CLEVELAND DIESEL

CLEVELAND DIESEL ENGINE DIVISION
GENERAL MOTORS CORPORATION
CLEVELAND 11, OHIO, U.S.A.

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S P E C I F I C A T I O N S

FOR

STANDARD MODEL 100 FT. TUG

FOR

DALZELL TOWING COMPANY, INC.

PROPOSAL NO. 38

Designed By
Marine Design Section
CLEVELAND DIESEL ENGINE DIVISION
General Motors Corporation
10 East 40th Street
New York 16, N.Y.

April 2, 1958

INDEX

APPROXIMATE DIMENSIONS:

Length over all (ex guards)	- 99'-5"
Length between perpendiculars (Center of rudder stock fwd. face of stem)	- 95'-0"
Length fwd. face stern post to aft face of stem	- 88'-4"
Beam, Molded	- 25'-10"
Depth at side amidships	- 13'-7½"

GENERAL CONDITIONS:

It is the intent and spirit of this specification that the Builder shall construct, equip and furnish the vessel complete in every respect and ready for service in accordance with contract drawings P-38, Nos. 38001, 38002 and 38003, accompanying this specification and subsequent drawings or instructions issued by the Architect or by the Builder and approved by the Architect, which carry out the general idea and intent of the original plans and to meet the requirements of the American Bureau of Shipping and all U. S. Governmental regulations.

Wherever the terms "or equal", "as selected", "as directed", "as approved" are used, it is understood that the decision rests with the Architect.

DEFINITION:

The word CONTRACTOR as used in this specification refers to Cleveland Diesel Engine Division, General Motors Corporation; the word BUILDER refers to the shipyard contracting to build the vessel; the word ARCHITECT refers to the Marine Design Section of Cleveland Diesel Engine Division, and the word PURCHASER refers to the ultimate owner after Cleveland Diesel Engine Division of General Motors Corporation.

INSPECTION:

The authorized agents and inspectors of Contractor or Purchaser shall have access to the vessel and any item of material or equipment intended for same at all reasonable times. Every facility will be afforded

inspectors for the performance of their work. All materials necessary for the purpose of inspection and testing will be furnished and handled at the expense of the Builder.

MATERIAL AND WORKMANSHIP:

All materials and manufactured articles entering into construction shall be of the best quality for their respective purposes.

Workmanship throughout shall be executed by skilled mechanics in accordance with best practice and satisfactory to the Architect. Any portion of the work found defective or unsuitable shall be removed and satisfactorily replaced without additional cost to the Contractor. Failure on the part of the inspectors to call attention to defective or improper work or materials shall not relieve the Builder from making good such defects when discovered.

GUARANTY:

The Builder guarantees for a period of one year after delivery the vessel and all engines, equipment, auxiliaries, accessories and attachments, if listed in the specifications and if supplied by the Builder, to be free from defects in material and workmanship. Builder agrees that in case its examination shall disclose to its satisfaction that the vessel or any machinery equipment or any part thereof has been defective in its workmanship or material, the Builder shall deliver to the Contractor, without charge, the parts or material, of first-class material and workmanship, necessary to replace any part so found to be defective, and the obligation of the Builder is limited to such replacement. This guarantee is in lieu of all other warranties or guarantees express or implied, and of all other obligations or liabilities of the Builder thereon.

DAMAGE:

The Builder shall protect the materials and work at all times and be responsible and make good any and all damage, from whatever causes, to any part of the vessel or its equipment or appurtenances, whether

supplied by himself, the Contractor or Purchaser while in his possession.

ALTERATIONS AND EXTRAS:

Should the Contractor deem it necessary or advisable during the course of construction to make changes in details, so long as the general style and type of the vessel and arrangements are maintained, such changes shall be made by the Builder without invalidating the contract and without additional cost to the Contractor, provided notice of the change is given before the particular part of the work involved is commenced.

No charges for extra work or materials will be allowed unless the Builder notifies the Architect of the extra, when it occurs, and the money involved. Authorization will then be given by the Contractor in writing. Failure on behalf of the Builder to acknowledge this procedure will invalidate these grounds for extras.

Extra work shall not be considered grounds for invalidating the contract or for delay in the time of delivery unless agreed upon at the time such extra work is authorized.

DRAWINGS:

The Architect will supply to the Builder the following drawings:

1. Lines and Offsets
2. Construction Plan
3. Construction Sections
4. Arrangement and Accommodation Plan
5. Outboard Profile
6. General Arrangement of Machinery
7. Propeller
8. Hydrostatic Curves
9. Bitt Details
10. Shafting Details and Arrangement
11. Lube Oil Piping
12. Fresh and Raw Water Circulating System
13. Fuel Oil System
14. Fire and Bilge Piping
15. Stern Frame
16. Rudder Details
17. Fresh Water Tanks

18. Rudder Carrier
19. Steering Assembly
20. Main Deck House Construction
21. Pilot House Details
22. Sound, Vent and Fill Piping
23. Stack Details
24. Boat Handling Details
25. Compressed Air Piping
26. Sea Chests
27. Electric Power Diagram
28. Mast Details
29. Fire, Bilge & Piping Manifold Details

No work shall be executed except from plans bearing the approval of the Architect.

In the case of discrepancies between drawings and specifications, the questions shall be submitted to the Architect for settlement before the work is started.

All drawings and specifications furnished by the Architect will remain the property of the Architect and be returned to him upon completion of the vessel.

CLASSIFICATION:

The vessel, with its machinery and equipment, is to be built to A.B.S. classification for coastwise towing. ✠ A1.

INSURANCE:

The Contractor shall, during the construction of the vessel and until same is delivered and accepted, keep said vessel, the engine equipment supplied by Contractor, and all materials and appliances in the Builder's possession or control for use in the construction thereof, fully insured under the Contractor's Broad Builder's Risk Policy, against all risks, including pre-keel coverage if mutually deemed desirable, and launching and trial trips, loss, if any, to be stated in the policy as payable to the Contractor and the Builder to the extent of their respective interests. A copy of the insurance certificate indicating type and extent of coverage shall be delivered to the Builder.

PATENT RIGHTS:

If any articles, tools, arrangements or equipment used in or about the vessel are covered by patents, all royalties shall be paid by the Builder, who assumes full responsibility for infringements and guarantees the Contractor and Architect against any costs for damages growing out of same.

LAYING DOWN LINES:

The lines shall be laid down full size on the mold loft floor from the Architect's offsets and carefully faired. After the loft work is completed, the Builder shall supply the Architect with a corrected table of offsets.

INCLINING EXPERIMENT:

The Architect will conduct an inclining experiment to determine metacentric height for "As Inclined", "Light" and "Loaded" conditions. and the Builder shall supply the necessary ballast and labor for handling same; he shall rig pendulums as directed and render all assistance required.

SUPPLIED BY CONTRACTOR:

All of the items of machinery and equipment set forth in the Proposal of the Cleveland Diesel Engine Division, General Motors Corporation, attached hereto and forming a part of these specifications.

SUPPLIED BY PURCHASER:

All deck lines, hawsers, deck, engine room and galley stores, all linens and blankets, all cooking and eating utensils, silverware and cutlery, all flags and signals, all engine room tools and spare parts, all rope, rope puddings and fenders, ship-to-shore telephone, RCA-VHF radio, radar and all nautical instruments (except compass and binnacle which shall be supplied by Builder).

All items supplied by the Contractor or Purchaser will be delivered to the Builder, f.o.b. railroad delivery point nearest to his plant. The Builder shall assume all trucking or other delivery charges from railroad to plant.

The Builder shall receive, store in a suitable manner and install on the vessel at the proper time, all items supplied by the Contractor and Purchaser and the Builder shall be responsible for the safekeeping of such items until the acceptance of the vessel.

It shall be the duty of the Builder to acquaint himself with the nature and extent of items furnished by the Contractor and to supply all necessary additional material required to make the installation complete.

