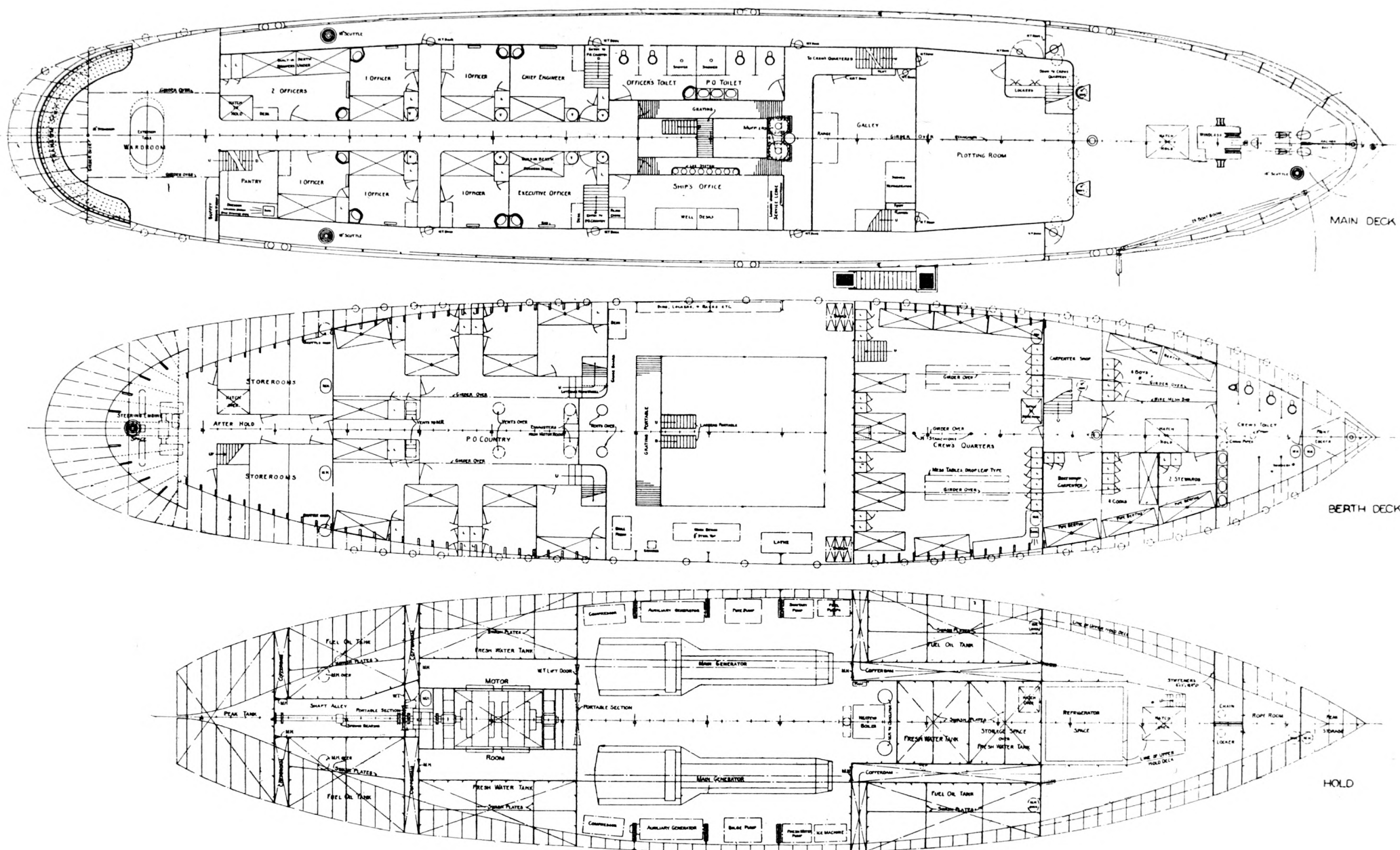
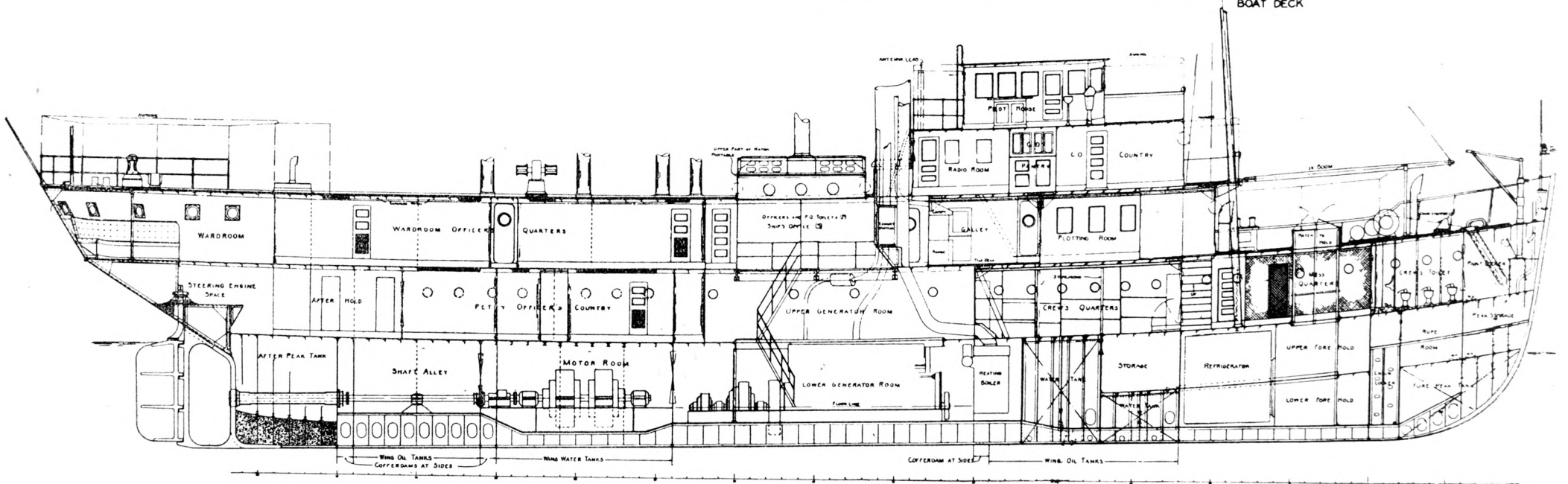
