EXXON COMPANY, U.S.A.
POST OFFICE BOX 1512 • HOUSTON, TEXAS 77001 "STANSHIP HOUSTON"

MARINE DEPARTMENT

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FLEET & BRANCH MANAGER

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MAINTENANCE & SERVICES MANAGER

September 6, 1978

EXXON BOSTON
Specifications

Newport News Shipbuilding & Drydock Co.
4101 Washington Avenue
Newport News, Virginia 23607

Attention: Mr. Guy Via, Jr.

Dear Sir:

Attached are addenda to the subject specifications.

Please attach these addenda to your copy of the specifications sent to you previously.

Very truly yours,

E. J. Worrel, Jr.
Asst. Repair Superintendent

EJW: bt
Attachments

c: Mr. H. J. Borgen
Mr. H. P. Leyendecker

86. I. Sewage Retention - Amidship House

Furnish labor and material required to modify the existing sewage overboard discharge system to add two (2) sewage holding tanks in the amidship square, one port and one starboard. The system is to be complete with tank level and alarm system, saltwater wash down system, and tank self-drainage system (one system per tank). The modified sewage handling system is to be capable of going overboard or to a holding tank.

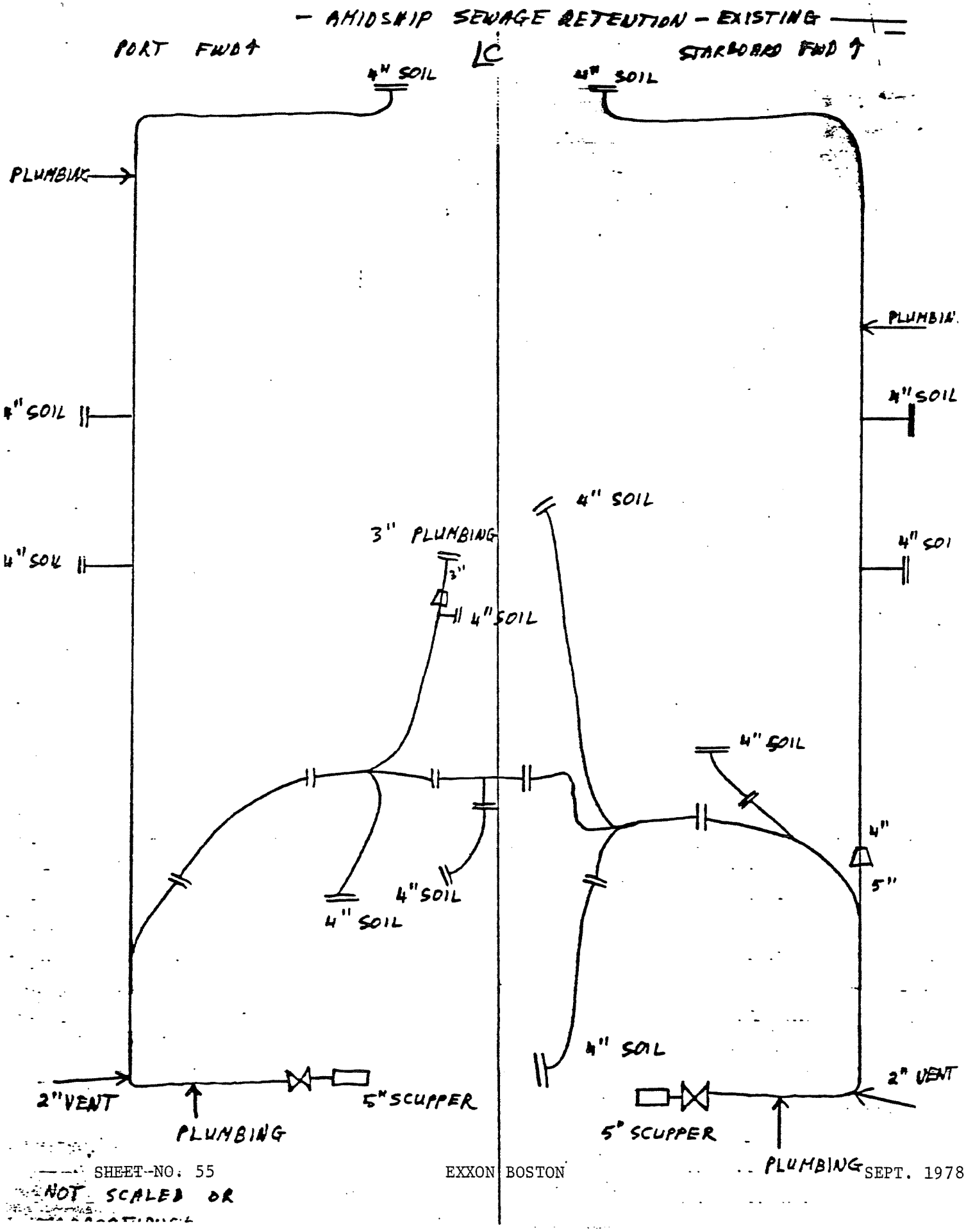
Modify the sewage piping to collect only black water. Insure that all newly installed drain lines are properly sloped (at least 1/4" drop per foot of pipe run). All new piping is to be extra strong galvanized.

Fabricate and install two 1,000 gallon holding tanks (approximate size 4'25. x 5' x 6'6 - see attached sketch) in the amidship square (one port and one starboard). Each tank is to have smooth interior with no internal framing (external framing for strengthening). They are to be shaped so as to allow last gallon drainage. Interiors are to have surface preparation of white metal blast (SS SA3), then apply two (2) coats of rust ban 6692 black coal tar epoxy or equal 8 MDFT each coat (16 MDFT total). Exterior of tank and foundation are to have surface preparation of white metal blast (SS SA3), then apply one (1) coat rust ban 191 or equal 4 MDFT, one (1) coat rust ban 6259 or equal 1 MDFT, and one (1) coat rust ban AK6403 or equal 2 MDFT. The tank shall be constructed with a suitable manhole access centered over the suction penetration. Furnish and install a 4" drain system from the tank overboard. Supply and install valve, piping, and scupper. A 2 1/2" vent system is to be incorporated from each tank to a suitable location above deck.

Install a tank level and alarm system for each tank to alarm in the ship's cargo office and indicate tank level. Level switches are to be DeLaval, Gems Single Station Liquid Level Switches -owner furnished. The level switches are to indicate when the tanks are 3/4 full.

Install a saltwater spray-down system in each holding tank supplied from the ship's saltwater service system. The spray-down system is to consist of one (1) 6353-3/8-22 (stainless steel) nozzle per tank. Also install a backflush line to the tank drain suction tail piece, tank inlet, and tank bypass from the saltwater service system.

Develop piping layout, design details, and equipment purchases. Provide engineering services to produce drawings and obtain approvals from USCG, ABS, USPHS, owners and others as required. Approval is to be obtained in the final drawings for all revisions or modifications. After completion, prove operation to satisfaction of all concerned.



