

MATERIAL SCHEDULE

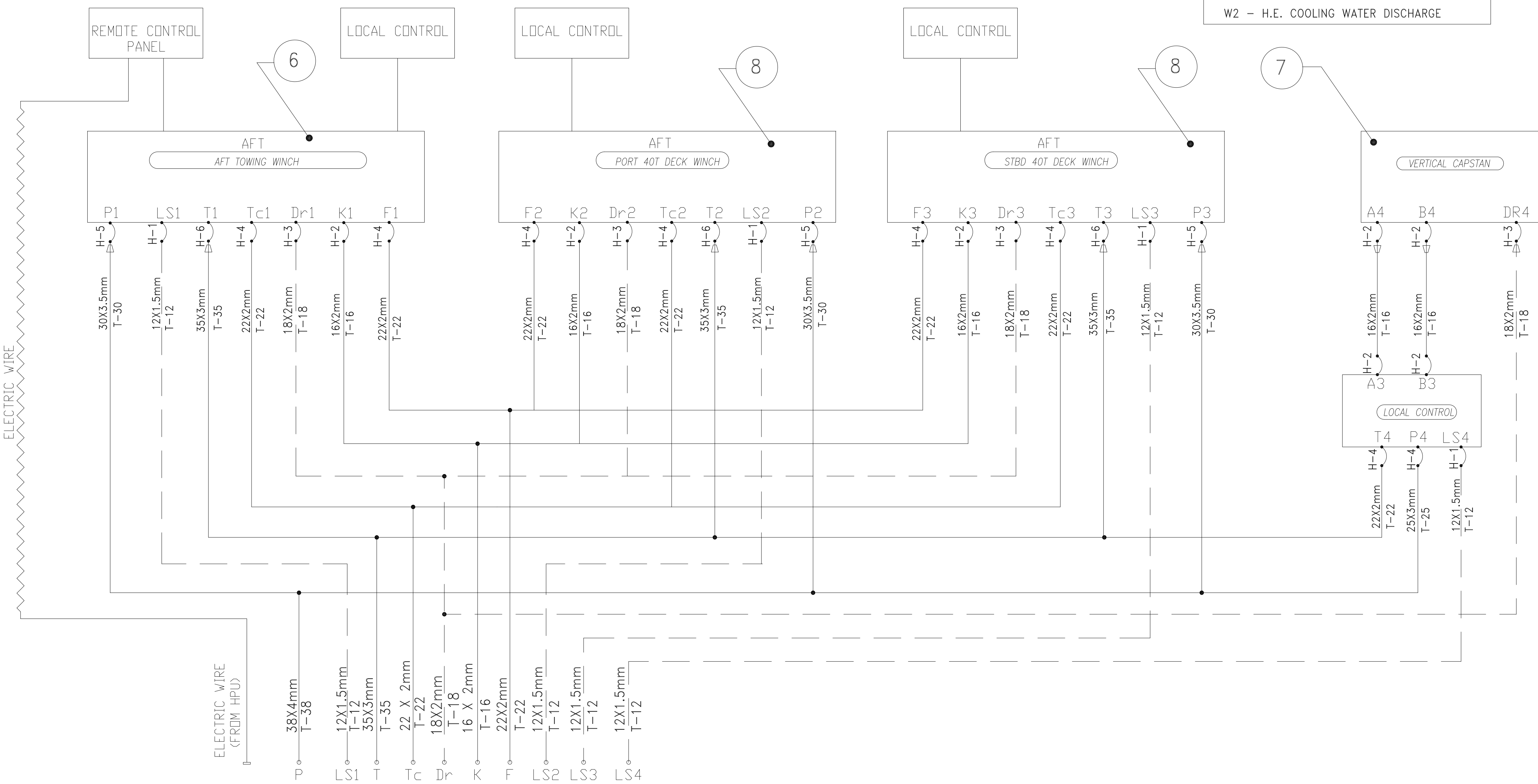
SERVICE	SIZE	PIPE	TAKE DOWN JOINTS	COMPONENTS	FLEX CONNECT	GASKETS	VALVES	TRIM	BOLTING	REMARKS
HYDRAULIC OIL SERVICE PIPING	ALL	STAINLESS STEEL TUBING TYPE 316L, ASTM A213 WALL THICKNESS VARIES	FLANGE SOCKET WELD, WELD NECK OR SLIP ON, 316L, STAINLESS STEEL, ASTM SA182, ANSI B16.11	SOCKET WELD STAINLESS STEEL, TYPE 316L, ASTM A182, ANSI B16.11	FLEX HOSE MEETING SAE J1942 AND J1475 FOR HYDRAULIC SERVICE SEE NOTE 9	GARLOCK STYLE 3000	GATE CARBON STEEL FLANGED CARBON STEEL, ASTM A216 GR WCB DR. ASTM A105 ANSI B16.34	GATE CRES STEM AND DISC SEAT	CARBON STEEL ASTM A307 GR B OR CARBON STEEL ASTM A563 GR A ANSI B18.2.2	HE-HEAD CARBON STEEL
		STAINLESS STEEL PIPE, TYPE 316L, ASTM A312	UNION GROUND JOINT, SOCKET WELD CARBON STEEL, ASTM A105, MSS-SP-83	BUTTWELD TYPE 316 STAINLESS STEEL, ASTM A276, ASTM A479, ASTM A182	COMPRESSION TYPE 316 STAINLESS STEEL, ASTM A479, ASTM A182		BALL THREADED, CARBON STEEL, ASTM A181, DR. ASTM A216 GR WCB	BALL CHROME PLATED BALL, RPTFE OR VITON SEATS		CHECK THREADED, CARBON STEEL, ASTM A105, DR. ASTM A216 GR WCB

PIPING IDENTIFICATION

- P - PRESSURE
- LS - LOAD SENSING
- T - TANK RETURN
- Tc - BRAKE TANK RETURN LINE
- Dr - DRAIN
- K - BRAKE PRESSURE
- F - HYDRAULIC MOTOR FLUSHING
- LS - LOAD SENSING
- W1 - H.E. COOLING WATER SUPPLY
- W2 - H.E. COOLING WATER DISCHARGE

