M/V SOLANO
SERVICE LIFE EXTENSION PROJECT (SLEP)
18-021

Request for Proposals
and Proposal Notices

Vessel Technical Specifications

12 April 2019

SAN FRANCISCO BAY AREA

WATER EMERGENCY TRANSPORTATION AUTHORITY

12 April 2019
000 GENERAL REQUIREMENTS

020 PURPOSE
The OWNER seeks a qualified shipyard (“CONTR”) to carry out the rebuild of the M/V SOLANO (SOLANO) from a 320 passenger 36m AMD 360C ferry to a 445 passenger EPA Tier 4 38m AMD 386B PYXIS Class ferry for operation in the San Francisco Bay Area.

Some drawings from the PYXIS Class are provided as reference for guidance. Changes are required to adapt reference engineering to this project due to differences between the SOLANO, equipment changes and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approval by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO and review of the reference information to ensure these concerns shall be addressed in the final bid price.

030 OWNER’S REQUIREMENTS VS. OWNER’S PREFERENCES
The purpose of the OWNER’s Requirements and Preferences is to convey to the CONTR what features and attributes the OWNER seeks in the new Vessel. The CONTR should incorporate these preferences, to the greatest extent possible, into its proposal and associated design submittals.

Certain performance requirements and technical aspects of the design are considered critical and absolute. These are referred to as the OWNER’S REQUIREMENTS. These requirements are of the highest priority to the OWNER and are met to the fullest extent possible, without compromise.

Maintaining commonality across the SOLANO and the PYXIS Class in the OWNER’s fleet is a primary goal as it minimizes training requirements and standardizes maintenance and spare parts inventories while minimizing downtime. The PYXIS Class were based off of the SOLANO with the changes needed for the larger capacity, equipment and Tier 4 engines. These common features, equipment and configurations are referred to as the OWNER’S PREFERENCES. While not absolute requirements, the desired features described in this document are being provided to assist the CONTR with proposing a Vessel that will integrate with the existing PYXIS Class fleet. The OWNER’s preferences are derived from the as-built files from the PYXIS Class. Any deviations from the PYXIS Class shall be addressed in the “Or Equals” process.

For the purpose of this document, OWNER’s Requirements are generally preceded by the word “shall” or presented in tabular form. Wherever an equipment manufacturer and/or model number is provided it will be deemed an OWNER Preference subject to the “Or Equal” process.

040 OVERVIEW
The OWNER requires a turn-key Vessel fully complete in every regard, built in compliance with applicable regulatory requirements, inspected and documented by the United States Coast Guard (USCG) and ready for passenger service.

The SOLANO shall be delivered to the CONTR at WETA’s North Bay Maintenance and Operation Facility (NBMOF) on Mare Island. After the CONTR delivers the Vessel to the CONTR’s shipyard the CONTR shall be responsible for completing a detailed lightship survey to validate the Vessels lightship displacement prior to the start of significant engineering and Construction. The Vessel shall then be stripped of all items of machinery, support systems, piping, wiring, insulation, joinery, trim and outfitting such that all that remains is a bare hull. It is assumed that a majority this work will take place in dry dock.

The Vessel’s bare aluminum structure shall be ship checked against the provided Vessel plans and the CONTR’s detailed engineering to ensure any As-Built changes are caught in the engineering phase prior to the start of major construction and installations of new equipment. Any deviations identified during the ship check shall be shown on marked up drawings that will be made available to the OR. Any differences between the existing vessel and the
engineering not identified by the CONTR are the responsibility of the CONTR and not the OWNER. The Vessel shall be cut transversely at the indicated parting line and separated into two pieces. The fabricated 2.4m house section shall be inserted to extend the superstructure and the new hull modules inserted to match the PYXIS Class. All new machinery, support systems, piping, wiring, insulation, joinery, trim and outfitting shall be installed as per these specifications to make the Vessel match the PYXIS Class.

The rebuilt Vessel shall be constructed and finished to the same high standard of recent PYXIS Class. Where grey areas may exist in these specifications the PYXIS Class shall be used as a guide as to requirements and intent.

050 MISSION

The rebuilt Vessel shall be treated as a new build in the eyes of the USCG and the FTA. The existing Vessel is at the end of its useful life for the purposes of capacity and emissions compliance. The scope of work has been determined to constitute a Major Conversion by the USCG so all engineering and construction shall be inspected and reviewed as such.

060 OPERATIONAL REQUIREMENTS

The rebuilt Vessel shall be utilized by WETA in passenger service in the San Francisco Bay Area on any number of our current routes. The Vessel is intended to operate up to 3,000 hours per year with a high degree of operation availability. Utilizing the machinery, equipment, materials, et cetera sourced for the PYXIS Class will ensure applicability with the intended service.

066 START UP & SHUTDOWN

All systems shall be set up with efficiency in mind so that a single trained operator can start up or secure the Vessel in no more than fifteen (15) minutes including safety walkthrough, system alignment, level checks for machinery, controls and navigation, and auxiliary systems. A system startup checklist shall be developed and provided by the CONTR. The equipment specified and as arranged on the PYXIS Class was done so to meet these requirements. The PYXIS Class arrangement started with the SOLANO arrangement and equipment was updated as needed. As such the standardization of arrangements was of paramount importance on the PYXIS Class as it is on the SLEP of the SOLANO.

070 ENVIRONMENTAL CONDITIONS

The CONTR shall provide a Vessel suitable for operation in the weather and sea conditions regularly found in the San Francisco Bay region of California.

The Vessel shall be able to meet all contract obligations for route turnaround time, seakeeping, and maneuverability under the following environmental conditions:

- Significant wave height: 4.5’ @ 5-7 seconds
- Typical wave pattern: wind driven chop at 3-4 feet @ 5seconds
- Wind velocity: 35 knots with gusts to 45 knots
- Winter design temperature: 30°F
- Summer design temperature: 100°FDB and 71°FWB @2.5%
- Heating Hours: 2,502 per year
- Design latitude: 38.11°N
- Minimum sea water temperature: 45°F.
- Maximum sea water temperature: 70°F.
080 VESSEL REQUIREMENTS

The key performance requirements and characteristics for the Vessel are described in Sections 081 through 089. Describing the current Vessel and the PYXIS Class that the rebuilt Vessels will be a close sister to.

081 PRINCIPAL CHARACTERISTICS

Principal characteristics of the existing Vessel are as follows:

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Existing</th>
<th>SWBS Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hullform</td>
<td>Catamaran</td>
<td>-</td>
</tr>
<tr>
<td>Hull Material</td>
<td>Aluminum</td>
<td>101</td>
</tr>
<tr>
<td>Regulatory Tonnage</td>
<td>Less than 100 GRT</td>
<td>091</td>
</tr>
<tr>
<td>Classification</td>
<td>To DNV, examined but not classed</td>
<td>091</td>
</tr>
<tr>
<td>Regulatory</td>
<td>United States Coast Guard - Subchapter K</td>
<td>091</td>
</tr>
<tr>
<td>Length Over All</td>
<td>135.4’</td>
<td>-</td>
</tr>
<tr>
<td>Beam (molded)</td>
<td>39.36’</td>
<td>-</td>
</tr>
<tr>
<td>Draft Max</td>
<td>4.92’</td>
<td>-</td>
</tr>
<tr>
<td>Main Engines</td>
<td>MTU16V4000M70, 2320kW@1970RPM</td>
<td>233</td>
</tr>
<tr>
<td>Propulsors</td>
<td>Hamilton HM811 w/ MECS controls</td>
<td>247</td>
</tr>
<tr>
<td>Reduction Gears</td>
<td>ZF BW-7550</td>
<td></td>
</tr>
<tr>
<td>Service Speed</td>
<td>34knots</td>
<td>082</td>
</tr>
<tr>
<td>Passengers</td>
<td>320</td>
<td>084</td>
</tr>
<tr>
<td>Interior Seats</td>
<td>300</td>
<td>084</td>
</tr>
<tr>
<td>Exterior Seats</td>
<td>20</td>
<td>084</td>
</tr>
<tr>
<td>Crew</td>
<td>4+ 1 Other</td>
<td>085</td>
</tr>
<tr>
<td>Bicycle Capacity</td>
<td>24</td>
<td>672</td>
</tr>
<tr>
<td>Fuel Capacity</td>
<td>2x 3300 gallons</td>
<td>126</td>
</tr>
<tr>
<td>Potable Water Capacity</td>
<td>500 gallons Stbd side</td>
<td>126</td>
</tr>
<tr>
<td>Black Water Capacity</td>
<td>500 gallons Port side</td>
<td>126</td>
</tr>
<tr>
<td>Lightship Displacement</td>
<td>141.53 LT @ 42.24’ forward of FR0</td>
<td>-</td>
</tr>
</tbody>
</table>

082 SPEED

The existing Vessel operates at approximately 34 knots fully loaded. Based on the PYXIS Class the rebuilt Vessel will meet or exceed this value with the equipment matching the PYXIS Class. The CONTR shall work with the Vessel designer AMD Marine Consulting Pty Ltd (AMD), of Australia to update the speed prediction from the initial weight and balance estimate through all of the monthly updates to the BWE to sea trials condition. The CONTR shall provide the initial weight, balance and speed estimate with their proposal as the basis used for sea trial acceptance.

083 APPEARANCE

The Vessel shall be finished to match the existing WETA fleet and the PYXIS Class. Paint color, joinery, seating, fabrics, laminates and all items of trim and outfit shall be matched to the new PYXIS Class. The finish work shall be of the highest marine standards. Painting shall be free from drips and sags, cut lines shall be crisp. All interior work shall have tight joints with seams parallel and smooth. All work shall be done to the highest aesthetic standards to the satisfaction of the OR. Any items that are retained from the original construction are intended to match this standard as well after final outfitting.
084 PAYLOAD/CAPACITIES

The rebuilt Vessel shall have both interior and exterior seating capacities to match the PYXIS Class General Arrangement drawings provided as a reference.

Seating
- Interior Seats 429 + 4 ADA spaces
- Exterior Seats 38

Reference Drawing
1. 0433-010-002-00-H General Arrangement

085 CREW

The rebuilt Vessels shall be certified to operate with no more than four (4) crew:

- One (1) licensed Master.
- One (1) high-speed qualified deckhand.
- Two (2) deckhands.

086 SEAKEEPING & MANEUVERING

The rebuilt Vessel shall exhibit excellent motions to maximize passenger comfort while operating on the routes in the San Francisco Bay Area. The AMD360C class and the AMD385 class Vessels that the AMD386 class Vessels are based on exhibit satisfactory seakeeping and maneuvering in service in the Bay Area. Provided the rebuilt Vessel matches the displacement and LCG of the PYXIS Class seakeeping and maneuvering will be acceptable.

087 MAINTAINABILITY

The CONTR shall complete the engineering and installations to match the PYXIS Class equipment and arrangements. Provided the PYXIS Class arrangements are followed as best possible then maintainability of the Vessel and the equipment shall be acceptable to WETA.

088 NOISE & VIBRATION

Noise and vibration criteria apply to calm water operation of the Vessel in Trial Condition from light load through full load with the propulsion prime movers operating through all power levels (minimum to maximum), with concurrent operation of one generator and normally operating support systems (such as heating and ventilation).

The CONTR shall perform a pre-construction and post construction noise and vibration analysis for benchmark purposes, this benchmark shall be used to assure that no additional vibration levels were added during the construction phase.

A third-party firm or firms specializing in marine acoustics, vibration analysis and sound measurements aboard marine Vessels shall be employed during pre and post construction builder’s trials to take measurements in all areas defined by the criteria below. The selected firm shall utilize measurement and reporting requirements from ISO 2923-1996 Acoustics - Measurement of noise onboard Vessels. They shall furnish a final report with all measured raw data, averaging calculations, final reportable results and recommendations for each area measured. This final report shall be made available in duplicate to the OWNER.

The CONTR shall be responsible to locate and correct unsatisfactory vibration conditions arising during tests and/or trials, or subsequently during the warranty period. Drive train alignments shall be performed in accordance with propulsion equipment manufacturer's tolerances at initial installation and afloat prior to Builder’s Trials. CONTR shall perform alignment, with written acceptance from propulsion equipment manufacturer’s representative. Flexible
couplings shall be capable of accommodating misalignment and isolating vibration in all directions (radial, axial and angular). Couplings shall be dynamically balanced to avoid any additional vibration due to rotational imbalance. CONTR shall not exceed the following overall frequency weighted RMS value standards.

Noise Criteria

Acoustic insulation shall be installed as per the PYXIS Class Vessel. The Vessel shall not exceed post construction noise levels by more than two ($\leq 2$) dBA higher than values recorded pre-construction. Readings shall be taken in the following areas:

<table>
<thead>
<tr>
<th>DECK</th>
<th>ZONE</th>
<th>Requirement (dBA)</th>
<th>Preference (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PILOTHOUSE</td>
<td>PILOTHOUSE</td>
<td>65</td>
<td>55</td>
</tr>
<tr>
<td>2ND DECK</td>
<td>FORWARD INTERIOR</td>
<td>65</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>AFT INTERIOR</td>
<td>70</td>
<td>65</td>
</tr>
<tr>
<td>MAIN DECK</td>
<td>FORWARD INTERIOR</td>
<td>77</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>CENTER INTERIOR</td>
<td>75</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>AFT INTERIOR</td>
<td>77</td>
<td>72</td>
</tr>
</tbody>
</table>

Notes:
1 – Underway conditions – Measurements shall be performed at the vessel’s primary operating speeds of 10 knots (idling speed) and 34 knots (full speed), one SSDG online, full HVAC at normal settings, Engine Room supply/exhaust fans on automatic. Measurements will be taken on runup to full speed to determine if any additional readings need be taken at intermediate RPM settings.

Vibration Criteria

Engine alignments shall be performed in accordance with propulsion equipment manufacturer’s tolerances at initial installation and afloat prior to Builder’s Trials. CONTR shall perform alignment, with written acceptance from propulsion equipment manufacturer’s representative. The final alignment report shall be generated from a laser-based alignment system, Easy-Laser type or equal.

CONTR shall not exceed the following overall frequency weighted RMS value standards taken near the locations indicated in all three axes:

### Interior Vibration Limits, mm/sec peak, single frequency components (1 Hz bandwidth) between 2 and 80 Hz

<table>
<thead>
<tr>
<th>Test Condition</th>
<th>U/W @ 10kts</th>
<th>U/W @ 34kts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward Interior Passenger Spaces</td>
<td>1.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Aft Interior Passenger Spaces</td>
<td>1.5</td>
<td>3.0</td>
</tr>
</tbody>
</table>

### Machinery Vibration Limits, mm/sec peak, single frequency components (1 Hz bandwidth) between 2 and 100 Hz

<table>
<thead>
<tr>
<th>Test Condition</th>
<th>U/W @ 10kts</th>
<th>U/W @ 34kts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine Foundations</td>
<td>3.0</td>
<td>6.5</td>
</tr>
<tr>
<td>Generator Foundations</td>
<td>6.5</td>
<td>6.5</td>
</tr>
<tr>
<td>SCR Foundation</td>
<td>3.0</td>
<td>6.5</td>
</tr>
<tr>
<td>Engine Room/Jet Room Bulkhead</td>
<td>3.0</td>
<td>6.5</td>
</tr>
<tr>
<td>Waterjet Foundations</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

Under all service conditions, the entire propulsion system shall be free of harmful vibrations (30mm/sec) throughout the entire operating range. Harmful vibration is defined as vibration capable of damaging primary or connected ancillary equipment and as specified by the equipment manufacturers or the aforementioned ABS limit whichever is
lower. In addition, the CONTR shall enlist a third-party firm to measure and report vibration utilizing ISO 4867 Code for the measurement and reporting of shipboard vibration data.

Harmful vibrations in any part of the system shall be corrected by the CONTR at no cost to the OWNER. A complete and thorough torsional vibration analysis of the main propulsion drive line (to include main engines, main engine mounts, shafting, couplings, gear box, propulsor unit, et cetera) and auxiliaries shall be provided by the CONTR, for review by the OWNER.

089 EMISSIONS

The main propulsion engines shall be OWNER Furnished Equipment (OFE). The propulsion package shall be MTU16V4000M65L series engines with exhaust emissions meeting US EPA Tier 4 standards and be certified as such. The engines will be rated at 3433HP@1800RPM, the same as the PYXIS Class. The engine package will be supplied with MTU’s cube style SCR and supporting auxiliary systems, the same as the PYXIS Class vessels.

090 VESSEL REGULATORY REQUIREMENTS

The Vessels shall be designed and constructed in accordance with the regulatory requirements summarized in Sections 091 through 092 and invoked throughout this specification. This specification also contains additional requirements that augment and/or exceed those of the regulatory agencies. In no case shall the requirements of this Technical Specification supersede or compromise the regulatory requirements.

091 REGULATORY

The Vessel shall be designed and built to DNV class rules for structure, but not classed. Structural calculations shall be examined by DNV with a letter provided to USCG for approval. The Vessel shall be inspected and certificated by the United States Coast Guard (USCG) according to 46 CFR, Subchapter K, small passenger Vessels (less than 100 gross regulatory tons). The Vessel shall meet all regulatory requirements to attain a lakes, bays, and sounds route upon the waters of San Francisco Bay. Due to the nature of the rebuild the USCG has determined that the scope of work constitutes a major conversion and as such shall be treated as a new Vessel in all aspects.

The CONTR shall obtain and furnish all certificates, licenses, documents and letters of compliance as may be required and/or issued by the USCG, and other regulatory bodies as required for this class of Vessel, route and service.

All certificates and letters of compliance required and/or issued by the regulatory bodies that are required to be displayed shall be mounted on the Vessel behind framed clear Plexiglas at locations consistent the existing locations or at locations specified by the OWNER. The CONTR shall take detailed pictures of the Vessel prior to removing the existing materials. The Signage Plan for the Vessel shall be drawn prior to removal of any materials. The Emergency Escape Plan, Fire and Safety, and Life Saving Equipment plans shall be verified As-Built prior to this phase also.

For any and all cases in which applicable regulatory language states or implies that the OWNER shall provide or perform a task, it shall be understood that, as part of this contract, such items and tasks shall be provided/ performed by the CONTR on behalf of OWNER.

The USCG requirements invoked have precedence over other regulatory requirements, and these Technical Specification, where conflict exists. Where rule interpretations vary between USCG districts, the CONTR shall ensure that the Vessel certificates are valid in San Francisco Bay.

Other regulatory requirements invoked in this specification are as follows:

- Rules of the applicable Classification Agency (ABS, Lloyd’s or DNV).
- Institute of Electrical and Electronic Engineers (IEEE) Publication No. 45.
- Occupational Safety and Health Administration (OSHA).
• U.S. Environmental Protection Agency (EPA), the California Air Resources Board (CARB).
• U.S. Public Health Service (USPHS).
• County health regulations applicable to San Francisco and Solano Counties.
• Americans with Disabilities Act (ADA) Passenger Vessel Accessibility Guidelines and Supplementary Information. Americans with Disabilities Act (ADA) PL101-336 as further described in Section 092.

092  ACCOMMODATIONS FOR PASSENGERS WITH DISABILITIES

The CONTR shall, in general, follow the guidelines of the Passenger Vessel Access Advisory Committee's report of November 13, 2000 as submitted to the Federal Architectural and Transportation Barriers Compliance Board.

The CONTR shall comply with all of the applicable sections of The Americans with Disabilities Act, ADA PL101-336 and Proposed Accessibility Guidelines for the construction and alteration of passenger Vessels covered by the Americans with Disabilities Act (ADA) published in the Federal Register on Tuesday, June 25, 2013. While this law has not been thoroughly interpreted for applicability to passenger ferries at this time, certain aspects of the law are clearly established. Among these are, the provision of at least one universally accessible restroom, entrance and egress for wheelchairs that does not exceed the allowable slope (1:12), tactile markings for the sight impaired, special designated areas for wheelchairs, and accessibility to equal refreshment areas and tables by wheelchairs. Deck and stair covering materials shall be ADA compliant. Aisles and passageways shall be wide enough for wheelchair access. Cashier stands, counter, snack bars, etc. shall all be accessible. Door openers for accessible toilets shall be operable at pressures that comply with ADA recommendations. Doors shall not swing into an aisle or passageway. All accessible services including toilets, refreshments, and outside and inside wheelchair locations shall at a minimum be provided on the boarding deck.

Visual warning systems must be fitted to flash emergency messages to those with hearing disabilities that accompany audible announcements. The PYXIS Class Vessel are fitted with ESS’s Vessel Alert system.

END OF 000 SECTION
100 STRUCTURE

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide, install and test the rebuilding and stretching of the Vessel. The CONTR shall include in their bid all items of structure, frames, stiffeners, floors, sub-frames, tonnage frames, brackets, clips, doublers, foundations and anything else required to complete and foundate the hull, house, systems, equipment and items of trim and outfit.

Anything inadvertently omitted from the plans and specifications deemed necessary and usual to a complete Vessel, shall be supplied as a part of this Contract. Materials used and the workmanship thereon shall be of the best description and quality throughout and of adequate sizes to accomplish the purpose intended. The work, in every respect, shall be made under the supervision and to the complete satisfaction of the OWNER and its Representatives in accordance with good marine practice. Defects appearing at any stage of the work shall be cause for rejection even though the piece in question may have previously been passed as satisfactory.

Costs associated with the Structure that do not fall into an identified SWBS section on the Schedule of Values can be charged to the Section 100 top level SWBS group as needed by the CONTR.

The drawings and schematics from the PYXIS Class are provided as reference for required materials and guidance. Some changes are required to adapt reference engineering to this project due to differences between the SOLANO, equipment changes and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approval by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, PYXIS and review of the reference information to ensure these concerns shall be addressed in the final bid price.

101 STRUCTURAL MATERIALS

Section 830 of this specification contains the principal requirements for materials used in construction of the Vessel. Aluminum alloys used in the Vessel shall be in conformance with the structural calculations and as per Table 101.1 unless otherwise noted.

<table>
<thead>
<tr>
<th>Component(s)</th>
<th>Material(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate ≥ ⅛”</td>
<td>ASTM B928 5083, 5086, 5456-H116 or H321</td>
</tr>
<tr>
<td>Plate &lt; ⅛”</td>
<td>ASTM B928 5083, 5086, 5456-H116 or H321, or 5052 of SAE AMS-QQ-A-250/8</td>
</tr>
<tr>
<td>Extrusions</td>
<td>ASTM B221 6061-T6, 5086, 5083, 5456-H111 or H112</td>
</tr>
</tbody>
</table>

Non-structural items of trim and outfit such as window and doorframes, castings, and hardware items may be alloy 6063 or alloy 6061 of ASTM B221 or alloy 356.1, 356.2 or A356.2 of ASTM B179. Alloy 6061-T6 of ASTM B241 may be used for pipes as structural components. If so used, allowable stresses shall be based on the zero-temper condition. Brasses and bronzes shall be mixtures of virgin material of proper proportion for the purpose intended and shall be clean, smooth castings, uniform in texture and finish. Galvanizing shall be done by the “hot dip” process. Electro-galvanizing will not be accepted. Unwelded fasteners, pipe, tube, sheet metal, or plates and shapes of stainless steel will be grade 316. Where stainless steel is welded, grade 316L will be used unless otherwise specified. In areas of extreme corrosion concern the use of duplex stainless-steel grade SAF 2205 or SAF 2507 shall be used. If the CONTR proposes the use of any specialty materials (Inconel, Duplex stainless steel, titanium, etc.) they shall obtain approval in writing from the OWNER for the application and welding procedures.
102 WELDING & FITTING

All welding shall conform to the requirements of the USCG, the selected classification society, and the special requirements of this specification. In addition, all welding shall be performed by USCG and classification society certified aluminum welders with current certification. Welder qualification certificates shall be provided to the OWNER prior to a welder performing welding on the Vessel.

Special attention shall be provided to joint design and welding procedures in high stress areas in recognition of the high life cycle service which this Vessel will experience.

All lap welds and fillet welds shall be continuous with ends wrapped around snipes, edges, limber holes, etc. All crater cracks shall be repaired in process.

Intermittent welding is permitted where, and only where, allowed by USCG and classification society rules. Special attention shall be paid to the length of both the weld and the interval, and the uniformity of the weld. The CONTR shall provide a detailed weld schedule that addresses all areas of the Vessel as dictated by the classification society rules and the CONTR’s structural calculations package.

The CONTR shall submit a plan for the non-destructive testing of structural welds. The plan shall designate the inspection plan, the acceptance criteria, and the resolution plan in the event that defective welds are discovered. The CONTR shall provide the plan to the OWNER for review at least thirty (30) days prior to start of welding.

The CONTR shall provide a written welding procedure for the isolation and protection of sensitive equipment when welding occurs onboard. The plan shall address, but is not limited to the following items:

- MTU engine electronics
- MTU emissions electronics
- MTU Callosum automation electronics
- Hamilton Propulsion Controls
- PA/GA electronics
- CCTV electronics
- Navigation electronics
- Battery Systems
- HVAC automation electronics
- Any additional sensitive electronics

103 STRETCH PLANS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to split the hulls and superstructure on the parting plane identified in the Advanced Multihull Design (AMD) Contract level Stretch Plan. The CONTR is required to provide the detailed engineering for the structural changes. The stretch plan shows the portions of the hull that will be replaced as part of the rebuilding process. The CONTR shall provide in their proposal how they intend to modularize the hull sections for incorporation into the existing hull and superstructure. The exact details of the hull structure, stretch and new hull modules shall be determined in the detailed Design and Engineering Phase. In order to expedite the construction process the CONTR is encouraged to group the new portions of the Vessel into modules that can be pre-outfitted and reduce the overall construction schedule. Below are a sample of reference hull structure drawings for the CONTR to determine the requirements for the Detailed Engineering and Design process.
Reference Drawings

- 0472-011-001-00 – Mid-Life Refurbishment Plan
- 0433-010-002-00-H-20180924 - PYXIS Class General Arrangement
- 8700-010-001 - SOLANO General Arrangement Drawing
- SOLANO Mid-Life Refurbishment Plans in Appendix B
- SOLANO Structural Drawings in Appendix B
- PYXIS Class Structural Drawings in Appendix B

111 HULL STRUCTURE

General Guidance

All hull structure shall meet USCG requirements and conform to the classification society rules however the Vessel will not be classed.

Det Norske Veritas (DNV) rules shall be used for structural design and construction. The structure shall be designed to meet DNV R4 rules for High Speed Light Weight craft and reviewed by DNV. DNV shall provide a letter stating the structure has been review and marked examined to be submitted and be approved by the USCG.

All overboard discharges and local structural reinforcement shall be constructed using insert plates in accordance with WETA’s standard detailing provided in Appendix B2. Doubler plates will not be allowed unless specifically approved by the OWNER.

All shell plating in way of the propulsors shall be suitably thick to effectively dampen structure borne vibrations. Alternate mass damping solutions may be applied, or thinner materials used subject to sufficient engineering analysis and OWNER approval.

A high level of structural detailing shall be used throughout the Vessel. Structural connections shall be integrated into the framing design wherever possible to avoid brackets. Lap jointed brackets and stiffeners shall not be used unless required by class or approved by the OWNER. Stiffener end terminations shall be softened and/or well integrated to provide a high degree of stress flow continuity and hard spots or stress concentration reductions.

111.1 New Hull Modules

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install new hull modules as per the reference drawings. The entire hull from the transom up to the parting plane shall be new structure. The reference drawings provide details on the parting planes both longitudinally and transversely. The incorporation of the new waterjets, engine, gear and SCR girders with the changes to the hull shape to fair in the new extended hull components requires that the entirety of the hull bottom be replaced aft of the parting line. The hull shape and structural details shall be defined by the Vessel’s designer, AMD. The CONTR shall be required to hire AMD at a minimum to define the hull shape, scantlings, structural calculations and to provide the DNV letters of examination. AMD shall also be hired to provide the guidance in regards to performance, weight, balance and structural details to ensure the rebuilt Vessel is as similar as possible to the PYXIS Class. The CONTR shall provide in their bid who they intend to use for all other items of production and systems engineering and naval architecture. The engineering package shall include everything that is required to fully define the structure of the new hull modules, assembly, cut parts and the final entire Vessel construction drawings with the new modules integrated for DNV review and approval. The final details of all of the drawings will be determined during the Detailed Design and Engineering Phase of the project.

111.2 Wet Deck

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove all the cladding on the underside of the main deck between the hulls. The underside of the main deck made
accessible by the removal of the cladding shall be high pressure washed to remove all salt and debris prior to inspection. All the cladding shall be replaced in kind after the wetdeck work has been completed. The cladding is a bolted and/or skip welded extruded corrugated hat section. Where no piping access is needed the cladding shall be welded in place. Where access to piping or other items in the wetdeck is required the cladding shall be bolted in place. The CONTR shall provide details on the new cladding to ensure it matches the existing the extruded hat section cladding. All details of the where sections are welded versus bolted shall be reviewed and approved by the OWNER prior to the installed of any cladding.

The CONTR shall provide for the OWNER a dedicated man lift (bucket or scissor) capable of lifting 2-3 people at the height needed to inspect the underside of the main deck structure. The CONTR shall clear obstacles and debris out of the way so the OWNER will have limited trouble operating the man lift around the underside of the Vessel. Obstacles shall be allowed if they do not preclude the man lift from accessing any portions of the wetdeck area for inspections. The CONTR shall provide the OWNER with dye penetrant supplies to check for cracks in the main deck structure. The wetdeck cladding shall be media blasted to SP-10 bare white metal and re-installed after the OWNER had given the approval to close the wet deck.

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all new wet deck cladding required to cover the new sections of the Vessel as part of the hull stretch. In addition, the CONTR shall provide an additional 200 lineal feet of the wet deck extrusion matching what is currently installed. The additional extrusion shall be installed at the direction of the OWNER. Any extrusion not used to replace wasted portions of the wet deck cladding shall be shipped to the OWNER’s NBOMF at the direction of the OWNER.

The wet deck cladding shall be installed with careful attention paid to faying surfaces and bolting hardware isolation. All hardware shall be 316SS and isolated with isolation materials approved by the OWNER. The installation details shall follow the requirements of the 631 section on proper isolation. The final details of all of the drawings will be determined during the Detailed Design and Engineering Phase of the project.

### 126 TANKS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install tankage in accordance with Table 126-1. Optional items shall be priced separately on the Schedule of Values for OWNER determination. All options shall be priced as standalone items that the OWNER can pick and choose based on budget and priority.

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Service</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Fuel Oil Storage</td>
<td>existing integral tanks 3300 gallons each, new independent tank option 2880 gallons each</td>
</tr>
<tr>
<td>2</td>
<td>Urea Tanks</td>
<td>New tanks meeting final EPA T4 requirements for 2 days of operation, ~250 gallons each</td>
</tr>
<tr>
<td>1</td>
<td>Potable Water Storage</td>
<td>Reuse existing after cleaning, qualification and recoating, total capacity 500 gallons</td>
</tr>
<tr>
<td>1</td>
<td>Sewage Holding</td>
<td>Provide new per reference drawings, total capacity 500 gallons</td>
</tr>
<tr>
<td>2</td>
<td>Oil Replenishment System (ORS) Tanks</td>
<td>Reuse existing</td>
</tr>
</tbody>
</table>
### Technical Specification

**Engine Room Clean Oil Tanks**
- Reuse existing

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Engine Room Clean Oil Tanks</td>
<td>Reuse existing</td>
</tr>
<tr>
<td>2</td>
<td>Reduction Gear Clean Oil Tanks</td>
<td>New 10 gallon per reference drawings</td>
</tr>
</tbody>
</table>

All tanks shall meet USCG and the selected classification society's structural requirements. Potable water, fresh water, and sewage tanks and associated systems shall comply with United States Public Health Service (USPHS) requirements. All tanks under pressure shall comply with the ASME Boiler Code.

All new tanks shall be independent of the hull shell and shall have sufficient space between the tank and shell structure for inspection and maintenance of the shell and the tanks. All tanks shall be supported on foundations to support the tanks under all load conditions. All tanks shall have bolted access openings so personnel may enter the tanks for cleaning, maintenance and repair.

The existing potable water tank shall be retained in the base scope of the Contract scope of work. The tank shall be opened, media blasted to SP-10 for inspections. The CONTR shall pressure test the tank in the presence of the OWNER and the USCG. Any suspect areas identified by the OWNER of the USCG during the inspections shall be dye penetrant tested, Ultrasonic Thickness (UT) tested or pit gauged as required by the nature of the defects. Any repairs to the Water tanks shall be handled in the change order process.

The existing Sewage tank shall be removed and replace with a new sewage tank as per the reference drawings. The sewage tank shall be outfitted similarly as the PYXIS Class designs were based off of the SOLANO. The details for the installation and plumbing of the in-tank sewage pumps shall be as per the PYXIS Class. All details for the production and integration of the systems shall be determined in the detailed engineering and design phase.

The potable water and sewage tanks shall be coated with an OWNER approved coating schedule, International paint or approved equal per the 631 SWBS section. Special attention shall be paid to the application of coatings and the schedule for the sewage tank. The existing potable water tank shall be media blasted to SP-10 internally, inspected, gauged and recoated.

The existing Engine Room Oil Replenishment System (ORS) tanks and clean oil tank shall be retained and reused in the new hull sections. The existing independent tanks shall be located in the new hull sections as per the reference machinery arrangement drawings of the PYXIS Class. The existing tanks shall be cleaned and inspected by the OWNER and MTU prior to reuse. Any areas that are deemed suspect by the OWNER or MTU shall be dye penetrant tested for possible cracks. Any repairs identified in the testing of the existing oil tanks shall be handled in the change order process. Any changes required to the existing oil tanks to meet the requirements of the new systems shall be included in this item by the CONTR. No new oil shall be added to the tanks and the machinery until the tanks have been inspected and signed off by MTU for warranty purposes.

The integral Fuel tanks shall be retained in the base package of the Contract scope of work. As such the CONTR shall be required to complete the engineering to change the Vessel arrangement, systems, tonnage, production drawings and naval architecture to account for the differences between the existing integral tank and the PYXIS Class independent tanks. The retention of the existing integral fuel tanks will require the CONTR to fully clean both fuel tanks, inspect and pressure test with the OWNER and USCG in attendance. Any areas that are deemed suspect by the OWNER or the USCG shall be dye penetrant tested for possible cracks. Any repairs identified in the testing of the existing fuel tanks shall be handled in the change order process. Any changes required to the existing fuel tanks to meet the requirements of the new fuel systems shall be included in this item by the CONTR.

The urea (DEF) tank volume shall be approximately 250-gallons each. The CONTR shall account in their pricing for two (2) 250-gallon tanks manufactured from 316L stainless steel. The PYXIS Class vessels are outfitted with round DEF tanks. The tanks shall be designed with an integral inspection port fabricated from pipe flanges suitable sized for access to inspect and clean the tank. The tanks shall also be designed with an integral pipe sump.
shall include the suction port and a low point drain. The tanks will be fitting with the stand pipe structure required for MTU’s supplied level sensors. The tank design shall also include an integral drip tray to ensure leakage of the DEF does not accumulate in the bilge. The tank design all include all other ports, brackets and foundations required to make all aspects of tank, DEF system and monitoring systems 100% functional. All details of tank construction shall be worked out in the detailed engineering and design phase.

Detail 126-1: DEF Tank PYXIS Class

126.1 Optional Independent Fuel Oil Tanks

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to complete the removal of the existing integral fuel oil tanks and the installation of new independent tanks. The new tanks shall be as per the PYXIS Class and have an approximate capacity of 3300 gallons each. The new fuel oil tank designs shall be as per the AMD reference drawings with additions and productions details added to match the PYXIS Class vessels. Exact details and production details shall be completed during the detailed engineering and design phase of the project. In general, the tanks shall be constructed and detailed as per the details below and the AMD reference drawings for estimating purposes. Included in this option should be a reduction in engineering effort from retaining the existing integral tanks. The CONTR should account for any reductions in engineering effort in this item to fairly price the option.

126.2 Optional New ORS & Clean oil Tanks

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to complete the engineering, design, fabrication and installation of new ORS and clean oil tanks. The new tanks shall be as per the PYXIS Class. The new ORS tanks shall have a capacity of 60 gallons and the new clean oil tank shall have a capacity of 15 gallons. The details and designs of the new tanks shall be determined during the detailed engineering and design phase. All oil tanks shall be fabricated from aluminum alloy as per the existing and the PYXIS Class. The proceeds from the scrap value of the old tanks shall be credited back to this item in the bid price to reflect the true cost of the option.

Tanks shall have Fills, Vents and Sounding provisions in accordance with Section 506.

Reference Drawings
- 8700-022-006 - Sullage Tank
- 0433-022-008-00-Fuel Tank & Foundation
151 SUPERSTRUCTURES

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to completely modify and add the new superstructure sections as per the reference drawings. The enclosed passenger deck areas shall be constructed from aluminum alloy and well insulated from exterior weather, noise, and odors of the machinery plant as per the existing and PYXIS Class designs.

The superstructure on the AMD class Vessels is constructed from very thin plating (2mm) and will require very skilled welders to complete proper welds with minimal distortion. If the CONTR cannot provide a recent example of a large-scale fabrication project utilizing aluminum plating of a similar thickness the CONTR shall be required to qualify all welders who will be working on the superstructure. The qualification shall consist of an agreed upon test panel utilizing the plating and stiffeners used in the AMD house construction. The test panel shall be approximately 300mm square with one plate butt seam and one stiffener. The panel shall have an acceptable level of distortion, all welds shall be appropriately sized, free from excessive print through.

The CONTR shall be required to complete all of the detailed engineering for the superstructure modifications. In addition to the construction and integration of the new superstructure modules the engineering effort will entail the definition of all items of systems and outfitting engineering required to completely integrate the new and modified systems into the new and existing superstructure sections.

The Contract base scope of work shall not include the aft main deck bike rack area enclosure structure. The engineering provided by AMD shall account for removal of this structure if the option to add it is not exercised. The base scope of work shall include all engineering required to remove the structure from the plans, weight studies and all other aspects of the Vessels design and construction. The reference bike rack drawings in the appropriate SWBS section shall be modified as required to account for the removal of the enclosing structure.

151.1 New Pilothouse Option

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to complete the removal of the existing portions of the pilothouse and install new as per the PYXIS Class. This shall include but is not limited to the pilothouse windshield and house sides as effected by the change from aft raked to forward raked windows. In addition, the revision to the window rake shall necessitate changes to the pilothouse dash and overhead consoles to match the arrangement of the PYXIS Class. These changes are not substantial so careful attention should be paid to the differences between the two arrangements. The PYXIS Class pilothouse arrangement was based off of the SOLANO with changes made for new equipment and the forward raked windshield. This option shall include everything that is required to make these changes, engineering, design, fabrication, installation, trim, outfit, insulation, windows, paint and anything else that is required to complete the installation the same as a new Vessel. Reference the appropriate SWBS sections for optional details that are included in this option.

151.2 New Aft Deck Bike Enclosure Option

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install the new structure enclosing the aft main deck exterior bike racks as per the PYXIS Class. The structure is as per the reference drawings.

Reference Drawings
- 0472-011-001-00 – Mid-Life Refurbishment Plan
- 0433-010-002-00-H-20180924 - PYXIS Class General Arrangement
- 8700-010-001 - SOLANO General Arrangement Drawing
- SOLANO Mid-Life Refurbishment Plans in Appendix B
- SOLANO Structural Drawings in Appendix B
- PYXIS Class Structural Drawings in Appendix B
163 SEACHESTS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all of the seachests in the new hull sections. There shall be two (2) main Engine Room sea chests in each new engine room. There shall also be one (1) sea chest in each Jet Room to service the fire pumps. All seachests shall be coated as per the requirements of Section 633. The Engine Room seachest reference drawing shall be provided. The Jet Room sea chest shall be as per the PYXIS Class Vessels drawings not provided.

**Reference Drawings**
- 0433-022-301-00-A- (Eng Room Seachest)

166 SPONSENS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install, modify and add rub rails per the reference drawings. The rub rail shall be robust and designed for the high number of daily landings associated with the intended route. The CONTR shall extended where required the rub rail design that exists on all the AMD Vessels. The CONTR shall utilize the specific SAPA rub rail extrusion die that WETA owns that matches the existing rub rails on all of the Vessels. The SAPA die number is 36195. Any excess rub rail extrusion purchased by the CONTR shall be provided to WETA when the Vessel is re-delivered for use on future repair projects. The CONTR shall be responsible for creating a detailed rub rail modification drawing during the detailed engineering and design phase of the project. The rub rails details will be matched to WETA’s operational requirements as per the PYXIS Class.

