

| MATERIAL SCHEDULE | | | | | | | | | |
|---|--------|---|--|---|--|------|--|------------------|-------------|
| SERVICE | PIPING | | TAKEDOWN JOINTS | | VALVES | | FITTINGS | FLEX CONNECTIONS | REMARKS |
| | SIZE | MATERIAL | MATERIAL | GASKETS | BOLTING | BODY | | | |
| POTABLE WATER VENT AND FILL IN HOLD MAWP: 50 PSIG MAX TEMP: 120°F | ALL | COPPER, SEAMLESS HARD DRAWN, ASTM B88, TYPE K | FLANGE, 150#, ANSI B16.24, SOLDER JOINT, COPPER | ARAMID FIBERS WITH A NEOPRENE BINDER | BOLTS: STAINLESS STEEL ASTM A193 GRADE B8M ANSI B18.2.1 NUTS: STAINLESS STEEL ASTM A194 GRADE 8M ANSI B18.2.2 | | WROT COPPER, ANSI B16.22, ASTM B75 | | |
| FUEL OIL FILL & VENT, LO FILL & VENT, WO PUMP-OFF & VENT IN HOLD MAWP: 50 PSIG TEMP: 120°F | ALL | CARBON STEEL ASTM A53 OR A106, GRADE B SEAMLESS, ANSI B36.10 SCH 40 | FLANGE CARBON STEEL ASTM A105 ANSI B16.5 150# SLIP-ON OR WELD NECK | INORGANIC FIBERS WITH A NITRILE BINDER ABS FIRE-SAFE TYPE APPROVED | | | CARBON STEEL ASTM A234, GR WPB ANSI B16.9 BUTT WELD LONG RADIUS | | |
| SEA CHEST VENT IN HOLD MAWP: 50 PSIG TEMP: 120°F | ALL | CU-NI 90/10 ASTM B466 OR MIL-T-16420 SEAMLESS CLASS 200 | UNION CU-NI 90/10 MSS SP-83 3000# SOCKET END | | | | CU-NI 90/10 MSS SP-83 3000# SOCKET END | | |
| ZERO DISCHARGE PUMP OFF & VENT IN HOLD MAWP: 50 PSIG TEMP: 120°F | ALL | CPVC SCH 80 ASTM D1784 ASTM F441 | SOCKET FLANGE CPVC ASTM F439 ANSI B16.5 150# | EPDM RUBBER ASTM-D1331 FULL FACE | | | CPVC ASTM F439 | | SEE NOTE 21 |
| POTABLE WATER FILL & VENT, ZERO-DISCHARGE TANK PUMP-OFF & VENT, BALLAST VENT, FO FILL & VENT, LO FILL & VENT, WO PUMP OFF & VENT, LAZ "A" & "B" VENTS IN WEATHER MAWP: 50 PSIG MAX TEMP: 120°F | ALL | STAINLESS STEEL ASTM A312 TYPE 316 ANSI B36.10 SCH 80 | FLANGE STAINLESS STEEL ASTM A182 TY 316 ANSI B16.5 150# SLIP-ON OR WELD NECK UNION STAINLESS STEEL ASTM A182 TY 316 ANSI B16.11 3000# | SEE IN HOLD GASKET MATERIAL | | | BALL: STAINLESS STEEL BODY ASTM A351, TYP 316 THREADED OR SW, 1500 PSI BALL: STAINLESS STEEL BALL RPTFE SEATS | | |