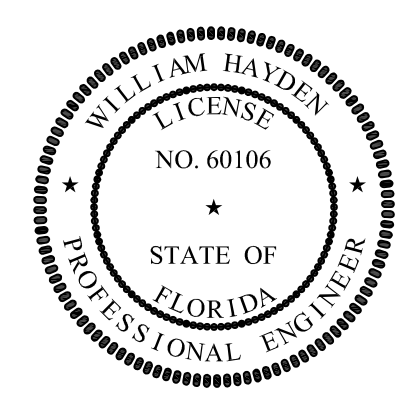
BILL OF MATERIALS

#	QTY.	SERVICE	TYPE	MAKE/MODEL	COMMENTS
1	2	HYDRAULIC PUMP PTO	PTO 400 FOR JOHN DEERE 4045 ENGINE	LOGAN 900-8020	
2	2	HYDRAULIC PUMP PTO	FLUID ACTIVATED CLUTCH, 400 FT-LB, SAE C 14T SPLINE	LOGAN SPF400, OPTION SPF-4300-01	MAX ENGAGEMENT 1800 RPM
3	2	HYDRAULIC PUMP PTO	RIGID COUPLING	LOGAN 088-0018	
4	2	HYDRAULIC PUMP PTO	PNEUMATIC CONTROLS W/ 24VDC SOLENOID	LOGAN 610-0052	
5	2	HYDRAULIC PUMP	PUMP, VARIABLE DISPLACEMENT, 26.4 GPM, 3000 PSI, SAE "C" FLANGE, 2 BOLT	REYROTH A10V50/21DFLR/31R-VSA42N00	
6	1	HYDRAULIC TOWING WINCH	WINCH, TOWING	OIL STATES SKAGIT SMATCO, LLC OSI-HTW-SD-20800	
7	1	HYDRAULIC VERTICAL CAPSTAN	CAPSTAN, VERTICAL	OIL STATES SKAGIT SMATCO, LLC OSI-HVC-ST	
8	2	DECK WINCH	40 TON DECK WINCH	OIL STATES SKAGIT SMATCO, LLC	
9	2	HYDRAULIC PILOT PUMP	PUMP, HYDRAULIC, PILOT PRESSURE, 870 PSI, 7 GPM, 7.5 KW ELEC MOTR, 208 VAC 3P	REYROTH PV041	FIXED DISPLACEMENT VANE PUMP
10	1	HYDRAULIC RESERVOIR ASSY	RESERVOIR, HYDRAULIC, 1300 LITERS, 60" W X 56" H X 24" D W/ HYDRAULIC COMPONENTS & DISTRIBUTION BLOCK	HYDRADYNE	
11	1	HYDRAULIC OIL COOLING	HEAT EXCHANGER, OIL COOLING, 40 GPM SEAWATER FLOW	SEN-DURE 16867-1-7	
12	1	H.E. SEA WATER COOLING PUMP	PUMP, CENTRIFUGAL, 23 GPM, 44PSI, STAINLESS STEEL, 208VAC, 3P TEFC MOTOR	PRICE PUMP MODEL HP755S, 5" IMPELLER	
13	AR	BULKHEAD PENETRATION	TYPE 316 W/ 2114 ASSEMBLY CARBON STEEL SLEEVE, DI COUPLING NUT, VITON GASKET	CBC MACHINE COMPANY TYPE 250/210 W/ 2114 ASSY	
14	1	STRAINER	1-1/2" BRONZE SIMPLEX STRAINER W/ .06 PERFORATED STAINLESS STEEL BASKET	EATON MODEL 72	24 GPM, .8 PSI PRESSURE DROP, CV = 31.5
PG-1"	AS REQ'D		1" SCHEDULE 40 PIPE, GALVANIZED		ASTM A-53
PG-1-1/4"	AS REQ'D		1-1/4" SCHEDULE 40 PIPE, GALVANIZED		ASTM A-53
P-2"	AS REQ'D		2" SCHEDULE 40 PIPE, 316L SS		ASTM A-312
T-12	AS REQ'D		12mm X 1.5mm 316L SS TUBING		ASTM A-312
T-16	AS REQ'D		16mm X 2mm 316L SS TUBING		ASTM A-312
T-18	AS REQ'D		18mm X 2mm 316L SS TUBING		ASTM A-312
T-22	AS REQ'D		22mm X 2mm 316L SS TUBING		ASTM A-312
T-25	AS REQ'D		25mm X 3mm WALL 316L SS TUBING		ASTM A-312
T-30	AS REQ'D		30mm X 3.5mm 316L SS TUBING		ASTM A-312
T-35	AS REQ'D		38mm X 4mm 316L SS TUBING		ASTM A-312
H-1	2		-8 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-2	2		-10 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-3	1		-12 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-4	6		-16 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-5			-20 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-6	7		-24 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-7	2		-32 HYDRAULIC OIL HOSE, USCG APPROVED	500 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-8	2		-32 HYDRAULIC OIL HOSE, USCG APPROVED	500 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
V-1	2		1-1/4" GATE VALVE, 125#		ASTM A105/A234
V-2	2		2" BALL VALVE, FULL PORT		ASTM A105/A234
CV-1	2		1-1/4" LIFT CHECK VALVE, STEEL, SCREWED, 150#		ASTM A105/A234
U-1-1/4"	1		1-1/2" UNION, ORIFICE, 12MM, GALVANIZED		ASTM A105/A234



DECK EQUIPMENT HYDRAULICS PIPING DIAGRAM FROM HPU/DISTRIBUTION BLOCK

GENERAL NOTES		ALTERATIONS		RESERVATIONS		REFERENCES	
NO.	DESCRIPTION	NO.	DESCRIPTION	NO.	DESCRIPTION	NO.	DESCRIPTION
1.	PIPING SYSTEM MATERIALS, INSTALLATION, AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH 46 CFR SUBCHAPTER M (TOWING VESSELS).	10.	SUPPORT HYDRAULIC TUBING WITH VIBRATION DAMPENING CLAMPS SUPPORTED WITH THE MAXIMUM SPAN INDICATED BELOW	1.	UPDATE PIPING DIAGRAM	1.	1372-551 COMPRESSED AIR PIPING
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.					2.	1372-5000 ELECTRICAL ONE LINE
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 HYDRAULIC OIL NEAR ANY ELECTRICAL DEVICES OR EQUIPMENT. DO NOT LOCATE TAKEDOWN JOINTS AROUND, NEAR, OR OVER ELECTRICAL EQUIPMENT. ROUTE ALL HYDRAULIC OIL PIPING AT LEAST 18 INCHES AWAY FROM ANY SURFACE THAT NORMALLY HAS AN OPERATING TEMPERATURE OF 450°F OR GREATER EQUIPMENT	11.	HEAT EXCHANGER SIZE BASED ON 55 GPM OIL FLOW, INLET TEMPERATURE 65°C, OUTLET TEMPERATURE 60°C, SEA WATER FLOW 24 GPM, INLET TEMPERATURE 35°C WITH A HEAT REJECTION OF 30KW				
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.	12.	HYDRAULIC OIL PIPING MUST BE SUITABLY INSULATED TO PREVENT INJURIES AND ALLOW ACCESS FOR PIPING INSPECTION				
7.	PIPING SHALL BE ADEQUATELY SUPPORTED BY CLAMPS OR HANGERS IN ACCORDANCE WITH APPLICATION. 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.						
9.	FLEXIBLE HOSE ASSEMBLIES SHALL MEET THE REQUIREMENTS OF 46 CFR 182.720 AND BE APPROVED FOR HYDRAULIC OIL SERVICE. END FITTINGS SHALL MEET SAE J1475. HOSE ASSEMBLIES SHALL NOT BE LESS THAN 9" IN LENGTH NOR MORE THAN 24" IN LENGTH.						



