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**MATERIAL SCHEDULE**

SERVICE	SIZE	PIPE	TAKEDOWN JOINTS			VALVES		FITTINGS	FLEXIBLE CONNECTIONS
			MATERIAL	GASKETS	BOLTING	BODY	TRIM		
FUEL OIL MAWP: 100 PSIG MAX TEMP: 120°F	ALL	CARBON STEEL ASTM A53 OR A106, GRADE B SEAMLESS ANSI B36.10 SCH 40	UNION GROUND JOINT CARBON STEEL ASTM A105 ANSI B16.11 SOCKET WELD	-	-	BALL: CARBON STEEL ASTM A216 GR WCB SOCKET WELD 3-PIECE 1500 PSI  SWING CHECK: CARBON STEEL ASTM A216 GR WCB 150#, SOCKET WELD SEE NOTES 12&14	BALL: CHROME PLATED CARBON STEEL BALL RPTFE SEATS  SWING CHECK: STAINLESS STEEL	CARBON STEEL ASTM A105 ANSI B16.11 3000# SOCKET WELD	SAE J1942 COMPLIANT HOSE  SEE NOTE 6

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- GENERAL NOTES (CONT)**
- ALL VALVES LOCATED BELOW THE FLOOR PLATES SHALL BE PROVIDED WITH REACH RODS. ALL VALVES SHALL BE PROVIDED WITH VISUAL CLOSURE STATUS.
  - PIPE THREAD SEALING TAPE, GALVANIZED PIPE, OR FITTINGS SHALL NOT BE USED.
  - VALVES CONSTRUCTED OF DUCTILE IRON, ASTM A395, MAY BE SUBSTITUTED WHERE PERMITTED BY ABS AND USCG REQUIREMENTS.
  - PIPE BENDS MAY BE USED IN LIEU OF ELBOWS WHERE PRACTICABLE. BENDS SHALL HAVE A BEND RADIUS OF FIVE TIMES NOMINAL DIAMETER WHEREVER PRACTICAL, WITH A MINIMUM RADIUS OF THREE TIMES NOMINAL DIAMETER.
  - TANK SHUT-OFF VALVES SHALL BE POSITIVE SHUTOFF AND HAVE FIRE SAFE METALLIC SEATS. TANK VALVES SHALL BE OPERABLE FROM THE MAIN DECK VIA FLEXIBLE TYPE REACH ROD ASSEMBLY.
  - REACH ROD OPERATOR SHALL BE LOCATED OUTBOARD OF THE CAR TIRE RAIL, CLEAR OF THE VEHICLE LANES AND OTHER OBSTRUCTIONS.
  - EACH FUEL OIL TANK SHALL BE FITTED WITH A LEVEL SENSOR. EACH SENSOR SHALL BE INSTALLED THROUGH THE TOP OF THE TANK AND INTERFACED WITH THE SHIP'S ALARM AND MONITORING SYSTEM. CONFIGURE TO PROVIDE CONTINUOUS LEVEL INDICATION, LOW & HIGH LEVEL ALARMS. SEE REF 1.
  - PIPING SHALL BE CLEANED AND TESTED IN ACCORDANCE WITH USCG REQUIREMENTS. SEE REF 1.

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**REVISION HISTORY**

REV	ZONE	DESCRIPTION	DWN	DATE	APVD

**EQUIPMENT & PUMPLIST**

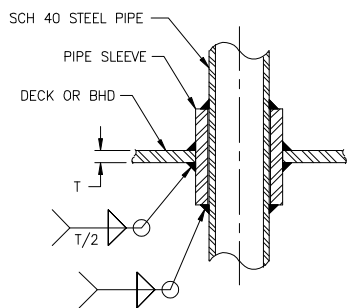
QTY	SERVICE	TYPE	MODEL	CAPACITY	REMARKS
1	FUEL OIL TRANSFER PUMP	HAND OPERATED ROTARY VANE	-	10 GAL/115 REV	INLINE INSTALLATION
3	GENSET FUEL OIL FILTER	TURBINE FILTER 2 ELEMENT	-	6 GPM 10 MICRON	ASTM F1201
1	EDG FUEL OIL FILTER	TURBINE FILTER 1 ELEMENT	-	3 GPM 10 MICRON	ASTM F1201
1	SIGHT FLOW INDICATOR	VISUAL	-	-	-

**SYMBOLS LIST**

	SUPPLY PIPE
	RETURN PIPE
	PIPE UP
	PIPE DOWN
	BULKHEAD PENETRATION
	REDUCER
	PLUG
N.S. / N.O.	NORMALLY SHUT / NORMALLY OPEN
	BALL VALVE, REACH ROD
	BALL VALVE
	SWING CHECK VALVE
	FLEXIBLE CONNECTION
	SIMPLEX FILTER
	DUPLEX FILTER
	SPILL CONTAINMENT/DRIP PAN
	MANUALLY OPERATED PUMP
	SIGHT FLOW INDICATOR
	LEVEL SENSOR