- VENTS TERMINATING IN THE MACHINERY SPACE SHALL BE POSITIONED TO PRECLUDE THE POSSIBILITY OF OVERFLOWING ON ELECTRICAL EQUIPMENT, ENGINES, OR HEATED EQUIPMENT.
- PROVIDE CONTAINMENT AT OIL FILLS, PUMP-OFFS AND VENTS. SUBMIT DETAILS OF CONTAINMENT TO OWNER FOR APPROVAL PRIOR TO FABRICATION. CONTAINMENT VOLUME SHALL BE A MINIMUM OF 21 GALLONS.
- PIPE BENDS SHALL BE USED IN LIEU OF ELBOWS WHERE PRACTICABLE. BEND RADII FOR VENT AND OVERFLOWS SHALL BE 5 TIMES NOMINAL PIPE DIAMETER AND 10 FEET FOR SOUNDING TUBES.
- SOUNDING TUBES THAT TERMINATE AT THE FREEBOARD DECK SHALL HAVE FLUSH SOUNDING TUBE CAPS, STAINLESS STEEL COMMERCIAL WELD-IN TYPE (NOT A PIPE COUPLING) WITH A BRONZE PLUG. EACH FLUSH SOUNDING TUBE SHALL HAVE THE TANK NAME LABELED ON OR NEAR THE CAP. SOUNDING TUBES THAT TERMINATE BELOW THE FREEBOARD DECK SHALL BE FITTED WITH A SELF-CLOSING GATE VALVE. EACH VALVE SHALL HAVE A LABEL INDICATING THE TANK SERVED.
- SOUNDING TUBES SHALL BE AS VERTICAL AS PRACTICAL AND SHALL TERMINATE AS CLOSE AS POSSIBLE TO THE DEEPEST POINT OF THE TANK OR VOID.
- NOTED VENT TERMINALS SHALL BE BALL CHECK TYPE WITH PROTECTIVE MESH SCREEN.
- VENT TERMINALS FOR THE FUEL OIL, LUBE OIL, WASTE OIL SHALL BE FURNISHED WITH SS FLAME SCREENS.
- SOUNDING TUBE TERMINALS SHALL BE LOCATED IN EASILY ACCESSIBLE LOCATIONS.
- TANKS SHALL BE FITTED WITH LEVEL SENSORS, HIGH LEVEL ALARMS, AND LOW LEVEL ALARMS PER REF 1. LEVEL SENSORS AND ALARMS SHALL BE INTERFACED WITH THE SHIP'S ALARM AND MONITORING SYSTEM. SEE REF 1.
- WHERE STEEL PIPING PENETRATES BULKHEADS OR DECKS, REINFORCING SLEEVES SHALL BE USED. SEE DETAIL 2-3B.
- SEE REFERENCES 4-9 FOR TANK DETAILS.
- SEE REFERENCE 6 FOR SANITARY DRAINS VENT LINES.
- MATERIAL TRANSITIONS FROM STEEL TO COPPER SHALL BE ACCOMPLISHED VIA FLANGED JOINTS, THE JOINTS SHALL BE FITTED WITH GALVANIC ISOLATION KITS TO PREVENT DIRECT METAL TO METAL CONTACT.
- CPVC PIPE AND FITTINGS SHALL HAVE A USCG CERTIFICATE OF APPROVAL THAT STATES CPVC PIPE AND FITTINGS MEET LOW FLAME SPREAD, AND TOXICITY REQUIREMENTS OF THE FTP CODE ANNEX 1, PARTS 2 AND 5. INSTALL PIPING IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION GUIDELINES.
- WHERE PLASTIC OR COPPER PIPE PENETRATES BULKHEADS OR DECKS, STEEL PENETRATION SLEEVES WITH USCG APPROVED SEALANT AND CRUSHING SLEEVES SHALL BE USED. SEALANT AND SLEEVES SHALL BE RATED FOR WATERTIGHT AND A60 APPLICATIONS. INSTALL PIPING TRANSITS IN ACCORDANCE WITH MANUFACTURER'S APPROVED INSTALLATION DETAILS.
- EMERGENCY DIESEL GENERATOR FUEL TANK SHALL BE PROVIDED WITH AN OVERFLOW PER REF 5. DRIP CONTAINMENT SHALL BE PROVIDED FOR THE VENT, IT NEED NOT MEET THE 21 GALLON REQUIREMENT OF NOTE 9.

| REV | ZONE | DESCRIPTION | DWN | DATE | APVD |
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| | | | | | |

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 MANUFACTURER'S 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.
- AVOID POCKETS IN THE PIPE LINES. BOSSES AND VALVES OR SCREWED PLUGS SHALL BE FITTED TO ENABLE COMPLETE DRAINING OF PIPES WHERE POCKETS DO OCCUR.
- 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 BASIC SHIP STRUCTURE. HANGERS SHALL NOT BE WELDED DIRECTLY TO PIPES. ALL COPPER-NICKEL AND COPPER PIPING SHALL BE SUPPORTED USING INSULATED HANGERS.
- EACH VENT PIPE SHALL BE SLOPED CONTINUOUSLY TO PROVIDE EFFECTIVE DRAINAGE BACK TO THE TANK.
- PROVIDE AN ENGRAVED LABEL PLATE AT EACH FILL, PUMP-OFF, VENT AND SOUND IN ACCORDANCE WITH REF 1.