SHEET NO. 55 EXXON BOSTON SEPT. 1978

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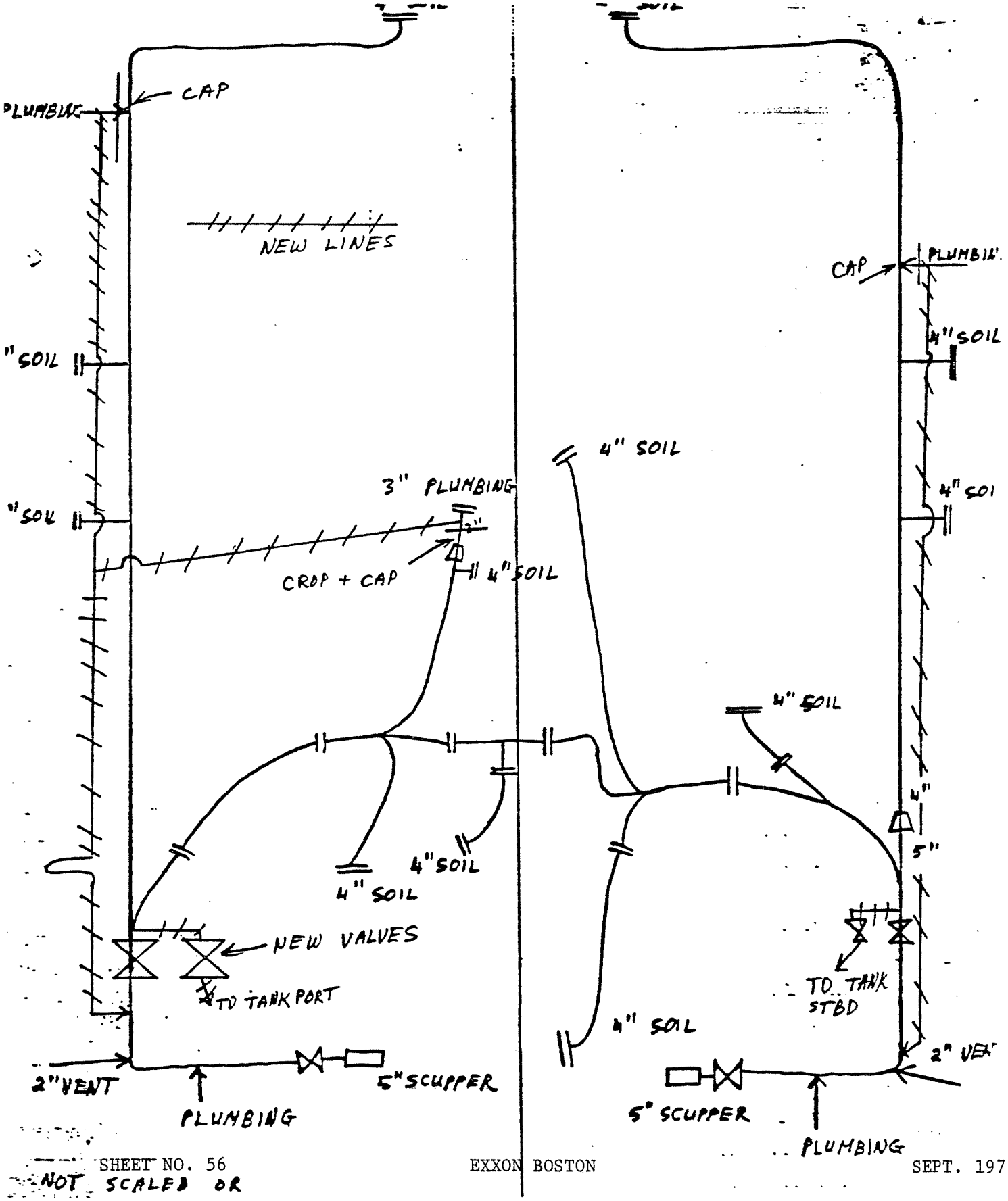

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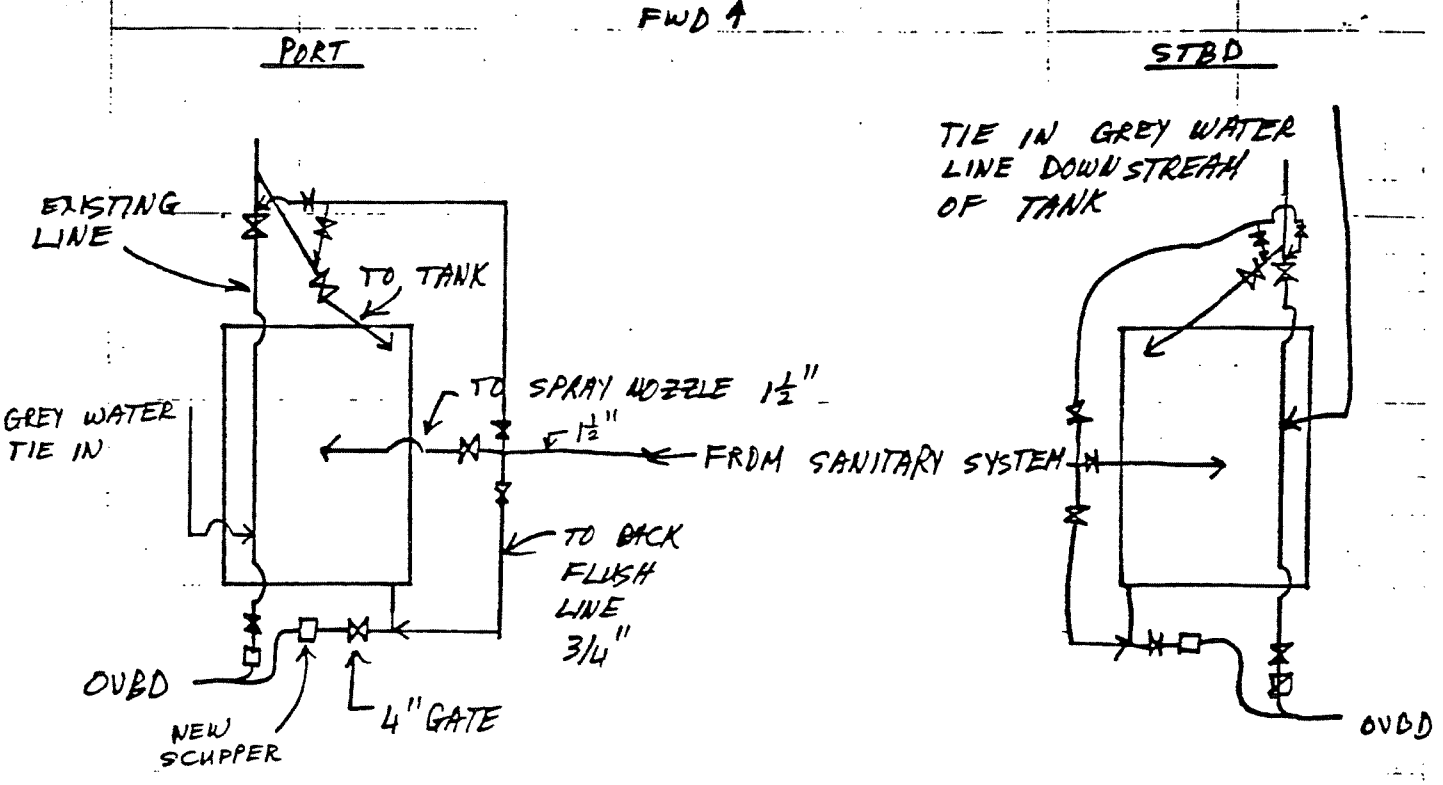
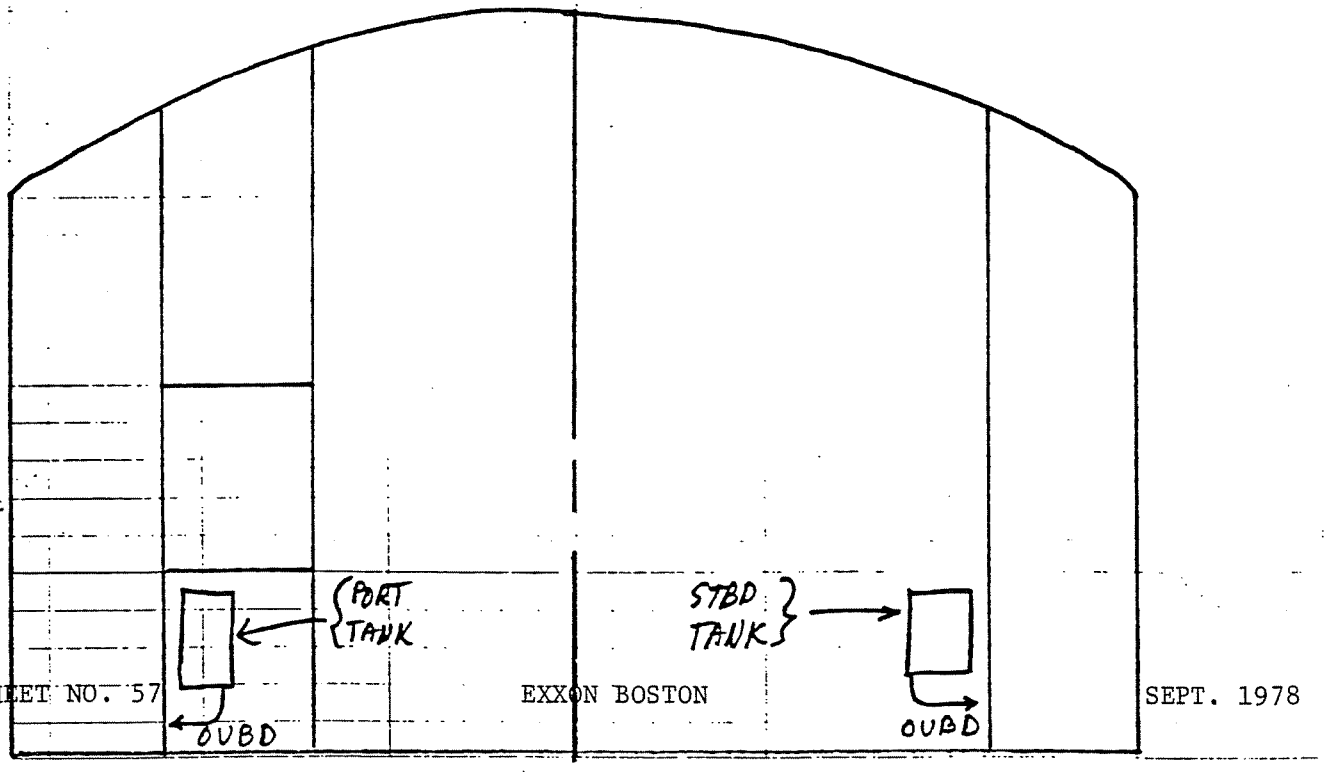
SEWAGE TANKS - AMIDSHIP -