**Reference Drawings**
- 0433-023-001-B (Bitts & Sponsons)

167 HULL DOORS, HATCHES & MANHOLES

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all new hatches and overhaul the existing as per the terms of this section. The CONTR shall pay close attention to the arrangement of the hatches on the main deck into the hull voids between the PYXIS Class and the SOLANO. Where hatches have to be moved to match the PYXIS Class location and size, they shall be replaced with new Freeman Marine hatches matching the provided in the material schedule. The locations of the old hatches shall be inserted and stiffened that same as the surrounding structure IWO that hatch. Engine Room access hatches are custom fabricated A-0 hatches and shall be reused as they were recently replaced. All Hatches not replaced shall have their seals and dogging mechanisms replaced to OEM specifications. All new interior hatches, excluding the tank void access hatch, shall utilize a single point mechanism for dogging while exterior hatches will utilize the standard tee bar.

The details of all of the hatch installations and moves shall be determined in the detailed engineering and design phase of the project. Hatch covers shall be secured to the Vessel with stainless steel wire lanyards or other means meeting the requirements of 46CFR§116.1160 and approved by the OWNER. All hatch covers shall be flush with the ring so as not to be a tripping hazard. On the interior of the Vessel hatch ring shall be installed such that the hatch ends up even with the installed flooring surface in that area. Exterior hatches into void spaces and emergency escapes shall rise far enough above the finished deck to prevent puddling similar to the PYXIS Class.

Emergency escapes from the Engine Room and access hatches to the Jet Rooms and tank voids shall be operable from both above and below the deck and shall be hinged. All hatches shall meet all Structural Fire Protection (SFP) regulatory requirements. Engine Room aft emergency escape hatches located in the aft Engine Room bulkheads (new) shall be protected with spray on Dendamix SFP meeting USCG requirements. The SFP on the hatch shall be covered with a light gauge stainless steel sheathing held in place with bimetallic pins similar to standard SFP. The protective flashing shall serve to protect the SFP and provide a secondary means of attachment as it will be
sandwiched between the hatch and the sheathing. The sheathing need not cover 100% of the SFP but shall cover what can be without interfering with the dogging mechanisms. All edges of the sheathing be hemmed of trimmed such that no sharp edges existing.

All exterior hatches shall be fit with a hasp to accommodate a pad lock. For the Jet Room access hatch, the hatch shall be fully operable from the Jet Room side with the hatch locked from above.

All tanks whether integral or freestanding shall be fitted with bolted manholes; or in the case of small tanks access hatches shall be fitted to permit cleaning and inspection.

Bolted hatches (soft patches), suitable stiffened, shall be provided in the overhead decks of the machinery spaces, of adequate size and suitably located to vertically remove and install main engines, reduction gears, SCRs, and generator sets. These access plates shall be flush with the finished deck. Fasteners shall be 316SS hex head bolts designed to ensure structural and watertight integrity as per the reference drawing provided from the PYXIS Class. Fasteners shall allow for quick and easy removal of the access plates for maintenance and repair operations. The perimeter of these soft patches shall be sealed with marine grade silicone sealant. Integrate machinery ventilation equipment into soft patches as may be required.

Layout, construction, and utility shall be equivalent to the soft patches on INTINTOLI, MARE ISLAND and the reference drawings from the PYXIS Class. These hatches shall permit the removal of the machinery without having to move or remove other machinery with the exception of minor piping and lighting fixtures. Gasket material shall be nonflammable. Hatches shall be hose tested after installation. The hull structure around the hatches shall be compensated as necessary to maintain hull structural integrity.

Provide bolted plate inserts in the Fidley bulkheads as necessary to allow for removal of machinery along that route, similar to PYXIS Class. Provide bolted plate access to any equipment or machinery that is contained within any normally closed space.

Provide a fire rated (as required by USCG, C, C’ or A-0) hinged deck hatch in the Pilothouse for access to the void space underneath. This deck hatch shall be located to best suit access to the space considering the installations there. The deck hatch shall be finished flush with the deck covering in the Pilothouse and be structurally reinforced to prevent any deck sag. The hatch shall be finished with the same deck treatment as the rest of the Pilothouse. Include hardware to hold the hatch in the open position. The hatch should be at least thirty inches (30") square, or of similar open area. If the existing pilothouse deck hatch is undisturbed by the contract scope of work and is located in a position approved by the OWNER the CONTR may reuse the existing hatch upon approval by the OWNER and in agreement with the USCG. Provide a ladder going into the void space and a grab bar on the face of the Pilothouse console to assist personnel access to the space.

Provide raised coaming type hatches for access to the Engine Rooms (reuse) and Jet Rooms (New). The existing arrangement of these hatches is acceptable except that the Jet Room raised coaming has been relocated in the new hull sections to the aft side of the house. Hatches shall be as per the reference drawings provided. Provide rails and grab bars as necessary for personnel use in climbing into or out of all hatches. Provide positive latching mechanisms for these hatches when open to preclude the hatch from falling with personnel in the hatch.

Lifting padeyes shall be installed above all Engine Room ladders to allow for easy lifting of parts, motors, and other heavy equipment.

Lifting padeyes shall also be welded to overhead framing to facilitate equipment change out where the weight of said equipment exceeds sixty-five (65) pounds. All padeyes shall be weight tested and marked accordingly, and rated at 1000 pounds minimum.

Soft patch perimeters shall be to be sealed with quick curing 3M™ 5200 marine adhesive sealant.
Some changes are required to adapt reference engineering to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approval by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO and review of the reference information to ensure these concerns shall be addressed in the final bid price.

<table>
<thead>
<tr>
<th>Table 167.1 – Hatch Material Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item Description</td>
</tr>
<tr>
<td>Main Deck</td>
</tr>
<tr>
<td>Main Deck Void#2</td>
</tr>
<tr>
<td>Engine Room Access</td>
</tr>
<tr>
<td>Jet Room Access</td>
</tr>
<tr>
<td>Engine Room Escape</td>
</tr>
<tr>
<td>UD HVAC Room Access</td>
</tr>
<tr>
<td>Pilothouse Plenum Access</td>
</tr>
</tbody>
</table>

Reference Drawings

- 0472-011-001-00 – Mid-Life Refurbishment Plan
- 0433-010-002-00-H-20180924 - PYXIS Class General Arrangement
- 0433-022-401-00-(Eng removal hatch)
- 0433-022-402-00-(Eng hatch cover)
- 0433-022-411-00-(Jet Room hatch)
- 0433-022-412-00-(jet rm hatch cover)
- 0433-022-421-00-(gen set hatch)
- 0433-022-422-00-(gen set hatch cover)

171 MASTS

The mast on the Vessel shall be retained. The CONTR shall supply all necessary labor, material, skills, and equipment required to make any modifications required to make the existing masts match the mast arrangement and functionality of the PYXIS Class masts. Any changes required due to changes in navigation or communication electronics equipment between the PYXIS Class and this Contract shall be made by the CONTR as part of this scope of work. As per the requirements of the 631 section the mast shall be stripped and blasted to a SP-10 profile prior to painting.

Reference Drawings

- SOLANO drawings
  - 8700-034-001 - Mast Base Structural A & D
  - 8700-034-002 - Mast
  - 8700-034-003 - Mast Details

END OF 100 SECTION
200  Machinery - Propulsion and Ship Service

Main propulsion power for the Vessel shall be provided by the propulsion package matching the PYXIS Class. The propulsion engines, SCRs, emissions control electronics and generator sets (prime movers only) are OWNER Furnished Equipment, see Appendix X. The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install everything else required to complete the requirements of this section. These items were required to be purchased by WETA as per CARB regulations as it relates to operational extensions granted to WETA. The goal of the project is to match the equipment and arrangement of the machinery as closely as possible to the PYXIS Class. This will lower WETA’s requirements for spare equipment and crew training requirements. Where machinery, valves or critical equipment shall be located below the deck plates they shall be provided with hinged access plates per the PYXIS Class and at the OWNERS direction. Access to equipment and piping is critical to the reliable operation of the WETA Vessels. The individual sections of this 200 level SWBS group are intended to describe as best possible the machinery, equipment, arrangement and installation matching that of the PYXIS Class. All items in the machinery spaces shall have the appropriate labels installed to indicate the location of the equipment if not visible, the piece of equipment if not intuitively obvious, all manifold, all valves and all pipes indicating the fluid and direction of flow as per the requirements of section 500.

Costs associated with the Machinery – Propulsion and Ships Service that do not fall into an identified SWBS section on the Schedule of Values can be charged to the 200 top level SWBS group as needed by the CONTR.

The drawings and schematics from the PYXIS Class are provided as reference for required materials and guidance. Some changes are required to adapt reference engineering to this project due to differences between the SOLANO, equipment changes and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approval by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the reference information to ensure these concerns shall be addressed in its proposal.

205  PROPULSION SYSTEM INTEGRATION

The CONTR shall employ the services of the Designated Propulsion Systems Integrator (DPSI) from the PYXIS Class. The DPSI for those Vessels is Pacific Power Group (PPG). WETA has purchased the items noted from PPG and the CONTR shall purchase from PPG everything needed to complete the propulsion system for the Vessel including all design, engineering, calculation, analyses, machinery, equipment, hardware be, filters, inspections, tests, and trials.

DPSI is aware of this project and can provide the scope of materials and services needed to complete the propulsion system installation including but not limited to couplings, reduction gears, shafting, bellows, lube oil pumps, fuel filtration, automation, controls and electronics not covered with the engines already purchased by WETA. The CONTR shall reference Appendix C for the complete list of OFE.

205.1 Extended Propulsion System Warranty Option

The CONTR shall supply, should the option be exercised, the extended warranties for the following equipment:

- MTU 16V4000M65L engines
- MTU Cube SCR system
- MTU Callosum system
- ZF9055 reduction gears
- Centa Shafting components and couplings

The extended warranty shall be the manufacturers standard extended warranty for the full 5 year period from in service date. These warranties shall be the same as other recent WETA new build programs.
233 DIESEL ENGINES

WETA furnished MTU 16V4000M65L main propulsion engines and Cube style SCR’s are utilized for this project. The engines match the rating and emissions profile of the engines installed in the PYXIS Class. The engines are rated at 3,433bhp @ 1800RPM and shall be EPA Tier 4 certified. The CONTR shall contact the DPSI for delivery time frames for the engines and SCRs. The CONTR shall utilize the delivery time frame for development of the proposed construction schedule.

The engines shall be installed in a similar manner as the engines and the PYXIS Class. The engine shall reside on MTU provide soft mounts and steel base plates. The CONTR shall mount the engines on chockfast after confirmation of the final wet alignments per OEM tolerances.

Reference Files
- Exhibit A - PPG Quotation (engines purchase M/V SOLANO)
- 0472-070-001-00- Machinery Arrangement
- 0472-071-001-00- Propulsion System Arrangement
- 16V4000M65 ZF9550 REV D (DPSI Arrangement Drawing)

241 REDUCTION GEARS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install ZF model ZF9055 marine reduction gears (gears) with a parallel vertical offset and ratios matching that of the PYXIS Class. The gears shall be configured with all items of outfitting and monitoring to match the PYXIS Class. The gears shall be provided by the CONTR and purchased from the DPSI as a part of the integrated propulsion package. The gears shall be mounted on ZF supplied soft mounts as per the PYXIS Class. The as installed gears shall have all items needed for servicing easily accessible. As per the PYXIS Class the gears shall be supplied from the DPSI with custom input couplings designed to work with the bulkhead shaft seals.

Reference Files
- 0472-070-001-00- Machinery Arrangement
- 0472-071-001-00- Propulsion System Arrangement
- 16V4000M65 ZF9550 REV D (DPSI Arrangement Drawing)

242 PROPULSION COUPLINGS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all machinery couplings as per the PYXIS Class. The entire driveline, torsional and misalignment couplings are to be a complete engineered system supplied by the DPSI and manufactured by CENTA. The CONTR shall provide alignment services as per the scope of Section 243.

Reference Files
- 0472-070-001-00- Machinery Arrangement
- 0472-071-001-00- Propulsion System Arrangement
- 16V4000M65 ZF9550 REV D (DPSI Arrangement Drawing)

243 SHAFTING

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install the propulsion shafting system. The shafting scope of supply is to include all of the components required to complete the installation of the shafting system as per the PYXIS Class purchased from the DPSI and manufactured by Centa.
All metal parts of the shafting system shall be painted to match the engine to prevent corrosion. Provide a removable drive line spool shaft in the Jet Room aft of the reduction gear for removal and servicing the shaft seal assembly.

243.1 Shafting Alignment

Preliminary propulsion train alignments shall occur prior to Vessel launch. Final alignment shall be conducted after Vessel launch once the Vessels structure has reached floating equilibrium (a minimum of 48 hours afloat). Care shall be taken to properly account for the daily heating and cooling of Vessel structure. An alignment report will be provided by the CONTR, indicating actual alignment measurements of the complete propulsion system and indicate compliance with all OEM requirements. The CONTR shall be responsible for the performance and documentation of all shafting alignments. The CONTR shall verify, in writing, to the OWNER that all final alignments of the shafting system and machinery is within all OEM requirements for installation and warranty. No elements of the system shall be delivered at their maximum misalignment tolerance. No reading may exceed 75% of the CENTA specified limit. The final shaft and engine alignments shall be witnessed by the OWNER. A copy of this inspection procedure shall be agreed to and signed by the OEMs for the main engine, shafting and coupling manufacturer, the reduction gear, and the waterjet. If a dispute arises in the accuracy of the alignment readings the OWNER shall require the CONTR to undertake alignment readings with a third-party alignment specialist utilizing a laser alignment system.

All propulsion shafting shall be easily removable, to allow for maintenance and repair of the reduction gear boxes, seals, couplings, and waterjets.

The CONTR is responsible to design and install removable guards over exposed shafting, shaft couplings, and all rotating machinery to prevent personnel injury and facilitate maintenance and inspections. All guards shall be fabricated from aluminum alloy unless specifically approved by the OWNER.

Should any changes to the PYXIS Class shafting system be required the CONTR shall be responsible for all costs associated with re-engineering the shafting system and providing the same level of analysis and documentation as conducted on the PYXIS Class.

Reference Files
- 0472-071-001-00- Propulsion System Arrangement
- 16V4000M65 ZF9550 REV D (DPSI Arrangement Drawing)
- CENTADISC-+025-60637-000-xxx
- CENTADISC-+034-60711-000-xxx_1 - No Torque Flange
- DCI WETA NB - CENTA_Whirling Letter_05 30 2018
- PPG -WETA DCI NB-Alignment_Force_Moment_Analysis

244 SEALS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install bulkhead seal assemblies in the Engine Room/Jet Room watertight bulkhead to allow the propulsion shaft to penetrate the boundary. The design and specification of this seal shall be as per the PYXIS Class purchased from the DPSI. The foundation for the seal assembly shall be as per the PYXIS Class.

Reference Files
- A14570-C-Ø240-WD200
- 0472-020-203-00 (BHD 3.5 Solano Mid-Life)
- 0433-020-203-00 (BHD 3.2 Pyxis Class)
247 WATERJETS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a complete Hamilton HT810 waterjet propulsion package as per the PYXIS Class. Any deviations from the PYXIS Class package would need to be specifically approved by the OWNER and the DPSI. The only known deviation currently would be a change to the new AVX Hamilton control system.

Reference Files
- 0472-070-001-00- Machinery Arrangement
- 0472-071-001-00- Propulsion System Arrangement
- A1300 Specification for HamiltonJet Waterjet Propulsion System

252 PROPULSION CONTROL SYSTEM

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a Hamilton Waterjet propulsion control system. The system shall be configured as per the PYXIS Class. The Control system shall be the AVX system from Hamilton for use on the HT810 series waterjets. The AVX system shall provide for all primary and backup controls at all three stations.

Provide dual lever throttle controls at all three operating stations and four (4) tiller assemblies, one (1) AVX “B” type at each bridge wing control station, one (1) AVX “A” type at the centerline helm station, and one (1) AVX “A” type mounted on the left armrest of the Captain’s chair. Open weather bridge wing units shall be provided inside a weathertight enclosure. All electrical components at bridge wing stations shall be mounted in NEMA 4 enclosures with internal heaters. Bridge wing stations shall be arranged to optimize visibility to the passenger boarding areas, and line handling locations at the Vessel stern and bow.

As per Hamilton standards the Control System shall be supplied power from two separate dedicated 24VDC control system battery banks. The battery banks shall be located in the Jets Rooms along with individual dedicated 24VDC battery chargers. All Hamilton control system cables shall be installed in wireways separated from AC electrical cables. While they may share the same hangers control system cables shall be separated from AC cables as best possible to limit any chance of EMI.

Reference Files
- A1300 Specification for HamiltonJet Waterjet Propulsion System

256 SEAWATER COOLING

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install the seawater systems to service the main propulsion engines, gears and generator sets, fire pumps, bilge pumps and HVAC sea water cooling systems. The systems shall be installed as per the PYXIS Class and the drawings provided for reference. The systems shall consist of two (2) sea chest crossed over to the common sea water header that all components shall drawing sea water from. The two (2) sea chest shall be plumbed to their own independent 8” CuNi Miller-Leaman strainers custom configured for this project.

All piping shall be installed isolated from the Vessel following standard marine practice. Isolation kits shall be approved by the OWNER during the detailed engineering and design phase of the project. All flexible bellows provided by the DPSI shall be installed in accordance with the manufacturer’s tolerances for alignment and compression. The installed bellows shall be inspected and approved by the DPSI and the OWNER.

All valves shall be operable from the deck plates without removal of the deck plates; remote operators and remote handwheels shall be routed above deck plate level at the sides of the engine rooms. The final location of the remote handwheels shall be at the discretion of the OWNER. Special care and attention shall be given to the arrangement and operability of the valves and access to the strainers. Valves that are installed with a gear operator and a reach
rod the CONTR shall ensure that visual indication of the valve’s orientation is quick and easy to identify. All piping shall be in accordance with the general piping requirements of Section 505 and the reference drawing provided.

To maintain serviceability, provide at least two feet (≥2’) of clearance between the forward end of engine and seawater crossover piping. All materials shall be as per the reference drawings. Where items are not covered in the reference drawings that shall be supplied and installed by the CONTR to complete the installation to the highest marine standards. The CONTR shall utilize standard off the shelf pipe hangers that provide isolation and protection to the CuNi piping. Any custom fabricated pipe hangers will need to be approved by the OWNER. Seachest coating are provided per Section 633.

<table>
<thead>
<tr>
<th>Table 256.1 – Seawater System Material Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piping, seachest to isolation valve &amp; overboard hull penetration</td>
</tr>
<tr>
<td>Seachests crossover 8”</td>
</tr>
<tr>
<td>Main Engine Supply 6”</td>
</tr>
<tr>
<td>Main Engine Discharge 6”-2” as req.</td>
</tr>
<tr>
<td>Marine Gear Cooling 1”</td>
</tr>
<tr>
<td>Generator&amp; Bilge Pump Suction 2”</td>
</tr>
<tr>
<td>Generator Discharge 1 ½”</td>
</tr>
<tr>
<td>Valves 6” – 2”</td>
</tr>
<tr>
<td>Valves 1”, Gear Cooling</td>
</tr>
<tr>
<td>Seawater strainers 8”</td>
</tr>
<tr>
<td>Flexible Connections</td>
</tr>
<tr>
<td>Hose connections</td>
</tr>
<tr>
<td>Fasteners</td>
</tr>
</tbody>
</table>

Reference Files
- 0433.022.301 - ENGINE ROOM SEA CHESTS
- 8in CuNi Basket Strainer, Port (Aurora)
- 8in CuNi Basket Strainer, Starboard (Aurora)

259 ENGINE EXHAUST

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install the complete propulsion and generator exhaust and emissions control systems as per the PYXIS Class. The main engines shall utilize MTU’s “cube” style SCR system as per the installation on the PYXIS Class. The generators shall utilize a standard dry exhaust system as per the PYXIS Class. The main engine exhaust system has undergone CFD validation from the manufacturer so any changes to the design from the PYXIS Class would require re-validation from the factory.

The CONTR shall purchase from the DPSI the exhaust system piping and flex sections from the main engine turbos to the inlet of the SCR and the outlet flex section from the SCR. The DPSI provided this scope of supply on the PYXIS Class due to the tight integration into the engine package. All piping sections and flex section provided by the DPSI are furnished with removable insulation blankets as per the Exhaust Insulation Section. The cube style SCR shall be fitted with MTU’s USCG approved insulation package.

The CONTR shall reference the PYXIS Class for the design of the exhaust system for this project. All exposed surfaces that exceed USCG temperature limits shall be insulated with removable blankets as per Section 259.2.
On Sea trials all supporting and surrounding aluminum structure shall be checked with infrared temperature gun. No portions of the Vessel’s aluminum structure shall exhibit temperature above 150°F under sustained full load conditions. Any minor changes in the SCR package from the PYXIS Class test engine installation to the SOLANO Certified EPA Tier 4 system shall be accommodated by the CONTR under the base work of this Contract.

Table 259.1 – Exhaust System Material Schedule

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Material Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Engine Turbo to SCR Inlet 12”</td>
<td>DPSI Provided, Sch 10s ASTM A312 316L Stainless Steel</td>
</tr>
<tr>
<td>SCR Outlet to Surge Tube 18”-16”</td>
<td>Sch 10s ASTM A312 316L Stainless Steel</td>
</tr>
<tr>
<td>Surge Tube 16”</td>
<td></td>
</tr>
<tr>
<td>Tailpipe Assembly 16”</td>
<td></td>
</tr>
<tr>
<td>Generator Exhaust 5”</td>
<td>Sch 40 ASTM A312 316L Stainless Steel</td>
</tr>
<tr>
<td>Generator Muffler 5”</td>
<td>HARCO End in, Side out 1236VRS 5 EI-SO SP per HARCO</td>
</tr>
<tr>
<td></td>
<td>Drawing #G 3291755</td>
</tr>
<tr>
<td>Flange OEM Turbo</td>
<td>Socket Weld or Slip On 316 Stainless Steel ASTM</td>
</tr>
<tr>
<td></td>
<td>A182/A182M Flanges, ASTM A240 Plate</td>
</tr>
<tr>
<td>Flange SCR Inlet DN300</td>
<td></td>
</tr>
<tr>
<td>Flange SCR Outlet DN450</td>
<td></td>
</tr>
<tr>
<td>Flange All Other ANSI B16.5 150#</td>
<td></td>
</tr>
<tr>
<td>Gaskets</td>
<td>Double Jacketed Stainless Steel</td>
</tr>
<tr>
<td>Fasteners</td>
<td>ASTM F593/F594 316 Stainless Steel</td>
</tr>
<tr>
<td>Isolation Hangers</td>
<td>MASON PC30 and CAPRO DYNAMICS W302-1</td>
</tr>
</tbody>
</table>

**259.1 Expansion Joints**

Provided by the DPSI as per the PYXIS Class. The expansion joints shall be approved by MTU and Hanco factory for this application. The flex sections shall be of the highest quality and covered under the DPSI’s standard warranty. The installation and alignment of the flex sections shall be inspected and approved by the DPSI and the OWNER.

**259.2 Exhaust Insulation**

Insulate all exhaust piping, flanges, expansion joints, silencers, and SCR in both the Engine Rooms and Jet Rooms, in accordance with the following:

- Engine exhausts shall be lagged with a multi-part system made up of silicon/fiberglass outer cloth (ALPHA MARITEX Style #3259-2-55) sewn to high temperature eighteen (18) ounce inner cloth (ALPHA SIL Style 600).
- Attached to that shall be a knitted stainless-steel wire tubular fabric (ALPHA MARITEX #91160) which is in direct contact with the pipe wall.
- Install a 2” temperature mat between the silicon outer cloth and the inner cloth.
- Insulation muffs are to overlap adjacent sections of insulated pipe by a minimum of 3”, and lace together with stainless steel hooks and wire. Insulation is to be installed in easily removable sections.
- Insulation blankets shall be pre-sewn and removable at all flanges.
- Cube style SCRs shall be insulated as per MTU’s standard USCG hot surface insulation package.

**259.3 Aft Engine Room Bulkhead Penetration**

The DPSI supplied outlet flex section shall be provided with a straight section of piping in the middle of the flex for the bulkhead penetration seal. The bulkhead penetration seal assembly shall be as per the PYXIS Class. The seal shall consist of a split 316L stainless steel gland plate that bolts into the AMD designed bulkhead opening. The gland shall accept Mineral Seal Corporation 1.75” fiberglass square braid MinGlas 3340 1000°F rated packing. The gland shall accept at a minimum 4 rows of square braid packing rope. The Jet Room side of the penetration shall contain the removable capture plate. The penetration shall be fully removable from the Jet Room side only as access to the aft
face of the SCR is restricted. The final details of the bulkhead penetration assembly shall be as per the PYXIS Class and finalized in the detailed design and engineering phase of the project after review and approval by the OWNER.

Detail 259.3-1: Bulkhead Penetration

![Diagram of Bulkhead Penetration]

259.4 Transom Penetration

The tailpipe shall penetrate the transom through a seawater cooled isolation ring as per the PYXIS Class. The seawater cooled aluminum ring shall be welded to the vessel’s transom. The hot stainless steel dry exhaust tailpipe shall attach to the aluminum flange and pipe stub off of the cooled seawater ring. There shall be an air gap between the dry stainless steel exhaust pipe and the aluminum sea water cooled ring, pipe stub and flange. The CONTR shall undertake a detail ship check of the PYXIS class with all detailed finalized in the detailed design and engineering phase of the project after review and approval by the OWNER.

Reference Files
- 0472-070-001-00- Machinery Arrangement
- 8700-259-10-SOLANO Exhaust System A&D

261 FUEL OIL SYSTEM

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install the fuel systems. Each engine will be provided with independent supply and return circuits. The sizing of piping and fittings will be in accordance with the PYXIS Class and OEM requirements. Fuel oil supply and return lines for main engines and generator sets shall be independent of each other all the to the tank per the PYXIS Class.

All fuel filters and associated gauges and valves shall be located above the Engine Room deck plates with drip pans under the fuel filter assemblies. Special care shall be exercised in meeting USCG spray protection requirements for the fuel oil system. Reference the provide machinery arrangement drawing for the approximate location of the filters.

The fuel system shall utilize the fuel filters and materials as per the material schedule for this section. All filtration for the main propulsion engines shall be purchased from the DPSI as part of the MTU approved fuel treatment system. The PYXIS Class Vessels were outfitted with MTU provided HYDAC filtration components. Any changes to the standard MTU scope of supply shall be accounted for by the CONTR in the bid price.

The CONTR shall provide and install an electric fuel priming pump for the main engines. The fuel priming pump shall be 24vdc and approved by the DPSI. The final details of the fuel system shall be as per the PYXIS Class and finalized in the detailed design and engineering phase of the project after review and approval by the OWNER.
All piping shall be in accordance with the general piping requirements of Section 505. Fuel oil tank level alarms (HI, HI-HI, LO, LO-LO and independent float switch alarms at 90% and 95%) and level sensing shall be provided by the CAMS as per the PYXIS Class. All sensors shall be purchased from the DPSI. The fuel system monitoring shall be as per the PYXIS Class.

<table>
<thead>
<tr>
<th>Table 261.1 – Fuel System Material Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Engine Supply 1.25” &amp; 1”</strong></td>
</tr>
<tr>
<td><strong>Main Engine Return 1”</strong></td>
</tr>
<tr>
<td><strong>Main Engine Intermediate Filter 1”</strong></td>
</tr>
<tr>
<td><strong>Generator Supply 1”</strong></td>
</tr>
<tr>
<td><strong>Generator Return ¾”</strong></td>
</tr>
<tr>
<td><strong>Main Engine Primary Fuel Filter ~10μm</strong></td>
</tr>
<tr>
<td><strong>Main Engine Intermediate Fuel Filter ~4μm</strong></td>
</tr>
<tr>
<td><strong>Generator Fuel Filter 10μm</strong></td>
</tr>
<tr>
<td><strong>Ball Valves</strong></td>
</tr>
<tr>
<td><strong>Return Check Valves</strong></td>
</tr>
</tbody>
</table>

Reference Files
- 0472-070-001-00- Machinery Arrangement
- MTU Fuel System Schematic for 16V4000M65L, Obtain from DPSI
- Intermediate Fuel Filter - 20171114_xz5470800098_0001
- Pre-Fuel Filter - 20171114_xz5470800097_0001

262 LUBE OIL SYSTEMS
The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all the various lube oil systems, tankage, pumps, controls and storage as per the PYXIS Class. The systems shall consist of the MTU pre-lubrication systems, the MTU ORS system, dirty lube oil system, Engine Room clean lube oil tanks, reduction gear clean lube oil tanks and various lube and hydraulic oil container storage.

Clean oil fill and dirty oil discharge fittings shall be provided in each Engine Room Fidley for connection of the appropriate shoreside oil system in accordance with Section 506. All clean lube oil systems and tankage shall be thoroughly cleaned and flushed prior to being placed in operation.

262.1 MTU Pre-Lube System
The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install the MTU pre-lubrication systems for both the MTU main engines. The system components shall be purchased from the DPSI as per their standard scope of supply. The exact details of the installation shall be as per the PYXIS Class Vessel installations with all components installed where they can be easy accessed and maintained. The pre-lube system is critical to the safe and reliable operation of the main engines. As such all piping, tubing, hoses and pumps shall be located where they shall be well supported, visually accessible for inspections and safely located in the bilge where they will not be subject to damage. All piping, tubing and hoses shall be installed free from stresses from misalignment and/or lack of support. The system shall be reviewed and approved by the DPSI prior to filling the
engines with oil and Dock Trials. The system shall be cleaned and flushed to the extent required by the DPSI for compliance with MTU warranties.

### Table 262.1 – Pre-Lube System Material Schedule

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump Suction 1.25”</td>
<td>Seamless Annealed Tube, A269 Grade 304 Stainless Steel. Wall Thickness to be Determined in the Detailed &amp; Engineering Phase. Fittings Swagelok Stainless Steel or Equal</td>
</tr>
<tr>
<td>Pump Discharge 1”</td>
<td>MTU Supplied</td>
</tr>
<tr>
<td>Pre-Lube Pump</td>
<td>MTU Supplied</td>
</tr>
<tr>
<td>Pre-Lube Pump Controller</td>
<td>MTU Supplied</td>
</tr>
<tr>
<td>Suction Hose</td>
<td>-16JIC by -20JIC MTU Supplied USCG Approved</td>
</tr>
<tr>
<td>Supply Hose</td>
<td>-16JIC by -16JIC MTU Supplied USCG Approved</td>
</tr>
<tr>
<td>Supply Check Valve</td>
<td>-16JIC MTU Supplied</td>
</tr>
</tbody>
</table>

#### 262.2 – MTU Oil Replenishment System (ORS)

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install the ORS’s for both main engines. The MTU system components shall be purchased from the DPSI as per their standard scope of supply. The ORS system provides make up oil from the ORS tanks mounted in the Engine Rooms. The system is constantly circulating lube oil from the main engines pan to the tank and back to the main engine.

The ORS tank shall be filled from a shore connection in the fiddley. The QD for the shore connection shall match the WETA shore side interface standards document referenced. The existing tank has a 1” fill connection, 1-1/2” vent connection, ¾” supply to engine connection that is valved and ¾” return from engine connection to the upper portion of the tank w/ internal plumbing to the lower power of the tank, ¾” valved connection to the dirty lube oil system and a ¾” valved drain connection at the bottom of the tank with threaded plug or cap. The tank is fitted with a DPSI approved pressure sensor teed into the drain port plumbing for tank level sending, WIKA S-10 series stainless steel. The tank shall be fitted with upper and lower 1” diameter sight glasses at 90% and 20% full. Each ORS tank shall be provided with an inspection port for cleaning, Seabuilt access plates or approved equal. The mounting of the ORS tank will account for thermal growth.

The oil will at engine operating temperatures and all piping, tubing, hoses and tanks shall be installed with this in mind. The existing tanks on the SOLANO and the PYXIS Class are insulated for crew safety utilizing the same SFP package and sheathing as the Engine Room side shells. All piping, tubing and hoses shall be installed to account for thermal expansion. All piping, tubing and hoses shall be installed such that crews undertaking normal Engine Room rounds will not accidentally come in contact with hot surfaces in excess of USCG limitations.

The exact details of the installation shall be as per the PYXIS Class Vessel installations with all components installed where they can be easy accessed and maintained. The ORS is critical to the safe and reliable operation of the main engines. As such all piping, tubing, and hoses shall be located where they shall be well supported, visually accessible for inspections and safely located in the bilge where they will not be subject to damage. All piping, tubing and hoses shall be installed free from stresses from misalignment and/or lack of support. The system shall be reviewed and approved by the DPSI prior to filling the engines with oil and Dock Trials. The system shall be cleaned and flushed to the extent required by the DPSI for compliance with MTU warranties.
262.3 – Dirty Lube Oil System

The CONTR shall provide and install the dirty lube oil system as per the PYXIS Class Vessels. The dirty lube oil system shall connect a common suction header to each piece of propulsion machinery in the Engine and Jet Rooms. That shall include the generators, main engines, ORS tanks and reduction gears. The waterjets shall not be connected to the system as the volume is not large enough to worry about. The system shall have an isolation valve located as close as possible to the suction port on each piece of equipment. The isolation valve shall be closed in the event of a failure of the dirty lube oil system piping so that the equipment will not lose all of its operating fluids. As such the isolation valves shall be located where they are well supported to resist the vibratory forces of the machinery it is attached to. If the valve is not located in plain sight signage shall be installed where visible to guide the crew to the location of the isolation valve at the direction of the OWNER. The isolation valves shall be lockable.

The pump and the manifold shall be located low in the Engine Room as per the PYXIS Class to limit the suction lift required by the dirty lube oil pump. The pump and manifold shall be located under an access plate in the Engine Room deck plates. The sizes listed in the material schedule are incumbent upon proximity of pump to subject elements. The discharge side shall be fitted with a stainless steel pressure gauge of suitable range visible above the deck plates. The system shall be plumbed to a shore side connection in the fiddley. The QD for the shore connection shall match the WETA shore side interface standards document referenced.

<table>
<thead>
<tr>
<th><strong>Table 262.2 – ORS System Material Schedule</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Engine Supply ¾”</strong></td>
</tr>
<tr>
<td><strong>Main Engine Return ¾”</strong></td>
</tr>
<tr>
<td><strong>ORS Tank Fill 1”</strong></td>
</tr>
<tr>
<td><strong>ORS Tank Vent 1-1/2”</strong></td>
</tr>
<tr>
<td><strong>Aluminum Fittings</strong></td>
</tr>
<tr>
<td><strong>Valves</strong></td>
</tr>
<tr>
<td><strong>Hoses</strong></td>
</tr>
<tr>
<td><strong>ORS Tank</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Table 262.3 – Dirty Lube Oil System Material Schedule</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suction Line Pump to Manifold 1.5”</strong></td>
</tr>
<tr>
<td><strong>Suction Line Gear and Gen. 1.25”</strong></td>
</tr>
<tr>
<td><strong>Suction Line Main Engine 1”</strong></td>
</tr>
<tr>
<td><strong>Discharge Line 1”</strong></td>
</tr>
<tr>
<td><strong>Pump</strong></td>
</tr>
<tr>
<td><strong>Valves</strong></td>
</tr>
<tr>
<td><strong>Hoses</strong></td>
</tr>
<tr>
<td><strong>Manifold</strong></td>
</tr>
</tbody>
</table>
262.4 – Clean Oil Replenishment

The CONTR shall provide and install the following items to provide clean lube and hydraulic oil replenishment. Each Engine Room shall be fitted out with a 15-gallon clean lube oil tank as per the PYXIS Class. The tank shall have a fill fitting matching the WETA shore side connector standards, vented fill cap with sounding rod, 1” diameter sight gauges at 90% and 10% and a ¾” valved filling station for an oiler can. The tank shall be mounted with an integral back splash and drip tray. These items shall be sized as per the PYXIS Class to fit the oiler can, jugs and funnels required of standard WETA Vessel operation.

Each Jet Room shall be fitted out with a 10-gallon clean reduction gear lube oil tank as per the PYXIS Class. The tank shall have a fill fitting matching the WETA shore side connector standards, vented fill cap with sounding rod, 1” diameter sight gauges at 90% and 10% and a ¾” valved and capped filling station for an oiler can. The tank shall be mounted with an integral back splash and drip tray. Each oil tank shall be provided with an inspection port for cleaning, Seabuilt access plates or approved equal. These items shall be sized as per the PYXIS Class to fit the oiler cans, jugs and funnels required of standard WETA Vessel operation.

Each Jet Room shall be fitted with a hydraulic and lube oil storage tray for two (2) 5-gallon buckets of hydraulic and lube oil. The tray shall be located as per the PYXIS Class. The tray shall be able to contain 5 gallons of fluid should a bucket get punctured. The tray shall also have chocking to retain the buckets such that they will not move excessively or fall over due to ship’s motion.

<table>
<thead>
<tr>
<th>Table 262.4 – Clean Oil System Material Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanks</td>
</tr>
<tr>
<td>Connections to tank</td>
</tr>
<tr>
<td>Fittings</td>
</tr>
<tr>
<td>Manifold</td>
</tr>
</tbody>
</table>

Reference Files

- 0472-070-001-00- Machinery Arrangement
- WETA Ship-Shore Interface-FINAL
- MTU Drawings for Pre-Lube and ORS Systems

298 OPERATING FLUIDS

All operating fluids required for testing, trials, and Delivery shall be at the CONTR’s expense. Upon completion of all Work defined in this Contract, all operational fluids in all equipment shall be topped up with OEM and OWNER approved fluids. At Acceptance all fluids shall be topped up and all machinery and equipment shall be ready to operate according to OEM requirements and recommendations. The OWNER will provide information concerning fleet standard operating fluids to the CONTR. For waterjet hydraulic and lubricating oil use a fluid that meets OEM and EPA Vessel General Permit requirements as an environmentally acceptable lubricant, for example CHEVRON Clarity® Synthetic EA hydraulic oil.

END OF 200 SECTION
300  ELECTRICAL SYSTEMS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install the ships service electrical systems in their entirety so that all aspects of the entire Vessels and all of its equipment shall be fully functional without causing harm to the Vessel or the crew and USCG approved. The ship service electrical power shall be furnished by two (2) diesel engine driven generator sets burning No. 2 diesel fuel oil. Each generator shall maintain one hundred percent (100%) of the Vessel load while operating at less than or equal to eighty five percent (≤85%) of its rated capacity. One shore power connection shall be provided on the bow.

Costs associated with the Electrical Systems that do not fall into an identified SWBS section on the Schedule of Values can be charged to the 300 top level SWBS group as needed by the CONTR.

The electrical systems shall be laid out and installed as per the PYXIS Class Vessels. Some changes maybe required to adapt PYXIS Class to this project due to differences between the SOLANO, equipment changes and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approval by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, PYXIS Class and review of the reference information to ensure these concerns shall be addressed in the final bid price.

301  ELECTRICAL LOAD ANALYSIS

An electrical load analysis (ELA) shall be prepared and maintained, by the CONTR throughout the Vessels’ construction program. This analysis shall be updated whenever actual purchased equipment data becomes available or when major service load changes occur. Each revision shall be updated and submitted to the OWNER. The load analysis shall show daytime and night time for summer and winter in addition to emergency conditions. The ELA shall be provided in excel so that all formulas and factors can be verified. All loads at each listed scenario shall have an assumed load factor. The final load factors shall be reviewed and approved by the OWNER during the detailed engineering and design phase of the project.

302  ELECTRICAL MOTORS

Motors shall meet appropriate regulatory, IEEE 45, and USCG criteria. Motors shall be low maintenance, high durability motors. AC motors three-fourths (¾) horsepower and larger shall be 3 phase, 208VAC if available for the application. One-half (½) horsepower and smaller AC motors may be 120 VAC single phase with the exception of motors for special electronic equipment, and manufactured component equipment motors, and motors one-half (1/2) horsepower or less. All motors shall be built by one manufacturer. All motors shall be suitable for full voltage starting, and shall, at a minimum, meet NEMA standards for the design involved. Motors shall be of the ball-bearing type and are designed such that the requirement for periodic lubrication is kept to a minimum. If a motor is to be controlled by a variable frequency drive (VFD), then the motor shall be compatible with the VFD operation in all respects, including having isolated bearings or other shaft-current mitigation technologies. Motor shall be TEFC type, except that TEAO type may be used for inline fan applications. Motors which run in continuous service shall be NEMA premium efficiency type. Motors shall be provided with a robust corrosion resistant coating, epoxy based or equal. All motors shall be fitted with a corrosion-resistant nameplate which shall include:

- The manufacturer’s type and frame design,
- Rated horsepower,
- Type of rating,
- Intended ambient temperature,
- Temperature rise at rated load,
- RPM at rated load,
- Operating voltage,
• Current drain at rated load,
• Number of phases, frequency, and code for locked rotor KVA on motors one-half (½) horsepower and greater, all in accordance with the national electric code.

