`1 SCOPE

The intent of this item is to install a new seachest, new pumps, a centrifugal separator, and new piping connecting to the existing uncontaminated science seawater system. Additionally, piping from approximately frame 110 to the forecastle is replaced with larger diameter piping and forecastle piping connections are added. The Contractor shall note that most of the uncontaminated science seawater system uses Hastelloy C and glass reinforced plastic (GRP) to minimize the chance of seawater contamination.

3.1 The Contractor shall note that the impressed cathodic protection system mastic extends aft to approximately frame 103 on the port side. The existence and location of this system shall be noted by the Contractor. It is not expected that this will be a work interference. The cathodic protection system mastic is shown on reference 2.rr.

3.2 The Contractor shall accomplish the following:

3.2.1 The Contractor shall install a seachest similar to that shown in figure 1. The seachest shall be fabricated from ½" thick AH 36 steel. This will require removing interferences as required to gain access and install the new seachest in the Void. The seachest shall be vented in a similar manner to the forward science seawater seachest (shown in reference 2.qq sheet 11, detail 13-B), except that the vent piping material shall be Hastelloy C, XXS wall thickness. The vent piping shall be mounted as far aft in the seachest as practicable. The slots for seachest inlet shall be 1 1/2 inches by 6 inches. The vertical centers of the slots shall be 4 inches apart., similar to the science seawater seachest slots shown on reference 2.ss. The slots shall be aligned with the long axis fore and aft. There shall be a minimum of 40 slots installed. The Contractor shall install 15" x 23" bolted watertight access plates with backing rings in the top of each side of the seachest to facilitate future access and maintenance. Reference 2.tt shows the existing structure in the area of the new seachest.

(See Separate File)

Figure 1

New Science Seawater Seachest

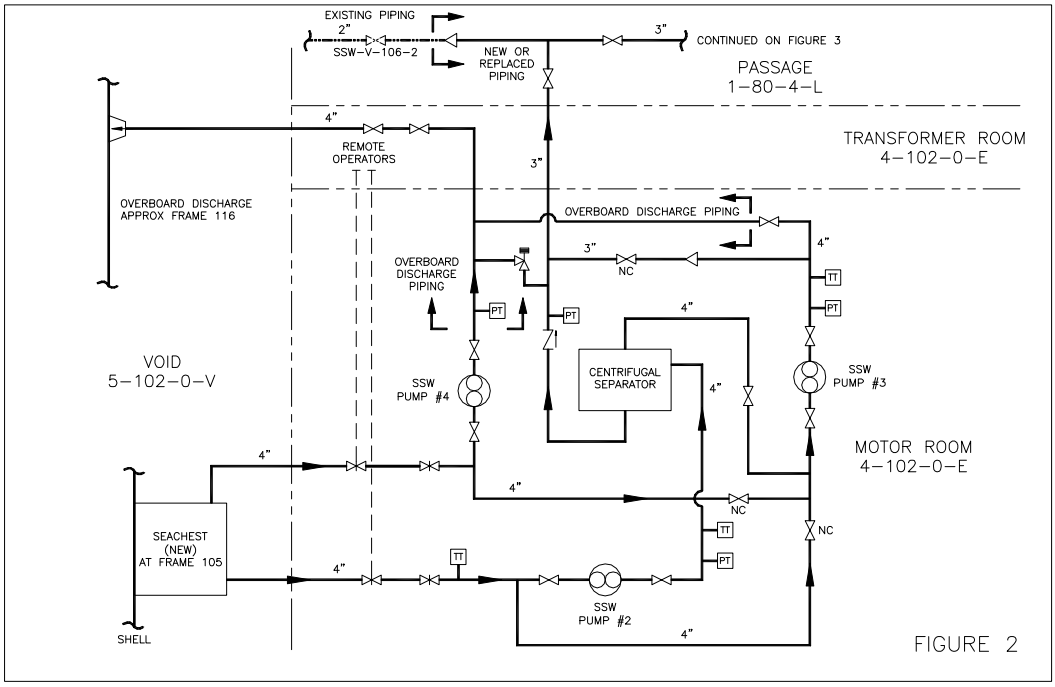

Figure 2
Science Seawater Piping (Aft)