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Title: 70.5'x30'x11' NCDOT TOWBOAT

DECK MACHINERY HYDRAULICS

Dwg. No. 17-1372-265
 Sht. 1 of 4

Drawn By: JAH Date: SEPTEMBER 7, 2018
 Checked By: Date: NONE
 App'd By: Scale: NONE
 ABS App'l: USC App'l:

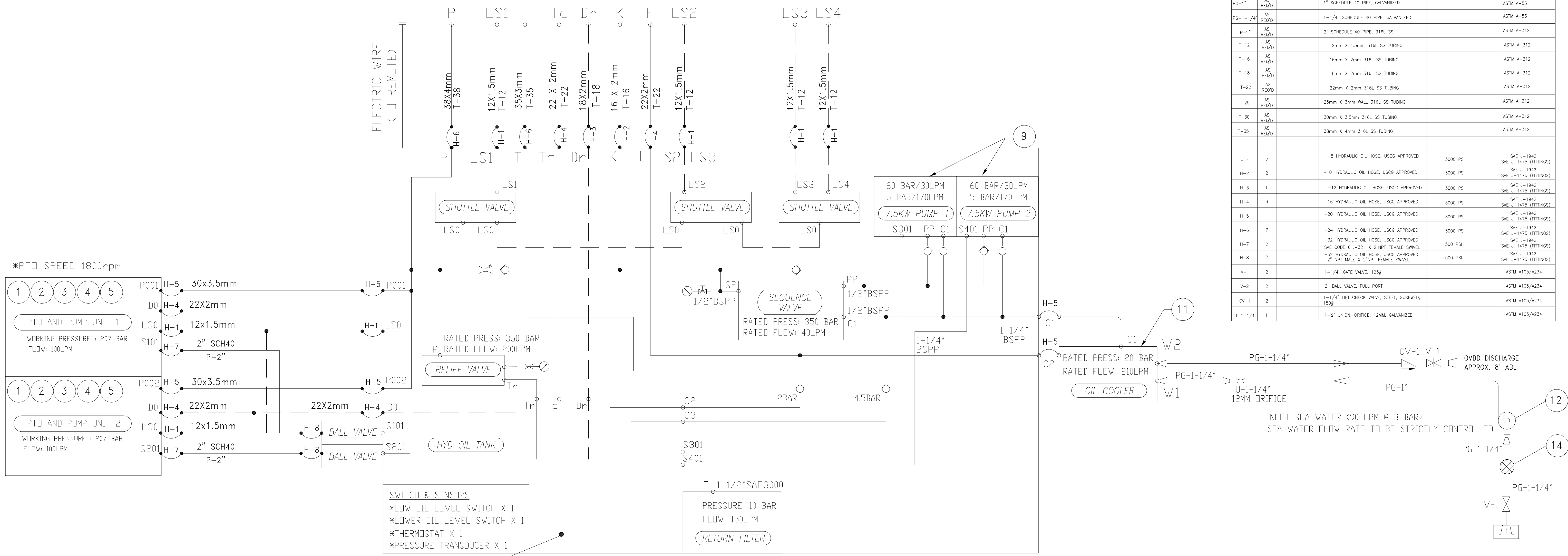
ALT. NO. NCDOT

— DRAWING SUBMITTALS —

MATERIAL SCHEDULE

SERVICE	SIZE	PIPE	COMPONENTS			GASKETS	VALVES			BOLTING	REMARKS
			TAKEDOWN JOINTS	FITTINGS	FLEX CONNECT		BODY	TRIM	BOLTS/STUDSNUTS/WASHERS		
HYDRAULIC OIL SERVICE PIPING MAWP: 3000 PSIG MAWT: 150°F	ALL	STAINLESS STEEL TUBING TYPE 316L, ASTM A213, WALL THICKNESS VARIES STAINLESS STEEL PIPE, TYPE 316L, ASTM A312	FLANGE SOCKET WELD, WELD NECK OR SLIP ON, 316L, ASTM A182, ANSI B16.11 BUTT WELD STAINLESS STEEL, ASTM A403, ANSI B16.9, MSS SP-43 UNION GROUND JOINT, SOCKET WELD CARBON STEEL, ASTM A105, MSS-SP-83	SOCKET WELD STAINLESS STEEL, TYPE 316L, ASTM A182, ANSI B16.11 COMPRESSION TYPE 316 STAINLESS STEEL, ASTM A276, ASTM A479, ASTM A182	FLEX HOSE MEETING SAE J1942 AND J1475 FOR HYDRAULIC 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 STEEL, ASTM A307 GR B OR ASTM A563 GR A DISC AND ANSI B18.21 SEAT BALL CHROME PLATED BALL, RPTFE DR VITON SEATS CHECK CRES DISC	HEX-HEAD CARBON STEEL ASTM A563 GR A ANSI B18.22		

BILL OF MATERIALS					
#	QTY	SERVICE	TYPE	MAKE/MODEL	COMMENTS
1	2	HYDRAULIC PUMP PTO	PTD 400 FOR JOHN DEERE 4045 ENGINE	LOGAN 900-8020	
2	2	HYDRAULIC PUMP PTO	FLUID ACTIVATED CLUTCH, 400 FT-LB, SAE C 141 SPLINE	LOGAN SFF400, OPTION SFF-4300-01	MAX ENGAGEMENT 1800 RPM
3	2	HYDRAULIC PUMP PTO	RIGID COUPLING	LOGAN 088-0018	
4	2	HYDRAULIC PUMP PTO	PNEUMATIC CONTROLS W/ 24VDC SOLENOID	LOGAN 610-0052	
5	2	HYDRAULIC PUMP	PUMP, VARIABLE DISPLACEMENT, 26.4 GPM, 3000 PSI, SAE "C" FLANGE, 2 BOLT	REKROTH A10V50T1DFLR/31R-VS42N00	
6	1	HYDRAULIC WINCH	WINCH, TOWING	OIL STATES SKAGIT SMATCO, LLC OSI-HTW-50-20860	
7	1	HYDRAULIC VERTICAL CAPSTAN	CAPSTAN, VERTICAL	OIL STATES SKAGIT SMATCO, LLC OSI-HVC-5T	
8	2	DECK WINCH	40 TON DECK WINCH	OIL STATES SKAGIT SMATCO, LLC	
9	2	HYDRAULIC PILOT PUMP	PUMP, HYDRAULIC, PILOT PRESSURE, 870 PSI, 7 GPM, 7.5 KW ELEC MOTOR, 208 VAC 3Ø	REKROTH PV41	FIXED DISPLACEMENT VANE PUMP
10	1	HYDRAULIC RESERVOIR ASSY	RESERVOIR, HYDRAULIC, 1300 LITERS, 60" X 56" X 24" W/ HYDRAULIC COMPONENTS & DISTRIBUTION BLOCK	HYDRADINE	
11	1	HYDRAULIC OIL COOLING	HEAT EXCHANGER, OIL COOLING, 40 GPM SEN-DURE 16867-1-7		
12	1	HE. SEA WATER COOLING PUMP	PUMP, CENTRIFUGAL, 23 GPM, 44PSI, STAINLESS STEEL, SUBMERSIBLE MOTOR	PRICE PUMP MODEL HP235, 07 WHEELER	
13	AR	BULKHEAD PENETRATION	TYPE 316L W/ 2"14 ASSEMBLY, CARBON STEEL SLEVE, DI COUPLING NUT, VITON GASKET	CBC MACHINE COMPANY TYPE 250/210 W/ 2114 ASSY	
14	1	STRAINER	1-1/2" BRONZE SIMPLEX STRAINER W/ .06 PERFORATED STAINLESS STEEL BASKET	EATON MODEL 72	24 GPM, 8 PSI PRESSURE DROP, CV = 31.5
PG-1"	AS REQ'D		1" SCHEDULE 40 PIPE, GALVANIZED		ASTM A-53
PG-1-1/4"	AS REQ'D		1-1/4" SCHEDULE 40 PIPE, GALVANIZED		ASTM A-53
P-2"	AS REQ'D		2" SCHEDULE 40 PIPE, 316L SS		ASTM A-312
T-12	AS REQ'D		12mm X 1.5mm 316L SS TUBING		ASTM A-312
T-16	AS REQ'D		16mm X 2mm 316L SS TUBING		ASTM A-312
T-18	AS REQ'D		18mm X 2mm 316L SS TUBING		ASTM A-312
T-22	AS REQ'D		22mm X 2mm 316L SS TUBING		ASTM A-312
T-25	AS REQ'D		25mm X 3mm WALL 316L SS TUBING		ASTM A-312
T-30	AS REQ'D		30mm X 3.5mm 316L SS TUBING		ASTM A-312
T-35	AS REQ'D		38mm X 4mm 316L SS TUBING		ASTM A-312
H-1	2		-8 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-2	2		-10 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-3	1		-12 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-4	6		-16 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-5	2		-20 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-6	7		-24 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-7	2		-32 HYDRAULIC OIL HOSE, USCG APPROVED	500 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-8	2		-32 HYDRAULIC OIL HOSE, USCG APPROVED	500 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
V-1	2		1-1/4" GATE VALVE, 125#		ASTM A105/A234
V-2	2		2" BALL VALVE, FULL PORT		ASTM A105/A234
CV-1	2		1-1/4" LIFT CHECK VALVE, STEEL, SCREWED, 150#		ASTM A105/A234
U-1-1/4"	1		1-1/4" UNION, ORIFICE, 12MM, GALVANIZED		ASTM A105/A234