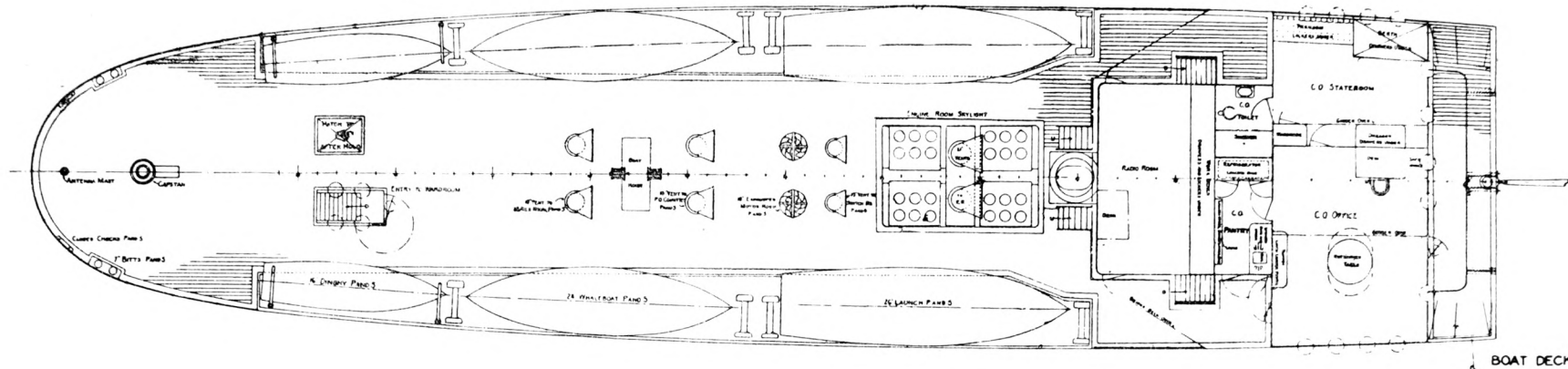
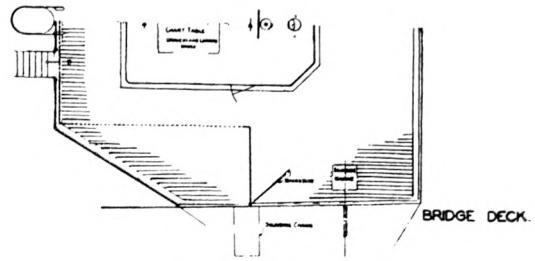