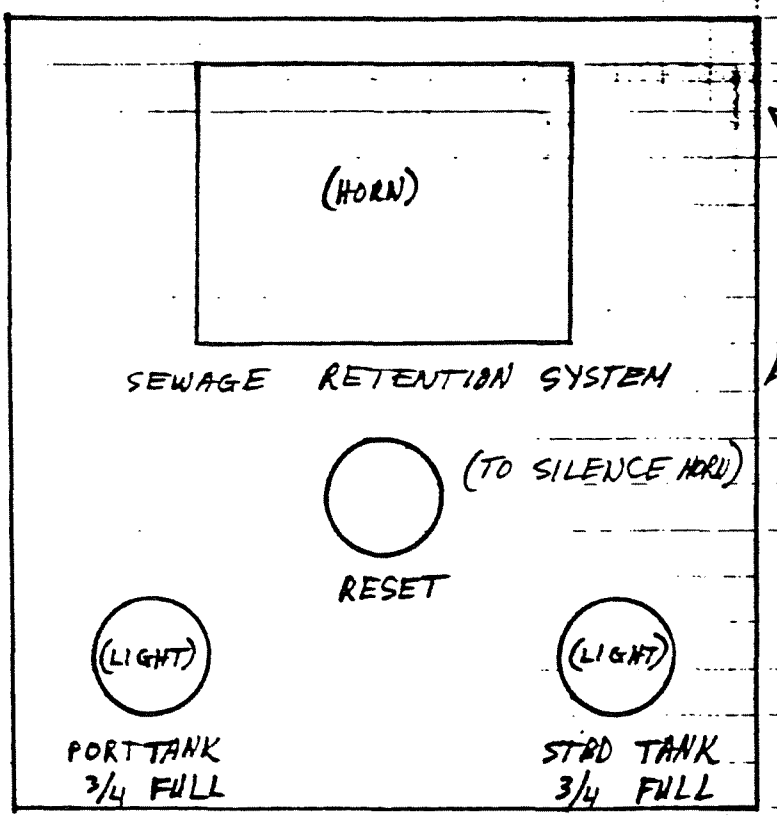


TANK ORIENTATION

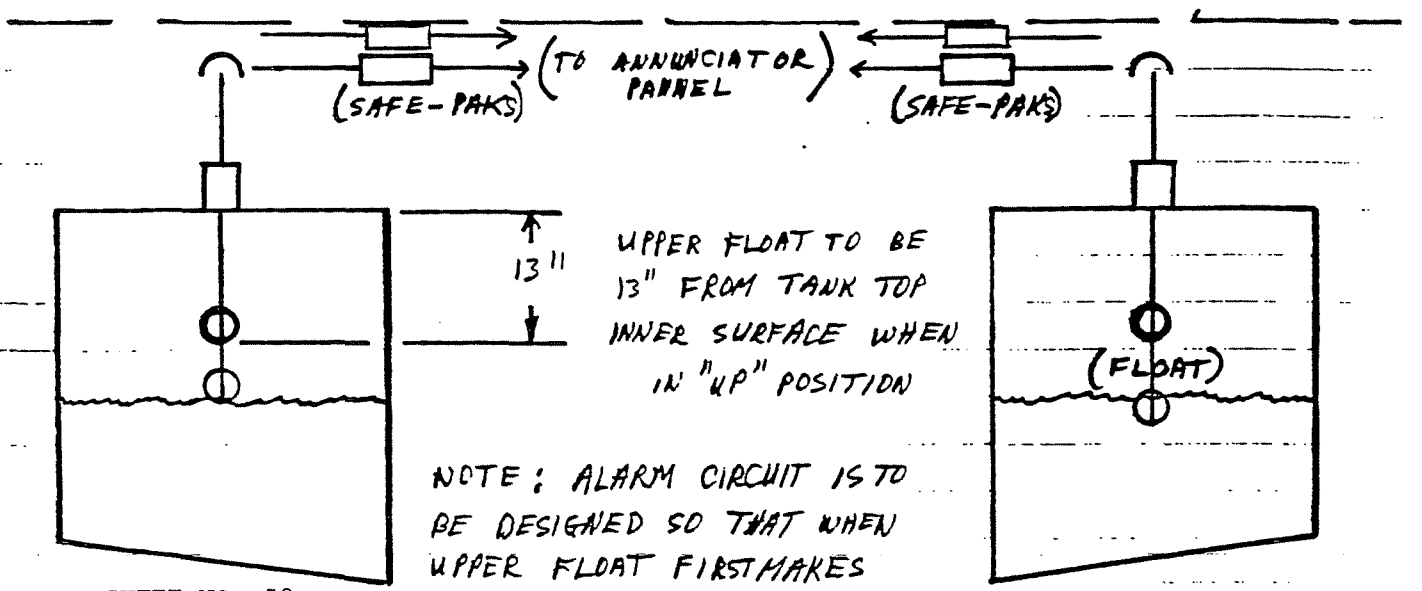


PREPARED BY DATE DEPARTMENT

SEWAGE RETENTION SYSTEM - HIGH LEVEL ALARM

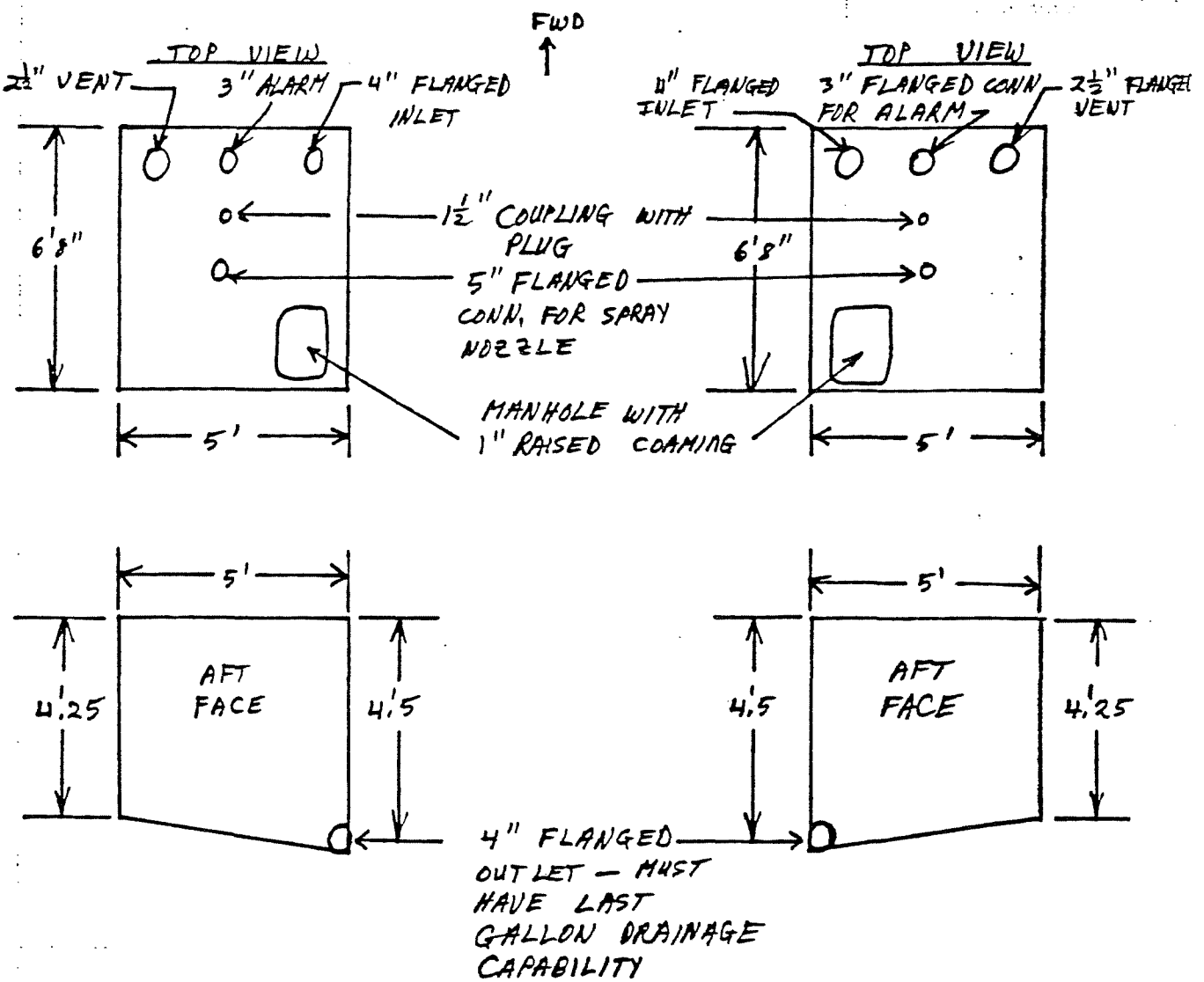


SAFE PAKS AND FLOATS ARE OWNER FURNISHED



NOTE: ALARM CIRCUIT IS TO BE DESIGNED SO THAT WHEN UPPER FLOAT FIRST MAKES CONTACT, THE AUDIO AND VISUAL INDICATORS REMAIN ENERGIZED UNTIL THE LOWER FLOAT RETURNS TO ITS NORMALLY OPEN POSITION (DOWN POSITION)

SEWAGE RETENTION TANKS - AMIOSAIP HOUSE



NOTE: TANK IS TO HAVE EXTERNAL STIFFENING - ALL SMOOTH INTERIOR SURFACES

II. FAST Sewage System Installation - Afterhouse

Furnish labor and material required to modify the existing sewage overboard discharge system and to install one FAST treatment system (FAST 26M owner furnished) on the port side of the lower engine room space, in the 20-40 frame area (see sketch). Obstructing piping and equipment are to be relocated as necessary. The FAST system is to be installed as per the manufacturer's guidelines. The modified sewage system is to be capable of going overboard or to the FAST system.

