

**Attachment 1 to Exhibit A
Specifications for the 2019 Drydocking and
Repair of the Oregon State University
Research Vessel Oceanus**

**SPECIFICATIONS
FOR THE
2019
DRYDOCKING AND REPAIR
OF THE
OREGON STATE UNIVERSITY
RESEARCH VESSEL *OCEANUS***



OSU Ship Operations
2020 SE OSU Drive
Newport, OR 97365-5275

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GENERAL PROVISIONS OF THE SPECIFICATIONS

1 INTENT:

- 1.1 This specification contains the general requirements for work by the drydock and repair Contractor for the Oregon State University Research Vessel *Oceanus*. These general requirements apply to all work items contained in this contract including care of the ship, sea trials, and services provided to the ship during the fulfillment of the contract. This attachment as well as the RFP will be incorporated into the resulting Contract. The Contractor will be held responsible for fully meeting any requirements herein as well as the requirements contained in the RFP. Work shall begin when specified by a contract signed by both parties. Conflicts in scheduling may result in the rejection of a bid.

2 DESCRIPTION OF VESSEL:

- 2.1 *Oceanus* is an uninspected (under 300 GRT), steel-hulled, Diesel engine powered, oceanographic research vessel owned by the National Science Foundation and operated under a cooperative agreement with Oregon State University (for specification purposes Oregon State University will be referred to as "the Owner" throughout this document).

The principal dimensions of the vessel are:

Length Overall	177 feet
Beam	33 feet
Draft (full load)	17.5 feet
Displacement (full load)	1,305 long ton
Estimated maximum draft upon arrival at shipyard	16 feet
Estimated maximum displacement upon arrival at shipyard	1000 long ton

3 VESSEL AVAILABILITY:

- 3.1 The vessel will be available at Newport, OR on **27 January 2019** for delivery to a shipyard by the Owner. Work shall commence upon arrival at the Contractor's facility and be must be completed, including necessary dock and sea trials by **8 March 2019**. The completion of work date shall be established by the yard at least two weeks in advance of the sea trial and/or completion date to allow time for O.S.U. to assemble the necessary crew.

4 NAVIGATION:

- 4.1 R/V *Oceanus* has a deep draft (17.5 feet at full load) for her length. The current editions of navigation charts published by NOAA will be used to determine the controlling water depths between the sea buoy and the Contractor's facility. Should the charts show insufficient water depths for safe navigation, the Contractor is required to provide other competent documentation to show that depths are adequate for the safe navigation of the vessel to the facility. Lack of safe navigation conditions will be sufficient cause to not award or to cancel the contract to a bidder. The shipyard shall provide all necessary pilots, tugs, and line handlers to get the ship from the fairway to the drydock and from the drydock to the fairway or suitable pier. The ship's main propulsion and thruster shall not be used to place the vessel in the drydock or remove it from the drydock.

5 REQUIREMENTS:

- 5.1 Contractor Coordinator:

5.1.1 The Contractor shall appoint a Coordinator to represent all trades and activities for which the Contractor is responsible. This person shall act on behalf of and as an agent of the Contractor. The Coordinator or his agent shall convene with the Owner's Representatives to discuss the status and progress of tasks at the start of each work day. The scheduling and location of this meeting shall be mutually agreeable to all parties. Any "stop work" order delays or other interruptions to work ordered by the Contractor and/or Owner's Representatives due in any respect to poor workmanship and/or unsafe working conditions, and all costs associated therewith, shall be the responsibility of the Contractor.

5.1.2 Additionally, a weekly production meeting shall be held to outline the activities planned and completed as well as to air problems and issues together with the actions taken to resolve the issues. An agenda shall be published and submitted the day before the meeting. Minutes shall be taken by the Contractor and a copy provided to the Owner's Representative.

5.2 Production Schedule:

5.2.1 The Contractor shall submit and maintain a production schedule such as a critical path network (CPN) or Gantt Chart as means of planning, tracking, and coordinating the accomplishment of contract work. The production schedule shall have the appropriate columns to indicate Item Number, Item Description, Estimated Duration of Days to Complete the Item, Start Date, Finish Date, Float Days, and Percentage Weight of the Total Contract for each item. The schedule shall be submitted to Owner with the initial bid package. The Contractor shall enter only the actual progress achieved and deliver an updated version of the schedule to the Owner's Representative, in printed form with an electronic copy, no later than 0900 every Monday during the contract period.

5.2.2 For work involving disassembling and inspection of equipment, machinery or systems, the work must be completed and a Condition Report must be submitted during the first 25-percent of the work performance period, unless an earlier requirement is included in the specific item.

5.2.3 Any "stop work" order delays or other interruptions to work ordered by the Contractor and/or Owner's Representatives due in any respect to poor workmanship and/or unsafe working conditions, and all costs associated therewith, shall be the responsibility of the Contractor.

5.3 Condition Reports:

5.3.1 A written Condition Report, in printed form with an electronic copy, shall be prepared and submitted by the Contractor to the Owner's Representative on all of the following occasions:

1. Whenever specifically required by this document.
2. Whenever the Contractor determines or notes that additional work or material or other deviation is necessary in order to produce a reliable and/or complete repair.
3. Whenever measurements, tests or inspections are required, results and findings shall be documented on a Condition Report.

5.3.2. Condition Reports shall contain, as a minimum, the following:

1. Name of the ship.
2. Contract number and related work item number.
3. Detailed description of conditions observed, including a record of all measurements taken and other supporting data.
4. Recommendations and cost of additional work and materials deemed to be needed, if any.

5. Estimate of the impact on the completion of the contract, if any.
- 5.3.3 Condition Reports shall be submitted to the Owner's Representative within twenty-four hours after completing the measurements, inspections or tests, or after the need for additional work or material is noted.
- 5.4 Changes to Specifications:
- 5.4.1 Changes to specifications contained herein, or to a specific task description, shall be made only as described in the Request for Proposal.
- 5.5 Work Hours:
- 5.5.1 At the beginning of the repair period, the Contractor shall advise the Owner's Representative in writing of the planned regular workday schedule. In the event the contractor desires to work at times other than those previously scheduled, notify the Owner's Representative at least four (4) hours prior to the end of the scheduled workday preceding the unscheduled work time. If previously unscheduled work is to be performed on a weekend or federal holiday, the Owner's Representative must be notified prior to 9:00am on the last regular workday before the unscheduled work.
- 5.6 Materials and Workmanship:
- 5.6.1 All materials furnished by the Contractor or subcontractors under the contract shall be in accordance with applicable rules and regulations of the U.S. Coast Guard (USCG), American Bureau of Shipping (ABS) and other applicable standards. Workmanship shall conform to the current edition of the American Bureau of Shipping's "Rules for the Building and Classing of Steel Vessels." Welding shall be performed in accordance with the applicable requirements of the USCG.
- 5.6.2 The ship will be delivered to the Contractor's facility in an "as-is" condition. It is the Contractor's responsibility to engineer, remove, modify, repair or replace all systems necessary to accomplish the contracted work.
- 5.6.3 The Contractor shall provide all necessary plant facilities, engineering labor, services, materials, machinery, equipment, appurtenances, tools, appliances, transportation, supplies, fuel, water, power, lighting, air, crane services, lift and disposal services, rigging, communication, line handling, wharfage, docking and shifting of the vessel, necessary to complete the specified work items.
- 5.6.4 Defects, appearing at any stage of construction through the return of the vessel and the subsequent warranty period, shall be cause for rejection of the material or work, even though the material or work had been previously approved as satisfactory. The defect shall be corrected by the Contractor at his expense.
- 5.6.5 Any and all damages to the vessel or equipment (e.g., paint peeled off by barrier tape, nail holes, water damage, broken glass, etc.) caused during the performance of the work shall be repaired by the Contractor, to the satisfaction of the Owner's Representative.
- 5.7 Protective Coverings:
- 5.7.1 Prior to starting work on interior spaces, protect the decks and deck coverings of spaces in which contract work is to be performed and spaces through which workers will traverse by covering the decks and deck coverings with a temporarily fitted heavy vinyl, plywood or particle board, with all edges and joints of the protective covering securely taped. Tape used for securing temporary coverings shall have an adhesive that does not remove paint from decks or bulkheads when removed. Maintain the protective covering in place during the entire contract period, renewing sections that are damaged during the contract period. For those decks over which equipment, valves, piping, or other materials must be handled, the temporary protective covering shall be plywood or particle board and shall be of sufficient thickness to protect the deck from damage in the event the equipment or materials are dropped.

