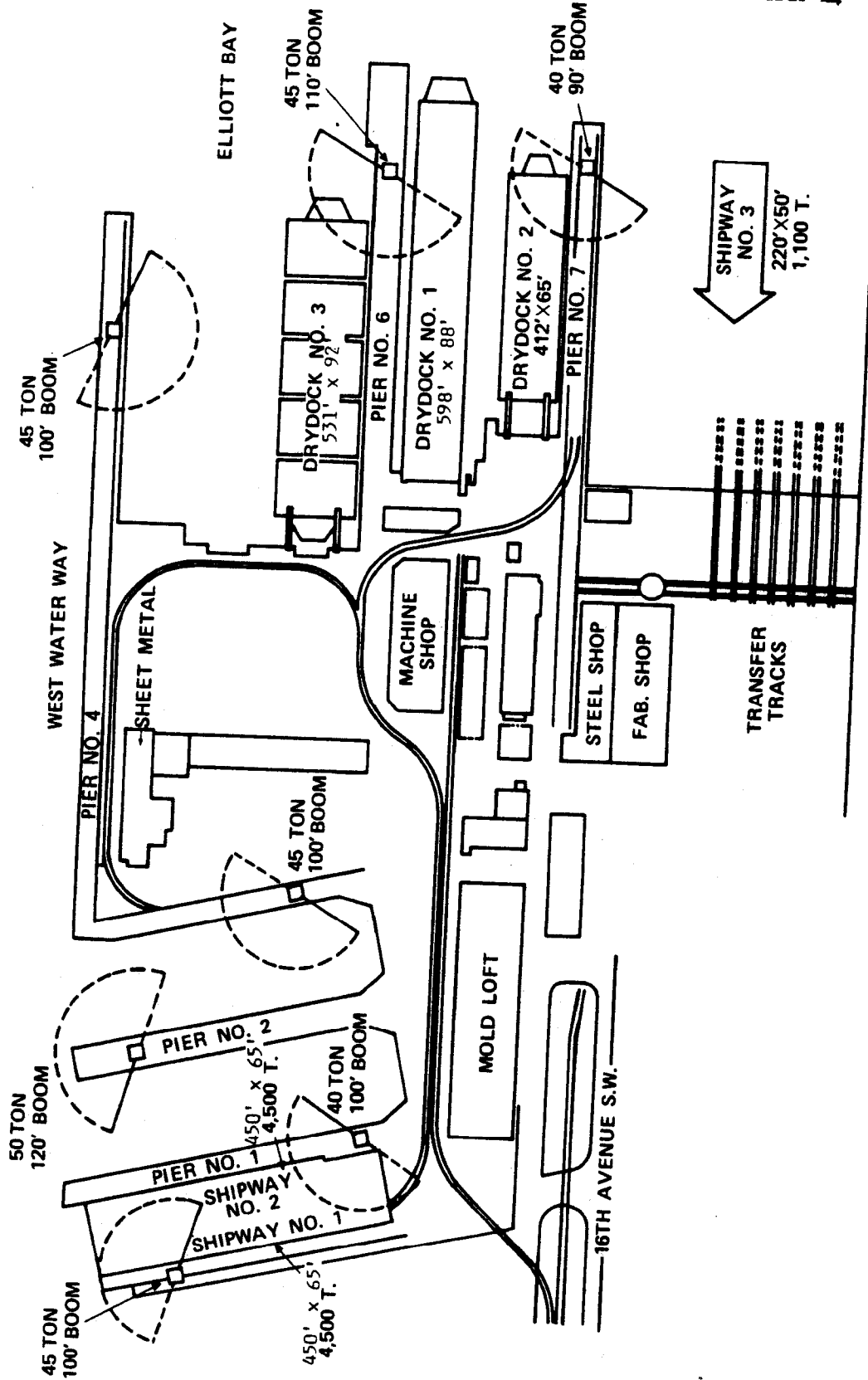
**TODD SHIPYARD CORPORATION**  
LOS ANGELES DIVISION



# TODD SHIPYARDS CORPORATION

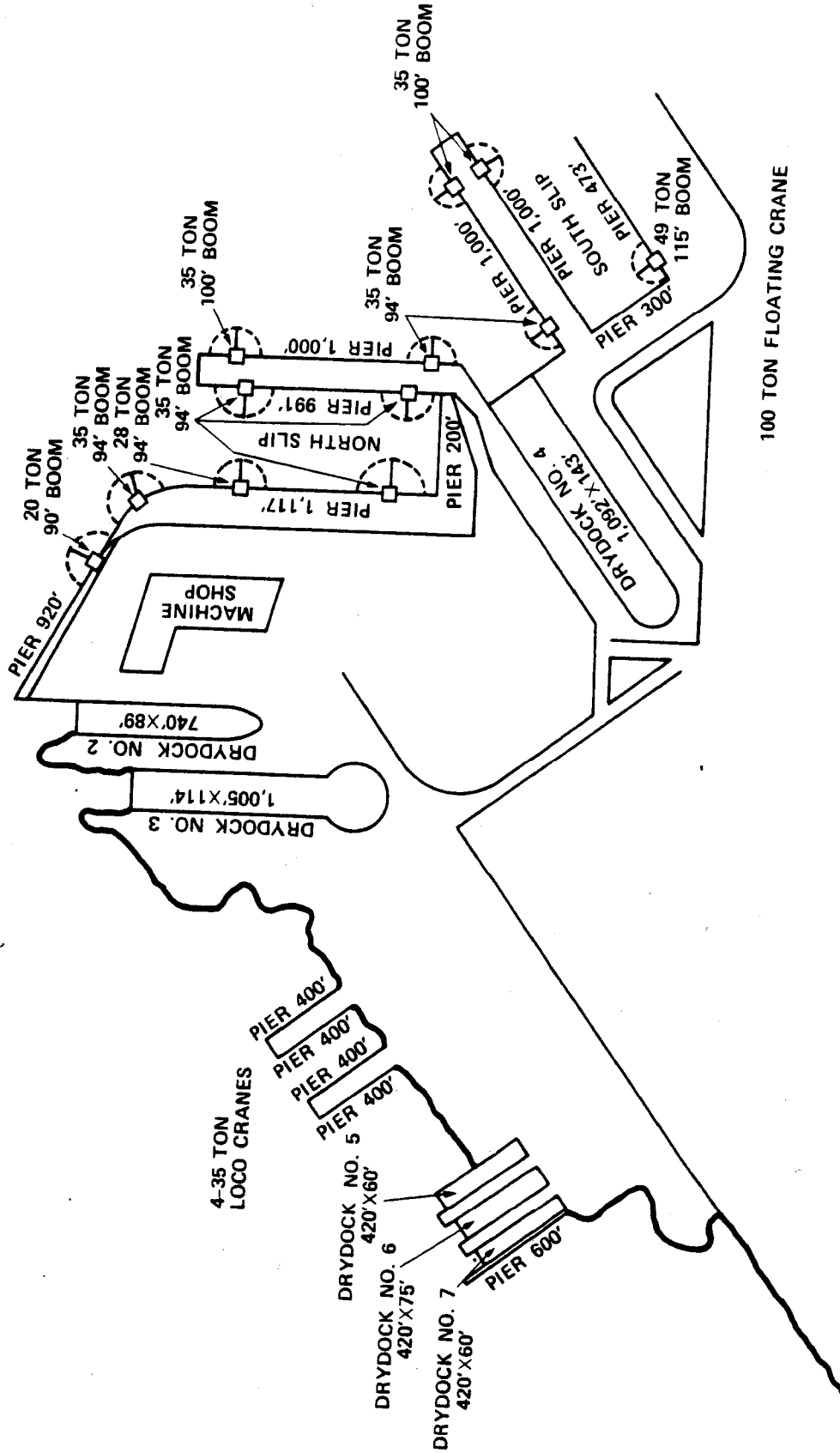
SEATTLE DIVISION

EXHIBIT 24



# TRIPLE "A" MACHINE SHOP, INC.

HUNTERS POINT



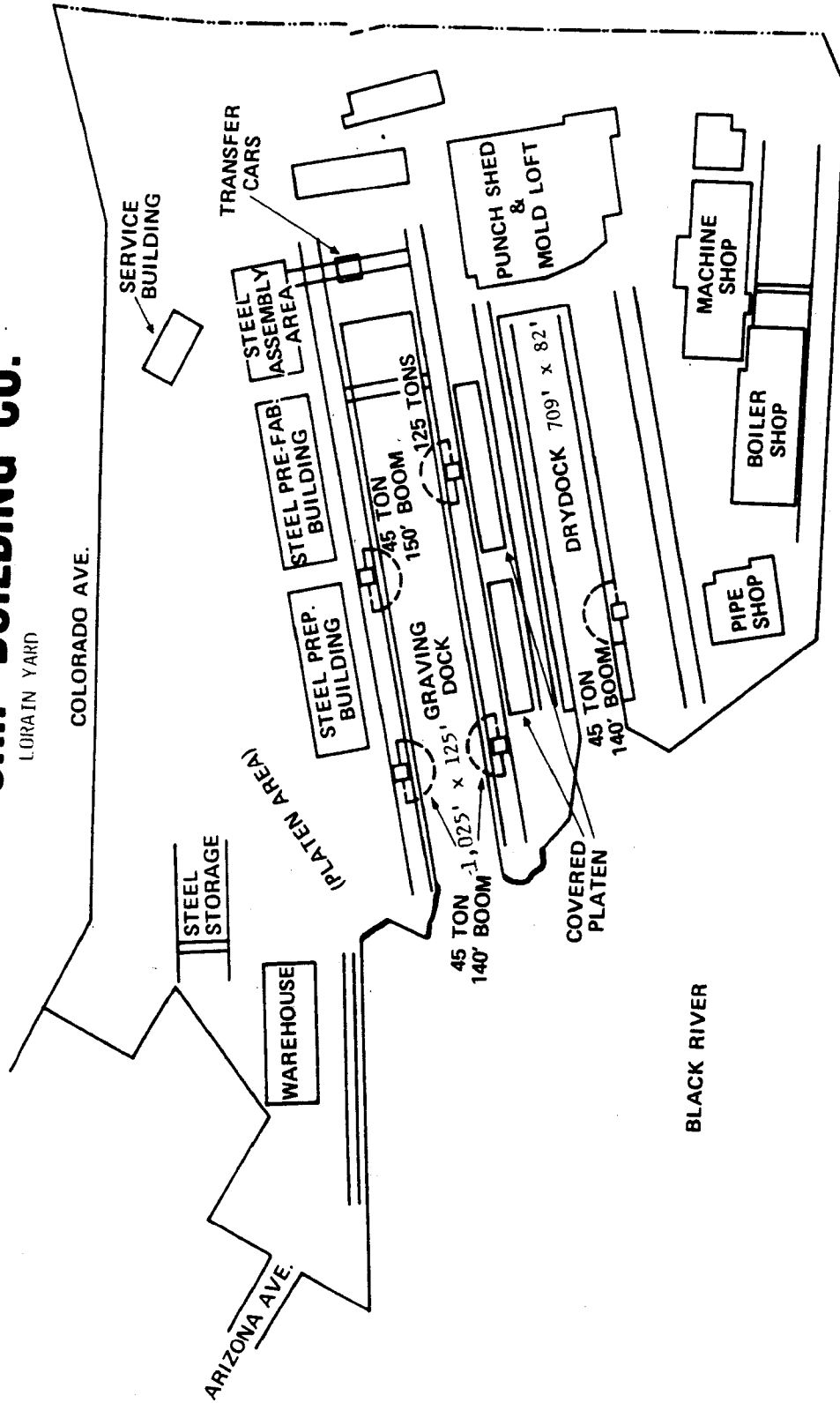
# AMERICAN SHIP BUILDING CO.