Remove the toilet shared by the two deck maintenance rooms on the starboard side (between frame 16 and 18) and cap the 4" drain line.

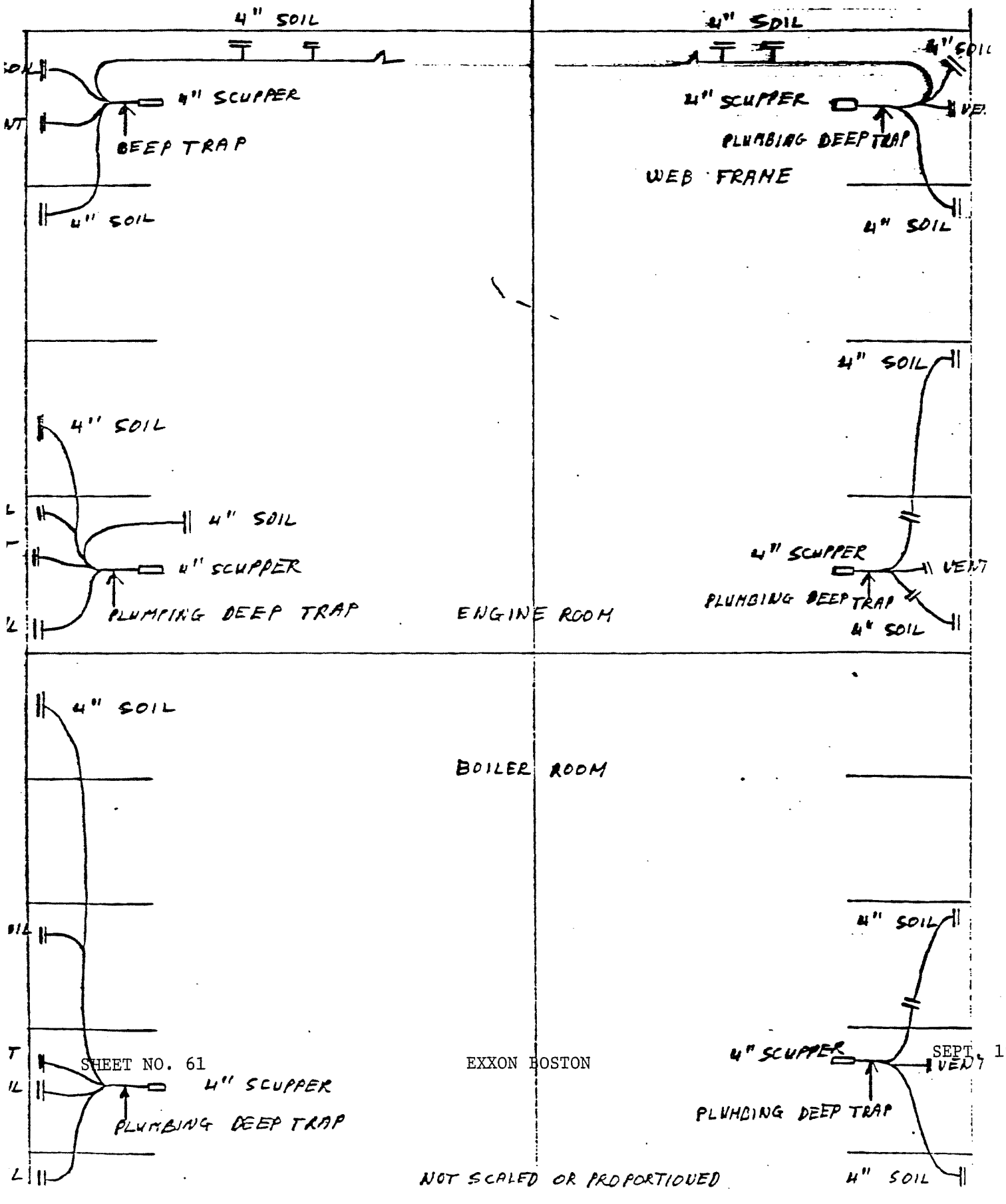
Modify the sewage piping system as per the sketch attached. Cut into the six (6) 4" soil lines in the engine room leading to the six scuppers (three port and three starboard) and install twelve gate valves. Six valves are to direct waste to the FAST System and the second six to direct waste overboard (see sketch). Install new drain lines to the FAST system and direct treated discharge overboard through the aft port scupper. Insure that all newly installed drain lines are properly sloped (at least 1/4" drop per foot for pipe running aft or athwartship, and at least 3/8" drop per foot for pipe running forward). New 4" drain piping is to be extra strong galvanized.