- 5.7.2 Protect all compartments, machinery, equipment, deck coverings, furnishings, vent terminals, insulation, glass, cables, piping systems, coatings, structures, and other ship components from damage and from entry of dust, dirt, grit, sand, and other foreign particles.
- 5.7.3 Any and all damage and contamination resulting from failure to provide adequate protection shall be repaired and cleaned to reestablish the condition that existed at the start of the work.
- 5.7.4 After completion of all other work, remove and dispose of all protective coverings.
- 5.8 Safety, Fire Protection and Cleanliness:
- 5.8.1 The Contractor shall be responsible for safety, fire protection and the general cleanliness of work areas during the repair period. The Contractor shall make a reasonable effort to clean all traffic and work areas daily. On completion of the work each day, loose gear shall be stowed out of traffic areas, manhole covers temporarily replaced, and deck plates replaced where practicable. The Contractor shall provide fire protection services in accordance with the "Utilities and Services" portion of the specifications.
- 5.8.2 Whenever abrasive blasting or other operations on or near the ship causes collection of blasting residue or other foreign particles to collect on exterior decks of the ship, the Contractor shall vacuum or sweep the decks to remove the residue and particles prior to the end of the day on which the contamination occurred. Do not wash the residue or particles through the ship's deck drains.
- 5.8.3 Any and all trash, dust, grit, paint chips and other dirt or debris generated by the contracted work shall be removed from the vessel on a daily basis during the course of the work and properly disposed of by the Contractor.
- 5.8.4 The Contractor shall provide fire watch standers whenever welding, flame cutting or other hot work is performed where combustible materials are present within 35 feet; or where wall or deck openings within a 35-foot radius expose combustible materials in adjacent areas; or when combustible materials are adjacent to the opposite side of metal partitions exposed to hot work, and could be ignited by conduction or radiation. In the latter case, a fire watch stander is required on both sides of the partition. The fire watch stander shall be outfitted by the contractor with a fire extinguisher of a suitable size and type; water extinguishers or hoses shall not be used. Prior to leaving the work site, the fire watch stander shall verify with the worker performing the hot work that no further hot work will be performed.
- 5.8.5 Engine room bilge cleaning: During the first three days of the repair period, pump and properly dispose of all oily water from the engine room bilges. At the completion of all other work, clean the engine room bilges by steam cleaning or other method approved by Owner's Representative. Remove all debris and pump the bilges dry.
- 5.8.6 Hazardous Materials: O.S.U. has made and will continue to make all reasonable efforts to identify asbestos-containing materials (ACM) and lead-based paint used in prior construction and repair of the vessel. Any material encountered in the course of work that has not been previously identified as positive or negative for asbestos or lead, and may reasonably be suspected to contain actionable levels of either, shall be sampled by a qualified individual and analyzed by a qualified laboratory at Contractor's expense prior to disturbing the material. If on analysis the material is found to contain actionable levels of ACM or lead, all proper measures for containment, abatement and personnel protection will be taken before and during the continuation of work involving the material. Such containment, abatement and protective measures will require a Change Work Authorization.
- 5.9 Disposal of Scrap and Fluids:
- 5.9.1 Any and all offcuts or similar remnants of metal, wood or other material remaining from work performed shall be removed from the vessel and properly disposed of by the Contractor. Any surplus of new material purchased for but not used in the work shall be delivered to Owner at the completion of all contracted

work, or may be retained by the Contractor with a corresponding reduction to the charges for the work upon agreement in writing by the Contractor and Owner's Representative.

- 5.9.2 If any parts, fittings, equipment and/or machinery are removed and replaced with new or rebuilt items, the removed items shall be presented to Owner's Representative for inspection prior to disposal. This inspection requirement will not apply to "expendable" items such as bolts, washers, gaskets, etc. removed and replaced in the normal course of the work. Unless otherwise instructed in writing by Owner's Representative upon inspection, the removed items shall be properly disposed of by the Contractor.
- 5.9.3 Whenever work requires that equipment, machinery, piping, tanks or bilges be drained of fluid, the Contractor shall be responsible for draining and proper disposal of the fluid. The Contractor shall pump all fluid from the applicable spaces into dockside tanks and properly dispose of the fluid.

5.10 Interferences / Access

- 5.10.1 The Contractor shall, without additional charges to the contract, remove any and all interferences required in order to perform the work specified in each item. The Contractor shall be responsible for identifying all interferences involved in accomplishing required work. This shall include the disassembly and removal of machinery, piping, ducts, cable, wiring, insulation, structures, and anything else which interferes with the proper accomplishment of work. Except as otherwise specified, this does not include relocations made necessary by new installations which physically prevent an interference from being returned to its existing location.
- 5.10.2 The Contractor shall, without additional charges to the contract, restore all interferences to their existing configuration and condition. All damaged or missing fasteners shall be replaced with new fasteners of the same as original. New gaskets, packing and seals shall be installed on all disturbed connections and proved leak free. In place of material that is rendered unsuitable for reinstallation during removal or storage, provide and install new materials which are equal in composition, strength, type, and size as existed prior to removal. All insulation removed or damaged shall be renewed with new insulation. Damaged coatings shall be prepared and painted to match the coating that existed prior to the start of work.
- 5.10.3 The Contractor may, with prior approval (see section 5.10.4 below), cut access openings in ship's structure if required to perform work. Such openings shall be limited to those which are essential for access to otherwise inaccessible areas or which greatly improve accessibility for removals or installations.
- 5.10.4 The Contractor shall submit to the Owner's Representative and to the American Bureau of Shipping (ABS), for approval, dimensioned sketches and the proposed location of any proposed access openings prior to accomplishment of the access cut. Generous radii shall be provided at all corners. Also include a description of the eventual restoration configuration, with material and welding details, and a narrative justification for cutting the opening.

5.11 Gas-Free Certification

- 5.11.1 The Contractor shall, without additional charges to the contract, be responsible for identifying and certifying that a safe atmosphere exists in and about a compartment prior to the commencement of any work. Whenever compartments must be gas-free to meet state and Federal regulations, the Contractor shall pump down, open, remove sludge, clean, wipe, ventilate and take all other action required to make the compartments safe for the work to be performed, When requested by the Contractor, and to the extent empty tank space is available, the ship's Engineers will shift fuel as required to facilitate gas-free requirements.

The Contractor shall be responsible for identifying the compartments that require gas-free certification. Specific requirements for gas-free certification are not normally included in the detailed specifications of any work item.

- 5.11.2 It is anticipated that *Oceanus* will be delivered to the contractor's facility with no more than 25% fuel on

board. Offloading of remaining fuel and lube oil will be necessary for ABS inspection of fuel tanks. When the Contractor is required to, or elects to, off-load fuel or lube oil from the ship, the oil shall be pumped to and stored in a clean, moisture free, storage tank. Oil samples shall be taken when oil is removed from the ship and when it is returned to the ship, and the samples analyzed by a lab for water and impurities to verify that the oils were not contaminated while in the Contractor's possession. Alternately, the Contractor may retain and use the removed fuel or oil and provide replacement fuel or oil of the same grade, specification and quantity as was removed.

- 5.11.3 Copies of gas-free certificates, issued by a Marine Chemist certified by the National Fire Protection Association, shall be posted on the ship in two locations designated by the Owner's Representative. Follow-up inspections by the Contractor's Competent Person shall also be documented at the same two locations.

5.12 Coatings:

- 5.12.1 All new and disturbed surfaces shall be prepared, primed and coated to match surrounding surfaces and in accordance with the *Oceanus* Paint Schedule provided in each work item. New or disturbed hull surfaces below the waterline shall be treated in accordance with the specifications in Item 103 (Painting Underwater Body) of this document and new or disturbed surfaces in tanks or bilges shall be treated in accordance with the specifications in the *Oceanus* Paint Schedule.