REFERENCES

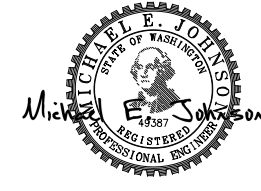
- 18026-200-832-1 TECHNICAL SPECIFICATION
- 18026-200-101-1 PROFILES AND DECK ARRANGEMENTS
- 18026-200-201-1 MACHINERY ARRANGEMENT
- 18026-200-256-1 COOLING SYSTEM SCHEMATIC
- 18026-200-261-1 FUEL OIL PIPING SYSTEM SCHEMATIC
- 18026-200-528-1 SANITARY DRAINS SCHEMATIC
- 18026-200-529-1 BILGE AND BALLAST PIPING SCHEMATIC
- 18026-200-529-2 LUBE OIL AND WASTE OIL PIPING SCHEMATIC
- 18026-200-533-1 POTABLE AND SANITARY WATER PIPING SCHEMATIC
- 18026-200-521-1 FIRE MAIN SYSTEM SCHEMATIC



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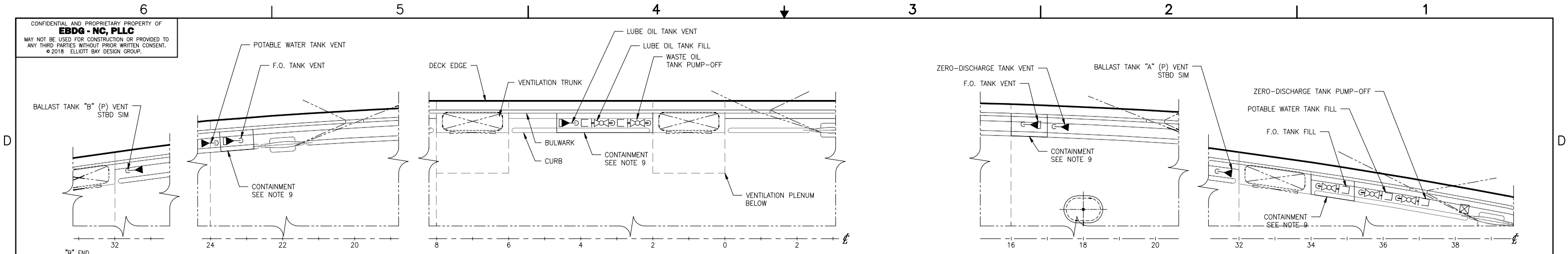


| TABLE 1 - 5 B | | | | | | | | |
|-------------------------------|------|---------------|----------------------------|-------|-------------|-----------|---------------|--------------------|
| FILLS, VENTS & SOUNDING TUBES | | | | | | | | |
| SPACE | QTY. | FILL/PUMP-OFF | | | VENT | | SOUNDING TUBE | |
| | | SIZE | TYPE | VALVE | SIZE | VALVE | SIZE | TYPE |
| POTABLE WATER TANK | 1 | 1 1/2" | FEMALE CAM-LOCK W/PLUG | BALL | 2" | BALLCHECK | NONE | - |
| FUEL OIL TANKS | 2 | 2" | QUICK DISCONNECT | BALL | 2-1/2" | BALLCHECK | 1 1/2" | FLUSH |
| EDG FUEL OIL TANK | 1 | - | - | - | 1" | BALLCHECK | 1 1/2" | FLUSH |
| LUBE OIL TANK | 1 | 1 1/2" | MALE CAM-LOCK W/CAP & PLUG | BALL | 2" | BALLCHECK | 1 1/2" | SELF-CLOSING VALVE |
| WASTE OIL TANK | 1 | 1 1/2" | MALE CAM-LOCK W/CAP & PLUG | BALL | 2" | NONE | 1 1/2" | SELF-CLOSING VALVE |
| ZERO-DISCHARGE TANKS | 2 | 2" | MALE CAM-LOCK W/CAP & PLUG | BALL | 3" | BALLCHECK | NONE | - |
| BALLAST TANKS | 4 | - | - | - | 5" | BALLCHECK | 1 1/2" | FLUSH |
| SEA CHESTS | 2 | - | - | NONE | 1-1/2" | NONE | NONE | - |
| MARINE SANITATION DEVICE | 1 | - | - | - | 5" | BALLCHECK | NONE | - |
| LAZ "A" AND "B" | 2 | - | - | - | 2" (2 PLCS) | BALLCHECK | NONE | - |

| SYMBOLS LIST | |
|--------------|--|
| | FILL/PUMP-OFF PIPING |
| | VENT PIPING |
| | DIRECTION OF FLOW ARROW |
| | PIPE UP |
| | PIPE DOWN |
| | VENT TERMINAL, FLAME SCREEN & BALL CHECK |
| | VENT TERMINAL WITH BALL CHECK |
| | MATERIAL TRANSITION |
| | SOUNDING TUBE TERMINAL |
| | BULKHEAD PENETRATION |
| | SELF-CLOSING VALVE |
| | CAMLOCK FITTING, TABLE 1-5B |
| | BALL VALVE |
| | UNION |
| | VENT TERMINAL |
| | FLANGE |