Develop piping layout, design details, and equipment purchases. Provide engineering services to produce drawings and obtain approvals from USCG, USPHS, ABS, owners, and others as required. Approval is to be obtained in all final drawings. After completion, prove work to satisfaction of all concerned.

AFTER HOUSE SANITARY SYSTEM

PORT FWD — EXISTING

STARBOARD FWD



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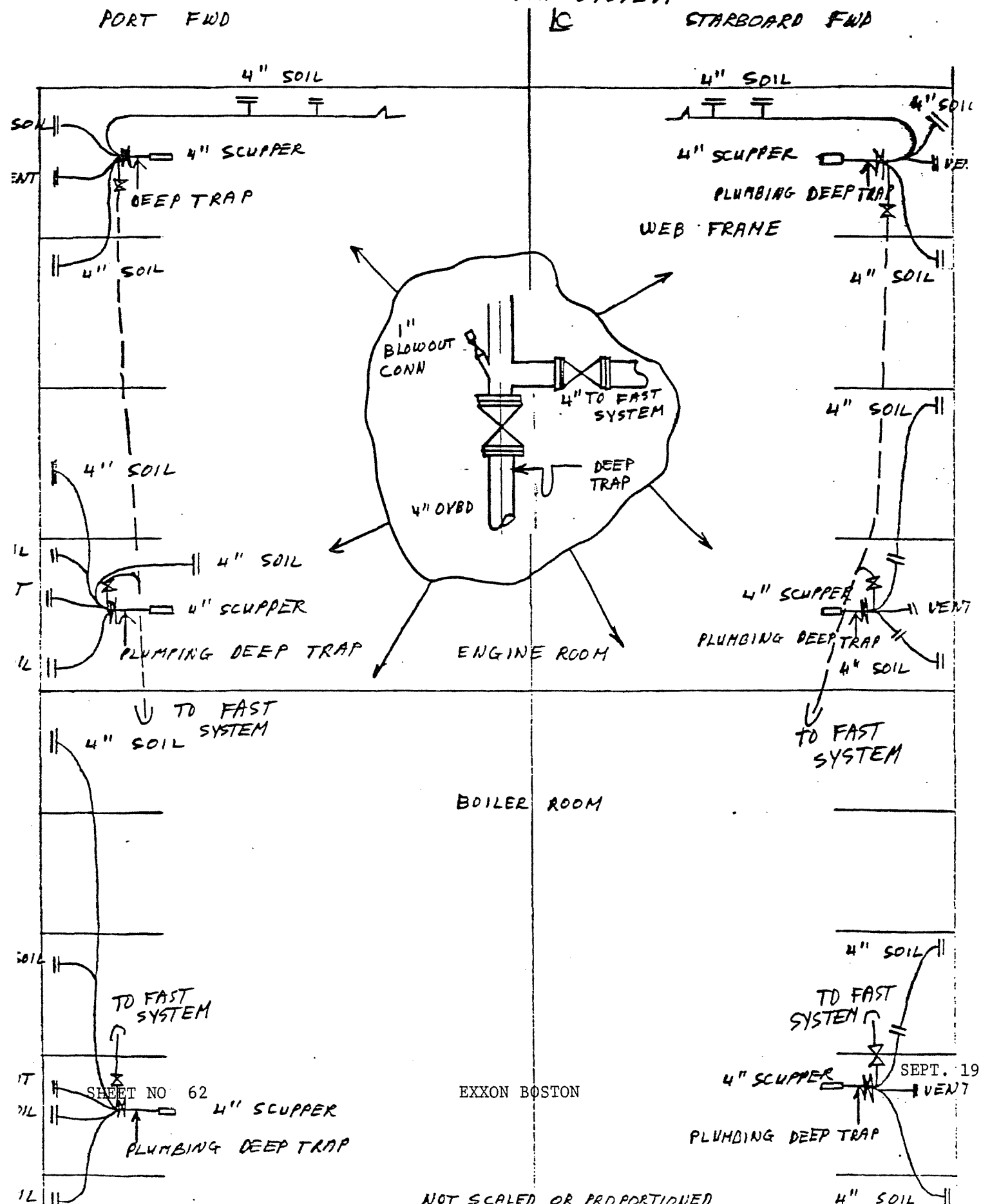
- AFTER HOUSE SANITARY SYSTEM



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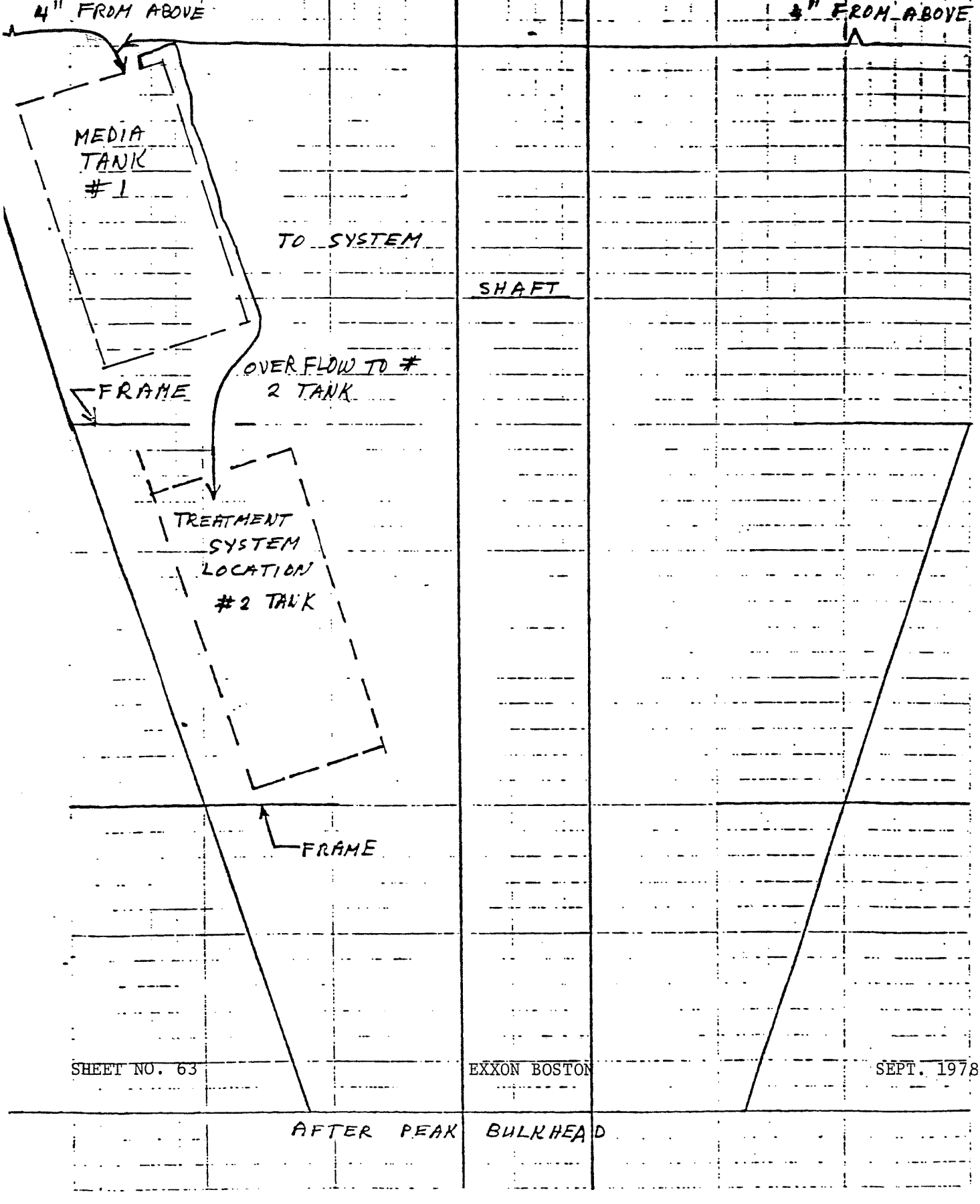
CALCULATION SHEET