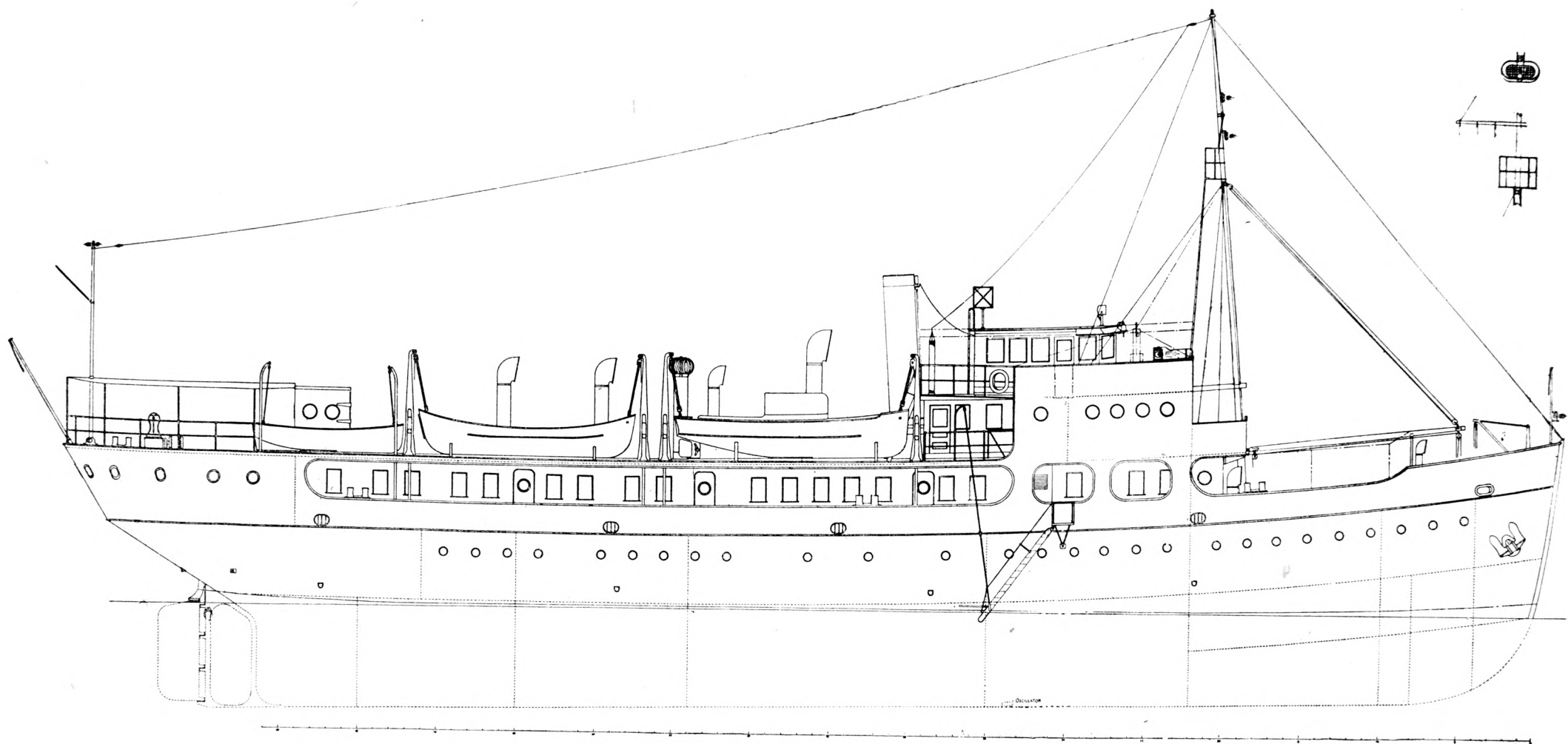
TYPE SECTIONS.