PILOT PUMP 2X7.5KW
HYDRAULIC OIL TANK (1300 LITERS)
HYDRAULIC POWER PIPING DIAGRAM

GENERAL NOTES		GENERAL NOTES		ALTERATIONS		RESERVATIONS		REFERENCES	
NO.	DESCRIPTION	NO.	DESCRIPTION	NO.	DESCRIPTION	NO.	DESCRIPTION	NO.	DESCRIPTION
1.	PIPING SYSTEM MATERIALS, INSTALLATION, AND WORKMANSHIP SHALL BE IN ACCORDANCE 46 CFR SUBCHAPTER M (TOWING VESSELS).	10.	SUPPORT HYDRAULIC TUBING WITH VIBRATION DAMPENING CLAMPS SUPPORTED WITH THE MAXIMUM SPAN INDICATED BELOW	1	UPDATE PIPING DIAGRAM	1.	1372-551 COMPRESSED AIR PIPING	9	
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.					2.	1372-5000 ELECTRICAL ONE LINE	8	
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.							7	
4.	PIPING SHALL BE ROUTED AS DIRECTLY AS POSSIBLE WITH A MINIMUM NUMBER OF BENDS AND FITTINGS.							6	
5.	DO NOT ROUTE PIPING CONTAINING HYDRAULIC OIL NEAR ANY ELECTRICAL DEVICES OR EQUIPMENT. DO NOT LOCATE TAKEDOWN JOINTS AROUND, NEAR, OR OVER ELECTRICAL EQUIPMENT. ROUTE ALL HYDRAULIC OIL PIPING AT LEAST 18 INCHES AWAY FROM ANY SURFACE THAT NORMALLY HAS AN OPERATING TEMPERATURE OF 450°F OR GREATER EQUIPMENT							5	
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.	11.	HEAT EXCHANGER SIZE BASED ON 55 GPM OIL FLOW, INLET TEMPERATURE 65°C, OUTLET TEMPERATURE 60°C, SEA WATER FLOW 24 GPM, INLET TEMPERATURE 35°C WITH A HEAT REJECTION OF 30KW					4	
7.	PIPING SHALL BE ADEQUATELY SUPPORTED BY CLAMPS OR HANGERS IN ACCORDANCE WITH APPLICATION. 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.	12.	HYDRAULIC OIL PIPING MUST BE SUITABLY INSULATED TO PREVENT INJURIES AND ALLOW ACCESS FOR PIPING INSPECTION					3	
8.	WHERE PIPES PENETRATE TANK BOUNDARIES, BULKHEADS, OR DECKS HEAVY WEIGHT SPOOL PIECES OR REINFORCING PENETRATION FITTINGS SHALL BE USED.							2	
9.	FLEXIBLE HOSE ASSEMBLIES SHALL MEET THE REQUIREMENTS OF 46 CFR 182.720 AND BE APPROVED FOR HYDRAULIC OIL SERVICE. END FITTINGS SHALL MEET SAE J1475. HOSE ASSEMBLIES SHALL NOT BE LESS THAN 9" IN LENGTH NOR MORE THAN 24" IN LENGTH.							1	

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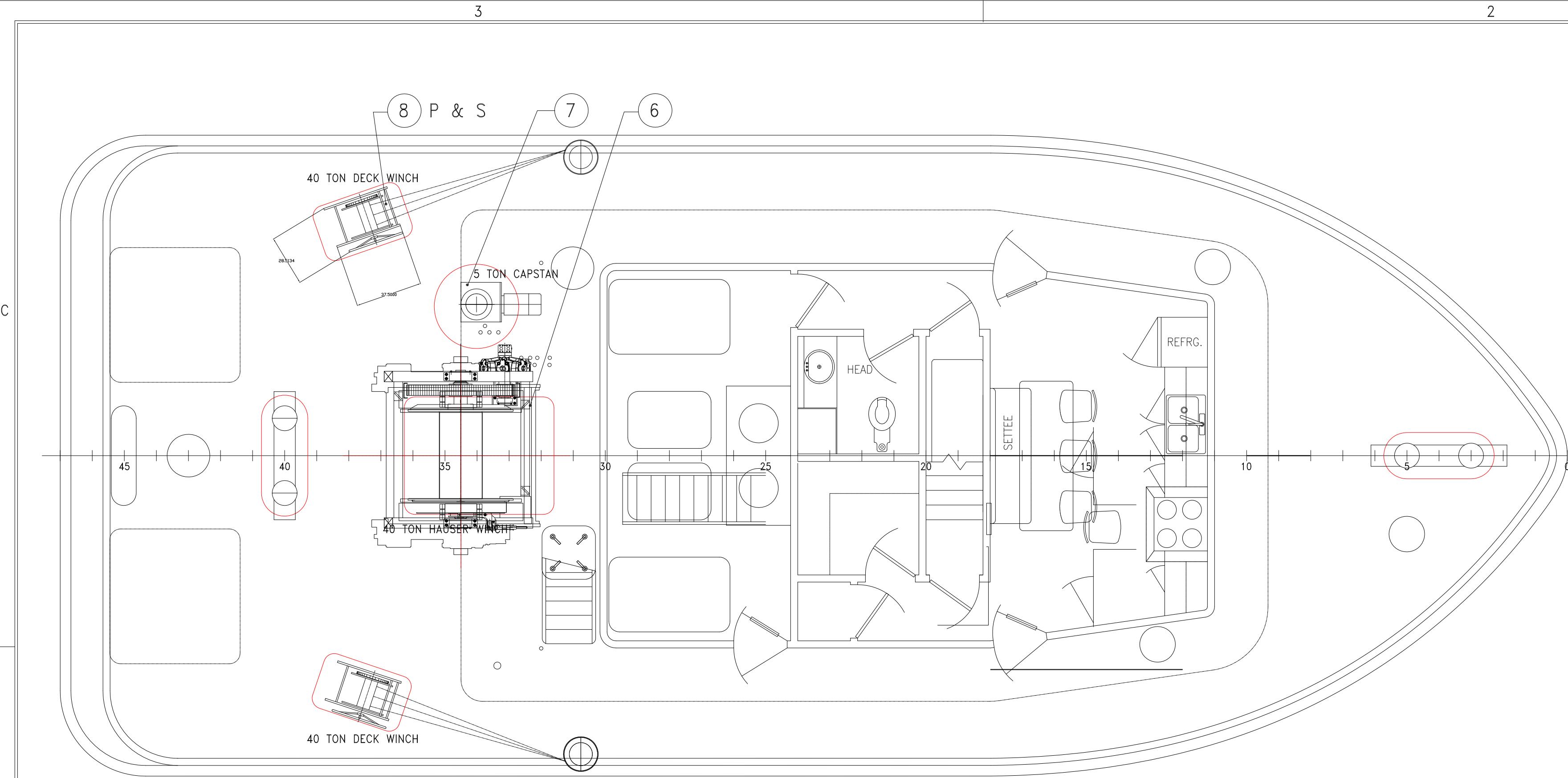
Title: 70.5'x30'x11' NCDOT TOWBOAT
DECK MACHINERY HYDRAULICS