TRIAL TRIP:

After a satisfactory dock trial, a trial trip shall be made over a measured mile during which time the machinery shall be required to run at various speeds and a full log of progressive runs, as directed by the Architect, shall be recorded. All auxiliaries and deck machinery and the various systems and apparatus shall be thoroughly tested and made to operate satisfactorily. Trials shall be conducted at the expense of the Builder. Fuel and lubricating oil remaining in tanks after trials shall be paid for by the Contractor.

ACCEPTANCE:

After final inspection, satisfactory trials and acknowledgment by the Contractor that all details of plans and specifications have been fulfilled, the vessel shall be formally delivered to the Contractor afloat and in satisfactory operating condition, at the Builder's dock or other point mutually agreed upon. All spaces and compartments shall be clean and all painting shall be touched up where needed, compass adjusted and vessel made ready for sea. Upon payment of the balance of money still due, the Builder shall turn over to the Contractor all necessary documents showing clear title and as required for the operation of the vessel.

STEEL HULL

MATERIALS:

All steel shall be in accordance with the American Bureau of Shipping requirements.

Steel castings shall be made by open hearth or crucible process and thoroughly annealed, cast true to pattern and free from defects.

WORKMANSHIP:

All of the highest class to conform with the requirements of the American Bureau and the approval of the Architect.

HULL CONSTRUCTION:

Construction and scantlings shall be generally as shown on the contract plans and later detail drawings, all to conform to the American Bureau requirements and the approval of the Architect.

Transverse bulkheads in the hull shall be located as indicated in the drawings so as to form a forepeak ballast tank, forecastle with fuel tanks under an oil tight flat, deep fuel bunkers, two after fuel tanks and afterpeak ballast tank. All fuel tanks shall be divided by oil-tight bulkheads. The forward tanks shall have a swashplate on about Frame 42.

Auxiliary foundations shall consist principally of flats at each side of the machinery space. Isolated items shall have suitable plate and angle supports as later detailed. Drip pans shall be fitted as required.

Reinforcements and insert plates shall be fitted in way of bitts and elsewhere as directed. Breast-hooks shall be fitted at the stem.

Pipe stanchions shall be fitted throughout the vessel as directed to support deck house and local weights and to minimize vibration. Fore and aft girders shall be arranged under deck beams where stanchions do not occur on every beam.

Access to all parts of the hull shall be provided and lightening holes and manholes fitted for this purpose as required. Limber holes shall be worked in floors, longitudinals, swashplates and other members to give ample drainage to all parts.

The main engine and reduction gear unit shall be mounted on steel chocks, about one-inch thick. Fitted bolts shall be used as required.

Backing chocks shall be fitted to hull to check swing of rudder.

WELDING:

The entire hull and superstructures shall be electric welded in conformity with the requirements of the American Bureau and to the approval of the Architect.

TESTING:

Previous to launching, all hull tanks shall be tested under a suitable head of water. Decks, shell and water-tight bulkheads outside of tank spaces shall be hose tested. All tests to the approval of the American Bureau.

CEMENTING: (Also see "Floor Covering")

Cement made of one-half Portland cement and half clean, sharp sand shall be used to fill inaccessible places in peaks of vessel. Care must be taken to provide limbers above the top of cement. Water and ballast tanks shall be sprayed with black Asphaltum base paint (Baltimore Copper Paint Company), or equivalent agreed upon.

FIXED BALLAST & CEMENT:

To total about 8.00 L.T. Placed as directed by the Architect.

CLEANING:

All steel work shall be thoroughly cleaned before painting and all chips, dirt, shavings, etc., shall be removed from bilges and all compartments.

Mill scale shall be removed from all steel surfaces either by pickling or sandblasting before any paint is applied.

The Builder shall at all times keep the vessel reasonably clean in bottom, bilges and pockets, and to thoroughly clean throughout before delivery.

STEEL SUPERSTRUCTURE

DECK HOUSE:

Deck houses shall be constructed and arranged as shown on plans. Deck beams and stiffeners shall be increased to support concentrated loads and arranged so ventilation duct may later be placed in passage overhead. Girders and stanchions located as required.

Bulkheads and partitions dividing the interior of the house shall be of 3/16" steel plate with suitable stiffeners and reinforcement.

Windows in pilot house shall be of Kearfott K-22B with 1/4" heat-treated glass, sashless type, 26" x 30", to drip into pockets and scuppered to deck, except two fixed windows at after sides of pilot house and two in back of pilot house. Inside of pilot house below window sills shall be sheathed with 3/8" mahogany marine plywood held in place by screws and arranged for ready removal.

STACK:

Shape and dimensions as shown in drawings. Of 3/16" steel plate with suitable reinforcements and stiffeners and a sealed top with louvers as shown. Hand grips and ladder rungs as required. Exhaust pipes, silencers and smoke pipes shall be fitted inside the stack and securely fastened.

HATCH:

In upper deck, as shown, just abaft the stack. Cover of 1/4" bolted with gasket to a 5" x 3" angle welded to deck plating. For removal of machinery parts. Also a steel trunk and quick-opening hatch for access to forecastle.

WATER-TIGHT STEEL DOORS:

Water-tight steel doors shall be located on each side of the main house and pilot house, having round corners, dogs and lock. Long hooks to be provided for holding doors partly open. Door openings shall have 26" clear opening except 30" to engine room. Head room of all doors 6'-4" above deck and coaming 18" high with

a portable 6" steel plate above the sill to provide a height of 24". Dutch doors and dead lights as indicated on plans.

HAWSER GRATING AND RACK FRAMES:

To have steel beams with portable wood grating over, front remaining open. Steel spray shields to be provided over steering rams.

SHELVES, BINS, LOCKERS, ETC.:

Of light steel plate, welded and suitably stiffened, located in engine room, galley and elsewhere as may be required.

WELDING:

All welds in the superstructure, rail and fittings shall be made smooth by chipping and grinding so as to reduce the likelihood of injury to cordage and personnel. Projecting corners and edges of steel work shall be rounded or smoothed off as required.

CARPENTRY

MATERIALS:

All wood used in construction shall be well seasoned, free from checks, wane, sap, loose knots, windshakes and other defects.

GRATINGS:

Hawser racks of Oregon pine, fitted in sections at the stern with portable traps fastened with brass screws over tiller and tank manhole. A similar rack shall be fitted at the bow extending aft as shown. Portable platform shall be fitted at the steering stand.

SPARS:

One mast of clear Oregon pine, about 7" diameter at heel and 3" diameter at head. Stepped on roof of the captain's cabin and supported by the back of pilot house. Fitted with all necessary galvanized iron work, steel wire rigging and turnbuckles, masthead range light and towing lights.

A spruce flag staff with truck and flag halyards shall be supplied at the after end of boat deck.

SHELVES AND BINS:

Fitted in the galley and sleeping quarters as required.

JOINERWORK

PILOT HOUSE AND CABIN:

Constructed in accordance with later detail drawing. Sheathed with 3/8" mahogany faced plywood, ceiling of 1/4" Masonite. Window and door trim of Honduras mahogany. Window Kearfott K-22B sashless balanced type with 1/4" flat heat-treated glass.

There shall be two fixed windows in the after end of the pilot house and on sides as indicated. All others shall drop into pockets scuppered to the deck, Lifts shall be fitted on each window.

Pilot house visor of 3/16" plate and faced with 1/2" round bar.

Shelves, chart, flag and book racks shall be provided as needed and all instruments shall be properly installed.

DOORS:

Interior doors shall be standard wood or steel joiner doors with about 24" opening.

Screen doors, 1-1/8" mahogany with monel metal wire mesh for galley and passages, as shown.

All door trim of wood to match doors. Doors and trim finished bright, varnished. (See "Steel Doors" under Superstructure). Doors entering passage on boat deck to be steel water-tight with dead light (see Water-tight Doors).

FURNITURE:

Made of mahogany where possible, all as shown on plans. Lockers standard steel type, size and locations as shown.

The galley mess table shall have a 1-1/2" wood top covered with Formica with plate ledge.

Builder shall supply 5" Air-foam mattresses of acceptable make for all berths, also curtains and rods for all air ports and windows in sleeping quarters.