GENERAL ARRANGEMENTS.



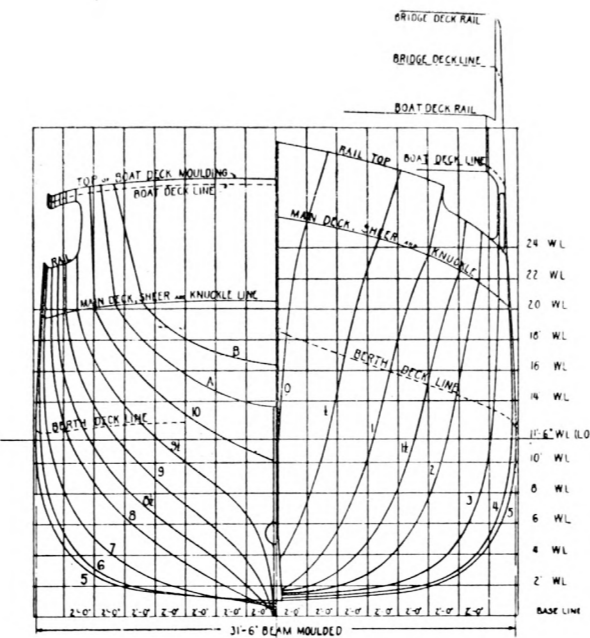
INBOARD PROFILE.



OUTBOARD PROFILE.