Dwg. No. 17-1372-265
Alt. No. 1
Sht. 2 of 3

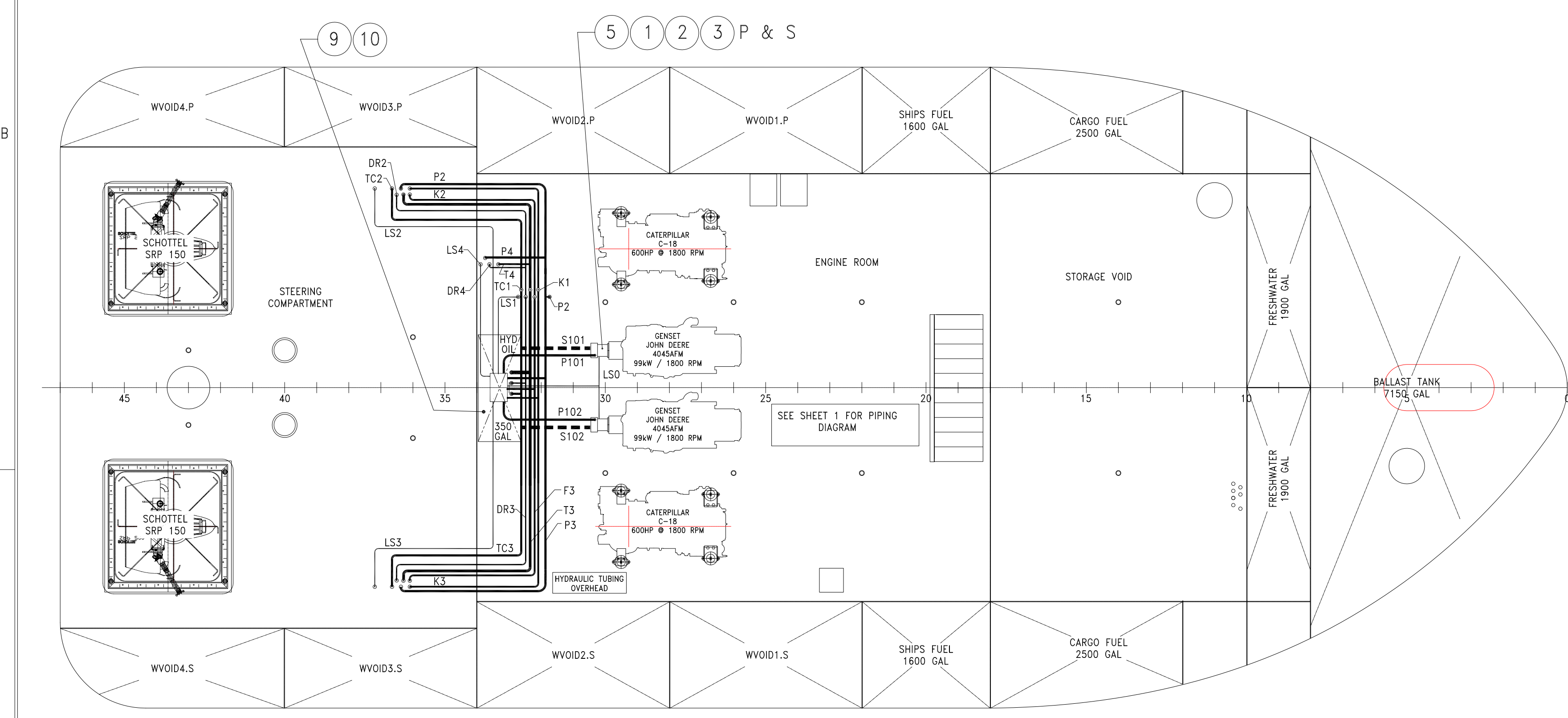
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App'd By: Scale: NONE
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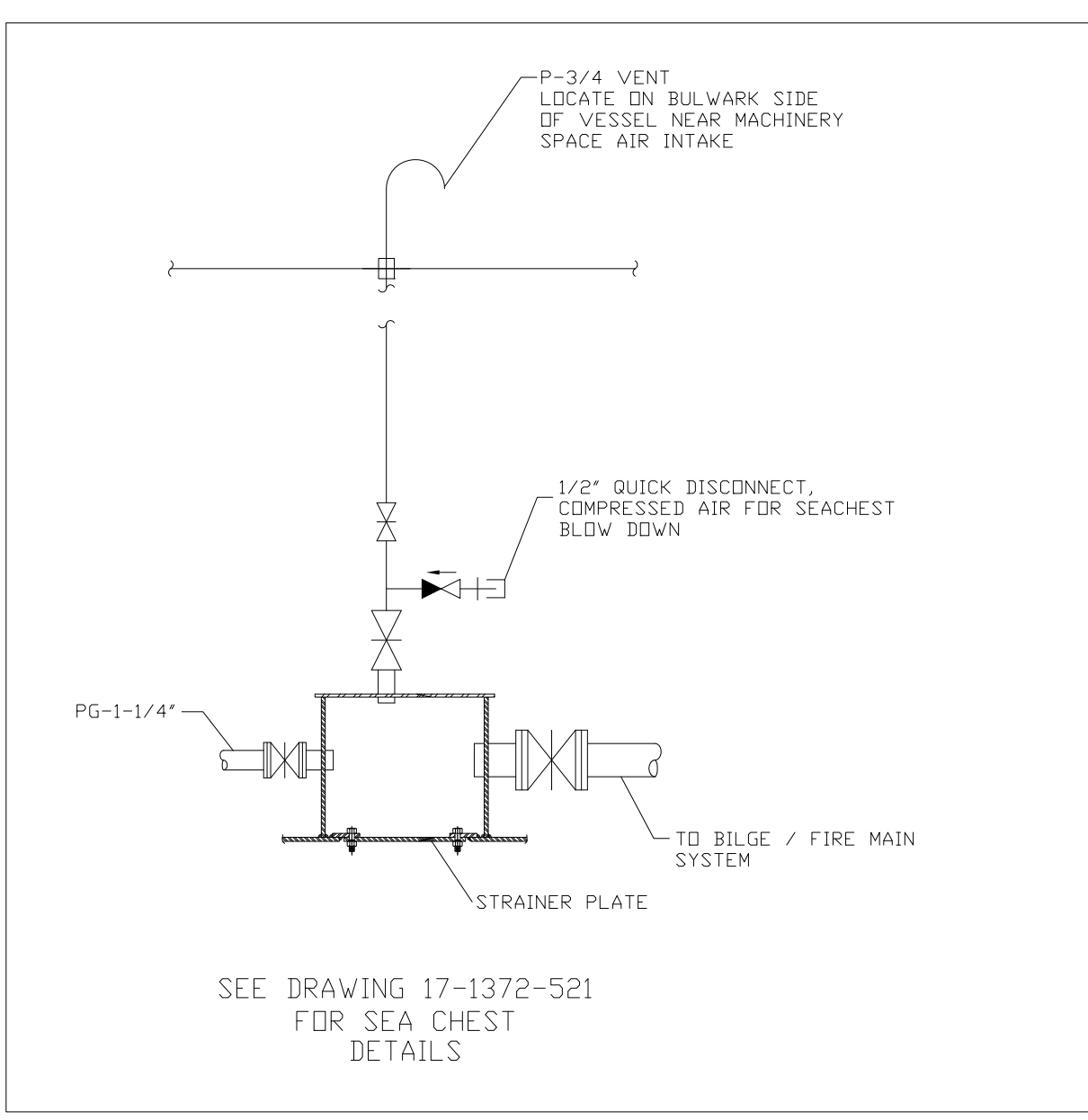
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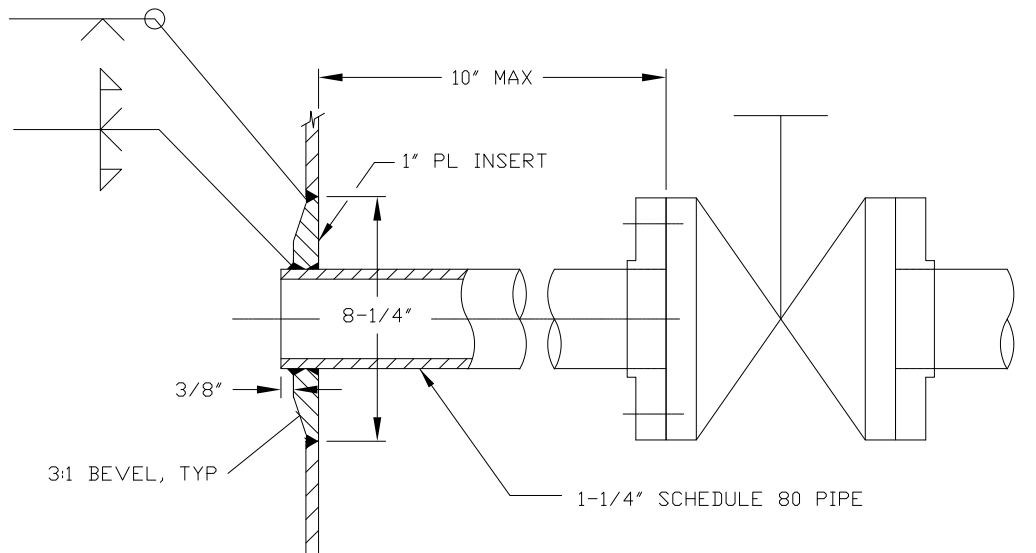
MAIN DECK ARRANGEMENTS