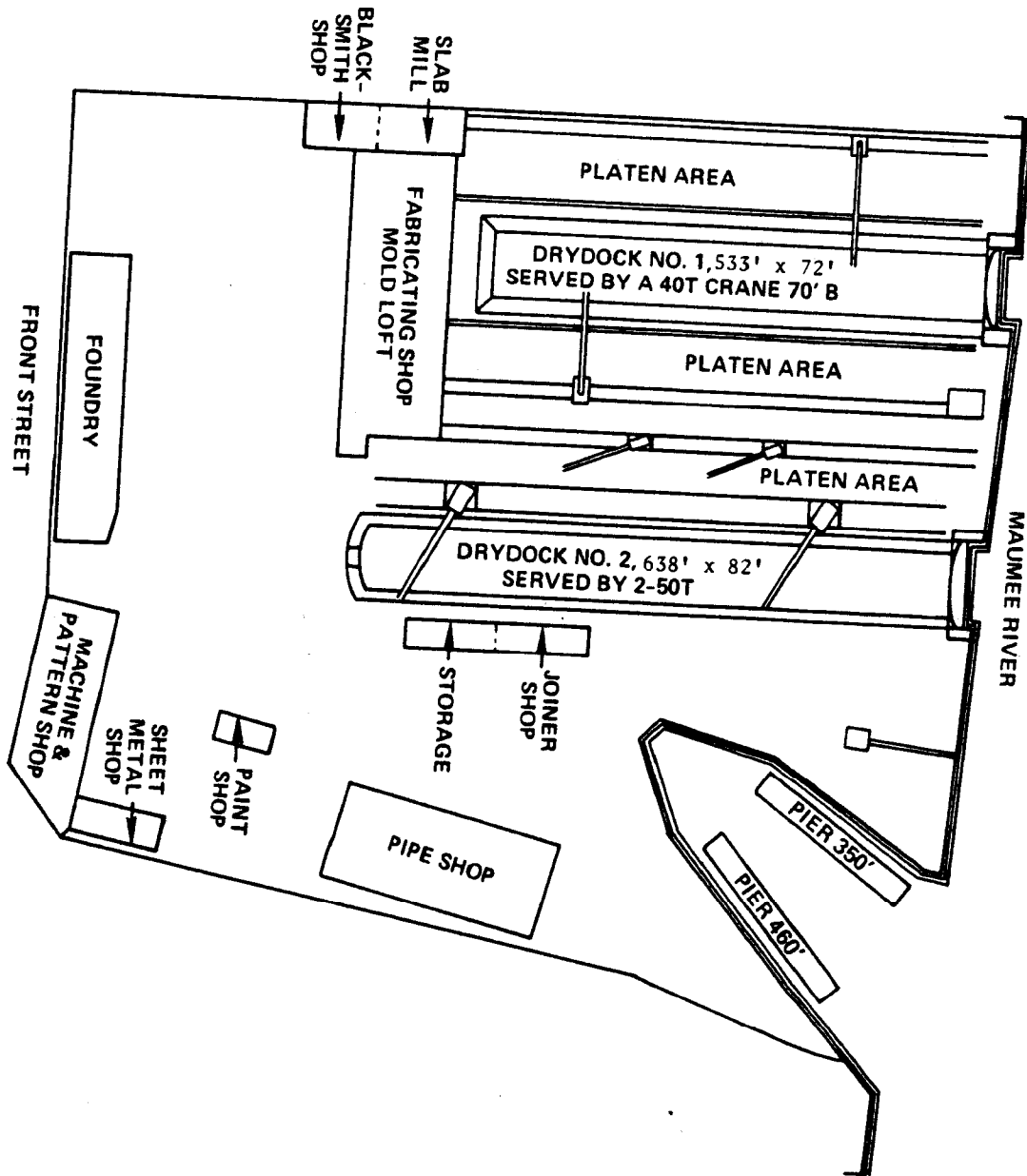
LORAIN YARD

COLORADO AVE.

ARIZONA AVE.

BLACK RIVER





**AMERICAN SHIP BUILDING CO.  
TOLEDO**



**BAY SHIPBUILDING CORPORATION**

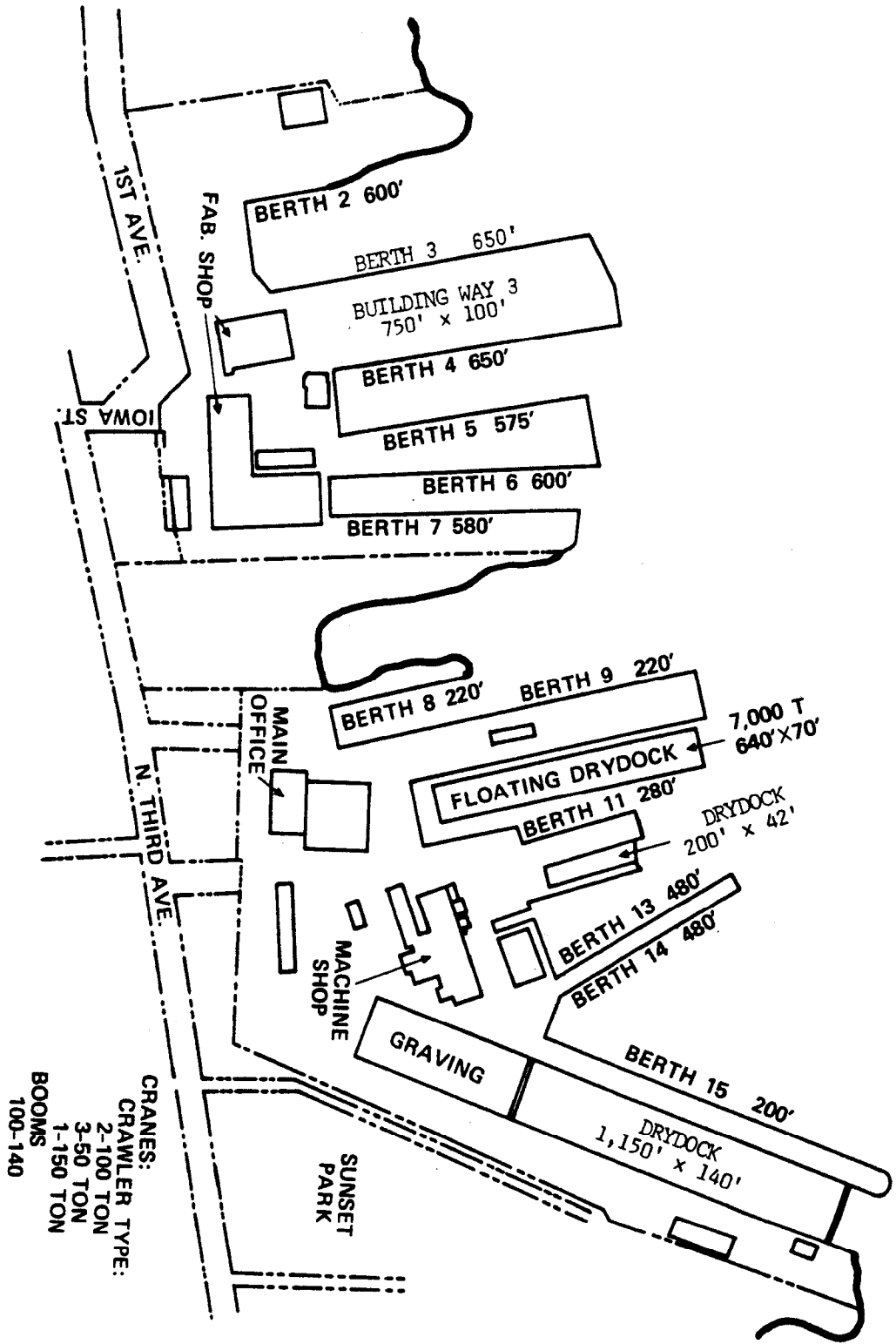
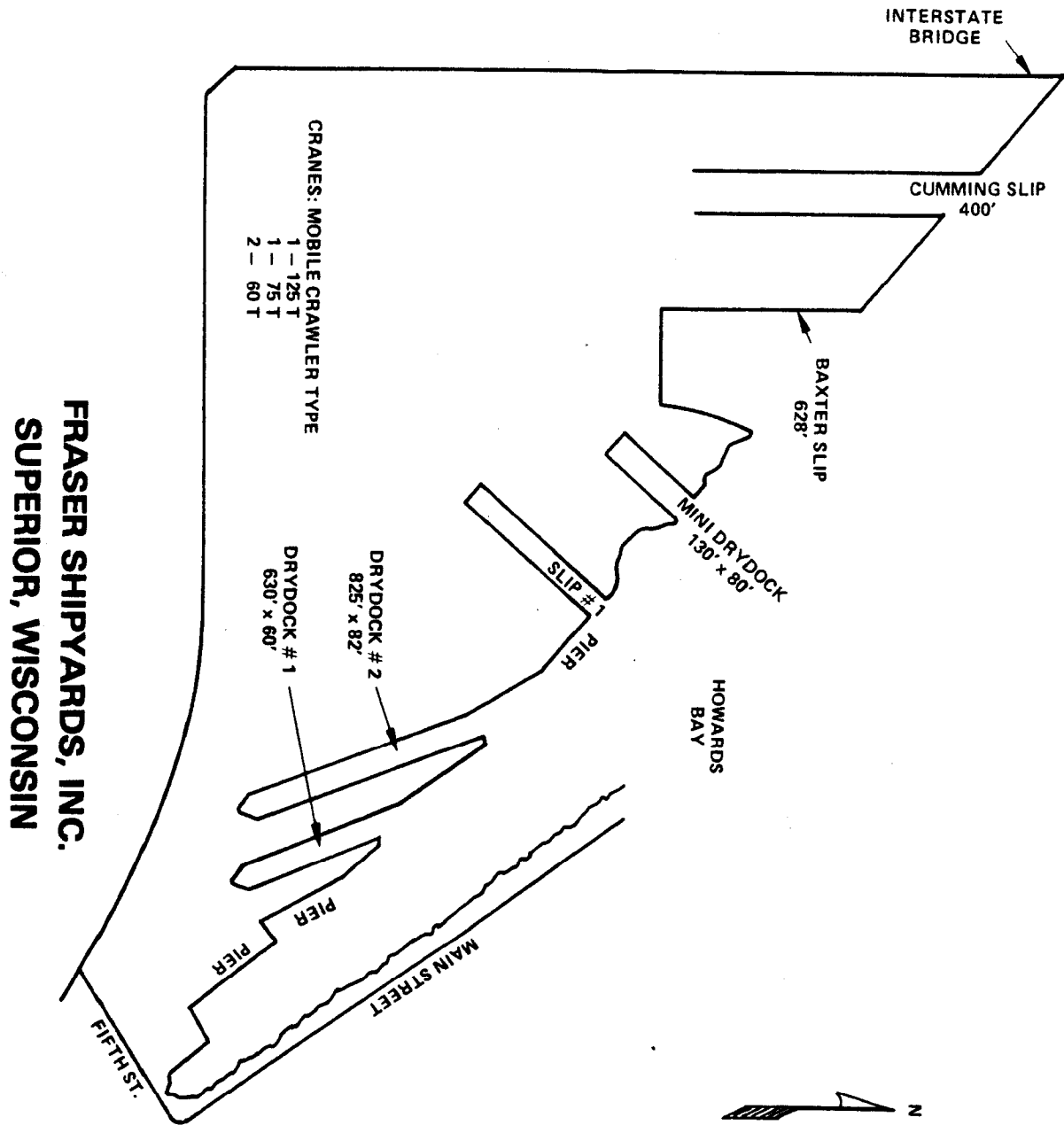
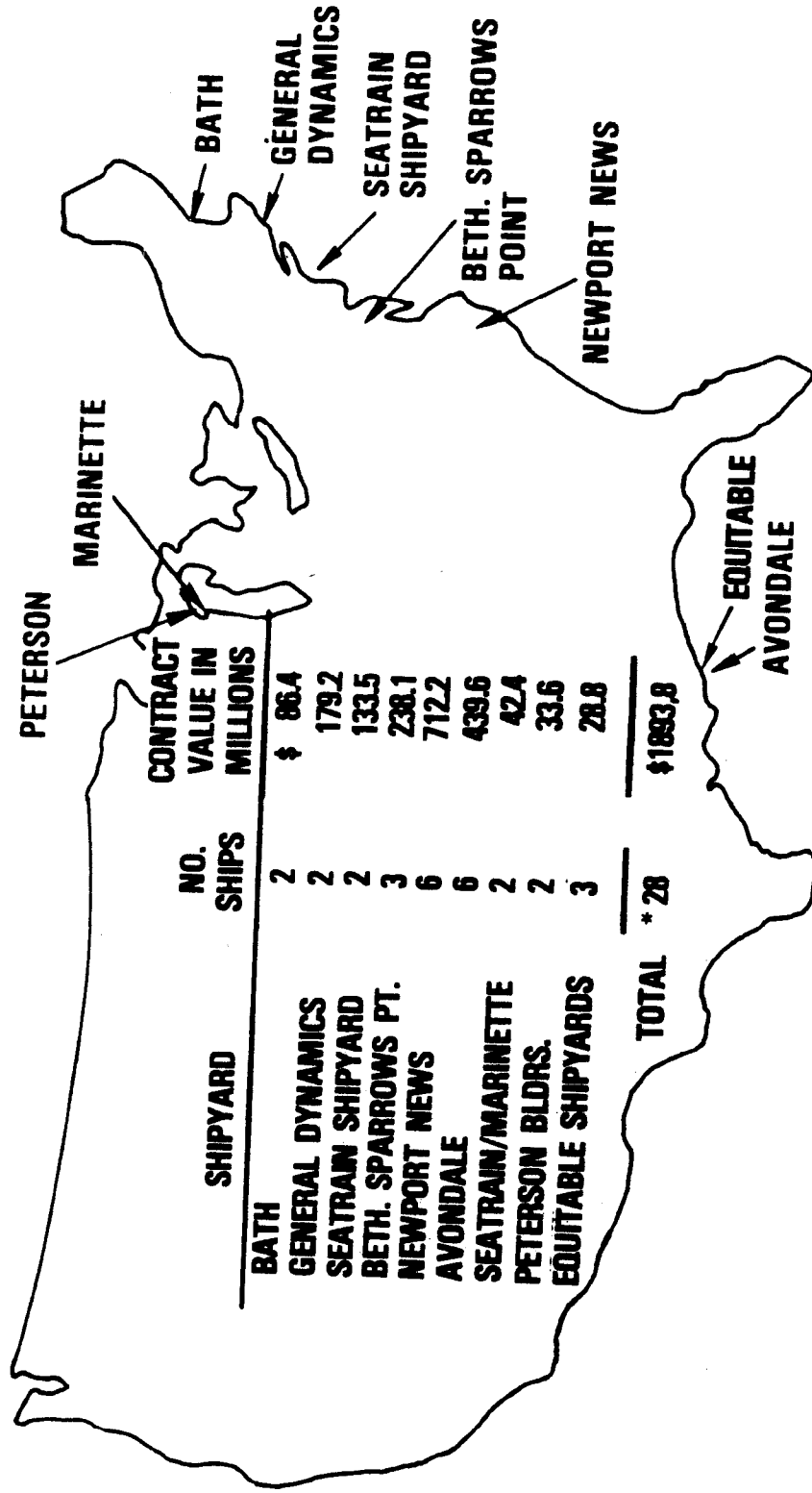