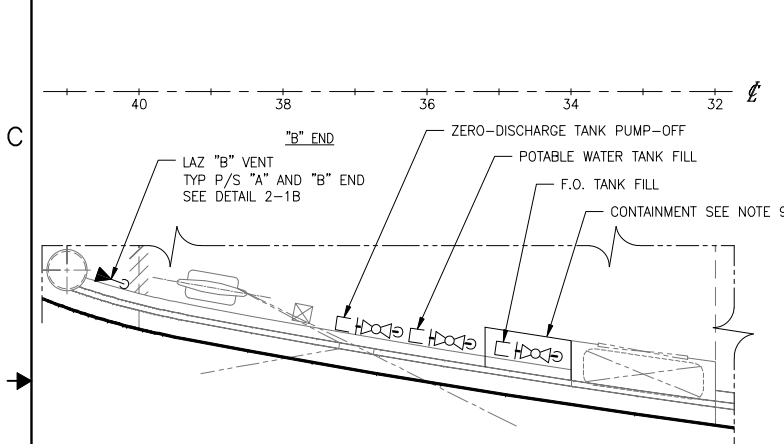
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| DWN: NUB | MOD: JEH |
| CKD: MEJ | APVD DATE: 7/31/18 |

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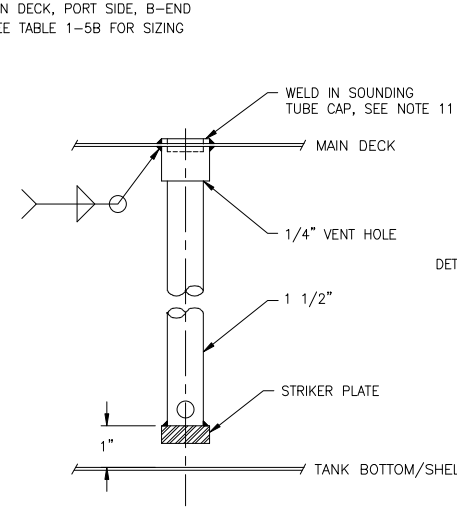


PLAN 2-5D
 VENTS AND FILL/PUMP-OFF CONNECTIONS
 MAIN DECK, PORT SIDE, B-END
 SEE TABLE 1-5B FOR SIZING

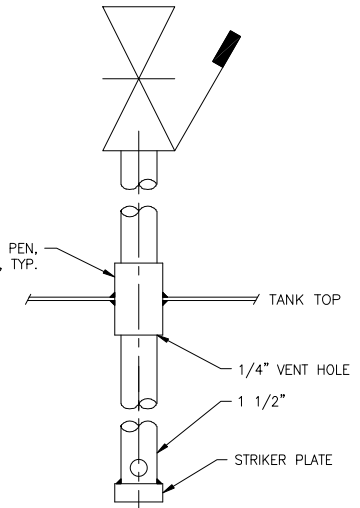
PLAN 2-2D
 VENTS AND FILL/PUMP-OFF CONNECTIONS
 MAIN DECK, PORT SIDE, A-END
 SEE TABLE 1-5B FOR SIZING



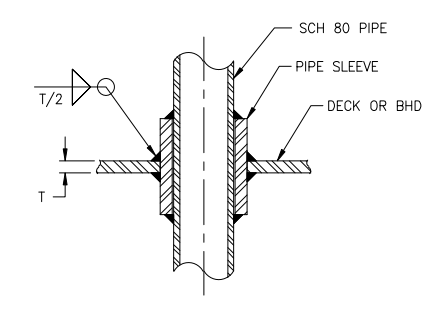
PLAN 2-6B
 VENTS AND FILL/PUMP-OFF CONNECTIONS
 MAIN DECK, STBD SIDE, B-END
 SEE TABLE 1-5B FOR SIZING