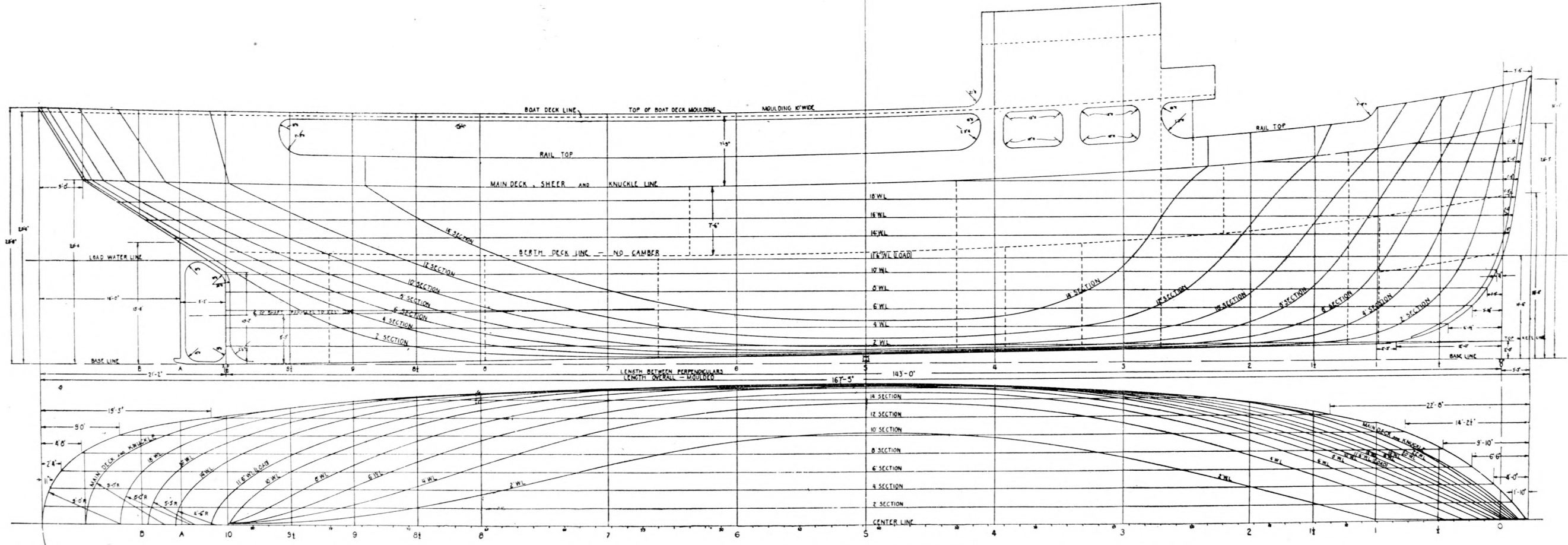
HALF BREADTHS

STATION	0	1	2	3	4	5	6	7	8	9	10	A	B	STATION	
2 Ft. Waterline	0-0-0	0-9-0	2-3-0	4-2-0	7-5-0	8-0-4	10-4-3	9-5-0	6-10-0	3-5-0	2-1-2	0-10-7	0-4-2	0-2-0	2 Ft. Waterline
4 "	0-0-0	0-5-0	2-11-2	5-3-0	7-7-4	11-2-4	13-5-7	12-11-5	10-9-0	6-9-0	4-4-4	2-3-4	0-9-4	0-2-0	4 "
6 "	0-0-0	1-5-4	4-3-0	6-10-2	8-2-4	12-7-4	14-5-0	14-3-4	12-9-4	8-5-4	7-2-4	4-4-4	1-7-0	0-2-0	6 "
8 "	0-0-0	2-3-0	5-2-0	7-10-4	10-2-4	13-4-0	15-0-4	15-3-3	13-2-0	11-2-4	9-6-0	6-10-4	3-5-4	0-2-0	8 "
10 "	0-0-0	2-10-4	5-11-0	8-7-4	10-10-0	13-10-7	15-4-4	15-4-4	13-7-4	11-3-7	11-3-4	9-1-0	5-11-0	0-2-0	10 "
12 (LOAD)	0-0-7	3-4-0	6-4-4	8-1-2	11-3-0	14-1-4	15-6-0	15-6-0	13-9-0	12-7-4	12-3-4	10-5-4	7-9-2	3-5-0	12 (LOAD)
14 "	0-3-0	3-10-4	7-0-2	9-9-0	11-9-4	14-4-0	15-6-4	15-6-7	13-9-0	12-4-0	12-5-0	10-5-4	7-9-2	3-5-0	14 "
16 "	0-3-4	4-3-7	7-6-0	10-2-0	12-2-4	14-6-0	15-6-3	15-6-7	13-9-4	12-0-3	12-0-3	10-5-3	7-9-2	3-5-0	16 "
18 "	0-6-6	4-8-0	6-2-0	10-0-0	12-4-4	14-7-0	15-3-4	15-7-4	13-6-0	12-3-4	12-7-0	10-4-0	8-3-7	4-3-7	18 "
20 "	0-11-4	5-3-0	6-7-0	11-3-0	12-11-7	14-0-2	15-4-7	15-4-7	13-7-0	12-11-7	12-11-7	10-4-0	8-3-7	4-3-7	20 "
22 "	1-6-0	5-10-4	5-4-0	11-11-0	12-11-0	14-0-2	15-4-7	15-4-7	13-7-0	12-11-7	12-11-7	10-4-0	8-3-7	4-3-7	22 "
24 "	1-7-7	6-6-0	6-6-0	11-11-0	12-11-0	14-0-2	15-4-7	15-4-7	13-7-0	12-11-7	12-11-7	10-4-0	8-3-7	4-3-7	24 "
Main Deck Knuckle	2-0-0	6-9-0	10-0-0	12-6-0	15-0-0	15-4-4	15-6-4	15-5-2	13-3-4	12-3-4	12-3-7	10-0-4	11-10-4	8-3-0	Main Deck Knuckle
Rail Top	3-10-0	6-3-0	11-1-4	12-5-4	13-6-2	15-3-4	15-4-7	15-2-4	13-0-3	12-3-7	12-10-0	10-0-4	11-10-4	8-3-0	Rail Top
Boat Deck at Side	---	---	---	---	14-0-0	15-2-0	15-2-7	---	---	---	---	---	---	---	Boat Deck at Side
Top Boat Deck Moulding	---	---	---	---	15-2-4	15-1-4	15-0-0	14-6-0	14-1-4	13-8-0	13-1-0	12-4-0	11-6-3	10-7-7	Top Boat Deck Moulding