303 ELECTRICAL MOTOR CONTROLLERS

All motor controllers shall be equipped with thermal protection devices appropriately sized to support the full running load of the equipment served.

Motor controllers shall be of an industrial type that conforms to the requirements of 46CFR as well as the UNDERWRITERS LABORATORIES (UL) Standard 508, and they are the appropriate label. Controllers shall also, at a minimum, conform to ABS regulations, IEEE 45 recommendations, and shall meet the requirements of the USCG. Controllers shall be provided from the same manufacturer, SQUARE D or equal. Controllers shall have overload sensors in each ungrounded phase. Controllers having remote start/stop stations shall have control transformers with ungrounded secondary circuits to prevent accidental starting or stopping caused by a single short to ground. All controllers shall have under voltage protection when operating from a remote, automatic two-wire device. All motor controllers shall be interfaced with the MTU Collosum system as per the Pyxis Class Vessels.

All motor controllers shall indicate: motor running; speed (if applicable); and direction (if applicable). They shall be fitted with "LOCAL/OFF/AUTO" controls as appropriate with a lock-out mechanism for the "OFF" position. Controls shall be near the controlled motor, as far as practicable. They shall include a corrosion resistant nameplate with the following information:

• Manufacturer
• Type and Serial Number
• Voltages and Phases
• Current or Horsepower
• Operating Instructions

A plastic laminated wiring diagram of each controller shall be permanently mounted inside the controller cover. Motor controllers shall be housed in metallic enclosures with the IP degree of protection or NEMA Enclosure rating appropriate for the space. Soft starters or reduced voltage starters shall be provided for motors which might create a generator overload condition or excessive voltage sag under any loading condition identified in the ELA specified in Section 301 of the Technical Specifications.

304 CABLE & INSTALLATION

Cable shall be USCG approved, with low smoke zero halogen insulation and jackets. Power distribution cable shall be TRICAB type BV, or equal. Other control and sensor cable shall be from other TRICAB product lines as applicable. Power distribution cable shall be rated for 90°C conductor temperature, and 45°C ambient temperature. Cable application shall be de-rated appropriately for use in machinery spaces, and sized to provide a voltage drop of five percent or less (≤5%) from the main distribution control panel to the final load. Where variable frequency drives (VFD) are installed, purpose built VFD cable, TRICAB type DF or equal, shall be provided between the VFD and motor. Control, sensing and data cables shall be mounted separately from line power cables.

Cables shall be run in continuous lengths and secured with metallic bands and rubber chafe protection to dedicated supports approximately every eighteen inches (18”). Any cables not long enough aft the extension of the vessel shall be removed and replaced with new cables. Cables shall be laid in neat and orderly rows, and cables larger than 10AWG shall be single banked. Power cables and control, sensor, and communication cables shall be run in separate cable trays, separated by at least twelve inches (12”); where these trays cross, they shall do so at a right angle. Any cable armor shall be aluminum.
Penetrations in watertight bulkheads and decks shall be made with compression block fittings (ROXTEC or equal), Rise/NoFirNo system, or other OWNER approved system. Where cables pass through non-tight bulkheads or decks, they shall be secured from movement and vibration, and the hole shall be rounded and smoothed to prevent cable chafing. Leave fifteen percent (15%) open space in all bulkhead and deck penetration.

Cables shall be labeled with an OWNER approved robust industrial cable tagging system. Labels shall be affixed with 3M™ 5200 marine adhesive at the entrances to enclosures, fixtures, and junction boxes, and on each side of each bulkhead or deck penetration. Within enclosures, each wire shall be labeled with its individual designation, using a labeling system accepted by the OWNER.

305 NAMEPLATES & LABELS – ELECTRICAL EQUIPMENT

Nameplates shall be fitted on all circuit breakers, distribution panels, shore receptacles, and connection boxes. Nameplates shall show "fed from" and location on all breaker panels. Amperages of breakers shall also be marked.

Nameplates shall be engraved phenolic material, white text on black background for general application, and white text on red background for items of particular criticality. Primary information shall be one quarter inch (¼”) high text, and supporting information shall be one eighth inch (¼”) high. Affix nameplates with 3M™ 5200 marine adhesive.

In general, nameplates shall list the title of the item, and voltage, phase, current, rating, usage, and purpose. On enclosures with buttons, gauges, switches, dials, indication lights, or other crew interface components, each component shall be labeled with its function. Where equipment items require specific operation procedures or conditions, instructional nameplates shall be provided to provide necessary information.

Prior to installation of nameplates, the CONTR shall develop a list of nameplates, and submit it to the OWNER for review and acceptance.

Plastic laminated circuit directory cards 8-½" by 11" (maximum) and one-line diagrams shall be provided inside panel boxes and distribution control panel s to identify the equipment and service supplied from each circuit including breaker amperage. All spare breakers shall be numbered and noted on the panel breaker label card.

311 ELECTRICAL SYSTEMS - GENERATING

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install two identical, self-regulating, 208-VAC, three (3) phase, four (4) wire, sixty (60) Hz diesel generator sets. They are EPA Tier 3 certified engines with permanent magnet style generators provided by the DPSI. The engines for the generator sets have already by purchased by the OWNER from the DPSI due to CARB requirements. The scope of supply from the DPSI shall include all labor, parts, testing, services and anything else that is required to take engines already purchased and integrate them with the HANCO generator package as per the PYXIS Class. The generators shall be HANCO packaged units with a capacity of 150kW utilizing the John Deere 6068 block as per the reference documentation.

Each generator shall be capable of supplying the Vessel’s full AC electrical load at eighty-five percent (85%) of its continuous rated capacity and shall be capable of starting the largest motor without requiring load shedding.

Voltage regulation shall be ± three percent (±3%). The generators are not intended to be operated in parallel.

The generator sets (gensets) shall be provided and installed, complete with an active master local control panel, instrumentation, governors, regulators, alarm sensors, automatic and manual shutdowns, cooling systems with an engine mounted CuNi heat exchanger, freshwater cooling, dry exhaust, drip pan, 24VDC electric starting system,
alternator and battery with appropriate bulkhead mounted charging system. The coolant header tank and remote reservoir shall have sight gauges installed to physically verify coolant level without opening the header tanks. The gensets shall be provided with an aluminum subframe and coated white in accordance with Section 633.

The gensets shall be test run at the factory under 100% load for four hours prior to delivery. The purpose of this requirement is to "break in" the engines.

The means of starting, stopping, monitoring and alarming of the gensets shall be as per the PYXIS Class. Per that package, the DPSI shall utilize the Dynagen TG410 controllers, Murphy PowerView PV101-C displays and the MTU Callosum automation system (CAMS). The Dynagen controller and PowerView display shall be integrated into the Engine Room distribution control panel mounted on the forward bulkhead above the generators. The distribution control panels shall control both generator and shore power in addition to providing indication lights for circuit breaker status, power available and the information from the Dynagen controller and PowerView display. The distribution panels shall be outfitted with a Local/Remote control switch. The switch when placed in local control shall make the control feature on the panel active, lock out control from the other stations and provide notification in the Pilothouse via the CAMS system that local control in that location has been activated. The primary motor-controlled circuit breaker for each Engine Room's generator shall be contained within the distribution control panel.

Reference Files
- Hanco Series John Deere T3 pg 1 & 2
- DCI North Bay 150kW Generator Assy
- TG410 Auto Start Controller 052914 Spec Sheet

313  BATTERY SYSTEMS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install the Vessels direct current (DC) electrical systems. All batteries provided onboard the Vessel shall be maintenance-free AGM marine type as per the material schedule. The batteries shall be installed as per the PYXIS Class. Battery chargers shall be installed where they shall be clear from dripping hazards such as hatches and piping system joints.

Batteries and battery banks shall be fully accessible for maintenance and located well clear of the bilge. All batteries shall be contained in USCG approved battery boxes with covers. All batteries shall be installed with USCG approved high quality Blue Sea disconnect switches mounted at an ergonomic height above the deck plates. All batteries and chargers shall be provided as per the material schedule for this section.

Each propulsion engine shall be fitted with its own starting battery and charging system. Each ship service generator shall be fitted with its own starting battery and a fully independent battery charger. Each Engine Room will be fitted with its own 24VDC battery banks, charging system and distribution panel. The Engine Room 24VDC battery bank shall be provide with cross over capability to provide the main engine with 24VDC power in the event of battery charger failure on the main engine starting battery bank. The crossover circuit shall be by way of a 1-2-Both battery switch suitably sized for full starting current. Each Jet Room will be fitted with a 24VDC Hamilton Control System battery bank and battery charger. All battery banks shall be sized as per OEM guidance and USCG requirements.

Battery banks shall be provided for 24VDC & 12VDC Pilothouse power. Each battery bank shall be provided with its own independent battery charger and distribution panel. The radio emergency power supply shall be sized and located to comply with both FCC, USCG regulations and the manufacturer of the radios.

All battery banks and chargers shall be fully integrated into the Vessel’s CAMS for monitoring and alarm. All battery banks shall reside on a common ships wide DC negative bus. The ships negative bus shall be monitored for ground faults by the Vessel’s CAMS.
### 314 POWER CONVERSION EQUIPMENT

Any variable frequency drives (VFD) shall be pulse width modulation type, marine grade, and air cooled. A record of their programming inputs, or equivalent configuration file, shall be presented as part of the As-Built drawing package to the OWNER prior to Acceptance of the Vessel. VFD installations shall include across the line manual bypass switches.

Solar panels shall be installed on the upper deck exterior aft of the Pilothouse. The panels, controllers and wiring shall be as per the PYXIS Class. The system shall consist of 6 each 350W solar panels. Each panel shall be fitted with its own microinverter to convert the output to 208VAC. A disconnect switch shall be provided for maintenance purposes. The combined output of the solar panels shall be tied into the Upper Deck P205 208/120VAC electrical panel on a 2 pole 15A circuit breaker. All materials shall be as per this section materials schedule. The CONTR shall complete detailed testing of the solar panel inverters during Dock Trials to ensure there is no interference with navigation or communication equipment.

The isolation transformer shall be provided as per the shore power section of these specifications and the material schedule.

The isolation transformer shall be provided as per the shore power section of these specifications and the material schedule.

### 315 UNINTERRUPTABLE POWER SUPPLIES (UPS)

Uninterruptable power supplies (UPSs) shall be provided for AC electronics and lighting loads. The intent is for certain AC loads to be provided with battery supplied backup power, and to provide service continuity during brief periods of main power supply loss. The UPSs for vital safety and navigation related loads shall provide backup for at least thirty (30) minutes, while non-vital loads may be backed up for shorter periods, not less than ten (≥10) minutes. UPS’s shall be as per the PYXIS Class Vessels and approved by equipment suppliers they are providing power too. All components shall be commercial marine grade and arranged per the reference drawings. The following equipment shall be considered vital electronics, which shall be backed up for thirty (30) minutes:

- Electronic charting system computer and monitor
- Radar components including monitors

### Table 313.1 – Battery Systems Material Schedule

<table>
<thead>
<tr>
<th>Battery Bank Description</th>
<th>Batteries Description</th>
<th>Charger Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stbd/Port Hamilton Jet Control 24VDC</td>
<td>2x Lifeline AGM GPL-U1T, 33Ah</td>
<td>MasterVolt MASS 24V/15-2 15A@24VDC, 208VAC 1φ</td>
</tr>
<tr>
<td>Stbd/Port Main Engine Starting 24VDC</td>
<td>2x Northstar SMS-AGM-480, 1420CCA, 217Ah</td>
<td>Newmar PT-24-60W 60A@24VDC, 208VAC 1φ</td>
</tr>
<tr>
<td>Stbd/Port Engine Room Control Power 24VDC</td>
<td>2x Lifeline AGM GPL-27, 100Ah</td>
<td>Newmar PT-24-90W 90A@24VDC, 208VAC 1φ</td>
</tr>
<tr>
<td>Stbd/Port Generator Starting 24VDC</td>
<td>2x Lifeline AGM GPL-2400T, 870CCA, 75Ah</td>
<td>Mastervolt MASS 24/25-2 25A@24VDC, 208VAC 1φ</td>
</tr>
<tr>
<td>Pilothouse 24VDC</td>
<td>2x Lifeline AGM GPL-24T, 80Ah</td>
<td>Newmar PT-24-45W 45A@24VDC, 208VAC 1φ</td>
</tr>
<tr>
<td>Pilothouse 12VDC</td>
<td>1x Lifeline AGM GPL-U1T, 33Ah</td>
<td>Mastervolt ChargerMaster 12/35-3 35A@12VDC, 120VAC 1φ</td>
</tr>
</tbody>
</table>

### Table 314.1 – Power Conversion Material Schedule

<table>
<thead>
<tr>
<th>Equipment Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Panels</td>
<td>350W Commercial rated panels</td>
</tr>
<tr>
<td>Microinverters</td>
<td>Enphase IQ6+, 290VA Rated</td>
</tr>
<tr>
<td>Microinverter Cabling</td>
<td>Q-12-20-200 &amp; Q-SEAL-10 as required</td>
</tr>
<tr>
<td>Isolation Transformer</td>
<td>Tierney AC375MD-3T18H-GS-TP, 75kVA Marine Duty</td>
</tr>
</tbody>
</table>
PART B - TECHNICAL SPECIFICATION

- PA/GA systems
- Emergency lighting
- Engine Room fire dampers, with provisions that the UPS will be overridden by the fire suppression system

Non-vital loads which shall be supplied by UPS include:
- WiFi and cellular communications network equipment
- Video display equipment including computer
- CCTV components
- Fire detection system panel

320 POWER DISTRIBUTION SYSTEMS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install electrical power generation and distribution systems to supply all electrical loads. The alternating current (AC) system shall include two (2) ship service generator sets, a shore power connection with isolation transformer and an Engine Room distribution control panel per the PYXIS Class in each engine room. AC distribution panels shall be provided in each Engine Room, the main distribution panel in the main deck machinery room, main deck panel, upper deck panel, Pilothouse panel and all required HVAC distribution as per the Pyxis Class. Direct current (DC) systems shall include battery chargers, battery banks, distribution panels, and all interconnecting cables as per the PYXIS Class. All conductors and loads shall be protected by appropriately rated and selectively coordinated circuit breakers. All distribution panels shall be as per the material schedule for this section.

Metering, local and remote control, and indication functions shall be provided throughout the system, as required by regulation and other sections of this specification. In the pilothouse the CAMS shall provide all data. In the Engine Rooms monitoring of the generator’s voltage, current and frequency will be provided on the Dynagen controller for AC power coming from that generator. The distribution control panel shall be as per the PYXIS Class and section 324.

Power distribution shall be a three phase (3Ø), four (4) wire, Y connected, 208/120VAC system with the neutral grounded only at the distribution control panels. AC distribution panels shall be provided as per the material schedule in an area inaccessible to passengers as per the Pyxis Class.

Electrical loads on each AC panel for the cruise load condition shall be balanced among the three phases to within ten percent (10%) of the average, except that non-simultaneous loads such as heating and cooling need not be considered together.

Circuit protection for DC circuits other than for engine starters shall be provided by distribution panels. DC distribution panels shall be installed in the Pilothouse, each Engine Room and as required elsewhere, but only in locations inaccessible to passengers. DC powered control, monitoring, and alarm systems, when fed from two sources of power, shall utilize selection diodes which will feed from the higher voltage of either power source without relays.

All circuit breakers and distribution equipment shall be provided from the same manufacturer, SQUARE D. AC and DC distribution panels shall be type I-Line and NQ, with BD and QOB circuit breakers as per the PYXIS Class. The P200 main distribution panel shall be an I-Line series panel board with BD & QB series breakers. P12, Pilothouse 12VDC distribution panel shall be a Blue Sea Systems panel meeting ABYC requirements as approved by the USCG on the Pyxis Class. All other panels shall be NQ series with QOB Breakers. Circuit breakers within the distribution control panels for generator, shore power, distribution control panel interconnect, and panel feeders may be alternate SQUARE D products. Surface mounted breakers in equipment room shall be DIN Rail mounted UL489 or AC and Blue Sea Systems meeting ABYC requirements for DC systems with review and approval by the OWNER and USCG. All panels shall be as per the Pyxis Class.

The hull shall not be used as a current carrying conductor.
Adequate accessibility and clearance for operation, maintenance, and inspection of all electrical equipment shall be provided.

Enclosures, junction boxes, and equipment shall have IP Ratings as identified in ABS Rules for Building and Classing Steel Vessels Under 90m, or shall be NEMA 1 for climate controlled interior locations, NEMA 4X for exterior locations, and NEMA 3R for other locations. Panel detail provided in the material schedule is for estimating and guidance purposes representing the panels supplied on the PYXIS Class. The final details of the power distribution system shall be as per the PYXIS Class and finalized in the detailed design and engineering phase of the project after review and approval by the OWNER.

*panel on PYXIS was a surface mounted panel, SOLANO to be flush mounted

### SHORE POWER CONNECTION

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install one (1) shore power connection on the bow of the Vessel. The fixture shall be an inlet, with male pins, and shall be based on the MELTRIC Decontactor DS200 product line, P/N 37-28043, 200A. The body shall be polycarbonate.

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a new isolation transformer rated for 100% duty cycle at 75kVA as per the 314.1 Material Schedule. The shore power receptacle shall be isolated from the distribution control panel by an isolation transformer to prevent current return through the hull. It shall be ventilated and mounted on the starboard side of the main deck forward under the forward windshield console. It shall feature a ruggedized double dipped aluminum enclosure, and the windings shall be double vacuum resin impregnated. Vibration and noise isolating resilient mounts shall be used when mounting the transformer. The console it is mounted in shall be ventilated top and bottom so that excessive heat does not accumulate in the stbd side console area.

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Table 320.1 – Power Distribution Material Schedule

<table>
<thead>
<tr>
<th>Panel Description</th>
<th>Series, Amperage &amp; Size</th>
<th>Panel Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>P200, Main Distribution Panel, Surface Mount</td>
<td>Square D I-Line, 800A 42 Pole 3P4W, NEMA 3R</td>
<td>208/120VAC 3φ per DWG#OQ-31834-00931769-01</td>
</tr>
<tr>
<td>P201, Port Engine Room Distribution Panel, Surface Mount w/ Door</td>
<td>Square D NQ Series, 225A 42 Pole, 3P4W, NEMA 3R</td>
<td>208/120VAC 3φ Cat No. NQ442L2C</td>
</tr>
<tr>
<td>P202, Stbd Engine Room Distribution Panel, Surface Mount w/ Door</td>
<td>Square D NQ Series, 225A 42 Pole, 3P4W, NEMA 3R</td>
<td>208/120VAC 3φ Cat No. NQ442L2C</td>
</tr>
<tr>
<td>P203, Main Deck Distribution Panel, Surface Mount w/ Door</td>
<td>Square D NQ Series, 225A 42 Pole, 3P4W, NEMA 3R</td>
<td>208/120VAC 3φ Cat No. NQ442L2C</td>
</tr>
<tr>
<td>P204, Upper Deck Distribution Panel, Flush Mount w/ Door*</td>
<td>Square D NQ Series, 225A 30 Pole, 3P4W, Type 1</td>
<td>208/120VAC 3φ per Cat No. NQ430L2C</td>
</tr>
<tr>
<td>P205, Pilothouse Distribution Panel, Flush Mount w/ Door</td>
<td>Square D NQ Series, 225A 30 Pole, 3P4W, Type 1</td>
<td>208/120VAC 3φ per Cat No. NQ430L2C</td>
</tr>
<tr>
<td>P24-1, Port Engine Room Distribution, Surface Mount w/ Door</td>
<td>Square D NQ Series, 225A 30 Pole, 1P3W, NEMA 3R</td>
<td>240VAC 1φ/ 48VDC Cat No. NQ30L2C</td>
</tr>
<tr>
<td>P24-2, Stbd Engine Room Distribution, Surface Mount w/ Door</td>
<td>Square D NQ Series, 225A 30 Pole, 1P3W, NEMA 3R</td>
<td>240VAC 1φ/ 48VDC Cat No. NQ30L2C</td>
</tr>
<tr>
<td>P24-3, Pilothouse 24VDC Distribution, Flush Mount w/ Door</td>
<td>Square D NQ Series, 100A 30 Pole, 1P3W, Type 1</td>
<td>240VAC 1φ/ 48VDC Cat No. NQ30L1C</td>
</tr>
<tr>
<td>P12, Pilothouse 12VDC Distribution, Flush Mount w/ meters</td>
<td>Blue Sea System, 100A 12 Pole, 12VDC 2W</td>
<td>Blue Sea System #1217</td>
</tr>
</tbody>
</table>
The shore power receptacle and the isolation transformer shall be three phase (3Ø) 208VAC, three (3) wire primary, and 208/120VAC three phase (3Ø) four (4) wire secondary. The shore power inlet shall be fitted in a location as per the PYXIS Class approved by the OWNER, generally forward on the bow to the starboard side of the fuel and DEF tank level alarm panels.

The shore power motor control breaker assembly shall be mounted in an enclosure under the main deck stairs with panel P203. The assembly shall house the motor-controlled circuit breaker rated at 200amps and controlled by local switches and the CAMS remotely from the PH. The local switches shall provide for indicator lights for breaker position and a power available light. The shore power system shall also include a phase rotation relay integrated into the enclosure and interfaced with CAMS to ensure the shore power is phased correctly before being closing the breaker. A shore power current transducer shall provide amperage data to CAMS to ensure the shore power load does not exceed shore power available. CAMS will provide indication to the HVAC system when on shore power to enter into power saving mode so as not to allow for dehumidification while on shore power. All other functionality needed to operate and monitor (CAMS) the shore power as per the PYXIS Class shall be provided as part of this scope of work.

324 ELECTRICAL SYSTEMS - DISTRIBUTION CONTROL PANELS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install for each of the two (2) generator sets, provide dead front distribution control panel. Distribution control panels shall have electrically operated circuit breakers and controls for the two (2) diesel generator sets and for the feeder from the shore power transformer. Energy for operation of the generator or shore power circuit breakers shall come from the source side of the breaker. The generators shall be not required to have paralleling capability. The distribution control panel automation, remote control, and remote metering and indication functions shall be provided by the CAMS as per the PYXIS Class.

Each distribution control panel shall include a local/remote control switch, which places the distribution control panel in either exclusively local manual control, or remote manual and automatic control via the CAMS. The theory of operation shall be that the distribution control panel will be dead until the switch is engaged in local operation. When the switch is engaged CAMS will lock out control of the distribution control panels from the Pilothouse and register an amber alarm that cannot be cleared until the distribution control panel is placed in remote control. This will allow the operator to be notified if they have left the distribution control panel in local operation before they leave the dock. The operator will also be notified if someone else takes control of the distribution control panel while in operation.

In the situation of a phase loss the operator would note that the circuit breaker trip light came on and CAMS would annunciate an alarm. CAMS will monitor the voltage on all three phases of both generators and the shore power. If CAMS registers a loss of voltage on one leg it will generate a phase loss alarm. The operator will not be able to engage the circuit breaker due to the phase loss. This will be indicated to them when they arrive in the pilothouse to silence the alarms. CAMS will not open any circuit breakers, that will be addressed in the primary motor control circuit breakers. All three primary circuit breakers will have under voltage trips to account for the phase loss and take the defective power source offline. If this happens while on generator power CAMS will fail over to the standby generator automatically. If this happens on shore power, power will be lost on the Vessel and CAMS will log the circuit breaker trip alarm and loss of phase alarm as CAMS will be monitoring the power sources upstream of the circuit breakers.

The capability shall be provided for starting and bringing on line the standby generator from the Pilothouse upon disconnection of the running generator. The remote start and connect operation shall occur either automatically or manually; the Pilothouse control shall include selection of either automatic or manual mode. The automatic start and connection of the standby generator shall trigger an alarm in the Pilothouse. Additionally, the remote control
shall allow manual disconnection and shutdown of the operating generator set. All CAMS functionality shall be as per the PYXIS Class.

Metering and indication necessary for the operator to assess system status shall be provided in the Pilothouse, in conjunction with the remote-control capability. This shall include ship service bus voltage and current on at least one phase, frequency, generator and shore power feed circuit breaker status, generator run or shut down status, and generator RPM. Proper phasing on the shore power circuit shall be monitored with a phase sequence relay. The phase sequence relay will output to CAMS that proper phase sequence has been achieved on shore power. CAMS will output to lights at each distribution control panel indicating that proper shore power phase sequence “Power Available” has been achieved.

Electrical interlocks shall be provided to prevent attempted paralleling of multiple sources onto the ship service bus. The interlock arrangement shall allow connecting independent sources to the distribution control panels when the distribution control panel interconnect circuit is open.

Metering, control and construction shall be as required by 46CFR Subchapter K, incorporating USCG guidance as contained in applicable NVICs, for a Vessel operated with an unmanned Engine Room and Pilothouse control. Insulating rubber floor mats shall be provided in front of each distribution control panel.

A ground detecting current transformer and ammeter shall be provided for the neutral grounding conductor. It shall be placed between the point at which the equipment grounding conductor network is connected to the hull, and the neutral bus. The ground fault current shall be displayed on the CAMS in the pilothouse with a test functionality acceptable to USCG.

Provide generator and shore power breaker tripped fault lights at the distribution control panels, and alarm breaker trips through CAMS to the Pilothouse.

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Indication</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port Generator Power Available</td>
<td>White Indicator Light</td>
<td>Indication Only</td>
</tr>
<tr>
<td>Port Generator Circuit Breaker Close</td>
<td>Red Indicator Light</td>
<td>Push Button to Close Breaker</td>
</tr>
<tr>
<td>Port Generator Circuit Breaker Open</td>
<td>Green Indicator Light</td>
<td>Push Button to Open Breaker</td>
</tr>
<tr>
<td>Stbd Circuit Breaker Trip</td>
<td>Red Indicator Light</td>
<td>Indication Only</td>
</tr>
<tr>
<td>Stbd Generator Power Available</td>
<td>White Indicator Light</td>
<td>Indication Only</td>
</tr>
<tr>
<td>Stbd Generator Circuit Breaker Close</td>
<td>Red Indicator Light</td>
<td>Push Button to Close Breaker</td>
</tr>
<tr>
<td>Stbd Generator Circuit Breaker Open</td>
<td>Green Indicator Light</td>
<td>Push Button to Open Breaker</td>
</tr>
<tr>
<td>Local/Remote Control</td>
<td>Not Illuminated</td>
<td>2 position rotary switch</td>
</tr>
<tr>
<td>Shore Power Available</td>
<td>White Indicator Light</td>
<td>Indication Only</td>
</tr>
<tr>
<td>Shore Power Breaker Close</td>
<td>Red Indicator Light</td>
<td>Push Button to Close Breaker</td>
</tr>
<tr>
<td>Shore Power Circuit Breaker Open</td>
<td>Green Indicator Light</td>
<td>Push Button to Open Breaker</td>
</tr>
</tbody>
</table>
330 LIGHTING

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all new lighting systems. The new LED lighting systems shall be throughout the portions of the Vessel which are normally accessible. This shall include the Pilothouse, passenger spaces, snack bar area, restrooms, Engine Rooms, Jet Rooms, auxiliary machinery and HVAC spaces, all voids containing equipment or machinery, and utility spaces such as closets, storerooms, and cleaning gear lockers. Void spaces with only minor equipment dedicated to those spaces, such as bilge water detectors, need not be provided with lighting. Lighting for all exterior deck areas, except the Pilothouse roof and passenger cabin roof, shall also be provided. Additionally, exterior lighting shall project onto the area adjacent the Vessel at boarding ramp locations, IBA launching locations, overboard rescue locations, and other areas designated by the OWNER.

An average full intensity lighting level of at least twenty (20) foot-candles shall be provided in passenger areas, passages, and stairs.

Each space which might be occupied during normal operation shall be equipped with at least one light with emergency battery backup power. This shall include the Pilothouse, passenger spaces, restrooms, Jet Rooms, and Engine Rooms. Emergency lighting shall be provided adjacent to egress doors, in stairways, and on open decks leading to life raft or buoyant apparatus embarkation locations. Emergency lighting systems shall include battery backup power for at least ninety (90) minutes of operation. Emergency lighting shall be provided in spaces required by USCG 46CFR Subchapter K regulations. Emergency lighting shall be normally on at all times and labeled as per the USCG requirements.
Aim adjustable LED floodlights shall be provided to illuminate line handling areas, boarding points, overboard rescue locations, the fueling station, and IBA launching locations. The OR shall review and approve all floodlight locations and aiming.

All exterior light fixtures and junction boxes shall be heavy-duty marine grade items.

Provide one (1) COLORLIGHT CL25-11 2x400W HMI searchlight, fitted atop the Pilothouse near centerline. The searchlight shall be supplied with power from AC power as per the reference drawings. The searchlight shall be operable using remote controls from the center Pilothouse console, and the bridge wing stations; bridge wing station controllers shall be mounted in a NEMA 4X watertight enclosure.

Two (2) hand operated searchlights receptacles shall be provided and mounted, one (1) at each bridge wing station.

Red LED safety lighting shall be installed in the Pilothouse vestibule and the bridge wings as per the PYXIS Class. The red lighting shall illuminate deck tripping hazards at stairs and steps as per the PYXIS Class.

331 LIGHTING CONTROL

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a new lighting control system. The lighting system shall be designed and arranged to allow programmable automated control of the lighting in the interior passenger seating areas. The lighting shall be dimmable by remote dimming modules that operate on a 0-10V signal. The CAMS system shall control those remote dimming modules to vary the lighting based on OWNER defined programming cycles. Each passenger deck shall be split into three zones, Inboard seating zone, Outboard seating zone and isles and passenger area that will not be dimmed for safety reasons.

The dimming modules shall be Eaton EcoSense LDCM-PL 450W @120VAC modules. The modules shall be arranged as required to balance the lighting loads on the various circuits. This arrangement shall be as per the PYXIS Class. The programming of the CAMS to control this lighting shall be as per the PYXIS with any minor updates that operations.
Emergency lighting shall not be switched or powered by the dimming system; it shall operate at full intensity at all times.

All exterior lighting shall be switched from the Pilothouse. All exterior working and deck lighting shall be controlled by three switches. Bow zone, Port side and Stbd side exterior lighting zones as per the PYXIS Class. Exterior passenger deck seating area lighting shall be always on.

Interior lighting in utility, mechanical spaces, and voids shall use switches adjacent to access doors or hatches. Lighting in the Fidley, Engine Room and Jet Room shall be always on.

The Pilothouse shall be equipped with both red and white LED lighting, which shall be independently switched. This may be satisfied with independent red and white light fixtures, or dual circuit fixtures which produce both red and white light. Provide a red and white chart table light on the working surface to the starboard side of centerline at a location determined by the OR.

See Section 422 of the Technical Specifications for navigation lighting indication panel requirements.

### 332 LIGHTING FIXTURES

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all new lighting fixtures. Lighting fixtures shall be commercial marine grade, and shall comply with USCG Regulations 46CFR Subchapter K, and are UL 1598A Listed. Where possible, lighting fixtures shall be provided by a single manufacturer. All lighting, except the searchlights, shall use LED light sources.

Fixtures shall have the degree of ingress protection required by ABS Rules for Building and Classing High-Speed Craft 2015, for the space in which they are placed. Metallic components on fixtures exposed to weather or dampness shall be 316SS, or suitably coated to prevent corrosion.

In areas with suspended ceiling systems, the light fixtures shall be flush mounted within the ceiling system. Fixtures shall be low profile light weight fixtures. Lighting shall be commercial marine grade, generally as Pyxix Class Vessels. The lighting design shall utilize a mixture of square ceiling panel LED’s and round Pauluhn DLL-14 LED fixtures on the interior as per the PYXIS Class.

At Dock Trails the CONTR shall complete detailed testing for LED interference with navigation and communication equipment. Testing shall take place at several different levels of dimming to ensure that no interference occurs at any point of normal operating lighting levels.

See Section 422 of the Technical Specifications for navigation light requirements.

### 333 ELECTRICAL SYSTEMS - RECEPTACLES

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install, at a minimum, receptacles as per the following section. The layout shall be similar to the SOLANO’s current layout with minor changes per the larger PYXIS Class. Receptacles rated at twenty amperes (20A), 120VAC, single phase (1Ø) shall be provided in machinery, utility, and service spaces in numbers and locations to be approved by the OWNER. Receptacle location and number shall be as per the PYXIS Class Vessels with an additional 6 receptacles to be added at the discretion of the OWNER. Receptacles in passenger spaces shall be tamper resistant, and shall include USB receptacles, EATON/COOPER TR8355, or equal. All 120VAC receptacles shall be hospital grade.

Location of all receptacles is subject to OWNER approval. The CONTR shall provide 120VAC and 208VAC receptacles on dedicated circuits in the Snack Bar space to serve all installed equipment requiring such service as per the PYXIS Class.

Receptacles throughout the Vessels shall be located so that power to any location within the space or on deck can be provided by a twenty-foot (20’) extension cord. Weathertight covers and ground fault interruption shall be
provided for weather deck areas and machinery spaces. Also, ground fault interruption (GFCI) shall be provided for the Snack Bar area. No receptacles shall be fitted in restrooms.

Provide one (1) three phase (3Ø) fifty ampere (50A) twist lock welding receptacle in each Engine Room.

END OF 300 SECTION
400 COMMAND AND MONITORING

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install the Command, Monitoring, Communication and Navigation electronics as per this section. The Vessel shall be fully equipped with machinery and equipment engineered and designed to allow the crew to safely, reliably, and efficiently command and control the Vessel.

Control, alarm, and monitoring systems (CAMS) shall in general mimic and follow the CAMS as installed and operating on the OWNER’s new North Bay Vessel PYXIS.

Commonality of design, function, operation, location, ergonomics, and logic is an OWNER Requirement.

CONTRs are highly encouraged to shipcheck the North Bay Vessels to ascertain how the CAMS shall be installed and function on these existing Vessels, most notably the PYXIS Class which this vessel should closely match. The CONTR shall obtain detailed information on the CAMS system from the DPSI to ensure the information is the most current for the PYXIS Class.

The Vessels shall be equipped with five (5) operating locations. The Pilothouse shall include a primary central operating station and two (2) bridge wing control stations. Each Engine Room shall be equipped with Local Operating Panels (LOP’s) to enable local control of propulsion machinery and equipment. All Engine Room and Jet Room machinery shall be locally controlled, and remotely control in the Pilothouse upon transfer of control.

Costs associated with the Command and Monitoring Systems that do not fall into an identified SWBS section on the Schedule of Values can be charged to the section 400 top level SWBS group as needed by the CONTR.

The PYXIS Class shall be the referenced for required materials and guidance. Some changes shall be required to adapt to this project due to differences between the SOLANO, equipment changes and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approval by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, PYXIS Class Vessel and these specifications to ensure these concerns shall be addressed in the final proposal price.

401 PILOTHOUSE & CONSOLE ARRANGEMENT

The CONTR shall retain the existing Pilothouse from the SOLANO. The existing console shall be modified to suit the new equipment being installed. Where changes in the installed equipment would create holes or aesthetically unpleasing fit up issues the face of that console shall be replaced to ensure a high-quality installed fit and finish. The overall construction, layout, design, functionality, ergonomics, and arrangement of the Pilothouse and the console shall be the same as the OWNER’s new PYXIS Class Vessels. To the greatest extent possible the installations on this Vessel shall be identical to that of the PYXIS Class. Some minor differences exist due to the retained equipment of SOLANO and the new equipment being installed. The Pilothouse shall be configured with four command and control stations as follows:

- Primary control station for the Master, located on Vessel centerline
- Radar observer and look out station for the High-Speed Qualified Deckhand, located to the left of the Master’s station
- Port and starboard bridge wing control stations located in the weather

The console arrangement shall be of an ergonomically correct configuration, incorporating at a minimum, the specific equipment identified in Section 200,300 & 400 Series of the Technical Specifications that apply to the Pilothouse, and as currently found on PYXIS Class. The CONTR shall utilize the PYXIS Class Vessel Pilothouse arrangement to configure the new equipment for the SOLANO. The CONTR shall create a new Pilothouse arrangement drawing detailing the new equipment that has changed from the PYXIS Class Vessels. The new drawing shall be used to create the full-sized mockup for the SOLANO. The CONTR shall complete a detailed full-size mockup
of the new equipment being installed in the existing console for OWNER review, adjustments and approval. The CONTR shall include in their price proposal that there will be minor changes to the faces of the existing console to account for new equipment and updated preferences. The final console shall be finished as per the existing Vessel except new in terms of finishes, trim and outfitting.

401.1 New Pilothouse Option

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old and provide and complete the installation of a new interior to the new Pilothouse option as per section 150.1. The costs for removing the old and rebuilding the new Pilothouse interior as per the PYXIS Class shall be included in the 151.1 New Pilothouse Option item.

The construction and finish of the new Pilothouse shall be similar to the existing SOLANO and the PYXIS Class. The CONTR shall create a new Pilothouse arrangement drawing detailing the new equipment that has changed from the PYXIS Class Vessels. The new drawing shall be used to create the full-sized mockup for OWNER review, adjustments and approval.

The new Pilothouse shall at a minimum be outfitted with the following equipment and features:

- A locking two (2) drawer file cabinet
- At least three (3) drawers for storage of miscellaneous items.
- Electrical power receptacles per Section 333 of the Technical Specifications
- HVAC to per Section 514 of the Technical Specifications
- Windows and sun glare shades in accordance with Section 625 of the Technical Specifications
- Horizontal chart surface, with full size chart under non-reflective Plexiglas
- Drawer and tube storage for charts, publications
- Cabinet storage for flare kit, lifejackets, toolbox, and first aid kit
- Storage for miscellaneous equipment
- Two (2) chairs for the Master and High-Speed Qualified Deckhand per Section 601 of the Technical Specifications
- One (1) two (2) person upholstered bench seat for other crew, with storage underneath per Section 601 of the Technical Specifications
- Coat Hooks
- Provide a small refrigerator and microwave in the crew restroom

The new console shall generally be arranged, built, and configured identical to the PYXIS Class Vessel as described above.

- The console shall be constructed and fitted with the following features:
- The console shall have a flat deck and an angled back panel
- The deck, back panel, and all other such surfaces in the Pilothouse shall be provided with a matte black finish to prevent glare and integral sun shading overhang
- A foot and knee recess at both seat locations
- The console shall incorporate a four inch by four-inch (4”x4”) toe kick at the bottom of the console where it meets the deck
- Two (2) means of accessing the inside of the console via removable doors
- 3-way switched lighting with a minimum of three (3) fixtures under the console
- Utility power receptacles per Section 333 of the Technical Specifications
- HVAC to maintain temperature under console per Section 514 of the Technical Specifications
- Two (2) wooden binocular boxes convenient to each chair, location subject to OWNER approval
• Two (2) retractable sliding radar keyboard trays convenient to each chair, location subject to OWNER approval
• Flat smooth space readily adjacent to each seat location for ergonomically operating a computer mouse

402 SECURITY REQUIREMENTS

The Vessel will operate in accordance with the USCG Maritime Transportation Security Act and is covered by a Vessel Security Plan as implemented and maintained by the OPERATOR. The Vessel shall meet or exceed all of the security requirements as contained within that plan, and in accordance with security installations as found on the OWNER’s PYXIS Class Vessel.

All doors on the Vessel shall be capable of being locked. All locks shall be keyed alike and keyed to the system already in place for existing North Bay Vessels. The Operator will provide a master key for use of the CONTR in keying the locks on the new Vessel. In general, the door locks shall be as they currently are except for the crew room access door.

The doors to the Pilothouse shall feature an electronic combination lock similar to PYXIS Class which is different than the current door on the SOLANO. The locks shall be setup to allow for manual operation with a key in the event of failure of the electronic lock. The passenger cabin Pilothouse door shall feature the same electronic combination lock and a security peep hole. The interior Pilothouse door (Crew Foyer to Pilothouse) shall be required to be a fire rated door as per the PYXIS Class. The current door on the SOLANO is only C’ class.

Exterior doors shall be provided with TRIOVING marine grade latch hardware, with cylinder locks keyed to the WETA master key. The OWNER will provide a sample master key. Any doors that are not able to be keyed to the WETA standard keys shall be provided with 150 keys for crew by the CONTR and stamped with a name as directed by the OWNER. New Hatches on the Vessel exterior shall be equipped with 316SS hasps and brass padlocks keyed to the OWNER’s fleet master key for padlocks.

