

SYMBOLS LIST	
	NPS PIPE SIZE AND FLOW DIRECTION ARROW
	REDUCER
	BULKHEAD PENETRATION (SEE DETAIL 2-5A)
	HOSE
	PIPE CAP/CAMLOCK FITTING
	DUPLEX FILTER
	TRIPLEX FILTER
	DRIP PAN (SEE NOTE 11)
	BALL VALVE
	CHECK VALVE
	GATE VALVE WITH HYDRAULIC ACTUATOR
	TANK SUCTION BELLMOUTH (SEE NOTE 10)
	HIGH LEVEL SWITCH
	LOW LEVEL SWITCH
	FUEL FLOW METER WITH RESETTABLE COUNTER
	LIQUID LEVEL SIGHT GAUGE WITH MAGNETIC MARKER

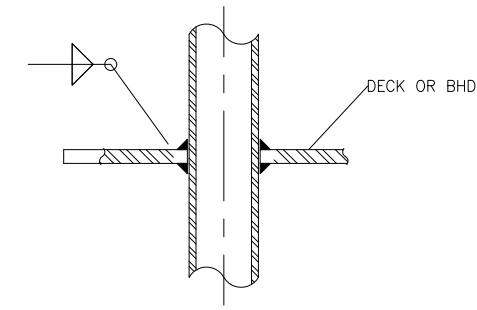
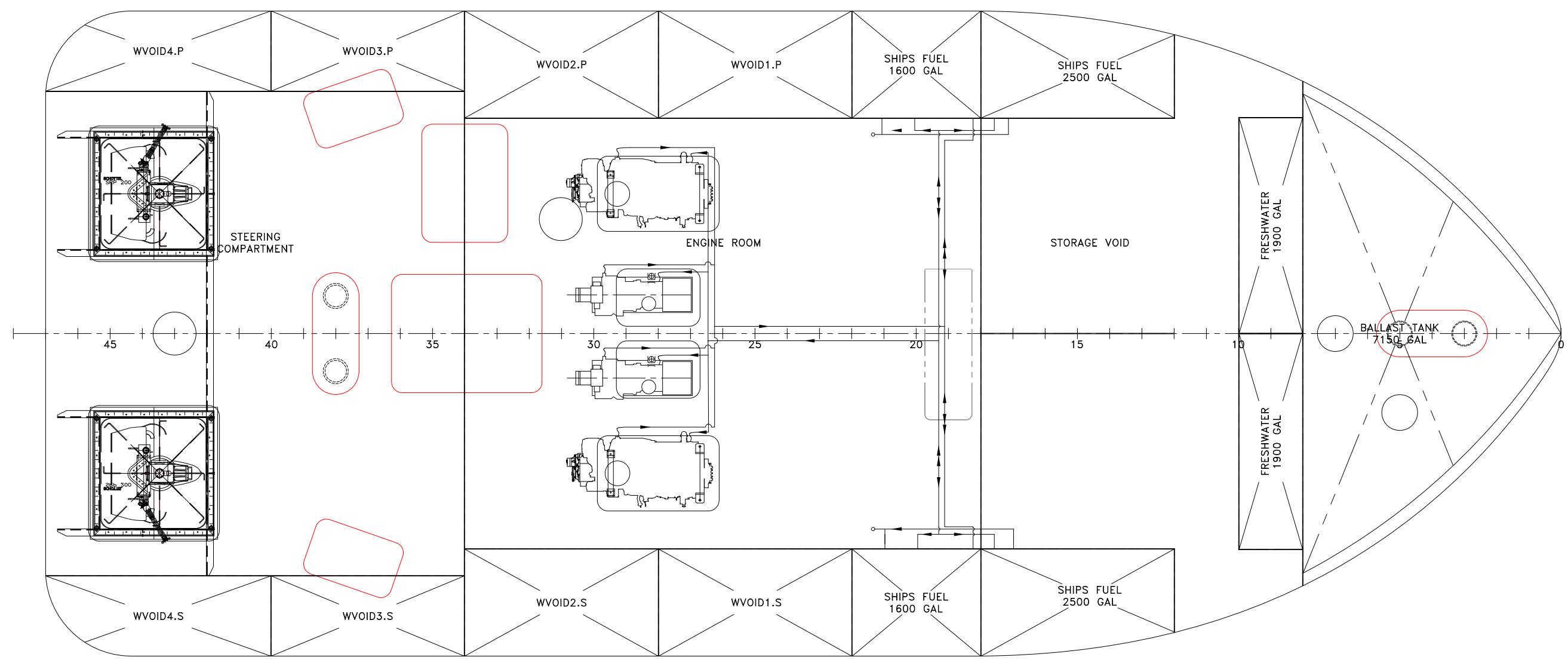