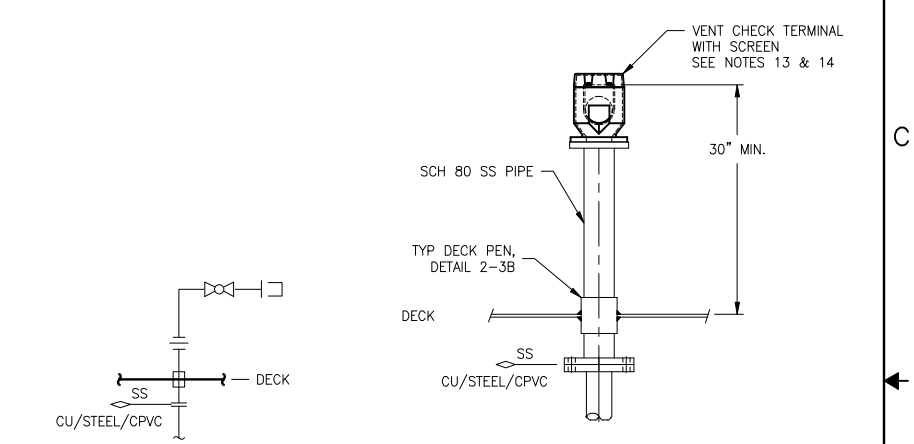
DETAIL 2-5B
 SOUNDING TUBE AT FREEBOARD DECK
 FUEL OIL & BALLAST TANKS



DETAIL 2-4B
 SOUNDING TUBE IN ENGINE ROOM
 WASTE OIL & LUBE OIL TANKS

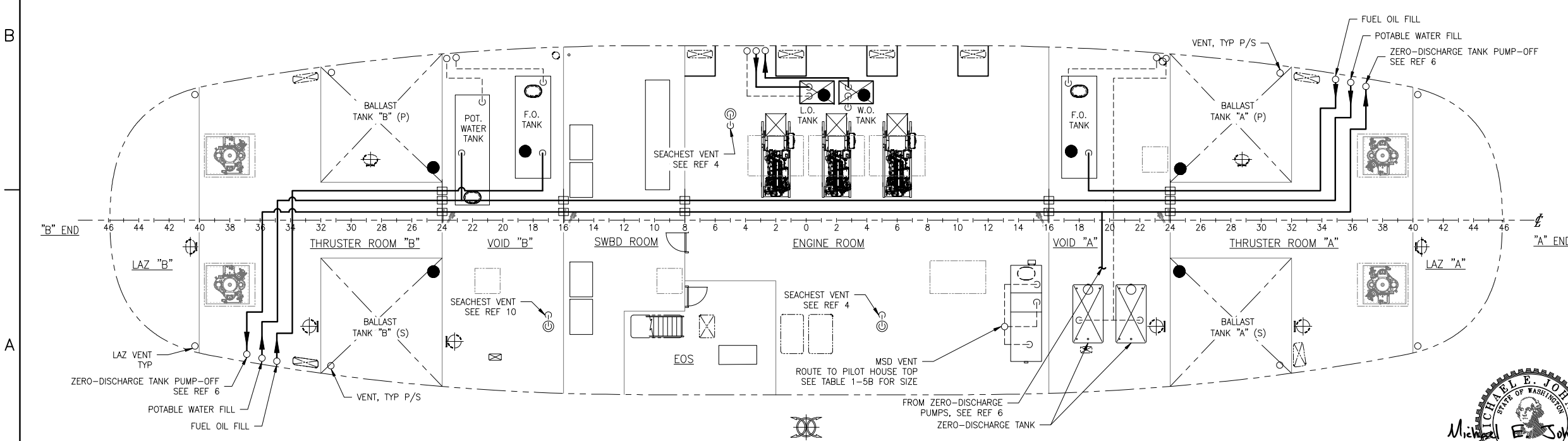


DETAIL 2-3B
 TYP DECK/BHD PENETRATION

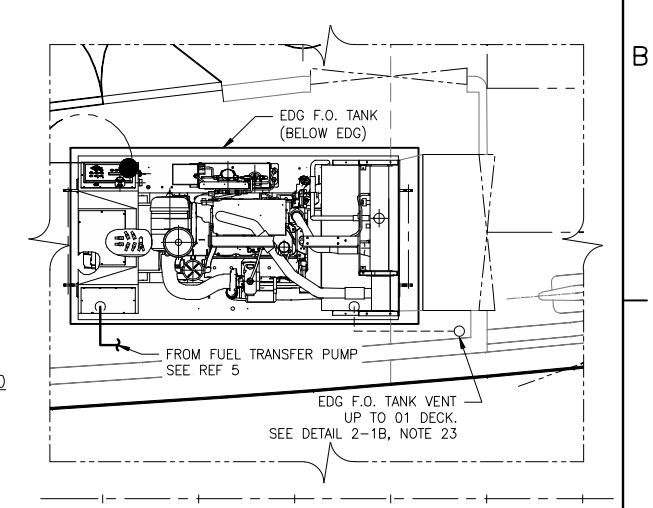


DETAIL 2-2B
 TYPICAL DECK CONNECTION

DETAIL 2-1B
 TYPICAL VENT



PLAN 2-4A
 HOLD



PLAN 2-1A
 E-GEN ROOM



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