See Section 604 of the Technical Specifications for more information concerning locks and keys. See Section 610 of the Technical Specifications for more information concerning doors.

403 PERSONNEL SAFETY

The Vessels shall be designed, arranged, and constructed so as to afford the requisite level of safety to operating personnel at all times while onboard and carrying out their assigned duties.

The Vessels shall meet or exceed the requirements of federal OSHA requirements as applicable to a Vessel of this type; and the requirements of the California Department of Industrial Relations, commonly referred to as CAL/OSHA.

Particular attention shall be paid to the following potential safety hazards:

• Protection from rotating machinery
• Protection from hot surfaces
• Pinch points with doors, hatches, stairs, boarding ramps, cleats, bitts, deploying lifesaving equipment, et cetera
• Tripping hazards on decks, stairs, walkways, and thresholds
• Fall hazards while handling lines, tending to shore utility connections, washing down the Vessel, cleaning exteriors of windows
• Fall hazards while working on the mast or house top
405 ANTENNAE

The CONTR shall provide and install antennae as necessary for the proper function of each electronic equipment item. Each antenna shall be provided with a mounting foundation on the rear of the Pilothouse roof or the mast. Each antenna shall be electrically isolated from the foundation to prevent corrosion, and to reduce radio interference. All antenna and antenna cables shall be replaced as part of the base scope of work while the overhead and transits are open. Costs for new antenna shall be attributed to the appropriate line items from the base scope or optional scope as appropriate.

The CONTR shall pay particular attention to manufacturer recommendations when locating antennae in relation to other antennae, to avoid radio interference. Any evidence of radio interference between electronic systems, or other radios, shall be rectified prior to Acceptance of the Vessel. All antennae shall be placed to avoid obstruction of navigation lights.

Antennae shall be provided for each and every item so that all equipment either being reused or new is fully functional in all respects. A detailed inspection by the CONTR and the OWNER shall take place to detail the status of all equipment at Delivery of the Vessel. Any antennae that were detailed as functioning upon delivery and fail or are damaged during the contract scope of work shall be replaced by the CONTR in kind.

406 GROUNDING & BONDING

Equipment grounding conductor system shall be installed throughout the Vessel, to prevent the structural aluminum from conducting ground fault current. The equipment grounding conductor system shall be insulated from the hull structure, except at the point at which the neutral bus of the AC electrical system is grounded; there the equipment grounding network shall be solidly grounded.

Dedicated equipment grounding conductors shall be provided for each electrical load. The frame, case, or enclosure of each load shall be isolated from the hull, and grounding conductors shall provide a continuous ground current path from the load's enclosure to the neutral grounding point at the switchboard. Grounding conductors shall also be installed to equipment on vibration isolation mounts.

Grounding conductors shall meet Article 250 of the National Electrical Code.

The grounding conductor of each convenience receptacle circuit shall be connected to the equipment grounding conductor network, similarly to all other equipment grounding conductors.

See Section 633 of the Technical Specifications for cathodic protection requirements.

407 ELECTROMAGNETIC INTERFERENCE (EMI)

The CONTR shall exercise care in the specification, design, procurement, and installation of all electrical and electronic systems to avoid harmful electromagnetic interference. Electronic systems, including processors, cables, and antennae, shall be installed with sufficient separation from other systems. Electronic signal cables shall not be run in the same cableways or penetrations as power cables.

During the Vessel test and trials period, the CONTR shall perform a methodical testing program to ensure that no noticeable electromagnetic interference is produced upon electronic systems by the operation of other electronic systems, lighting, inverters or VFD’s. The CONTR shall produce a matrix of electronic systems which shall be sequentially tested, with effects on other electronic systems monitored for interference. The magnetic compass shall be included in the requirements of this section.

Noticeable interference shall be rectified by the CONTR prior to Vessel Acceptance by the OWNER, at the CONTR’s expense.
413  EXTERNAL VESSEL COMMUNICATION

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to complete the removal of the existing and to provide and install a new Vessel wide internet access system, featuring WiFi access and cellular communication to shore based networks. The system shall allow passengers to establish wireless internet connections, and shall also permit connections for a point-of-sale (POS) system, the electronic charting system (see Section 453), CAMS (see Section 438), and other Vessel electronics systems as capable and necessary.

The WiFi system shall be powered through an uninterruptible power supply (UPS), as outlined in Section 315 of the Technical Specifications.

All system components shall be located in lockable rooms or enclosures, within suspended ceiling cavities, or otherwise made inaccessible to passengers. All components shall be securely fastened to the Vessel. As part of the installation, the CONTR shall install two Ethernet cables to allow for the future addition of equipment. Each cable shall be installed with approximately ten feet (10’) feet of spare length, terminated, tested, and secured to the Vessel structure. One spare cable shall be installed between the Ethernet switch and the cash register location at the Snack Bar, and the other shall be installed between the Ethernet switch and the top of the mast interior. The antenna for off ship communications shall be mounted per manufacturer’s recommendations in a location approved by the OWNER, in the vicinity of the Pilot house roof or mast.

The system shall generally consist of the following major components or the newest version if superseded:

- CISCO MERAKI MR53 WiFi access points, which shall be powered by Power-over-Ethernet. One access point shall be installed within the ceiling cavity on each passenger deck, near the center of the space. Two (2) access points shall be provided.
- One (1) twenty-four (24 port Ethernet switch supporting Power-over-Ethernet, CISCO SF350-24MP-K9-NA, or equal. The switch shall be located inside the Pilot house console.
- One (1) Cisco "8x5 Next Business Day" SmartNet service plan for switch described above, e.g., CON-SNT-SF350N24
- One (1) PEPLINK MAX-HD2-LTEA-W-T cellular modem
- Two (2) COMROD AC21BI4 antennae, for cellular modem communication to cellular network.
- LMR-400-UF (ULTRAFLEX) cable, between the cellular modem and COMROD antennae.
- CAT6 Ethernet cable between the WiFi access points and Ethernet switch, and between the Ethernet switch and cellular modem.

The CONTR shall provide all commissioning, including programming, setup, and testing, to ensure a functional installation. The integrity and continuity of each Ethernet cable run shall be tested. The CONTR shall provide a complete data communication system to transmit critical operating parameters to shore.

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to complete the installation of an MTU GO MANAGE system including all hardware, software, integration, and testing. Provide all processors, cables, connectors, splitters, optical isolators, as required to complete the system. The complete system shall be procured from the DPSI by the CONTR in addition to all integration, commissioning, and testing.

421  NAVIGATION & SIGNALING EQUIPMENT

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to re-use the existing navigation electronics on the Vessel. The CONTR shall provide the services of Cal Marine Electronics (CME), point of contact is Fred King at, 415-391-7550 to inspect, clean and validate all aspects of the Vessel current navigation equipment. As part of Trials the CONTR shall swing the compass and provide a new deviation card for posting in the Pilot house.
421.1 New Navigation & Signaling Equipment Option

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all new navigation and signaling equipment. Navigation equipment shall conform to USCG 46CFR Subchapter K requirements, and be augmented by the following requirements. Any navigation equipment required for operation under USCG regulations shall be furnished and installed by the CONTR, whether or not it is specified herein.

421.1.1 Compass

Provide one (1) four and a half inch (4½") RITCHIE Helmsman liquid beaded cylinder magnetic compass, installed in the Pilothouse console at the steering station, positioned low and on centerline for ease of visibility by the helmsman. The compass card shall be selected for maximum visibility. Magnetic compass lighting shall be blue for night operation with an independent on/off switch. The operation of the lighting shall not affect the compass direction. The compass shall be swung as part of Sea Trials and provided with a deviation card.

421.1.2 Bell

One (1) ten-inch (10") diameter fog bell of polished brass with mounting hardware, engraved with the name of the Vessel, shall be mounted as directed by the OWNER.

421.1.3 Supplemental Navigation Equipment

The following items, or equal, shall be included as supplemental navigation equipment:

- Two (2) black walnut binoculars holders
- USCG approved flare kit in a waterproof container; flares kits shall be purchased new within 30 days of Vessel Delivery
- Two (2) WEST MARINE Raiatea waterproof 7×50 binoculars
- Navigational charts 18649 and 18654, printed on demand within thirty (30) days prior to Delivery
- All USCG required publications including COLREGS, Coast Pilot, Light Lists, et cetera
- Anchor day shapes

421.1.4 Clock and Barometer

Provide and install a clock and a barometer, CHELSEA Patriot Deck Clock and CHELSEA Patriot Deck Barometer, or equal. Each clock and a barometer shall have a six-inch (6") face, and be securely fastened to the aft Pilothouse bulkhead.

422 NAVIGATION LIGHTS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old NORESELIGHT and incandescent navigation lighting system and provide and install with new. Navigation lights shall be provided in accordance with the USCG Navigation Rules, COMDTINST M16672.2D (COLREGS) applicable to the Vessel's size and intended service.

A fully functional navigation light system shall be installed aboard the Vessel. It shall consist of supply circuits from the DC power distribution system, a navigation light indication panel, appropriate navigation light fixtures, and connecting cables.

The navigation light indication panel shall meet all requirements of 46CFR 111.75-17 and manufactured by J-Box Inc. It shall be mounted in the Pilothouse, in a location approved by the OWNER. Model number shall be as per the material schedule. The panel shall be flush mounted in the aft Pilothouse bulkhead. The panel shall contain a five (5) circuit plugin printed circuit board with solid state current sensors. Include provision for an emergency repair plug which allows plugin boards to be removed for service without affecting the operation of any light. Panel shall also include an alarm test push button and pilot light dimmer control. The panel shall be fully solid-state including LED
visual alarm indicator lamps. A supervised light circuit shall provide audible and visual alarm in the event of a failed navigation light or blown fuse. An ungrounded neutral panel shall be provided so that both plus and minus sides of each branch light circuit and power inputs shall be switched and fused. The indication panel shall provide simple controls to switch between normal running and off modes, and the selected model shall be subject to OWNER approval. The panel shall meet all requirements of USCG, SOLAS, and ABS.

Navigation lights shall be dual element DHR60 LED, or equal. They shall be commercial marine grade, constructed of corrosion resistant materials. Housing shall be black. Navigation lights shall be located generally as installed on the PYXIS Class, and in accordance with International Navigation Rules or Inland 72 COLREGS as appropriate, and shall be accessible for maintenance. Lights shall be provided with shadow boxes and shields as required to ensure light pollution does not effect navigation or crew operations.

<table>
<thead>
<tr>
<th>Panels</th>
<th>J-Box# NLFM5DUG24DCDP-PFA</th>
</tr>
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<tbody>
<tr>
<td>Anchor, 360 White 2NM</td>
<td>DHR60#60.06.00.00</td>
</tr>
<tr>
<td>Masthead, 225 While 5NM</td>
<td>DHR60#60.03.00.00</td>
</tr>
<tr>
<td>Port, 112.5 Red 2NM</td>
<td>DHR60#60.02.00.00</td>
</tr>
<tr>
<td>Stbd, 112.5 Green 2NM</td>
<td>DHR60#60.01.00.00</td>
</tr>
<tr>
<td>Stern, 135 While 2NM</td>
<td>DHR60#60.04.00.00</td>
</tr>
</tbody>
</table>

### 423 NAVIGATION ELECTRONICS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to re-use the existing navigation electronics on the Vessel. The CONTR shall provide the services of CME, point of contact is Fred King at 415-391-7550 to inspect, clean and validate all aspects of the Vessel current navigation equipment. CME currently services the Vessel so they shall be aware of all existing equipment and its condition. Any UPS’s that are to be reused shall have their batteries replaced.

#### 423.1 New Navigation Electronics Option

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all new navigation electronics equipment. Any navigation equipment required for operation under USCG regulations shall be furnished and installed by the CONTR. Navigation and communications equipment shall conform to USCG requirements for this Vessel in 46CFR Subchapter K service in the San Francisco Bay Area. The CONTR shall procure the package from CME. The package shall be arranged and wired as per the PYXIS Class and the OWNERS discretion. CME can provide any additional details required.

It shall include the equipment systems described in subsequent sections of these Technical Specifications, including satellite compass, radios, loudhailer, whistle, video display, radars, global positioning system, electronic charting system, automatic identification, depth sounder, and anemometer. Navigation electronics shall be interfaced and networked to the maximum extent possible. Where models called out herein have been superseded by newer models, or newer models are available, the most currently available or most recent unit shall be provided.

For each of these systems, all components necessary for a complete and functional installation shall be provided and installed by the CONTR. This shall include power supplies, batteries, transceivers, operator controls and interfaces, speakers, processors, antennae, foundations, enclosures, vibration isolation mounts, electrical insulators, and all interconnecting cabling, penetrations, and seals. So far as possible, all systems shall be provided by the fleet standard manufacturer, FURUNO. Equipment which uses 120VAC power shall be provided with a marine grade uninterruptible power supply (UPS) or equivalent arrangement of batteries and battery inverter/chargers.
Unless noted otherwise, the operator interface of each system shall be located as per the PYXIS Class Vessel, with proximity to the helmsman commensurate to the item’s importance and frequency of use. See Section 401 of the Technical Specifications for further guidance. Generally, all systems shall be designed for operational commonality with the OWNER’s North Bay fleet. Other system components may be mounted within the Pilothouse console cabinetry, in the void space below the Pilothouse, or on the aft bulkhead, as appropriate. Adequate cooling air circulation shall be ensured. Locations of the equipment and components for all systems shall be subject to OWNER approval. Enclosures, cases, and junction boxes shall be provided as necessary to protect equipment.

The display of each system shall be dimmable to preserve the night vision of the crew. Where dimming capability is inadequate or impossible, tinted filters shall be provided to reduce the intensity of display lighting for night operation. The filters shall be secured against normal Vessel motions and vibrations, but shall be removable for daylight operation. Removable filters shall be provided with a dedicated daytime storage location which prevents their damage and scratching.

Enclosures, junction boxes, and equipment shall have IP Ratings as identified in ABS Rules for Building and Classing Steel Vessels Under 90m, or shall be NEMA 1 for climate controlled interior locations, NEMA 4X for exterior locations, and NEMA 12 for other locations.

426 SATELLITE COMPASS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to re-use the existing installed satellite compass. The CONTR shall provide the services of CME to inspect, clean and validate all aspects of the satellite compass. CME currently services the Vessel so they are aware of all existing equipment and its condition.

The existing satellite compass is interfaced with all existing bridge electronics to the maximum extent possible. Any new bridge electronics shall be interfaced with the existing AIS to the maximum extent possible.

426.1 New Satellite Compass Option

If the 423.1 option for new electronics is exercised by the OWNER the CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a new satellite compass FURUNO Model SC-130 system, or newest available FURUNO model. The CONTR shall procure the package from CME. All costs shall reside in the 423.1 option pricing. The system shall consist of all components required to create a functional system in the final arrangement as directed by the OWNER.

The satellite compass shall be interfaced with all bridge electronics to the maximum extent possible.

The satellite compass shall be arranged and wired as per PYXIS Class Vessel and the OWNERS discretion. CME can provide any additional details required.

432 TELEPHONE SYSTEM

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a new AIPHONE telephone system. An eight (8) station, all master, AIPHONE model TD-12HL telephone system shall be installed to provide communications between the Pilothouse, the Snack Bar work area, each of the Jet Rooms, each crew station, and each of the Engine Rooms as per the current system arrangement. Each station shall have the ability to call any other station. Power for this telephone system shall be provided from Pilothouse panel P205. Exact phone placement shall be approved by the OWNER. Each station shall be provided with engraved label plates for all selectable stations on the phone.

433 PUBLIC ADDRESS & MESSAGING SYSTEM

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to re-use the existing installed PA/GA System. The existing system was designed and installed by Electronic Systems Support, Inc.
(ESS), point of contact is Andy Herbst at (636) 677-0244 ext. 110 as per the WETA standard system. The existing system shall be disassembled, cleaned, inspected and tested by ESS for proper operation.

The existing amplifiers shall be removed, cleaned, tested and returned to WETA as spares. ESS will provide new amplifiers as this is the most common failure point.

ESS shall modify the existing system for the new larger Vessel. This shall include all additional speakers and upgrades required to closely match the ESS system installed in the PYXIS Class. All new speakers shall be installed on the interior and exterior of the Vessel. All speakers shall be high quality marine units, BOSE 131 or equal. All exterior loudspeakers, junction boxes, and fittings shall be stainless steel or non-metallic, watertight, heavy-duty marine grade equipment with terminations sealed for protection against the effects of wind and water. All dissimilar metals shall be isolated to mitigate the effects of galvanic corrosion. In the aft portion of the Vessel or where existing wire runs are not long enough new wire runs shall be installed and the existing too short wire runs shall be removed. Junction boxes shall only be used where specifically approved by the OWNER.

All of the wiring at the existing ESS PA/GA rack shall be removed and re-run in combed, neat and orderly wire paths so that to the maximum extent possible the equipment in the racks is not obstructed by the wiring. Where existing wiring is not long enough to provide for a clean sanitary installation the wiring shall be replaced so that the system can be cleaned up to the maximum extent possible. The OWNERS intention is illustrated below in a generic example photo (not an ESS rack) of cleaning up wiring to provide a sanitary, organized installation providing the maximum access to the equipment installed. The CONTR shall account for costs associated with changes in the equipment racks between the existing Pilothouse and the new Pilothouse arrangements.
433.1 New Public Address & Messaging System Option

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a new integrated internal communications system, as provided by ESS. The system shall be substantially identical to the existing system and the PYXIS Class vessels. The system shall integrate functions for public address and general alarm (PA/GA), video display screens, accompanying audio broadcast for passenger information, and CCTV. This specification section shall be reviewed in conjunction with Sections 439 and 448 of the Technical Specifications.

The CONTR shall provide and install a public address and general alarm (PA/GA) system, with speakers and alarms installed in all passenger spaces, on all weather decks, and in the Engine Rooms, and with visual alarm lights for the hearing impaired. The PA/GA system shall produce at least the minimum USCG required sound pressure level in all normally occupied spaces. Public address system microphone stations shall be located in the Pilothouse and passenger cabins close to the boarding areas. The Pilothouse microphone station shall override the passenger space microphones.

The system shall include a control panel located in the Pilothouse located as per the PYXIS Class Vessel with the final decision by the OWNER. It shall allow the operator to broadcast either separately or collectively to four zones throughout the Vessel, and shall also include a contact maker to activate the general alarm in all occupied spaces. Provide remote microphone jacks on each passenger deck with volume controls. Provide two (2) spare microphones for these jacks to be stored in the Pilothouse.

The general alarm function shall produce an alarm tone using signal generators and amplifiers, which shall be broadcast over the speaker network. The signal generators and amplifiers shall be provided in duplicate.

Fire alarm and general alarm systems shall be separate. The fire/smoke alarms shall not cause the general alarm to sound.

Speakers shall be BOSE 131, or equal. Speakers and their cable penetrations shall be watertight. All exterior loudspeakers, junction boxes, and fittings shall be stainless steel or non-metallic, watertight, heavy-duty marine grade equipment with terminations sealed for protection against the effects of wind and water. All dissimilar metals shall be isolated to mitigate the effects of galvanic corrosion. The system shall comply with USCG rules for Subchapter K inspected Vessels. Mounting and location of all components is subject to OWNER approval.

ESS can provide any details required on the system installed on the PYXIS Class.

The CONTR shall account for costs associated with changes in the equipment racks between the existing Pilothouse and the new Pilothouse arrangements.

436 GENERAL & FIRE ALARM SYSTEM

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old and provide and install a new general and fire alarm system in accordance with USCG requirements. The CONTR shall provide and install an approved series fire detection and alarm system or the newest model available, in accordance with 46CFR Subchapter K regulations. This shall include 100% new sensors, wiring and all components required to ensure the fully functioning, certified and approved system. The system shall in general be configured as per the existing system. All existing components and wiring shall be removed from the Vessel. The system shall include rotating red beacons in the Engine Rooms, and strobe lights in the passenger areas. In accordance with regulations, the system shall allow for activation via smoke or heat detection, and manual pull station. Thermal and optical detection is preferred for the machinery spaces.

The fire detection system's monitoring shall be divided into zones, so that the location of an alarm can be quickly and clearly communicated to the crew. Zones shall not span multiple decks. Final zone layout shall be as per the PYXIS Class and subject to OWNER approval on layout and hardware.
437 TANK LEVEL INDICATORS (TLI)

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all fuel, oil, water, urea, and sewage tanks shall be fitted with tank level measurement devices, which shall integrate with CAMS to provide tank level indication and alarm functions. Where the contract base scope work retains an existing tank the CONTR shall reuse the existing level senders for incorporation in the new CAMS system. Where contract base or optional scope of work requires new tanks the CONTR shall provide new level senders as per the DPSI scope of supply for the CAMS on the PYXIS Class. Contract base scope of work tank level sender costs shall be captured in this line item. Contract optional scope of work tank level sender costs shall be captured in the appropriate option. Therefore, the optional item shall reflect the actual cost of the complete option.

All tank level measurement and indication components shall be approved by the OWNER and the DPSI and shall provide tank level indication to the nearest one percent (1%) along the entire height of the tank. The CONTR shall reference the appropriate section of the Technical Specifications for each tank and a detailed shipcheck of the Vessel.

Tank level sensors shall be provided by the DPSI and shall be flange mounted at the top of the tank to facilitate removal and servicing except where noted. Flange and penetration size shall be adequate to allow removal of all sensors without interference with any ship structure. All sensors shall be as per the PYXIS Class MTU supplied (DPSI) and non-MTU sensors (DPSI Approved). As an example, the ORS tanks take a WIKA pressure sensor that the CONTR shall procure once it is approved by the DPSI and the OWNER as matching the scope of supply on the PYXIS Class.

For the ORS tanks provide a TLI and local sightglasses. The TLI shall be incorporated into CAMS to monitor and alarm the tank level. Provide two (2) sightglasses with one-inch (1”) windows in the face of the tank straddling the twenty percent (20%) and ninety percent (90%) full marks.

For the lube oil day tanks provide local sightglasses in the face of the tank as further described in appropriate section of the Technical Specifications.

For fuel oil and urea tanks, level indication stations shall be provided adjacent to the fill connections. Each station shall include an amber light which illuminates when the tank level is eighty-five percent (85%) or greater, and a red light and audible alarm which activates when the tank level is ninety percent (95%) or greater. The system shall also include a “Monitoring Active” green light and a light test button. These level float switches for these alarms shall be independent of the standard tank TLI as per the PYXIS Class. Additionally, these same sensing, alarm, and indication functions shall be provided in the Pilothouse as part of CAMS.
The fuel storage tanks shall be supplied with a completely separate (redundant) high level float switches that will result in an audible and visual alarm in the Pilothouse and at the fuel fill containment when the fuel level in the tank reaches ninety percent (90%) and ninety five percent (95%). This system shall have the MTU standard alarm interlock to turn off alarms after filling has been completed as per the PYXIS Class.

Provide tank tables for all tanks for conversion of percentages, tank level indication readings, and sightgauge soundings to gallons. For the fuel tanks the TLI shall be calibrated along their entire height within two percent (±2%) accuracy at 100-gallon increments during initial tank filling as part of Dock Trials.

438 CONTROL, ALARM & MONITORING SYSTEMS (CAMS)

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a whole ship integrated Control, Alarm, and Monitoring System (CAMS). The system shall be the MTU Callosum system. All of WETA’s large passenger Vessels utilizing MTU propulsion utilize the MTU Callosum system. In order to not burden WETA with duplicitous training, operating, and maintenance and repair costs the standard MTU system shall be used. The CAMS shall to the greatest extent possible match the system installed on the PYXIS Class. The CONTR shall account for in their bid costs to make the changes necessary for minor differences between the PYXIS Class programming and the SOLANO. The DPSI can provide any details required on the system installed on the PYXIS Class.

The CONTR is responsible for all liaisons with the DPSI in order to provide a complete system. The CONTR shall verify compatibility of all components. All existing components shall be cleaned and tested by the DPSI and returned to the OWNER for fleet spares.

Provide six (6) analog main propulsion engine tachometers, separate from any other system. Locate a tachometer for each engine at each propulsion control station. Tachometers located in bridge wing enclosures shall be weatherproof. Locations of tachometers shall be as per the PYXIS Class and the OWNER’s discretion.

The propulsion and Vessel CAMS shall be designed, manufactured and warranted by the engine manufacturer, the warranty shall mirror the engine warranty period and general terms and the service provider shall be the engine manufacturer’s authorized service and warranty provider. The system shall be fully documented, with service and parts details, including wherever possible illustrated parts catalogs. The system shall be a serial production system, and the components shall be classification type approved.

The system shall meet all USCG requirements and the CONTR and OEM shall be responsible for USCG approval, and DVTP and QFA if required. DVTP and QFA on the Callosum system was not required on the PYXIS Class.

The system shall provide the following, as a minimum the same as the PYXIS Class and other WETA Vessels:

- Fully integrated engine, reduction gear, SCR, and selected Vessel system control, (exclusive of the water jet controls specified elsewhere), alarm, monitoring, and data logging
- All power supplies shall be redundant
- The data network cabling shall be redundant
- Provide all engine, reduction gear, and SCR sensors and wiring
- Provide all I/O modules, data interface modules, programming modules, PLCs, and PCs, et cetera
- The CONTR shall be responsible for the selection, supply, and installation of Vessel system sensors, switches, cabling, interposing relays, motor starters, circuit breakers/fusing, power supply, and installation as required to fully support CAMS
- The CONTR shall be responsible for the design of the interfacing of the Vessel systems with support from the engine manufacturer
- The CONTR shall supply wiring diagrams and schematics for power supply circuits, signal converters, et cetera as required
The system shall include Engine Room local operating panels (LOPs), with integrated control and monitoring for: engine, pre-lube pump, reduction gear, and SCR and all other functionality provided on the PYXIS Class and other WETA Vessels. The LOPs shall also be the interface point for the waterjet engine speed command and reduction gear command. The LOPs shall have integrated feedback signals for the waterjet system as per the PYXIS Class.

The system shall have Human Machine Interface (HMI) assemblies in the Pilothouse as per the reference information. The HMI assemblies shall primarily consist of high definition touch screens sized as per the PYXIS Class and the reference information. They shall also include audible alarm annunciators, control switches, enclosures and mounting arrangements, and other components as necessary.

The alarms shall be self-monitoring, and independent of the functions monitored as per MTU Callosum standard and installed on other WETA Vessels.

The CAMS shall integrate with the ships ventilation, HVAC and other machinery systems to the greatest extent possible to the same as the PYXIS Class reference material that can be provided by the DPSI. The CONTR should account for some changes between the Vessels due to differences in installed machinery and changes driven by feedback from operation of the PYXIS Class.

Graphic interface screen arrangements shall be subject to OWNER approval. However, the provided reference information from the PYXIS Class should be very close to the desired system arrangement.

The CAMS shall also provide access to all engine manuals and technical information. The CAMS shall not include actual Vessel propulsion control of the engine RPM, clutch engagement, reversing buckets, and steering. Propulsion Control shall be provided by the new Hamilton Jet AVX System. The programming for the interface between the CAMS and the AVX system has not been completed as the AVX is not currently released. The CONTR, DPSI and Hamilton Jet shall account for in their bid the costs associated with engineering the interface been these two systems for data logging and indication. The system shall provide for control of pumps, fans, main propulsion start/stop, the electric plant, and other systems the same as the PYXIS Class. It is assumed there will be minor tweaks in the programming to account for operation feedback from the PYXIS Class.

The system shall include the ability to connect via the Ethernet network and cellular modem to the internet for remote shoreside monitoring via the MTU GO MANAGE system.

The CONTR shall account for costs associated with changes in the equipment racks between the existing Pilothouse and the new Pilothouse arrangements.

Reference Files
- Contact DPSI for available current materials

439 CCTV SURVEILLANCE SYSTEM

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to re-use the existing installed CCTV System. The existing system was designed and installed by ESS as per the WETA standard system. The existing system shall be disassembled, cleaned, inspected and tested by ESS for proper operation.

ESS shall modify the existing system for the new larger Vessel. This shall include all additional cameras and upgrades required to closely match the ESS system installed in the PYXIS Class. All new cameras shall be installed on the interior and exterior of the Vessel. The cameras shall be vandal resistant, weatherproof, and shall have internal anti-condensation heaters. All exterior cameras, junction boxes, and fittings shall be stainless steel or non-metallic, watertight, heavy-duty marine grade equipment with terminations sealed for protection against the effects of wind and water.

The wiring in the CCTV rack shall be addressed as per the requirements of Section 433. In the aft portion of the Vessel or where existing wire runs are not long enough new wire runs shall be installed and the existing too short.
wire runs shall be removed. Junction boxes shall only be used where specifically approved by the OWNER. The location of the existing CCTV rack shall be adjusted as required by the various optional scope of work items. The CONTR shall account for costs associated with changes in the equipment racks between the existing Pilothouse and the new Pilothouse arrangements.

CONTR shall provide the following pointing device for the CCTV system which is different than ESS’s previous scope of supply. This shall be provided in the base and optional items.

- NSI laser ball-IP68 switches – black carrier, MTSX-38N8-BT1

439.1 New CCTV Surveillance System Option

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a new CCTV system, as provided by ESS on the PYXIS Class. The system shall be substantially identical to the existing system with the changes made for the larger PYXIS Class. The system shall integrate functions for public address and general alarm (PA/GA), video display screens, accompanying audio broadcast for passenger information, and CCTV. This specification section shall be reviewed in conjunction with Sections 439 and 448 of the Technical Specifications. ESS can provide any details required on the system installed on the PYXIS Class. The CONTR shall account for costs associated with changes in the equipment racks between the existing Pilothouse and the new Pilothouse arrangements.

441 RADIOS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to re-use the existing radios on the Vessel. The CONTR shall provide the services of CME to inspect, clean and validate all aspects of the Vessel radios. CME currently services the Vessel so they are aware of all existing equipment and its condition. The existing radios shall be interfaced with all existing bridge electronics to the maximum extent possible. Any new bridge electronics shall be interfaced with the existing radios to the maximum extent possible. In the aft portion of the Vessel or where existing wire runs are not long enough new wire runs shall be installed and the existing too short wire runs shall be removed. Junction boxes shall only be used where specifically approved by the OWNER.

441.1 New Radios Option

If the 423.1 option for new electronics is exercised by the OWNER the CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all new radios. The CONTR shall procure the package from CME. The CONTR shall provide three (3) ICOM Model IC-M604A DSC/VHF radiotelephone units, including all necessary accessories. Two (2) radios shall be installed on the overhead of the helm station, and one (1) shall be installed in the Pilothouse console. All locations shall be subject to OWNER approval. All costs shall reside in Section 423.1 option pricing.

Two (2) COMMAND MICIII remote microphone units shall be connected to one of the radios mounted on the Pilothouse overhead. One COMMAND MICIII shall be mounted at each bridge wing control station. ICOM OPC-1541 extension cables shall be employed as necessary. Placement of microphones shall not allow the cord to interfere with crew sightlines.

The radios shall be interfaced with all existing bridge electronics to the maximum extent possible. The radios shall be arranged and wired as per the PYXIS Class and the OWNERS discretion. CME can provide any additional details required.

443 DECK LOUDHAILERS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to re-use the existing loudhailer on the Vessel. The CONTR shall provide the services of CME to inspect, clean and validate all aspects of the loudhailer. CME currently services the Vessel so they are aware of all existing equipment and its condition.
The CONTR shall modify the existing system for the new larger Vessel. This shall include all upgrades required to closely match the PYXIS Class. All new speakers shall be installed on the exterior of the Vessel. All speakers shall be high quality marine units as per WETA standard scope of supply from CME. All exterior loudspeakers, junction boxes, and fittings shall be stainless steel or non-metallic, watertight, heavy-duty marine grade equipment with terminations sealed for protection against the effects of wind and water. All dissimilar metals shall be isolated to mitigate the effects of galvanic corrosion. In the aft portion of the Vessel or where existing wire runs are not long enough new wire runs shall be installed and the existing too short wire runs shall be removed.

### 443.1 New Loudhailer Option

If the 423.1 option for new electronics is exercised by the OWNER the CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a new FURUNO LH-300 loudhailer system. The CONTR shall procure the package from CME. A loud hailer system shall be provided for two-way communication from the Pilothouse to the line handling stations on both sides of the Vessel, the bow, and the stern. All costs shall reside in Section 423.1 option pricing.

All speakers shall be high quality marine units as per WETA standard scope of supply from Cal Marine Electronics. All exterior loudspeakers, junction boxes, and fittings shall be stainless steel or non-metallic, watertight, heavy-duty marine grade equipment with terminations sealed for protection against the effects of wind and water. All dissimilar metals shall be isolated to mitigate the effects of galvanic corrosion. The loudhailer system shall be arranged and wired as per the PYXIS Class and the OWNERS discretion. CME can provide any additional details required.

### 444 WHISTLES

Two (2) electric horns shall be installed, KAHLENBERG Model KB-30A, or equal. The horns shall be audible at a range of at least one and a half nautical miles (1½ NM) and shall comply with all USCG requirements. Both horns shall be mounted on the mast or Pilothouse roof; one shall project forward, the other shall project aft.

The forward projecting horn is the primary horn, and shall be the official horn for regulatory purposes. It shall have an integrated fog signal feature, as provided by the KAHLENBERG Model M-512 Whistle Control unit; the control unit shall be mounted in the control console in the Pilothouse. Additionally, the bridge wing control stations shall include momentary push buttons to activate the horn.

The aft projecting horn shall be activated by momentary push buttons located at the bridge wing control stations. These push buttons shall include guards to prevent inadvertent activation, and shall be suitably separated from the forward projecting horn push buttons to prevent confusion between horns.

All exterior horns, junction boxes, and fittings shall be stainless steel or non-metallic, watertight, heavy-duty marine grade equipment with terminations sealed for protection against the effects of wind and water. All dissimilar metals shall be isolated to mitigate the effects of galvanic corrosion.

### 448 VIDEO SYSTEM

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to re-use the existing installed video digital messaging system. The existing system was designed and installed by ESS as per the WETA standard Vessel Alert system. The existing system shall be disassembled, cleaned, inspected and tested by ESS for proper operation.

ESS shall modify the existing system for the new larger Vessel. This shall include all additional monitors and upgrades required to closely match the ESS system installed in the PYXIS Class with six (6) 42” flat screen monitors. All monitors, junction boxes, and fittings shall be stainless steel or non-metallic, heavy-duty marine grade/commercial equipment as per the ESS standard scope of supply for their WETA standard Vessel Alert system.
The wiring in the video digital messaging system rack shall be addressed as per the requirements of Section 433. In the aft portion of the Vessel or where existing wire runs are not long enough new wire runs shall be installed and the existing too short wire runs shall be removed. Junction boxes shall only be used where specifically approved by the OWNER. The location of the existing video digital messaging system rack shall be adjusted as required by the various optional scope of work items. The CONTR shall account for costs associated with changes in the equipment racks between the existing Pilothouse and the new Pilothouse arrangements.

448.1 New Video System Option
The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a new video digital messaging system, as provided by ESS on the PYXIS Class. The system shall be substantially identical to the existing system with the changes made for the larger PYXIS Class.

The video digital messaging system shall be ESS Vessel Alert capable of feeding custom video messages provided by the OWNER, as well as digital video files to help the Vessel meet 49 CFR Part 39 Americans with Disabilities Act requirements for passenger Vessels. Provisions shall also be made for displaying paid advertisements, and location and telemetry data from the electronic charting system described in the Technical Specifications. All details, hardware and installation from ESS shall be as per the PYXIS Class.

The video digital messaging system shall be controlled from the Pilothouse, and will be used to provide safety messaging and arrival and departure messaging in conjunction with the PA/GA described in the Technical Specifications. ESS can provide any details required on the system installed on the PYXIS Class. The CONTR shall account for costs associated with changes in the equipment racks between the existing Pilothouse and the new Pilothouse arrangements.

451 RADARS
The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to re-use the existing radars on the Vessel. The CONTR shall provide the services of CME to inspect, clean and validate all aspects of the radars. CME currently services the Vessel so they are aware of all existing equipment and its condition.

All radar arrays shall be serviced including replacement of the brushes. The existing radars shall be interfaced with all existing bridge electronics to the maximum extent possible. Any new bridge electronics shall be interfaced with the existing radars to the maximum extent possible.

451.1 New Radars Option
If the Section 423.1 option for new electronics is exercised by the OWNER the CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all new radars on the Vessel. The CONTR shall procure the package from CME. The radars shall be the new FURUNO FAR-3000 series radars, one primary and one secondary. The radars shall utilize the 6.5’ open arrays with the high-speed option. The radars shall be providing with all options required to match the WETA standard scope of supply from Cal Marine Electronics for other WETA Vessels in the fleet. All required items including the chart plotter option mounted in the radar display and the San Francisco Bay Chart cartridge shall be provided. The hardware shall be installed and provided as per the Vessels existing arrangement or as per the PYXIS Class depending on the Pilothouse options chosen. All costs shall reside in the 423.1 option pricing.

The radars shall be arranged and wired as per the PYXIS Class and the OWNERS discretion. CME can provide any additional details required.

452 GLOBAL POSITIONING SYSTEMS (GPS)
The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to re-use the existing GPS on the Vessel. The CONTR shall provide the services of CME to inspect, clean and validate all aspects of
the GPS. Cal Marine Electronics currently services the Vessel so they are aware of all existing equipment and its condition.

The existing GPS is interfaced with all existing bridge electronics to the maximum extent possible. Any new bridge electronics shall be interfaced with the existing GPS to the maximum extent possible.

### 452.1 New GPS Option

If the Section 423.1 option for new electronics is exercised by the OWNER the CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install an all new GPS on the Vessel. The CONTR shall procure the package from CME. The GPS shall be the FURUNO GP170. The GPS system shall be provided and installed as per the PYXIS Class. All costs shall reside in Section 423.1 option pricing.

The GPS shall be interfaced with all bridge electronics to the maximum extent. The GPS shall be arranged and wired as per the PYXIS Class and the OWNERS discretion. CME can provide any additional details required.

### 453 ELECTRONIC CHARTING SYSTEM (ECS)

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to re-use the existing ECS on the Vessel. The CONTR shall provide the services of CME to inspect, clean and validate all aspects of the ECS. Cal Marine Electronics currently services the Vessel so they are aware of all existing equipment and its condition.

The existing ECS is interfaced with all existing bridge electronics to the maximum extent possible. Any new bridge electronics shall be interfaced with the existing ECS to the maximum extent possible.

#### 453.1 New ECS Option

If the 423.1 option for new electronics is exercised by the OWNER the CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install an all new ECS on the Vessel. The CONTR shall procure the package from CME. The CONTR shall provide all materials, equipment, services and software required to make the ECS system fully functional as per WETA’s standard ECS systems on all of the North Bay Vessels. The ECS system shall be provided and installed as per the PYXIS Class. Some items of hardware have changed so final arrangement and details shall be subject to the OWNERS discretion. All costs shall reside in the 423.1 option pricing.

The ECS shall consist of the following materials:

- Hatteland AC/DC 19" Monitor JH 19T14 MMD-MA1-SABA Series 1
- Navigation Computer - Logic Supply ML450G-50-25939
- NSI laser ball-IP68 switches – black carrier, MTSX-38N8-BT1
- Logitech K380 multi-device Bluetooth Keyboard – with FLOW, 3 devices
- Victron Energy TR241210 24V-12V 10A DC-DC converter

The system shall use ROSE POINT ECS software #700010, and one license shall be provided for the Vessel. The PC and its CPU, graphics, and memory shall exceed the minimum hardware requirements of the ROSE POINT software, including capacity for future software upgrades matching the PYXIS Class requirements unless they have changed.

The ECS shall include a man overboard (MOB) function activation at the helm station. Activating the MOB function shall cause recording and display of the Vessel position at the time the button was pressed, and the course to return to that position shall be displayed on the electronic charting system display. The return course shall be maintained until it is cleared by the crew.

Only physical, hardwired communication ports should be used. Serial to USB or similar adapters should not be used. Primary user interface will be a trackball and keyboard. A user interface shall be provided comprised of a keyboard and the referenced trackball. Infrared peripherals are not allowed.
The dimmer nob option shall require the dimmer nob to be mounted and labeled separately at the discretion of the OWNER.

The ECS PC shall include an Ethernet connection to the Ethernet switch which is connected to the cellular modem as described in Section 413 of the Technical Specifications. The system will typically be disconnected, but shall have the ability to temporarily be connected for software updates and maintenance.

The ECS shall be interfaced with all bridge electronics to the maximum extent possible.

The ECS shall be arranged and wired as per the PYXIS Class and the OWNERS discretion. CME can provide any additional details required.