5.13 Tests and Inspections:

- 5.13.1 At least four hours, but not more than 24 hours, in advance of conducting each required test and inspection, the Contractor shall notify the Owner's Representative in order to allow the Owner's Representative the opportunity to witness, or to arrange for another Owner's Representative to witness, the tests and inspections. If an Owner's Representative is not present at the scheduled time of the test or inspection, and if the required 4-hour advance notification was furnished to the Owner's Representative, the Contractor may proceed with the test or inspection. If the test or inspection requires the attendance of an ABS Surveyor, the Contractor shall request attendance in accordance with ABS schedule requirements.
- 5.13.2 All tests and inspections shall be witnessed by the Contractor's supervisor responsible for the work. A Condition Report shall be prepared to document the results of all tests and inspections.
- 5.13.3 To the extent possible, all tests and inspections shall be scheduled during the normal weekday work shift. Tests and inspections may be scheduled for other times only when necessary to avoid a delay in the contract completion. When necessary to schedule a test or inspection after the normal day shift or on a weekend, the Owner's Representative shall be notified of the test or inspection at least four hours before the end of the last preceding regular work shift.
- 5.13.4 Inspections and testing shall include an operational test of all newly installed, overhauled, and repaired equipment, and all equipment removed or partially removed as an interference to other work and subsequently reinstalled, to demonstrate proper operation. Shipboard equipment will be operated by the ship's crew.

5.14 Work by Owner:

- 5.14.1 The Owner shall have the right to have work on ship's equipment, not included in the contract, performed by representatives of the manufacturer of the equipment or other qualified individuals. The Owner shall also have the right to have ship's crew perform work on equipment or perform general maintenance not included in the contract. Owner-directed work shall not interfere with, or retard the progress of, the Contractor's work.

5.15 Tests and Trials:

- 5.15.1 Any and all systems opened for inspection or repair, or removed and reinstalled as interferences for other work, shall be tested for proper operation as soon as practicable following completion of all work involving each individual system. Any such tests which can be safely performed with the ship drydocked shall be completed prior to refloating and sea trial.
- 5.15.2 Approximately two (2) days before the end of the performance period, conduct a one-day sea trial. The date for sea trials must be approved by the Owner's Representative.
- 5.15.3 The Contractor shall submit to the Owner's Representative, no later than two days before sea trials, a schedule for testing all equipment the Contractor has worked on. The Contractor must submit a list of the personnel who will ride the ship during sea trials prior to departure. The list must include Name, Citizenship, Address and person to be notified in case of emergency.
- 5.15.3 The Contractor shall provide at least one supervisor for sea trials to coordinate testing, adjustment and repair or discrepancies.
- 5.15.4 All equipment will be operated by ship's personnel.
- 5.15.5 An attempt will be made to do all testing during normal working hours, however, it may be necessary to depart early and/or return late.
- 5.15.6 No Contractor work will be allowed during trials except as approved by the Owner's Representative.
- 5.16 Berthing, Messing and Stores:
- 5.16.1 Berthing and messing onboard will not be required with the possible exception of the night of arrival and the night before departure depending on schedule. This will be coordinated with the Contractor.
- 5.16.2 Stores for the homebound voyage to Newport will be delivered to the vessel no more than 48 hours prior to departure. Owner's Representative shall notify Contractor of scheduled delivery time as soon as known. Contractor shall provide access for the delivery vehicle as close to the vessel as practicable, and shall provide a forklift and qualified operator to transfer palletized stores from the delivery vehicle to a point where the pallets can be picked and loaded aboard the vessel using the ship's crane.
- 5.17 Drawings and Manuals:
- 5.17.1 All drawings and manuals provided to the Contractor shall be returned to the Owner within 5 days of the date the vessel departs the Contractor's facility. The reasonable cost of reproducing or obtaining replacements will be deducted from the final payment for any drawings or manuals not returned in accordance with this provision.
- 5.17.2 Where required by the detailed specifications, drawings and manuals for new work or equipment will be provided by the Contractor to the Owner. Drawings shall be provided in a form reproducible by blueprint or xerographic techniques and as digital files compatible with AutoCAD software. At least two copies of each manual shall be provided.
- 5.18 Completion of Work:
- 5.18.1 The Owner reserves the right to approve any work presented as "complete" by the Contractor prior to authorization of payment.
- 5.19 Warranties:
- 5.19.1 Contractor warrants all labor, workmanship and repairs for a minimum period of 90 days from time of contract completion. Manufacturer's warranties for any equipment installed by Contractor shall pass to Owner.

5.20 Owner-Furnished Material ("OFM")

- 5.20.1 All materials and supplies which are required to accomplish the specified work shall be new, Contractor-supplied materials unless they are identified in Attachment 'A' to this Specification. The items listed in Attachment 'A' are the only materials which will be Owner-Furnished in association with this work. If an item of material is not listed in Attachment 'A' and referenced to a Specification Item Number, it is to be Contractor-provided at no additional cost to the Owner.

DETAILED SPECIFICATIONS

LIST OF WORK ITEMS

CLASS A Items - Basic

- 101 Drydocking and Berthage
- 102 Utilities and Services
- 103 Painting Underwater Body
- 104 Seachest Crossover Pipe
- 105 ABS Load Line Survey
- 106 Valves
- 107 Tailshaft, Rudder and CPP
- 108 Bow Thruster
- 109 Potable Water Tanks
- 110 Void Preservation
- 111 Anchors & Chain
- 112 Chain Locker & Hawsepipes
- 113 Hull & Tank Anodes
- 114 Main Engine Heat Exchangers

CLASS B Items – Additional Work Pricing

- 201 Tank Painting
- 202 Steel Replacement & Welding
- 203 UT Gauging
- 204 Anodes

Class C Items – Optional

- 301
- 302

Attachments:

- A Valve List/Matrix
- B. Owner-Furnished Information (Referenced Drawings)

ITEM NO. 101: DRYDOCKING AND BERTHAGE

- [1] **General:**
Drydock the ship for specified maintenance.
- [2] **Owner-Furnished Information ("OFI")**
Docking Plan CDI Marine Dwg #9250-800-21
- [3] **Owner-Furnished Material: ("OFM")**
None for this specification item.
- [4] **Contractor-Furnished Material: ("CFM")**
Contractor shall furnish all labor and material to accomplish the specified work.
- [5] **Statement of Work:**

1. Drydock vessel in accordance with position (1) on the referenced drawing and side blocking plan. Aft keel block at section 15-C (frame 61) shall be a minimum of 1' - 11 3/8" high and forwardmost keel block at section 12-A (frame 24) shall be a minimum of 5' - 1 3/8" high. After vessel is in lifting position, resting on keel blocks, and bilge blocks have been set, the Contractor shall have a qualified diver check blocks for proper position and contact.

Note: The following bottom appendages must be kept clear:

- a) Bow Thruster between frames 9 and 11. Provide adequate clearance to remove bow thruster as set forth in Item 107 (Bow Thruster).
 - b) Transducers between frames 55 and 61.
 - c) Sea chests port/starboard between frames 24 and 25 (sea chest scoops port/starboard protrude 5" below shell).
 - d) Aft sea chest between frames 66 and 67 starboard side.
 - e) Bilge keels port/starboard frames 23 to 58.
 - f) Bilge blocks shall not be placed at Frames 25, 32, 38, 50, 56 or 60 due to blocking rotation.
2. After the ship is hauled out, service lines shall be provided and hooked up to provide services specified in Item 102 (Utilities and Services). A suitable brow shall be furnished and maintained to provide a safe access to the ship.
3. The Contractor shall remove and provide safe storage for a small number (2) of 6 gallon gasoline tanks for the ship's emergency pump and rescue boat. The Contractor shall also remove the rigid-hull inflatable boat and canister liferafts (4) from the vessel prior to commencement of any work, and provide safe and secure storage for them during the duration of the contract period. Depending on the timing of the drydocking period, Owner may elect to send rafts for servicing and return them to the shipyard. The tanks, rescue boat and liferafts shall be returned to the ship at the completion of work.
4. Immediately after the ship is hauled the entire hull, including propeller and other appendages, will be water-washed. This item must be completed in no more than 48 hours from commencement of haulout.

5. After water-washing, the Contractor and Owner's Representative shall jointly inspect the hull. The Contractor shall complete and submit a report of findings and recommendations, including estimates, in a preliminary Docking Report. The report will be provided to the Owner's Representative within one working day after the inspection. Items to be inspected include:

Hull: Condition as to structural damage, corrosion, weld, rivets, fastenings, evidence of grounding or other damage, or excessive strain.