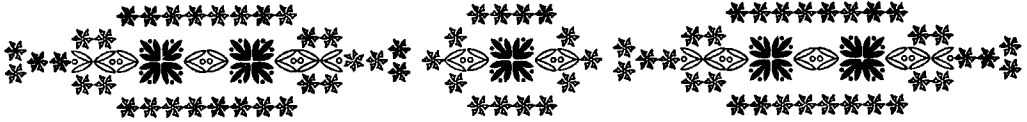


HEIGHTS ABOVE BASE

STATION	0	1	2	3	4	5	6	7	8	9	10	A	B	STATION	
2 Ft. Section	15-0-4	14-4-0	13-0-2	11-8-0	10-9-0	10-5-4	10-3-4	10-1-2	9-10-4	8-10-0	7-10-0	6-7-4	6-4-0	5-11-0	2 Ft. Section
4 "	14-5-4	13-7-7	12-3-4	11-2-0	10-3-3	10-1-2	10-0-0	9-8-4	8-8-4	8-3-0	7-8-4	7-5-0	7-2-4	6-11-0	4 "
6 "	14-5-0	13-1-0	11-8-0	10-8-4	10-5-4	10-3-0	10-2-0	9-10-4	8-10-4	8-3-0	7-8-4	7-5-0	7-2-4	6 "	
8 "	13-6-0	12-4-0	11-4-0	10-2-6	10-2-7	10-0-0	9-9-0	8-8-4	8-3-0	7-8-4	7-5-0	7-2-4	6-11-0	8 "	
10 "	15-4-4	14-6-4	13-6-0	12-1-2	11-0-4	10-0-4	9-8-4	8-7-4	8-3-0	7-8-4	7-5-0	7-2-4	6-11-0	10 "	
12 "	17-6-0	16-1-0	15-1-0	14-0-4	13-1-4	12-0-4	11-4-4	11-1-4	10-0-0	9-0-0	8-0-0	7-0-0	6-0-0	12 "	
14 "	19-4-4	18-4-4	17-4-4	16-4-4	15-4-4	14-4-4	13-4-4	12-4-4	11-4-4	10-4-4	9-4-4	8-4-4	7-4-4	14 "	
Main Deck Knuckle	25-0-4	24-5-7	23-6-0	22-7-4	21-12-4	20-11-0	20-2-4	19-4-4	18-7-0	17-6-4	16-7-0	15-6-4	15-0-0	14-0-0	Main Deck Knuckle
Top of Rail Moulding	27-5-4	27-2-4	26-1-0	25-0-4	24-3-4	23-5-4	23-1-4	22-10-0	21-9-0	21-0-0	20-7-7	20-1-7	19-1-7	18-1-7	Top of Rail Moulding
Boat Deck at Side	7-5-7	7-5-7	7-5-7	7-5-7	7-5-7	7-5-7	7-5-7	7-5-7	7-5-7	7-5-7	7-5-7	7-5-7	7-5-7	7-5-7	Boat Deck at Side
Top Boat Deck Moulding	15-2-4	15-2-4	15-2-4	15-2-4	15-2-4	15-2-4	15-2-4	15-2-4	15-2-4	15-2-4	15-2-4	15-2-4	15-2-4	15-2-4	Top Boat Deck Moulding
Rail Top	18-4-4	18-4-4	18-4-4	18-4-4	18-4-4	18-4-4	18-4-4	18-4-4	18-4-4	18-4-4	18-4-4	18-4-4	18-4-4	18-4-4	Rail Top
Boat Deck	10-4-5	10-11-7	10-0-0	10-1-4	10-4-4	10-5-0	10-8-4	10-4-4	10-1-0	10-0-4	10-1-0	10-3-7	10-4-7	10-6-4	Boat Deck



LINES & OFFSETS.



THE SURVEY SHIP "HYDROGRAPHER"

Information kindly supplied by the U.S.A. COAST & GEODETIC SURVEY

The Survey Ship *Hydrographer*, now under construction for the United States COAST AND GEODETIC SURVEY, will have a length of 168 feet, breadth of 31 feet 6 inches and depth of 18 feet. The mean draft will be 10 feet 6 inches and at that draft the displacement will be approximately 760 tons. This ship was designed for hydrographic surveying on the South Atlantic and Gulf Coasts of the United States. The size of the ship, method of propulsion and arrangement of quarters were determined after a careful consideration of the localities in which the vessel will be employed principally and conditions under which work will be carried on.