EXXON HUNTINGTON — AFT HOUSE
FAST TREATMENT SYSTEM ORIENTATION



SHEET NO. 63 EXXON BOSTON SEPT. 1978

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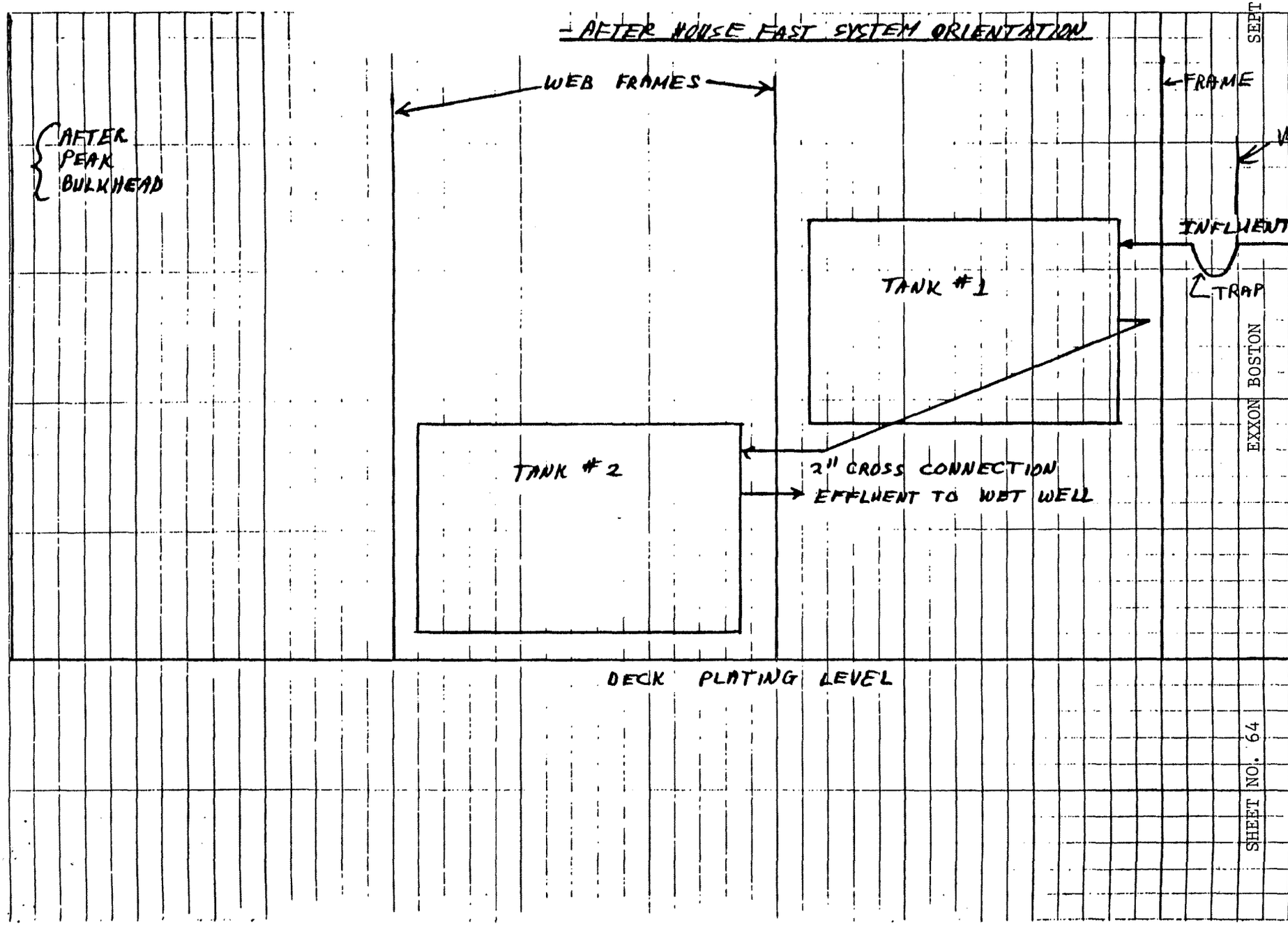

CALCULATION SHEET 990-704C (A-165)

SUBJECT

SEPT. 1978

PREPARED BY

EXXON BOSTON

DATE

DEPARTMENT

SHEET NO. 64

PAGE

Marine Sewage Systems

Installation Instructions: M Series

EXXON BOSTON

Installation Instructions
For ~~Models 6M, 9M, 13M and 18M~~ 26M

Contents:

General. Each M Series FAST system is a complete marine sewage plant in component form. The components can be located where space is available and then interconnected. Each component is fully assembled prior to shipment, and will pass through a 28" x 60" watertight door without disassembly. Components may be oriented fore and aft

The most critical aspects of installations are piping and venting, so that the sewage will flow freely into and through the system. Read these instructions and the associated drawings carefully.

Each boat and installation is unique. If you have any questions, call your local distributor or St. Louis Ship. To assist you in installation we make available a qualified field representative for up to two (2) days at no cost to you, other than for transportation expenses (billed at cost).

Operation. As fresh sewage enters the media tank, an equal volume of purified water is displaced through the tablet chlorinator and into the wet well. Liquid level switches in the wet well operate the discharge pump. The blower runs continuously.

Equipment Furnished. Media tank, tablet chlorinator, wet well, discharge pump, blower, pump and blower motor starters, 45 lb. drum of chlorine tablets.

Special Note. The FAST ~~18M~~ 26M differs from the other models in one respect. It uses two model ~~9M~~ 13M media tanks, connected in series rather than a single tank. The first media tank should be set about 6 inches higher than the second tank to insure gravity flow from the outlet of the first tank to the inlet of the second tank. This will permit the tanks to be located up to 10 feet apart. If greater spacing is desired, raise the first tank an additional 1/4 inch per additional foot of separation. Otherwise, all installation requirements are the same as for the other models.

Labor and Materials Required, but not furnished. Structural foundations, interconnecting piping and wiring.

Caution. Do not weld on the bodies of the media tank or wet well. Their interiors are coated with epoxy resin and the heat will destroy the coating Also, protect the plastic parts of the tablet chlorinator from weld splatter during installation.

FAST
SEWAGE SYSTEMS

2

Soil Piping. Soil piping to the system must slope 1/4 inch per foot when the vessel is at its normal trim. This will insure adequate flow velocity and prevent deposition of sewage solids in the pipes.