455 AUTOMATIC IDENTIFICATION SYSTEM (AIS)

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to re-use the existing AIS on the Vessel. The CONTR shall provide the services of CME to inspect, clean and validate all aspects of the AIS. Cal Marine Electronics currently services the Vessel so they are aware of all existing equipment and its condition.

The existing AIS is interfaced with all existing bridge electronics to the maximum extent possible. Any new bridge electronics shall be interfaced with the existing AIS to the maximum extent possible.

455.1 New AIS Option

If the Section 423.1 option for new electronics is exercised by the OWNER the CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install an all new AIS on the Vessel. The CONTR shall procure the package from CME. The AIS shall be the FURUNO FA-170. The AIS system shall be provided and installed as per the PYXIS Class. All costs shall reside in Section 423.1 option pricing.

The AIS shall be interfaced with all bridge electronics to the maximum extent possible.

The AIS shall be arranged and wired as per the PYXIS Class and the OWNERS discretion. CME can provide any additional details required.

465 DEPTH SOUNDERS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to re-use the existing depth sounder on the Vessel. The CONTR shall provide the services of CME to inspect, clean and validate all aspects of the depth sounder. Cal Marine Electronics currently services the Vessel so they are aware of all existing equipment and its condition.

The existing depth sounder is interfaced with all existing bridge electronics to the maximum extent possible. Any new bridge electronics shall be interfaced with the existing AIS to the maximum extent possible. If the location of the existing transducer is located IWO of the hull structural modification work it shall be removed and replaced with a new transducer in kind. The transducer shall be mounted inside of the pipe cofferdam to stop interior flooding should the transducer seal become compromised.

465.1 New Depth Sounder Option

If the Section 423.1 option for new electronics is exercised by the OWNER the CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install an all new depth sounder on the Vessel. The CONTR shall procure the package from CME. The depth sounder shall be the FURUNO RD-33 Pilothouse display with a smart transducer. The final transducer model shall be determined after the final location has been approved by the OWNER. The transducer shall be a FURUNO/AIRMAR stainless steel transducer suitable for an aluminum Vessel of this speed in commercial service. The depth sounder system shall be provided and installed as per the PYXIS Class. All costs shall reside in Section 423.1 option pricing.
The depth sounder shall be interfaced with all bridge electronics to the maximum extent possible.

The depth sounder shall be arranged and wired as per the PYXIS Class and the OWNERS discretion. Cal Marine Electronics can provide any additional details required.

467 ANEMOMETERS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a complete AIRMAR ultrasonic weather station, model 150WX, or equal. The CONTR shall procure the package from Cal Marine Electronics, Fred King, 415-391-7550. The unit shall connect via NMEA 2000 protocol to a FURUNO RD33 display unit in the Pilothouse. The installation shall include display unit, antenna, and all required items.

The anemometer shall be interfaced with all bridge electronics to the maximum extent possible. The anemometer shall be arranged and wired as per the PYXIS Class and the OWNERS discretion. CME can provide any additional details required.

END OF 400 SECTION
500 AUXILIARY SYSTEMS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all Vessel auxiliary systems in strict compliance with applicable USCG rules and requirements for 46CFR Subchapter K inspected passenger vessels, and also in accordance with machinery and equipment manufacturer's installation guidance and requirements. All systems, machinery, equipment, materials, fabrications, workmanship, piping, wiring, et cetera shall be designed and installed in accordance with good marine practice. All auxiliary system designs and arrangements are to be as per the PYXIS Class and approved by the OWNER, prior to purchase and construction.

Some changes are required to adapt PYXIS CLASS to this project due to differences between the SOLANO, equipment changes and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approval by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO and the PYXIS Class to ensure these concerns shall be addressed in the final proposal price.

Costs associated with the Auxiliary Systems that do not fall into an identified SWBS section on the Schedule of Values can be charged to the Section 500 top level SWBS group as needed by the CONTR.

Note that all machinery and equipment that can be remotely started, from the Pilothouse or elsewhere, shall be fitted with a master cut-off switch at the equipment operating station in order to prevent personnel hazard.

503 PUMPS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all pumps required as per these specifications and to make the Vessel fully functional in all regards. Where pumps are to be reused the CONTR shall be responsible for removing the pumps, inspecting the pumps, providing a report on the results of the inspection. At a minimum the reused pumps seals and bearings shall be replaced, in addition the motors shall be sent out and refurbished with new bearings and other standard wear items replaced. The CONTR shall provide the OWNER with information on the vendor that is to be used for this scope of work for review and approval prior to issuing a PO. The CONTR shall be required to provide proof of alignment for all new and re-used pumps that are not close coupled. The alignment reports shall be reviewed and approved by the OWNER.

505 GENERAL PIPING REQUIREMENTS

All piping shall conform to USCG requirements for strength, materials, and testing, and to the special requirements of this section and the specific system details contained in this specification. Piping runs shall be straight, neat, and out of the way of walkways, passageways, ventilation openings, and areas needed for machinery maintenance access. Pipe hangers welded to ship structure shall be suitably located to support pipe against stress and vibration. Wherever piping has to be removed for maintenance or replacement of other components, flanges or take down joints shall be fitted. Piping to rotating machinery shall have flexible connections of components suitable for the pressure and service.

All valves, fittings, gaskets, and fasteners shall be high quality marine grade, no pot metal or nickel-plated components shall be used. All piping system fasteners shall be 316 stainless steel. Body and end connections shall be compatible with the piping they are installed in. All valves shall be high quality, quarter turn butterfly or full port ball style unless required otherwise by regulatory agencies. Valves in seawater systems shall have no ferrous materials. Valve disks and stems shall be made of highly corrosion resistant material, i.e. Monel, Inconel, Hastelloy or equal. The CONTR shall reference the appropriate specification section for material schedules and details required.

All seawater valves and piping shall be one hundred percent (100%) isolated from the hull for galvanic protection. Isolation shall be achieved with standard flange isolation kits, standard bolt isolation kits, Micarta sheet and isolation tape. Details of isolation shall be reviewed in the detailed design and engineering phase of the project to the
satisfaction of the OWNER. The CONTR shall provide a report to the OWNER prior to launching showing the isolation of all seawater systems. The OWNER shall witness all testing of the isolation of components in the report. The CONTR shall ensure all valves handles rotate in the same direction (e.g., clockwise to close, counter clockwise to open). All valves that are accessed on a daily basis shall be made accessible above deck plates.

The CONTR shall exercise great care to ensure the ergonomic aspects of all valve operators in the machinery spaces. All valves and valve operators shall be intuitively and easily operated by the crew; and to the greatest extent possible be located in same relative position on the Vessels as the existing North Bay Vessels. CONTR is to size piping appropriately to maintain flow velocities in accordance with SNAME standards (Reference: Marine Engineering, Harrington) and as per the PYXIS Class.

Shore interface fittings shall conform to the OWNER’s standard in Appendix B.

All pipe hangers and clamps shall be stainless steel with non-conductive bushings around the pipe, ZSI Alpha, Beta or Omega series clamps.

All valves located below deck plates shall be equipped with reach rods or remote operators so as to be accessible from the deck plates without removing deck plates. Removable or hinged deck access hatches shall not be used to access valves unless specifically approved by the OWNER.

All check valves shall be entirely constructed from stainless steel, Monel, Inconel, Hastelloy as appropriate for the service.

506 VENTS, FILLS & SOUNDING SYSTEMS

All spaces and tanks shall be vented as required by USCG regulations. All vent openings to weather decks shall be fitted with stainless steel insect screens (except urea tank vents which require a special vent fitting, as described below). Screens shall be accessible for cleaning and replacement. Vent and fill caps shall be color coded to show service following OWNER standard piping system colors in table 507-1. All tank fills shall have caps with stainless steel wire rope lanyards. All vents for systems containing oil shall terminate above an oil containment.

Tank vents and load/off-load connections shall be configured and located such that they are not subject to mechanical damage during docking. Flameproof vents shall be fitted on each fuel tank vent. The end of the vent shall be mounted vertically with the opening facing down within the bounds of the fuel oil containment located on the bow. Fuel, urea, and sewage tank vents shall be located as per the PYXIS Class.

Tank level indication shall be provided through the CAMS as described in Section 438.

Fuel tanks, urea tanks, potable water tank, and lubricating oil tanks shall be fitted with deck fills and vents sized for the service intended and as per the reference drawings. Shoreside connections and fittings shall be provided in accordance with the WETA standard shore side interface.

Where hull void vents or tanks vents are not disturbed, modified or effected in any way by the contract scope of work they shall be reused. The CONTR shall be required to overhaul all vent fittings that are to be reused. This shall include complete descaling, removal and replacement of all flame or insect screens with materials reviewed and approved by the OWNER and the USCG.

506.1 Fuel Oil

The fuel oil system shall be arranged so that both fuel tanks can be filled from the bow. Fuel oil fill piping to the storage tanks shall be consolidated into a central single fueling containment complete with a cofferdam and drain. Fuel tank vent system piping shall also be located within this containment area. Flameproof vents shall be fitted on each fuel tank and mounted vertically with the opening facing down. Fuel oil fill piping and vents shall be sized for fueling at ninety gallons per minute (90 GPM) from the deck fill connections to the tanks.
This is how the fill and vent piping on the existing Vessel is currently configured. All portions of the piping exposed to the weather in the wetdeck and at the bow shall be replaced for safety reasons. All portions of the fill and vent piping contained within the hull and protected from the effects of the marine environment shall be reused after they have been reviewed and inspected by the OWNER and the USCG. The final piping systems shall be pressure tested in the presence of the OWNER and the USCG to ensure that there are no leaks.

A two-stage high level alarm system completely independent level switches of the primary sounding and measuring system shall be installed to prevent overfill during refueling operations. The alarm shall provide the following indications at two stages as per the CAMS system installed on the PYXIS Class Vessel. The system shall utilize a High alarm (Amber) and a High-High alarm (Red) at the bow as per the reference materials.

506.2 Potable & Freshwater

Water tank fill and vent shall be located on the bow, separate from the fuel fill station. It shall be located in its present location provided the addition of the UREA fill connections do interfere with the existing locations.

506.3 Lube Oil

Separate clean oil fill and dirty oil discharge connections will be installed in the Fidley in a dedicated containment. Each connection shall be outfitted with the standard quick disconnect fittings as detailed in the WETA standard shore side interface. Tank vents shall terminate in this containment.
506.4 Sewage

Sewage tank discharge shall be located on the bow and provided with a containment; the containment shall be shared with the fuel tank fill and vent fittings. The discharge connection shall be valved and capped with a stainless steel wire rope lanyard and be directly compatible with the WETA standard shore side interface. Sewage tank vent shall be located in such a manner as to keep odors away from passenger and boarding areas as it currently is.

506.5 Urea (Diesel Exhaust Fluid)

Tanks for urea, also known as diesel exhaust fluid (DEF), shall be filled from the bow. A single connection shall be located near the fuel fill within a separate containment. The fill shall be connected to both urea tanks with isolating valves operated at the filling station, so that tanks can be filled independently or simultaneously. The fill connection shall be as per the WETA standard shore side interface and the reference drawings.

To the maximum extent possible urea piping shall use bent tubing in lieu of fittings. Threaded connections and fittings are not permitted.

The urea tank vents shall be led to the same containment as the fill fitting. Urea tank vents shall be as per the reference drawings. CONTR is to take care in sloping tank fill lines downward toward the urea tank top located in each tank void. Separate vent lines shall be installed to service both urea tanks.

The urea tank shall be vented directly to the ball check vent at the bow. No vent filter shall be used.

506.6 Void Spaces

Each void space that is fitted with bilge suction shall be fitted with a vent terminating above the main deck. The fuel tank void vents shall be sized per USCG requirements. Existing hull void vents shall be reused as applicable. Reused vents shall have any ball checks disassembled and serviced. Screens shall be replaced.

507 PIPING DESIGNATION & MARKINGS

All piping systems shall be color coded and stenciled in large letters at least twice in each compartment to indicate their service as set forth in Table 507-1. Arrows of contrasting color to the pipe shall be applied to the pipes to indicate the direction of fluid flow under normal conditions.
All valve wheels and handles shall have engraved stainless steel name tags attached that indicate the system, purpose of the valve, and the normal position if appropriate. For example:

![POTABLE WATER FILL NORMALLY CLOSED & LOCKED](image)

Prior to installation of valve tags, the CONTR shall develop a list (of tags) and submit it to the OWNER for review and approval. All nameplates shall adhere to the equipment with a permanent marine adhesive, 3M™ 5200 or approved equal.

<table>
<thead>
<tr>
<th>Table 507-1 Pipe Designation &amp; Marking</th>
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<td>Seawater</td>
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<td>Bilge or Ballast</td>
</tr>
<tr>
<td>Prime Mover Cooling</td>
</tr>
<tr>
<td>Potable Cold Water</td>
</tr>
<tr>
<td>Potable Hot Water</td>
</tr>
<tr>
<td>Hydraulic Oil</td>
</tr>
<tr>
<td>Fuel Oil</td>
</tr>
<tr>
<td>Clean Lube Oil</td>
</tr>
<tr>
<td>Dirty Lube Oil</td>
</tr>
<tr>
<td>Refrigerant</td>
</tr>
<tr>
<td>Sanitary Drains</td>
</tr>
<tr>
<td>Urea (DEF)</td>
</tr>
</tbody>
</table>

508 THERMAL INSULATION OF MACHINERY & PIPING

Main and generator engine exhausts, SCR units, HVAC air ducts, HVAC refrigerant lines, and all cold and hot potable water piping is to be thermally insulated, to the satisfaction of the OWNER, equipment manufacturers, and USCG. All insulation material and installation details shall be in accordance with ASTM Volume 01.07 "Shipbuilding" Standard F683, and reviewed and approved in the detailed design and engineering phase of the project. Reference individual SWBS sections for additional insulation requirements.

513 MACHINERY VENTILATION SYSTEMS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a combustion air ventilation system from Callenberg Technology Group (CTG) Goteborg, Sweden. The CTG Point of contact is Per-Anders Leikeryd, Sales Manager, Per-Anders.Leikeryd@tridentllc.com and Helena Hummel, Team Leader Projects, Helena.Hummel@tridentllc.com.

The system shall be as per the PYXIS Class and integrated into the Vessels comprehensive HVAC system. The system consists of intake fans, variable frequency drives, intake and exhaust A-60 stainless steel fire dampers, temperature
and pressure sensors and other items used for automation and control. Local control shall be provided at the access to each space so that crew may secure the fan before entering the space. The local start/stop shall not be an emergency stop. The fire dampers shall remain open at all times in the Engine Room contrary to CTG standard practice. The fire dampers shall only close upon activation of the fire suppression system for the subject space. The system shall provide for ventilation of the following machinery spaces as per the PYXIS Class:

- Port & Stbd Engine Rooms
- Port & Stbd Jet rooms
- Main Deck Machinery Room
- Pilothouse Console and Plenum Room (covered by Pilothouse HVAC)

The system shall be designed to maintain the forward portion of the Engine Rooms within the manufacturers’ requirements for the main engines and generators at the environmental conditions as stated for the PYXIS Class. An 85°F ambient outside temperature was used for the PYXIS Class. The aft portion of the Engine Room that contains only the SCR’s shall be maintained within the temperature limits provided by the equipment suppliers for items located aft of the main engines. The intention is that the aft portion of Engine Rooms shall have a higher allowable ambient temperature due to the large radiated heat load from the SCR. The PYXIS Class system as designed by CTG was sized to account for this two-zone methodology. The Jet Room and Main Deck Machinery room ventilation shall be for equipment protection as well, and sized per the PYXIS Class Vessels.

The systems electrical control shall be arranged as per the PYXIS Class with local and remote-control functionality and integration with the CAMS.

The intake air plenums shall be configured as per the PYXIS Class with the integral soft patch for removal of the generator from the Engine Room. As per the PYXIS Class the fans shall be mounted on the soft patch. As per the CTG standard the fans shall be mounted on CTG supplied vibration mounts. The CONTR shall be required to supply USCG-approved, in material and configuration, flexible joints between the fans and the deck connection.

All outfitting and electrical connections shall be installed to facilitate the removal of the equipment and the soft patch. The soft patch shall include the vertical portions of the bulkhead between the Fidley and the plenum that span the horizontal soft patch in the deck. The hull module construction drawings from AMD shall depict these details. Anything not shown in the drawings in order to complete the installation and make the two-piece soft patch system (deck & bulkhead) fully integrated and complete shall be made by the CONTR. This shall include all items of trim and outfitting needed to make the soft patches watertight, sealed, and suitably installed to protect the faying surfaces, CONTR shall provide all details that are needed to maintain the fire boundaries as required by the USCG.

The intake air flow shall enter through a Delta-T aluminium demisters sized as per the PYXIS Class arrangement. The demisters shall be installed properly with gaskets and sealant to protect the faying surfaces.

The CONTR shall be required to provide backup power to the 208VAC electric fire dampers. Loss of AC power shall not result in the closing of the fire dampers under any circumstances other than fire. The connection details for the backup power shall be reviewed and approved by CTG, the OWNER and the USCG. The CONTR shall contact CTG for the most current information available as the reference information could be out of date with the As-Built condition of the PYXIS Class.

Reference Files
- 0433-022-421-00-(gen set hatch)
- 0433-022-422-00-(gen set hatch cover)

514 HEATING, VENTILATION & AIR CONDITIONING (HVAC)

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a HVAC system from Callenberg Technology Group (CTG) Goteborg, Sweden.
The HVAC system currently installed in the Vessel was supply by CTG under a previous company name. CTG is aware of all of the installation details of both systems. The as rebuilt SOLANO will have some differences from the PYXIS Class. As such all ducting shall be designed specifically for this Vessel. The PYXIS Class have an additional 100mm of overhead clearance between the main deck and upper deck and between the plenum space under the pilothouse and the deck of the pilot house. The existing ducting in the SOLANO is not insulated and as such none the ducting shall be reused for this installation.

The CONTR shall note that the diagrams provided by CTG are basic and not tailored to the exact limitations and geometry of the actual structure. Those details are not available to WETA for this contract. It should also be noted by the CONTR that CTG uses SOLAS as a standard for all of their installations. Therefore, their drawings indicate SOLAS details and it is up to the CONTR to modify the CTG scope of supply to match USCG requirements for a 46CFR Subchapter K Vessel in terms of materials and fire boundaries. The exact details of the installation shall be determined in the detailed design and engineering phase of the contract. The CONTR shall be required to create production level drawings of the ducting and details for OWNER review and approval in addition to the CTG drawings. The CONTR should contact CTG and estimate this system as a new installation.

The CONTR shall contact CTG for the most current information available as the reference information could be out of date with the As-Built condition of the PYXIS Class.

### Table 514-1 HVAC DESIGN CRITERIA

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Cooling Season</th>
<th>Heating Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather</td>
<td>100°FDB-71°FWB@2.5%</td>
<td>30°FDB</td>
</tr>
<tr>
<td>Sea Water</td>
<td>70°F</td>
<td>45°F</td>
</tr>
<tr>
<td>Passenger Cabins / Pilothouse</td>
<td>74°FDB-62°FWB</td>
<td>72°F</td>
</tr>
</tbody>
</table>

#### 514.1 Heating System

The enclosed cabin, main deck, upper deck and Pilothouse shall have space heating provided by the CTG HVAC system as per the PYXIS Class. The heat installed shall be sized to keep the passenger cabin temperature as per Table 514-1. The system shall provide for dehumidification and all other functionalities provided in the PYXIS Class system design.

#### 514.2 Passenger Cabins

The CONTR shall exercise care in the location and selection of ventilation diffusers. Ventilation diffusers shall not blow directly on passengers. The conditioned air distribution system shall be designed to ensure that windows do not fog, both in the Pilothouse and in the passenger spaces. All louver, diffusers, grilles, and registers shall be readily removable for inspection, cleaning, and servicing (by means of thumb screws, latches, clips, et cetera).

Makeup fresh air and overpressurization ducts shall be located as per the PYXIS Class. This configuration closely matches the existing configuration of the SOLANO, but is not identical. Make up air volume for the passenger cabins shall be controlled by CO2 sensors in the passenger compartment to reduce the heating/cooling loads. The CONTR shall account for more overpressurization ducts than are currently installed on the PYXIS Class. The exact amount of open area shall be determined during the detailed engineering and design phase with approval by the OWNER and USCG.

Mechanical exhaust, quantities to match replenishment supply, shall be provided by exhausting from the restrooms, snack bar area, and the passenger decks as per the PYXIS Class. HVAC system design for restroom spaces shall be
provided with natural supply (a grille in the restroom door) and mechanical exhaust directly to the vessel exterior as per the existing and PYXIS Class.

514.3 Pilothouse Air Conditioning

The Pilothouse air condition system is currently installed in a CTG unit similar to the PYXIS Class. The PYXIS Class Vessel utilizes this air handlers to also supply cooling capacity to the plenum space under the pilothouse and the console. This cooling capacity and air flow are critical to provide necessary cooling to pilothouse electronics. The reference materials provided shall be utilized by the CONTR to apply this functionality to the SOLANO. The details of this system shall be determined during the detailed design and engineering phase. All of the ducting for this system shall be replaced with new insulated ducting as per the requirements of this section.

The Pilothouse HVAC air handler shall also provide conditioned air to the machinery plenum space under the Pilothouse in addition to providing for airflow under the dash as per the PYXIS Class.

514.4 Pilothouse Defogging

HVAC system design for defogging of Pilothouse windows shall be properly sized to keep all Pilothouse windows clear of fog under all conditions of weather. The fans associated with the Pilothouse defogging system shall be quiet type multi-speed fans to allow operator selection of at least three (3) levels of defogging. The CONTR shall ensure that Pilothouse HVAC and defogging systems meet the noise criteria of the Technical Specifications when the fans are being operated at their highest speed setting. The system shall be configured and installed as per the PYXIS Class vessels for either pilot house window orientation option chosen.

514.5 Fire Dampers

All fire and balance dampers shall be installed with full and easy access, allowing for complete operation, maintenance, and inspection of the dampers. Fire damper installation shall allow one (1) member of the crew to reset all fire dampers in three (3) minutes or less. All fire dampers, actuators, fasteners, bushings and components shall be constructed from stainless steel or non-corrosive materials. All electric fire dampers in critical services to the Vessels operation shall be provide with backup power so that the loss of AC power does not affect the vessel operation.

516 REFRIGERATION SYSTEMS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old and provide and install a new refrigeration compressor/condenser plant for the HVAC system. The existing refrigerant compressor on the vessel is undersized for the rebuilt vessel and at the end of its useful life. The details of the compressor utilized for the PYXIS Class can be obtained from a detailed ship check. All aspects of the that compressor shall be reviewed and approved by CTG and the OWNER for use on this project as it is possible that differences between the Vessels requires changes to the compressor package. The compressor package on the PYXIS Class was provided by Bowman Refrigeration Inc. (Bowman) of Seattle, Washington (206) 706-3033.

Refrigerant lines shall be to be insulated in accordance with standard commercial practice to protect personnel and to maintain fluid temperature. Refrigerant piping systems materials shall conform to Section 1107 of the International Mechanical Code and USCG regulations.

Routing of the refrigerant lines shall take into account the space required for the insulation, isolation (galvanic and thermal), oil drainage concerns and all other aspects of a proper installation. The size, fittings, materials (non-ferrous) and all aspects of the refrigerant piping system shall be reviewed and approved in the detailed design and engineering phase.
521 FIREMAIN

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old and provide and install a new firemain system, in accordance with 46CFR Subchapter K vessel. Calculations (as required by 46CFR) are to be developed and provided to OWNER and USCG for review. The firemain system shall be complete in every respect, and is to include pumps, piping, valves, gauges, recessed fire hose cabinets (for all fire stations), fire hoses and nozzles, spanner wrenches, signage, hull fittings, et cetera.

The fire main piping system shall be serviced by two (2) electric driven fire pumps, provided with all necessary and appropriate controls and monitoring features, and will supply seawater to fire stations located and equipped to suit USCG regulations. A single fire pump is to be installed in each Jet Room, and each fire pump is to be sized to handle the full requirements of the Vessel’s total firemain system. Both fire pumps are to be connected to the common, ship-wide firemain piping system as per the reference drawings. Bilge and firemain piping systems are to be kept separate; however, fire pumps are to be configured and arranged to serve as backup bilge pumps. There is to be a properly sized CuNi Class 200 cross-connect pipe with appropriate valves and take down joints as needed, run between each hull’s fire pump suction and bilge manifold as per the PYXIS Class. All firemain piping (except aluminum thru-hull sections), including at hangers, penetrations and at end connections is to be totally isolated from structure and dissimilar metals. Reference the material schedule for a detailed breakdown of the system.

Fire pumps shall be self-priming. Fittings and valves shall be installed in each fire pump housing or suction inlet, to allow priming with seawater. Appropriate fittings and valves to allow venting of fire main discharge piping immediately downstream from the fire pump are required. The fire pump shall be fitted with a vacuum/pressure gauges on the inlet and outlet as appropriate.

Fire pumps and related systems shall be operable from the Pilothouse, the Fidley, as well as locally at the pumps. Firemain pressure shall be displayed on CAMS.

The system shall be designed and installed as per the PYXIS Class vessels.

<table>
<thead>
<tr>
<th>Table 521.1 – Firemain Material Schedule</th>
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<tr>
<td>Seachest Isolation Valve 2 ½”</td>
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<td>Fire Pump Suction from Seachest Isolation Valve 2 ½”</td>
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<td>Fire Pump Strainer, 2 ½”</td>
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<tr>
<td>Fire Pump Emergency Jet Room Bilge Suction 1 ½”</td>
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<tr>
<td>Emergency Jet Room Suction Isolation Valve 1 ½”</td>
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<tr>
<td>Fire Pump Suction to Bilge Manifold, 2”</td>
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<tr>
<td>Bilge Manifold Isolation Valve 2”</td>
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<tr>
<td>Fire Pump Discharge 2”-1 ½”</td>
</tr>
<tr>
<td>Overboard Isolation Valve 2”</td>
</tr>
</tbody>
</table>
524 AUXILIARY SEA WATER COOLING SYSTEMS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old and provide and install new piping systems to support the seawater cooling and supply requirements of auxiliary machinery and other installed equipment. General piping design guidance is provided in Section 505 of the Technical Specifications, and is to be followed throughout the design and installation of all auxiliary seawater systems. Auxiliary equipment requiring seawater includes generators, fire pumps, refrigeration equipment, reduction gear coolers, shaft seals, and exhaust spray and transom cooling rings for diesel engines. See Sections 256, 259, 516, and 521 of the Technical Specifications.

Quick opening sea strainers shall be installed ahead of all pumps and machinery with appropriate sea valves, isolation valves, gauges, vents, et cetera. To the greatest extent possible, all valves shall be operable from the deck plates without removal of the deck plates. Where valve actuators shall be located below deck plates provide a hinged access hatch. Special care and attention shall be given to the arrangement and operability of the valves and access to the strainers. All auxiliary seawater piping (except aluminum sections), including at hangers, penetrations and end connections is to be completely isolated from structure and dissimilar metals. Seachest coating shall be provided per Section 633. All auxiliary sea water systems shall be provided and installed as per the PYGIS Class Vessels.

<table>
<thead>
<tr>
<th>Fire Pump</th>
<th>Reference 521 Section</th>
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<td>HVAC Chiller Cooling Pump Section 2”</td>
<td>CuNi 90/10 Class 200 ASTM B466, CuNi ANSI B16.5 150# Flanges</td>
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<tr>
<td>HVAC Chiller Cooling Pump Discharge 2-2 ½”</td>
<td>Norris Lug Body, Bronze ASTM B62 w/316 Stainless Steel Internals, ASTM A276</td>
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<tr>
<td>HVAC Chiller Pump Suction Isolation Valve 2”</td>
<td>Ball Valve, Full Port, Socket Weld, Bronze ASTM B62 w/316 Stainless Steel Internals, ASTM A276</td>
</tr>
<tr>
<td>HVAC Chiller Pump Discharge Isolation Valve 2”</td>
<td>Pump Industries, Model No. SP150SS-47550-21211-PEO,</td>
</tr>
<tr>
<td>HVAC Chiller &amp; Saltwater Regulator Isolation &amp; Bypass Valves 2 ½”</td>
<td></td>
</tr>
<tr>
<td>HVAC Chiller Pump</td>
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526 DRAINS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a new element of exterior drainage as required. Where existing drainage is installed in the existing Vessel and is not affected by the contract scope of work the CONTR shall be required to open and inspect the deck fittings and the piping. The upper deck aft drain piping from the aft exterior deck to the main deck shall be removed and replaced with PVC schedule 80 piping down to the main deck. The aluminum piping installed is failing. The new PVC piping shall require support every 2’ maximum due to its brittle nature and its exposed location in the overhead within arm’s reach of passengers.

All new section of the Vessels shall get new deck drainage as per the provide reference drawings. All new exterior decks shall be designed for drainage of water as per the PYXIS Class. Drained water shall be collected and led overboard through downspouts as per the PYXIS Class. The final details of the drainage shall be reviewed and approved in the detailed design and engineering phase. The final design shall ensure that water is not collected in any locations and is routed away from passengers as per the existing Vessels and the PYXIS Class.

Trapped deck drains shall be provided in all restrooms, storerooms, and the Snack Bar. These drains shall be directed to the sewage tank as per the PYXIS Class. P-Traps shall be large enough that typical vessel motions will not drain traps of sealing water.

Any drainage that is required due to the OWNER exercising a contract optional scope of work item shall have its costs accounted for in the optional scope of work item. All drainage required to provide full and complete drainage of the rebuilt Vessel’s base contract scope of work shall be accounted for in this line item. Any areas of water pooling or poor routing of drained water (sprayed on passenger areas or other improper routing) shall be addressed under the base contract scope of work to the satisfaction of the OWNER.

<table>
<thead>
<tr>
<th>Table 526.1 – Drain &amp; Scupper Material Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain pipes Welded 1 ½”</td>
</tr>
<tr>
<td>Aluminum SCH40 5086, 5083 H111 or H112 ASTM B221</td>
</tr>
<tr>
<td>Drain Pipes Non-Metallic</td>
</tr>
<tr>
<td>SEACOR USCG approved Thermoset Plastic SCH80</td>
</tr>
<tr>
<td>Deck Drain Fittings 2-1 ½”</td>
</tr>
<tr>
<td>Type C, Navy Standard Flush Strainer, W&amp;O 510103</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Aluminum Deck Drain</td>
</tr>
</tbody>
</table>

528 SEWAGE SYSTEM

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old and provide and install a new sewage system. The new sewage system shall collect sewage from all installed toilets, grey water from sink, snack bar and interior deck drains as detailed in the reference drawings. The system shall be designed and installed to meet all USPHS regulations. The sewage tank shall be sized per Section 126 and the reference drawings. The sewage tank shall be fitted with a submersible pump, high-level alarm set to ninety (90%), and tank level indication all tied into CAMS. Control of the sewage pump shall be as per the CAMS system and as per the PYXIS Class.

The toilets shall be as per the material schedule and installed to meet all draft ADA requirements. All toilets shall be fresh water flushing. All other items such as sinks, fixtures and associated hardware shall be determined during the
detailed engineering and design phase. The new hardware shall be as per the PYXIS Class Vessels with final details determined in the detail design and engineering phase to the satisfaction of the OWNER.

<table>
<thead>
<tr>
<th>Table 528.1 – Sewage System Material Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toilet Drains 3”</td>
</tr>
<tr>
<td>Typical Sink Drains 1 ½”</td>
</tr>
<tr>
<td>Kiosk Combined Sink Drain 2”</td>
</tr>
<tr>
<td>Deck Drains 2”</td>
</tr>
<tr>
<td>Deck Drain Fittings 2”</td>
</tr>
<tr>
<td>Black Water Discharge 3”</td>
</tr>
<tr>
<td>Black Water Header Vents 1 ½”</td>
</tr>
<tr>
<td>Sewage Tank Vent 2 ½”</td>
</tr>
<tr>
<td>Black Water Discharge Isolation Valve 3”</td>
</tr>
<tr>
<td>Sewage Tank Vent Fitting 2 ½”</td>
</tr>
<tr>
<td>FW Flushing Line 1”</td>
</tr>
<tr>
<td>FW Flushing Valve 1”</td>
</tr>
<tr>
<td>Black Water Pump</td>
</tr>
<tr>
<td>Toilets</td>
</tr>
<tr>
<td>Tank</td>
</tr>
</tbody>
</table>

Sewage pump off station is to be equipped with appropriate stand pipe, isolation valves and pipe fittings, and a cam and groove style end fitting with secured cap and a stainless steel wire rope lanyard as per the WETA standard shore side interfaces. The shore off load station is to be located inside an appropriately sized containment that doubles as the fueling station containment as per the existing. Weatherproof, lockable sewage pump controls shall be located adjacent to the shore connection fitting, the sewage pump shall also be operable via CAMS.

A fresh water flushing connection shall be provided at the sewage shore off load station, for the purpose of flushing the shoreside hose with fresh water after pumping sewage ashore. Provide an approved backflow preventer and appropriate valving to all portions of the system that are non-potable as per the PYXIS Class.

Sewage tank vent shall be located in such a manner as to keep odors away from passenger spaces and boarding areas. The CONTR shall take particular care to properly slope all drains to the sewage tank and to provide convenient clean out ports for snaking lines. Lines shall drain to the tank at all conditions of running and static trim. The details in general shall be as per the PYXIS Class. The details of the sewage pump installation shall be as per WETA standard details below 528-1&2. The final details of the entire system shall be determined in the detailed design and engineering phase of the project to the satisfaction of the OWNER.
529 BILGE SYSTEM

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old and provide and install two new (2) identical bilge systems, one (1) serving each hull. Calculations and piping arrangements are to be developed and provided to OWNER and USCG for review and approval. Each hull’s bilge system shall be complete in every respect, and is to include pumps, piping, valves, gauges, manifolds, rose boxes and/or suction bells, signage, hull fittings, et cetera. The bilge piping systems shall be serviced by two (2) electric driven bilge pumps, provided with all necessary and appropriate controls and monitoring features, and equipped in every way to suit USCG regulations. A bilge pump is to be installed in each Engine Room, and each bilge pump is to be sized to handle the full requirements of each hull that it is located in.
The bilge systems shall be installed and arranged to discharge overboard and to a deck discharge fitting located in each Fidley. A bilge manifold valve assembly shall be fabricated and installed in each Engine Room. The OWNER is to approve location and arrangement of manifold prior to fabrication. USCG approved signage shall be provided regarding overboard discharge. Bilge pumps are to be self-priming and fittings and valves are to be installed in each bilge pump housing or manifold, to allow priming with seawater. Provide appropriate fittings and valves to allow venting of bilge discharge piping immediately downstream from the bilge pump.

Bilge pumps and related systems shall be operable from the Pilothouse, the Fidley, as well as locally at the pumps. Bilge pumps may not double as fire pumps, and there shall not be any cross connections of bilge systems, between the port and starboard hulls. Provide a locally controlled submersible style bilge pump in each Forepeak plumbed for direct overboard discharge.

Monitoring of the bilge levels and control of the bilge pumps shall be by the Vessel CAMS. All bilge level switches shall be located where they shall be accessible for inspection and testing to the satisfaction of the OWNER. The manual test mechanism for the switch shall be oriented where it is easily accessible from the deck plate level with a hook for quick USCG testing.

All equipment and details of the bilge system shall be as per the PYXIS Class Vessels. The final details of the system shall be determined in the detailed design and engineering phase of the project to the satisfaction of the OWNER.

<table>
<thead>
<tr>
<th>Table 529.1 – Bilge System Material Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shell to Isolation Valve 2”</strong></td>
</tr>
<tr>
<td><strong>Sea Suction from 8” Header &amp; Fire Pump Suction, 2”</strong></td>
</tr>
<tr>
<td><strong>Bilge Suctions 1 ½”</strong></td>
</tr>
<tr>
<td><strong>Bilge Discharge 2” Overboard, 1 ½” to Deck Discharge</strong></td>
</tr>
<tr>
<td><strong>Sea Suction Isolation &amp; Overboard Isolation Valves, 2”</strong></td>
</tr>
<tr>
<td><strong>Bilge Suction Isolation Valves, 1 ½”-2”</strong></td>
</tr>
<tr>
<td><strong>Bilge Suction and Overboard Check Valves, 2-1 ½”</strong></td>
</tr>
<tr>
<td><strong>Bilge Manifold</strong></td>
</tr>
<tr>
<td><strong>Bilge Pumps, Self Priming Centrifugal</strong></td>
</tr>
<tr>
<td><strong>Forepeak Bilge Pumps</strong></td>
</tr>
<tr>
<td><strong>Bilge Level Sensors</strong></td>
</tr>
<tr>
<td><strong>Bilge Suction Foot Valves, 1 ½”</strong></td>
</tr>
</tbody>
</table>

533 POTABLE & FRESH WATER SYSTEMS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old and provide and install new combined potable and fresh water systems. Provide an approved backflow preventer and appropriate valving to all portions of the system that are non-potable as per the PYXIS Class Vessels.
The design and installation of the potable water and fresh water systems shall satisfy all health regulations of the USPHS.

CONTR is to provide a redundant pump arrangement for the potable and fresh water system. Two (2) identical pumps with appropriate cross connect piping and valves to allow pump switching both connected to a single pressure set and tank are to be installed in the potable water tank void. Switching of pumps shall be controlled remotely in the Engine Room and locally at the pumps. Potable water systems shall be flushed and disinfected in accordance with accepted standards for such procedures. The CONTR shall be wholly responsible for obtaining certification that the potable water system is fit for human consumption. The existing potable water tank shall be reused as per the details Section 126.

All equipment and details of the potable and fresh water systems shall be as per the PYXIS Class Vessels. The final details of the system shall be determined in the detailed design and engineering phase of the project to the satisfaction of the OWNER.

<table>
<thead>
<tr>
<th>Table 533.1 – Potable &amp; Fresh Water System Material Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Potable/Freshwater Supply</strong></td>
</tr>
<tr>
<td><strong>Isolation Valves</strong></td>
</tr>
<tr>
<td><strong>Suction from Tank, 1 ¼”-1”</strong></td>
</tr>
<tr>
<td><strong>Fills &amp; Vents 1 ¼” Fill, 2” Vent</strong></td>
</tr>
<tr>
<td><strong>Vent Fitting 2”</strong></td>
</tr>
<tr>
<td><strong>FW Flushing Line 1”</strong></td>
</tr>
<tr>
<td><strong>Potable/Freshwater Pumps</strong></td>
</tr>
<tr>
<td><strong>Hot Water Heater</strong></td>
</tr>
<tr>
<td><strong>Accumulators</strong></td>
</tr>
<tr>
<td><strong>Suction Filter 1 ½”</strong></td>
</tr>
<tr>
<td><strong>Potable Water Filter 1”</strong></td>
</tr>
<tr>
<td><strong>Bottle Water Filling Station</strong></td>
</tr>
</tbody>
</table>

555 FIRE SUPPRESSION SYSTEMS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old and provide and install new fire detection, alarm and suppression systems. The systems shall be installed to protect machinery spaces in accordance with USCG requirements. The FM200 bottles, pilot cylinders, time delays and pressure switches shall be located in the Engine Room Fiddley as per the PYXIS Class. The pull Stations shall reside outside the Fiddley as per the PYXIS Class Vessels. Any additional details required can be obtained from Commercial Fire Protection, Inc., point of contact Roger Sigmen, Roger@cfirepro.com, 360-661-2360.

The fire alarm and monitoring system shall be as per the requirements of Section 436.

The CONTR shall use FM200 for fire suppression system as per the PYXIS Class Vessels. The final details and arrangements of the system shall be determined during the detailed design and engineering phase to the satisfaction of the OWNER.
UREA (DEF)

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a complete and integrated urea system to support the EPA Tier 4 compliant main propulsion engines. Urea or diesel exhaust fluid (DEF) fill, storage, alarm, monitoring, and pumping systems shall be required for this Vessel. The DEF system is to include two (2) storage tanks, tank level indication and alarms, tank fills and vents, piping, valves, pumps, DEF metering, and all other necessary components and equipment to meet USCG regulations, and main engine OEM. UREA fill connections shall be as per WETA shore side interface standards.

Two (2) DEF tanks are to be fabricated and installed, one (1) tank located in a void forward of each Engine Room. The CONTR shall provide a complete DEF system for the Vessel. Final DEF tank locations and positioning inside the void are to be determined during the detailed design and engineering phase to the satisfaction of the OWNER. Tank and piping layouts and arrangements inside each void shall be logical and clean and be as per the PYXIS Class Vessels.