DIAGRAM 2-4A
TANK BULKHEAD PENETRATION

SERVICE	SIZE	PIPE	COMPONENTS				VALVES		BOLTING		REMARKS
			TAKEDOWN JOINTS	FITTINGS	FLEX CONNECT	GASKETS	BODY	TRIM	BOLTS/STUDS	NUTS/WASHERS	
FUEL OIL SERVICE PIPING MAWP: 15 PSIG MAWT: 126°F	ALL	CARBON STEEL, SCH 80, SEAMLESS, ASTM A53 OR ASTM A106 GRADE B, ANSI B36.10	FLANGE SOCKET WELD, WELD NECK OR SLIP ON, CARBON STEEL, ASTM A105, ANSI B16.5 UNION GROUND JOINT, SOCKET WELD CARBON STEEL, ASTM A105, MSS-SP-83	SOCKET WELD CARBON STEEL, ASTM A105 OR ASTM A234 GR WPB, ANSI B16.11 BUTTWELD CARBON STEEL, ASTM A234, GR WPB, ANSI B16.9 OR B16.28	FLEX HOSE MEETING SAE J1942 AND J1475 FOR DIESEL SERVICE SEE NOTE 9	GARLOCK STYLE 3000	GATE FLANGED CARBON STEEL, ASTM A216 GR WCB OR ASTM A105 ANSI B16.34 BALL THREADED, CARBON STEEL, ASTM A105, ASTM A181, OR ASTM A216 GR WCB CHECK THREADED, CARBON STEEL, ASTM A105, ASTM A181, OR ASTM A216 GR WCB	GATE CRES STEM, DISC AND SEAT BALL CHROME PLATED BALL, RPTFE OR VITON SEATS CHECK CRES DISC	CARBON STEEL ASTM A307 GR ANSI B18.2.1	HEX-HEAD CARBON STEEL ASTM A563 GR A ANSI B18.2.2	