Miscellaneous Items: Items such as anodes, propeller, propeller nozzle, sea chests, bilge keels, drains, scuppers, acoustic transducers and other underbody fittings.
6. Any fuel or material removed solely to meet weight or structural limits of the Contractor's drydock shall be at the Contractor's expense. Material shall be stored by the Contractor or replaced with new. The Owner shall approve storage arrangements and replacement materials.
7. If the ship is docked in cold or freezing weather, all sea valves, pipes or similar fittings attached to the hull shall be drained to prevent freezing and possible damage.
8. While the ship is in drydock, all hull openings shall be secured outside of normal working hours to the maximum extent practical.
9. The ship shall remain out of the water until all work ordered under the contract which requires drydocking has been completed.
10. Sufficient ballast (fresh water) shall be added to the ship prior to undocking to ensure safe trim and stability for refloating, relanding on the blocks if necessary, and transfer to pier side. A ballasting plan will be developed and approved by the vessel's Master and the Contractor's Dockmaster, and submitted in writing to the Owner's Representative no less than 48 hours prior to scheduled undocking of the ship.
11. Upon the completion of work the ship will be undocked. When refloating, the dock shall be flooded until as many underwater openings as possible are covered without lifting the ship off the blocks. An adequate watch shall be posted to check for leaks. If leaks are found, the dock shall be pumped down and repairs made before again flooding. If no leaks occur, upon approval of the Owner, the undocking will continue. Bow and centerline sighting markings shall be referenced so that the ship may be re-landed, if necessary.
12. If the Contractor can complete some items outside of the drydock, the ship will be berthed at a suitable dock at the Contractor's facility. Services in accordance with Item 102 (Utilities and Services) shall be provided as well as a suitable brow.
13. An alternative blocking arrangement to that in the referenced drawing will be acceptable only if it is developed and stamped by a qualified naval architect, and approved in advance by the Owner's Representative.

ITEM NO. 102: UTILITIES AND SERVICES

- [1] **General:**
Provide utilities and services to the ship while at the Contractor's facility, either in drydock or alongside the pier.
- [2] **Owner-Furnished Information ("OFI")**
None for this specification item.
- [3] **Owner-Furnished Material: ("OFM")**
None for this item.
- [4] **Contractor-Furnished Material: ("CFM")**
Contractor shall furnish all labor and material to accomplish the specified work.
- [5] **Statement of Work:**
The following utilities and services, including connection and disconnection as required, shall be furnished during the time the ship is in the Contractor's facility:
1. 100 GPM, 80 PSI water to fire main (connection will be made to the main deck aft fire station using 1-1/2 inch hose to one side of the Y-connection);
 2. 150 amp 460 volt, 3 phase, 60 Hertz electric power via 8AWG grounded four-conductor cable. Contractor shall supply electrician to wire in power cable and connect to vessel. Connection point is located in AC room on 01 deck starboard, below pilothouse.
 3. Trash skip box.
 4. Chemical toilet (if ship's heads are secured).
 5. Potable water, 5/8 or 3/4 inch hose with standard hose bib, pressure regulated to 50 PSI, for refilling tanks at completion of work. Connection is located on 01 deck starboard, aft of bridge wing.
 6. 120 PSI, 20 cfm, air for ship's control air and occasional use of air tools.
 7. A suitable brow with safety net.
 8. Line handling, tug and pilot service, fenders etc., as required for movement or berthing of vessel.
 9. Fire watches for all hot work.
 10. Security watchman.
 11. A suitable office for use by ship's crew and OSU owner's representative. The field offices shall be available for occupancy commencing on the start of work on the project, all the way through final re-delivery of the vessel. The field office shall be furnished with the following minimum:
 - a) One office desk and two chairs.
 - b) Two phone lines with external yard access.
 - c) Internet connection (wireless or CAT-5.)

12. A minimum of two (2) reserved parking spaces in the yard's main parking area or otherwise convenient to the drydock.

ITEM NO. 103: PAINTING UNDERWATER BODY

- [1] **General:**
Waterwash, inspect, prep and paint hull and appendages below waterline.
- [2] **Owner-Furnished Information ("OFI")**
Bow Thruster White-Gill Dwg. #1634 sheets 1&2
Docking Plugs PBI Dwg #9250-100-3
- [3] **Owner-Furnished Material: ("OFM")**
None for this item.
- [4] **Contractor-Furnished Material:**
Contractor shall furnish all labor and material (other than that shown as Owner-Furnished) to accomplish the specified work.
- [5] **Statement of Work:**
Antifouling paint to be applied to entire outer shell plating below light waterline. Allowance to be made for ten (10) non-contiguous areas each of 100 square feet requiring light sand-sweep and application of top coat below the antifoul; and six (6) non-contiguous areas each of 10 square feet requiring sandblasting to SSPC-SP-6 and application of primer, undercoat and top coat below the antifoul. Bid to include unit costs per non-contiguous area for each of the two types of allowance work described above; unit costs shall be used for adjusting (upward or downward) final contract price based on the deviation of actual work content from allowances.

The Contractor shall provide all labor and materials necessary to:

1. Accomplish the following in way of cleaning and painting underwater body. Bow Thruster intake/discharge, stern tube, sea chest/tube, sea chests, Kort nozzle and monkey rudder shall be included as underwater body for cleaning and painting. This shall require the Contractor to remove and reinstall screens, bow thruster steering deflector, lower section of steering shaft, distance piece and bow thruster pump impeller in coordination with Item #107 (Bow Thruster).
2. Provide and install suitable protective covers over exposed bow thruster shafts and bearings, CPP propeller blades (if not already removed in coordination with Item #104 (Tailshaft/CPP)), rotating seals, transducer faces/openings and zinc anodes. Remove covers on completion of painting.
3. Provide labor and materials required to high pressure (3000 - 5,000 psi) water wash the under body to the deep load line free of all marine growth and loose paint. This work is to commence immediately upon haulout and is to be completed within 48 hours. Entire outer hull to be inspected by Contractor and Owner's Representative immediately upon completion for any and all deficient areas requiring further surface preparation.
4. In areas where coatings have been removed for structural repairs or from other causes, cleaning and abrasive blasting will be required. Owner's Representative shall specify to Contractor the areas and degree of blasting (sand or high-pressure water) to be performed.
5. Remove the hull plugs and drain all potable water and ballast tanks, and reinstall the plugs using a suitable anti-seize and sealing compound.
6. Paint hull in accordance with *Oceanus* Paint Schedule.

7. Clean out all fouling material up to sea valve in the forward clean seawater intake and coat as per *Oceanus* Paint Schedule. The intake is located on the starboard side above the bow thruster intake screens. The sea valve will be removed as per Item #106 (Valves).
8. Notes and Precautions:
 - a. When placing keel blocks, it will be necessary to allow enough room under bow thruster steering extension tube to lower the tube out of the way for shell plate cleaning and painting in the surrounding area.
 - b. All hull openings and deck scuppers shall be plugged to prevent water damage to the new paint areas. Some hull openings may require temporary connections for services as required by Item 102 (Utilities and Services).
 - c. All painting shall be done in accordance with the paint manufacturer's instructions, with particular attention to application rate.
 - d. Through-hull transducers will be removed by the Owner's Representatives for overhaul or replacement during the drydock period. Openings shall be covered as above.

[9] Paint Schedule

New or Bare Steel Below Waterline:

Surface Preparation:	SSPC-SP-6 (Commercial Blast)
First Prime Coat:	PPG Amercoat 240LT, Oxide Red 5-6mil DFT
<i>(Note: When plates and shapes are welded in place, overcoat welds with Amercoat 240LT to a minimum of 5.0-6.0 mils DFT. Maximum re-coat window is 30 days.)</i>	
Second Prime Coat:	PPG Amercoat 240L, Haze Gray 5-6 mils DFT
First Top Coat:	PPG ABC3 Tin-Free Antifouling, Black 5-6 mils DFT
Second Top Coat:	PPG ABC3 Tin-Free Antifouling, Red 3-4 mils DFT

Existing Hull Below Waterline:

Surface Preparation:	<u>Corroded/mechanically damaged areas:</u> spot-blast to SSPC-SP-6 (Commercial Blast). Square off areas & feather all edges.
	<u>"Barnacle feet"/calcium deposit areas:</u> Sandsweep, or water blast at 5,000psi minimum, to SSPC-SP-7 (Brush-Off Blast). Feather all edges.
	Treat all surfaces with Prep 88 cleaner, followed by a second pressure wash with fresh water. (Note: If surfaces are hot, pre-wet before application of Prep

88 cleaner. Insure all cleaner is removed from the surface prior to "First Prime Coat".)