The DEF tanks shall be as per Section 126. The final volume of the DEF tank shall be as per the requirements of the DPSI to meet a two (2) day supply, eight (8) Vallejo to San Francisco round trips, plus twenty percent (+20%) reserve approximately 250 gallons @ 90%.

DEF tank level sensors (high and low), tank level indicators, and DEF quality sensors, to detect excess water or other inadvertent contamination of the DEF, are to be installed with alarm displays and annunciation locally and in the Pilothouse via CAMS. Sensors are to be provided by the DPSI.

The tanks are to be filled with DEF through a single shore fill connection located on the bow with a containment. DEF tanks, piping, valves, fittings, and all surfaces coming into contact with DEF are to be manufactured from 316LSS material through and through. There is to be no aluminum, steel, brass, bronze et cetera in contact with DEF except for the 316L stainless steel UREA cooler supplied by the DPSI that shall be integrated into the main engine seawater cooling system as per the PYXIS Class. Use tubing or pipe bends in lieu of fittings to the greatest extent possible. Threaded connections are not allowed anywhere in the DEF system.

The DEF system shall be provided and installed as per the PYXIS Class Vessels and these specifications. The final details and arrangements of the system shall be determined during the detailed design and engineering phase to the satisfaction of the OWNER.

<table>
<thead>
<tr>
<th>Table 555.1 – Fire Suppression System Material Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FM200 Piping 1 ½’’</strong></td>
</tr>
<tr>
<td><strong>FM200 Pilot Lines 5/16’’</strong></td>
</tr>
<tr>
<td><strong>FM200 System, Kidde Custom Engineered</strong></td>
</tr>
<tr>
<td><strong>Enclosure Information (Engine Room)</strong></td>
</tr>
<tr>
<td>Table 558.1 – UREA System Material Schedule</td>
</tr>
<tr>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>UREA SCR Supply &amp; Return 3/8”</td>
</tr>
<tr>
<td>UREA Isolation Valves</td>
</tr>
<tr>
<td>UREA Hoses Supply &amp; Return</td>
</tr>
<tr>
<td>UREA Fill 1”</td>
</tr>
<tr>
<td>UREA Vent 1 ¼”</td>
</tr>
<tr>
<td>UREA Vent Filter</td>
</tr>
<tr>
<td>UREA Vent Filter Attachment Hose</td>
</tr>
<tr>
<td>UREA Cooler DPSI Provided</td>
</tr>
</tbody>
</table>

564  **OPTIONAL TRIM SYSTEM**

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a complete and integrated interceptor type trim system designed and installed to optimize overall propulsion efficiency at normal operating speeds per the PYXIS Class vessels.

The trim system shall be Humphree trim control with ride control options featuring electric and manually adjustable interceptor trim tabs located on the transom of each hull as per the PYXIS Class. The interceptor trim tab control panel shall be located on the Pilothouse console as per the approved final Pilothouse arrangement full size mockup.

All components of the system shall be purchased from Humphree including the hull centerline “fixed” interceptor.

The CONTR shall use the PYXIS Class and information from the supplier on the PYXIS Class. The final details and arrangements of the system shall be determined during the detailed design and engineering phase to the satisfaction of the OWNER. During Sea Trials the optimum trim settings shall be determined for 10 through 34 knots and programed into the system during the commissioning process with the manufacturer. The Humphree point of contact is Sean Berrie, Technical Sales Manager, Humphree USA, Sean.berrie@humphree.com, 757-374-9435.

581  **GROUND TACKLE**

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a complete ground tackle system as per the PYXIS Class vessels. Any sliding surface for anchor movement shall be faced with UHMW plastic. The rode and stowage shall be as per the PYXIS Class with all of the final details determined during the detailed design and engineering phase of the project to the satisfaction of the OWNER.
582 MOORING

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all aspects of the vessel's mooring system per the PYXIS Class vessels. Aspects of the mooring system reference drawings that are already installed on the existing hull and are not disturbed by the contract scope of work can be reused. Any mooring hardware to be reused shall be mechanically prepped to SP-3 for dye penetrant testing. The CONTR shall dye penetrant test any items to be reused and provide a report to the OWNER for review. Any aspects of the reference drawings that are needed to be installed due to the contract scope of work and any optional scope of work item exercised shall be installed as per the reference drawings. Items installed that are covered under the contract base scope of work shall be accounted for in this line item. Contract optional scope of work items that require any portions of the mooring system as per the reference drawings shall be accounted for in the appropriate optional scope of work item.

Keyhole any bulwarks in the way of line handling fittings as per the PYXIS Class.

The lines utilized for Vessel docking shall be of fixed length; this requires that the orientation of mooring fittings to the passenger boarding doors be dimensionally exact. The CONTR shall shipcheck the existing Vessel and passenger dock and provide mooring fittings that shall be completely compatible in all respects.

Some changes are required to adapt reference engineering to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO and review of the reference information to ensure these concerns shall be addressed in the final proposal price.

Reference Files

- 0433-010-002-00-H General Arrangement
- 0433-023-001-00-(sponson & mooring bitts-SH1)_STAMPED
- 0433-023-001-00-(sponson & mooring bitts-SH2)_STAMPED

583 LIFESAVING EQUIPMENT

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all aspects of the Vessel’s life savings equipment. Four (4) one hundred (100) person IBAs and one (1) twenty-five (25) person IBA shall be provided, fully outfitted, and installed in locations approved by the USCG and the OWNER. The IBA’s shall be provided with means for one (1) person launching. The 25-person IBA shall be installed on a cradle on the foredeck for San Francisco Bay Vessel Mutual Assistance Plan compliance purposes. An opening shall be fitted in the bulwarks forward to facilitate launching of the 25-person IBA as per the PYXIS Class Vessels. The locations and equipment shall be as per the PYXIS Class Vessels. IBA launching mechanisms shall be manufactured by
the IBA supplier as per the PYXIS Class. All final details shall be determined in the detailed design and engineering phase of the project to the satisfaction of the OWNER.

Adult lifejackets shall be provided, marked, and stowed in numbers and locations that conform to USCG requirements. The Vessels existing life jackets can be reused to supplement the new higher quantity required by the higher passenger capacity. The CONTR shall provide for 10% of the existing lifejackets to no longer be serviceable and to be replaced. The CONTR shall supply fifty (50) child size lifejackets, and two (2) infant lifejackets in addition to the USCG required lifejacket capacity. Ensure additional stowage is provided for a total of fifty (50) child size life jackets. Lifejackets in the passenger cabins shall be stored in metallic boxes underneath the seats. Boxes shall be fitted with hasps for security ties. Storage lockers or deck boxes shall be provided for additional lifejackets that are not stowed beneath seats or additional locations as approved by the OWNER. Lifejackets shall be stowed on both passenger decks in ratios proportionate to the seating.

Four (4) twenty-inch (20") diameter life ring buoys shall be provided, marked, and stowed on the Vessel as required by the USCG. One (1) ring on each side of the ship shall be fitted with fifteen (15) fathoms of three (3) strand black UV resistant Polypropylene line. Two (2) of the life buoys shall have water lights fitted. Life rings shall be mounted in FRP cabinets with stainless steel hardware from Cheyenne Manufacturing, Inc.

Twelve (12) USCG approved hand combination flare and smoke distress signals shall be stowed in a portable watertight container located in the Pilothouse and stored inside the console with ready access. The existing distress signals kit can be reused provided the CONTR replaces any items that are due to be replaced by USCG regulations within the time frame of the contract warranty clause. As an example, if there were some flares that were due to expire 6 months after the Vessel is delivered that resides within the warranty period of the contract therefore the CONTR shall replace them.

The CONTR shall install a Jason’s Cradle system as per the WETA Standard Jason’s cradle reel assembly on the PYXIS Class vessels. The CONTR shall provide the cradles and all portion of the system required to make it fully functional for personal recovery. The system shall include all the structure, machinery, equipment, rigging and controls required to install the system. The system can be ship checked on the Vessels referenced. The CONTR is encouraged to complete detailed ship check.
All four (4) boarding locations shall have cradle attachment points fabricated into the sponson, color coded red and green, so that the cradle can be utilized in its proper orientation and any of the boarding locations.

The CONTR shall prepare a list of all proposed lifesaving equipment for OWNER approval prior final development of the designs.

Provide rescue slide installations at all four boarding locations. Provide one (1) rescue slide per vessel to be stored at a location determined by the OWNER. Rescue slides shall be identical in form and function to existing slide installations on the PYXIS Class vessels. The rescue slide shall be stored in rolling U shaped cradle as per the reference vessel. Provide eyes at each boarding location for securing the rescue slide in place during use, these eyes also double as a hold down attachment points for the passenger boarding throw ramps.

Provide all USCG required items with appropriate signage and stowage. This shall also include all required portable fire extinguishers as per the material schedule below.

<table>
<thead>
<tr>
<th>Table 583.1 – Fire Extinguisher Material Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Deck Forward Port &amp; Starboard</td>
</tr>
<tr>
<td>Engine Room Access Port &amp; Starboard</td>
</tr>
<tr>
<td>Main Deck Machinery Room</td>
</tr>
<tr>
<td>Upper Deck Aft Port Side</td>
</tr>
<tr>
<td>Pilothouse</td>
</tr>
</tbody>
</table>

Some changes are required to adapt referenced vessels to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approval by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO and PYXIS to ensure these concerns shall be addressed in the final proposal price.

END OF 500 SECTION
600 OUTFITTING

601 GENERAL ARRANGEMENT

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all aspects of the interior and exterior outfitting. The OWNER desires a modern, easily maintainable interior with a light, open aesthetic and good exterior visibility through large windows. Every effort shall be made to maximize passenger privacy while adding interest to the passenger seating arrangement through various combinations of aircraft-style seats and booths with tables and bench seating. The interior and exterior spaces of the vessel shall be arranged as per the PYXIS Class Vessels and these specifications. The outfitting of the Vessel shall be of the highest quality as per the other vessels in the WETA fleet.

The CONTR shall retain the services of a Designated Marine Interior Designer (DMID) that is fully experienced and capable of providing detailed marine interior design, specifications, drawings, and other documentation to fully define the outfit of the new Vessel. The DMID shall provide plans and schedules detailing the proposed interior design elements of the Vessel. The DMID on the PYXIS Class is Ship Interior Systems (SIS) of Hood River, Oregon. SIS is automatically approved as a DMID. If the CONTR proposes a different DMID that proposal shall be included in their proposal indicating the firm’s qualifications for review and approval by the OWNER prior to final bids. At a minimum these plans and schedules shall include deck covering plans, ceiling layout plans, interior design and finish schedules, seating arrangements and details, and Snack Bar arrangement. It is assumed that these plans shall be largely identical to the PYXIS Class Vessels.

The work assigned to the DMID shall include the following elements, as a minimum:
- Concept Design Package – including sketches, project definition, assistance with General Arrangement refinement, themes, schemes for marine interiors, fit out of all public spaces.
- Specification of all finishes.
- Three-dimensional (3D) computer aided design and modelling of major components of the passenger cabins.
- Production of images, visuals, renderings, color boards for the proposed design in two and three dimensions (2D & 3D).
- Detailed Design Package – including illustration of details regarding deck coverings, furniture, deckhead, ceilings, bulkhead linings, joinery elements, interior paint, Snack Bar design, et cetera.
- Refinement of finish selections in concert with the OWNER to final specify outfit styles, construction, coverings, materials, sizes, designs and detailing, and incorporating environmentally sustainable best practices leading to an overall responsible design.
- Perform a detailed Snack Bar equipment layout, installation methods, surface finishes, select materials, and equipment selection in concert with the OWNER and the Operator.
- The Snack Bar will provide the same scope of services and refreshment offerings as currently exist on the North Bay Vessels.

The CONTR’s DMID shall start with the PYXIS Class Vessels as a basis for the interior design of the rebuilt SOLANO. If any deviations from the base materials used in the PYXIS Class are required due to Buy America requirements or availability the CONTR shall detail those deviations in their proposal. The deviations shall also be accompanied by the Buy America calculations indicating why the deviation is required. Where deviations are required and approved by the OWNER the materials used shall not be of lesser quality than the PYXIS Class materials. All final interior details shall be subject to review and approval by the OWNER.

The deviation from the PYXIS Class materials shall require a complete new interior design package with options submitted and reviewed by the OWNER until the design package is selected and approved. If all of the materials provided in the reference materials are used then the design package will be limited to drawings and renderings to
ensure the reference materials are being applied correctly as per the PYXIS Class. SIS can be contacted for additional details not depicted in the reference information.

The CONTR’s DMID shall prepare, if a new design package is required due to material deviations, for the OWNERS approval the documents as listed in Section 601 of the Technical Specifications. These include three (3) unique color board themes showing the arrangement of furniture and colors with actual samples of the materials to be used for the seating, tables, commissary space, deck covering, bulkheads, paint, glass, doors, window treatments, et cetera. The CONTR’s DMID shall consult with the OWNER prior to starting the color boards for information on the OWNER’s color preferences, color bands, and color logo/insignia.

Costs associated with the Outfitting that do not fall into an identified SWBS section on the Schedule of Values can be charged to the 601 top level SWBS group as needed by the CONTR.

Some changes are required to adapt reference engineering to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the specifications to ensure these concerns shall be addressed in the final proposal price.

Reference Files

- 0433-010-002-00-H General Arrangement
- 0472-011-001-00-P2 Mid-Life Refurbishment Plan

### 602 HULL DESIGNATING & MARKING

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all aspects of the nameplates, notices, notice frames, markings and labels, required to complete the Vessel to the satisfaction of the USCG and all other regulatory agencies. This includes the ship name on each side of the bow, and the ship name and hailing port across the stern, deck plans, a CONTR’s nameplate, and all licenses and certificates required for posting.

The CONTR shall provide Vessel name lettering and hailing port lettering made from 1/8” thick aluminum plate. The lettering shall be permanently welded to the Vessel at locations approved by the OWNER. Size and style of the lettering shall also be subject to OWNER approval thirty (30) days prior to beginning this work. The lettering shall be preserved and painted following installation.

The CONTR shall provide ships name stenciled on the top of the passenger cabin deckhouse in large letters (characters at least two feet (≥2’) tall) to provide for helicopter identification of the Vessel.

The CONTR shall provide WETA specific stick on branding items and logos as directed by the OWNER so that the Vessel matches the exterior appearance of the PYXIS Class Vessels. The OWNER will provide information on size, location, quantity, colors, et cetera along with the associated graphics files. See Appendix B of the Technical Specifications.

The CONTR shall provide two (2) American flag decals, same as the existing North Bay fleet. The port side flag will fly in normal left to right orientation, the starboard side flag will fly in reverse in keeping with official government flag etiquette.

The CONTR shall provide two (2) plastic brochure racks measuring thirty inches wide by twenty inches tall (30”x20”) on the Main Passenger Deck. Locations of all display cases and brochure racks shall be subject to OWNER approval.

The CONTR shall provide a builder’s plaque to be approved by the OWNER for design, fabrication and installation location.
All nameplates, labels and identification tags shall be permanently adhered to the equipment or adjacent surface with a marine adhesive, 3M 5200 or approved equal.

The CONTR shall provide frames for the following items and any additional display documents as required by USCG, locations to be determined by the OR. Frames shall be bolted to bulkheads using reinforced backing plates and 316SS fasteners:

- Stability Letter
- FCC Certificate
- Certificate of Documentation
- Certificate of Inspection
- Tonnage Certificate
- Fire & Safety Plan
- Emergency Evacuation Plan
- Compass Deviation Card
- Station Bills
- Lifejacket Instructions

The CONTR shall provide interior signage in accordance with the WETA standard drawing provided in Appendix B and additional signage as required to encompass:

- No Smoking signs
- Fire door markings
- Video surveillance
- Seats reserved for disabled and elderly
- No Admittance, Crew Only
- Lighted exit signs
- Lifesaving equipment locations
- Life preserver markings
- Life buoy markings
- Boarding direction signs
- Instructions for use of lifesaving equipment
- Any and all markings and notices required by USCG
- Signs denoting mobility impaired (wheelchair) facilities
- All tactile and announcement boards required by the Access Board Guidelines
- Any other signs as directed by the OWNER

All vents, fills, and shore side connections shall be clearly marked to show their purpose and restrictions on their use.

Pipe marking details are provided in Section 507.

Fire hydrants and firefighting equipment shall each be marked to indicate the station number and handheld fire extinguishers shall be marked with the location of their station, all per USCG requirements.

Service and other spaces not otherwise required to have markings shall have identification plates of 1/8" thick engraved aluminum material. Markings shall be compatible with the interior design scheme.

If the Vessel is provided with certified spaces (certified for deduction from gross tonnage as determined by the Tonnage Admeasurer), those spaces shall be permanently marked by center punching as required by admeasurement regulations.

Emergency lights shall be marked with a 1" high letter "E", with white lettering on a red background.
To facilitate future blasting and painting of the hulls, provide permanent skip weld marks to indicate the boot stripe location along each hull, at full load static displacement plus 6”.

Where any items of hull designation and markings are existing and are undisturbed by the contract scope of work the CONTR may request these items be reused if approved by the OWNER. All items requesting to be reused shall be done in writing to ensure there is no confusion on what was approved and what was not.

603 DRAFT MARKS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install Vessel draft markers made from 1/8” thick aluminum plate. The draft markers shall be permanently welded to the Vessel at locations approved by the OWNER. Size and style of the lettering and draft markers shall also be subject to OWNER approval thirty (30) days prior to beginning this work. The lettering and draft markers shall be preserved and painted following installation. Where any items of draft markings are existing and are undisturbed by the contract scope of work the CONTR may request these items be reused if approved by the OWNER. All items that are requested to be reused shall be done in writing. This shall ensure there is no confusion on what was approved and what was not.

604 LOCKS, KEYS & TAGS

Weather tight doors and all joiner doors, except where otherwise specified, shall be fitted with cylindrical type locksets, with latch bolt operated by knob from inside, keyed cylinder outside. Pilothouse doors from the cabin, and interior crew only doors (Crew Room and Pilothouse), shall have cypher type four (4) digit electronic locks with manual key override. Bridge wing doors shall have deadbolt style cylinder locks with knob on the interior and keyed access on the exterior. Interior fire doors in main vertical zone bulkheads interior stairway enclosure doors and interior passage way doors shall have cylindrical type latch sets with knobs free on both sides. Doors held open by magnetic holdbacks shall have flush-ring type handles. All Doors shall be as per the PYXIS Class Vessels accept the Pilothouse wing stations doors shall be raised by 6” if the new pilot house option is exercised.

All restrooms shall be fitted with privacy indicator locks. Provide six (6) manual override keys for crew use.

All door locks on the Vessel shall be set up for single OWNER grand master key operation. The OWNER shall provide the CONTR with a SOLANO Master Key. The fleet standard is TRIOVING for door hardware.

The overall number of keys on the Vessels shall be minimized and consolidated to the maximum extent possible; all keys shall be tagged and indexed. A twenty-four (24) key locker is to be provided in the Pilothouse, located per the OWNER.

Exterior doors leading to the Engine Room and Fidley shall be fitted with hasps for WETA standard brass pad locks.

External hatches leading to void spaces and other machinery spaces shall be furnished with hasps and WETA Standard brass padlocks or equal locking provisions for securing with a padlock. The padlocks shall be provided by the OWNER to ensure it matches the key and type used throughout the fleet. Manhole keys and/or wrenches shall be provided and stowed as directed by the OWNER.

610 EXTERIOR & INTERIOR DOORS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old, provide and install all new exterior and interior doors. Exterior doors shall be manufactured by PACIFIC COAST MARINE INC., FREEMAN MARINE, or approved equal, matching the existing units and as per the PYXIS Class Vessel door and hatch schedule. All doors are to be hinged accept for the Fidley sliding doors. All doors shall be keyed to match the existing SOLANO locks in all locations. If any locksets are unable to be keyed to match the SOLANO the CONTR shall provide WETA with 150 sets of the new keys all stamped to WETA’s specifications for nomenclature.
During Dock Trials all doors shall be hose tested by the OWNER for proper closure and tightness and deficiencies shall be corrected.

All hardware, trim, and fittings shall be corrosion resistant satin finished 316SS, unless otherwise approved, and shall be designed for rugged marine applications. Hardware shall be standardized and shall be TRIOVING, or OWNER approved equal. Provide hold backs and stops for all doors. Hold backs shall all be installed at or above waist level, and shall be self-latching with thumb release. All stops and hold backs shall be mounted on doubler plates. Tamper proof screws shall be used for all interior doors. All dissimilar metals shall be isolated to mitigate the effects of galvanic corrosion.

All exterior doors shall be weathertight as per the PYXIS Class. Doors leading to Fidley shall be aluminum sliders as per the PYXIS Class or approved equal. Anything not addressed on the PYXIS Class shall be addressed in the detailed design and engineering phase of the project to the satisfaction of the OWNER. In general doors should open in the direction of egress. The windows fitted in weathertight doors giving access to outside passenger decks shall comply with Access Board requirements. All doors shall be tested for proper closure and tightness and deficiencies shall be corrected prior to Sea Trials. Doors and hatches required to be closed at sea shall be so marked.

Doors in passenger areas shall meet the ADA requirements of Section 092 and incorporate fairings or be installed flush to eliminate all tripping hazards. Provide ADA approved high density foam or rubber wedges on the interior and exterior of all passenger loading doors to ease the transition between the door sill and the finished passenger cabin deck. All aspects (dimensions, style, color, arrangement, et cetera) shall match existing installations on North Bay fleet Vessels. All doors shall be installed with the minimum possible threshold for ADA and to limit slips, trips and falls. The upper deck aft doors to the exterior deck shall not be installed as per the PYXIS Class, they shall be installed with the minimum possible threshold. Where possible the threshold shall be removed when it is not required for weather or water tightness or for the structure of the door. All doors shall have marine grade closers and hold open 316 stainless steel latches and hardware.

All interior doors shall be robust lightweight construction as per the PYXIS Class. Interior doors shall not open into aisles or passages if possible, and shall comply fully with Access Board requirements. Install half height or reduced height doors as necessary leading to all under stairway spaces to create utility spaces therein.

Fire doors (C’ rated unless directed otherwise by the USCG) shall be fitted for interior passenger stairways, these shall be provided with magnetic hold backs which shall be controlled from the Pilothouse as well as locally. The entry door from the crew foyer to the pilothouse shall be A-0 rated with the requisite magnetic holdbacks as well unless directed otherwise by the OWNER. The magnetic hold backs shall be 24VDC so that the loss of AC power does not cause the doors to slam shut on passengers. The magnetic hold backs shall be strong enough such that the doors will not come unintentionally free in a seaway and injure passengers.

A security peep hole shall be provided in the door leading from the passenger areas to the Pilothouse and Crew Room.

Doors leading to bridge wings shall open outward and against the wind. These doors shall be weathertight, include dogs on both sides, and drop windows. Provide hold back hooks to keep the doors open when the bridge wing is in use. Theses doors hall include a six-inch (6”) sill to preclude standing water in the bridge wing from entering the Pilothouse.

Some changes are required to adapt PYXIS Class Vessels to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, PYXIS Class Vessel and review specifications to ensure these concerns shall be addressed in the final proposal price.
Table 610.1 – Door Material Schedule

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Manufacturer Series</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>FWD Bow Door</td>
<td>Freeman Series 1120</td>
<td>Lever Lockset, Keyed to SOLANO, Lock Key Outside</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thumbset Inside, Dogged</td>
</tr>
<tr>
<td>Main Deck Boarding French Doors</td>
<td>Freeman Series 1611</td>
<td>Lever Lockset, Keyed to SOLANO, Lock Key Outside</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thumbset Inside, Dogged</td>
</tr>
<tr>
<td>Main Deck Staircase Utility Room</td>
<td>Freeman Series 1611</td>
<td>Lever Lockset, Keyed to SOLANO, Lock Key Outside</td>
</tr>
<tr>
<td>Doors</td>
<td></td>
<td>Thumbset Inside</td>
</tr>
<tr>
<td>Main Deck Staircase French Doors</td>
<td>Freeman Series 1620</td>
<td>Flush Ring Handles, Magnetic Hold back Operable from</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the Pilothouse</td>
</tr>
<tr>
<td>Fidley Sliding Doors</td>
<td>Yard Custom</td>
<td>As per PYXIS Class, Hasp for Padlock</td>
</tr>
<tr>
<td>Main Deck Aft Machinery Door</td>
<td>Freeman Series 1111</td>
<td>Lever Lockset, Keyed to SOLANO, Lock Key Outside</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thumbset Inside, Dogged</td>
</tr>
<tr>
<td>Pilothouse Wing Doors</td>
<td>Freeman Series 1120</td>
<td>Lever Lockset, Keyed to SOLANO, Lock Key Outside</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thumbset Inside, Dogged</td>
</tr>
<tr>
<td>Pilothouse Entrance Door</td>
<td>Freeman A-0</td>
<td>Lever Lockset, Keyed to SOLANO, Cypher w/ manual Key</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Override</td>
</tr>
<tr>
<td>Crew Foyer Door</td>
<td>SIS, Joinery Door</td>
<td>Lever Lockset, Keyed to SOLANO, Cypher w/ manual Key</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Override</td>
</tr>
<tr>
<td>Head Doors</td>
<td>SIS, Joinery Door</td>
<td>Privacy Indicator and Push Plate</td>
</tr>
<tr>
<td>Upper Deck Aft Exterior Doors</td>
<td>Freeman Series 1120</td>
<td>Lever Lockset, Keyed to SOLANO, Lock Key Outside</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thumbset Inside, Dogged</td>
</tr>
</tbody>
</table>

Reference Files

- 0433-010-002-00-H General Arrangement
- 0472-011-001-00-P2 Mid-Life Refurbishment Plan

612 RAILS, STANCHIONS & LIFELINES

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all handrails, grabs, and/or bulwarks shall be fitted on all decks where necessary for the safety of passengers, and for crew access. Full length hand rails shall be fit along the exterior sides of both the main and second deck for crew access, cleaning, and line handling. Intermittently placed handholds will not be acceptable. Handrail stanchions shall be of non-corrosive material.

Where breaks are required for line handling, portable handrail sections and suitable grabs shall be provided for the safety of line handlers. Provide personnel safety equipment, harnesses, tracks, rigging, fittings, railings etc. to enable crews to externally deploy lifesaving gear, service cabin top equipment, wash and maintain all windows. Provide hand rails for crew use at each boarding door per the existing fleet. Handrail height along main passenger deck sponson shall be located thirty-six inches (36”) above the sponson.

Provide a HARKEN certified personnel access rail system shall be fitted above both main and upper deck windows, port and starboard, for the full length where the superstructure extends to the side to facilitate window maintenance and cleaning. The rail may break at the location of the forward passenger loading door on the main deck. The system shall be sized for a 300-pound person. The system shall be complete with two cars fitted in each section of rail. One car shall provide for a full body safety harness and one for a working harness. Stops shall be
fitted at the end of each section to capture the cars. Grab rails shall be furnished at each end of the track to facilitate crew attaching to or leaving the rail system.

The CONTR shall ensure ready access to the bow of the Vessel for the crew by providing hinged gates, which permit safe transit up and down each side of the Vessel for safe line-handling or other purposes.

Exterior observation decks shall be fitted with handrails and bulwarks up to a height of 42" to protect against small parcels or children falling overboard. The bulwarks shall be fitted with mesh screens as per the PYXIS Class vessels. Where passengers are likely to place their feet against the bulwark mesh panels stainless steel shall be used in lieu of the aluminum panels on the PYXIS Class vessels. The CONTR shall outfit the exterior deck as per the PYXIS Class vessels with a gate at the top of the aft stairwell. The gate shall have a positive latch and a “Crew Only” sign.

Handrails shall be installed as required around machinery and elsewhere for safety of operation. Handrails shall be removable where they may interfere with repair or maintenance of equipment.

Some changes are required to adapt the PYXIS Class standard to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, PYXIS Class and the specifications to ensure these concerns shall be addressed in the final proposal price.

Reference Files
- 0433-010-002-00-H General Arrangement
- 0472-011-001-00-P2 Mid-Life Refurbishment Plan

621 NON-STRUCTURAL BULKHEADS & CEILINGS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all softcore joiner panel bulkheads in accordance with the final approved interior arrangement. The existing Vessels and the PYXIS Class use NORAC joinery systems out of aluminum. All joinery systems shall conform to the fire load and structural fire protection requirements of USCG. Lightweight durable components shall be used throughout. Any systems or components located behind joinery panels that need to be accessed for maintenance of operation shall be provide with lockable access hatches and labeled.

If any deviations from the base materials used in the PYXIS Class shall be required due to Buy America requirements the CONTR shall detail those deviations in their proposal. The deviations shall also be accompanied by the Buy America calculations indicating why the deviation is required. Where deviations are required and approved by the OWNER the materials used shall not be of lesser quality and match the color boards provide where possible. All final interior details shall be subject to review and approval by the OWNER. SIS can be contacted for additional details if required.

All outside corners of joiner panel bulkheads shall be shielded with shaped 316SS sheathing from the deck up forty-eight inches (48”) to protect corners from damage.

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install a grid ceiling system, Dampa, Danacoustic or equal. This shall be integrated with the HVAC, CCTV, speakers, and lighting to give a clean finished appearance. Use square ceiling tile panels with beveled edges, not planks. The ceiling shall be compliant with the USCG structural fire protection rules. Access shall be provided to any equipment concealed above the ceiling tiles or behind joiner panels. All access panels shall be labelled with their use. Perforated ceiling tiles with sound damping insulation is preferred if fire load conditions can be met; otherwise install solid tile panels. The ceiling tiles shall be supplied in two colors as per the PYXIS Class Vessel. The CONTR shall be required to create a reflected ceiling plan detail the color layout of the ceiling as directed by the OWNER, but also including all items mounted in the ceiling tiles. If required the ceiling plan shall be overlaid against major system
mount above ceiling such as wire ways, HVAC, piping systems such that the items can be placed knowing where interferences are likely to be.

Ceiling tile panels and HVAC louvered ceiling panels in the Pilothouse shall be matte black in color. Joiner bulkhead panel colors and patterns, and ceiling tile colors, shall be coordinated through the work of the DMID and as per the PYXIS Class.

Some changes are required to adapt PYXIS Class standard to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review the specifications to ensure these concerns shall be addressed in the final proposal price.

Reference Files
- 0433-010-002-00-H General Arrangement
- 0472-011-001-00-P2 Mid-Life Refurbishment Plan

622 FLOOR PLATES & GRATINGS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all gratings in both Engine Rooms, both Jet Rooms, and in any void spaces that contain tanks or machinery that require periodic inspection or maintenance. The gratings shall allow easy access to all parts of the space. Gratings shall be aluminum diamond tread plate secured to aluminum frames with 316 stainless steel countersunk slotted screws. Handrails shall be installed as required to permit safe movement around the machinery space when the Vessel is underway. Handrails shall be portable if required for machinery access. Gratings shall be flanged up at the perimeter wherever possible. Hinged access plates shall be fitted in gratings as necessary to gain access to valves or equipment below the gratings, with finger holes for ease of opening. All deck plate accesses shall be labelled as to their purpose. All plates shall be sized so as to be easily removable and reinstalled by one person. Steps shall be provided wherever needed to accommodate changes of elevation or items interfering with the plane of the surrounding deck grating. CONTR shall provide diamond plate for all deck plates with formed edges. Keep deck plate framing free of vertical members to allow for enhanced access below the framing with deck plates removed.

Shaft couplings, belt drives, and other rotating and exposed machinery shall be fitted with removable guards to prevent personnel injury.

Some changes are required to adapt PYXIS Class to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the specifications to ensure these concerns shall be addressed in the final proposal price.

Reference Files
- 472-070-001-00-P1 Machinery Arrangement
- 0472-071-001-00-P1 Propulsion System Arrangement

623 LADDERS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all ladders and stairs required by the contract scope of work to provide for a complete fully functional Vessel. Interior stairs between passenger spaces, arranged and dimensioned to allow a total of four (4) passengers to descend/ascend abreast, shall be designed for loads of at least 200 pounds per square Foot as per the PYXIS Class. Stairs shall be fitted with handrails and non-slip deck treads, Wooster or equal. Wherever installed, non-slip treads
shall not present a tripping hazard. Hand rails supported by bulkheads shall have a clear hand space of at least two inches (2”).

Vertical ladders in general, as well as inclined ladders to machinery spaces, shall be of aluminum construction as allowed by USCG. All ladders shall be fitted with hand rails and overhead grabs as required for safe use.

Ladders shall be installed into all voids and the Jet Rooms; avoid use of vertical ladders and install slightly inclined ladders to the greatest extent possible. Inclined ladders into the main Engine Rooms are preferred if the arrangement supports that orientation; emergency escape ladders shall be slightly inclined if possible. Rungs welded to bulkhead plate fields will not be permitted. Hull access ladders shall comply with OSHA regulations.

A ladder shall be fitted within to provide an emergency escape from the Pilothouse to the top of the passenger deck house from each bridge wing. Provide a drop-down ladder through a hatch that can be operated from the aft house top, permitting egress from the aft house top to the exterior passenger seating area. This ladder shall fold up so that it is not accessible to passengers and shall be fitted with a securing device at the house top level as per the PYXIS Class.

Where stairways or ladders that are existing are not changed or modified by the Contract scope of work they may be reused by the CONTR provided they are in acceptable condition. If a stairway is to be reused the CONTR shall at a minimum replace the Wooster stair treads in addition to any interior finishes or coating that may have been or will be applied to the subject item. The CONTR shall provide to the OWNER in writing the items that are intended to be reused for review and approval. The OWNER will not approve an item for reuse if it is not in satisfactory condition or has to be modified in some way to match the PYXIS Class.

Some changes are required to adapt PYXIS Class standard to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the specifications to ensure these concerns shall be addressed in the final proposal price.

Reference Drawings
- 0433-010-002-00-H General Arrangement
- 0472-011-001-00-P2 Mid-Life Refurbishment Plan

624 TONNAGE

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all items, structure, opening and other related tonnage items required to furnish the as rebuilt SOLANO with a USCG approved tonnage certificate for under 100 tons as per industry standards for 46CFR Subchapter K fast ferries such as this one.

The original Vessel was built with a longitudinal tonnage framing scheme that is not well documented. The PYXIS Class Vessel are a mixture of transvers and longitudinal tonnage schemes. ABS has reviewed the tonnage engineering for the PYXIS Class and the vessels as per the referenced tonnage certificate. The rebuilt SOLANO shall meet the PYXIS Class standard for tonnage as reviewed and approved by the OWNER.

The CONTR shall create a completely new tonnage plan for this Vessel for review and approval by the OWNER, ABS and USCG. Some changes are required to adapt PYXIS Class standard to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the specifications to ensure these concerns shall be addressed in the final proposal price.
PART B - TECHNICAL SPECIFICATION

Reference Drawings
- Pyxis - ON 1286883 – ITC
- Pyxis - ON 1286883 - US

625 AIRPORTS, FIXED PORT LIGHTS & WINDOWS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all new windows in the portions of the Vessel affected by the base scope of work in the contract. This shall include but is not limited to the windows in the stretch portion of the house plus any windows affected by the base scope of work. The new windows in the affected sections of the house shall be in kind to the existing windows in the house, Pacific Marine Equipment. The CONTR shall also be required to remove, cleanup, polish and reinstall all other windows in the Vessel. Polishing the windows shall be completed by someone trained in window polishing and shall not result in visual imperfections in the windows after polishing. Any windows that develop imperfections (differences in refraction, waviness or other conditions that result in a non-uniform visual surface) shall be replaced by the CONTR at their own cost. As part of the removal and re-installation of the windows the CONTR shall account for in their proposal price the costs to deal with broken fasteners and bent trim rings. All broken, snapped or seized fasters shall be repaired or new fasteners installed adjacent to the failed ones as approved by the OWNER.

WETA does not have detailed engineering on the existing windows installed on the SOLANO. The CONTR shall be required to develop the details for the new windows needed as part of the base contact scope of work. All final details shall be determined during the detailed design and engineering phase to the satisfaction of the OWNER.

Some changes are required to adapt PYXIS Class standard to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the specifications to ensure these concerns shall be addressed in the final proposal price.

625.1 New Windows Option

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all new windows in the Vessel. All windows shall be of the bonded, frameless type and installed using an approved marine grade adhesive system such as Sika, 3M or equal. The glass shall be high quality toughened safety glass. Glass panes shall be of a thickness required by the USCG and DNV classification society rules but in no case less than what is provided on the reference drawings.

The reference drawing provided are for the new Pilothouse on the PYXIS Class. If the option for the new Pilothouse is not exercised by the OWNER the CONTR shall be required to complete drawings for bonded, frameless windows for the existing Pilothouse. This shall include any structural changes that need to take place to facilitate the installation of proper bonded windows. All details shall be determined in the detailed design and engineering phase to the satisfaction of the OWNER.

If the OWNER exercises the option for the new Pilothouse geometry as per the PYXIS Class reference drawings then all of the windows as detailed in the reference drawings shall be installed as per the drawings. The costs for the new windows in the new Pilothouse option shall be accounted for in the Pilothouse option al scope of work item.

Some changes are required to adapt PYXIS Class standard to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the specifications to ensure these concerns shall be addressed in the final proposal price.
626 WINDOW WIPERS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all new pilothouse window wipers for all forward facing windows. The wipers that are existing shall be replaced in kind including the controls exactly matching what is installed or the most current version of that equipment provided it does not change the functionality of the system. The existing window wash system shall be rebuilt with a new solenoid valve. The CONTR shall inspect all of the existing window wash piping and provide a report to the OWNER on the condition.

All windows wipers, washdown fittings and hardware shall be reinstalled with a proper marine adhesive sealant and isolated from the aluminum structure with a dielectric shield. All details of the installation shall be inspected, reviewed and approved by the OWNER prior to reinstallation of the system. The CONTR shall provide replacement wiper information in the detailed design and engineering phase of the project subject to review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO and review of the specifications to ensure these concerns shall be addressed in the final proposal price.

626.1 New Wipers Option

If the 151.1 option for new pilothouse is exercised by the OWNER the CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all new Pilothouse window wipers for the new Pilothouse option.

The all Pilothouse window shall be fitted with marine grade straight line wipers as per the PYXIS Class vessels. The operating mechanism may be on top and the Pilothouse structure above the window shall enable this installation. Multiple blades shall be installed if required to ensure that visibility is not impaired in heavy rain. The blade shall clear at least ninety percent (≥90%) of the glass area.

Wiper controls shall be solid state, independent control for each window, with auto park feature. They shall be fitted with a fresh water wash system with the reservoir refilled from the Vessel’s potable water system. Location of wiper controls shall be determined by the OR.

Quiet operation of the wipers is essential. Wipers shall be operating when sound measurements are recorded per Section 073.1 of the Technical Specifications.

Some changes are required to adapt PYXIS Class standard to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the specifications to ensure these concerns shall be addressed in the final proposal price.

631 PAINT & COATINGS

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old, provide and apply all new coating systems across the entire Vessel. The CONTR shall provide a complete painting schedule to the OWNER for review and approval based off of the information in this section. The CONTR shall provide any updated new part numbers or manufacturers requirements or may provide a proposed alternate coating system manufacturer for review and approval. The CONTR’s painting schedule shall be reviewed and approved by the paint manufacturer(s) before it is submitted to the OWNER for approval. The paint schedule shall include information pertaining to paint formulation, surface preparation and cleaning, environmental constraints, and application techniques, color layout and tolerances. Upon receipt of the OWNER’s approval, painting system applications may begin. All coating systems shall be legal in the State of California. The CONTR shall use the WETA standard colors, the PYXIS Class vessel does not match this standard and shall not be used for color codes only.
Paint performance, including but not limited to anti-fouling performance, shall be fully warranted by the CONTR. Some changes are required to adapt PYXIS Class standard to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the specifications to ensure these concerns shall be addressed in the final proposal price.

631.1 Surface preparation

These Specifications reference minimum surface preparation requirements; all surface preparation shall be in accordance with the coating manufacturer’s instructions and/or approval/supervision and subject to the inspection and approval of the OR. The default surface preparation shall be NACE International Joint Surface Preparation Standard SSPC SP-10. SP-10 standard shall be enforced to ensure all portions of the hull can be fully inspected and recoated to like new condition. Blasting shall be limited to the external hull surfaces and the Potable Water tank unless approved otherwise by the OWNER. All other unpainted aluminum surfaces shall be cleaned by whatever means necessary to permit a full inspection and leave them in like new condition.