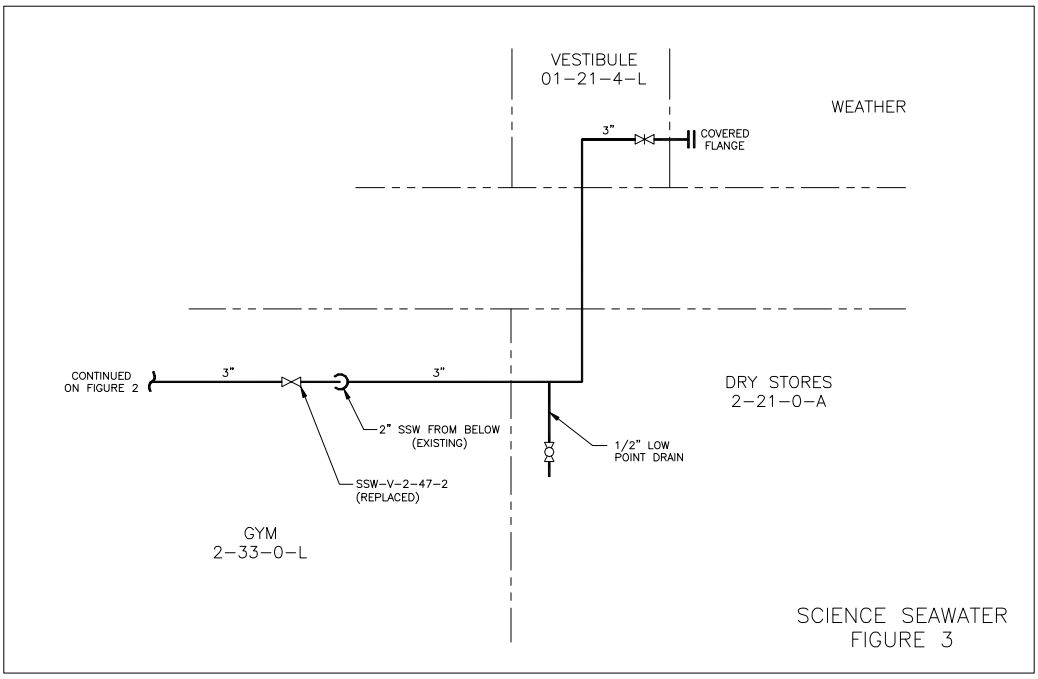

Figure 3
Piping Arrangement (Forward)

3.2.2 The Contractor shall fabricate and install pump foundations for the new Government furnished Monoflo TE071SS1R5/E (Hastelloy C) science seawater pumps. A suggested location is bulkhead mounted on the port side of the lower Motor Room (4-102-0-E) as shown in figure 5. Additionally, the Contractor shall fabricate and install foundations for the centrifugal separator and the pump variable speed drives.

3.2.3 The Contractor shall fabricate and install a centrifugal separator. A suggested design for the centrifugal separator is shown in figure 4. The centrifugal separator shall be fabricated from Hastelloy C.