First Prime Coat:

Spot-coat PPG Amercoat 240L, Red
5-6 mils DFT

Second Prime Coat:

Spot-coat PPG Amercoat 240L, Haze Gray
5-6 mils DFT

First Top Coat:

PPG ABC3 Tin-Free Anti-Fouling, Black
5-6 mils DFT

Final Coat:

PPG ABC3 Tin-Free Anti-Fouling, Red
5-6 mils DFT

ITEM NO. 104: SEACHEST CROSSOVER PIPE

- [1] **General:**
Clean and re-coat the 10" crossover pipe between the port and starboard seachest in the engine room. The crossover pipe is approximately 18' in length with a 90-degree elbow at each end.

- [2] **Owner-Furnished Information ("OFI")**
Seachests & Crossover Pipe PBI Dwg # 9250-120-1 Rev C

- [3] **Owner-Furnished Materials ("OFM")**
None for this item.

- [4] **Contractor-Furnished Material ("CFM")**
The Contractor shall furnish all labor and material to accomplish the specified work.

- [5] **Statement of Work:**
The Contractor shall provide all labor and material to:
 1. Remove sea valves from crossover pipe and sea chests (per Item 107, Sea Valves). Fabricate and install spool pieces and bolt in in place of valves.
 2. Remove marine growth from interior of crossover pipe from starboard sea chest to port sea chest by high pressure (6,000 - 8,000 PSI minimum) water wash using a self-propelled in line mole. The marine growth is mainly mussels. A foam "pig" or similar cleaning swab should be run through the pipe sufficient times to ensure cleanliness and removal of debris from the bore.
 3. Inspect, with Owner's Representative present, via flexible-head video camera or other means which allows for a view of not less than 100% of the pipe interior.
 4. Re-coat pipe interior as per Paint Schedule. Pipe shall be re-inspected as in (3) above before final anti-fouling coat is applied to ensure even coating.
 5. Clean pipe exterior to SSPC-SP-2 condition and paint as per Paint Schedule.

[9] **Paint Schedule:**

Seachest Crossover Pipe:

Interior:

Surface Preparation:	Sandsweep or high-pressure water blast (30,000 psi minimum) to SSPC-SP-7 (Brush-Off Blast).
First Coat:	PPG Amercoat 240L, Red 4-6 mils DFT
Second Coat:	PPG Amercoat 240L, White 4-6 mils DFT
Third Coat:	PPG ABC3 Tin-Free Anti-Fouling, Black 4-6 mils DFT

Exterior:

Surface Preparation:

SSPC-SP-2 (Hand Tool Cleaning)

First Coat:

Amercoat 235, Red
4 mils DFT

Second Coat:

Amercoat 235, Red
4 mils DFT

ITEM NO. 105: ABS LOAD LINE SURVEY

[1] **General:**

Provide services of and assistance to American Bureau of Shipping representative (the terms "representative", "inspector" and "surveyor" are considered identical for the purpose of this specification) in conducting the five-year load line survey for renewal of the vessel's load line certificate.

[2] **Owner-Furnished Information ("OFI")**

Shell Expansion	PBI Dwg. #9250-100-1, Rev G
Main & Brk Deck Shell Expansion & Frames	PBI Dwg. #9250-107-1 thru 4, Rev C
Construction Profile	PBI Dwg. #9250-101-1, Rev B
Framing Sections Below Main Deck	PBI Dwg. #9250-101-2 thru 7, Rev B
Bulkheads Between Whaleback & Main Deck	PBI Dwg. #9250-101-8
Skeg, Shell Exp. & 1 st Platforms & Frames	PBI Dwg. #9250-103-1 thru 4, Rev C
International Load Line Certificate #	
UT Gaging Report of February 2017	

[3] **Owner-Furnished Material: ("OFM")**

None for this Specification Item.

[4] **Contractor-Furnished Material: ("CFM")**

Contractor shall furnish all labor and materials to accomplish the specified work.

[5] **Statement of Work:**

The Contractor shall provide the services of an ABS Surveyor, and provide all labor and materials to assist, in performing ABS load line survey. Work to include, but is not limited to:

1. Provide the services of a non-destructive testing (NDT) organization, acceptable to the ABS, to take ultrasonic thickness (UT) readings on the hull frames, tank internals, deck beams and girders, interior decks and weather decks as follows:

A. Three girth belts of shell and deck within the midship half-length, together with internals in way. The ABS Surveyor will provide locations. Readings shall include a minimum of two (2) each readings on each plate in the hull, tank top, superstructure deck, navigation bridge deck and top of house, plus two readings on the web and flange of each frame in way of each hull and deck plate (a minimum of 60 readings per girth belt.)

B. Two wind-and-water strakes, port and starboard, for the midship half-length. The ABS Surveyor will provide locations. (Minimum of 100 readings.)

C. Box keel. The ABS Surveyor will provide locations. (Minimum of 50 readings.) If this work requires cutting into the keel or removing lead ballast, a Change Work Authorization for the additional work will be required.

D. Deck plate on weather decks as specified by ABS Surveyor. (Minimum of 100 readings.)

E. Other areas as may be required by the ABS Surveyor.

2. The following tanks will be opened for inspection under this item and for other work under this contract:

All fuel oil storage tanks P/S/CL.
Main Engine day tanks P/S.
Generator day tank.

Lube oil storage tanks P/S
Waste oil tank CL.
All ballast tanks P/S/CL.
Potable water tanks P/S.
Sewage tanks P/S.
Chain locker and sump.

The ABS Surveyor may require additional tanks to be opened for inspection and UT testing as above. All tanks are to be closed at the completion of survey and other work using new gaskets and new cotton grommets.

3. Remove all fuel and ballast tank vent valves for inspection and restore at completion of survey. No flame screening is to be installed in any ballast tank vent valve.
 4. Once vessel has been refloated, hydrostatically test all ballast tanks by filling to overflow through tank vents. Owner's Representative will determine tank sequence for filling. ABS Surveyor will direct areas to be inspected relative to each tank.
 5. Some readings or inspections may require the removal of sheathing and insulation in living quarters and other areas. All removed material shall be restored to original condition at the completion of testing.
 6. Any and all coatings and similar coverings disturbed in the course of testing shall be restored to match original condition, including primer and final coating. Surface preparation and coating shall be in accordance with the *Oceanus* Paint Schedule as provided in this Specification.
 7. Upon completion of UT gaging, submit a report documenting the readings obtained. The report must include, at a minimum:
 - A. The location of each reading;
 - B. The reading obtained;
 - C. The original design thickness at that reading location.
- The above data may be presented in plan and section views representing the various areas gaged, in a grid format, or any equivalent format satisfactory to the ABS Surveyor.
8. Upon completion of the ABS Load Line Survey to the satisfaction of the Surveyor, provide ABS Survey Report to Owner's Representative.

ITEM NO. 106: VALVES

[1] General:

Remove the valves listed in this Item for inspection, cleaning, and repair or replacement whichever is more economical. Past experience has shown that it is more economical to replace smaller valves, 2" and under, than it would be to overhaul them. This will be left to the Contractor's discretion. Any larger valve that is found to be defective beyond economical repair shall be reported to the Owner's Representative immediately.

[2] Owner-Furnished Information ("OFI")

None for this Item.

[3] Owner-Furnished Material: ("OFM")

None for this item.

[4] Contractor-Furnished Material: ("CFM")

Contractor shall furnish all labor and material, other than replacement valves above 2" that may be supplied by the Owner, if required.

[5] Statement of Work:

1. Provide labor and materials required to recondition or replace the valves in this item.
2. While in drydock, openings in the hull caused by disassembled shell valves shall be closed up temporarily at the end of the workday by replacing the valve or by blank flanging the openings. Before the dock is flooded, all shell valves shall be inspected to assure that they are secured. While flooding the dock, continuous inspection of sea valves shall be made until the ship is afloat and all valves are under a normal working head.
3. Remove valves. Disassemble, clean, lap in seats on all metallic valves. Clean valve stem threads and polish stems in way of gland packing. Inspect composition seats in butterfly valves for damage. All butterfly valves are to be hydro-tested at 25psi minimum. All metal-contact sealing valves (globe, gate, wafer, etc.) are to be tested by dye-transfer ("blue fit"). All tests to be witnessed and approved by Owner's Representative, and by ABS Surveyor at the surveyor's discretion. A written report of all valves tested shall be submitted to the Owner's Representative and the ABS Surveyor, in electronic form with a printed copy, no less than 48 hours prior to re-floating the vessel.
4. Reassemble all valves with correct size, type and number of rings and new packing, and reinstall. Install with new flange gaskets on all flanged type valves. Renew all burned off, missing or defective bolts, studs, nuts, or other fastenings with material equivalent to original.
5. If any valve is found to be defective beyond economical repair it shall be reported to the Owner's Representative immediately. Valve repair (beyond the scope of item 3) or replacement, if required, will be authorized by a Change Work Authorization and/or with Owner-Furnished equipment, but time and labor to install the valve(s) shall be considered within the scope of the original contract.
6. Valves (a total of 27) to be serviced under this item are described and located in Appendix B.