Bypass. Provision should be made for direct overboard discharge of sewage, bypassing the FAST system. This will provide sanitary facilities for the crew in case of malfunction, and also permit bypassing at sea where treatment is not required.

The simplest method is a two valve gravity flow arrangement. ~~Ball valves are recommended~~. Gate valves are acceptable so long as the stems are oriented upward to prevent clogging.

Trap. It is necessary to isolate the vessel soil piping from the sewage system with a water seal trap. Occasionally, detergent foam will form in the media tank and partially block the media tank vent, creating backpressure. The trap will prevent this backpressure from affecting operation of the toilets.

The minimum depth of the trap shall be not less than sixteen (16) inches, from the centerline of the outlet pipe to the centerline of the pipe at the bottom of the trap.

Note that the inlet to the trap is 1'-0" or more above the outlet. This 1'-0" drop corresponds to the expected worst case backpressure in the media tank vent. ~~If 1'-0" drop is not available,~~ When larger vent size is required, enlarge to the larger pipe size as close to the media tank as possible.

**Each ~~9M~~ 13M media tank used in the ~~18M~~ 26M is equipped with a ~~2 1/2~~ 3 inch vent connection. These should be combined into a single vent of the size specified in the table as close to the media tanks as possible. – 5"

The trap should be equipped with a 2 inch cleanout and fill connection at the top of the inlet pipe, and a 2 inch cleanout at the bottom.

Trap Vent. The upstream side of the trap should be equipped with a 2 inch vent to the exterior of the vessel. This will permit free flow of sewage in the soil pipes. ~~If the soil lines are adequately vented to atmosphere, this vent may not be required~~. However, if the fixtures incorporate one way (check valve) air inlets, a separate trap vent will be required. The trap vent may be fabricated from ordinary black iron pipe.

Media Tank Vent. The media tank must be vented to the exterior of the vessel, and this vent must not be combined with the trap vent or any other soil line vent upstream of the trap.

The media tank vent should be fabricated from galvanized steel pipe or other material suitably protected against corrosion. X a flame screen is required (for inspected vessels only), the exterior termination of the vent should be fitted with a

3

pipe reducer. so that the opening and flame screen will be two pipe sizes larger than the vent pipe size. This will reduce the additional pressure drop due to the screen. The exterior termination of the vent should be located to permit removal and cleaning of the screen.

See Table 1 for minimum tank vent size.

Vent Piping (General). Vents must terminate not less than 10 feet from any ventilation air inlet, window used for ventilation, doorway normally used by personnel. or source of vapor ignition. Vent piping must slope not less than 1 inch per foot upward and away from the media tank or trap so that condensation will not accumulate in the vent. Vent runs should be as short as practicable.

For inspected vessels, the U. S. Coast Guard requires a flame screen on all vents.

Water Piping. Pump discharge piping should be 1-1/4 inch and all other water piping shall be 2 inch pipe size. The 2 inch pump suction piping should be reduced to 1-1/2 inch at the pump suction connection.

If media tank and wet well are set at the same deck level, maximum length of the spillover line from media tank to chlorinator to wet well is 30 feet. Piping should slope downward from the media tank at 1/4 inch per foot.

The run between the media tank outlet and chlorinator inlet must be equipped with a trap with centerline to centerline depth of sixteen (16) inches. No drop is needed. Inlet and outlet of the trap can be at the same level.

Note: In both water and air piping use unions to permit removal and maintenance of components.

Air Piping. Air piping from blower to media tank must be one (1) inch pipe size. ~~Acceptable~~

Media Tank. The media tank may be installed on a flat deck or on two longitudinal or three transverse frames with bearing areas at least 3 inches wide. The frames should pick up the six bolt holes predrilled on the tank baseplate. The tank may be secured in place with six 1/2 inch grade 5 bolts, ~~or with three, 3 inch long 3/16 inch fillet welds spaced along each long side of the baseplate~~. The tank baseplate should be horizontal when the vessel is at its normal trim. Provide at least 2'-0" above the top of the tank for access.

Tablet Chlorinator. The tablet chlorinator is preassembled to a bracket for bulkhead mounting. It should be installed so that the notches in its bottom are at the downstream end. Tilt the bracket or shim the chlorinator so that it slopes 1/4 inch per foot (centerline of outlet connection about 1/2 inch below centerline of inlet connection). Be sure the tilt angle is such that water does not accumulate in the bottom of the chlorinator.

The chlorinator may be located at any point in the line between media tank and wet well, but must be downstream of the trap and not less than 2'-8" above the base of the wet well.

Provide at least 1'-0" access above the top of the feed tubes for their removal.

Wet Well. The wet well may be installed on a flat deck or on two frames with bearing areas at least 3 inches wide. The frames should pick up the four bolt holes predrilled on the tank baseplate. Secure with either four 1/2 inch grade 5 bolts or with two 3 inch long 3/16 inch fillet welds on each side. The tank baseplate should be horizontal when the vessel is at its normal trim.

4

Allow at least 1'-6" above the top of the tank for access.

Discharge Pump. The discharge pump should be operated in the flooded suction mode. Its base should be not more than 2'-0" above the baseplate of the wet well. If the discharge head is greater than 15 feet or if the discharge point may be submerged, install a check valve in the discharge line. The pump base should be tack welded to the deck. **Do not run the pump dry!**

If the pump is run backward, the rotor may unscrew and the pump will not deliver water. If this happens, disassemble the pump and reassemble the rotor and pump.

Blower. The blower assembly is preassembled to a bracket for bulkhead mounting. Install so that the silencer inlet will not pick up foreign objects from the deck, and with belt drive towards the bulkhead.

Make sure that the blower gear case has oil in it before starting. The fill plug is at the top of the gear case (opposite the drive end), the oil level plug is below it and just above the drain plug. Add SAE 40HD oil until it overflows from the oil level plug hole.

See Table 2 for standard sheave sizes.

Table 2.
M Series Sheave Sizes

FAST Model No.	Motor Sheave	Blower Sheave
26M	4.6	4.1

Blower Relief Valve. ~~The relief valve should be~~

The purpose of the relief valve is to protect the blower from damage due to overpressure. Make sure that the relief valve operates freely and is lubricated with machine oil.

Electrical Equipment. Motors and the pump starter control transformer can be connected for either 220/230 VAC or 440/460 VAC operation. (These motors are **not** suitable for 208 VAC operation. If 208 VAC operation is required, special motors are required.) Unless otherwise stated in the purchase order, the overload heater coils furnished will be for 440/460 VAC. Table 3 lists proper Cutler-Hammer part numbers.

Table 3.
Overload Heater Coil Part Numbers

Line Voltage	Blower Starter	Pump Starter
440/460 VAC	H1025	H1023

The pump starter incorporates a line disconnect which can break all current to both motors. It should be located in sight of the motors. The pump starter also incorporates a fused control transformer to produce 110 VAC for the pump pilot circuit.

Electrical service required is 3.5 KVA. The branch circuit feeding the motor starters should be protected by a 20 amp circuit breaker. Cables should be bronze armored marine type, TTIB-4 and DTIB-4 as applicable. Junction boxes should be watertight, and cables should enter starter enclosures at the bottom. In running cables and locating cable supports *do not weld on body of media tank or wet well.*

The liquid level switch on the wet well incorporates 3 independent sets of contacts: pump off (2 red wires), pump on (2 yellow wires) and high level (2 blue wires). ~~If the high level~~

5

Startup Checklist. Before startup, check these items:

1. Soil piping leading to FAST system must be sloped at 1/4 inch per foot and vented to vessel exterior upstream of the trap.
2. Media tank vent and drop into trap must be in accordance with Table 1 in *Trap* section of this instruction.
3. Media tank vent must not be combined with any other vent.
4. Horizontal vent runs must slope upward and away from media tank.
5. Vents must not terminate within 10 feet of weather deck, ventilation air inlets, windows or doors used for ventilation, doorways normally used by personnel, or sources of vapor ignition.
6. If flame screen is used on media tank vent, it must be two (2) full pipe sizes larger than size of vent pipe.
7. Media tank base must be at same level as, or higher than, wet well base.
8. Gravity flow lines from media tank to chlorinator to wet well to overboard (if applicable) must slope 1/4 inch per foot.
9. Grease bearings on blower drive end and on both motors before startup.
10. Blower must be filled with oil and be equipped with proper sheaves, as per Table 2.