EXHIBIT 29



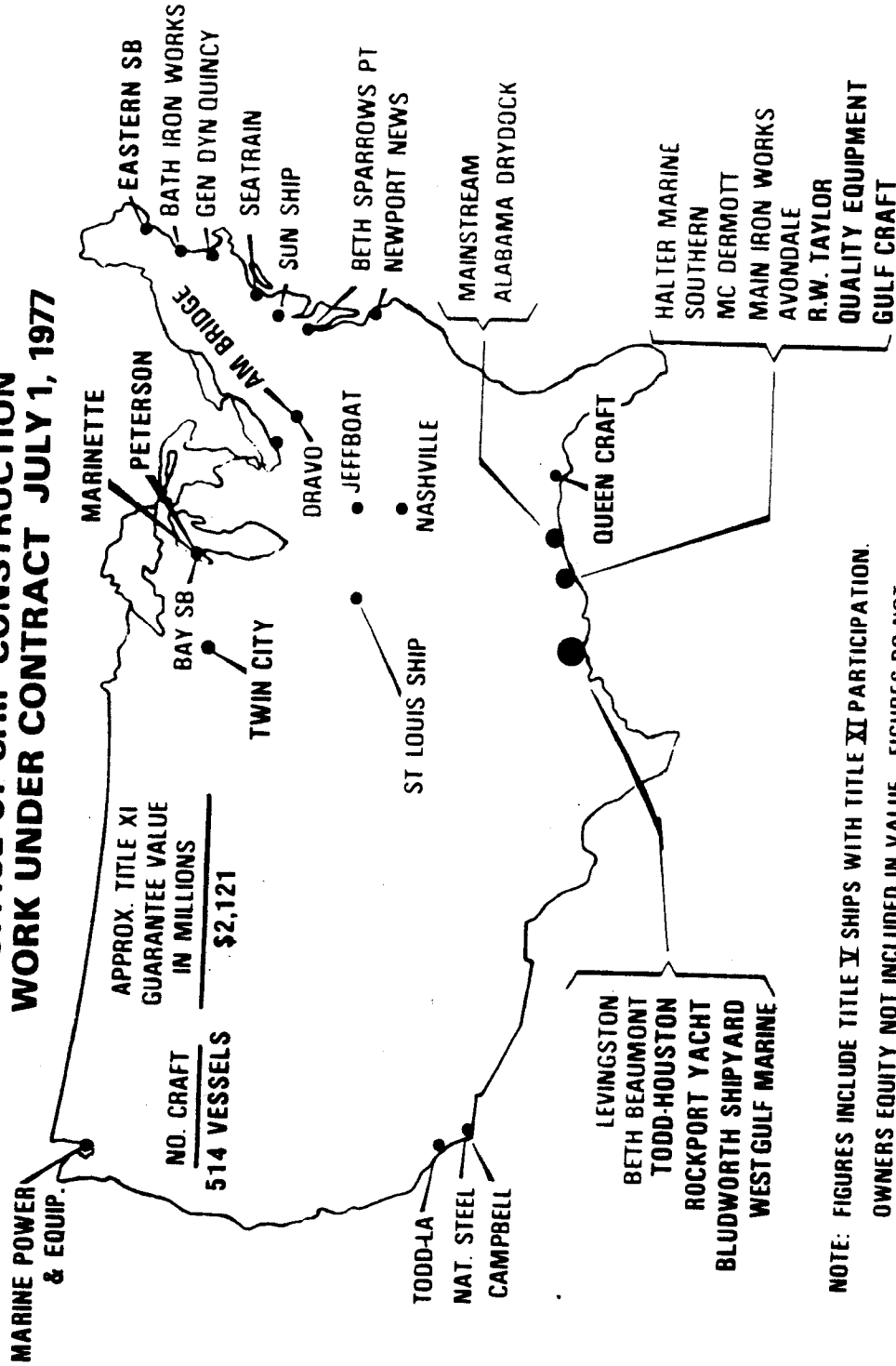
**FRASER SHIPYARDS, INC.  
SUPERIOR, WISCONSIN**

**SHIPBUILDING PROGRAM (TITLE V)  
OFFICE OF SHIP CONSTRUCTION  
SHIPS UNDER CONSTRUCTION JULY 1, 1977  
TOTAL CONTRACT VALUE, UNDELIVERED SHIPS**



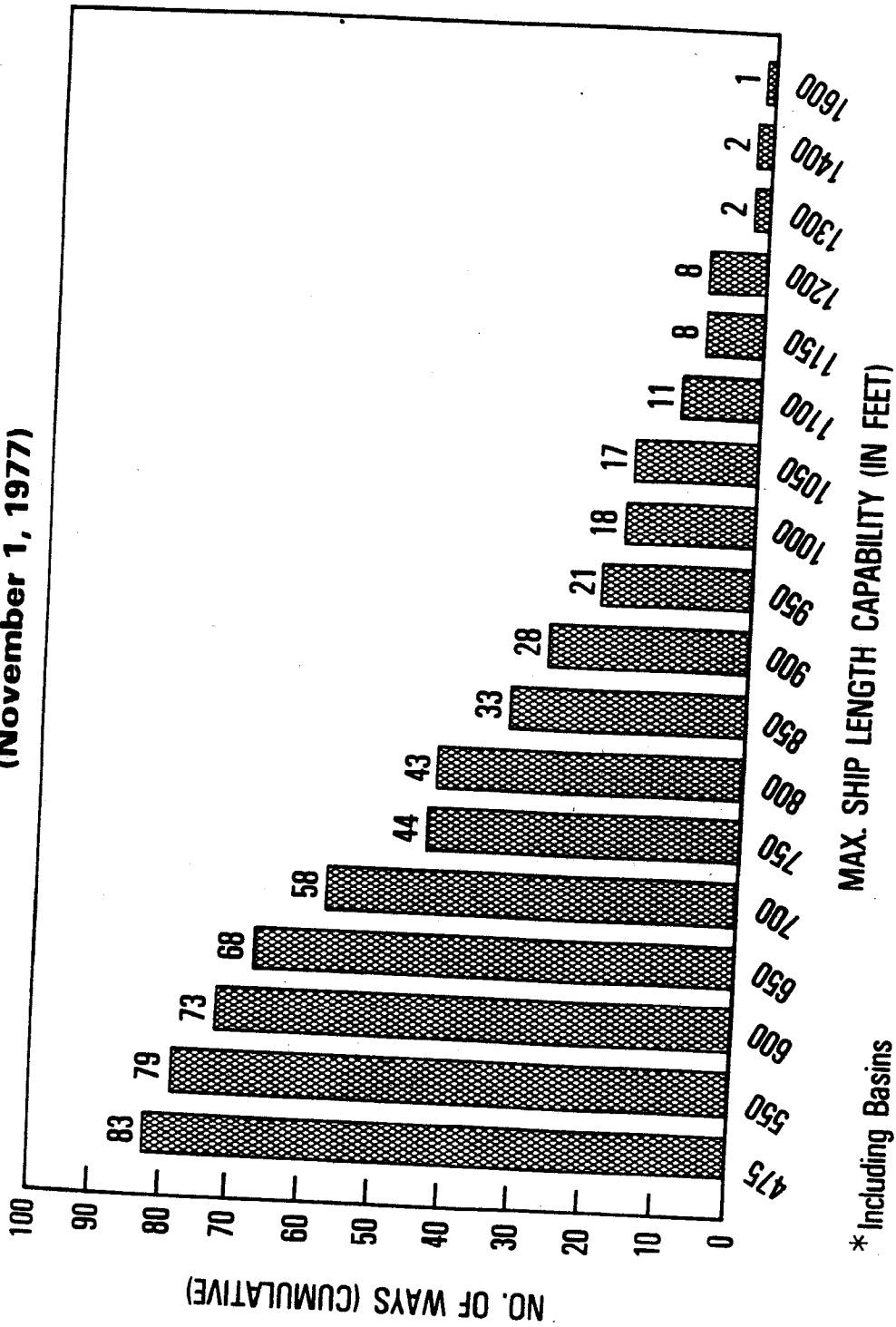
\* IN ADDITION TO 28 NEW SHIPS, SIX MAJOR TITLE CONVERSIONS, WITH A CONTRACT VALUE OF \$60.8 MILLION, ARE ALSO ON ORDER.

**SHIP FINANCING GUARANTEE CONSTRUCTION PROGRAM (TITLE XI)  
OFFICE OF SHIP CONSTRUCTION  
WORK UNDER CONTRACT JULY 1, 1977**



**NOTE:** FIGURES INCLUDE TITLE XI SHIPS WITH TITLE XI PARTICIPATION.  
OWNERS EQUITY NOT INCLUDED IN VALUE. FIGURES DO NOT  
INCLUDE VESSELS UNDER CONSTRUCTION FOR WHICH TITLE XI  
APPLICATION IS PENDING.