ITEM NO. 107: TAILSHAFT, RUDDER & CPP

[1] **General:**

Remove, inspect, gage and reinstall tailshaft & propeller. Check rudder bearing clearances & repack post. Inspect & maintain Controllable Pitch Propeller system. Inspect and gage stern tube bearings.

[2] **Owner-Furnished Information ("OFI")**

Skeg, Bottom Plate	PBI Dwg. No. 9250-103-4, Rev. C
Shafting Arrangement	PBI Dwg. No. 9250-203-1, Rev. C
Propeller Shaft and Coupling Detail	PBI Dwg. No. 9250-203-2, Rev. C
Shaft Installation	Bird Johnson Dwg. # 107241000
Hub Assembly	Bird Johnson Dwg. # 107242000
OD Box Assembly	Bird Johnson Dwg. # E010RA07000 Rev D

[3] **Owner-Furnished Material: ("OFM")**

Bearing staves (if required).
Replacement tailshaft, hub and blades (if required).

[4] **Contractor-Furnished Material: ("CFM")**

Contractor shall supply all labor and material (other than that shown as Owner-Furnished) to accomplish the specified work.

[5] **Statement of Work:**

All activities concerning the tailshaft and propeller will be accomplished under the direction of a qualified technical representative furnished by the Contractor. (Sound Propeller Systems and Rolls-Royce Naval/Marine Systems are the approved technical representatives for work on the Bird-Johnson Controllable Pitch Propeller system.) The Contractor shall provide all labor and materials (other than that shown as Owner-Furnished) to perform the work identified below:

1. The Controllable Pitch Propeller system oil shall be drained from the hub and tailshaft (approximately 100 gallons). Two samples will be taken for inspection under the supervision of the Owner's Representative. First sample will be taken immediately after opening the system. A second will be taken after approximately 10 gallons have drained from the system. Samples are to be delivered immediately to the Owner's Representative. The remaining oil is to be disposed of by Contractor.
2. Prior to withdrawing tail shaft, the monkey rudder will have to be removed from the Kort nozzle by flame cutting and lowered to the drydock floor.
3. Remove the end cap, disengage and remove the valve pin liner. **Move tailshaft cooling line out of way prior to disassembly of the coupling.** Remove shaft muff coupling and stern tube packing. (CAUTION: Be sure all parts are match marked for reinstallation.) Tailshaft section is to be cleaned prior to drawing through stave bearings and shaft tube.
4. Uncouple the valve rod and withdraw tailshaft and propeller as a unit to the drydock floor. The propeller and shaft must be moved to the inside shop, or to a clean, dry area. Take clearance measurements on shaft journals and spark-test fiberglass shaft coating. Perform non-destructive testing (magnetic-particle or dye-penetrant as appropriate) on hub coupling and driveshaft coupling ends. Contractor shall provide for safe storage of the shaft off of the vessel while all shaft, propeller, stern tube and rudder work is being performed.
5. If upon inspection replacement is deemed necessary by Owner's Representative in consultation with Contractor, Owner will have the option to send old shaft to an outside contractor, or to accept proposal by shipyard for refurbishment (requiring a Change Work Authorization), and/or supplying a refurbished shaft.

6. Visually inspect the stave bearings. Take tailshaft bearing clearance readings, forward and aft stern tube, minimum of eight readings at each end of tube. In the event any bearing staves need replacing the Owner will furnish the staves. All old staves removed shall be given to the Owner's Representative for length comparison of new staves to be provided by Owner.

7. Tailshaft tube preservation work, including water blasting and painting (per Item 103), shall be done while the tailshaft is out for inspection.

8. No blasting, painting or controllable airborne debris shall be occurring or present when the system is open. Remove the propeller and components from the tail shaft. Inspect the propeller blades. Take clearances of oil ports on all removed blade positions. The blades need to be removed first and inspection of the crank rings and sliding blocks need to be performed to determine whether the hub needs to be disassembled for machining. If so, affect all repairs, replace seals and machine internal workings of the hub. (Any repairs to the propeller blades or hub will be treated as a separate item requiring a Change Work Authorization.) Reinstall propeller components on the shaft.

9. Inspect and replace any damaged or corroded fittings for the hoses and piping.

10. Inspect the shaft driven hydraulic pump and clean & adjust the chain and sprocket.

11. Inspect and clean load control system components.

12. Overhaul CPP Oil Distribution Box in accordance with manufacturer's recommendations. This will include, at a minimum, replacement of the aft lip seals and O-rings; cleaning, inspection and gaging of the forward and aft bearings; inspection of sliding blocks and ring; replacement of control arm seals; and inspection and gaging of the shaft section internal to the box.

13. Clean, inspect and lap (if necessary) all hydraulic manifold valves and the check valves on the hydraulic line coming from the CPP head tank (below the O.D. Box.)

14. Take rudder stock bearing clearance readings. Renew packing in upper rudder post.

15. Take rudder stock pintle bearing clearance readings.

16. The hub and propeller are to be assembled onto shaft, prior to shaft being installed.

17. Clean CPP room bilge (up to level of floorplates) of any and all debris, water and oil residue.

18. Complete reinstallation of all associated appurtenances. New 1-1/8" packing shall be installed. A final clearance check will be accomplished between the tailshaft and the stern bearing and presented to the Owner. The Contractor shall furnish and refill the system with new (sealed drums) EnviroLogic HF 46 oil, no substitutes (approx. 100gal.)

19. Prior to reconnecting and torquing muff coupling, take run outs on shaft to check alignment.

20. An accurate pitch check shall be performed prior to refloat and during sea trials and witnessed by the Owner's Representative. This will include comparing the pitch marks on the hub to the pointer on the oil distribution box (prior to refloat), and the OD box pointer to the pitch indicators in the pilothouse and bridge wings box while underway. Any error between the pitch marks on the hub and the pointer on the OD box are to be corrected and the pitch check is to be repeated. Minor discrepancies between the other pitch indicators are allowed at the discretion of the Owner's Representative.

ITEM NO.108: BOW THRUSTER

- [1] **General:**
This item provides for inspection and maintenance of the bow thruster, including bearing and clearance readings and ultrasonic testing of seachest & U-tube.
- [2] **Owner-Furnished Information (“OFI”)**
Bow thruster: White-Gill Dwg. #1634, sheets 1 & 2
Fr’s, Flr’s & Bhd’s stem to Fr 12: PBI Dwg. #9250-101-2, Rev. B
Mn. Dk. shell expansion, stem to Fr 12: PBI Dwg. No. 9250-107-1, Rev. C
Bow Thruster installation: PBI Dwg. # 9250-203-4, Rev. B
Coupling for Motor Drive: PBI Dwg. # 9250-203-6, Rev. B
- [3] **Owner-Furnished Material: (“OFM”)**
Allube AquaShield grease for bearings.
Owner may elect to provide any required replacement parts or provide a Change Work Authorization for purchase of parts to Contractor.
- [4] **Contractor-Furnished Material: (“CFM”)**
Contractor shall furnish all labor and material to accomplish the specified work other than replacement parts that may be provided by the Owner.
- [5] **Statement of Work:**
1. Take & record clearance readings on:
 - a) Rotor shaft gland neck ring.
 - b) Rotor tip/ liner radial clearance.
 - c) Rotor/guide vane hub clearance.
 - d) Rotor shaft internal bearing/ sleeve radial clearance.
 - e) Discharge deflector/distance piece hub clearance.
 - f) Discharge deflector/ distance piece rim clearance
 - g) Discharge deflector/ distance piece chamfer clearance.
 - h) Discharge deflector/ distance piece radial wobble about true center. (Record movement)
 - i) Rotor radial wobble about true center. (Record movement)
 2. Remove the thruster screens and pump impeller, the steering deflector, and the lower section of the steering shaft. Indelible witness marks must be made prior to removal to ensure proper orientation for reinstallation. Remove two manhole covers on “U” tube for internal inspection.
 3. After interior of B.T. intake sea chest and tube has been blasted, take a minimum of eight (8) UT readings per side of sea chest and tube area. Check for eroded welds and hairline cracks around hard points.
 4. Check and record end play on steering shaft.
 5. Check SS bearings and housings and impeller bearing. Repack all bearings using Allube AquaShield 109 AF20015 or equal.
 6. Renew packing on pump shaft and steering shaft.
 7. Verify that the steering shaft flange bolts are wired in place.