BILL OF MATERIALS					
#	QTY.	SERVICE	TYPE	MAKE/MODEL	COMMENTS
①	2	FO TANK LEVEL ALARM	SWITCH MODULE ON GEM SURESITE SIGHTGLASS		MOUNTS TO SURESITE TUBE OPPOSITE LEVEL INDICATOR FLAGS
②	2	ME FUEL FILTER	TRIPLEX COALESCING		SEE NOTE 11
③	2	SSDG FUEL FILTER	DUPLEX COALESCING		SEE NOTE 11
④	2	REMOATE SHUTDOWN FO TANK VALVES	2" 150# ANSI FLG. GLOBE VALVE, HYD. ACTUATED	ABS APPROVED. LK VALVE	
⑤	2	FUEL TRANSFER PUMP	BRONZE GEAR PUMP WITH RELIEF VALVE, 100GMP, 50PSI, 1725RPM 5HP 208VAC, 60HZ 3PH,		
⑥	4	CAM LOCK			
⑦	2	VENT GUARD	WINTEB		
P-1 1/4"	AS REQ'D		1 1/4" SCH.40 PIPE, SEAMLESS, BLACK		ASTM A-106
P-1"	AS REQ'D		1" SCH.40 PIPE, SEAMLESS, BLACK		ASTM A-106
P-3/4"	AS REQ'D		3/4" SCH.40 PIPE, SEAMLESS, BLACK		ASTM A-106
P-1/2"	AS REQ'D		1/2" SCH.40 PIPE, SEAMLESS, BLACK		ASTM A-106
H-1	4		3/4" FUEL OIL HOSE, USCG APPROVED		SAE J-1942, SAE J-1475 (FITTINGS)
H-2	4		1/2" FUEL OIL HOSE, USCG APPROVED		SAE J-1942, SAE J-1475 (FITTINGS)
V-1	4		3/4" FULL PORT BALL VALVE, STEEL, SCREWED, 150# WOG		ASTM A105/A234
V-2	4		1/2" FULL PORT BALL VALVE, STEEL, SCREWED, 150# WOG		ASTM A105/A234
V-3	2		1" FULL PORT BALL VALVE, STEEL, SCREWED 150# WOG		ASTM A105/A234
V-4	14		2" FULL PORT BALL VALVE, STEEL, SCREWED 150# WOG		ASTM A105/A234
CV-1	2		3/4" LIFT CHECK VALVE, STEEL, SCREWED, 150# WOG		ASTM A105/A234
CV-2	2		1/2" LIFT CHECK VALVE, STEEL, SCREWED, 150# WOG		ASTM A105/A234
CV-3	1		1" LIFT CHECK VALVE, STEEL, SCREWED, 150# WOG		ASTM A105/A234