- GENERAL NOTES**
- VESSEL TO BE CONSTRUCTED IN ACCORDANCE WITH 46 CFR SUBCHAPTER H REGULATIONS.
  - THIS DRAWING IS DIAGRAMMATIC AND DOES NOT REPRESENT A COMPLETE DETAILED DESIGN. EQUIPMENT LAYOUT IN A GIVEN AREA IS APPROXIMATE. THE CONTRACTOR SHALL DEVELOP A DETAILED DESIGN THAT PROVIDES A FULLY FUNCTIONAL ARRANGEMENT SUITABLE FOR INSTALLATION, TAKING INTO ACCOUNT ALL NECESSARY SYSTEM INTERFACES AND INTERFERENCES. DIMENSIONS SHALL BE VERIFIED FROM THE SHIP AND MANUFACTURERS' CERTIFIED DRAWINGS AS APPROPRIATE.
  - PIPING SHALL BE RUN AS DIRECTLY AS PRACTICABLE WITH A MINIMUM NUMBER OF BENDS AND FITTINGS. PIPE SPOOLS SHALL BE SIZED AND ARRANGED TO PROVIDE FOR REMOVAL, INSPECTION, SERVICING, AND REPLACEMENT OF PIPING, VALVES, FITTINGS, AND EQUIPMENT WITHOUT CUTTING STRUCTURE OR PIPING.
  - 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 WELDED DIRECTLY TO PIPES.
  - WHERE PIPES PENETRATE TANK BOUNDARIES, BULKHEADS, OR DECKS HEAVY WEIGHT SPOOL PIECES OR REINFORCING PENETRATION FITTINGS SHALL BE USED. SEE DETAIL 1-6A.
  - FLEXIBLE HOSE SECTIONS BETWEEN THE ENGINE ATTACHED CONNECTIONS AND VESSEL PIPING SHALL BE 3/4" SAE FLARE SWIVEL ON BOTH ENDS. FLEXIBLE HOSE SHALL BE FLAME RESISTANT IN ACCORDANCE WITH 46 CFR 56.60-25. HOSE ASSEMBLIES SHALL NOT BE LESS THAN 9" IN LENGTH NOR MORE THAN 24" IN LENGTH.
  - 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.
  - ARRANGE LEVEL INDICATOR TO PROVIDE INDICATION THROUGH THE GREATEST RANGE OF TANK LEVEL AS PRACTICABLE. LEVEL INDICATOR SHALL BE LOCATED ADJACENT TO TANK TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE.
  - DRIP PANS WITH UP-TURNED, SEALED, FLANGED EDGES SHALL BE PROVIDED BENEATH ALL FILTERS, PUMPS, STRAINERS, AND ANY OTHER EQUIPMENT THAT CONTAINS OIL AND REQUIRES PERIODIC MAINTENANCE. DRIP PANS SHALL BE PROVIDED WITH DRAIN VALVES.