Prior to the application of coating materials on any surfaces, including those already coated with a shop coat, the surface shall be made clean and free from foreign matter such as: ink marks, dirt, dust, grease, heat and mill scale, oil, residual abrasive from blasting, rust salt deposits, weld spatter, standing water, et cetera. Cleaning and coating applications shall be scheduled so that contaminates from the cleaning process will not fall on any freshly cleaned or newly coated surfaces.

631.2 Application

All paints and coatings shall be mixed and applied in strict accordance with the manufacturer’s instructions and to the satisfaction of the manufacturer’s Technical Representative. Spray equipment shall be suitable for the material applied and shall be fitted with all necessary traps, separators, mechanical agitators, pressure gauges and regulators. Air caps, nozzles, needles and operating pressures shall be as recommended by the paint and spray equipment manufacturers.

All painting shall be done in a professional manner, and the applied coatings shall be free of holidays, pinholes, bubbles, drips, runs and sags. All coats shall be applied to produce a film of uniform thickness. Edges, corners, seams, joints, welds, and other surface irregularities shall receive stripe coats to ensure adequate thickness of coating.

The finished Dry Film Thickness (DFT) of the individual coats and the complete system shall be in accordance with these Technical Specifications. The DFT and integrity of the applied coatings shall be verified by the use of an approved and calibrated DFT gauge. All readings shall be documented in the QA/QC report along with atmospheric conditions. Paints and coatings shall be applied only under temperature and atmospheric conditions approved by the coating system manufacturer. The OWNER shall be required to spot check all results to ensure standards are being followed.

631.3 Machinery and Electrical

In general, newly installed piping shall be color banded in accordance with the color code requirements of the system served. The color code has been provided in Section 507. If machinery finish is damaged during the course of contract work, damaged areas shall be feathered and painted to match existing coatings. Equipment that is delivered with only factory applied primer shall be coated per this Specification or to the satisfaction of the OWNER.

Do not paint electrical cable. Mask all electrical cable to prevent coating and overspray. Electrical components such as power distribution panels, motor control enclosures, junction boxes, et cetera shall retain color and
coating as supplied from the factory, provided it is a finish coat. Items with only a factory prime coat will be finish painted in accordance with this Specification. Protect and mask off factory lenses, switches, pushbuttons, label plates, et cetera from paint damage. Electrical panels in the Pilothouse shall be painted flat or matte black.

631.4 Tank Coatings

The CONTR shall remove all existing coatings from the interior of the tanks so that detailed structural inspections can take place. The method of removal shall be media blast (SP-10) or alternate proposed to the OWNER for review and approval prior to the start of coating removal.

The Sewage tank shall be replaced as per Section 126. The interior of the new tank shall be blasted to SP-10 and then coated as per the coating manufacturer’s instructions for sewage tank coatings. Edges, corners, seams, joints, welds, and other surface irregularities shall receive stripe coats to ensure adequate thickness of coating.

Table 631.4-1 – Tank Coating Schedule

<table>
<thead>
<tr>
<th>Location</th>
<th>Coating System</th>
<th>DFT (mils)</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Water and Sewage Tanks</td>
<td>SP-10 to achieve manufacturers required profile</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Interline 850, Full Coat, TLA851/A</td>
<td>5 mils</td>
<td>Grey</td>
</tr>
<tr>
<td></td>
<td>Interline 850, Stripe Coat, TLA850/A</td>
<td>5 mils</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td>Interline 850, Full Coat, TLA850/A</td>
<td>5 mils</td>
<td>White</td>
</tr>
</tbody>
</table>

631.5 Interior Coatings

The CONTR shall remove all existing coatings from the interior of the Vessel so that detailed structural inspections can take place. The method of removal, be it be media blast (SP-10) or machine tool (SP-3) shall be proposed to the OWNER for review and approval prior to the start of coating removal.

The interior coating schedule shall be proposed by the CONTR and shall be a marine interior paint suitable for the application in a high wear environment. The coatings shall conform to the colors provided in the PYXIS Class for the interior design subject to the terms of the interior design section. The paint schedule shall include information pertaining to paint formulation, surface preparation and cleaning, environmental constraints, and application techniques, color layout and tolerances. Upon receipt of the OWNER’s approval, painting system applications may begin. All coating systems shall be legal in the State of California.

631.6 Exterior Coatings

A representative exterior painting color scheme with logos and branding is provided for reference in Appendix B. The CONTR shall provide a final color scheme tailored to their Vessel configuration to the OWNER for approval prior to any painting activities.

Exterior areas of the Vessel not exposed to view shall be left unpainted such as the tunnel between hulls, the inside of bulwarks, undersides of roof structures, and handrails. The CONTR shall determine all such areas with OWNER’s approval prior to painting. All markings on aluminum left bare that are subject to public view shall be removed by an appropriate cleaning agent or buffing.

Colors on multiple coats of epoxy primer shall be of a differing shade.
The CONTR shall exercise care in the painting of the bow and bulwarks to avoid glare and reflection into the Pilothouse. Gloss finishes on these surfaces shall be avoided, dark gray colors shall be utilized where directed by the OR.

The CONTR shall coat the inner surface of all hull penetrations with a proven marine epoxy coating system such as Blueseal or equal. Hull penetrations to be coated include, but may not be limited to, thru-hull piping connections, stern tubes and seachests. The epoxy coating system shall be applied to the entire interior surface of each hull penetration, wrapping onto both the outer surface of the hull for no less than 6” and the entire face of the flange to completely encapsulate the aluminum as shown in Appendix B. The Blue Seal or Amercoat 140 shall be applied over everything while the antifouling approved by International for use with Intersleek shall only be applied to the interior of the pipe and not over the face of the flange.

The CONTR shall intermittently weld at the boot stripe to facilitate future painting operations. Paint thickness and type shall be in general accordance with Table 631-1 and the provided Interspec from the PYXIS Class with the color codes corrected to WETA Standard colors. In all cases, the application method, thicknesses, and recoating schedule must follow the coating manufacturer’s requirements.

Paint all hull markings with one coat of INTERSLEEK 1100SR color White below waterline and INTERTHANE 990HS color White or Black (to provide required contrast) above the waterline. Mask edges to ensure sharp edges of the hull markings.
### Hull Penetrations

#### Reference Appendix B

- ** gensets engines, gears and Machinery, main areas bulwarks, non-EW Superstructure **

Only one topcoat scheme provided as per the WETA and Hu. 6” Hu applied in each area.

- **Superstructure**
  - SP-10 to achieve manufacturers required profile
  - Epoxy primer, Intershield 300V, ENA380/ENA383 ** 6 mils ** Bronze
  - Epoxy primer, Intershield 300V, ENA381/ENA383 ** 6 mils ** Aluminum
  - Intersleek 731 Tie Coat, BXA730/BXA731 ** 4 mils ** Light Pink
  - Intersleek 1100SR Foul Release, FXA992/FXA993/FXA994 ** 6 mils ** Blue

- **Weather Decks**
  - Sandblast to achieve manufacturers required profile
  - Interbond 998, KRA925/KRA923 ** 5 mils ** Dark Grey
  - SILOXOGRIP , N9020A/N9020B ** 25 mils ** Gray

- **Exterior house overheads, inner bulwarks, non-exposed areas**
  - Left bare SP-10 aluminum for all exterior surfaces accept for bow bulwarks as per Interspec, interior surfaces that are not exposed shall be left with their mill finish.

- **Machinery, main engines, gears and gensets**
  - OEM epoxy coatings, at the direction of the OWNER

- **Hull Penetrations Reference Appendix B**
  - Mechanically achieve manufacturers required profile ** 2-3 mils **
  - Blue Seal - Filler coats (as required) ** 10 mils ** Blue or Grey
  - Blue Seal - Top coat ** 10 mils ** Blue or Grey

#### Table 631.6-1 – Exterior Coating Schedule

<table>
<thead>
<tr>
<th>Location</th>
<th>Coating System</th>
<th>DFT (mils)</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hull - waterline to keel, 6&quot; boot stripe</td>
<td>SP-10 to achieve manufacturers required profile</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Epoxy primer, Intershield 300V, ENA380/ENA383</td>
<td>6 mils</td>
<td>Bronze</td>
</tr>
<tr>
<td></td>
<td>Epoxy primer, Intershield 300V, ENA381/ENA383</td>
<td>6 mils</td>
<td>Aluminum</td>
</tr>
<tr>
<td></td>
<td>Intersleek 731 Tie Coat, BXA730/BXA731</td>
<td>4 mils</td>
<td>Light Pink</td>
</tr>
<tr>
<td></td>
<td>Intersleek 1100SR Foul Release, FXA992/FXA993/FXA994</td>
<td>6 mils</td>
<td>Blue</td>
</tr>
<tr>
<td>Hull - waterline to sheer and guard rails, colors applied as per the WETA provided 990HS color scheme (adapt to 979). Only one topcoat shall be applied in each area.</td>
<td>SP-10 to achieve manufacturers required profile</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Epoxy primer, Intershield 300V, ENA380/ENA383</td>
<td>6 mils</td>
<td>Bronze</td>
</tr>
<tr>
<td></td>
<td>Epoxy primer, Intershield 300V, ENA381/ENA383</td>
<td>6 mils</td>
<td>Aluminum</td>
</tr>
<tr>
<td></td>
<td>Interfine 979, (990HS ref. color) 990W37R/A1gl</td>
<td>4 mils</td>
<td>Dark Blue</td>
</tr>
<tr>
<td></td>
<td>Interfine 979, (990HS ref. color) 990W37U/A1gl</td>
<td>4 mils</td>
<td>Light Blue</td>
</tr>
<tr>
<td></td>
<td>Interfine 979, (990HS ref. color) 99037T/A1gl</td>
<td>4 mils</td>
<td>Green</td>
</tr>
<tr>
<td></td>
<td>Interfine 979, SYB000/SYA056</td>
<td>4 mils</td>
<td>White</td>
</tr>
<tr>
<td>Superstructure</td>
<td>SP-10 to achieve manufacturers required profile</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Epoxy primer, Intergard 7500, KUA751/KUA759</td>
<td>6 mils</td>
<td>Light Red</td>
</tr>
<tr>
<td></td>
<td>Epoxy primer, Intergard 7500, KUA752/KUA759</td>
<td>6 mils</td>
<td>Aluminum</td>
</tr>
<tr>
<td></td>
<td>Interfine 979, (990HS ref. color) 990W37R/A1gl</td>
<td>4 mils</td>
<td>Dark Blue</td>
</tr>
<tr>
<td></td>
<td>Interfine 979, (990HS ref. color) 990W37U/A1gl</td>
<td>4 mils</td>
<td>Light Blue</td>
</tr>
<tr>
<td></td>
<td>Interfine 979, (990HS ref. color) 99037T/A1gl</td>
<td>4 mils</td>
<td>Green</td>
</tr>
<tr>
<td></td>
<td>Interfine 979, SYB000/SYA056</td>
<td>4 mils</td>
<td>White</td>
</tr>
<tr>
<td>Weather Decks</td>
<td>Sandblast to achieve manufacturers required profile</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Interbond 998, KRA925/KRA923</td>
<td>5 mils</td>
<td>Dark Grey</td>
</tr>
<tr>
<td></td>
<td>SILOXOGRIP , N9020A/N9020B</td>
<td>25 mils</td>
<td>Gray</td>
</tr>
</tbody>
</table>

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**Note:**

- OEM epoxy coatings, at the direction of the OWNER
- Blue Seal - Filler coats (as required)
- Blue Seal - Top coat

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12 April 2019

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### Antifouling as per International Paint

<table>
<thead>
<tr>
<th>Material</th>
<th>Coating Thickness</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antifouling per International Paint</td>
<td>5 mils</td>
<td>Red</td>
</tr>
</tbody>
</table>

### Cathodic Protection

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old, provide and install all new passive zinc Mil-spec MIL-A-18001k anode-type protection system with meters installed in each Engine Room to allow for assessment of each of the hulls' potential by the Operators. Bolt-on passive anodes shall be provided on the hull bottoms, and at each main engine seachest in sufficient numbers, locations and weight to protect the hull as per the reference drawings provided. Unless otherwise noted, all hardware and fasteners used in the construction of the Vessel shall be 316 stainless steel.

Some changes are required to adapt PYXIS Class standard to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the specifications to ensure these concerns shall be addressed in the final proposal price.

#### 633.1 Isolation of Dissimilar Metals

The assembly of dissimilar metals throughout the vessel shall be in accordance with good shipbuilding practices and all regulatory requirements. Corrosion and Coatings Prevention in the Rules for Building and Classing Aluminum Vessels of the ABS shall be followed without exception.

Copper tubing is not permitted in sea water systems, and copper nickel piping shall be isolated from the hull & hull fittings. Water systems shall be constructed using the same material for piping and fittings throughout the system. Steel and other non-aluminum metal fittings shall be isolated from the aluminum structure at their mounting surfaces by means of 10 mil PVC tape, Micarta or other approved methods. Isolate stainless steel from aluminum using isolation kits, and TEF-GEL in areas where direct contact cannot be avoided. Pumps in sea water systems shall be free of ferrous components.

### Deck Covering

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old, provide and apply all new deck coverings. Deck coverings shall not be applied until production work, especially welding, has been substantially completed. The decks shall be smooth and fair when deck coverings are applied. All decks shall be covered as per the PYXIS Class vessels. SIS can be contacted for more detailed information.

The CONTR shall be required to create new fire load calculations for this Vessel and adjust items as needed if the fire load differs from the PYXIS Class. In all scenarios the CONTR shall be required to provide a finished product as per the standards and PYXIS Class meeting all USCG requirements. SIS can be contacted for additional details.

Full width and depth Wooster super grit safety treads shall be fitted on all stairs, safety yellow at top and bottom stair. Stair treads shall not present tripping hazards wherever installed.

Rubber matting shall be provided for the Pilothouse and installed in way of ship service distribution control panels and other electrical equipment. Matting installed in way of electrical equipment shall conform to MIL SPEC #M-15562F Type III for dielectric properties.

After installation of finished decks, they shall be immediately and completely covered with plastic protective runners and cardboard protection through completion of the delivery voyage in order to protect the finishes.
Some changes are required to adapt PYXIS Class standard to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the specifications to ensure these concerns shall be addressed in the final proposal price.

635 INSULATION

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old, provide and install all new insulation throughout the Vessel. The Structural Fire Protection (SFP), acoustic and thermal insulation shall be installed as per the PYXIS Class vessels. Care shall be taken to ensure the integrity of this barrier.

Acoustic insulation shall be installed in the Engine Rooms as per the PYXIS Class. The manufacturer’s recommended methods shall be used for installation of the insulation. Sound leaks at doors and other openings shall be sealed to provide an acoustic sound barrier.

Machinery space insulation shall be lined with sheet metal (no perforations, sheathing). All insulated surfaces shall be sheathed to protect of the underlying insulation and ease of cleaning as per the reference drawings. Mild steel or galvanized pins shall not be used for installation of insulation. Use welded bi-metallic stainless-steel pins and stainless-steel clips. In machinery spaces the sheet metal linings shall overlap, with the lower section tucked under the upper section to preclude liquids from getting behind the lining. Structural fire protection must be fitted throughout the Vessel in accordance with USCG requirements as specified in 46CFR and the PYXIS Class.

Engine exhausts shall be lagged with a multi-part system made up of silicon/fiberglass outer cloth (ALPHA MARITEK Style #3259-2-SS) sewn to high temperature eighteen-ounce (18 oz.) inner cloth (ALPHA SIL Style 600). Attached to that shall be a knitted stainless-steel wire tubular fabric (ALPHA MARITEX #91160) which is in direct contact with the pipe wall. Install a 2" temperature mat between the silicon outer cloth and the inner cloth.

Some changes are required to adapt PYXIS Class standard to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the specifications to ensure these concerns shall be addressed in the final proposal price.

### Table 635.1 – Insulation Material Schedule

<table>
<thead>
<tr>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine Room Acoustic – All Locations Accept Inboard Side Shell</td>
<td>ACOUSTIC INSULATION 2&quot; THICK INCOMBUSTABLE HULL BOARD 2.9pcf W/ 1# LEAD BARRIER, SOUNDOWN# ILC1020UM OR EQUAL</td>
</tr>
<tr>
<td>Engine Room SFP Rated as Required</td>
<td>FIRE MASTER MARINE SFP BLANKET 70 kg/M^3</td>
</tr>
<tr>
<td>Engine Room Inboard Side Shell Acoustic</td>
<td>ACOUSTIC INSULATION 2&quot; THICK INCOMBUSTABLE HULL BOARD 2.9pcf SOUNDOWN OR EQUAL</td>
</tr>
<tr>
<td>Engine Room Escape Hatch</td>
<td>Dendamix Marine, A-15 with auxiliary retention, ASF</td>
</tr>
<tr>
<td>Engine Room, Machinery Room &amp; as required Sheathing</td>
<td>RIGIDIZED 1SLG PATTERN UNPOLISHED TEXTURED ALUM SHEET, 0.032&quot; THICK OR EQUAL</td>
</tr>
<tr>
<td>Superstructure Thermal</td>
<td>THERMAL INSULATION 2.5&quot; THICK WITH 2 mil FOIL FACING 0.75pcf FLEXIBLE MARINE NAUTICA IMO FF OR EQUAL</td>
</tr>
</tbody>
</table>
644 SANITARY SPACES & FIXTURES

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old, provide and install all new unisex restrooms on the vessels as per the provided reference plans. The existing restrooms will need to be removed due to changes in the tonnage scheme. There shall be three main deck restrooms, one upper deck passenger restroom and one crew restroom. The outboard restroom on the main deck shall be ADA compatible. The upper deck restroom shall be ADA compatible as well as there is plenty of space to arrange it as such. Both identified restrooms shall be outfitted to meet all requirements for the accommodation of the mobility impaired (ADA). All restrooms shall be accessible only from the Vessel interior.

Restrooms shall be outfitted as per the PYXIS Class and the following:

- Headhunter fresh water flush head, with remote mounted flushing button.
- One single stainless steel sink and faucet.
- Mirror.
- Automatic liquid soap dispenser w/ drip tray.
- Infrared paper towel dispenser (ADA only).
- Hand dryer.
- Floor drain.
- Overhead light.
- PA speaker.
- Power exhaust ventilation.
- AC power receptacle (Crew restroom only).
- Waste receptacle.
- Coat hook.
- Stainless steel baby changing station (ADA head only)
- Four (4) crew half height lockers (Crew head only)
- A small refrigerator for crew use (Crew head only)
- A dedicated drawer or cabinet for storage of cleaning gear and supplies (Crew head only)

Some changes are required to adapt PYXIS Class standard to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the specifications to ensure these concerns shall be addressed in the final bid price.
645 INTERIOR OUTFITTING

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old, provide and install all new interior outfitting on the SOLANO. It is the OWNERS intention to match the outfitting of the PYXIS Class as best possible. Where deviations are detailed by the OWNER, they shall be intended only to reduce costs of the project. Deviations proposed by the CONTR will have to be justified, reviewed and approved by the OWNER as per the requirements of Section 601.

Some changes are required to adapt PYXIS Class standard to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the specifications to ensure these concerns shall be addressed in the final proposal price.

645.1 Color Boards

The CONTR shall provide the interior design services of the DMID as per the requirements of the 601 section. It is the OWNERS intent that the rebuilt SOLANO be identical to the PYXIS Class. Reference the 601 section for requirements and guidance.

645.2 Furniture and Furnishings

The selection of furniture, furnishings, and upholstery materials and colors shall take into account the durability, cleanability, and maintainability of such materials. The materials and colors proposed by the CONTR/CONTR shall match those used on the PYXIS Class. Furnishings shall be as per the PYXIS Class. Furnishing not supplied by the seating manufacturer shall be manufactured from marine grade heavy duty aluminum and aluminum honey comb panels, Ayers or approved equal. The finishes on furniture shall be as per the PYXIS Class, these specifications with the final details determined during the detailed design and engineering phase to the satisfaction of the OWNER. All items installed in the Vessels shall have construction drawings and 3D isometrics provided to the OWNER for review and approval. UES can be contacted for additional details.

645.3 Seats

The seating on the Vessel shall be provided as per the provided reference materials on general arrangement. However, the base scope of work shall have one deviation from the PYXIS Class materials. The interior seating for the contract base scope of work shall be fitted with the UES Elastomeric comfort upholstery custom configured to WETA specifications. There will not be slip covers over the Elastomeric comfort upholstery providing a reduction in both cost and fire load.

Exterior seats shall be equipped as per the PYXIS Class vessel. All seats shall have non-corrosive anodized or powder coated aluminum frames as per the PYXIS Class and the arrangement required to meet the required life jacket stowage on the Vessel.

Seats and tables shall be installed using welded or riveted seat tracks. The final details determined during the detailed design and engineering phase to the satisfaction of the OWNER.

The CONTR shall provide to the OWNER all details of the seating order for review and approval in the detailed design and engineering phase of the project. UES can be contacted for additional details.

645.31 PYXIS Seat Fabric Option

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install the same seating as described previously with the exact fabrics and slip covers as PYXIS Class Vessel. The CONTR as part of this option shall account for all changes required in weight, fire load, Buy America and anything
else effected by the change in the interior seating materials. All costs associated with this change shall be accounted for in this contract optional scope of work item. UES can be contacted for additional details.

645.4 Tables

Tables shall be provided by UES as per the PYXIS Class and track mounted with aluminum frames similar to those of the seats. Tops shall be aluminum structure with plastic laminate finish and sea rails as per the PYXIS Class. Dimensions, numbers, and locations shall be as per the PYXIS Class and the reference materials provided.

The CONTR shall provide to the OWNER all details of the table order for review and approval in the detailed design and engineering phase of the project. UES can be contacted for additional details.

645.5 Metal Case Furniture

Case goods (desks, cabinets, etc.) shall be of aluminum and aluminum honeycomb, Ayers or approved equal. The gauges of aluminum shall be heavy enough to provide the necessary degree of strength and stability for marine use.

Drawers and drawer guides shall be constructed so as to operate freely and without noise. All drawers and doors shall have catches with rated strength such that they will remain closed when tilted thirty degrees (30°) from horizontal, but drawers shall be removable at will. Drawers shall have side glides and positive stops to prevent accidental opening.

Doors and drawer heads in metal furniture shall be of vermin proof sealed box construction, braced with proper reinforcements to prevent undue racking or twisting. Doors shall be equipped with rubber bumpers to prevent rattling.

The finishes on furniture shall be as per the PYXIS Class with the final details determined during the detailed design and engineering phase to the satisfaction of the OWNER. All items installed in the Vessels shall have construction drawings and 3D isometrics provided to the OWNER for review and approval. UES can be contacted for additional details.

645.6 General Wall Decor

Bulkheads in all enclosed passenger areas shall be covered in soft core panels and aluminum or stainless-steel sheet metal finished in compliance with the Section 621 and the reference materials provided. The finishes on bulkheads shall be as per the PYXIS Class with the final details determined during the detailed design and engineering phase to the satisfaction of the OWNER.

Where flooring cannot be cleanly terminated on a bulkhead or piece of furniture 2½” wall base shall be used to provide a clean and aesthetically pleasing finish of the highest quality. The materials to be used shall be to be provided to the OWNER for review and approval prior to any wall base being installed.

645.7 Hardware

All items of hardware provided as required throughout these Technical Specifications shall be high quality marine hardware. Wherever possible provide 316SS hardware with a satin finish. Where stainless steel hardware is in close contact with aluminum care shall be taken to properly isolate the two metals and products such as TEF-GEL in areas where direct contact cannot be avoided.

Provide coat hooks throughout the Vessel on stanchions, doors, and bulkheads fitted with tamper proof screws. Coat hooks shall be located at least seventy-two inches (72”) above the deck, except as required by the Access Board Guidelines, provided they do not pose a hazard to younger passengers. Due to the low level of ADA compliant coat hooks they have to be installed where children cannot accidentally run into them at eye level. Where coat hooks are installed in joiner panel bulkheads mount the hooks on a backing plate. Do not install coat hooks over tables.
Provide coat hooks (MCMASTER-CARR #12845A21, stainless steel) shall be fitted with tamper proof screws as follows at the discretion of the OWNER:

- Four (4) in the Pilothouse.
- Fifty (50) in each enclosed passenger deck.
- Two (2) installed in each passenger restroom.

In main passenger aisle ways provide deck mounted handrails along the back of adjacent row seats. Provide bulkhead mounted handrails at the base of all video monitors that are bulkhead mounted.

Reference Files

- 0433-010-002-00-H General Arrangement
- 0472-011-001-00-P2 Mid-Life Refurbishment Plan

651 COMMISSARY SPACES

651.1 Snack Bar

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old, provide and install an all new snack bar. The snack bar shall be as per the PYXIS Class vessels with some modifications to equipment locations and details. As an example, the three sink unit and ice bin may flip locations and the stainless steel raised bar area may be raised slightly to provide better storage space. All final details of the snack bar shall be determined in the detailed design and engineering phase of the project.

The OWNER top shall be designed and sized to provide access for the mobility impaired. Specifically, there shall be a section of the bar with an ADA compliant counter height to accommodate wheelchair patrons. See the requirements as set forth in Section 092.

All commissary equipment shall be securely mounted and fastened to bulkheads, decks, or countertops. Mountings shall be designed and installed to withstand acceleration forces equal to four (4) times the acceleration due to gravity. The equipment installed shall be as per the reference materials provided. SIS manufactured the snack bar on the PYXIS Class so they can be contacted for any additional details not shown in these plans.

The CONTR shall provide sufficient electrical circuits and outlets in the snack bar to serve all appliances and equipment at their intended design locations. The CONTR shall also provide at least two (2) spare outlets in the Snack Bar. The CONTR shall provide plumbing service to support the installation of all equipment.

The design, construction and outfitting of the snack bar shall take into account the service that it is in. There shall be no cracks or voids where products, liquids or other materials can fall into and create unsanitary conditions. All wet areas or serving areas for drinks shall be provided with appropriate drip trays. As an example, there coffee machine shall be furnished with a stainless steel drip tray with a drain routed to the common drain.

The soda equipment and syrup shall be located in the snack bar similar to the PYXIS Class. The syrup bags shall be provided with a rack to securely hold them. The rack shall hold the syrup off the floor and provide a containment should one of the larger bags leak. The installation shall include a rack for the CO2 bottle, the mounting of the syrup pumps, the water connections for the carbonator and the cold plate. There shall be an outlet located below the sinks where the carbonator will be placed. The soda installation shall take place in Vallejo after the vessel has been delivered. The CONTR shall provide all of the racks, mounting surfaces, hose routing and all other items required for a quick and clean installation by the soda vendor.

All flooring in the snack bar area shall be sloped to the provide deck drains so that no liquids can for stagnant standing pools. The common drain lines for the snack bar sinks and ice bins shall be furnished with the appropriate air gap as per health code requirements.
Some changes are required to adapt PYXIS Class standard to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the specifications to ensure these concerns shall be addressed in the final proposal price.

651.2 Ticketing Station
The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old, provide and install an all new dedicated Ticketing Station on the main interior passenger deck in accordance with the PYXIS Class vessels. The Ticket Station will be attended by a crewmember during and immediately after boarding for direct ticket sales. The Ticketing Station presents a significant traffic flow and passenger congestion challenge during boarding and shall be arranged to accommodate approximately thirty (30) passengers queuing for tickets without impacting the boarding process.

The Ticketing Stations shall consist of an integrated desk (slightly shorter fore& aft than PYXIS), with 110-volt outlet, PA mic jack, Aiphone, coat hooks and dedicated seating for one (1) crewmember. Ticket processing equipment will be furnished by the OWNER and integrated by the CONTR. Details shall be as per the PYXIS Class with final details determined in the detailed design and engineering phase of the project after review and approved by the OWNER.

654 UTILITY SPACES
The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to remove the old, provide and install an all new utility spaces with shelves, bins, racks, et cetera, arranged to suit and provide secure underway stowage of material and equipment to be stowed, and with scantlings adequate to support the loads imposed. The storage shall be located in the snack bar area. All plumbing shall be run clear to maximize the storage are under the bar and in the cabinets. This will require some changes from the PYXIS Class snack bar cabinets to maximize the storage space available.

656 TRASH DISPOSAL SPACES
The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all new stainless steel trash receptacles. Trash receptacles shall be provided in pairs with separate receptacles for:

- General waste.
- Recycling newspapers, aluminum cans, plastics.

The receptacles shall be arranged as per the General Arrangement drawings. The snack bar shall be fitted with a stainless steel trash receptacle that can be moved around as needed. The built in trash receptacle in the PYXIS Class snack bar shall be converted to a storage locker.

671 LOCKERS & SPECIAL STOWAGE
The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all new stowage lockers as follows:

671.1 CLEANING GEAR LOCKERS (UPPER PASSENGER DECKS)
- The Upper Deck immediately aft of the Pilothouse vestibule.
- Provide space for a mop, mop bucket, broom, and vacuum storage.
- Provide three (3) shelves with sea rails for cleaning products.
- Provide two (2) double tiered crew lockers in the crew restroom, lockers shall be eighteen inches wide by twenty-four inches deep (18”×24”) with provision for installation of a padlock.
671.2 EMERGENCY GEAR LOCKER (MAIN DECK)
- The Emergency Gear Locker shall be located under the main deck stairs in a space shared with Snack Bar items. The space shall be accessible via half height doors from either side of the stairwell.
- Stowage for evacuation slide, emergency gear, safety harness, spare fire extinguishers.
- Eight feet (8') of linear shelving fitted with sea rails for small item stowage.

671.3 DECK LOCKER (MAIN DECK)
- Provide a portable weathertight fiberglass Bosun’s locker located on the foredeck; securely mounted to a deck foundation.
- Provide stowage for the anchor rode.
- This locker shall be moved into the passenger cabin during the Delivery voyage and replaced to the bow prior to Acceptance.

671.4 CREW LOCKERS
- The existing crew room lockers in the existing crew room restroom on the upper deck shall be replaced with new and located as per the PYXIS Class vessels.

672 BICYCLE ACCESS & STOWAGE

The CONTR shall supply all necessary labor, material, services, engineering, and equipment required to provide and install all new bicycle storage. The bicycle storage shall be arranged as per the PYXIS Class. The CONTR shall be required to provide modified structure to support the bicycle racks if the aft bicycle rack enclosure option 151.2 is not exercised. The engineering effort shall include some time to adjust the height of the racks as they are mounted on the structure depicted.

Some changes are required to adapt PYXIS Class standard to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the specifications to ensure these concerns shall be addressed in the final proposal price.

END OF 600 SECTION
800 MANAGEMENT & ENGINEERING

The CONTR shall supply all necessary labor, materials, services and engineering required to provide all project management and engineering functions contained in Series 800 Technical Specifications and as otherwise required by the RFP. CONTR shall utilize the services of the AMD Marine Consulting Pty Ltd (AMD), of Australia for the specific hull, house, naval architecture and structural design elements of the global Vessel structure. AMD designed the SOLANO and the PYXIS Class and has been deeply involved in developing the concept of rebuilding the SOLANO.

Point of Contact: Allan Soars
amd@amd.com.au

All other aspect of the engineering effort that will take place in the detailed design and engineering phase of the project shall be completed by an engineering firm as proposed by the CONTR in their STEP-2 proposal and approved by the OWNER. The engineering firm proposed by the CONTR shall be required to have recent experience with high speed lightweight aluminum ferry boats of similar size and complexity to the SOLANO and the PYXIS Class vessels.

Costs associated with the Management and Engineering that do not fall into an identified SWBS section on the Schedule of Values can be charged to the 800 top level SWBS group as needed by the CONTR.

Changes are required to adapt PYXIS Class standard to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the specifications to ensure these concerns shall be addressed in the final proposal price.

802 CONTRACT GUIDANCE DRAWINGS

The OWNER will provide all of the contract guidance and reference drawings that they have the data rights to use. The list of engineering provide is extensive and shall include the following groups of drawings:

- SOLANO Mid-Life Refurbishment Plans
- SOLANO Vessel drawings
- PYXIS Class Vessel, Limited set Structural

The engineering, the PYXIS Class vessels and reference materials provided shall be used by the CONTR to develop the price proposal for this Contract. The engineering, the PYXIS Class vessels, and reference materials provided shall also form the basis for the detailed design and engineering effort that the CONTR shall complete as part of the Contract scope of work.

Changes are required to adapt PYXIS Class standard to this project due to differences between the SOLANO, the rebuilt SOLANO and the PYXIS Class. The CONTR shall address the required adaptation in the detailed design and engineering phase of the project after review and approved by the OWNER. The CONTR is strongly encouraged to undertake detailed ship checks of the SOLANO, the PYXIS Class and review of the specifications to ensure these concerns shall be addressed in the final proposal price.

810 DESIGN & ENGINEERING

The CONTR shall provide all detail design and production level engineering services necessary to fully define the Contract scope of work in accordance with the Specifications. Services shall include technical calculations, surveys, material selection, preparation of diagrams, sketches, schedules, data, and preparation of all production drawings and As-Built drawings.
The engineering content developed during the detailed design and engineering phase by the CONTR shall provide the OWNER with all details, engineering, drawings and calculation required to review and approve all aspects of the Contract scope of work, any optional scope of work exercised and the design and construction of the Vessel as a whole.

The CONTR shall account for in their price proposal the engineering effort that it will take to fully define this project and complete the engineering needed to define the production effort to the satisfaction of the OWNER and the USCG. The CONTR shall not start any construction activities until a Notice to Proceed with Construction has been authorized by the OWNER when the engineering has reached a satisfactory level of completion and approval. All engineering required shall be submitted until approved by the USCG Marine Safety Center. The costs associated with the DNV approval or “Examination” of the AMD vessel structural work shall be the responsibility of the CONTR. All engineering drawings that will be provided by the OWNER will be part of this RFP. The CONTR understands that the OWNER shall only provide guidance, review and approval during the detailed design and engineering phase of the Project. In general, the CONTR shall, at a minimum be required to provide drawings to define every SWBS section in these technical specifications.

All drawings shall conform to a mutually agreeable Ship Work Breakdown Structure (SWBS) numbering system based on these specifications with additions as agreed upon and needed to address engineering content that does not match a particular SWBS section exactly. As an example, where these specifications detail a generic 111 Hull Structure section the CONTR shall add SWBS drawings for stanchions (115) and jetguards (190), as an example. All drawings shall be submitted in electronic format as AutoCAD® .dwg with Adobe® Acrobat .pdf versions of the AutoCAD files. Scanned drawings with hand mark ups submitted as .pdf files will not be acceptable. The .pdf file format is only to be used for viewing of CAD drawings. Booklets of details and calculations may be on sheets sized 11” x 17” or 8½” x 11”.

All drawings shall incorporate the Standard WETA details contained in Appendix B of this specification.

All data created from this project shall be provided to and reviewed by the OWNER, including all information provided to USCG. During the detailed design and engineering phase, drawings shall be reviewed on a weekly basis at a weekly web meeting organized by the CONTR. The CONTR shall include all personnel deemed necessary for the meeting, and any others requested by the OWNER. The CONTR shall be responsible for taking meeting minutes and emailing a brief synopsis of each meeting to include all decisions made and any action items.

Drawings shall include a Bill of Materials (BOM) of all major components defined in the drawing. Raw materials such as plate, extrusions, pipe, pipe fittings, hoses and hose end fittings shall be called out in the drawing or in an attached material schedule. All drawings shall show enough detail, including material schedules, such that the system can be recreated from the drawings. Symbols on drawings shall conform to recognized marine commercial standards. Materials shown on drawings shall have item numbers and be identified in a material list by material specifications, ASTM, ANSI, NEMA, etc., as appropriate.

The OWNER will review the CONTRs detailed production level drawings to determine compliance with the Specification and Contract. The OWNER’s review will not relieve the CONTR of responsibility for deviations from the Specification unless specific written approvals of deviations shall be received by the CONTR with the final approval of the drawing by the OWNER. Approval of a drawing does not constitute approval of a deviation, mistake, or omission. OWNER approval of a deviation from the Specification will not relieve the CONTR of the responsibility for satisfactory operation of the system or equipment. Work performed by the CONTR prior to the OWNER’s review and approval of the CONTR’s drawings will be at the CONTR’s own risk.

All drawings shall be initialed in the title block by the drafter and the engineer responsible for the production level drawings prior to submittal to the OWNER. They shall be signed by the engineer and supervising engineer checking the drawing. Each drawing shall be checked and finished before submitting to the OWNER for final review. Concept
or progress reviews of drawings are encouraged, but the status of the drawing must be made clear to the OWNER prior to review. Drawings without appropriate signatures and drawings which are not complete will not be reviewed by the OWNER for anything other than concept approval and will be returned to the CONTR for completion. Returned drawing submittals do not count towards fulfilling the CONTR’s obligations with regard to scheduling; i.e., all returned drawings must be resubmitted complete within the scheduled time.

The CONTR shall furnish a copy of all written or email correspondence sent to or received from regulatory agencies to the OWNER. When submitting system production level drawings, such as piping diagrams and isometric wiring diagrams, CONTR shall include the calculations by which the system components were sized. The OWNER will not review these drawings without supporting calculations.

810.1 As-Built Drawings

All working drawings are to conform to an “As-Built” condition and stamped “AS-BUILT FINAL” in the title block. The final drawings shall reflect systems and arrangements of the Vessel as finally completed and approved. The drawings shall not be stamped “AS-BUILT FINAL” until after the CONTR has verified that the physical configuration of the Vessel matches the drawing being submitted as an As-Built. Close attention shall be paid to electrical and piping termination details. The CONTR shall verify that equipment data matches the drawing BOMs.

810.2 Display Drawings

The CONTR shall develop and provide 24”x36” D sheet size, non-fading positive prints of drawings to be mounted in the locations as required by the USCG on board the Vessel. Any plans required by the USCG for issuance of the COI shall also be provided by the CONTR. These drawings shall be mounted in anodized aluminum, or stainless steel, frames with clear plastic covers (“Plexiglass”) prior to Redelivery of the Vessel.

810.3 Weight Control Program

Minimizing weight growth during the contract work is important. Scantling sizes shall be kept to a reasonable size. All systems shall be designed to balance the weight of the Vessel versus the long-term durability of the Vessel.

The CONTR shall prepare and maintain a Builder’s Weight Estimate (BWE). BWE shall include a review by AMD and an updated to impacts on naval architecture such as speed, trim, balance, structural design load and stability. Each revision of the BWE shall be submitted to the OWNER. The weight estimate shall conform to the agreed SWBS system. Throughout the construction period, the CONTR shall monitor the actual weight of equipment and materials against the BWE. The BWE shall be updated and resubmitted monthly along with the progress payment applications; the progress payment application will not be approved unless accompanied by an up-to-date BWE. Significant weight growth or migration shall be brought to the attention of the OWNER.

810.4 Service Life Margin

The CONTR shall incorporate a Service Life Margin into the Vessel design. The Service Life Margin is an allowance for future growth of the Vessel during its operational life. This margin shall be intact when the Vessel is delivered to the OWNER. As a minimum the CONTR shall include a service life margin of 4,480 pounds (2 long tons) and a contract modification margin of 2,240 pounds (1 long ton). The centers of these weights are assumed to be on centerline at the vessel’s Longitudinal Center of Gravity (LCG) and 4’ above the main deck.

820 TECHNICAL DOCUMENTS

As part of the complete Vessel, the CONTR shall provide to the OWNER, upon delivery:

- A complete set of the USCG approved drawings for the Vessel.
• A complete set of all As-Built drawings for the Vessel. Three (3) full-sized black and white reproducible copies and an identical AutoCAD (Latest Release) copy on CD-ROM.
• Smaller drawings, such as 8 ½" x 11", and 11" x 17", shall be on bond paper.
• Manufacturer’s drawings and schematics – minimum three (3) copies of each document.
• Vendor and subcontractor drawings – minimum three (3) copies of each document.
• Machinery, equipment, and parts: manuals and technical documentation – minimum three (3) copies of each document and one copy on CD-ROM.
• Vessel operations manual, specifically procedures to operate shipyard custom built and interfaced systems including machinery, controls, auxiliary, electrical, plumbing and safety – minimum three (3) copies.
• One copy of all purchase orders. The purchase orders shall be grouped by SWBS section. The intention is that the OWNER shall have all of the information required to contact vendors, order spares, operate and repair the Vessel.

830.1 MATERIALS

830.1.1 Control of Materials

The materials used on the work shall meet all requirements of these technical specifications.

Materials to be supplied shall be identified in the CONTR-developed documents such as: specifications, purchase technical specifications, drawing BOMs, drawing equipment lists, or detail drawings. Materials shall be described to the extent required for ordering or reordering from suppliers. Descriptions shall include brand name, model, type, size and other information as applicable to the item.

Where necessary to provide flexibility and competition in the purchasing process, alternative manufacturers may be suggested by CONTR and shall be subject to approval by the OWNER.