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NO.	DESCRIPTION
1.	PIPING SYSTEM MATERIALS, INSTALLATION, AND WORKMANSHIP SHALL BE IN ACCORDANCE 46 CFR SUBCHAPTER M (TOWING VESSELS).
2.	THIS DRAWING IS DIAGRAMMATIC ONLY AND DOES NOT REPRESENT A COMPLETE DETAILED DESIGN. THE CONTRACTOR SHALL DEVELOP FULLY A DETAILED DESIGN THAT PROVIDES A FUNCTIONAL ARRANGEMENT SUITABLE FOR INSTALLATION.
3.	PRIOR TO FABRICATION OF MATING PIPE ASSEMBLIES, VERIFY EQUIPMENT CONNECTIONS FOR SIZE, LOCATION AND TYPE IN ACCORDANCE WITH MANUFACTURER CERTIFIED DRAWINGS, OR DIRECTLY FROM THE EQUIPMENT. TEMPLATE BOLTING PATTERNS AND CONNECTIONS AS REQUIRED.
4.	PIPING SHALL BE ROUTED AS DIRECTLY AS POSSIBLE WITH A MINIMUM NUMBER OF BENDS AND FITTINGS.
5.	DO NOT ROUTE PIPING CONTAINING FUEL OIL NEAR ANY ELECTRICAL DEVICES OR EQUIPMENT. DO NOT LOCATE TAKEDOWN JOINTS AROUND, NEAR, OR OVER ELECTRICAL EQUIPMENT. ROUTE ALL FUEL OIL PIPING AT LEAST 18 INCHES AWAY FROM ANY SURFACE THAT NORMALLY HAS AN OPERATING TEMPERATURE OF 450°F OR GREATER EQUIPMENT
6.	TAKEDOWN JOINTS SHALL BE PROVIDED AT INTERVALS WHICH ALLOW DISASSEMBLY AND REMOVAL OF PIPING AND EQUIPMENT WITHOUT REQUIRING REMOVAL OR MODIFICATION STRUCTURE.
7.	PIPING SHALL BE ADEQUATELY SUPPORTED BY HANGERS IN ACCORDANCE WITH ASTM F708. HANGERS SHALL BE ATTACHED TO THE PIPE WITH BOLTED CLAMPS AND WELDED TO THE BASIC SHIP STRUCTURE. HANGERS SHALL NOT BE ATTACHED BY WELDING DIRECTLY TO PIPES.
8.	WHERE PIPES PENETRATE TANK BOUNDARIES, BULKHEADS, OR DECKS HEAVY WEIGHT SPOOL PIECES OR REINFORCING PENETRATION FITTINGS SHALL BE USED. SEE DETAIL 2-5A
9.	FLEXIBLE HOSE ASSEMBLIES SHALL MEET THE REQUIREMENTS OF 46 CFR 182.720 AND BE APPROVED FOR FUEL OIL SERVICE. END FITTINGS SHALL MEET SAE J1475. HOSE ASSEMBLIES SHALL NOT BE LESS THAN 9" IN LENGTH NOR MORE THAN 24" IN LENGTH.
NO.	DESCRIPTION
10.	FUEL OIL SUPPLY SUCTION BELLSOUTH AREA SHALL BE AT LEAST 1 1/2 TIMES THE SUCTION PIPE INTERNAL AREA.
11.	FUEL FILTERS SHALL BE USCG APPROVED WITH METAL BOWLS FILTERS SHALL BE FITTED WITH BALL VALVES FOR FILTER ISOLATION WHILE THE ENGINE IS RUNNING, WATER PROBES, AND DIFFERENTIAL PRESSURE GAUGES.
12.	DRIP PANS WITH UP-TURNED EDGES SHALL BE PROVIDED BENEATH ALL FILTERS. EACH DRIP PAN SHALL BE FITTED WITH A LOW POINT DRAIN PORT.
13.	REMOVE FUEL OIL SUPPLY SHUT OFF REACH RODS SHALL TERMINATE AT A FLUSH DECK BOX. LOCATE DECK BOXES ON THE MAIN DECK NEAR THE DECKHOUSE AND OUT OF VEHICLE LANES LOCATE A T-WRENCH ON THE DECKHOUSE BULKHEAD ADJACENT TO EACH DECK BOX. PERMANENTLY LABEL EACH DECK BOX IN ACCORDANCE WITH REF. 1
14.	FUEL SYSTEM PIPING SHALL BE CLEANED, FLUSHED AND HYDROSTATICALLY TESTED PRIOR TO BEING PLACED INTO SERVICE.
15.	PIPE THREAD SEALING TAPE, GALVANIZED PIPE, AND GALVANIZED FITTINGS SHALL NOT BE USED.

PROFESSIONAL ENGINEER

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Title: 70.5'x30'x11' NCDOT TOWBOAT