External Air Supply. If specified in the purchase order, the system will be furnished less blower, but will incorporate a pressure regulator and orifice plate for flow regulation. Connect to the external air supply with a 1 inch line and provide a separate shutoff valve upstream of the regulator. Set regulator to 3.5 PSI.

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12. Blower and pump starters must be equipped with proper overload heater coils. and each coil should be installed with pointed end up.
13. Chlorinator must tilt 1/4 inch per foot, and the downstream tube must be charged with chlorine tablets. Make sure tablets lie flat in feed tubes, and that water does not stand in chlorinator when there is no flow.
14. Does vessel have operating instruction manual?

Startup Procedure.

1. Set up for automatic operation and turn on blower (air lift operation).
2. Fill media tank with water and leave water running to check automatic operation of pump. Turn off water.
3. Close overboard bypass and allow sewage to enter media tank.
4. Flush all toilets to check for proper operation. If flushing is slow, check soil pipe venting.
5. Instruct vessel personnel in operation of system.

FAST SEWAGE SYSTEMS
ST. LOUIS SHIP
DIVISION OF PDTT INDUSTRIES INC
611 EAST MARCEAU STREET. ST LOUIS MO 63111

EXX-MOR-010767

nstallation Notes:

- Media tanks are to be mounted fore and aft. #1 Media tank forward of #2.
- Wet well base must be at least 12" lower than media tank base #2.
- Locate chlorinator for 1/4" drop per foot from ℄ 2" media tank spillover to ℄ 2" chlorinator inlet.
- Set chlorinator so that notches at bottom of box are under downstream tube. Shim chlorinator or tilt base for 1/4" drop per foot.
- There is no high level alarm with this system.

iping:

- Water and soil lines to drop 1/4" per foot.
- Vent media tank and trap separately to exterior of vessel on stack deck.Vents to terminate not less than 10 feet above weather deck in gooseneck.Vents to terminate not less than 10 feet from ventilation inlets, doors, windows, etc. Horizontal vent runs to slope not less than 1 inch per foot.

iping Materials:

ir:galvanized schedule 40.
ump suction:schedule 80 Galv.
lon-suction water:schedule 80 Galv.
ent:galvanized schedule 40.
leophrene hose - identified by ≋≋ on drawing.

DIMENSIONS AND WEIGHTS

UNIT	LENGTH	WIDTH	HEIGHT	DRY WT.(LB)	OPERATING WT. (LB)
ledia Tank	6'-6 1/4"	2-3 3/4"	4'-4"	1450	3800
let Well	2'-3"	2'-3"	4'-7"	450	1200
llower	2'-0"	1'-0"	3'-0"	180	180
)ischarge Pump	2'-6"	0'-11"	0'-10"	120	120
:hlorinator	2'-0"	1'-3"	2'-4"	50	60

\ccess

ledia tank	Top and one end	1'-6"
let well	Top 2'0" one side	1'6"
:hlorinator	Top 2'0" above top of feed tubes	

SEWAGE CONVERSION OWNER FURNISHED MATERIALS

I. AMIDSHIPS

2 - No. 6353 - 3/8 GG-22 Stainless steel spraying nozzles.

2 - Gems DeLaval Fabri Level Kits (2 level switches per kit).

4 - Gems Safe - Paks

I. AFTER HOUSE

1 - Complete Fast Model 26 M Sewage system consisting of:

2 - 13 M Media Tanks

1 - Wet Well

1 - Chlorinator

1 - Blower, complete with motor, base, silencer

2 - Pumps with motors

1 - Combination starter

45# - Sanuril Tablets

1 - Pump Rebuild Kit

1 - Spare Blower

1 - Spare Vee Belt

GAT:bjc
7/25/78

III. Cargo Manifold Modification

Provide labor and material to modify the port and starboard cargo manifolds in accordance with the attached sketch. Only lines A, B, the port forward stripper, and the starboard forward bunker line are affected. Spacing is to be as follows:

C to B_2	6'
B_2 to Stripper (Bunker)	4'
Stripper (Bunker) to A_2	2'

Remove four spool reduction pieces (A and B, port and starboard) and save for replacement. Remove the line extensions (A and B, port and starboard) and fabricate new extensions dimensioned as sketched. Each new line is to be properly supported and tied to the existing stripper line. Replace the spool reduction pieces.

Fabricate and install extensions for the 6" stripper line and the 8" bunker line. Support as needed.

Furnish and install a 3' section to the forward side of the existing collection pan and hose rub rail, port and starboard. Support these extensions as needed.

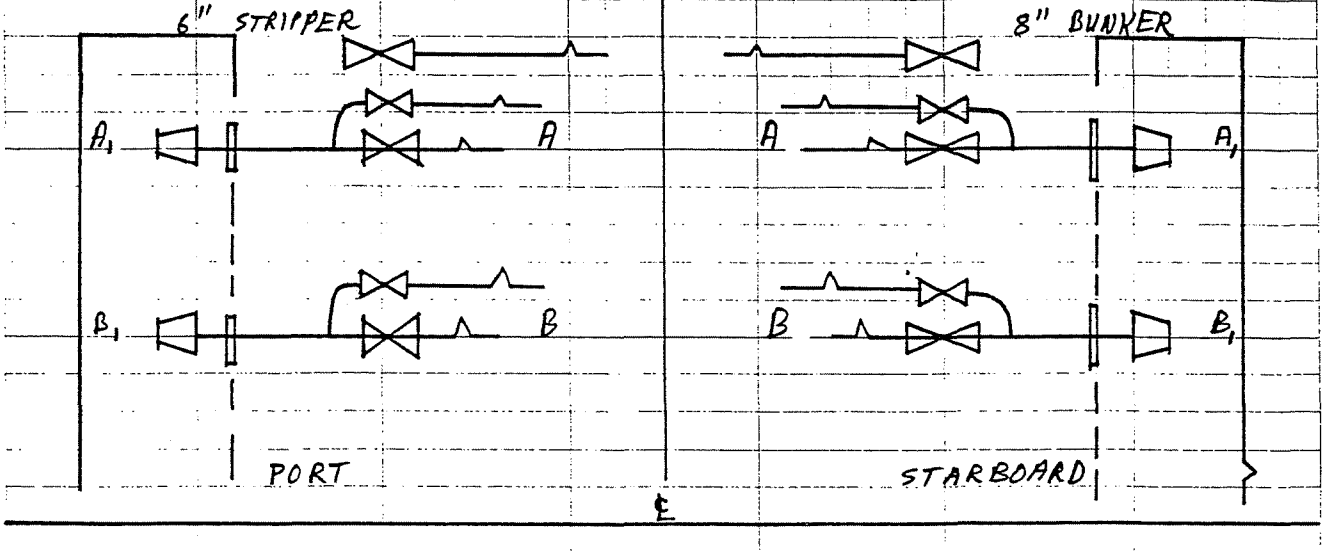
Blast all new sections of pipe, supports, etc. and coat in an approved manner.

Provide engineering services to develop details, produce drawings, and obtain approvals from USCG, ABS, owners and others as required. All final drawings and work are to have approval from all concerned. After completion of all work, prove to satisfaction of owners and others as required.

CALCULATION SHEET

SUBJECT	PREPARED BY	DATE	DEPARTMENT	PAGE
MANIFOLD MODIFICATION- EXXON BOSTON	JAJ	9/5/78		

EXISTING



MODIFICATION