This vessel is intended primarily for coastwise and offshore hydrographic surveys in localities where safe harbors and supply bases are at no great distance from any part of the work. Severe storms are infrequent and as a rule moderate weather conditions prevail. The summers however are hot.

Under these conditions it is not necessary to employ a large ship on the work. It is the aim of this Bureau to perform its hydrographic work with the smallest ships which can carry the necessary personnel and equipment with safety and comfort and which can continue the surveys with few interruptions for fuel and other stores. It has been found that the cost of hydrographic surveying varies somewhat in proportion to the size of the survey ship and that therefore, for the sake, of economy the size of the ship should be kept as small as practicable. It is believed that a ship of between 700 and 800 tons displacement, if so designed as to make full use of all available space, will meet these conditions reasonably well. Because of the fact that during part of the year high temperatures are encountered, the ship was designed to give the maximum possible ventilation and freedom from heat in living quarters.

The ship will be propelled by an electric motor supplied from two Diesel-electric generating sets. This type of motive power was selected both because of its great flexibility and because of its economy of operation. During much of the time the ship will run at reduced speed and frequently she will be anchored in exposed localities. The dual Diesel-electric generators will make it possible to develop only so much power as may be required. The Diesel engines will insure a quick get away when necessary with no fuel consumption

while at anchor. The small auxiliary plants provide sufficient power for lighting and for auxiliary machinery. This type of power also contributes to a cool ship. Lastly, the Diesel engines give us a large "steaming radius" from small bunker capacity and eliminate the largest source of fresh water consumption.

Complete control of the operation of the propelling machinery from the bridge has long been recognized as the ideal for a surveying ship. With the development during the past few years of the Diesel-electric method of propulsion, a ready means of attaining this ideal of control was at hand. Diesel-electric propulsion with controls located both in the pilot house and in the engine room has passed the experimental stage and has taken its place as a standard installation. With the adoption of Diesel engines for the new ship, it followed almost as a matter of course to go a step farther and make a Diesel-electric installation.

The propelling machinery of the *Hydrographer* then consists of two full Diesel engines, each developing about 450 brake horse-power at 275 revolutions per minute, each direct connected to a 250 KW. generator and 25 KW. exciter, and a double armature propelling motor rated at 640 shaft horse-power at 125 revolutions per minute. The auxiliaries, both engine room and deck, are all motor driven. The ship is heated by means of an oil-burning heating boiler and the galley equipment is oil-burning (1).

In connection with the design of the ship, extra heavy longitudinal members were provided to minimise the damage that might result from grounding. A survey ship must work in waters that other ships should avoid until chartered and therefore a survey ship may be expected to ground occasionally. Three extra heavy web frames were introduced in the machinery space on account of the tendency of Diesel engines to set up vibrations when operating at full load.

The boat equipment will consist of two motor boats each 30 feet long and especially designed for hydrographic work, two whaleboats each 24 feet long for topographic work and surf landings and two dinghys each 16 feet long for general utility. Patent davits of the tilting type will be used in handling the motor boats and the whaleboats and the ordinary type of gooseneck davits will be used in handling the dinghys. A motor driven boat hoister with the control at some distance to prevent confusion in the leads of the lines is installed amidships and provides ready means for handling the boats under all conditions.

(1) The book of specifications gives the following supplementary details :

The principal auxiliary machinery will consist of two 25 kilowatt full Diesel direct-connected generating sets, a motor-driven fire and deck pump, a motor-driven bilge pump, a motor-driven sanitary pump, a motor-driven fresh-water pump, a motor-driven auxiliary high-pressure air compressor, a motor-driven low-pressure air compressor, an oil-burning water-tube heating boiler, and such small pumps, mechanism, and devices for the fuel-oil and generating systems and machine shop.

Special attention was paid to the development of the ground tackle. On account of the excessive use of the ground tackle at times the Survey has found it desirable to provide chains of larger dimensions than the sizes prescribed by the rules of the various classification bureaus. For this ship the size called for by the rules has been retained but the chains are to be of cast steel in lieu of wrought iron. The windlass is driven by a 7-1/2 horsepower motor, direct connected and is arranged with windlass motor and control on the same bed plate. The motor and controllers are water tight and are designed for open deck mounting.