**MAJOR U.S. PRIVATE SHIPYARDS**  
**\* NUMBER OF SHIPWAYS BY MAXIMUM LENGTH CAPABILITY**  
**(November 1, 1977)**

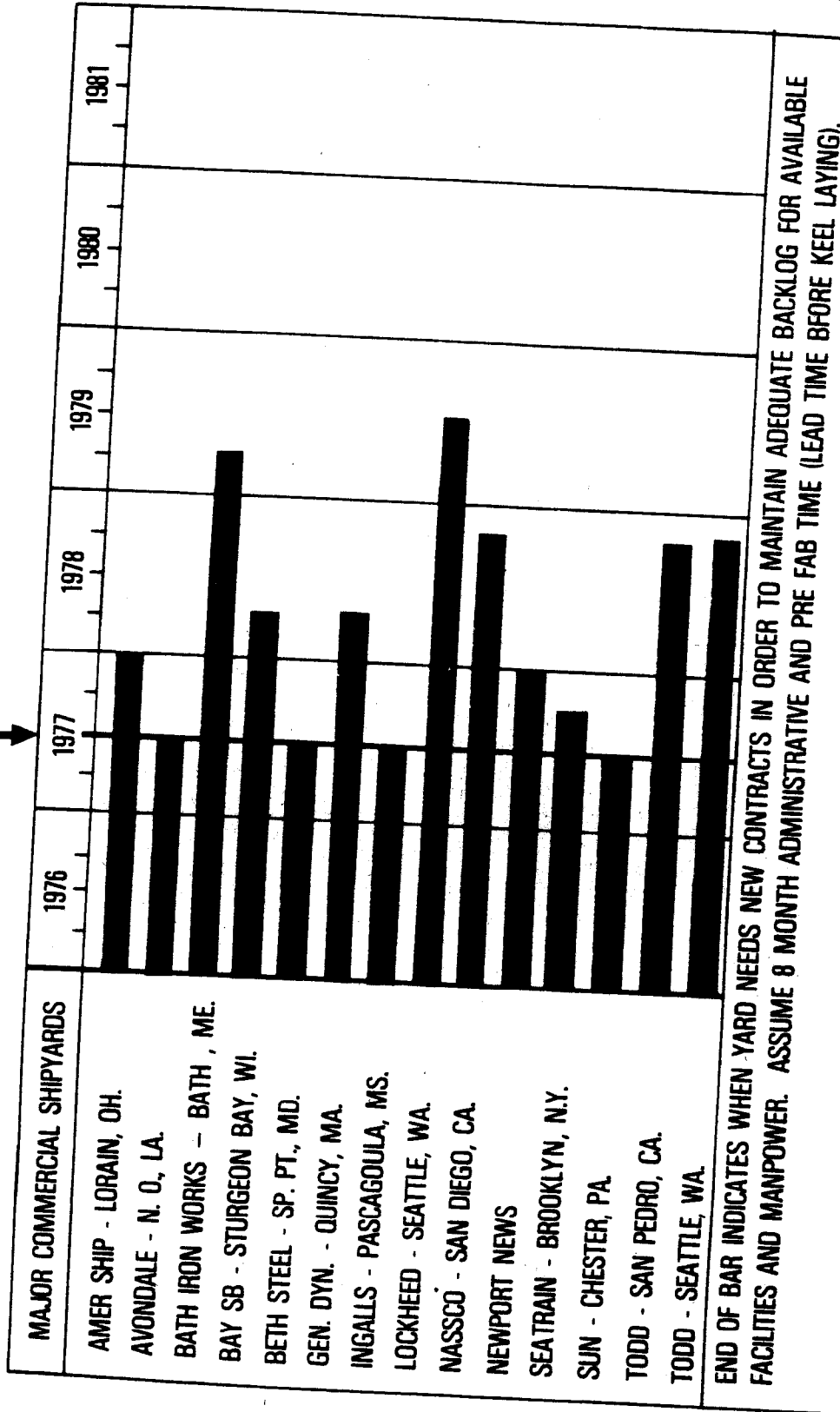


\* Including Basins

# SHIPYARD STATUS: NEED FOR NEW BUSINESS

U.S. DEPARTMENT OF COMMERCE  
MARITIME ADMINISTRATION

TIME NOW JULY 1, 1977



# U.S. SHIPYARD EMPLOYMENT

EXHIBIT 34

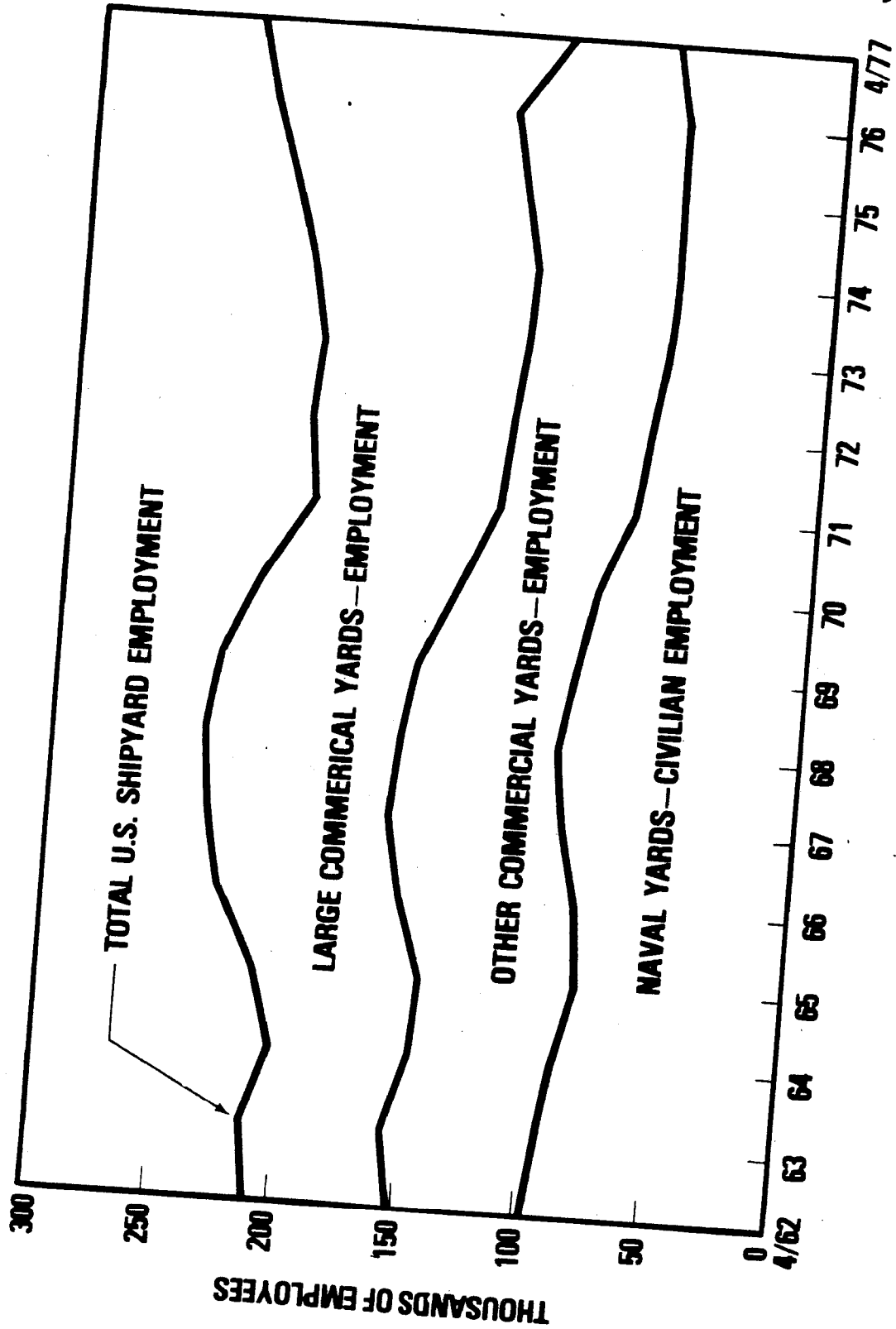


TABLE I

SHIP CONSTRUCTION CAPABILITY  
BY SHIP TYPE



TABLE 1

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE

Region	Shipyard	Shipway or Basin	Maximum Ship Size	General Cargo										Dry Bulk			
				Mob. Cargo 475 x 68	Mob. Cargo 598 x 97	Container 610 x 90	RO/RO 684 x 102	LASH 893 x 100	Container 947 x 106	21,300	570 x 75	51,000	600 x 105	100,000	900 x 106		
EAST	Bath Iron Works	A	650 x 88	1	0	1	0	0	0	0	0	1	1	0	0	0	
		B	700 x 130	1	1	1	1	0	0	0	0	1	1	1	1	0	
		C	700 x 130	1	1	1	1	0	0	0	0	1	1	1	1	0	
	Bethlehem Steel Sparrows Point	7	900 x 108	1	1	1	1	1	1	1	0	1	1	1	1	0	
		10	900 x 108 1200 x 192	1	1	1	1	1	1	1	0	1	1	1	1	1	
	General Dynamics Quincy	6	860 x 123	2	1	1	1	1	1	0	0	1	1	1	1	0	
		7	936 x 143	2	1	1	1	1	1	0	0	1	1	1	1	0	
		8	860 x 123	2	1	1	1	1	1	0	0	0	1	1	1	1	
		11	860 x 144	2	1	1	1	1	1	0	0	0	1	1	1	1	
		12	860 x 144	2	1	1	1	1	1	0	0	0	1	1	1	1	
	Maryland S/B & D/D	1	850 x 110	(10)	(5)	(5)	(5)	(5)	(1)	(0)	(0)	(5)	(5)	(5)	(1)	(1)	
	Newport News S/B	6	715 x 93	1	1	1	1	1	0	0	0	1	1	1	1	0	
		7	715 x 93	(1)	(1)	(1)	(1)	(1)	(0)	(0)	(0)	(1)	(1)	(1)	(1)	(0)	
		8	940 x 125	1	0	1	0	0	0	0	0	0	1	0	0	0	
		9	940 x 125	2	1	1	1	1	1	1	0	0	1	0	0	0	
		10	960 x 124	2	1	1	1	1	1	1	0	0	1	1	1	1	
		11	1100 x 136	2	1	2	1	1	1	1	0	0	1	1	1	1	
		12	1600 x 240	9	5	5	4	1	1	1	2	2	2	2	2		
				(19)	(10)	(13)	(8)	(5)	(3)	(14)	(9)	(5)	(1)	(5)			

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE

Region	Shipyard	Shipway or Resin	Maximum Ship Size	General Cargo							Dry Bulk			
				Mob. Cargo 475 x 68	Mob. Cargo 598 x 97	Container 610 x 90	RD/RO 684 x 102	LASH 893 x 100	Container 947 x 106	21,300 570 x 75	51,000 600 x 105	100,000 900 x 106		
Seatrain S/B Corp.	3	5	720 x 112	1	1	1	1	0	0	1	1	0		
			1094 x 143	3	2	2	1	1	1	3	2	1		
			1094 x 143	3	2	2	1	1	1	3	2	1		
	Sun S/B & D/D	6	8	745 x 129	(7)	(5)	(5)	(3)	(2)	(2)	(2)	(7)	(5)	(2)
				745 x 129	1	1	1	1	0	0	1	1	0	
				700 x 195	1	1	1	1	0	0	1	1	0	
TOTAL EAST COAST	Slab A	Slab B	700 x 195	2	2	2	1	1/2	1/2	1/2	2	1	1/2	
			700 x 195	2	2	2	1	1/2	1/2	2	1	1/2		
			700 x 195	(6)	(6)	(6)	(4)	(1)	(1)	(6)	(4)	(1)		
				<u>52</u>	<u>35</u>	<u>38</u>	<u>27</u>	<u>12</u>	<u>7</u>	<u>42</u>	<u>31</u>	<u>12</u>		
GULF	Alabama D/D & S/B	1	523 x 68	1	0	0	0	0	0	0	0	0	0	
			523 x 68	1	0	0	0	0	0	0	0	0	0	
			523 x 68	1	0	0	0	0	0	0	0	0	0	
			620 x 90	1	0	1	0	0	0	0	0	1	0	0
			620 x 90	(4)	(0)	(1)	(0)	(0)	(0)	(0)	(0)	(1)	(0)	(0)
Avondale	1	2	600 x 80	1	0	0	0	0	0	0	1	0	0	
			1200 x 126	6	6	5	5	5	5	6	6	5		
			1050 x 174	6	3	3	3	3	3	3	3	3		
				(13)	(9)	(8)	(8)	(8)	(8)	(10)	(9)	(8)		
Beth. Beaumont	1	1	842 x 96	1	1	1	1	0	0	0	1	0	0	
			842 x 96	(1)	(1)	(1)	(1)	(0)	(0)	(1)	(0)	(0)	(0)	

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE

Region	Shipyard	Shipway or Basin	Maximum Ship Size	General Cargo							Dry Bulk		
				Mob. Cargo 475 x 68	Mob. Cargo 598 x 97	Container 610 x 90	RD/RC 684 x 102	LASH 893 x 100	Container 947 x 106	21,300 570 x 75	51,000 600 x 105	100,000 900 x 106	
	Galveston S/B	5	700 x 120	1 (1)	1 (1)	1 (1)	1 (1)	0 (0)	0 (0)	0 (0)	1 (1)	1 (1)	0 (0)
	Levingston SB	1	700 x 100	2 (2)	1 (1)	1 (1)	0 (0)	0 (0)	0 (0)	1 (1)	1 (1)	0 (0)	0 (0)
	Litton/Ingalls	1	690 x 85	1	0	0	0	0	0	0	1	0	0
		2	550 x 80	1	0	0	0	0	0	0	0	0	0
		7	650 x 90	1	0	1	0	0	0	0	1	0	0
		8	650 x 90	1	0	1	0	0	0	0	1	0	0
		9	650 x 90	1	0	1	0	0	0	0	1	0	0
		10	650 x 90	1	0	1	0	0	0	0	1	0	0
		WB	800 x 175	6 (12)	6 (6)	6 (10)	6 (6)	0 (0)	0 (0)	0 (0)	6 (11)	6 (6)	0 (0)
	Marathon	1	1100 x 150	4 (4)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
	Tampa Ship Repair	3	650 x 150	1 (1)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)	1 (1)	0 (0)
	<b>TOTAL GULF COAST</b>			<b>38</b>	<b>19</b>	<b>24</b>	<b>17</b>	<b>2</b>	<b>2</b>	<b>27</b>	<b>18</b>	<b>2</b>	<b>0</b>
WEST	Beth. San Francisco	4	550 x 90	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE

Region	Shipyard	Shipway or Basin	Maximum Ship Size	General Cargo							Dry Bulk			
				Mob. Cargo 475 x 68	Mob. Cargo 598 x 97	Container 610 x 90	RO/RO 684 x 102	LASH 893 x 100	Container 947 x 106	21,300 570 x 75	51,000 600 x 105	100,000 900 x 106		
	FMC Corporation	4	700 x 105	1 (1)	1 (1)	1 (1)	1 (1)	0 (0)	0 (0)	1 (1)	1 (1)	1 (1)	0 (0)	
	Lockheed S/B	1	650 x 90	1	0	1	0	0	0	1	0	0	0	
		3	650 x 90	1	0	1	0	0	0	1	0	0	0	
		21	700 x 100	1	1	1	0	0	0	1	0	0	0	
				(3)	(1)	(3)	(0)	(0)	(0)	(3)	(0)	(0)	(0)	
	National Steel & S/B	1	980 x 170	4	2	1	1	1	1	2	1	1	1	
		2	690 x 90	1	0	1	0	0	0	1	0	0	0	
		3	900 x 106	1	1	1	1	1	0	1	1	1	1	
		4	900 x 106	1	1	1	1	1	0	1	1	1	1	
				(7)	(4)	(4)	(5)	(3)	(1)	(5)	(3)	(3)	(3)	
	Todd, San Pedro	1	800 x 84	1	0	0	0	0	0	1	0	0	0	
		2	800 x 84	1	0	0	0	0	0	1	0	0	0	
				(2)	(0)	(0)	(0)	(0)	(0)	(2)	(0)	(0)	(0)	
	Todd, Seattle	1A	550 x 96	1	0	0	0	0	0	0	0	0	0	
				(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	
	Triple "A" Hunters Point	2	715 x 82	1	0	0	0	0	0	1	0	0	0	
		3	996 x 107	2	1	1	1	1	1	1	1	1	1	
		4	1088 x 136	4	1	1	1	1	1	2	1	1	1	
				(7)	(2)	(2)	(2)	(2)	(2)	(4)	(2)	(2)	(2)	
	<b>TOTAL WEST COAST</b>			<u>22</u>	<u>8</u>	<u>10</u>	<u>6</u>	<u>5</u>	<u>3</u>	<u>15</u>	<u>6</u>	<u>5</u>	<u>5</u>	

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE

Region	Shipyard	Shipway or Basin	Maximum Ship Size	General Cargo									Dry Bulk					
				Mob. Cargo 475 x 68	Mob. Cargo 598 x 97	Container 610 x 90	RO/RO 684 x 102	LASH 893 x 100	Container 947 x 106	21,300	570 x 75	51,000	600 x 105	100,000	900 x 106			
GREAT LAKES	American S/B-Lorain	GD2	705 x 78	1	0	0	0	0	0	0	0	1	0	0	0	0		
		GD3	1021 x 121	2 (3)	1* (1)	1* (1)	1* (1)	1* (1)	1* (1)	1* (1)	1* (1)	1 (2)	1* (1)	1* (1)	1* (1)	1* (1)	0 (1)	
	American S/B-Toledo	GD1	529 x 68	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
		GD2	634 x 78	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	Bay S/B Corp.	GD1	1146 x 136	2	1*	1*	1*	1*	1*	1*	1*	1	1*	1*	1*	1*	1*	
		3	750 x 105	1 (3)	1* (2)	1* (2)	1* (2)	1* (2)	1* (2)	1* (2)	1* (2)	1 (2)	1* (2)	1* (2)	1* (2)	1* (2)	1* (2)	0 (1)
	Fraser Shipyards	GD2	825 x 76	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
		TOTAL GREAT LAKES		9	3	3	3	3	3	3	3	2	2	2	2	2	2	2
TOTAL POSITIONS ALL YARDS				<u>121</u>	<u>65</u>	<u>75</u>	<u>53</u>	<u>28</u>	<u>21</u>	<u>20</u>	<u>58</u>	<u>28</u>						

\*Maximum size ship that can exit St. Lawrence Seaway locks is 730' x 78'.



Region	Shipyard	Shipway or Basin	Maximum Ship Size	25,000 620 x 75	38,000 688 x 90	89,000 894 x 105	120,000 920 x 138	125,000 cu. ft. 932 x 140	225,000 1100 x 140	265,000 1100 x 178	390,770 1204 x 228	80,000	886 x 106	160,000 998 x 143		
GULF	Seatrain S/B Corp.	3	720 x 112	1	1	0	0	0	0	0	0	0	0	0		
		5	1094 x 143	2	1	1	1	1	1	1	1	1	1	1		
		6	1094 x 143	2	1	1	1	1	1	1	1	1	1	1		
		6	745 x 129	1	1	0	0	0	0	0	0	0	0	0		
		8	745 x 129	1	1	0	0	0	0	0	0	0	0	0		
		Slab A	2	700 x 195	2	2	2	2	2	2	2	2	2	2	2	
GULF	Sun S/B & D/D	Slab B	700 x 195	2	2	2	2	2	2	2	2	2	2	2		
		TOTAL EAST COAST		38	31	13	7	7	6	3	2	13	13	6		
		GULF	Alabama D/H & S/B	1	523 x 68	0	0	0	0	0	0	0	0	0	0	0
				2	523 x 68	0	0	0	0	0	0	0	0	0	0	0
				4	523 x 68	0	0	0	0	0	0	0	0	0	0	0
				5	620 x 90	1	0	0	0	0	0	0	0	0	0	0
TOTAL				(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)		
81	Avondale	1	600 x 80	0	0	0	0	0	0	0	0	0	0	0		
		2	1200 x 126	5	5	5	5	5	5	5	5	5	5	5		
		3	1050 x 174	3	3	3	3	3	3	3	3	3	3	3		
Beth. Beaumont	1	842 x 96	(8)	(8)	(8)	(3)	(3)	(0)	(0)	(0)	(0)	(8)	(8)	(3)		
	TOTAL		(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)		
Galveston S/B	1	700 x 120	1	1	0	0	0	0	0	0	0	0	0	0		
	5		(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)		

\*Sun Ship has capability of building a ship of this deadweight tonnage if deeper draft to compensate for shipways' beam limitation of 195 feet.

Region	Shipyard	Shipway or Basin	Maximum Ship Size	Tankers										OBO					
				25,000 620 x 75	38,000 688 x 90	89,000 896 x 105	120,000 920 x 138	125,000 cu. m. 932 x 140	225,000 1100 x 140	265,000 1100 x 178	390,720 1204 x 228	80,000 886 x 106	160,000 998 x 143						
WEST	Levingston	1	700 x 100	1 (1)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)		
		Litton/Ingalls	1	690 x 85	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			2	550 x 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			7	650 x 90	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			8	650 x 90	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			9	650 x 90	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			10	650 x 90	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		WB	800 x 173	6 (11)	6 (6)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	
		Marathon	1	1100 x 150	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
		Tampa Ship Repair	3	650 x 150	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
TOTAL GULF COAST				25	18	9	4	4	1	10	10	0	0	0	0	0	0		
WEST	Beth. San Francisco	4	550 x 90	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)		
		4	700 x 105	1 (1)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)		
		1	650 x 90	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		3	650 x 90	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Lockheed S/B		21	700 x 100	1 (3)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)		



Region	Shipyard	Shipway or Basin	Maximum Ship Size	Tankers										OBO									
				25,000 620 x 75	38,000 688 x 90	89,000 894 x 105	120,000 920 x 138	125,000 cu. M. 932 x 140	225,000 1100 x 140	265,000 1100 x 178	390,770 1204 x 228	80,000 886 x 106	160,000 998 x 143										
National Steel & S/B		1	980 x 170	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0			
		2	690 x 90	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		3	900 x 106	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		4	900 x 106	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Todd, San Pedro		1	800 x 84	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		2	800 x 84	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Todd, Seattle	1A		550 x 96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Triple "A" Hunters Point		2	715 x 82	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		3	996 x 107	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		4	1088 x 136	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				(4)	(2)	(2)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
TOTAL WEST COAST				15	8	5	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
GREAT LAKES	American S/B-Lorain	GD2	705 x 78	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		GD3	1021 x 121	1	1*	1*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
GREAT LAKES	American S/B-Toledo	GD1	529 x 68	(2)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)		
		GD2	634 x 78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
				(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	

\*Maximum size ship that can exit St. Lawrence Seaway locks is 730' x 78'.

Region	Shipyard	Shipway or Basin	Maximum Ship Size	25,000 620 x 75	38,000 688 x 90	89,000 894 x 105	120,000 920 x 138	125,000 Gr. M. 932 x 140	225,000 1100 x 140	265,000 1100 x 178	390,170 1204 x 228	80,000 886 x 106	160,000 998 x 143	
Bay S/B Corp.	GD1	3	1146 x 136	1	1*	1*	0	0	0	0	0	0	0	
			750 x 105	1	1*	0	0	0	0	0	0	0	0	0
				(2)	(2)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Fraser Shipyards	GD2	825 x 76	1	0	0	0	0	0	0	0	0	0	0	
			(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
TOTAL GREAT LAKES				6	3	2	0	0	0	0	0	2	0	
TOTAL POSITIONS ALL YARDS				85	60	29	12	12	7	3	2	27	12	

\*Maximum size ship that can exit St. Lawrence Seaway locks is 730' x 78'.

SHIP CONSTRUCTION CAPABILITY BY SHIP TYPE  
SUMMARY

REGION	GENERAL CARGO						DRY BULK				TOTAL POSITIONS ALL YARDS
	Mob. Cargo 475 x 68	Mob. Cargo 598 x 97	Container 610 x 90	RO/RO 684 x 102	LASH 893 x 100	Container 947 x 106	21,300 570 x 75	51,000 600 x 105	100,000 900 x 106		
East Coast	52	35	38	27	12	7	42	31	12		
Gulf Coast	38	19	24	17	9	9	27	18	9		
West Coast	22	8	10	6	5	3	15	6	5		
Great Lakes	9	3	3	3	2	2	6	3	2		
TOTAL POSITIONS ALL YARDS	121	65	75	53	28	21	90	58	28		

58

REGION	TANKERS										TOTAL POSITIONS ALL YARDS
	25,000 620 x 75	38,000 688 x 90	89,000 894 x 105	120,000 920 x 138	125,000Cu.M. 932 x 140	225,000 1100 x 140	265,000 1100 x 178	390,770 1204 x 228	80,000 886 x 106	160,000 998 x 143	
East Coast	38	31	13	7	7	6	3	2	13	6	
Gulf Coast	25	18	9	4	4	1	0	0	9	4	
West Coast	15	8	5	1	1	0	0	0	3	2	
Great Lakes	7	3	2	0	0	0	0	0	2	0	
TOTAL POSITIONS ALL YARDS	85	60	29	12	12	7	3	2	27	12	

TABLE II

MAJOR U.S. PRIVATE SHIPYARDS  
NUMBER OF SHIPBUILDING WAYS BY LENGTH  
(MAXIMUM SHIP SIZE)

TABLE II

MAJOR U.S. PRIVATE SHIPYARDS

NUMBER OF SHIPBUILDING WAYS BY LENGTH (MAX. SHIP SIZE)