8. Renew the 2 (10"x1 ½") round anodes on the manhole covers.
9. Paint the interior of sea chest as per Item No. 103 (Painting Underwater Body).
10. Reassemble the unit. No power or air tools are to be used for reassembly of any bow thruster component. Test run the steering deflector 360 degrees in each direction. The thruster pump shall be tested during sea trials.
11. The removal and reinstallation of the bow thruster components shall be done in the presence of the Owner's Representative.

ITEM NO. 109: POTABLE WATER TANKS

- [1] **General:**
This item provides for cleaning and recoating of the port and starboard potable water tanks.
- [2] **Owner-Furnished Information (“OFI”)**
None for this item
- [3] **Owner-Furnished Materials: (“OFM”)**
None for this specification Item.
- [4] **Contractor-Furnished Material: (“CFM”)**
The Contractor shall furnish all labor and material to accomplish the specified work.
- [5] **Statement of Work:**
The Contractor shall provide all labor and materials to:
1. Remove the manhole covers in the lower engine room.
 2. Plug all fill lines and vent lines prior to cleaning. Remove tank level sensors.
 3. For both tanks, clean all tank surfaces to SSPC-SP-3 condition. Paint the cleaned areas of the tanks as per Paint Schedule below. Allow adequate drying time for each subsequent layer of paint.
 4. When cured, remove plugs from fill lines and vents. Owner’s Representative is to inspect prior to contractor replacing the manhole covers. Replace covers using new gaskets and cotton grommets.
 5. Fill with fresh water and sanitize the tank by superchlorinating to a minimum free available chlorine (FAC) level of 80 ppm for at least 1 ½ hours. (This will require 3 gallons of standard or 2 gallons of “ultra-strength” sodium hypochlorite bleach per tank.) Thoroughly drain the tank through the docking plugs and reinstall plugs. Tanks must be sanitized and drained prior to leaving the drydock. Each tank’s capacity is 4,000 gallons.
 6. Refill and flush tanks (minimum 30 minutes flushing through overflow vents) after vessel has been re-floated.

[9] **Paint Schedule**

Potable Water Tanks:

First Coat:	Spot-coat, Amercoat 240, Buff 8 mils DFT
Second Coat:	Amerlock 2, Off-White 8 mils DFT

ITEM NO. 110: VOID PRESERVATION

- [1] **General:**
Inspect voids for leakage and re-coat for preservation.
- [2] **Owner-Furnished Information (“OFI”)**
- | | |
|----------------------|---------------------------|
| Voids, Fr 7-9 | PBI Dwg 9250-107-1, Rev C |
| Rudder | PBI Dwg 9250-518-1, Rev A |
| Skeg | PBI Dwg 9250-103-4, Rev C |
| Rub Rail (Port only) | PBI Dwg 9250-800-2, Rev B |
- [3] **Owner-Furnished Material: (“OFM”)**
None for this Specification Item.
- [4] **Contractor-Furnished Material: (“CFM”)**
Contractor shall furnish all labor and materials to accomplish the specified work.
- [5] **Statement of Work:**
The Contractor shall provide all labor and materials to inspect and preserve the following voids:
- A. Void between Frames 7 and 9, below bow thruster.
 - B. Rudder Kort nozzle and vertical fin (“monkey rudder”).
 - C. Skeg shoe piece.
 - D. Exterior hull rub rail, Frames 20-62, Port side only.
 - E. Aft seachest, Frames 66-67, Starboard side.
1. Remove plugs and check for the presence of water.
 2. Pressure test to 2psig for 20 minutes.
 3. Apply a fill-and-drain rust-inhibiting compound, grade 2 (water-displacing soft-film properties,) such as Paco Systems “Float-Coat” or equal. Drain. Reinstall plugs using good quality pipe sealant. Owner’s Representative to be present during the removal of all plugs and recoating of voids. Contractor to provide specification sheet for coating used.
 4. If evidence of water is found, repair of any leaks will be treated as a separate item requiring a Change Work Authorization.

ITEM NO. 111: ANCHORS & CHAIN

[1] **General:**

Inspect, blast and re-coat the ship's anchors and anchor chain.

[2] **Owner-Furnished Information ("OFI")**

None for this item.

[3] **Owner-Furnished Material: ("OFM")**

None.

[4] **Contractor-Furnished Material: ("CFM")**

Contractor shall provide all labor and materials (other than chain and fittings that may be provided by Owner) to perform the work identified below.

[5] **Statement of Work:**

1. Roust out both anchor chains, including anchors and bitter ends, onto the drydock floor. Chains are 7 shots (105 fathoms) for the starboard anchor and 6 shots (90 fathoms) for the port anchor of 1" Grade Two chain.
2. Water-wash and sand-sweep or tumble chains and anchors to SSPC-SP7 condition.
3. Inspect the chain, with Owner's Representative, including connecting links, pear links and swivels. Measure the length of six links in three places on each shot and provide measurements to the Owner's Representative. The measurement of six links should be 26-3/4" plus 3/4" minus 0". Take diameter measurements of at least three links in each shot. The diameter should exceed 0.90". If any shots are stretched or worn significantly beyond the tolerances stated above, the Owner may elect to replace them as Owner Furnished Material. In either case, the replacement will be considered as part of this item. Any scrap chain will remain property of the Owner and will be loaded on the fantail of the ship prior to departure. The Owner's Representative may require, based on the measurements made, that some shots be moved in sequence or that the chain be "end-for-ended;" such work will be limited in nature and will be considered to be part of this item.
4. On completion of the inspection, paint anchors and chain as per Paint Schedule. It is strongly recommended that chain be hung for painting and marking.
5. All locking wires shall be replaced. Shackles, shackle bolts, locking pins, swivels and other anchor chain fittings shall be generously lubricated with a suitable waterproof compound approved by the Owner.
6. At the completion of all work, and after all paint has cured, return chain to ship, connect to "weak links", and flake chain back into the chain locker in neat rows.
7. Ranging or stowing the chain may require ABS attendance for operational survey of the anchor windlass.

[9] **Paint Schedule:**

Anchors & Chain:

First Coat:

PPG Amerlock 2, Red
4-6 mils DFT

Second Coat : PPG Amerlock 2, Black
4-6 mils DFT

Re-mark and paint shots as follows:

- The detachable links are to be painted red, white or blue - red for 15 fathoms, white for 30, blue for 45, red for 60, white for 75 and so on.
- At the 15-fathom mark, one (1) link on each side of the detachable link is to be painted white, and one turn of wire to be wrapped securely around each stud. At the 30-fathom mark, two links on each side of the detachable link are to be painted white with two (2) turns of wire wrapped around the studs of the second links from the detachable link (and so on for each subsequent shot).
- The second to last shot will be given a top coat of yellow and the last (inboard) of red.
- Paint used in marking shall be a high gloss marine striping paint and shall be allowed to become dry and hard before stowing in the chain locker.

ITEM NO. 112: CHAIN LOCKER & HAWSEPIPES

[1] **General:**

Clean and re-coat chain locker, chain locker sump, hawsepipes and spill pipes.

[2] **Owner-Furnished Information ("OFI")**

Anchor Handling Arrangement & Detail PBI Dwg. No. 9250-520-1, Rev. A (2 sheets)

[3] **Owner-Furnished Material: ("OFM")**

None for this specification Item.

[4] **Contractor-Furnished Material: ("CFM")**

Contractor shall furnish all labor and material to accomplish the specified work.

[5] **Statement of Work:**

The chain locker is located between frames 4 and 6 and shares a common thwart-ship bulkhead with the sea water ballast tank forward and the bow thruster machinery compartment aft. The locker is divided into two compartments by a longitudinal bulkhead at centerline, approximately five feet (5') high; combined surface area for both compartments is approximately 450 square feet. The chain locker sump is located directly beneath the locker, with access via a manhole at Frame 6 at the forward end of the Bow Thruster room.