A special effort has been made to provide comfortable quarters for the petty officers and non-rated members of the crew in order to retain the best men obtainable for these positions.

The petty officer's quarters is on the deck below the wardroom officer's quarters. It consists of single and double staterooms and a large open country for mess and lounging. The quarters for the non-rated members of the crew is on the same deck as the petty officer's quarters but forward of the machinery spaces. These quarters are divided into two compartments. The forward compartment provides stateroom accommodations for the two ranking deck petty officers and the stewards, the after compartment provides bunking accommodations for the remainder of the crew and adequate space for messing.

Toilet facilities for the crew, including shower baths, are provided forward of their quarters.

The plotting room is located at the forward end of the house on the main deck. Large windows are provided abaft the breakwater and large ports are provided along the front. This room is large enough to provide for two drafting tables with room enough around them to permit officers to work on any side and also provide sufficient room for desks for reduction of sounding records, computations, etc., and ample filing and storage space.

In order to keep the routine clerical work of the ship separate and apart from the records of the field work, an office for the executive officer and his yeoman is located on the starboard side of the machinery uptake.

The commanding officer's quarters are on the boat deck house just under the bridge and the radio room is just abaft his quarters. The radio room will be provided with the most modern equipment including both high and low frequency communication sets, radio-acoustic sound-ranging and radio direction-finding apparatus.

The ship will be equipped with the latest type of echo sounding apparatus which enables the officer on watch to obtain an instantaneous sounding at the press of a button or to obtain a profile of the bottom by continuous soundings. With the officer on watch in direct control of the propelling machinery and in a position to know the exact depth of water under his ship at all times, it is believed this will prove to be a most efficient and comfortable surveying ship.

The Director of the U. S. COAST AND GEODETIC SURVEY has also very kindly indicated the principles which were used for establishing the specifications of the anterior type of surveying vessel employed by the UNITED STATES, the "*Surveyor*", which we give hereunder:

The actuating principle in designing the "*Surveyor*" was to have a ship that would be a self contained unit for a large surveying party in Alaskan waters for a season of about seven months for combined surveying operations. With this end in mind, the ship was designed with a maximum fuel and water capacity, ready facilities for the handling of sufficient launches and small boats for the various detached parties and special attention was paid to the comfort of personnel, both officers and crew.

As finally constructed, the ship has a cruising radius of approximately 5000 miles which enables her to remain on the working ground for a period of at least thirty days without any necessity of returning to a port for fuel and supplies.

One of the most important needs of a surveying ship of this type is adequate drafting facilities. The large drafting room on the main deck of the "*Surveyor*" gives ample room for the installation of the necessary drafting tables for work on the various sheets and also for the installation of the several desks for the necessary office work on the books, records, etc. In addition to the drafting tables in the drafting rooms, the two chart desks in the pilot house are available for office work in case of necessity.

In connection with the work of the COAST AND GEODETIC SURVEY in Alaska, it is exceedingly difficult to secure in the isolated localities, where most of the work is taking place, suitable lumber for the signals required in the work. In designing the "*Surveyor*" one compartment was set aside for carrying such signal lumber, enabling the party to procure this lumber at the port where the outfit is being taken aboard at the beginning of the season.

In some localities the work requires a great deal of anchoring. The particular design of the stem and forefoot of the "*Surveyor*" was adopted to eliminate or at least reduce to an absolute minimum the hanging up of the anchor on the forefoot when being hoisted aboard.

The handling of launches and small boats several times a day required that special attention be given to the method of such handling. Structural davits were designed which permitted the hoisting and hauling in of the heavy surveying launches in a very few minutes.

This ship has been operating for about ten years and has proven very satisfactory for the purpose designed.

In regard to the cost of construction of such vessels, only a rough approximation can be given. The contract for the "*Surveyor*" was let the fall of 1915 in the amount of \$289,000. The lowest proposal received about five years after that time for a sister ship of the "*Surveyor*" was just under \$400,000. It is believed that this latter figure closely approximates the cost of building such a ship as the "*Surveyor*" to-day. The cost of installing Diesel electric propelled machinery is considerably higher than the cost of installing reciprocating steam engines and boilers. This is particularly true for construction in the UNITED STATES.