Length OA (In Feet):	475	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1300	1400	1600
<u>ATLANTIC COAST</u>																		
Bath Iron Works	3	3	3	3	2													
Beth-Sparrows Point	3	3	3	3	3	3	3	3	3	1	1	1	1	1				
General Dynamics, Quincy	5	5	5	5	5	5	5	5	1									
Maryland SB & DD	1	1	1	1	1	1	1	1										
Newport News SB & DD	7	7	7	7	7	5	5	5										
Seatrains SB Corp	3	3	3	3	3	2	2	2	2	2	2	2	2	1	1	1	1	1
Sun SB & DD	4	4	4	4	4	1	1	1	1	1	1	1	1	1	1	1	1	1
TOTAL	(26)	(26)	(26)	(26)	(25)	(17)	(17)	(17)	(12)	(7)	(6)	(6)	(4)	(3)	(3)	(2)	(2)	(1)
<u>GULF COAST</u>																		
Alabama DD & SB	4	4																
Avondale	13	10	10	8	8	8	8	8	8	8	8	8	5	5	5	5	5	5
Beth-Beaumont	1	1	1	1	1	1	1	1										
Ingalls-E. Bank	6	6	5	5	5	5	5	5										
Ingalls-W. Bank	6	6	6	6	6	6	6	6										
Galveston SB	1	1	1	1	1	1	1	1										
Levingston SB Co.	1	1	1	1	1	1	1	1										
Marathon	1	1	1	1	1	1	1	1										
Tampa Ship Repair	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TOTAL	(34)	(31)	(27)	(24)	(18)	(16)	(16)	(9)	(9)	(9)	(9)	(6)	(6)	(5)	(5)	(2)	(2)	(1)

MAJOR U.S. PRIVATE SHIPYARDS

NUMBER OF SHIPBUILDING WAYS BY LENGTH (MAX. SHIP SIZE)

Length OA (In Feet):	475	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1300	1400	1600
<u>PACIFIC COAST</u>																		
Beth-San Francisco	1	1	1	1	1													
FMC Corporation	1	1	1	1	1													
Lockheed SB	3	3	3	3	3													
National Steel & SB	4	4	4	4	3	3	3	3	3	1								
Todd-San Pedro	2	2	2	2	2	2	2											
Todd-Seattle	1	1																
Triple "A"	3	3	3	3	3	2	2	2	2	2	1	1						
TOTAL	(15)	(15)	(13)	(13)	(10)	(7)	(7)	(5)	(5)	(3)	(1)	(1)						
<u>GREAT LAKES*</u>																		
American SB-Lorain	2	2	2	2	2	1	1	1	1	1	1							
American SB-Toledo	2	1	1															
Bay SB Corp.	2	2	2	2	2	2	1	1	1	1	1	1						
Fraser Shipyards	2	2	2	1	1	1	1											
TOTAL	(8)	(7)	(7)	(5)	(5)	(4)	(3)	(2)	(2)	(2)	(1)	(1)						
Grand Total	83	79	73	68	58	44	43	33	28	21	18	17	11	8	8	2	2	1
All Coasts and Great Lakes																		

\*Maximum size ship that can exit St. Lawrence Seaway locks is 730' x 78'.

· APPENDIX A

STANDARD FORM 17

FACILITIES AVAILABLE FOR THE CONSTRUCTION

OR REPAIR OF SHIPS







PRINCIPAL SHOPS AND BUILDINGS									
NAME OF SHOP OR BUILDING	DIMENSIONS OF SHOP OR BUILDING	MATERIALS PROCESSED (See note)	LARGEST EXIT		WEIGHT OF MATERIAL OR NUMBER AND SIZE OF UNITS PRODUCED PER 8 HOURS (See note)	ALL OTHER SHOPS (List other simulations, include mold loft, if any)			
			Width	Height					
Fabricating									
Plate			X X X X	X X X X					
Sheet metal									
Subassembly									
Carpenter			X X X X	X X X X	X X X X X X X				
Woodworking			X X X X	X X X X	X X X X X X X				
Boat assembly or molding									
Machine		X X X X X X X	X X X X	X X X X	X X X X X X X				
Electrical		X X X X X X X	X X X X	X X X X	X X X X X X X				
Electronic		X X X X X X X	X X X X	X X X X	X X X X X X X				
Pipe									
Galvanizing									
Foundry									
Rigger		X X X X X X X	X X X X	X X X X					

NOTE:—Indicate materials as steel, aluminum, reinforced plastic, wood, plywood, sheet metal, etc.

SHOP OR YARD CRANES (5 tons or over)

BRIDGE TYPE						STATIONARY, RAIL OR MOBILE					
Cap. (Std. tons)	Max. span	Height of hook	Area/shop serviced	Type	Cap. (Std. tons)	Max. reach	Capacity at reach	Boom length	Height hinge	Area serviced	Height of hook above base at out reach

MAJOR ITEMS OF MACHINE TOOLS AND EQUIPMENT (List briefly such of the large items as will indicate the shop, e.g. 30" plate bending rolls, 10" plate shears, 400 ton type press NO storage, 1" of dimensions for each area must type make or model of all important shops in 12" x 12" x 12" etc.)

STORAGE SPACE (Sq. Ft.) FOR COMPONENTS AND MATERIALS (Less boat storage) (List dimensions for each area, plus type material stored)

Machine items for heat treating (turning, grinding, etc.) - list quantity such as the large items as will indicate the capacities of the important shop equipment with plate shears, e.g., 10' plate bending rolls, 10' plate shears, 400 ton Hyper press, 30' plate furnace and mill table 20' x 20' B.C. etc.)

RAW STEEL STORAGE (Sq. ft.)      WELDING AND ASSEMBLY (Sq. ft.)

ACREAGE LEGALLY CONTROLLED

IN USE	DEVELOPED (including in use)	TOTAL (including undeveloped)
--------	------------------------------	-------------------------------

EXISTING LOCAL ORDINANCES LIMITING PRODUCTIVE USE

LIMITATIONS IMPOSED BY PROPERTY ZONING CLASSIFICATION

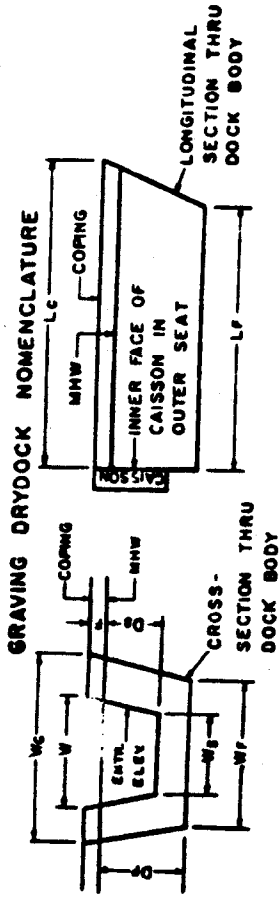
YARD LAYOUT—PLEASE FURNISH A PLOT PLAN OF YARD OR PLANT, IF AVAILABLE

LOCATION OF PRODUCTION FACILITIES FOR PRODUCTS LISTED IN ITEM 11. OF STD. FORM 129			ON WATERFRONT	
EMPLOYMENT	CURRENT	CURRENT NO. SHIFTS	MOBILIZATION—SHIFTS	<input type="checkbox"/> Yes <input type="checkbox"/> No
Management, administration				
Professional, engineering				
Professional, technical (All others)				
Production, skilled				
Production, semiskilled				
Production, unskilled				
Nonproduction				
Total		x x x x x		x x x x
NUMBER OF PRODUCTION PERSONNEL PRESENTLY ENGAGED IN SHIP AND/OR BOAT IN SHIP OR BOAT REPAIR CONSTRUCTION				
APPROXIMATE TOTAL EMPLOYMENT OF ALL AFFILIATED CONCERNS ONLY LISTED IN ITEM 8. OF STD. FORM 129 (NOTE: An affiliate is a concern that directly, or indirectly through one or more intermediate concerns, or is controlled by, is under common control with, the reporting firm. Common ownership of stock by individuals does not in itself, constitute affiliation.)				
DISTANCE TO NEAREST RAILROAD CONNECTION		DISTANCE TO NEAREST AIRPORT—IDENTIFY		
LARGEST CONVEYANCE AVAILABLE AND MAXIMUM DIMENSIONS OF LOAD, FOR OVERLAND TRANSPORTATION OF FINISHED PRODUCTS (Not to exceed limitations imposed by local ordinances)				
NAVIGATIONAL RESTRICTIONS (INDICATE ALL AT M.L.W.)				
MINIMUM CHANNEL TO TIDEWATER		MINIMUM HORIZONTAL AND VERTICAL BRIDGE CLEARANCES TO TIDEWATER (Identify structures)		
LIMITING LOCK DIMENSIONS TO TIDEWATER (Identify locks)				
PROJECTS UNDER CONSTRUCTION WHICH WILL ALTER NAVIGATIONAL RESTRICTIONS (Specify projects and state effect and estimated completions)			DESCRIPTION OF TYPES OF WORK NORMALLY SUBCONTRACTED	

16

**PRODUCTION EXPERIENCE** (List at least three of the largest and the most complex ships or boats constructed, indicating (1) date completed, (2) hull length, beam, and molded depth, (3) type propulsion unit (fully described), (4) horsepower, (5) electrical and electronic installation, (6) special piping features, (7) size and tensile strength of plates, if steel, or type hull material, if other than steel, (8) special annealing, heat treating, or stress relieving problems encountered, if steel, plus, (9) any other important problems resolved). (NOTE.—If no previous construction experience give detailed description of major conversion or industrial manufacturing work considered comparable to ship or boat construction.)

GRAVING DRYDOCK CHARACTERISTICS SUMMARY



**KEY**  
 MHW - Mean High Water  
 DF - Depth of Dock from MHW to Floor  
 DS - Depth of Dock from MHW to sill  
 LC - Length of Dock at coping  
 LF - Length of Dock at Floor  
 W - Width of Dock at top of entrance.  
 WC - Width of Dock at coping or maximum clear width above Dock Floor.  
 WF - Width at Dock Floor  
 WS - Width of Dock at entrance (sill)  
 F - Freeboard. Distance from MHW to top of coping. Indicate if part of F may be superflooded.

DRYDOCK NUMBER	LENGTH		ENTRANCE DIMENSIONS		DOCK BODY DIMENSIONS			STANDARD DEFINITION	A. C. AMPERES (60 HZ-3Ø)			REMARKS						
	FLOOR	COPING	SILL	WIDTH	DEPTH	WIDTH	DEPTH		DEPTH	FREEBOARD	2400 V		132 KV	TEST/ CHECK				
	L <sub>f</sub>	L <sub>c</sub>	W <sub>s</sub>	W	M.M.W.	D <sub>s</sub>	FLOOR	W <sub>f</sub>	WC	D <sub>f</sub>	W <sub>c</sub>	W <sub>f</sub>	D <sub>f</sub>	F				
1																		(e.g. Indicate dimensions of pits in dock floor)
2																		
3																		
4																		
5																		

\* Alternate Hotel Service Consists of 2400 V Supply and 1000 KVA (480V SEC.) Portable Transformer.  
 \*\* Test and Check-out Power Consists of 13,200 V Supply and 3,750 KVA (480V SEC.) Portable Transformer.

... consists of 13,200 V Supply and 3,750 KVA (480V SEC.) Portable Transformer.  
 ... consists of 13,200 V Supply and 3,750 KVA (480V SEC.) Portable Transformer.

FLOATING DRYDOCK CHARACTERISTICS SUMMARY

FLOATING DRYDOCK	MAXIMUM LENGTH OF PONTOON	MAXIMUM DEPTH OVER BLOCKS	CLEAR WIDTH BETWEEN WINGWALLS	LIFT CAPACITY (TONS)	NORMAL KEEL BLOCK HEIGHT	A.C. AMPERES (60 HZ - 3 $\phi$ )		REMARKS (Indicate existence of hauling blocks, if end selection can be lowered, and max. length of ship DD can accommodate).
						480V MAX. HOTEL (Indus)	2400V ALT. TEST/ HOTEL CHECK	

APPENDIX B

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES

LEGEND: Remarks Column

1/ Type of work usually engaged in

2/ Employment - Mid-1977



MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES <sup>a/</sup>

Name and location	Maximum Ship Size (LOA--Beam)	Berths/Piers Usable length in feet	Remarks
	SW--Shipway GD--Graving Drydock FD--Floating Drydock MR--Marine Railway		
<u>EAST COAST</u>			
<u>SHIPBUILDING YARDS</u>			
Bath Iron Works Corp. Bath, Me.	(2) 650 (+) x 88 SW 700 x 130 SW 500 x 81 FD	<u>850</u> 2900	1/ Construction, conversion and repairs - all types of vessels. 2/ 3,430  Also has floating bow drydock for sonar domes.
Beth. Steel Corp. Sparrows Point, Md.	(2) 900 x 108 SW 1200 x 192 GD	<u>1260</u> 3968	1/ New ship construction - to vessels 1200' in length. 2/ 3,225
General Dynamics Corp. Quincy SB Division Quincy, Mass.	(2) 860 x 123 GD 936 x 143 GD (2) 860 x 144 GD	<u>823</u> 4621	1/ Construction, conversion and repairs - all types of vessels. 2/ 5,080
Maryland SB and DD Co. Baltimore, Md.	850 x 110 SW 775 x 110 FD 715 x 91 FD 900 x 146 FD	<u>1902</u> 5650	1/ Construction, conversion and repairs - all types of vessels. 2/ 1,600
Newport News SB & DD Co. Newport News, Va.	(2) 715 x 93 SW (2) 940 x 125 SW 960 x 124 GD* 1100 x 136 GD* 650 x 88 GD 862 x 114 GD 458 x 68 GD 1600 x 240 GD**	<u>1200</u> 13600	1/ Construction, conversion and repairs - all types of vessels. 2/ 26,000  * Used for construction. ** Located in new North yard.
Seatrain SB Corp. Brooklyn, N.Y.	(2) 700 x 112 GD 1094 x 143 GD	<u>1400</u> 4590	1/ New ship construction - to vessels 1094' in length. 2/ 1,790

<sup>a/</sup> Shipbuilding: for ships 475' x 68' or above.