FUEL OIL PIPING

Dwg. No. 17-1372-261 Alt. No. 1
Sh. 1 of 3

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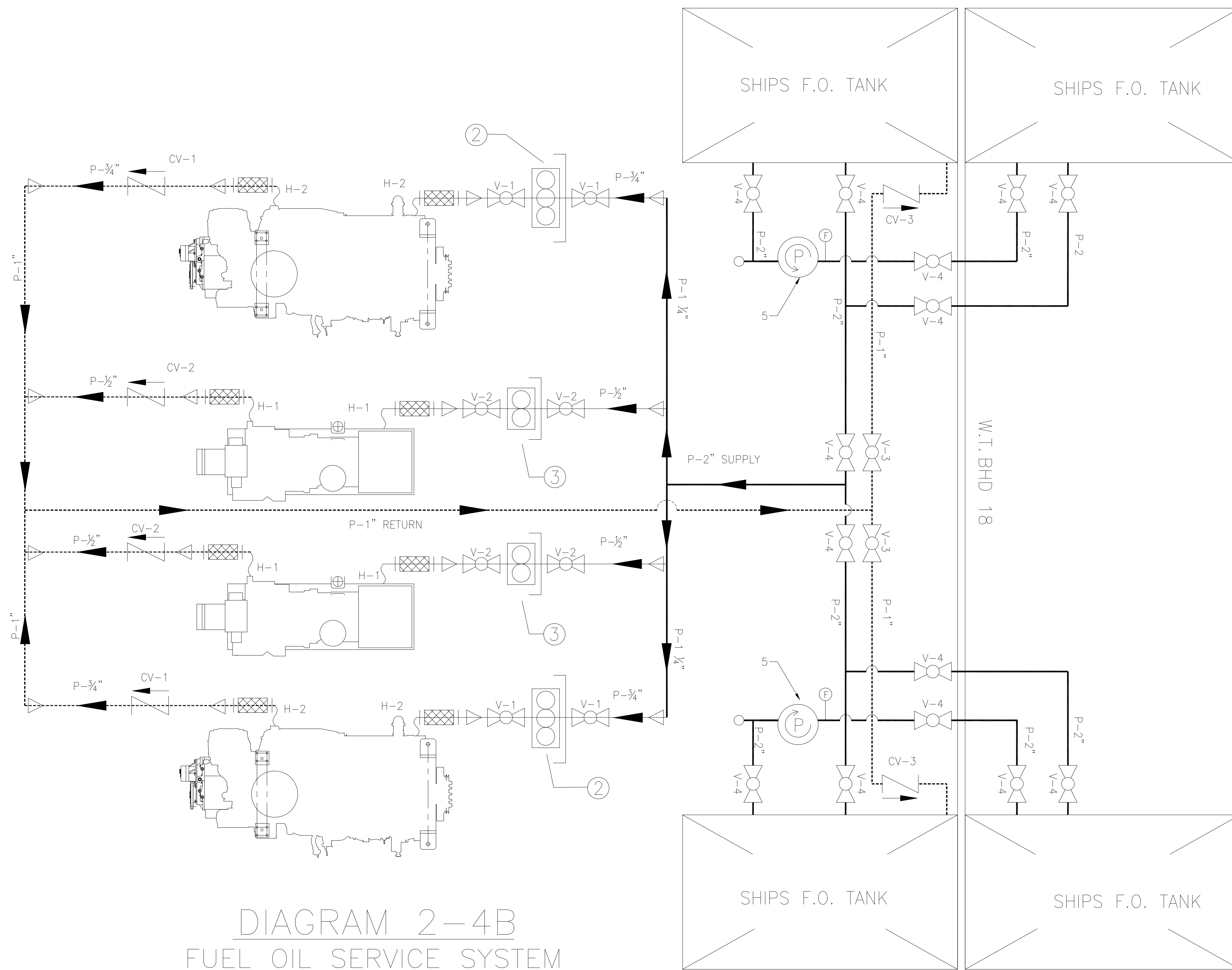