(see separate file)
Figure 4
Centrifugal Separator

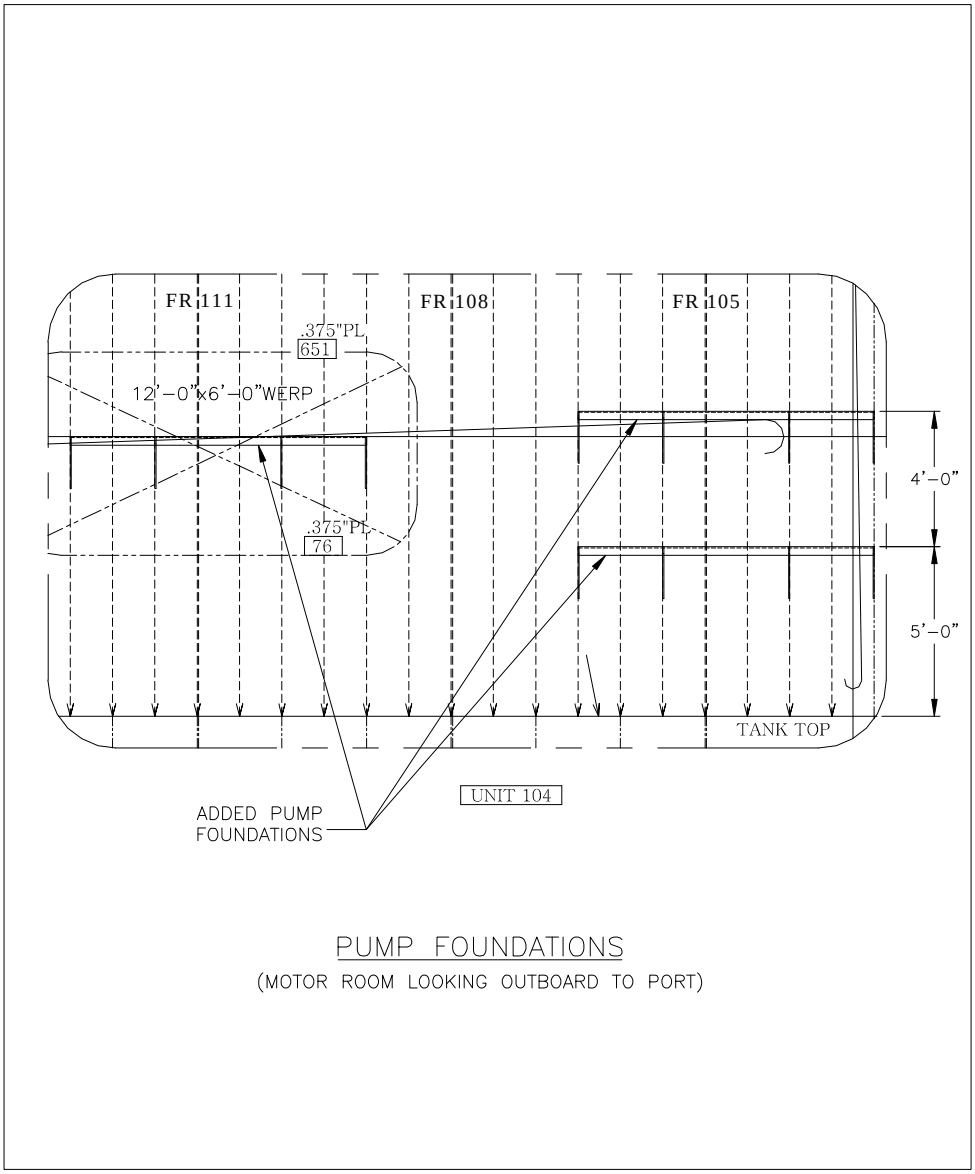

Figure 5a
Pump Foundations

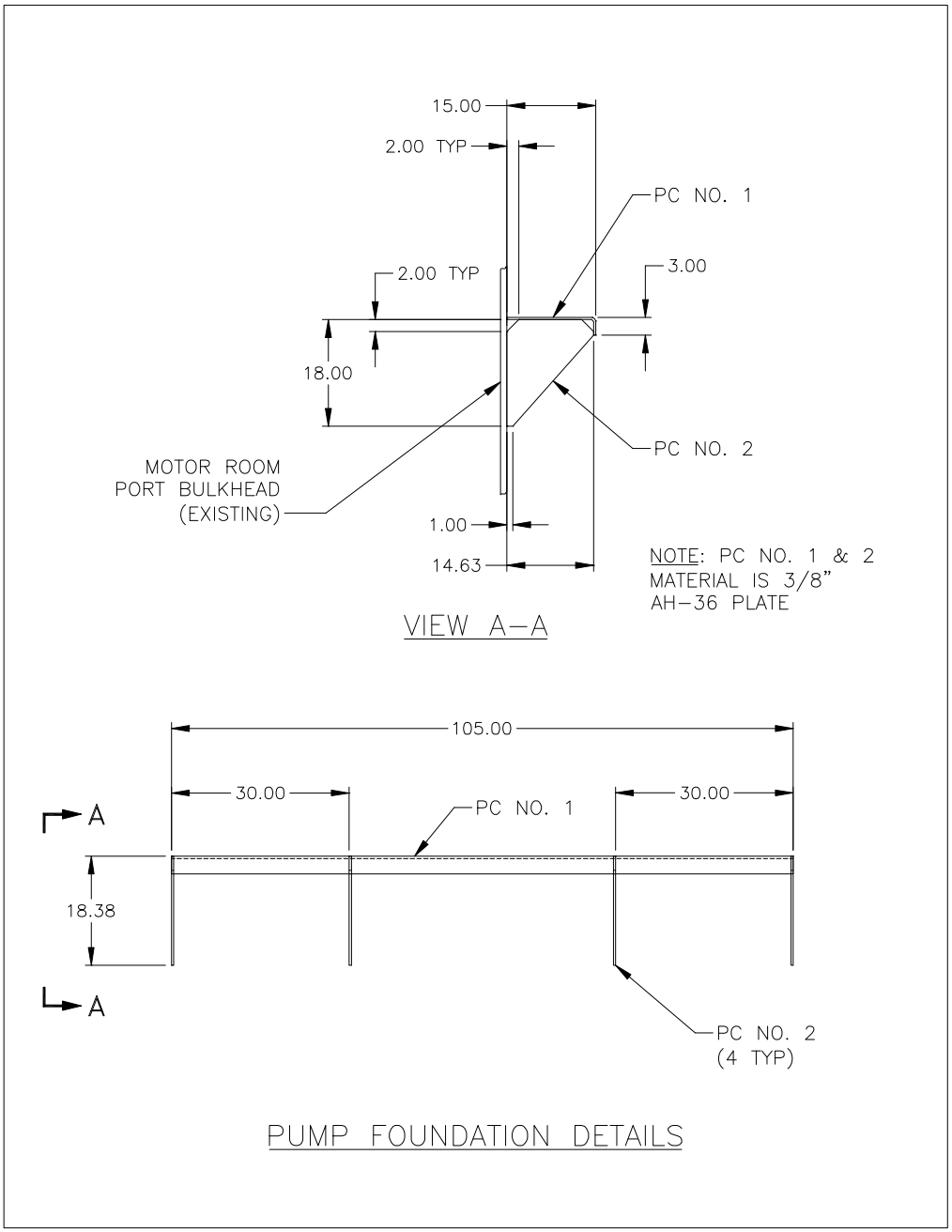

Figure 5b
Pump Foundations

3.2.4 The Contractor shall install piping, pumps, valving, hangers, and overboard discharges as shown in figures 1 and 3. Long radius elbows and long turn sweep tees shall be used to reduce the chance of ice blockage. The number of elbows shall be minimized, again to reduce the chance of ice blockage. Materials shall be in accordance with reference 2.a, except that Hastelloy C shall be used instead of titanium. The Hastelloy C valves and variable speed pumps for the installation are Government furnished. Piping from the seachest to the watertight penetration through the Void inboard bulkhead shall be fabricated from Hastelloy C XXS wall thickness pipe. **No GRP piping shall be used between the seachest and the pump discharge valves**. All dissimilar materials shall be electrically isolated from each other. Overboard discharge piping may be fabricated from 90-10 copper nickel IAW MIL-T-16420K Type I class 200, ASTM B466 or ASTM B467. Overboard discharge piping is labeled in figure 2. The Contractor shall install remote operating gear for the valves as shown in figure 2. The remotely operated valves shall be capable of operation from Transformer Room 2-102-2-E