- REFERENCES**
- 18026-200-832-1 TECHNICAL SPECIFICATION
  - 18026-200-506-1 FILLS, VENTS, AND SOUNDS



**DETAIL 1-6A**  
TYP DECK/BHD PENETRATION

NORTH CAROLINA FERRY SYSTEM  
8500 SHIPYARD RD WAREHOUSES, NC 27683

**Elliott Bay Design Group**  
North Carolina, PLLC

CLIENT: NORTH CAROLINA D.O.T.  
RALEIGH, NORTH CAROLINA  
PROJECT: DOUBLE-ENDED AZIMUTH DRIVE FERRY

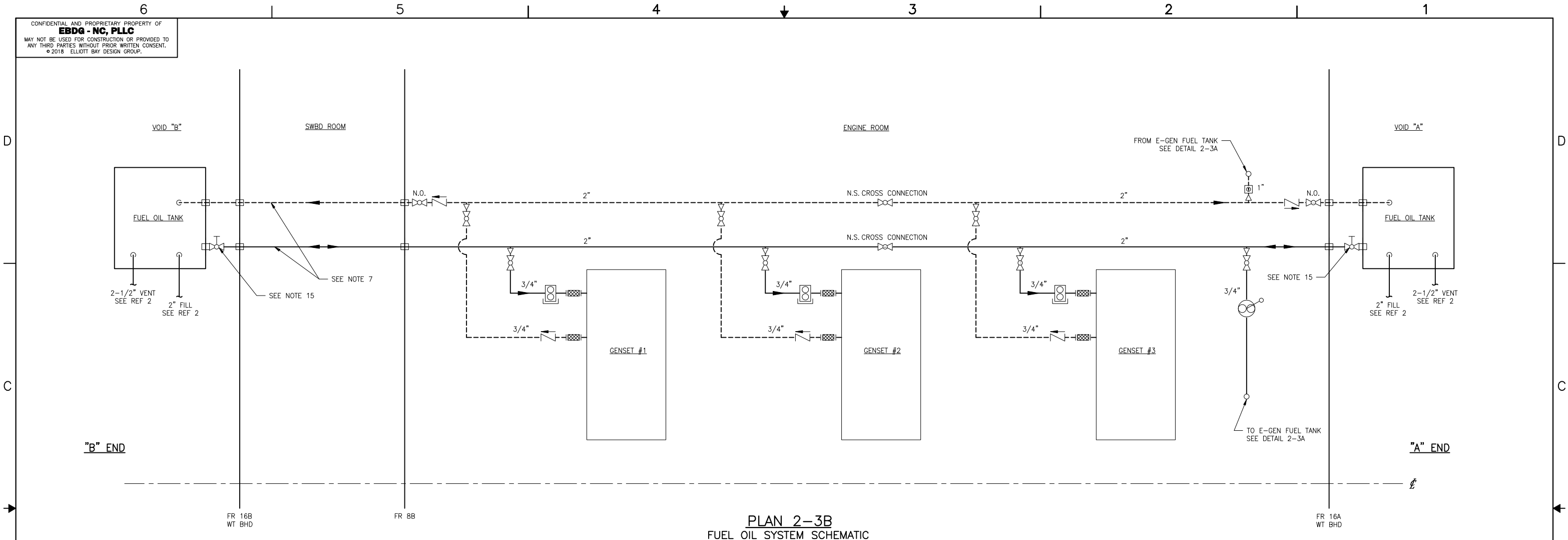


**FUEL OIL PIPING SYSTEM SCHEMATIC**

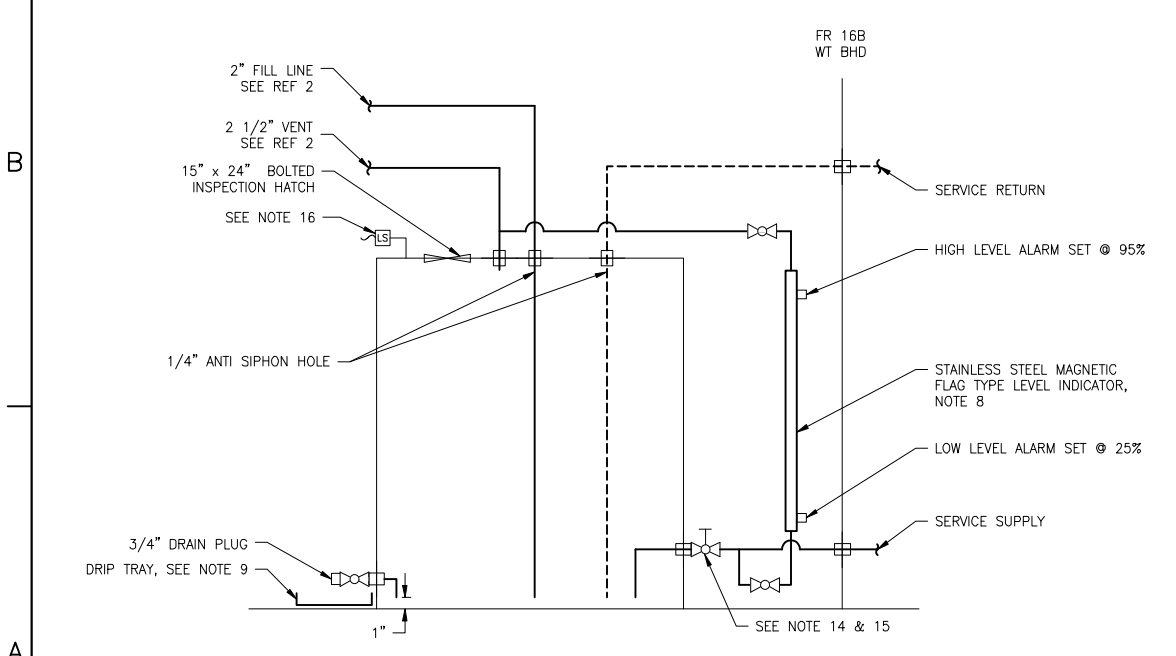
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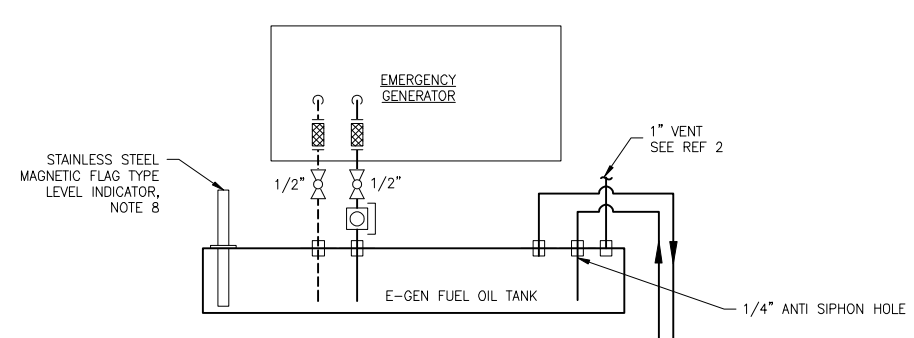
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**PLAN 2-3B**  
 FUEL OIL SYSTEM SCHEMATIC



**DETAIL 2-5A**  
 TYP STORAGE TANK  
 "B" END SHOWN, "A" SIMILAR



**DETAIL 2-3A**  
 EMERGENCY GENERATOR FUEL OIL SYSTEM



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SCALE	NONE	FILE NAME	18026-200-261-1-	SHEET	2 OF 2

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