SHEATHING AND INSULATION QUARTERS:

Throughout the deck house with the exception of upper engine room (see later paragraph), the sides and ceilings shall be covered flush with 1/4" Masonite attached by brass screws to wood furring pieces bolted to beams, frames and stiffeners, trimmed with mouldings as required.

The pilot house and space below pilot house floor shall be insulated throughout. Wood filling pieces shall be set between steel and the sheathing as needed for securing radiators, toilet fixtures, hooks, etc. Air port, vent openings, etc., shall be neatly boxed.

Spaces between sheathing and steel except that portion of the ceiling covered by a house above, shall be filled with fiberglass in sheets compressed to sufficient density to prevent sagging and held in place with weld plugs or chicken wire.

Forecastle space and flat shall be thoroughly painted but not insulated or ceiled.

In upper engine room the end bulkheads, house sides, under side of upper deck and hatch shall be sheathed with Johns-Manville 3/16" perforated marine veneer and insulated with Bx Spintex 3½# density. The veneer shall be laid flush over face of beams, stiffeners, etc., and necessary wood grounds and battens shall be fitted to hold same in place. Rounded corner posts shall be provided.

REFRIGERATOR AND DEEP FREEZE UNIT:

Foster HR35R (or equal), 2/3 day box and 1/3 freeze unit, four-door unit of aluminum alloy to pass Navy requirements, of size and location as shown on plans. To consist of a refrigerator section and deep freeze section and independent refrigeration machines which will be located in engine room.

LIGHT BOARDS:

Of steel to meet requirements of the law, for port and starboard, bow and stern and towing lights on galvanized brackets.

NAME BOARDS:

Of mahogany, port and starboard, on galvanized brackets. Name laid in gold leaf outlined in black.

TOOL BOARD:

Of mahogany, for hand tools, in engine room.

SHELVES:

Wood shelves in quarters and galley for electric fans. Shelves in clothes lockers and elsewhere as required. Also glass racks, dish racks and shelves in galley.

FRAMES:

Of hardwood for pilot rules and licenses, secured in place by brass screws.

JOINER HARDWARE:

Heavy cast brass, marine type, of approved make and pattern.

Butts for pilot house doors shall have fixed pins. Hinges for steel doors of steel with brass pins. For interior doors, butts shall have loose brass pins. All doors to have two butts each.

Rim locks with solid brass knobs, or ring handles as desired, and thumb bolts for each door. All locks shall be supplied with two keys and there shall be two master keys to fit all locks.

Brass locks shall be fitted to locker doors and refrigerator. Screen doors shall have brass spring hinges and brass night latches.

Brass hooks shall be provided for holding open all doors including screen door, and long steel hooks shall be provided for holding deck house doors partly open. Pilot house, toilet rooms, galley and sleeping quarters shall be fitted with rugged cast brass coat hooks, number and location as directed. Galley shall have ample cup hooks. Brass chains and toggles for all air ports. Brass curtain rods for port openings.

Refrigerator strap hinges and lever catches and locks of heavy pattern bronze.

Kick plates, sill-plates and similar items shall be fitted as directed.

Hardware shall be complete to meet all requirements.

PAINTING

EXTERIOR:

The entire exterior of steel hull and superstructure shall be given three coats of vinyl or other approved paint on exterior from keel up. Area below the waterline to be coated with anti-fouling Vynallast, all of color as selected by Purchaser.

Decks shall be finished with "Weatherdek" non-skid paint (Asbestolith Manufacturing Co.). Tank test must be completed before any paint is applied.

INTERIOR:

Inside all steel shall receive a coat of Marine primer except in the fuel oil tanks. The hull, tank tops, bulkheads, etc., shall have two more coats of paint as selected, except in the fuel tanks which shall not be painted at all.

In the machinery space, upper and lower, exposed steel surfaces shall receive, in addition to one coat of primer, one coat of flat paint and one coat of enamel of color selected.

Steel work behind insulation and sheathing shall be thoroughly painted before closing in.

WOODWORK:

All exterior woodwork finished bright shall be thoroughly sanded and receive a total of four coats of spar varnish, one to be applied in shop before parts are erected.

Sheathing inside quarters, galley and pilot house and all woodwork not varnished shall receive one priming coat, one coat of flat paint and one coat of enamel.

Furring and filling pieces concealed by sheathing shall have a coat of paint before sheathing is fastened in place.

Mast shall be painted or varnished as directed, and rigging shall be painted with aluminum paint.

All rails, ladders, fittings and equipment shall be properly painted. Life preservers, life preserver boxes, lifeboat and other items shall be lettered as required.

MARKINGS:

Name and hailing port on stern and name on each side of bow in letters 7" high.

Draft marks shall be accurately laid out on each side of stem and one each side of rudder blade.

Freeboard marks shall be placed as directed by the American Bureau of Shipping.

All letters and numerals on steel to be outlined in weld ridges and painted in white.

Name boards shall have name in 7" letters, gilded.

MACHINERY:

All machinery not suitably painted shall be thoroughly touched up with original type paint after trial trips.

REPAINTING:

If, after the specified coats of paint or varnish have been applied, they become damaged while the vessel is still in the Builder's hands, such damage shall be repaired and repainted without additional cost to the Contractor.

FLOOR COVERING:

Floors of galley, toilet rooms, pilot house, deck staterooms and passages shall be covered with "Asbestolith" or equal composition, 1" thick, rounded up at edges to form sanitary base. To be laid after sheathing is erected. Floors to be provided with drains, as directed, and blocks shall be placed on deck so as to raise pieces of equipment above the level of the flooring.

FITTINGS

RUDDER:

Welded steel, balanced type. Blade of double plate 3/8" thickness. Steel diaphragm plates of 3/4" plate placed at about 15" intervals. Forward edge formed by a 2" diameter round bar and the after edge by an 11" x 3/4" flat bar. Lower stock shall be about an 8" square steel bar and upper stock about 7" dia., squared to take tiller and fitted with a lifting eye. A monel sleeve shall be fitted in way of neck bearing. The lower stock shall be turned and fitted with a monel sleeve to take a 6-1/2" diameter cutless rubber bearing.

Round rudder bolting palms are to be fitted to both upper and lower stocks. The upper stock shall have the palm forged integral and the lower palm to have a square hole for receiving the lower stock and then welded. The palm flanges are to be about 24" in diameter and about 2-7/8" thickness.

Backing chocks shall be welded to the shell to allow 100° swing hardover to hardover.

Space between rudder plates shall be filled with an approved composition which shall be poured out after the interior has been thoroughly coated.

RUDDER PORT:

A steel tube of about 1/2" thick and 14" O.D. The lower 24" of the port shall be a cast steel ring about 2" thick forming a part of the ship's structure.

SKEG:

Steel casting, shaped as shown in drawing. Socket bushed with cutless rubber bearing and having a drain hole. Welded to the stern frame casting.

RUDDER NECK BEARING:

A bronze neck bearing, machine stepped, is to be fitted in the lower portion of the rudder port sealed with packing glands for retaining grease.

RUDDER CARRIER:

Made up of a steel base bolted to the deck, properly reinforced. A cast steel or fabricated carrier in halves, arranged for grease and bolted to the rudder stock containing a grease reservoir. Bronze wearing rings to be installed in base, one for vertical wear and one for horizontal wear. Steel clamps to hold the carrier in place as directed.

TILLER:

Of welded plate, taking about 100° of arc, with a wrought steel hub, in halves, fitted to the rudder stock to take rams of Sperry gear. Provision to be made for relieving tackle and to by-pass oil from one ram cylinder to the other for emergency steering.

STERN TUBE:

Cast steel of about 14" inside diameter, 17½" outside diameter, enlarged at inboard end. Welded to stern frame and to tank bulkhead.

STERN BEARING:

Bronze sleeve with flange fitted to stern frame and bushed with Goodrich cutless rubber bearing, 50-3/4" in length. A steel rope guard, in halves, shall be welded to stern frame overhanging the propeller hub.