3.2.5 The Contractor shall replace the existing 2-inch diameter piping from the new pump riser connection on the main deck at approximately frame 110 to a new 3"x3"x2" tee at the 2" forward pump riser on the 2nd deck at approximately frame 45 with 3-inch pipe. Valve SSW-V-2-47-2 shall be replaced with a 3-inch valve. The new GRP piping and fittings shall meet the material requirements of reference 2.a. The Contractor shall add a 3 inch line from the new tee at the forward science seawater pump riser to a new port weather connection near the existing science seawater connection on the 01 level serving the forecastle. The forecastle piping connection shall be 3-inches in diameter. A piping sketch of this area is shown in figure 3.

3.2.6 Piping instrumentation shall be installed downstream of each new science seawater pump, and at the seachest outlet as shown in figure 2. The instrumentation includes temperature and pressure transmitters. The sensors shall be arranged to minimize the chance of ice damaging the sensors. The sensors as a minimum shall be angled away from the direction of flow by at least 45 degrees. The temperature sensors shall be of the RTD type similar to that used on the forward science seawater pump.

3.2.7 The Contractor shall install electrical controllers and wiring to the new science seawater pumps. The pumps are variable speed and reversing. The variable speed shall be controlled locally near the pump.

3.2.8 The Contractor shall install heat tracing tape on the overboard discharge piping in Void 5-102-0-V to prevent the overboard discharge from freezing. The heat tracing tape shall be Grainger 4E516 or equal. The heat tracing tape shall be insulated in accordance with reference 2.oo.