Repair: drydocking facilities for ships 300' in length or above.

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES

Name and location	Maximum Ship Size (LOA--Beam)		Berths/Piers		Remarks
	SW--Shipway	GD--Graving Drydock	Usable length in feet	Longest Total linear feet	
Sun SB and DD Co. Chester, Pa.	(2) 745 x 129 (2) 700 x 195 1100 x 195	SW SW* FD	<u>1100</u> 3900		1/ Construction, conversion and repairs - all types of vessels.  2/ 4,480  * Shipbuilding platform. Maximum ship 1400' x 195' or two ships 700' x 195' simultaneously.
<u>EAST COAST</u>					
<u>REPAIR YARDS WITH DRYDOCK FACILITIES</u>					
Beth. Steel Corp. Baltimore, Md.	530 x 81 775 x 106 900 x 136 585 x 71 456 x 44	FD FD FD GD GD	<u>964</u> 12944		1/ Ship repairs and conversion  2/ 1,940
Beth. Steel Corp. East Boston, Mass.	690 x 92 533 x 86	FD FD	<u>1020</u> 3111		1/ Ship repairs and conversion  2/ 500
Beth. Steel Corp. Hoboken, N.H.	443 x 66 685 x 106 549 x 90 640 x 96 1064 x 138	FD FD FD FD GD*	<u>923</u> 3000		1/ Ship repairs and conversion  2/ 650  * Military Ocean Terminal, Bayonne, N.J. - leased by Bethlehem.
Boston Marine Industrial Park Boston, Mass.	1145 x 119	GD*	N.A.		* GD #3 is a public drydock in the former Boston Naval Annex, owned by the Economic Development Industrial Corp. of Boston and leased to ship repair companies.
Braswell Shipyards, Inc. Boston, Mass.	673 x 90	GD*	N.A.		1/ Ship repairs and overhaul  2/ 130  * GD #4 is located in the Boston Marine Industrial Park in the former Boston Naval Annex and is leased by Braswell.

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES

Name and location	Maximum Ship Size (LOA--Beam)		Berths/Piers Usable length in feet	Remarks
	SW--Shipway GD--Graving Drydock FD--Floating Drydock MR--Marine Railway	Longest Total linear feet		
Brewer DD Co. Staten Island, N.Y.	400 x 81 500 x 81	FD FD	<u>653</u> 2606	<u>1/</u> Ship repairs and conversion. <u>2/</u> 200
Bromfield Corp. United SB Division East Boston, Mass.	376 x 36	FD	<u>430</u> 790	<u>1/</u> Ship repairs and conversion. <u>2/</u> 80
Ira S. Bushey & Sons Brooklyn, N.Y.	455 x 71 300 x 66	FD FD	<u>786</u> 4086	<u>1/</u> Ship repairs and conversion. <u>2/</u> 200
Coastal DD & Repair Corp. Brooklyn, N.Y.	340 x 60 456 x 80 706 x 112	GD GD GD	<u>575</u> 1150	<u>1/</u> Ship repairs and conversion. <u>2/</u> 450
Colonna's Shipyard Inc. Norfolk, Va.	300 x 40 360 x 65	MR MR	<u>900</u> 2200	<u>1/</u> General ship repairs. <u>2/</u> 130
Detyens Shipyards Mt. Pleasant, S.C.	560 x 82 305 x 87	FD FD	<u>300</u> 600	<u>1/</u> General ship repairs. <u>2/</u> 400
Jacksonville Shipyards Jacksonville, Fla.	(2) 660 x 90 900 x 140 400 x 53	FD* FD FD*	<u>680</u> 4184	<u>1/</u> Ship repairs and conversion. Construction of small vessels. <u>2/</u> 2,385 * Leased from the Navy.
Munro Drydock Inc. Chelsea, Mass.	350 x 60	MR	<u>300</u> 955	<u>1/</u> General ship repairs. <u>2/</u> 40
Norfolk SB & DD Corp. Norfolk, Va.	670 x 84 316 x 60 441 x 64	FD FD MR	<u>1420</u> 11200	<u>1/</u> Ship repairs and conversion. Construction of small vessels. <u>2/</u> 2,060
Perth Amboy DD Co. Perth Amboy, N.J.	400 x 68	FD	<u>400</u> 2130	<u>1/</u> Ship repairs and conversion. <u>2/</u> 150

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES

Name and location	Maximum Ship Size (LOA--Beam)		Berths/Piers		Remarks
	SW--Shipway	GD--Graving Drydock	Usable length in feet	Longest Total linear feet	
Puerto Rico DD & Marine Terminals San Juan, P.R.	632 x 83	GD	<u>1000</u> 1000		<u>1/</u> Ship repairs. <u>2/</u> 125 Leases Naval Industrial Reserve Shipyard.
Rodermond Industries Jersey City, N.J.	360 x 58	FD	<u>842</u> 842		<u>1/</u> Ship repairs. <u>2/</u> 130
Savannah Machine and Shipyard Co. Savannah, Ga.	532 x 64	GD	<u>382</u> 1563		<u>1/</u> Ship repairs and conversion. <u>2/</u> 400
Todd Shipyards Corp. Brooklyn, N.Y.	700 x 85 622 x 92 755 x 95	GD FD FD	<u>1152</u> 7653		<u>1/</u> Ship repairs and conversion. <u>2/</u> 410
Tracor Marine, Inc. Port Everglades, Fla.	360 x 80 (Syncrolift with 400' transfer system)		<u>1080</u> 1880		<u>1/</u> Ship repairs. <u>2/</u> 330
<u>GULF COAST</u>					
<u>SHIPBUILDING YARDS</u>					
Alabama DD & SB Co. Mobile, Ala.	(3) 523 x 68 620 x 90 620 x 83 750 x 100 380 x 70	SW SW FD FD FD	<u>1132</u> 9370		<u>1/</u> Ship construction, conversion, and repairs. Also drill rig construction. <u>2/</u> 3,430
Avondale Shipyards, Inc. New Orleans, La.	*(2)1050 x 174 **1200 x 126 378 x 68 300 x 50 1000 x 216 600 x 80	SW SW FD MR FD SW	<u>1625</u> 3565		<u>1/</u> Ship construction, conversion and repairs. Also drill rig construction. <u>2/</u> 6,900  * Three vessels up to 1050' x 174' can be constructed simultaneously.  ** Five large, greater than 600' LOA, vessels can be under construction simultaneously in this area.

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES

Name and location	Maximum Ship Size (LOA--Beam)		Berths/Piers Usable length in feet	Remarks
	SW--Shipway GD--Graving Drydock FD--Floating Drydock MR--Marine Railway	Longest Total linear feet		
Beth. Steel Corp. Beaumont, Tex.	842 x 96 SW 650 x 84 FD	<u>1100</u> 4050	1/ Construction of barges and drilling rigs. Also ship repairs and conversion. 2/ 1,240	
Galveston SB Co. Galveston, Tex.	700 x 120 SW	None*	1/ Construction of barges, tugs, and oceangoing integrated tug/barge units. 2/ 280 * City wharf in Galveston is available.	
Ingalls SB Division Litton Industries Pascagoula, Miss.	(4) 690 x 85 SW 550 x 80 SW 650 x 90 SW 481 x 71 GD *800 x 173 FD	<u>2650</u> 8090	1/ Construction, conversion, overhaul - all types of vessels. 2/ 24,900 * West Bank can launch ship up to 800' x 173'. Equivalent of six conventional inclined ways in terms of ships delivered annually.	
Levingston SB Co. Orange, Tex.	700 x 100 SW 350 x 60 FD 420 x 120 FD	<u>520</u> 2430	1/ Construction of offshore drilling rigs and drill ships. Yard has capability of building large oceangoing ships. 2/ 2,100	
Marathon LeTourneau Co. Gulf Marine Division Brownsville, Tex.	1100 x 150 SW	<u>500</u> 500	1/ Construction of offshore drilling rigs and drill ships. Yard has capability of building large oceangoing ships. 2/ 614	
Tampa Ship Repair & DD Co. Tampa, Fla.	650 x 150 SW 542 x 78 GD	<u>845</u> 1800	1/ Ship construction and repairs. 2/ 640	

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES

Name and location	Maximum Ship Size (LOA--Beam) SW--Shipway GD--Graving Drydock FD--Floating Drydock MR--Marine Railway	Berths/Piers Usable length in feet  Longest Total linear feet	Remarks
<u>GULF COAST</u> <u>REPAIR YARDS WITH DRYDOCK FACILITIES</u>			
Bender Welding & Machine Co. Mobile, Ala.	415 x 55    FD	$\frac{617}{1667}$	1/ Ship repairs and construction up to 200' long.  2/ 495
Hunt Shipyard Division Geosource Inc. Harvey, La.	350 x 65    FD	$\frac{3000}{3000}$	1/ Ship repairs and barge construction.  2/ 225
Southern SB Corp. Slidell, La.	350 x 54    GD	$\frac{200}{300}$	1/ Construction and repair of vessels up to 350' in length and not drawing over 15' of water.  2/ 250
Todd Shipyards Corp. Galveston, Tex.	670 x 86    FD	$\frac{1086}{5035}$	1/ Ship repairs and conversion. Also nuclear-related work.  2/ 817
Todd Shipyards Corp. Houston, Tex.	600 x 95    SW 600 x 96    FD	$\frac{1844}{3271}$	1/ Ship repairs and conversion. Construction of barges and vessels up to 600' in length.  2/ 300
Todd Shipyards Corp. New Orleans, La.	696 x 86    FD 628 x 80    FD	$\frac{1725}{4956}$	1/ Ship repairs and conversion.  2/ 370
<u>WEST COAST</u> <u>SHIPBUILDING YARDS</u>			
Beth. Steel Corp. San Francisco, Calif.	550 x 90    SW 700 x 94    FD 950 x 144    FD	$\frac{813}{3680}$	1/ Ship repairs and conversion. Can build C3 and C4 type vessels.  2/ 1,000

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES

Name and location	Maximum Ship Size (LCA--Beam)		Berths/Piers	Remarks
	SW--Shipway		Usable length in feet	
	GD--Graving Drydock		Longest	
	FD--Floating Drydock		Total linear	
	MR--Marine Railway		feet	
FMC Corp. Portland, Ore.	700 x 105	SW	$\frac{600}{600}$	1/ Construction of vessels up to 700' in length. 2/ 380 Leases drydocks and berths from Port of Portland as required.
Lockheed SB & Construction Co. Seattle, Wash.	650 x 90 650 x 90 700 x 100 400 x 46 530 x 80 600 x 96	SW SW SW FD FD FD	$\frac{800}{6500}$	1/ Ship construction, conversion and repairs - all types of vessels. 2/ 2,875
National Steel and SB Co. San Diego, Calif.	980 x 170 690 x 90 (2) 900 x 106 397 x 52 687 x 90	GD SW SW FD GD*	$\frac{1090}{7075}$	1/ Construction, conversion and repairs - all types of vessels. 2/ 6,050 * Leased from Unified Port District of San Diego.
Todd Shipyards Corp. San Pedro, Calif.	(2) 800 x 84 563 x 82 665 x 83	SW FD FD	$\frac{680}{4800}$	1/ Construction, repairs and conversion - all types of vessels. 2/ 1,640
Todd Shipyards Corp. Seattle, Wash.	550 x 96 650 x 83 420 x 62 550 x 88	SW FD FD FD	$\frac{1137}{4850}$	1/ Ship construction, repairs and conversion - all types of vessels. 2/ 1,060
Triple "A" Machine Shop Hunters Point San Francisco, Calif.	715 x 82 996 x 107 1088 x 136 (2) 416 x 56 416 x 71	GD GD GD GD GD	$\frac{600}{24000}$	1/ Ship repairs, overhaul and conversion. Has ship construction capability. 2/ 1,500 All graving docks are part of the inactive Hunters Point Naval Shipyard and are leased from the U.S. Navy.