INBOARD BEARING AND STUFFING BOX:

Bronze sleeve with flange fitted to stern tube and bushed with Goodrich cutless rubber bearing. A bronze flanged stuffing box (L. Q. Moffitt type) with flax packing shall be bolted over the bearing flange and a bronze gland shall be secured to the stuffing box with Tobin bronze bolts. Packing as approved by the Contractor. A salt water flushing line is to be provided for flushing the stern tube.

FREEING PORTS:

Openings with 3/4" round bar grill as shown on Outboard Profile. Also semi-circular holes in bulwark as shown.

BLEEDER PLUGS:

Of bronze, about 1-1/2" with square recess for wrench, screwed into steel reinforcing plate inside the shell, fitted at the lowest point of all compartments. A special wrench shall be supplied to fit plugs.

MANHOLES:

There shall be one 18" manhole plate without grating for access to each tank space and the fore and aft peaks. There shall be 24" quick-opening escape type manholes, one to forecastle mounted on a steel trunk and one to after engine room. All manhole plates shall be fitted with flax packing. Manhole openings with bolted plate covers shall be fitted in each of the fresh water tanks as well as all flats below the main deck. Those mounted on flats are to be fastened with countersunk bronze screws into a reinforcing ring, and those mounted on bulkheads are to be fastened with bronze car screws on reinforcing rings. Manhole plates on the forecastle flat to be raised, thus providing for future floor covering thickness.

BITTS, KEVELS AND CLEATS:

Extra strong pipe with cast steel or welded heads. Bitts and kevels with suitable deck reinforcements welded together in accordance with detailed drawings.

The towing bitts and bow bitts shall be about 14" diameter and side bitts and "niggerhead" about 12" diameter.

Half cleats shall be fitted on bitts as directed.

BOAT DAVIT:

One davit having a built up arm of 3/8" plate, faced with 3/8" x 4" flat bar. Main stock to be about 5-1/2" diameter. Bearings to be bronze bushed. There shall also be a two-ton Beebe hoist (6" drum) for raising and lowering the boat, complete with necessary cable and sheaves.

RIGGING:

Shrouds and stays of 6 x 7 galvanized steel wire of suitable sizes and make.

End fittings shall be Roebling (or equal) drop forged open sockets. Turnbuckles shall be of sizes required by the American Bureau of Shipping.

Flag halyards shall be fitted as directed.

BLOCKS:

Necessary blocks of proper sizes and suitable fittings, wood or galvanized shell, as selected, with self-lubricating sheaves.

CHOCK RAIL:

Located on top of the main rail, as shown, consisting of a 5" extra heavy pipe, split lengthwise, welded to the rail and joined by a breast hook supporting the "niggerhead".

AIR PORTS:

Location and number as shown in drawings. Of approved type and make with extra heavy brass frame and sash, 3/4" glass and four bolts and bail nuts and shutter, opening 16".

INSECT SCREENS:

Brass frame, monel metal wire mesh. For all air ports and vent openings (see "Joinerwork" for screen doors).

DEAD LIGHTS:

12" dead lights in doors as shown.

VENTILATION:

There shall be two water-tight ventilators located as shown on plans and ducts carried just above

the engine room floor plates, where possible. Wing fans shall be installed in these intakes as well as openings in back of deck house. Fans described under "Machinery".

MUSHROOM VENTS:

Of welded construction, consisting of 10" standard pipe extending to a suitable height above deck and down through the ceiling in the compartment served. Provided with a dished top operated by a screw and hand wheel at the bottom. One located over each toilet room and elsewhere as required.

RING BOLTS AND SMALL FITTINGS:

Eye bolts to secure bow and stern, fenders, also on deck, house, bulwarks, etc., as required. All necessary chocks, cleats, fairleads, brass deck plates and other small fittings as may be required.

STEEL LADDERS:

With flat bar stringers and double bar rungs, of suitable size, as directed. Rungs in each tank.

Ladders with flat bar stringers, flanged checker-plate treads and pipe hand rails shall be fitted from upper to lower engine room, pilot house and forecastle.

HAND RAILS:

As shown, to consist of 1-1/4" galvanized pipe stanchions about 36" high and two courses of galvanized pipe rails, the top 1-1/4" continuous and the lower 1" intercostal between the stanchions. All welded construction.

SCUPPERS: (House)

Of 1-1/2" galvanized wrought iron pipe, located at low points in all house roofs leading to main deck, port and starboard.

ELECTROLYSIS PLATES:

The Builder shall install magnesium plates fitted to the shell plating, stern frame, rudder, hull outlets and suctions, as directed.

STEERING GEAR:

Steering engine hydraulic pump unit (see "Machinery") will be located on the platform at after end of machinery space. Hydraulic lines will run aft to ram group in fantail. Where they pass through the deck or fuel oil tank, extra heavy pipe tunnels are to be provided with a stuffing box at one end.

One cast brass master steering control stand, located in pilot house, with a 42" diameter wheel and a lever steerer on the boat deck. Wheel, tubular spokeless type, with rudder order indicator in pilot house.

STACK INSIGNIA: (Supplied by Purchaser, Installed by Builder)

A letter or other device, cut from sheet steel attached to each side of the stack by means of bolts and distance pieces.

ENGINE SIGNALS:

A gong and a jingle shall be installed in the engine room with pulls at one side of the pilot house, complete with wires, chains, pulleys, bell cranks, etc., and sound tubes returning to pilot house.

SOUND AND POWER PHONES:

From pilot house to engine room. Hose McCann (or equal). Engine room phone to have head set.

EQUIPMENT

GYPSY: (Supplied by Purchaser, Installed by Builder)

A. A. Johnson Series 19-5, 26" drum over welps 26" high, 40" diameter lower flange with totally enclosed under-deck drive, maximum rating 12,000# pull at 25 FPM. Reliance motor, 20 H.P., 115 volt, D.C., 575 RPM, 30 min. duty, compound wound. Cutler-Hammer drum control with pedestal for operating located above on boat deck. Cutler Hammer magnetic controller, Durristor resistors.

ANCHOR:

One 500# anchor, Danforth shackle fitted with thimble for Manila rope. Steel chocks shall be secured to deck to stow the anchor in location later designated.

COMPASS AND BINNACLE:

One 7" constellation spherical compass, Wilfred O. White & Sons, Inc. (or equal), mounted in brass shelf cylinder with day shield. Spring suspension 110 volt light and resistor. Six-inch quadrantal globes and brackets and heeling magnets and tube. Located in front of wheel in pilot house. Compass shall be adjusted by a recognized compass adjuster at the Builder's expense before delivery of the vessel.

BELL:

One, to meet requirements of the law, with stationary bracket, M. M. Company Fig. 3350 (or equal) and braided lanyard. Mounted as directed.

CLOCKS:

One 6" dial brass, finish case, 8-day Chelsea Clock Company (or equal) clock striking ship's bell, mounted in pilot house. A similar clock, polished brass non-strike, mounted on gauge board in engine room.

FIRE EXTINGUISHERS:

One Walter Kidde & Company (or equal) 100# hose rack system consisting of two 50# cylinders of CO_2

with mounting racks, remote control type, with 50 ft. of 1/2" hose and discharge nozzles. Also five 15# portable-CO_2 extinguishers with hangers located as directed.

HOSE:

Builder will supply two fifty-foot lengths of 2-1/2", 4-ply, underwriter's label CRL fire hose, double jacketed with N. Y. Corporation thread couplings on each end. Complete with nozzles and wrenches.

All remaining lube oil filling or deck wash hose to be supplied by Purchaser.

LIFE PRESERVERS:

Thirty-inch ring buoys as shown with hangers and water lights located as directed. (A.& P. Mfg. Co).

Twenty approved block cork life jackets properly marked and stowed as directed.

LIFEBOAT: (Supplied by Purchaser)

One 12-person, 16 ft. metallic lifeboat (Lane or equal), with coastwise equipment, ridge pole and cover, to meet U.S.C.G. requirements for coastwise service.