DIAGRAM 2-4B
FUEL OIL SERVICE SYSTEM

-- GENERAL NOTES --		-- GENERAL NOTES --	
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4.	PIPING SHALL BE ROUTED AS DIRECTLY AS POSSIBLE WITH A MINIMUM NUMBER OF BENDS AND FITTINGS.	13.	REMOTE FUEL OIL SUPPLY SHUT OFF REACH RODS SHALL TERMINATE AT A FLUSH DECK BOX. LOCATE DECK BOXES ON THE MAIN DECK NEAR THE DECKHOUSE AND OUT OF VEHICLE LANES LOCATE A T-WRENCH ON THE DECKHOUSE BULKHEAD ADJACENT TO EACH DECK BOX. PERMANENTLY LABEL EACH DECK BOX IN ACCORDANCE WITH REF. 1
5.	DO NOT ROUTE PIPING CONTAINING FUEL OIL NEAR ANY ELECTRICAL DEVICES OR EQUIPMENT. DO NOT LOCATE TAKEDOWN JOINTS AROUND, NEAR, OR OVER ELECTRICAL EQUIPMENT. ROUTE ALL FUEL OIL PIPING AT LEAST 18 INCHES AWAY FROM ANY SURFACE THAT NORMALLY HAS AN OPERATING TEMPERATURE OF 450°F OR GREATER EQUIPMENT	14.	FUEL SYSTEM PIPING SHALL BE CLEANED, FLUSHED AND HYDROSTATICALLY TESTED PRIOR TO BEING PLACED INTO SERVICE.
6.	TAKEDOWN JOINTS SHALL BE PROVIDED AT INTERVALS WHICH ALLOW DISASSEMBLY AND REMOVAL OF PIPING AND EQUIPMENT WITHOUT REQUIRING REMOVAL OR MODIFICATION OF PERMANENT STRUCTURE.	