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES

Name and location	Maximum Ship Size (LOA--Beam)		Berths/Piers		Remarks
	SW--Shipway	GD--Graving Drydock	Usable length in feet	Longest Total linear feet	
<u>WEST COAST</u>					
<u>REPAIR YARDS WITH DRYDOCK FACILITIES</u>					
Beth. Steel Corp. San Pedro Yard Terminal Island, Calif.	600 x 86	FD	<u>1800</u>		<u>1/</u> Ship repairs and conversion. <u>2/</u> 680
	720 x 93	FD	<u>4175</u>		
Calif. SB & DD Co. Long Beach, Calif.	320 x 68	FD	<u>600</u>		<u>1/</u> Ship repairs and conversion. <u>2/</u> 230
			<u>1700</u>		
Campbell Industries Marine Division San Diego, Calif.	(2) 360 x 50	FD	<u>575</u>		<u>1/</u> Construction of fishing boats and ferry boats. Also ship repairs. <u>2/</u> 680  Graving dock is leased from Unified Port District of San Diego. (Listed under NASSCO)
			<u>1975</u>		
Campbell Industries San Diego Marine Division San Diego, Calif.	380 x 80	FD	<u>600</u>		<u>1/</u> Primarily ship repairs. Also construction of boats and barges up to 200' in length. <u>2/</u> 300
			<u>1855</u>		
Dillingham Marine & Mfg. Co. (formerly Albina Eng. & Machine Works) Portland, Ore.					<u>1/</u> Ship repairs and conversion. <u>2/</u> 300  Leases drydocks and berths from Port of Portland as required.
Dillingham Shipyard Honolulu, Hawaii	370 x 54	FD	<u>550</u>		<u>1/</u> Ship repairs and conversion. <u>2/</u> 200
			<u>750</u>		
Lake Union DD Co. Seattle, Wash.	340 x 52	FD	<u>1000</u>		<u>1/</u> Ship repairs and conversion. <u>2/</u> 105
			<u>4235</u>		



MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES

Name and location	Maximum Ship Size (LOA--Beam)		Berths/Piers		Remarks
	SW--Shipway GD--Graving Drydock FD--Floating Drydock MR--Marine Railway		Usable length in feet	Longest Total linear feet	
Merritt Ship Repair Co. Oakland, Calif.	350 x 50	FD	$\frac{600}{1155}$		1/ Ship and barge repairs. 2/ 60
Northwest Marine Iron Works Portland, Ore.	500 x 100 (Barge construction only)	SW			1/ Ship repairs, conversion and barge construction. 2/ 460  Leases drydocks and berths from Port of Portland as required.
Port of Portland Swan Island Ship Repair Yard Portland, Ore.	633 x 85 525 x 88 810 x 105	FD FD FD	$\frac{750}{6360}$		Port of Portland owns these drydocks which are leased to ship repair companies on an as-required basis.
Todd Shipyards Corp. San Francisco Division Alameda, Calif.	523 x 80 900 x 136	FD FD	$\frac{800}{2485}$		1/ Ship repairs and conversion. 2/ 1030
Willamette Iron & Steel Co. Portland, Ore.			$\frac{1232}{1232}$		1/ Ship repairs and conversion. 2/ 625  Leases drydocks and berths from Port of Portland as required.
Willamette Iron & Steel Co. Richmond, Calif.	744 x 80 583 x 80 (3) 570 x 80	GD GD GD	$\frac{1560}{1560}$		1/ Ship repairs and conversion. 2/ 350
<b>GREAT LAKES</b>					
<b>SHIPBUILDING YARDS</b>					
(Maximum size ship that can exit St. Lawrence Seaway locks is 730' x 78')					
American SB Co. Lorain, Ohio	705 x 78 1021 x 121	GD GD	$\frac{900}{1800}$		1/ Ship construction, repairs and conversion. 2/ 1,000

MAJOR U.S. SHIPBUILDING AND REPAIR FACILITIES

Name and location	Maximum Ship Size (LOA--Beam)		Berths/Piers		Remarks
	SW--Shipway	GD--Graving Drydock	Usable length in feet	Longest Total linear feet	
American SB Co. Toledo, Ohio	634 x 78	GD	<u>800</u>		<u>1/</u> Ship construction, repairs and conversion.  <u>2/</u> 475
Bay SB Corp. Sturgeon Bay, Wis.	750 x 105 650 x 66 1145 x 136	SW FD GD	<u>820</u> 7090		<u>1/</u> Ship construction, conversion and repairs.  <u>2/</u> 1,540
Fraser Shipyards Superior, Wis.	825 x 76 621 x 56	GD GD	<u>900</u> 4450		<u>1/</u> Ship construction, conversion and repairs.  <u>2/</u> 150
<u>GREAT LAKES</u>					
REPAIR YARDS WITH DRYDOCK FACILITIES					
American SB Co. Chicago, Ill.	694 x 73	GD	<u>850</u> 1300		<u>1/</u> Ship repairs and conversion.  <u>2/</u> 120
Peterson Builders Sturgeon Bay, Wis.	342 x 30	FD	<u>550</u> 2515		<u>1/</u> Construction and repair of ships and boats.  <u>2/</u> 650

APPENDIX C

MAJOR TOPSIDE REPAIR FACILITIES

SHIPS 300 FEET IN LENGTH AND OVER

MAJOR TOPSIDE REPAIR FACILITIES, SHIPS 300 FEET  
IN LENGTH AND OVER

EAST COAST

Ardell Marine Corporation  
Brooklyn, N.Y.

American Ship Repairs Co., Inc.  
Brooklyn, N.Y.

Arnessen Electric Company, Inc.  
Brooklyn, N.Y.

Atlantic Marine, Inc.  
Fort George Island, Fla.

Atlantic Repair Co., Inc.  
Brooklyn, N.Y.

Auto Marine Sales Corp.  
Ft. Lauderdale, Fla.

Banks Ship Rigging Corporation  
Brooklyn, N.Y.

Berkley Shipbuilding & Drydock Corp.  
Norfolk, Va.

Braswell Shipyards, Inc.  
Mt. Pleasant, S.C.

Caddell Dry Dock & Repair Co.  
Staten Island, N.Y.

Cardinal Engine & Boiler Works, Inc.  
Brooklyn, N.Y.

Carolina Marine & Drydock Co.  
Wilmington, N.C.

Consolidated Service, Inc.  
Charleston, S.C.

Diesel Injection Sales & Service  
Norfolk, Va.

Electric Motor and Contracting Co.  
Norfolk, Va.

General Ship & Engine Works, Inc.  
East Boston, Mass.

General Ship Repair Corporation  
Baltimore, Md.

Horne Brothers, Inc.  
Newport News, Va.

Hudson Engineering Company  
Hoboken, N.J.

Industrial Welding & Machine, Inc.  
Portland, Me.

J-Y Industrial Corporation  
Brooklyn, N.Y.

Kurt's Marine Diesel, Inc.  
Ft. Lauderdale, Fla.

Marine Contractors Co., Inc.  
East Boston, Mass.

Marine Electric Corporation  
Brooklyn, N.Y.

Merrill-Stevens DD Company  
Miami, Fla.

Metro Machine Corporation  
Norfolk, Va.

A. Moe & Co., Inc.  
Philadelphia, Pa.

Moon Engineering Company, Inc.  
Norfolk, Va.

Newport Ship Yard, Inc.  
Newport, R.I.

Nordic Diesel & Machine Co., Inc.  
Brooklyn, N.Y.

Norlantic Diesel, Inc.  
Fairhaven, Mass.

Promet Corporation  
East Providence, R.I.

Reynolds Shipyard Corporation  
Staten Island, N.Y.

Rollinson Electric Contractors, Inc.  
Savannah, Ga.

Sandblasters, Inc.  
Charleston, S.C.

Seahol Contracting Company  
Charleston, S.C.

South Portland Shipyard & Marine  
Railway Corp.  
South Portland, Me.

Stephen Ransom, Inc.  
Port Newark, N.J.

Surless Ship Repair Corporation  
Brooklyn, N.Y.

Thames Shipyard & Repair Co.  
New London, Conn.

Tickle Engineering Works, Inc.  
Brooklyn, N.Y.

Williams Brothers  
Division of Gowen, Inc.  
Portland, Me.

Williams & Manchester Shipyard  
Newport, R.I.

Wilmington Iron Works, Inc.  
Wilmington, N.C.

#### GULF COAST

American Marine Corporation  
New Orleans, La.

Bludworth Shipyard, Inc.  
Houston, Tex.

Boland Marine and Mfg. Co.  
New Orleans, La.

Buck Kreihs Co., Inc.  
New Orleans, La.

Coastal Iron Works, Inc.  
Corpus Christi, Tex.

Coastal Marine Service of Texas, Inc.  
Port Arthur, Tex.

Dixie Machine Welding & Metal Works  
New Orleans, La.

Farmer's Marine Copper Works, Inc.  
Galveston, Tex.

J. A. Gerrets, Inc.  
New Orleans, La.

Hahn & Clay  
Houston, Tex.

Harrisburg Machine Co., Inc.  
Houston, Tex.

Hendry Corporation  
Tampa, Fla.

Lone Star Marine Salvage Co.  
Houston, Tex.

Marine Repairs, Inc.  
Houston, Tex.

McDonough Iron Works  
Galveston, Tex.

Runyan Machine & Boiler Works, Inc.  
Pensacola, Fla.

Saucer Marine Service, Inc.  
New Orleans, La.

Sherman Shipyard  
Panama City, Fla.

Slocum Iron Works, Inc.  
Mobile, Ala.

#### WEST COAST

Cavanaugh Machine Works  
Wilmington, Calif.

Coastal Marine Engineering Co.  
San Francisco, Calif.

Colbert, Inc.  
Stockton, Calif.

Dockside Machine and Ship Repair  
Wilmington, Calif.

Duwamish Shipyard, Inc.  
Seattle, Wash.

Electro-Mechanical Co.  
Portland, Ore.

Ets-Hokin & Galvan Electric Co.  
San Diego, Calif.

Franklin Machine Works, Inc.  
San Francisco, Calif.

Fulton Shipyard  
Antioch, Calif.

General Engineering & Machine Works  
San Francisco, Calif.

Kettenburg Marine  
San Diego, Calif.

Marine Iron Works, Shipyard Division  
Tacoma, Wash.

Marine Power & Equipment Co.  
Seattle, Wash.

Pacific Dry Dock & Repair Co.  
Oakland, Calif.

Pacific Marine & Supply Co.  
Honolulu, Hawaii

Plant Bros. Corp.  
San Francisco, Calif.

Rowe Machine Works, Inc.  
Seattle, Wash.

Service Engineering Company  
San Francisco, Calif.

Southwest Marine, Inc.  
Chula Vista, Calif.

Tacoma Boatbuilding Co., Inc.  
Tacoma, Wash.

Triple "A" South  
San Diego, Calif.

West Winds, Inc.  
San Francisco, Calif.

Wilmington Iron Works  
Wilmington, Calif.

Wilmington Welding & Boiler Works  
Wilmington, Calif.

GREAT LAKES

Advance Boiler & Tank Company  
Milwaukee, Wis.

G. W. Industries, Inc.  
Cleveland, Ohio

Hans Hansen Welding Co., Inc.  
Toledo, Ohio

Lower Lake Dock Company  
Sandusky, Ohio

Niagara Industries, Inc.  
Erie, Pa.

Nicholson & Hall Corporation  
Buffalo, N.Y.

Nicholson Terminal & Dock Co.  
River Rouge, Mich.

Oldman Boiler Works, Inc.  
Buffalo, N.Y.

Perry Shipbuilding Corp.  
Erie, Pa.

Pittsburgh & Conneaut Dock Co.  
Conneaut, Ohio

Sen-Wel Industries, Inc.  
Buffalo, N.Y.

Soo Drydock Company  
Sault Ste. Marie, Mich.

William Farrel, Inc.  
Toledo, Ohio

Ste. Marine Yard & Marine, Inc.  
Sault Ste. Marie, Mich.