The Contractor shall provide all labor and material to:

1. While anchor chain is out of chain locker and hawsepipes (see Item 112, Anchors and Anchor Chain) water wash hawsepipes, spill pipes, all interior bulkheads, overhead and center line bulkhead with high-velocity water stream. When wash down is complete, remove standing water (water will drain to chain locker sump and must be removed before opening sump for work specified below.) Allow adequate time to dry before paint is applied.
2. Prep chain locker, chain locker sump, spill pipes and hawsepipes for cleaning. Plug all suction lines from both sides of locker prior to cleaning. Spot clean both sides of locker and sump to SSPC-SP-3 condition. Owner's Representative shall be notified when cleaning of this area is complete so a visual inspection of prepped areas can be made prior to paint application. Any and all debris and marine growth must be removed from locker and sump before proceeding.
3. Blast complete interiors of both hawsepipes and both spill pipes to SSPC-SP6 condition.
4. Upon completion of all prep, cleanup and inspection, coat the locker and sump interiors as per Paint Schedule.
5. Coat spill pipe and hawsepipe interiors as per Paint Schedule.
6. Anchor chain shall not be brought on board until after the coating has cured and the lockers have been inspected by the Owner's Representative.

[9] **Paint Schedule:**

Chain Lockers:

First Coat: Spot coat PPG Amerlock 2, Gray
4-6 mils DFT

Second Coat: PPG Amerlock 2, Gray

6-8 mils DFT

Third Coat:

PPG Amerlock 2, White
6-8 mils DFT

Hawsepipes & Spill Pipes:

First Coat:

PPG Amerlock 2, Gray
6-8 mils DFT

Second Coat:

PPG Amerlock 2, Black
6-8 mils DFT

ITEM NO. 113: HULL & TANK ANODES

[1] **General:**

Inspect and replace hull and ballast/sewage tank anodes.

[2] **Owner-Furnished Information ("OFI")**

None for this item.

[3] **Owner-Furnished Material: ("OFM")**

None for this Item.

[4] **Contractor-furnished Material: ("CFM")**

Contractor shall furnish all labor and material to accomplish the specified work.

[5] **Statement of Work:**

Contractor shall provide all labor and materials necessary to:

1. Renew all hull anodes. This includes twenty-four (24) each for the exterior hull, aluminum alloy MIL-A-24779, 10lb with steel straps, Galvotec GA-A10H or similar. The new anodes shall be located in the same area as those removed. Straps and weld areas shall be painted in accordance with the requirements for bottom paint in Item 103 (Painting Underwater Body). Please provide fixed price for replacement of exterior hull anodes. The exterior hull anode locations are:

- 6ea. in engine room sea chests, (3) port and (3)starboard
- 6ea. on monkey rudder and Kort nozzle
- 6ea. on stern tube
- 4ea. on hull above & forward of nozzle
- 4ea. on hull by transducer well
- 2ea. on top of shoe piece
- 1ea. in aft sea chest
- 2ea in Bow Thruster sea chest

Total of thirty-one (31) exterior hull anodes.

2. Renew a minimum of six (6) anodes in ballast and/or sewage tanks. Specific anodes to be replaced will be determined by the Owner's Representative upon inspection.

ITEM NO. 114: MAIN ENGINE HEAT EXCHANGERS

- [1] **General:**
Clean, preserve and pressure-test main engine lube oil and jacket water heat exchangers.
- [2] **Owner-Furnished Information ("OFI")**
None for this item.
- [3] **Owner-Furnished Material: ("OFM")**
None for this item.
- [4] **Contractor-Furnished Material: ("CFM")**
Contractor shall furnish all labor and materials , including gaskets, seals, and zincs, to accomplish the specified work.
- [5] **Statement of Work:**
Contractor shall provide all labor and materials to:
1. Remove both engine jacket water and lube oil heat exchangers from the ship and transfer to inside shop. Lube oil and coolant removed from heat exchangers shall be disposed of by contractor.
 2. Disassemble both heat exchangers and acid clean.
 3. Reassemble the heat exchangers using new gaskets and seals.
 4. Hydrostatic test both sides of both heat exchangers to manufacturer's specifications (75 psi), hold pressure for at least 30 minutes. Tests are to be conducted in the presence of Owner's Representative.
 5. Any tube leak repair will be covered by a Change Work Authorization. Any other leak repair shall be covered by this item.
 6. Re-install the heat exchangers in ship and add oil and coolant necessary to bring levels up to normal.
 7. Visually inspect both systems for leaks when brought under main engine pressure during sea-trial.

ITEM NO. 201: TANK PAINTING

- [1] **General:**
Provide contract pricing for multiple degrees of tank painting.
- [2] **Owner-Furnished Information ("OFI")**
None for this item.
- [3] **Owner-Furnished Material: ("OFM")**
None for this item.
- [4] **Contractor-Furnished Material: ("CFM")**
Contractor shall furnish all labor and material to accomplish the specified work.
- [5] **Statement of Work:**
Contractor shall provide pricing for the following grades of tank preparation and painting. Pricing shall include, but not be limited to, labor, materials, equipment, staging, testing, and other services as necessary.
1. SSPC-SP-3 blast, 2 coats PPG Amerlock 2, per 100 square feet.
 2. SSPC-SP-6 blast, primer and 2 coats PPG Amerlock, per 10 square feet.

ITEM NO. 202: STEEL RENEWALS & WELDING

- [1] **General:**
Provide contract pricing for steel renewals and welding repairs.
- [2] **Owner-Furnished Information ("OFI")**
None for this item.
- [3] **Owner-Furnished Material: ("OFM")**
None for this item.
- [4] **Contractor-Furnished Material: ("CFM")**
Contractor shall furnish all labor and material to accomplish the specified work.
- [5] **Statement of Work:**
Contractor shall quote for each plate type a lump sum price to replace a 3ft x 3ft and a 6ft x 6ft plate. This price will be used to establish cost for smaller steel renewals. In addition, quote for each plate type a unit price per pound of steel (minimum quantity one long ton) cropped and renewed. This pricing will be used to prorate the cost of steel renewals for which the aggregate is one ton or more. Internal structural members/stiffeners shall be quoted on a per pound basis. Weld repairs not requiring new steel shall be priced per linear foot per pass.
- Pricing shall include, but not be limited to, labor, materials, equipment, staging, testing, and other services as necessary. All materials and welding shall be in accordance with ABS and USCG requirements.
1. Flat plate (3' x 3')
 2. Flat plate (6'x 6')
 3. Flat plate (per pound)
 4. Shaped plate (3'x 3')
 5. Shaped plate (6' x 6')
 6. Shaped plate (per pound)
 7. Compound plate (3' x 3')
 8. Compound plate (6' x' 6')
 9. Compound plate (per pound)
 10. Bulkhead (3' x 3')
 11. Bulkhead (6' x 6')
 12. Bulkhead (per pound)
 13. Internals (per pound)
 14. Gouge/Vee out and reweld (per linear ft/pass)
 15. Clean and build up or clad-weld (per linear ft/pass)

ITEM NO. 203: ANODES

- [1] **General:**
Provide pricing for additional anodes.
- [2] **Owner-Furnished Information (“OFI”)**
None for this item.
- [3] **Owner-Furnished Material: (“OFM”)**
None for this item.
- [4] **Contractor-Furnished Material: (“CFM”)**
Contractor shall furnish all labor and materials to accomplish the specified work.
- [5] **Statement of Work:**
Contractor shall provide a per-piece quote for additional aluminum hull or tank anodes above the quantities specified in Item 113.

Pricing shall include, but not be limited to, labor, materials, equipment, staging, testing, and other services as necessary. All materials and welding shall be in accordance with ABS and USCG requirements.

ITEM NO. 204: UT Gauging

- [1] **General:**
Provide pricing for additional UT gauging.
- [2] **Owner-Furnished Information ("OFI")**
None for this item.
- [3] **Owner-Furnished Material: ("OFM")**
None for this item.
- [4] **Contractor-Furnished Material: ("CFM")**
Contractor shall furnish all labor and materials to accomplish the specified work.
- [5] **Statement of Work:**
Contractor shall provide quote per fifty (50) UT shots beyond those specified in Item 105.