3.3 The Contractor shall accomplish all electrical equipment installation and relocation in accordance with references 2.y, 2.jj as modified by reference 2.nn and 2.ee, 2.kk, and manufacturer instruction manuals. General guidance for installation of ship service power circuits for the pressure and temperature sensors are shown in Figure 5. Unless otherwise specified in the installation drawings, cable installation requirements for wireways, cable penetration, cable tags, wire markers, etc., shall be in accordance with references 2.y and 2.jj as modified by 2.nn and 2.kk.

(To be added)
Electrical Sketch
Figure 6

3.4 The Coast Guard Inspector shall approve the exact location of new and relocated equipment. It is the responsibility of the Contractor to remove and reinstall all interferences necessary to complete the required work for this item. . The Contractor shall ensure that there is adequate maintenance access for all new, relocated and adjacent equipment.

3.5 The Contractor shall establish a subcontract with Alstom Drives and Controls, the MPCMS supplier, to integrate the seawater system monitoring functions and sensor calibration into the MPCMS. The contractor shall work with the MPCMS sub-contractor to establish remote monitoring connection points for new pressure and temperature signals to MPCMS. The present MPCMS configuration is provided in references 2.t and 2.u. General guidance for required MPCMS installations is shown in Figure 6. The 4-20 mA output from the pressure gauges shall be connected to the MPCMS using the MPCMS type AI.1 I/O STND interface. The 4-20 mA output from the temperature controller shall be connected to the MPCMS using the MPCMS type AI.3 I/O STND interface.

3.6 The Contractor shall run all required cabling required for this installation. Where practical, all MPCMS control cabling shall be routed using existing Sensitive Power wireways. References 2.k through 2.r provide details on the present wireways. The contractor shall make all necessary cable terminations except for the MPCMS terminations. MPCMS cables at RTU connection points shall be coiled neatly with sufficient length for the MPCMS sub-contractor t make the necessary connections.

3.7 Alstom Drives and Controls, the supplier of the MPCMS shall provide all MPCMS hardware and all MPCMS programming changes. All MPCMS cable terminations to MPCMS hardware shall be made by Alstom Drives and Controls. The MPCMS sub-contractor shall integrate the new remote monitoring signals to the MPCMS. This effort shall include:

- The Contractor and Alstom shall interface into MPCMS remote start, remote stop, run indication, and pump direction for each pump. Additionally temperature and pressure indication as shown in figure 1 shall be interfaced into the science seawater mimic.

- Work with prime contractor to establish monitoring connection points to MPCMS. General guidance for the MPCMS interfaces is shown in Figure 6.

- Provide any required MPCMS hardware, such as RTU analogue input boards, circuit card chassis, I/O Expansion Cabinets, I/O Extender Cables as necessary to connect the science seawater monitoring functions.

- Terminate MPCMS cables at RTU or RTU Terminal Connection Boxes, as required.

- Calibrate the science seawater gage 4-20 mA output signals for proper operation at MPCMS.

- Develop, program, and test all software changes to the affected RTU.

- Develop, program, and test all software changes to the affected MPCMS Processors.

- Develop, program, and test all software changes to the MPCMS Operator Workstation software including:

- Integrate the pressure and temperature sensors into the existing auxiliary seawater system mimic to clearly show the pressure and temperature values, as well as pump status. The new science seawater pumps shall be capable of remote starting, stopping, and reversing from ECC.

- Program MPCMS alarm setpoints for these parameters.

- Operator Workstation software changes shall be made and tested on all workstations, including portable units as necessary.

- Modify and test CTES configuration data and mimics to incorporate new MPCMS signals.

- Modify and test SPTE Simulation and Instructor Workstation software as required to incorporate the new MPCMS signals.

- Update the MPCMS Technical Manual, reference 2.ll, with required change pages.

4 NOTES

None

5 GOVERNMENT FURNISHED MATERIAL (GFM)

Science Seawater Pumps, Monoflo FE071SS1R5/E, Hastelloy C, with mechanical seals and 10 horsepower motor (3 total)
ABB variable speed drive, model ACH401600932 + AOAE0000 (3 total)
4 inch Hastelloy C gate valves, 150# flanged, with Hastelloy C trim (14 total)
4-inch bronze gate valves (2)
4-inch Hastelloy C relief valve, 150# flanged
3-inch Hastelloy C check valve (1)