15.	PIPE THREAD SEALING TAPE, GALVANIZED PIPE, AND GALVANIZED FITTINGS SHALL NOT BE USED.
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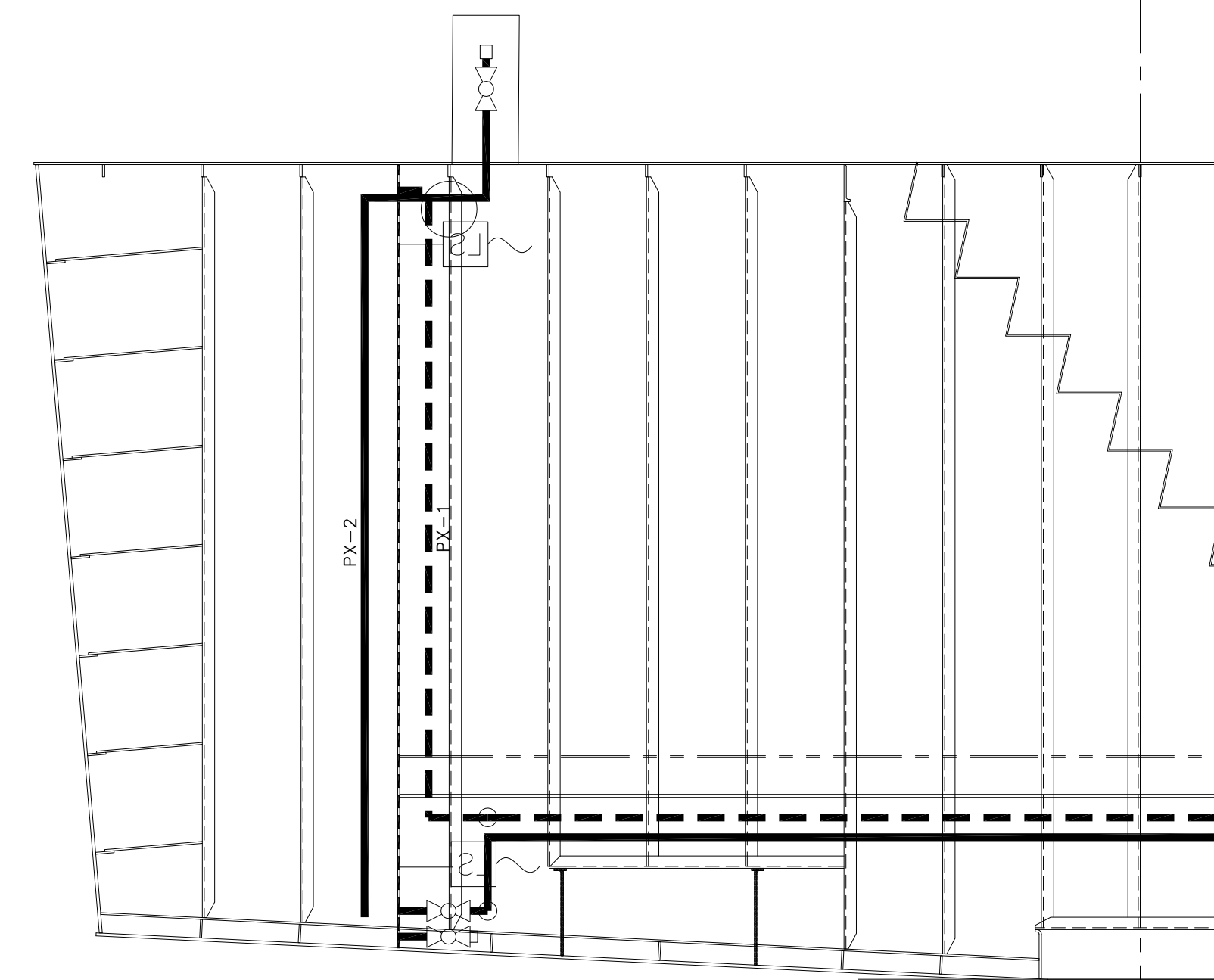
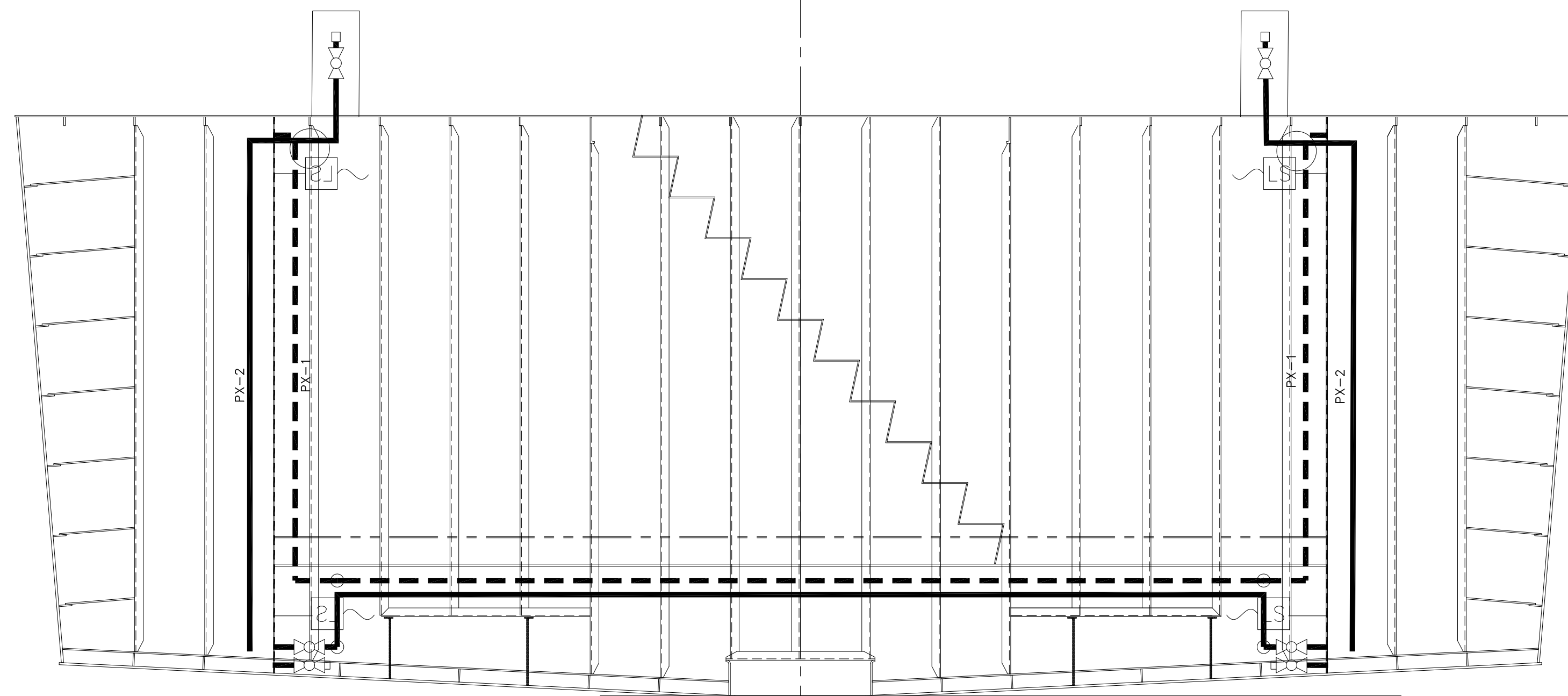
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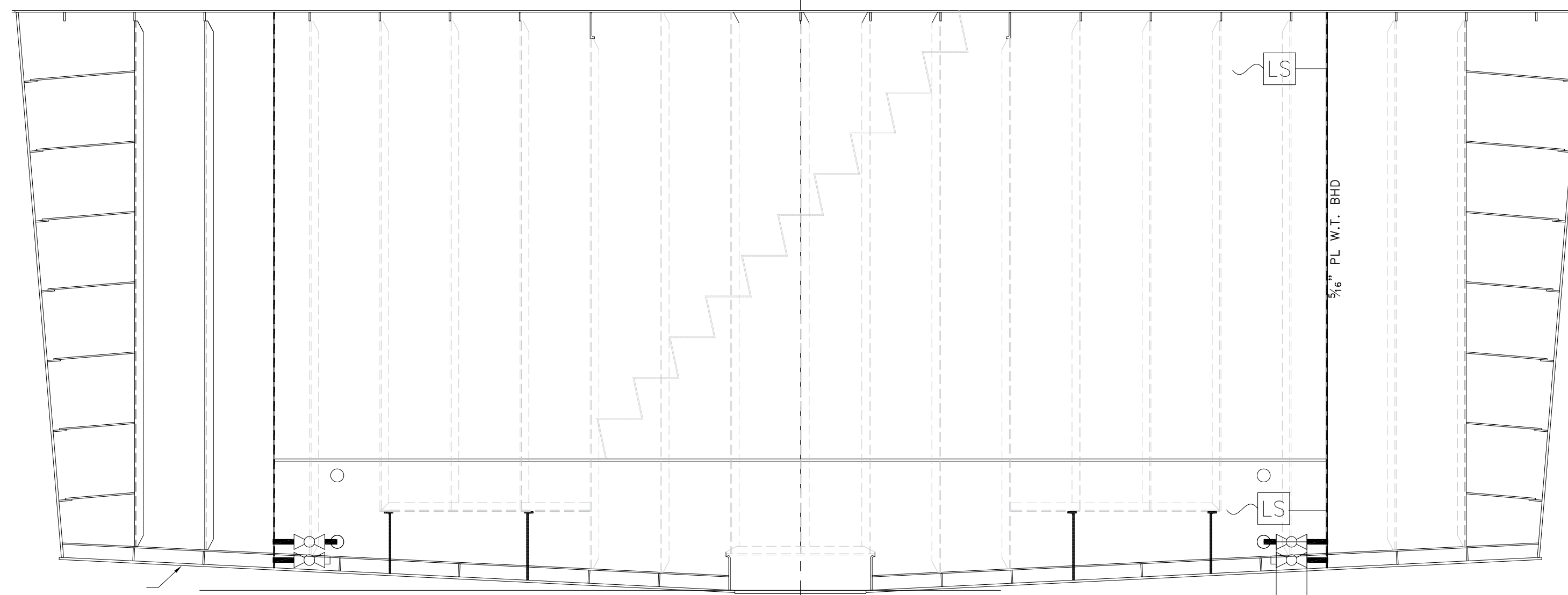
B

A



5/16" PL W.T. BHD @ FR 18
W/ 3x2x5/16" L STIFFS ON AFT FACE
SHOWN LKG FWD

5/16"
W/ 3x2



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