NAVIGATION LIGHTS:

Side	- 1 pr. Perko Fig. 21, #10 galv. fr. 3-wire Mogul sep. oil fount. (112-1/2° - 10 Pt.)
Stern	- 1 Perko Fig. 985, #1 (135°- 12 Pt) galv. fr. 3-wire Mogul sep. oil fount.
Bow Light	- 1 Perko Fig. 982, #1 galv. fr. 3-wire Mogul sep. oil fount.
Towing Lights	- 3 Perko Fig. 1151 lights, 3 cast bronze, water-tight boxes. All mounted on mast, set on forward side screened to 20 points.

Anchor	- 1 Perko Fig. 23, #22-1/2 (360° - 32 Pt). Oil only.
Masthead Range Light	- 1 Perko Fig. 403, cast bronze electric only, arranged for switch and key from pilot house.

CANVAS COVERS:

Of khaki canvas of suitable weight, fitted to searchlight and lifeboat. All fitted with brass grommets and cotton lacings.

MEDICAL OUTFIT:

An approved first-aid outfit, suitable for the needs of the crew, shall be installed in the pilot house.

PLUMBING

FRESH WATER PRESSURE SET:

A Decatur Pump Company (or equal) of 300 gal/hr. capacity consisting of a Burks Super Turbine pump direct connected to a 1/4 H.P., 115 volt, D.C. motor, compound wound, with automatic pressure switch (on at 20# and off at 40#) overload protection, pressure gauge, air intake valve, check valve, and all other necessary items, mounted on a cylindrical hot galvanized pressure tank, 18" x 36", capacity 42 gals., with water gauge glass and guard and 3/4" pipe connections. Master switch to be Trumbull (or equal).

SALT WATER PRESSURE SET:

A duplicate of the fresh water system except that the pump shall be all bronze, suitable for salt water.

PLUMBING FIXTURES:

Water closets #1930, seats Church #800, white, without covers, and flushing valve of approved make in toilet rooms on main deck level.

Lavatories located as shown, Standard P-4219WZ, Marco 14" x 26", white porcelain enamelled iron, with stopper, chain, chainstay, and two self-closing chromium plated faucets marked "Hot" and "Cold" and cast brass trap.

Two shower basins built of steel plates, floors covered same as floors of quarters, provided with Standard B-196 shower head, controlling valves, for hot and cold fresh water; also shower curtains, rods, rings, etc., and shower drain fitting. An ash grating shall be fitted in the shower basin.

All brass articles shall be chromium plated.

TOILET ACCESSORIES:

With each lavatory there shall be a soap dish, glass and tooth-brush holder, a medicine cabinet with mirror, shelves and towel bar. The toilet rooms shall

have paper holders. Two towel bars and a towel rack shall be installed in the galley. All brass articles shall be chromium plated.

GALLEY DRESSER AND SINK:

Lockers with shelves and doors of #14BWG steel, painted or mahogany marine plywood, shall be built in galley as shown, about 33" above floor, and on top of these lockers shall be constructed lockers with shelves, dish and glass racks of #14BWG stainless steel or mahogany. The dresser top of stainless steel with ledge around the edge and two stainless steel sinks 16" x 16" x 12" built integral with the dresser top. All locker doors shall have brass hinges and catches, those on the stainless steel door to be chromium plated.

Galley sink shall be fitted with two chromium plated gooseneck faucets with compression handles marked "Hot" and "Cold", piped to the pressure system.

Floor under dresser shall be cemented 1/2" higher than the galley floor.

REFRIGERATOR AND DEEP FREEZE UNIT:

Box described under "Joinerwork".

Kelvinator compressor sets (or equal) with 1/4 H.P., 1725 RPM, compound wound, 115 volt, D.C. motor unit installed in the engine room. One set shall be of sufficient capacity to comfortably maintain an average temperature of 40° F. in the box without operating more than 16 hours in 24. Coils or fins shall be installed in the box as directed by the manufacturer. Complete thermostatic regulating valves for controlling temperature.

A similar unit shall be installed to maintain an average temperature of -10° F. in the quick-freeze section of the box.

Drinking water coils of tinned copper pipe shall be fitted as directed leading to a self-closing faucet on refrigerator with stainless steel drip pan, draining to the deck (outside). Drinking water line shall be connected to the fresh water pressure system.

RANGE:

Webbperfection #117 size (or equal), top 36" x 26", single oven with Valjean carburetor burner, guaranteed to operate satisfactorily with diesel fuel. To have marine rails, plate shelves, hot water coil and turnbuckles or other approved means of holding in place.

A metal hood shall be fitted over the range enclosing the exhaust fan.

If wall sheathing is extended behind the range, same will be protected by sheet metal over asbestos.

HOT WATER SYSTEM:

A galvanized steel tank of about 40 gallons capacity shall be installed near the range, piped to the fresh water pressure system and the coil in the range, with a line to the hot water faucet at the galley sink and to the lavatories and shower. There shall be one electric booster heater in the hot water line to one of the sinks to raise water temperature to 180° F. Edwin L. Wiegard Company "Chromaloy", 2000 watts, 115 volt. Complete with Square "D" Company Series #B-1 controller, Cat. #QO-2ARO (or equal).

FLOOR DRAINAGE:

All floors of quarters on main deck, forecastle, galley, pilot house, cabin and toilet rooms shall have suitable floor drains emptying overboard. Brass floor plates and traps for cleaning.

PLUMBING PIPING:

All supply piping of Type "K" copper tube with sweat joint copper and bronze fittings as far as possible, otherwise of brass I.P. size with screw fittings and ground joint unions arranged for convenient dismantling. Drainage piping (ex. water closets) shall be galvanized iron with galvanized screw fittings and iron body brass mounted valves.

The two culinary tanks shall have the necessary fill, vent and sounding connections and a 1-1/4" equalizing with 3/4" suction line to the pump of the fresh water pressure set. Thence with 3/4" main discharging through 1/2" branches to shower, galley sink, hot water tank, heating boiler and engine cooling water tank and 3/8" branches to each lavatory and to drinking water coils in refrigerator.

Hot water lines shall be, in general, same as the cold water lines.

Salt water pressure set shall draw from the sea, through a strainer, and discharge to the water closets.

Water closet discharge shall be 4" heavy lead pipes with bronze flapper valve and clean-out casting and bronze gate valve at the ship's side, or a combination of the two. Drain from galley sink 1-1/2" pipe with trap, brass valve at side of ship. Lavatories shall drain overboard.

Piping throughout shall be provided with all necessary valves and fittings, properly hung and protected with horizontal portions in the quarters covered with hair, felt, or other approved material to prevent drip from condensation.

Two steel tubes shall pass through the deep fuel tank and be welded to bulkheads. Shall be of adequate size for future forecastle requirements.

Steel plates shall be welded over the tubes in the engine room bulkheads and all pipes passing through shall be made water-tight by means of stuffing boxes.

STEAM HEATING SYSTEM

BOILER:

A steam boiler, Kewanee 1736 (or equal), steel, sufficient capacity to heat all living quarters to 70° F. with outdoor temperature 0° F., also engine room and galley through a temperature range of 40° F., piped to fresh water pressure system and equipped with all necessary fittings including automatic feed, damper regulator, relief valve, regulating valve, pressure switch, lock switch, low water cutout, strainer; pressure gauge, thermometer, etc. All for 115 volt, D.C. operation.

An oil burner Nu-Way Corporation (or equal) guaranteed to operate satisfactorily on diesel fuel, with all necessary parts and appliances, connected to an overhead fuel service tank. Also a complete condensate return unit Economy Pumps, Inc., (or equal), size 10-S, with 1/3 H.P., 115 volt, D.C. motor. The oil burner master switch Trumbull Type "D" (or equal).

Boiler and burner shall be installed in the engine room on a suitable foundation, properly fastened and braced. Smokepipe, without horizontal runs, if possible, and of ample size, shall be conducted up the stack with Liverpool head, if desired. Smokepipe shall be insulated where necessary.

PIPING:

Separate lines shall be used for steam and condensate return with stop valve and air valve at each radiator. All piping to be Type "K" copper tubes with sweat joint fittings and brass valves and all necessary unions and drain plugs so that every part of the system may be easily taken down or drained.