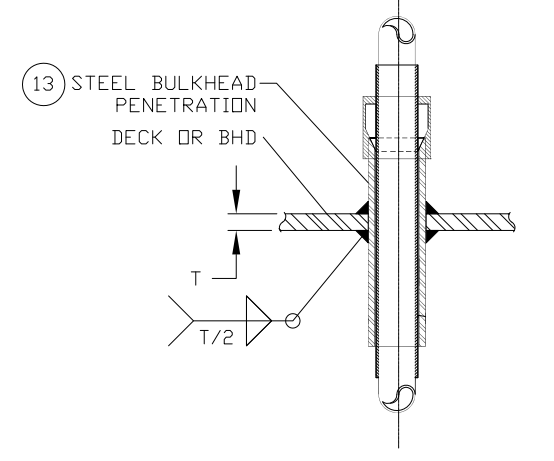
HOLD ARRANGEMENTS



SEE DRAWING 17-1372-521 FOR SEA CHEST DETAILS



DETAIL 3-4D OVERBOARD DISCHARGE NO SCALE



DETAIL 3-1C TYP. DECK OR BULKHEAD PENETRATION NO SCALE

BILL OF MATERIALS					
#	QTY.	SERVICE	TYPE	MAKE/MODEL	COMMENTS
1	2	HYDRAULIC PUMP PTO	PTO 400 FOR JOHN DEERE 4045 ENGINE	LOGAN 900-8020	
2	2	HYDRAULIC PUMP PTO	FLUID ACTVATED CLUTCH, 400 FT-LB, SAE C 141 SPLINE	LOGAN SPF400, OPTION SPF-4300-01	MAX ENGAGEMENT 1800 RPM
3	2	HYDRAULIC PUMP PTO	RIGID COUPLING	LOGAN 088-0018	
4	2	HYDRAULIC PUMP PTO	PNEUMATIC CONTROLS W/ 24VDC SOLENOID	LOGAN 610-0052	
5	2	HYDRAULIC PUMP	PUMP, VARIABLE DISPLACEMENT, 26.4 GPM, 3000 PSI, SAE "C" FLANGE, 2 BOLT	REXROTH A10VSO71DFLR/31R-VSA42N00	
6	1	HYDRAULIC TOWING WINCH	WINCH, TOWING	OIL STATES SKAGIT SMATCO, LLC OSI-HTW-SD-20B60	
7	1	HYDRAULIC VERTICAL CAPSTAN	CAPSTAN, VERTICAL	OIL STATES SKAGIT SMATCO, LLC OSI-HVC-51	
8	2	DECK WINCH	40 TON DECK WINCH	OIL STATES SKAGIT SMATCO, LLC	
9	2	HYDRAULIC PILOT PUMP	PUMP, HYDRAULIC, PILOT PRESSURE, 870 PSI, 7 GPM, 7.5 KW ELEC MOTR, 208 VAC 3ø	REXROTH PV041	FIXED DISPLACEMENT VANE PUMP
10	1	HYDRAULIC RESERVOIR ASSY	RESERVOIR, HYDRAULIC, 1300 LITERS, 60"W X 56"H X 24"D W/ HYDRAULIC COMPONENTS & DISTRIBUTION BLOCK	HYDRADYNE	
11	1	HYDRAULIC OIL COOLING	HEAT EXCHANGER, OIL COOLING, 40 GPM SEAWATER FLOW	SEN-DURE 16867-1-7	
12	1	H.E. SEA WATER COOLING PUMP	PUMP, CENTRIFUGAL, 23 GPM, 44PSI, STAINLESS STEEL, 208VAC, 3ø, TEFC MOTOR	PRICE PUMP MODEL HP75SS, 5" IMPELLER	
13	AR	BULKHEAD PENETRATION	TYPE 9910 W/ 2114 ASSEMBLY, CARBON STEEL, 3/8" LEVE, DI COUPLING NUT, VITON GASKET	CBC MACHINE COMPANY TYPE 250/210 W/ 2114 ASSY	
14	1	STRAINER	1-1/2" BRONZE SIMPLEX STRAINER W/ .06 PERFORATED STAINLESS STEEL BASKET	EATON MODEL 72	24 GPM, 8 PSI PRESSURE DROP, CV = 31.5
PG-1"	AS REQ'D		1" SCHEDULE 40 PIPE, GALVANIZED		ASTM A-53
PG-1-1/4"	AS REQ'D		1-1/4" SCHEDULE 40 PIPE, GALVANIZED		ASTM A-53
P-2"	AS REQ'D		2" SCHEDULE 40 PIPE, 316L SS		ASTM A-312
T-12	AS REQ'D		12mm X 1.5mm 316L SS TUBING		ASTM A-312
T-16	AS REQ'D		16mm X 2mm 316L SS TUBING		ASTM A-312
T-18	AS REQ'D		18mm X 2mm 316L SS TUBING		ASTM A-312
T-22	AS REQ'D		22mm X 2mm 316L SS TUBING		ASTM A-312
T-25	AS REQ'D		25mm X 3mm WALL 316L SS TUBING		ASTM A-312
T-30	AS REQ'D		30mm X 3.5mm 316L SS TUBING		ASTM A-312
T-35	AS REQ'D		38mm X 4mm 316L SS TUBING		ASTM A-312
H-1	2		-8 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-2	2		-10 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-3	1		-12 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-4	6		-16 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-5			-20 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-6	7		-24 HYDRAULIC OIL HOSE, USCG APPROVED	3000 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-7	2		-32 HYDRAULIC OIL HOSE, USCG APPROVED	500 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
H-8	2		-32 HYDRAULIC OIL HOSE, USCG APPROVED	500 PSI	SAE J-1942, SAE J-1475 (FITTINGS)
V-1	2		1-1/4" GATE VALVE, 125#		ASTM A105/A234
V-2	2		2" BALL VALVE, FULL PORT		ASTM A105/A234
CV-1	2		1-1/4" LIFT CHECK VALVE, STEEL, SCREWED, 150#		ASTM A105/A234
U-1-1/4"	1		1-1/4" UNION, ORIFICE, 12MM, GALVANIZED		ASTM A105/A234