All piping passing through bulkheads shall be fitted with stuffing boxes and through floor with cast brass chromium-plated escutcheons. All pipes shall be secured in place by straps and hangers and covered with magnesia jacketed insulation, fastened with brass bands. There shall be separate circuits for different groups of quarters as later directed.

Convectors, in general, American Radiator of sizes and types as selected. To be distributed throughout the quarters. In the pilot house convection type

radiators shall be used; similar convectors in forecastle. To have stop valves, air relief and by-pass. Sheathing, where necessary, shall be protected by sheet metal and asbestos.

Two unit heaters, Modine Manufacturing Co. H-160 horizontal, 160 sq. ft. EDR, 1/35 H.P., 115 volt D.C. motor in the engine room.

ELECTRICAL

AUXILIARY GENERATOR SET: (Supplied by Contractor)

The Contractor will supply one 4-71 set consisting of G.M.C. two-cycle, diesel engine, fresh water cooled, direct connected to a 115 volt, D.C. generator 40 KW; also lube oil and fuel pumps attached. Heat exchangers, electric starters, starting batteries and exhaust muffler. Unit to be supplied with power take-off and clutch for driving fire pump.

Builder shall install on a suitable foundation, provide sea connections, flexible exhaust pipe and other pipe fittings, insulation and all other material needed. The Builder shall also supply and install foundation and necessary belting arrangement for the fire pump.

BELT-DRIVEN GENERATOR:

There shall be a belt-driven generator of 25 KW capacity, Safety Car Heating & Lighting Co. Type GF251200, 120/140 volt, D.C., 1200/3200 RPM, with General Electric voltage regulator Model 3GBD15A1, pulleys and belts, etc., all supplied and installed by the Builder.

SWITCHBOARD: (Supplied by Purchaser--Installed by Builder)

Of steel dead front type of suitable size and shall have all necessary instruments and circuit breakers mounted thereon. To be mounted on an angle frame in location later indicated. All instruments and switches shall be back-connected and all connections on back of board shall be made with flat copper busbars and all connections of busbars to be done with cadmium plated steel screws and nuts. Wiring for the voltmeter switch, pilot lights, etc., shall be made with fireproof wire neatly fastened by composition cleats to back of board.

Rectifiers, converters and transformers to be supplied as needed for radio and other circuits where special requirements exist.

Design of switchboard, layout of circuits, etc., shall be according to approved drawing. All lighting to be 115 volt, D.C.

A separate panel shall be provided in the engine room with necessary switches to take care of power circuits as designated. Metal guards and wood

rails shall be fitted for switchboard or any separate panel or instruments liable to contact or damage.

Fuses shall be of enclosed National Code type.

Instruments: Ammeters and voltmeters shall be Weston Model 921 for 115 volt, D.C. operation and shall be protected by necessary shunts and fuses, respectively. Generator pilot lights shall be of such type as to give illumination for the front of board. All other necessary instruments such as pilot lights, switches, fuses, etc., are to be approved type, all in accordance with AIEE #45 rules.

Circuit Breakers: The main generator circuit breakers are to be ITE Type KB, 3 pole, having 600 volt D.C. maximum rating and with shunt trip. Steering engine breaker is to be ITE "F" Frame, Type ETI #4064.

Reverse Current Relay: A reverse current relay shall also be provided, Safety Car Heating Co. S-20-EA (or equal).

Shore Power: Provision to be made for 115 volt, D.C. shore connection to the switchboard with voltmeter and indicator light on board.

SEARCHLIGHT:

Portable Light Company, "One-Mile-Ray", 750 watt, 3-M, 115 volt, D.C. incandescent pilot house control, lamp and stand to be all aluminum and to be readily demountable.

BLINKER LIGHT:

Mounted on top of mast, to be operated from the pilot house.

CARBON PILE REGULATORS: (Supplied with switchboard)

Two carbon-pile regulators for regulation of the lighting circuit shall be supplied. Safety Car Heating & Lighting Co. Type S-1050E.

ALARM BELL SYSTEM:

Complete electric alarm bell system to meet the requirements of law, consisting of 6" bells located

one in lower passage, one in galley and one in engine room with positive switch located in pilot house and elsewhere as directed. The wire used shall be rubber insulated and there shall be a separate set of batteries for these bells.

FANS:

12" General Electric Supply Company (or equal) oscillating G. E. type, 115 volt, D.C. for the galley and 10" fans for each stateroom. To be mounted as directed with portable cord and plug to special receptacle.

LIGHT FIXTURES:

All necessary light fixtures shall be supplied by the Builder, of neat and substantial design, suitable for the purpose intended. Make, style, number and arrangement in accordance with layout approved by the Contractor. Vapor-proof cages shall be used as required. Portable lights shall be provided for the engine room.

Snap switches shall be installed for all fixtures. Water-tight switch and receptacle boxes shall be used for exterior house lights, running and towing lights, etc. All appliances shall be submitted to the Contractor for approval before they are ordered.

WIRING:

All cables and wires shall be supplied by the Builder and shall be in accordance with the latest marine practice and American Bureau requirements. All wires shall be of ample sizes, marine core and stranded, unless otherwise approved, and to have the best grade 3/32" rubber-covered insulation.

All wires, if directed by the American Bureau of Shipping and AIEE Rules, shall be carried in galvanized steel conduits. Wherever conduit is exposed to the weather it shall be of brass. An outlet is to be provided on the aft end of the boat deck for the searchlight. Wherever they pass through bulkheads or decks care shall be exercised to make water-tight by means of stuffing boxes, nylon (or equal).

Flexible weather-proof rubber cable shall be provided for staff lights, searchlight, portables in engine room, radio lead-in and elsewhere as required.

Junction boxes wherever needed shall be located in accessible positions and in no case concealed by joinerwork or otherwise not readily removable.

All circuits for both power and lights shall be run direct from the switchboard.

Complete electrical connections shall be provided for all motor-driven units, including steering machine, pumps, blowers, refrigerating machine, etc.

Running and staff lights shall be controlled by an automatic Henschel tell-tale panel, 3-wire double filament lamps, 10 outlets. Tell-tale panel shall have two light attachments in pilot house which will show a red light whenever lights are extinguished.

RADAR: (Supplied by Purchaser)

Radio Marine Corporation of America CR-103 (or equal) complete with inverter and all necessary equipment to insure operation on 115 volt, D.C. current.

VHF TELEPHONE: (Supplied by Purchaser)

One VHF set, RCA #8058, complete with power pack, junction box and vibrator.

STORAGE BATTERIES:

Builder shall supply and install 56 cells of Exide-Ironclad batteries (Electric Storage Battery Co.) MV 17 AB, having a rating of 245 ampere-hours, full charge gravity 1.215-1.225, finish charge rate 18 amps., fitted in fourteen trays of the latest marine type, complete with terminal lugs and separators all neatly packed in lead-lined boxes secured in place.

Steel racks shall be provided for holding all batteries in a properly ventilated place, and steel wire grills fitted with hinges and latches protecting the batteries.

A filling device and two containers each holding five gallons of distilled water, also tools, and any other items required for proper operation.

MACHINERY

MACHINERY SUPPLIED BY CONTRACTOR:

Main engine 16-567C Wichita gear drive unit. Contractor will supply all items of machinery equipment and appurtenances covering the main engine and auxiliary diesel-electric generating units, as set forth in the Proposal of the Cleveland Diesel Engine Division of General Motors Corporation, hereto attached and forming a part of these specifications.

PROPULSION MACHINERY INSTALLATION:

Items supplied by the Contractor are enumerated in the description attached to this specification. It shall be incumbent upon the Builder to acquaint himself with what the Contractor will supply as he shall be required to supply and install all other items necessary to carry out the general scheme and to make same complete and in operating condition.

The Builder shall install all apparatus supplied by the Contractor in a satisfactory manner and coordination between propulsive equipment and ship load equipment shall be accomplished whether heretofore distinctly specified or not.

It is definitely understood that all machinery, equipment, material and labor (other than specified as furnished by the Contractor or Purchaser) will be supplied and installed by the Builder, piped, wired or otherwise connected, as described in these specifications and shown on plans or as directed and as necessary for their satisfactory operation for the purpose intended, all to the requirements of the American Bureau and the approval of the Architect.

PROPELLER:

Propeller shall be cast of manganese bronze, right hand, five-blade, of 9'-6" diameter from drawing supplied by the Architect, all to conform to the requirements of the American Bureau of Shipping.

Propeller to be accurately finished and balanced, with blades equally spaced and carefully

checked and adjusted to pitch. Hub shall be taper bored, 1" per foot, keyseated and counter-bored, to fit tailshaft and secured to same by key and tail nut locked in an approved manner and covered with bronze conical water-tight fairwater.

Plate templates for the bore of hub and key-way, also special wrench for propeller nut shall be furnished as approved.

SHAFT AND COUPLING:

Propeller shaft of hammer-forged steel about 10" diameter. A cast steel split flanged half coupling attached at the forward end, secured with bolts and keys and joined to the flange of the intermediate shaft.

After end of shaft shall be tapered 1" (on diameter) per foot to fit propeller, keyseated, threaded and fitted with tail nut and keeper. Composition sleeves shall be shrunk on in way of bearings and a thinner sleeve between making a continuous liner. Coupling bolts of machine steel turned to driving fit.

INTERMEDIATE SHAFT:

About 10" diameter, length as shown. Forged flanges at each end, one to match shaft coupling and one to match reduction gear coupling.

INTERMEDIATE BEARING:

Between reduction gear and stuffing box of cast iron upper and lower halves, lined with 1/4" Babbitt, tapped and grooved for lubricating. Dodge (or equal).

FIRE PUMP:

One Goulds Fig. 3755, size 2" x 2½" - 9 driven by generator set through a power take-off unit with clutch. Pump single stage, single suction, ball bearing, bronze fitted, centrifugal pump with cast iron casing, capacity 200 GPM at 100# pressure.

BILGE PUMP:

One Goulds Fig. 3655, size 2" x 2" - 7 single stage, single suction, centrifugal pump. Capacity 110 GPM at 65 psi at 3500 RPM. Motor 7½ H.P., 115 volt, D.C., 3500 RPM, marine type. Square "D" controller (or equal).

FUEL OIL TRANSFER PUMP:

Goulds Fig. 1895 or Viking Model DLQ, 2½" rotary type with built-in pressure relief valve. Capacity 90 GPM at 25 psi pressure, 420 RPM. Falk motor reducer, Class 2, 420/1750 RPM. Driven by a 3 H.P., 1750 RPM, 115 volt, D.C., drip-proof, marine type motor. Cutler-Hammer (or equal) push-button starter and marine controller.

LUBE OIL STAND-BY PUMP:

One DeLavel 90 GPM at 40#/sq.in., arranged for horizontal mounting. Type 313CD250 rated at 1750 RPM and having a 5 H.P., 115 volt, D.C., marine type motor. Unit complete with push-button starter (Cutler Hammer controller, or equal).

HAND PUMPS:

Two hand rotary oil pumps, Trimont #1 (or equal). One for fuel oil and one for lube oil.

DETACHED TANKS:

Potable Fresh Water Tanks: Two, separate from hull, shaped to fit after portion of engine room, of 5/16" steel plate. Fitted with manholes and swash-plates, about 1200 gallons each.

Fresh Water Expansion Tank: One, welded, galvanized iron tank of about 20 gallons capacity, located in upper engine room and piped to the circulating water system of the main engine.

Fuel Oil Service Tank: One welded steel tank of about 50 gallons capacity, located in upper engine room, piped to the fuel oil system for main and auxiliary engines, provided with nipple and valve at bottom for testing contents.

Compressed Air Tanks: For high pressure starting air supplied with machinery. One low pressure tank for signal horn supplied by Builder.

Lubricating Oil Storage Tank: A detached tank of 400 gallons capacity, hung from deck beams (under deck) in the engine room.

Waste Boxes: Two galvanized sheet steel boxes with hinged covers, located conveniently in the engine room for stowage of waste and rags, all as approved.

TANKS GENERAL:

All tanks shall be constructed with reinforcing in way of tappings, tested in the shop, and installed with suitable cradles, foundations and hangers, fitted with stiffeners, baffle plates, etc., as directed. Also all necessary fill, vent, sounding and drain connections.

Glass gauges fitted with valves and cocks, top and bottom, and substantial guards will be fitted to all tanks as required. All tanks are to be calibrated.

GAUGES:

Pressure gauges of ample size and suitable range shall be furnished and installed in fresh water, bilge, fire and fuel air and lube oil lines as required.

Thermometers shall be installed in overboard circulation water and fire and bilge discharges, and discharge of fresh water cooling of main engines, all as approved.

SIGNAL (AIR) OUTFIT:

One Kahlenberg Challenge, Model S-4 (or equal) single marine compressed air signal horn complete with

base, S-4 whistle valve, S-4 air strainer, nipples and assembly mounted on pilot house roof as directed, with cord pulls from each side of pilot house. Outside pipes shall be insulated. Outfit shall be thoroughly tested.

AIR COMPRESSORS: (Supplied by Contractor)

Described in Machinery Specification forming a part of this specification.

VENTILATION: (Mechanical)

Engine Room: There shall be two L.J. Wing Co. fans. Size 22-H-18 with 3/4 H.P., 115 volt, D.C. motor. One for each duct at the after corners of the deck house. Also two smaller Wing fans in ducts at the forward end of engine room, L.J. Wing Co. 13H-18, 1/4 H.P., 115 volt D.C. motor.

Galley: Sutton Mfg. Co., Model MBG-110. To exhaust air from galley and discharge up the stack. Rated 500 CFM, 1/4 H.P. motor, 115 volt, D.C., 1725 RPM.

SILENCER & SPARK ARRESTOR: (Supplied by Contractor)

AUXILIARY DIESEL GENERATOR SETS: (Supplied by Contractor See "Electrical").

ENGINE ALARM PANEL: (Supplied by Contractor).

PYROMETER: (Supplied by Contractor).

SPARE PARTS:

The vessel is to be delivered to the Purchaser with at least the minimum spare parts required by A.B.S. to meet their classification.

WORK BENCH:

One substantial work bench with steel top about 3/16" thick on a steel frame fitted in the engine room and provided with drawers, lockers and racks for tools.

There shall be mounted a combination vise with both flat and pipe jaws, size and type as selected.

CHAIN HOISTS:

Two 1/2 ton Yale triplex (or equal) chain hoists with shackle traveling on a 1-1/2" diameter round bar, one on each side of main engine.

ENGINE ROOM FLOOR PLATES:

To be laid in portable sections over entire floor 3/16" steel checker-plate fitted to inner flange of frames and supported on steel angles and held in place by 3/8" countersunk head brass machine screws. Access to be arranged for valves, piping, etc., as required.

SEA STRAINERS:

Ellcon Hayward (or equal) 6" duplex flanged salt water strainers, cast iron construction, hard copper baskets, 3/16" holes for 100# working pressure (or equal).

SEA CHESTS AND SUCTIONS:

Two sea chests of welded steel construction or section of 18" tubing 3/4" wall shall be located one at each side at the forward end of engine room as shown on plans, each fitted with steel body angle valves having composition seat and fittings with hand wheels arranged accessible from the engine room floor level. Strainer plates of stainless steel attached to shell outside of each opening with holes having a collective area equal to twice the area of attached pipes. Each sea chest shall be provided with connections for vent, air for blowing out and circulating water return. Sea chests shall be cross-connected by a 6" galvanized wrought iron pipe with a branch to the duplex strainer.

Separate sea chests shall be provided for the fire pump and auxiliary generator, each fitted with a suitable strainer. The bilge pump shall be connected to the main cross-over and the pressure sets to the auxiliary generator sea chest. All sea chests shall be fitted with vents and compressed air connections for blowing out. Electrolysis eliminators shall be fitted as directed.