GENERAL NOTES		ALTERATIONS		RESERVATIONS		REFERENCES	
NO.	DESCRIPTION	NO.	DESCRIPTION	NO.	DESCRIPTION	NO.	DESCRIPTION
1.	PIPING SYSTEM MATERIALS, INSTALLATION, AND WORKMANSHIP SHALL BE IN ACCORDANCE 46 CFR SUBCHAPTER M (TOWING VESSELS).	10.	SUPPORT HYDRAULIC TUBING WITH VIBRATION DAMPENING CLAMPS SUPPORTED WITH THE MAXIMUM SPAN INDICATED BELOW	1.	UPDATE PIPING DIAGRAM	1.	1372-551 COMPRESSED AIR PIPING
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.					2.	1372-5000 ELECTRICAL ONE LINE
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 HYDRAULIC OIL NEAR ANY ELECTRICAL DEVICES OR EQUIPMENT. DO NOT LOCATE TAKEDOWN JOINTS AROUND, NEAR, OR OVER ELECTRICAL EQUIPMENT. ROUTE ALL HYDRAULIC 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 OF PERMANENT STRUCTURE.	11.	HEAT EXCHANGER SIZE BASED ON 55 GPM OIL FLOW, INLET TEMPERATURE 65°C, OUTLET TEMPERATURE 60°C, SEA WATER FLOW 24 GPM, INLET TEMPERATURE 35°C WITH A HEAT REJECTION OF 50KW				
7.	PIPING SHALL BE ADEQUATELY SUPPORTED BY CLAMPS OR HANGERS IN ACCORDANCE WITH APPLICATION. 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.	12.	HYDRAULIC OIL PIPING MUST BE SUITABLY INSULATED TO PREVENT INJURIES AND ALLOW ACCESS FOR PIPING INSPECTION				
8.	WHERE PIPES PENETRATE TANK BOUNDARIES, BULKHEADS, OR DECK'S HEAVY WEIGHT SPOOL PIECES OR REINFORCING PENETRATION FITTINGS SHALL BE USED.						
9.	FLEXIBLE HOSE ASSEMBLIES SHALL MEET THE REQUIREMENTS OF 46 CFR 182.720 AND BE APPROVED FOR HYDRAULIC OIL SERVICE. END FITTINGS SHALL MEET SAE J1475. HOSE ASSEMBLIES SHALL NOT BE LESS THAN 9" IN LENGTH NOR MORE THAN 24" IN LENGTH.						

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Title: 70.5'x30'x11' NCDOT TOWBOAT
DECK MACHINERY HYDRAULICS
 Dwg. No. 17-1372-265
 Alt. No. 1
 Sht. 3 of 4
 Drawn By: JAH Date: SEPT 07, 2018
 Checked By: Date:
 App'd By: Scale: 1/4" = 1'-0"
 ABS App'l: USC App'l:

- DRAWING SUBMITTALS -

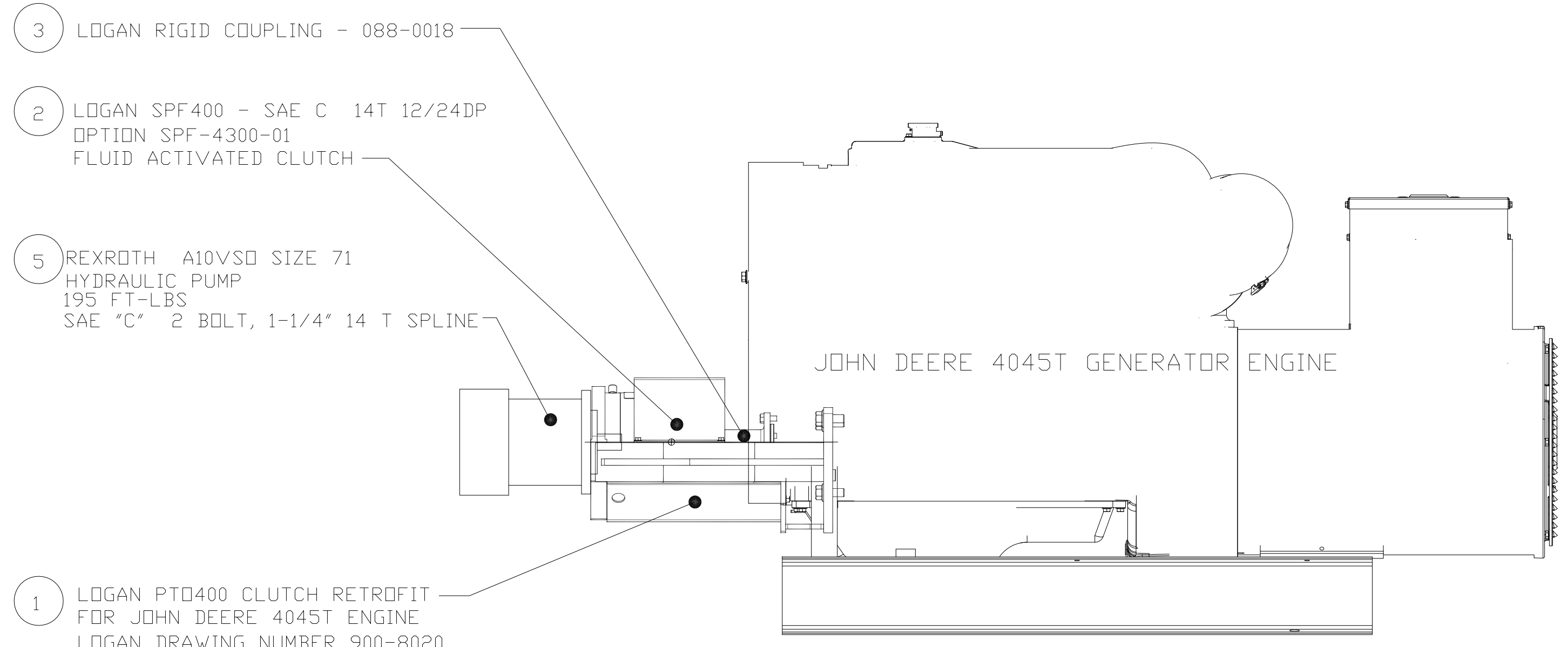
BILL OF MATERIALS

#	QTY.	SERVICE	TYPE	MAKE/MODEL	COMMENTS
1	2	HYDRAULIC PUMP PTO	PTO 400 FOR JOHN DEERE 4045 ENGINE	LOGAN 900-8020	
2	2	HYDRAULIC PUMP PTO	FLUID ACTIVATED CLUTCH, 400 FT-LB, SAE C 14T SPLINE	LOGAN SPF400, OPTION SPF-4300-01	MAX ENGAGEMENT 1800 RPM
3	2	HYDRAULIC PUMP PTO	1 1/2" DP RIGID COUPLING	LOGAN 088-0018	
4	2	HYDRAULIC PUMP PTO	PNEUMATIC CONTROLS W/ 24VDC SOLENOID	LOGAN 610-0052	
5	2	HYDRAULIC PUMP	PUMP, VARIABLE DISPLACEMENT, 26.4 GPM, 3000 PSI, SAE "C" FLANGE, 2 BOLT	REXROTH A10VSO71DFLR/31R-VSA42N00	

POWER TAKE-OFF DETAILS

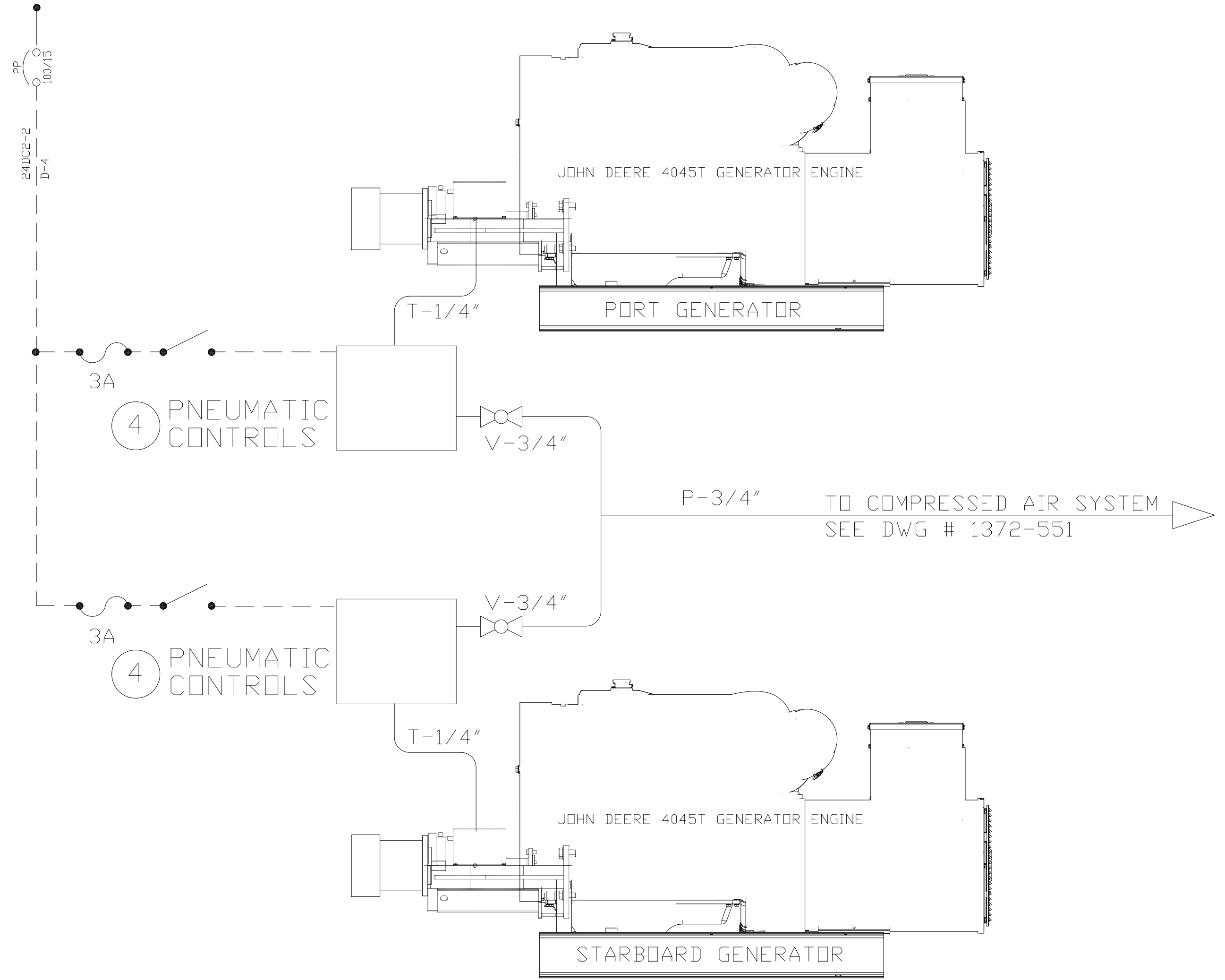
SYMBOLS LIST

P-3/4"	NPS PIPE SIZE
T-1/4"	TUBING SIZE
D-4	ELECTRICAL CABLE
[Hatched Box]	HOSE
[Ball Valve Symbol]	BALL VALVE
[Fuse Symbol]	FUSE
[Switch Symbol]	SWITCH
[Circuit Breaker Symbol]	CIRCUIT BREAKER



GENERATOR PTO CLUTCH ASSEMBLY

ENGINE ROOM 24DC2 PANEL



24VDC/PNEUMATIC CLUTCH CONTROL

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Title: 70.5"x30"x11" NCDOT TOWBOAT

DECK MACHINERY HYDRAULICS

Dwg. No. 17-1372-265
 Alt. No. 1
 Sht. 4 of 4

Drawn By: JAH Date: SEPTEMBER 7, 2018
 Checked By: _____ Date: _____
 App'd By: _____ Scale: NONE
 ABS App'l: _____ USCG App'l: _____

GENERAL NOTES

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ALTERATIONS

NO.	DESCRIPTION	NO.	DESCRIPTION	DATE	BY	NO.
1	UPDATE PIPING DIAGRAM	1	UPDATE PIPING DIAGRAM	9/24/18	JH	1

RESERVATIONS

NO.	DESCRIPTION	NO.	DESCRIPTION
1	1372-551 COMPRESSED AIR PIPING	1	40 TON DECK WINCHES TBD
2	1372-5000 ELECTRICAL ONE LINE		

REFERENCES

NO.	DESCRIPTION	NO.	DESCRIPTION
1	1372-551 COMPRESSED AIR PIPING	1	40 TON DECK WINCHES TBD
2	1372-5000 ELECTRICAL ONE LINE		