EXHAUST SYSTEMS:

Exhaust from the main engine shall consist of a special cast steel elbow with flange to fit the exhaust manifold, thence spiral flexible steel tubing to the silencer.

Auxiliary generator in the engine room shall be fitted with black iron exhaust pipes, jacketed with asbestos up to the upper grating, thence spiral flexible steel tubes with regular flanges to silencers.

Tail pipes from all exhausts shall be of IPS standard flange pipe, extending from silencers to top of stack. Exhausts shall be capped to protect from rain.

All silencers shall be furnished by Contractor and shall be installed by the Builder with suitable hangers and supports, insulated with asbestos and covered with canvas or other acceptable jacket material.

SEA WATER COOLING SYSTEM:

Byers galvanized standard wrought iron pipe for cross-over 6", remaining piping Aeroquip hose with bronze fittings in conjunction with wrought iron piping. Globe valves cast steel body at hull, gate valves iron body brass mounted, elsewhere.

Sea water pumps on main engine shall draw through the strainer with discharge through the fresh water cooler and overboard with a stop and check valve at the shell. A branch from the sea water discharge shall be run to lubricating oil cooler of the reduction gear. Thermometer shall be fitted in salt water lines entering and leaving the fresh water cooler. Fire pump shall be piped so as to serve as emergency circulating pump. The auxiliary generator and two air compressors, if water cooled, shall draw raw water from a separate sea chest through a 3" line with a duplex strainer.

All to be arranged with gate valves, check valves and relief valves as approved.

FRESH WATER CIRCULATING SYSTEM:

Aeroquip hose and bronze fittings in conjunction with wrought iron piping, bronze gate valves as required.

Fresh water pump on engine shall discharge through the engine, through the Sylphon temperature regulator to the fresh water cooler, the lubricating oil cooler and back to the pump.

An expansion tank located in the upper engine room shall have a 1" connection from the bottom to the suction end of the attached pump, and a vent line up the stack discharging to the deck. A 1/2" vent from the highest point in the system shall join the tank vent line. The tank shall be provided with a filling line from the ship's fresh water pressure system.

FUEL OIL SYSTEM:

Standard wrought iron pipe, black; steel screw fittings; valves on bulkhead, steel, elsewhere brass.

The main filling line of 4" pipe shall be carried across the forward engine room bulkhead, at the top, under the deck, up and out through deck house on each side, provided with flanges at deck house sides, fitted with 2" brass plugs for filling hose. Four 2-1/2" branches from the filling main, each with a cast iron body bronze fitted valve shall be arranged to fill deep bunker tanks and two low forward tanks, allowing all tanks to be filled from either side of deck house. Filling pipes shall be carried down to the tank bottoms and fitted with return bends.

Suction valves to all tanks forward of engine room shall be located on forward engine room bulkhead in a convenient position to allow installation of reach rods on valves carried up to deck in deck house, with brass deck plates over and two special "T" wrenches to fit squared heads on the rods. Bearings shall be fitted on reach rods as directed. Deep tanks shall have high and low suctions. Suction from the forward tanks shall pass through deep bunker. After fuel oil tanks shall be provided with a single line for suction and discharge with valves at the tank bulkhead fitted with reach rods.

All tank suction lines shall be carried to a common header through a duplex strainer to the fuel oil transfer pump so that fuel can be transferred from any tank to any other tank.

A branch from the suction main is carried to the fuel oil hand pump which discharges to the fuel oil service tank that supplies fuel to the range, generator set and heating boiler. Surplus oil overflows back to the filling main.

A line from the attached pump suction also connects with the main suction line at a point past the strainer, but before the hand pump branch.

Discharge from the attached fuel pump passes through a pressure regulating valve on the way to the injectors and excess fuel is returned to the service tank.

Vent pipes of galvanized iron shall be carried up alongside the deck house to the underside of roof or at the bulwarks to underside of main rail as may be indicated. All vents shall have return bends, bronze wire gauze over openings and plugs of approved type.

Sounding pipes 2" iron pipe shall extend from the low point in each tank to the deck with stainless steel deck plates with bronze plug. A striking tee shall be welded to the "T" wrenches to fit bottom of each sound pipe.

LUBRICATING OIL SYSTEM:

Standard black steel pipe, malleable screw fittings. Iron body brass mounted and brass valves.

Starting with the discharge side of the attached scavenging pump a 4" line runs to the filter with a by-pass to the high and low connections with a pressure relief and check valves in the line. The attached pressure pump picks up oil from the filter and discharges to the lube oil cooler with by-passed relief valve and proportioning valve in the line. From the cooler a 4" line to the distribution systems of main engine. A strainer, pressure relief valve. low pressure alarm and thermometer are installed in this line. A by-pass with lube oil hand priming pump is located between the filter and the engine. A vent from the main engine crank case is carried to the filter. The motor-driven lube oil stand-by pump draws from the filter and discharges to the cooler. A second hand pump is installed to pick up drains from reduction gear and auxiliary generator set and discharge overboard. The stand-by pump is piped to drain the main engine sump and discharge overboard through the same overboard discharge.

FIRE, BILGE & BALLAST SYSTEMS:

Bilge and ballast pipe standard, galvanized Byers wrought iron in conjunction with Aeroquip hose. Within the fuel oil tanks the bilge lines shall pass inside extra heavy steel pipes, welded at the bulkheads

and one end made water-tight by means of a stuffing box.

Fittings standard galvanized malleable iron. Valves steel body at the hull, iron body brass mounted elsewhere.

Fire lines to deck connections standard galvanized iron pipe. A manifold made up of cross valves with non-return feature shall be located near the pumps and shall have a line to each ballast tank serving for both suction and fill, also two bilge suctions in the engine room and one suction from the sea. There shall be an independent engine room bilge suction for the fire pump. Each bilge suction end shall be fitted with a strainer box and duplex strainers shall be located at the suction end of each pump.

Where ballast lines pass through bulkheads, an angle valve shall be mounted and a reach rod carried to the main deck, fitted with a stainless steel plate and bronze plug with a special wrench to fit the squared end of the valve rod.

A separate sea chest shall be fitted for the fire pump.

Fire and bilge pump shall be cross-connected so as to do interchangeable duty, also so that both can operate on the fire lines at the same time. Fire pump shall be piped to do emergency duty supplying circulating water to the main engine and a pressure reducing valve shall be set in this line.

Pressure gauges shall be installed in the discharge side of each pump. Discharge lines shall be carried to the two fire plugs on each side of the deck house, two deck wash connections and the fire and bilge pump overboard discharges to feed into a main line of 3" pipe with a 3" globe hull valve and swing check, discharging overboard.

COMPRESSED AIR PIPING:

Cold drawn seamless steel tubing for high pressure and standard black steel for low pressure systems. Fittings standard black wrought steel and forged steel flanges. Bronze globe valves 600# and 200# pressure.

Both compressors shall be provided with automatic pressure operated control switches, check valves, pressure relief valves and stop valves. They shall be piped with a pressure equalizer between the starting air tanks. Each tank shall be fitted with safety pop valves set at 10% over the operating pressure, a stop valve at both inlet and outlet, a pressure gauge and a drain at the bottom. From the tanks a line shall be carried to the main engine starting valve, also fitted with a branch with a pressure reducing valve to an auxiliary tank to supply low pressure air to the signal horn, sea chests and for general engine room service. The low pressure tank shall have the same fittings as the high pressure tanks.

Exposed pipes to the air signal shall be properly insulated.

DRAINAGE:

Recesses and pockets in all lines shall be fitted with cocks and unions so that piping can be thoroughly drained.

GENERAL:

Piping is not to run through fuel oil tanks unless it goes through an extra heavy pipe tunnel and has a stuffing box on one side. Complete piping plans shall be prepared by the Architect and submitted to the Builder before work is started.

Any part of the foregoing description may be superceded by instructions by the General Motors Corporation or requirements of the American Bureau of Shipping, U.S.C.G., or any Governmental inspection service having jurisdiction, where such are in conflict with this specification, without additional cost to the Contractor.