No materials shall be ordered until after Notice to Proceed has been authorized by the OWNER. Any materials ordered prior to such notice to proceed shall be at the CONTR’s sole risk.

All materials incorporated in the Work covered by this Contract are to be new, of current production, of the specified or most suitable grade of their respective kinds for the purpose and, except where otherwise specifically provided for in the Contract for particular items, currently supported by spare parts in the United States of America and as required by the Contract. All material items used shall be suitable for use in a marine environment and for their intended use.

All materials shall be free from imperfections of manufacture and from defects that adversely affect appearance or serviceability.

Materials banned by the State of California shall not be used under this Contract.

Structural plates, shapes, bars, castings, forgings and all other material used throughout the vessel which are subject to regulatory body approval shall meet the requirements of the regulatory bodies.

830.1.2 Samples

Samples of materials shall be submitted for approval when so directed by the OWNER or indicated in the Contract Documents. The OWNER may order such sampling at its sole discretion. Any work in which untested materials are used after such direction from the OWNER, and which the OWNER has not approved in writing, is subject to removal at the OWNER’s direction and at the CONTR’s expense.
Material samples may, at the option of the OWNER or regulatory bodies, be subjected to laboratory testing beyond that normally performed by the manufacturer, to verify compliance with quality requirements. The results of the tests may be the basis for acceptance of quality of manufactured lots. Except where such testing is expressly required by the Contract, the costs of laboratory testing that is requested by the OWNER and beyond that normally performed by the manufacturer shall be paid for by the OWNER as Extra Work at the laboratory facility’s invoiced price and without CONTR mark-up.

830.1.3 Tests and Inspections at Place of Manufacture, Production or Shipment

In addition to material tests and inspections that occur at the CONTR’s facilities, certain items of equipment and other materials shall be inspected and/or tested at the source (place of manufacture, production or shipment) as required by the regulatory bodies and the Contract. During the monthly progress meetings CONTR shall notify the OWNER of anticipated tests that may occur in the following month that the OWNER may desire to witness including propulsion component testing.

Where inspections and tests at the place of manufacture, production or shipment are made, the following conditions shall be met. The conditions in subparagraphs ‘A’ and ‘B’ below are requirements of any Contract or agreement between the CONTR and the producer, manufacturer, fabricator or supplier:

A. The OWNER and regulatory body representatives shall have the cooperation of the CONTR and the producer, manufacturer, fabricator or supplier with whom the CONTR has contracted for the materials.
B. The OWNER and regulatory body representatives shall have full entry at all times to such parts of the plant as may concern the production, manufacture, assembly, cleaning, painting and packaging of similar materials being furnished.
C. In the case of plant facilities located within the continental United States, the OWNER shall be advised of the production and/or fabrication schedule a minimum of 4 calendar days prior to beginning work on any similar item requiring test or inspection. In the case of plant facilities located outside the continental United States, the OWNER shall be advised of the production and/or fabrication schedule a minimum of 10 calendar days prior to beginning work on any similar item requiring test or inspection. Such notifications shall include the recommended dates that the OWNER be on site to witness or perform tests and inspections.
D. Planning and coordinating the conducting and witnessing of tests and inspections at sources of supply by regulatory body representatives shall be the responsibility of the CONTR.

All materials that are fabricated or installed without having received the required inspections and tests witness thereof by regulatory body representatives, shall be considered unacceptable and may, at the OWNER’s discretion, be subject to removal and correction at the CONTR’s expense.

The OWNER reserves the right to retest materials that have been tested at the source of supply, after they have been delivered and prior to incorporation into the work where, damage warrants such retest. The OWNER reserves the right to reject all materials which, when retested, do not meet the requirements of the Contract.

830.1.4 Material Certification

Where materials are required by these specifications to conform to certain standards and requirements, such as those of the USCG, ASTM, AISI, ANSI, FCC, USPHS, or UL, the following provisions shall apply:

A. All items requiring U.S. Coast Guard approval are listed in COMDTINST M16714.3 (old CG-190), “Equipment Lists,” or a USCG approval letter or certificate shall be furnished to the OWNER upon request.
B. Copies of materials certifications, test reports, metal analyses, welding inspections, non-destructive test data, welding procedures and test schedules shall be provided to the OWNER as requested.
C. The OWNER may permit the use, prior to or without sampling and testing, of certain materials or assemblies when accompanied by the manufacturer’s certificate of compliance stating that such materials or
assemblies fully comply with the requirements of these specifications. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies delivered to the work must be accompanied by a certificate of compliance in which the lot is clearly identified.

D. Provision of invoices, certificates of compliance or other documentation contending that furnished materials comply with standards and other requirements applicable to the materials shall not relieve the CONTR of his responsibility to perform inspections, tests, research or other validation work necessary to ensure that the materials do in fact comply with the requirements.

E. All items requiring classification society approval shall have an approval affidavit furnished to the OWNER prior to installation of the item.

830.1.5 Protection and Storage of Material

The CONTR shall be responsible for the protection from the elements, weather, and abuse, of all material intended for use and installed on board the Vessel until Acceptance of the Vessel by the OWNER.

Due consideration shall be given to the nature of the item during handling and storage. Materials shall be stored out of the weather in a manner that assures the preservation of material quality and fitness for the work.

All finished surfaces shall be protected by appropriate means. Surfaces damaged or marred shall be replaced or repaired by the CONTR to the satisfaction of the OWNER at the CONTR’s expense.

The OWNER may reject any material improperly stored or handled.

The OWNER may require that stored materials, even though inspected before storage, be inspected again prior to their use. Stored materials shall be located so as to facilitate their prompt inspection.

830.1.6 OWNER Furnished Equipment (OFE) and Material

The CONTR shall furnish all parts, materials, equipment, tools, or any other items as necessary to complete the full installation of the items listed below. As per these specifications the OWNER is only furnishing the following two items for this project. Should it become necessary for additional OWNER Furnished Equipment to be utilized, the provisions for such shall be negotiated.

- Two (2) each MTU16V4000M65L EPA Tier 4 propulsion main engines and EPA required emissions equipment as per the provided reference materials. Contact the DPSI for any additional clarification on scope.
- Two (2) each John Deere 6068AFM85 EPA Tier 3 generator engines as per the provided reference materials. Contact the DPSI for any additional clarification on scope.

830.1.7 “Or Equal” Material

Where a specific brand name and/or model is required by the Contract design package, followed by the term “or equal,” the indicated brand name shall be provided unless OWNER approval of an “or equal” product is obtained. To request OWNER approval of an “or equal” product, the CONTR must submit a written request to the OWNER and shall be obligated to include the following in the request:

A. All relevant data establishing equality or superiority of the proposed product as it relates to:
   a. performance, reliability, maintainability, durability, size, and weight characteristics
   b. requisite regulatory body approvals
   c. availability of parts and service
   d. service history/records of the proposed item

B. Identification of any material variations of the proposed “or equal” product from the materials provided and these specifications otherwise addressed by item ‘A’ above.

C. The warranty of the proposed item.
D. Drawings and sketches of the proposed item, if available.
E. Names, addresses and telephone numbers of firms that have the item in similar service.
F. An analysis of the effect on Vessel’s weight, center-of-gravity and stability.
G. A statement that no increase in the Contract Price or time to complete the Work shall result from use of the “or equal” item. Written quotes from the “specified” and proposed “or equal” vendors shall be provided.
H. Other salient technical data necessary for a comparative analysis.

The CONTR shall make arrangements for the OWNER to view the proposed “or equal” item in use at the CONTR’s site or deliver a sample to the OWNER if requested.

The OWNER shall provide a written determination regarding the request for use of the “or equal” item. The OWNER’s determination shall be considered final. For use of an “or equal” item to be considered approved, it must have the unambiguous written approval of the OWNER. The OWNER’s approval of an “or equal” item allows the CONTR the option of procuring that item. In each case where the request is disapproved by the OWNER, the CONTR shall provide the specified material at no extra cost to the OWNER.

Use of “or equal” items and material substitution shall not be considered without a written request for same, nor shall it be allowed without the OWNER’s written approval.

It shall be the CONTR’s responsibility to design, integrate, test and incorporate the “or equal” item in the work. All costs to the CONTR as a result of the use of the “or equal” item, over and above the cost of the originally specified brand name item, shall be at the CONTR’s expense. The CONTR shall be entitled to no extension of time associated with the use of an “or equal” product. The OWNER shall not be responsible for any delay resulting from a substitution request.

In cases where material items are explicitly called out by brand name in the OWNER’s requirements without the use of the “or equal” phrase; the items so specified must be provided.

830.2 TESTING & TRIALS REQUIREMENTS

The CONTR shall develop, in cooperation with the OWNER, a comprehensive testing and trials plan. The plan shall identify all testing milestones, communicate and continually update a testing schedule, define testing procedures and track deficiencies, corrections and Acceptance.

The CONTR shall provide a Master Test Plan and Index for OWNER’s approval before the start of Construction. The CONTR shall provide test procedures to the OWNER for approval at least thirty (30) days prior to beginning any test.

Tests shall be conducted to the requirements and satisfaction of the OWNER, the USCG OCMI, and specific equipment manufacturers as required. Tests shall consist of the following phases:

- Factory Acceptance Testing (see Section 831)
- Component Quality Assurance & Testing (see Section 832)
- Dock Trials (System Testing) (see Section 833)
- Sea Trials (Vessel Testing) (see Section 834)
- Drydockling Inspection (see Section 835)
- Acceptance Trials (see Section 836)

Following completion of Dock, Sea Trials and Acceptance Trials, any item of CONTR furnished equipment that shows questionable operating characteristics shall be thoroughly examined and repaired by the CONTR, if necessary. The tightness of all electrical connections, switches, circuit breakers, and buss bars shall be verified to the OWNER’s satisfaction. If repairs are necessary or if the performance of any CONTR furnished equipment does not meet
specification requirements, tests of the individual units are to be repeated by the CONTR and corrections made until the equipment meets the specifications.

The CONTR shall provide all instruments for operational tests. The type and quantity shall be such that they shall provide sufficient data to analyze the performance of systems, machinery, and equipment. Electric motor test instruments shall include a voltmeter, ammeter, and watt meter, either as separate meters or combined in a single analyzer.

Ship’s gauges and instruments may be used for tests of the systems they serve provided they have been calibrated. Shipyard test instruments and means of connection shall be provided as necessary for additional readings required to test machinery and systems.

The CONTR shall check test instruments against standards at the beginning and end of the test program. If readings taken during a test appear unreasonable, the OWNER can require the CONTR to check all the instruments, gauges and thermometers, whether ship or test, used on the test in question.

The CONTR is responsible for all costs associated with all testing and trials.

831 FACTORY ACCEPTANCE TESTING

Certain equipment may be factory tested and accepted based on the satisfactory results of factory tests. CONTR shall identify all factory-tested equipment for prior approval by OWNER and shall submit documentation of satisfactory testing to the OWNER. Examples of some equipment subject to Factory Acceptance Testing are:

- Pressure test all non-integral tanks or pressure Vessels.
- Operational and load tests for generator engines on test beds in compliance with the regulatory requirements.
- Functional tests for other machinery, electrical and electronic equipment at vendor’s facilities.
- Acceptance of glass in portholes or windows and installation.

832 COMPONENT QUALITY ASSURANCE (QA) & TESTING

The CONTR shall implement a complete and thorough component quality assurance and testing program. The purpose of this program is to ensure that all workmanship is satisfactory, all equipment has been properly installed, all systems shall be functioning properly, all subcontract work is satisfactory and that all required regulatory inspections have been completed. This program will cover all aspects of construction, including metal work, machinery systems, piping systems, electrical systems, interior and joinery, outfitting and paint.

The testing and inspection of metal work will begin with inspection of frames and sub-assembly fabrications and will progress through module assembly and finally complete hull and deckhouse assembly. All tanks, both integral and independent, will be pressure tested and demonstrated to be tight. All watertight bulkheads and decks will be tested and shown to be tight. All doors, windows, hatches and other hull openings will be tested and demonstrated to be watertight or weather tight as appropriate.

If required by the regulatory bodies, x-ray testing (or other regulatory accepted test with specified requirements) will be performed on shell seams and supporting structure.

Measurements of shaft diameter and radial run-out shall be recorded. Proper installation of the main engines and gears will be confirmed and the alignment procedures for the main engines and shafting verified and recorded.

Initial testing of main propulsion machinery and ship service generators shall be under the direction of the manufacturer’s representative and the OWNER shall be in attendance. Manufacturer’s representatives shall also witness Sea Trials.
All piping systems will be flushed as required, and pressure tested in accordance with regulatory requirements and manufacturer’s recommendation. The proper installation of all piping systems including routing, materials, equipment installation, labeling, piping support and isolation will be confirmed. Proper functioning of individual components will be confirmed and overall system performance will be verified and recorded.

The installation and calibration of all electrical systems, sensors, alarms, tank levels, and electronics will be inspected, including proper routing, cable size, termination, labeling and testing of individual cables. The proper operation of the generators, distribution control panel and power management systems will be verified. The proper installation and functioning of all navigation, communication and security systems will be confirmed in conjunction with the electronics vendor.

The installation of all insulation, joinery and finished interior will be inspected and reviewed by the OWNER. The CONTR will manage and approve the installation of the various interior subcontractors and will review and coordinate approval with the OWNER of all interior samples. The CONTR will also be responsible for verifying proper operation of various equipment and systems including appliances, lighting, sanitary systems, et cetera.

Paint preparation and final finish will be confirmed with paint supplier representative.

The CONTR will assemble a list of tests to be completed and will coordinate with the OWNER and regulatory inspectors to demonstrate completion of various tests and inspections. Testing shall not be limited to the regulatory requirements but shall prove all systems to the satisfaction of the OWNER. The OWNER shall be given forty eight (48) hours’ notice on all system testing and will witness the tests unless the option to witness is specifically waived.

The OWNER and an authorized manufacturer’s representative shall be present for inspections and shall confirm acceptance of all work completed. All work completed shall be inspected by the CONTR in the presence of the OWNER and regulatory inspectors as required. The OWNER shall have the right to appoint additional consultants and representatives to witness tests and trials at their discretion.

Upon satisfactory completion of the Dock Trials and after correction of all defects by the CONTR to the satisfaction of the OWNER, the CONTR shall take the ship on Vessel Testing in a simulated fully loaded condition.

833  DOCK TRIALS

Dock trials shall be conducted to demonstrate proper functioning of propulsion systems and controls, auxiliary systems, electronics and safety equipment prior to Sea Trials. At least two weeks prior to dock trials, the CONTR will present an agenda to the OWNER for review and comment.

Initial start-up and application of load to the main engines will be performed by the CONTR in conjunction with the engine/reduction gear manufacturer’s representatives. The engine and gear manufacturers will review and approve the installation of the main engines and gears, including alignments prior to engine start-up.

Following initial start-up and testing, the main engines will be run at the dock for a minimum of four (4) hours to demonstrate readiness for Sea Trials. Controls and clutches will be verified from each Control station.

Generator start-up and testing will be completed in conjunction with the generator manufacturer’s representative. Proper function of the switchgear and power management systems will be verified by the distribution control panel manufacturer. Following initial start-up and testing the generators will be run for a minimum of four (4) hours to demonstrate readiness for Sea Trials.

All auxiliary systems will be run at the dock to verify proper operation. Bilge and fire systems will be demonstrated to be fully operable in case of an emergency during Sea Trials. The proper operation of the steering system will be verified from each Control station, including the emergency steering station.
All navigation and communication electronics will be verified to be functioning properly in conjunction with the electronics vendor.

The proper deployment of the anchor and ground tackle will be demonstrated by lowering and retrieving the anchor in a controlled manner.

The proper operation of the IBA cradle and release will be demonstrated by simulating launching and retrieving while dockside.

It will be the responsibility of the subcontractors to have all necessary spare parts for their systems (i.e. filters, fuses, gaskets, relays, valves, etc.) readily available so as to not delay dock or sea trials if such failure should or does occur and these parts are needed.

The Dock Trials will consist of the following (not necessarily all-inclusive) list:

- Weather/water tightness of hatches, windows, port lights, doors, shell doors etc.
- Safety equipment – life rafts to be put aboard just before Sea Trials with maximum future service time possible, fire extinguishers to be put aboard also with inspection dates as far as possible in the future.
- Lifting appliances, cranes, boarding/ accommodation ladders, et cetera
- Steering gear
- Ventilation and heating system
- Air conditioning
- Electrical systems and generators, load tests
- Generator to generator switching shore power to generator switching and vice versa
- Anchor and mooring equipment
- Deck equipment, bollards, et cetera
- Bilge and fire-fighting systems
- Sanitary systems
- Bridge and navigation equipment
- Hydraulic equipment
- Alarm tests for safety systems
- Test of lifesaving equipment
- Fire shutdown systems for ventilation, valves and required pumps et cetera
- Working tests of all machinery
- Tests of domestic hot and cold water service
- Black-out test
- Complete electrical lighting systems
- Communication equipment
- P/A and CCTV camera / monitoring equipment, et cetera
- Navigation equipment that can be pre-tested in port
- USCG stability test
- Harbor condition noise and vibration level measurements

The shore fuel, sewage and water connections will be separately verified and tested.

834  SEA TRIALS

Following completion of Dock Trials, Sea Trials will be conducted to demonstrate the performance of the Vessel and proper function of systems underway. Every effort shall be made to replicate a “working” scenario at sea.
The CONTR shall conduct at least two (2) sets of Sea Trials. The first set shall be Builder’s Trials for yard personnel and regulatory inspectors to confirm proper functioning of all systems. During Builder’s Trials the engine and gear manufacturers will verify performance and proper installation of the main engines, gears, and waterjets including developed power, cooling temperatures, et cetera. Builder’s Trials shall be a minimum of eight (8) hours in length unless specified otherwise.

The second set of Sea Trials shall be Performance Trials to demonstrate contractual performance and proper functioning of all systems to the OWNER. The Performance Trials will be conducted at the full Trial Condition specified in Section 837. This trial shall be a minimum of eight (8) hours in length unless specified otherwise.

Sea Trials will be conducted in a location mutually agreed to by the OWNER and the CONTR.

The procedures shall follow SNAME T&R Bulletin C-2, 1973 “Code for Sea Trials.” Sea Trials shall include measurement of speed, fuel consumption, noise, vibration, and wake wash in accordance with the agreement. Care shall be taken to specify, in the test documents, the acceptable level for all figures to be recorded during Trials.

At least two (2) weeks prior to the start of Sea Trials, the CONTR will present a Sea Trials agenda to the OWNER for approval and to the equipment manufacturers for review and comment. Following completion of Sea Trials, the CONTR shall prepare the final Sea Trials report in a timely fashion and present the results to the OWNER.

At a minimum, Sea Trials shall consist of the following:

- Propulsion Performance Trials (Builder’s Trial only).
- Speed Trials (at full range of RPM)
- Endurance test (minimum 4 hours continuous uninterrupted period at 100% of rated engine power).
- Night Trials
- Emergency Crash Stop (from full speed ahead)
- Split Throttle turning
- Ahead Steering (at full speed ahead)
- Astern Operation and Steering (up to maximum safe speed)
- Turning Circle (at full speed ahead)
- Zigzag Maneuver (at full speed ahead)
- Auxiliary Systems Testing (underway testing of systems, as required)
- Blackout Test
- Noise and Vibration Survey (underway portion; see Section 057)
- Thermographic Survey of electrical installations
- Compass Adjustment (Builder’s Trial only)
- Navigation and Communications Systems Testing (underway testing, as required; i.e. GPS, depth sounder, RADAR, integration, et cetera)
- Unmanned Engine Room Testing (command, control and monitoring systems)
- Check of tank capacities and draughts for speed runs
- Controls and helm operation
- Test from ahead to astern and astern to ahead
- ‘Slow ahead’ trial with two engines
- ‘Slow ahead’ trial with one engine
- ‘Full ahead’ trial on one/two engines at a time, port and starboard
- Dead ship inspection and start-up
- Emergency steering and maneuvering
- Full load test of emergency fire pump
All domestic items that would normally be in use during sea conditions to be run and tested while on the trials, including heads and miscellaneous equipment throughout the Vessel to be sure that they function normally under sea conditions.

Speed trials will be conducted at a minimum of 100-rpm intervals from idle to 75% load. Above 75% load, speed trials will be conducted at a minimum of 50-rpm intervals. For each setting, two (2) runs will be made in opposite directions over a reciprocal course to account for any wind, waves or current. Speed will be determined by measuring the time to cover a set distance as determined by the Vessel’s GPS.

A minimum of one hour of trials shall be conducted at night, commencing no earlier than 1 hour after sunset, at maximum possible operating speed, to determine if visibility, reflections, night backlighting, or fogging issues are present on the Bridge and to correct same.

Additional trials may be required if the conditions are not favorable due to excessive wind or waves.

Lubricating oils from all diesels and gearboxes shall be sampled for analysis after trials.

The CONTR shall be responsible for all costs associated with Sea Trials including provision of crew, fuel oil, lube oil, meals for all attendees, water provisions and any instrumentation or other test equipment required.

Any defects found during the Sea Trials shall be corrected by the CONTR at their own expense and demonstrated to the OWNER prior to acceptance of the Vessel by the OWNER.

835 DRYDOCKING

At the OWNERS sole discretion, the Vessel shall be drydocked after all Sea Trials are completed and within thirty (30) days prior to Redelivery in order to place the bottom in first class condition. If the Vessels is delivered from a shipyard other than one in San Francisco Bay, this drydocking shall be done by the CONTR after Redelivery of the Vessel to the San Francisco Bay Area. This drydocking operation shall include having the underwater appendages examined, bottom cleaned, any voyage damages repaired, and paint put in first class condition. Seachests shall be opened for examination and, upon inspection and cleaning as necessary, shall be closed up in good order. The OWNER shall be notified of the time and place of this drydocking and shall inspect the Vessel prior to undocking.

The drydocking shall be witnessed by the USCG for the purposes of fulfilling their periodic under water inspection requirements.

Docking plans shall be provided with the Vessel. The docking plan shall identify two (2) unique block set arrangements to allow for full bottom painting over a two year time frame with annual dry dockings.

All costs associated with this drydocking shall be borne by the CONTR.

836 PRELIMINARY ACCEPTANCE SURVEY & TRIALS

Prior to Final Acceptance Trials at the OWNER’s location, the CONTR shall conduct Preliminary Acceptance Trials at or near the CONTR’s facilities. This Preliminary Acceptance shall be contingent upon the following:

A. Allowing for a small quantity of minor deficiencies (see below), all physical work shall be completed, with all requisite regulatory approvals, certifications and letters of compliance obtained, and with the Vessel ready for service in full compliance with the Contract to the satisfaction of the OWNER.

B. The Vessel shall be thoroughly cleaned in accordance with Section 951 of these provisions to the satisfaction of the OWNER.

C. All shop and installation tests and inspections shall be completed, with results demonstrating compliance with the Contract to the satisfaction of the OWNER.
D. The Preliminary Acceptance Survey described herein shall have been completed, with the results supporting a conclusion by the OWNER that the Vessel is complete, clean, free of deficiencies, and ready for delivery to the OWNER in compliance with the Contract to the satisfaction of the OWNER.

E. All Trials and prerequisite tests shall have been completed, with results demonstrating compliance with the Contract, and approved by the OWNER.

F. Any prerequisite tests to Acceptance Trials and/or Preliminary Acceptance shall have been completed, with results demonstrating compliance with the Contract, and approved by the OWNER.

G. Correction of all known deficiencies including deficiencies that develop or shall be identified after Acceptance Trials.

H. Completion of CONTR responsible training.

I. USCG Sector approval, except for all items noted on the 835 Form that are the responsibility of the OWNERs.

The survey, tests, inspections and trials referred to in subparagraphs “C” through “I” above shall serve to assist the OWNER in making the determination as to whether the requirements of subparagraphs “A” and “B” above are fulfilled.

The conduct of the Preliminary Acceptance Survey shall be contingent upon receipt by the OWNER of written notice from the CONTR of presumptive completion of all physical work, testing and clean-up provided for under the Contract. The Preliminary Acceptance Survey shall precede the Acceptance Trial for the Vessel.

The Preliminary Acceptance Survey shall be solely for the purpose of relating WETA’s determination that, if the CONTR delivers the Vessel in like condition in material, operation and performance, and corrects deficiencies which shall be authorized in writing by the OWNER to be corrected following Preliminary Acceptance but before the Vessel Redelivery (see below), the Vessel as constructed and presented is acceptable to the OWNER.

Preliminary Acceptance by the OWNER shall not constitute acceptance by the OWNER of any latent defects or other deficiencies which may develop or be identified subsequent to Preliminary Acceptance, but prior to completion of the warranty period. Such defects and deficiencies shall be the responsibility of the CONTR to correct. In addition, Preliminary Acceptance shall not stop the count of construction time, nor shall such acceptance be the basis for starting the count of time for the warranty/guarantee period.

A Preliminary Acceptance Survey for the Vessel shall be a prerequisite to the Redelivery of the Vessel to the OWNER’s location.

The CONTR shall retain full responsibility, including risk of loss of the Vessel until the OWNER takes possession of the Vessel at Final Acceptance. Such responsibility shall include the insurance, security, safety, maintenance and operation of the Vessel and any other obligations under the Contract. The CONTR must procure and maintain and provide proof of insurance against any loss of or damage to the Vessel or personal injury (including death) or damage to or loss of property caused during the delivery voyage, including without limitation Full Form Hull and Machinery Insurance (American Institute Hull Clauses or equivalent) in an amount equal to the value of the Vessel, and Full Form Protection and Indemnity Insurance (SP-38 or equivalent) which insurance and proof of insurance must be satisfactory to the OWNER. Such insurance and proof shall be at the CONTR’s expense, including all deductibles. The OWNER and Blue and Gold Fleet must be named as additional insured under any such insurance. It is intended that the OWNER shall take custody of the Vessel upon Final Acceptance of the Vessel.

A Preliminary Acceptance Survey shall be conducted after all physical work, testing and clean-up provided for under the Contract is completed. The intent of the Preliminary Acceptance Survey shall be to affirm that the refurbishment of the Vessel is complete; the form, fit and function of installed materials are satisfactory, and the Vessel is clean and clear of rubbish, excess material, etc., in accordance with Section 951. In conjunction with the survey, the status of the compartment close-outs required by the Contract shall be presented for review, with any remaining close-outs performed prior to completion of the Preliminary Acceptance Survey.
The existence of any uncorrected deficiency affecting the safety, operation, performance or immediate efficient use of the Vessel for its intended service shall be sufficient cause to reject Preliminary Acceptance of the Vessel pending correction of the deficiency by the CONTR. The existence of uncorrected deficiencies shall likewise be a cause for rejection of the Vessel until their number has been reduced to a level acceptable to the OWNER.

Upon completion of the Preliminary Acceptance Survey for the Vessel, a letter relating WETA’s determination regarding Preliminary Acceptance of the Vessel shall be issued by the OWNER. The letter shall provide notice as to the extent of unsatisfactory or incomplete Work which must be corrected or completed prior to Acceptance Trials of the Vessel, and which discrepancies, if any, may be deferred for accomplishment after Acceptance Trials, but before Final Acceptance Survey of the Vessel. In connection with this notice, it must be recognized that under the terms of the Contract, the CONTR is required to deliver a complete Vessel that is free of all deficiencies, and that deferral of corrective Work is not a waiver by the OWNER of its entitlement to a complete Vessel that is free of deficiencies.

The CONTR shall immediately take appropriate action to correct and complete any work that is determined to be unsatisfactory or incomplete, and shall be responsible for any delay in the Project associated with correcting deficiencies. The cost of such delay shall be at the CONTR’s expense.

Any work or operation of the Vessel called for by the OWNER in the course of inspection of previously unsatisfactory or incomplete Work shall be performed at the CONTR’s expense in advance of Preliminary Acceptance.

837 DELIVERY ACCEPTANCE TRIALS & DELIVERY ACCEPTANCE

Following successful completion of Preliminary Acceptance Trials, Preliminary Acceptance, and Delivery, the CONTR shall conduct Final Acceptance Trials from the San Francisco Ferry Terminal. Final Acceptance Trials shall demonstrate the Vessel’s readiness for sea and return to normal passenger ferry service, and that the it meets the following performance criteria:

- Service speed requirement as described in Section 082.
- Compatibility with passenger-loading facilities and demonstration of passenger loading/unloading rates as described in Section.

Following the Final Acceptance Trials and Final Acceptance, the completed Vessel shall be turned over to WETA’s Operator in San Francisco, California.

At the time of turnover, the Vessel’s fuel tank levels shall match the levels recorded at initial Delivery to the CONTR. Any discrepancy in the fuel tank levels will be adjudicated based on the current pricing for diesel fuel at that locale.

Final Payment, less retainage, against the Contract shall be made by the OWNER within 30 calendar days of the OWNER’s issuance of a letter of Final Acceptance.

838 TRIALS CONDITION

- Fully loaded with passengers (simulated weight).
- 90% tankage of fuel, potable water, DEF with sewage pumped down.

A full passenger load may be simulated with the use of temporary weights (water or other) positioned throughout the Vessel so as to mimic a standard distribution of passengers. CONTR shall submit a simulation plan to the OWNER for approval at least 30 days prior to trials.

839 INCLINING & STABILITY

The CONTR shall propose to the OWNER, a plan for determining the stability of the Vessel, tracking the stability during the update to the BWE and the plan for final Stability.
This plan shall detail the process that the CONTR will follow in obtaining USCG approval of the final Trim & Stability Booklet and issuance of a USCG Stability Letter.

The CONTR shall submit a Final Trim & Stability Booklet for OWNER review ten (10) days after Vessel launch.

Stability Letters shall be framed and posted in the Pilothouse.

Ballast tanks (or designated voids and tankage) and a ballasting plan shall be provided to allow for waterborne servicing of a waterjet.

840 TRAINING

The CONTR shall provide technical instruction and training for the proper operation, preventative maintenance, and basic troubleshooting of the major machinery and control systems, to be conducted by the manufacturer's Technical Representative for up to eight (8) OWNER’s personnel, for maintenance and operation of the following equipment:

- Main propulsion engines/emissions system – total six (6) hours.
- Ship’s service diesel generators – total two (2) hours.
- Main distribution control panel and electrical distribution – total four (4) hours.
- Plumbing – total two (2) hours.
- Safety systems – total two (2) hours.
- Pilothouse controls – total eight (8) hours.

Training shall be scheduled and coordinated with the OWNER. OWNER shall make every possible effort to minimize duplication of training but due to operating schedules it may not be possible to schedule all personnel simultaneously for training. Multiple sessions may be required in some or all areas listed above.

OWNER will pay all wages and expenses of OWNER’s personnel during training sessions.

850 REGULATORY BODY REVIEW, APPROVAL & CERTIFICATION OF WORK

The CONTR shall plan, coordinate and obtain in a timely manner all regulatory body inspections of the Work, and reviews and approvals of the related drawings, specifications and other documentation, as required to obtain the required regulatory classifications and certifications of the Vessel. A schedule of inspections, tests and trials requiring regulatory body observance shall be maintained in accordance with the provisions of the Technical Specifications.

The Contract Design Package shall be submitted to the USCG for compliance review with respect to USCG and applicable regulations, including but limited to 46CFR Subchapter K. This project has been determined to be a Major Conversion by the USCG therefore all aspects of this project shall be treated as new construction.

All deliverables shall be revised to address comments provided by the regulatory bodies in conjunction with their reviews. This work shall be accomplished to the satisfaction of the OWNER.

All fees associated with inspections, witness of material and equipment tests and certifications, reviews and approval of Work, and classification and certification of the Vessel by regulatory bodies shall be included within the Contract Price. Costs of travel and per diem for visits to CONTR’s and manufacturers’ facilities by regulatory body agents shall be considered included in the Contract Price.

A copy of all written communications, which includes electronic transmissions of information or letters, between the CONTR or its agents and the regulatory bodies, and any attached drawings or other technical documentation included with each written communication, shall be provided to the OWNER if requested. A copy of each item of written communication, plus any attached technical documentation, from the CONTR or its agents to a regulatory body shall be forwarded to the OWNER if requested, on the day the communication is mailed or otherwise
transmitted to the regulatory body. A copy of each item of written communication, plus any attached technical documentation, from a regulatory body to the CONTR or its agents shall be provided to the OWNER within two days of receipt by the CONTR or its agents.

END OF 800 SECTION
900 SHIPYARD CONTRACT SERVICES

The CONTR is required to notify the OWNER within two calendar days of any material deviations in the Contract Design Package from the OWNER’s Requirements on a form that is acceptable to the OWNER. The scope of the Work associated with the term “design,” as used throughout the Contract documents, shall be broadly interpreted to be inclusive of the associated engineering, calculations, studies, and other related Work necessary to affect a thorough design. The scope of the term “Material” shall be broadly interpreted to include the Vessel’s “Equipment,” except where a clear distinction is made between “Material” and “Equipment” in a particular clause, or group of clauses, for purposes of clarity of intent.

Work and materials shall not be deemed to have been called for under the Contract simply because they were included in a submission for a progress payment or were included in a progress payment.

Costs associated with the Shipyard Contract Services that do not fall into an identified SWBS section on the Schedule of Values can be charged to the 900 top level SWBS group as needed by the CONTR.

902 PROSECUTION & PROGRESS

After posting of the Notice of Intent to Award and prior to Notice to Proceed the CONTR shall submit the following to the OWNER:

A. Project Schedule (see Sections 921 - 924).
B. The following lists derived from the Project Schedule:
   a. A list showing anticipated dates for procurement of materials and equipment, or the ordering of articles of special manufacture.
   b. A list showing proposed begin and end fabrication and installation dates for Vessel systems, tests and trials, maintenance items, and other items of scheduled Work.
   c. A list of proposed shipment dates for material other than stocked items.
C. Deliverable Schedule (see Section 925).
D. A list showing all proposed Subcontractors, Vendors, and Suppliers to be used, their addresses and applicable purchase order numbers.
E. A letter designating the CONTR's Project Manager, defining that person's responsibility and authority, and providing a specimen of his signature.
F. A letter designating the Equal Employment Opportunity Officer and that person's responsibilities and authority.

The CONTR shall provide adequate materials, labor and equipment to ensure the completion of the Project in accordance with all Contract requirements. The Work shall be performed as vigorously and as continuously as conditions may permit. The CONTR shall take into consideration and make due allowances for foreseeable delays and interruptions to the Work such as weather, equipment breakdowns, shipping, Regulatory agency inspections and approvals. Receipt and acceptance of a schedule submitted by the CONTR shall not be construed to assign responsibility for performance or contingencies to the OWNER or relieve the CONTR of his responsibility to adjust his forces, equipment, and Work schedules as may be necessary to insure completion of the Work within prescribed time (See Sections 941 through 946).

The CONTR must take delivery of the Vessel at its shipyard or at the NBOMF MARE ISLAND facility if the CONTR’s shipyard is outside the San Francisco Bay Area. Upon completion of the work, including the inspection and testing, the OWNER will accept Redelivery of the Vessel at the CONTR’s shipyard, if the shipyard is within the San Francisco Bay Area.

If the shipyard is outside the San Francisco Bay Area, the CONTR must Redeliver from and Redeliver the Vessel to the NBOMF MARE ISLAND facility as a condition of completion of the work. All costs associated with the Delivery and
Redelivery of the Vessel to and from the NBOMF MARE ISLAND facility from outside of the San Francisco Bay Area shall be the sole responsibility of the CONTR.

The OWNER may require up to three OWNER’s Designated Representatives (OR) onboard for all legs of deliveries at OWNER’s expense.

903 DELIVERY OF VESSEL TO CONTR

The OWNER, at its expense, will Deliver and Redeliver the Vessel to and from the CONTR’s location within the San Francisco Bay Area. If the CONTR’s shipyard location is outside the Bay Area, the Vessel becomes the CONTR’s responsibility upon taking possession of the Vessel from the OWNER at the OWNER’s Bay Area facilities. Upon taking possession of the Vessel for Delivery until the Vessel has been Redelivered and the CONTR has received Final Acceptance from the OWNER in writing, the CONTR shall insure the Vessel for all risk, liability, peril, including the Delivery and Redelivery voyages.

The CONTR shall have a Superintendent or Project Manager on-site at all times with the authority to act on the CONTR’s behalf.

910 MANAGEMENT REVIEW & PROGRESS MEETINGS

The CONTR shall present Management Reviews to the OWNER. The reviews shall be scheduled at least once per month at a location in or near the construction shipyard and shall be coordinated so that they are held concurrently with the progress meetings. The first review is to be held within thirty (30) calendar days following Notice to Proceed. These reviews shall, at a minimum, address the following topics:

A. Status of the design and outstanding design issues. Actions taken to resolve issues and schedules for same shall be included. OWNERResponsible actions shall also be included that affect the CONTR.
B. Material status, certification, delivery schedule and other outstanding issues. Actions taken to resolve issues and schedules for same shall be included. OWNERResponsible actions that affect the CONTR shall also be included.
C. Construction schedule, issues and status. Actions taken to resolve any issues shall be addressed. OWNERResponsible actions that affect the CONTR shall be included.
D. Status of the Work to date, current and potential problem areas that could affect the Project Schedule and cost, and activities including inspections scheduled for the following two weeks.
E. Regulatory body approval and certification; status and outstanding issues; actions underway to resolve any outstanding issue(s).
F. Quality Assurance.
G. Schedule of Values and payment.
H. Change Order status and any contractual issues.

The CONTR shall address any OWNER actions that are requested or required to resolve any issue and/or support the CONTR’s efforts.

The CONTR shall provide a written record of the minutes of the progress meetings, provide copies to the OWNER and maintain a file of minutes. The OWNER shall sign the minutes acknowledging receipt of the minutes and may, at
his discretion, provide comments or additional information to the CONTR to be appended to the minutes to resolve questions of accuracy. The acknowledgement of the accuracy of the minutes by OWNER shall not constitute acceptance of any item of equipment or component parts.

921 PROJECT SCHEDULE

Within seven (7) calendar days after Notice to Proceed the CONTR shall prepare and submit to the OWNER for review and comment a manpower resource loaded schedule as described below. The OWNER to review and comment within seven (7) calendar days. CONTR then has seven (7) calendar days to modify or comment on the OWNER’s review and resubmit the schedule. After the OWNER’s comments are addressed to the satisfaction of the OWNER, the schedule at that time shall become the Project Schedule. The Project Schedule is to be developed to the CONTR’s normal detail and as agreed in this document to produce OWNER-specific information, and shall be prepared by the CONTR’s “in-house” supervisory personnel. The Project Schedule should not deviate significantly from the preliminary schedule submitted with the CONTR’s Proposal. The completed Project Schedule shall define the operations required to bring the entire work to Acceptance by the scheduled Acceptance date and within the allotted time. The Project Schedule may be modified to incorporate the most efficient use of CONTR resources provided no additional costs or time delays are incurred on the Project.

The CONTR warrants that the Project Schedule is the CONTR’s committed plan to complete all Work within the allotted Contract Time and assumes responsibility for prosecution of the work as shown. The CONTR shall utilize the Project Schedule in planning, scheduling, coordinating, and performing the Work under this Contract (including major activities of subcontractors, equipment vendors, and suppliers).

The purpose of the Project Schedule shall be to:

A. Assure adequate planning, scheduling and reporting during execution of the work by the CONTR;
B. Assure coordination of the work and material procurement of the CONTR and all subcontractors;
C. Assist the CONTR and OWNER in monitoring the progress of the work and evaluating proposed changes to the Contract and the Project Schedule; and

NOTE: The Project Schedule shall be developed to connect and drive the work from Contract Award. The Project Schedule shall be developed to the contractors normal detail of major tasks by trade and job cost numbers.

The CONTR shall provide the Project Schedule to the OWNER in both electronic (on Microsoft Project compatible software) and hard copy format.

922 SCHEDULE REQUIREMENTS

The Project Schedule shall incorporate labor and major equipment resource data as described below. The schedule must show the order in which the CONTR proposes to carry out the Work. The Project Schedule shall cover the time from Notice to Proceed to Final Acceptance, which period of time constitutes the Contract Time. The Project Schedule shall be itemized in sufficient detail to cover at a minimum the following tasks:

A. Major milestones from CONTR.
B. Anticipated dates for procurement of materials and equipment, or the ordering of articles of special manufacture;
C. Construction broken down into modules for each major structure unit, Vessel system, or task, including proposed begin and end construction dates and installation dates.
D. All subcontract/vendor/supplier activities, including begin and end dates.
E. Any anticipated periods of shutdown and multiple-shift Work.
F. Major inspection and testing. Final testing as defined for regulatory body approval, OWNER’s approval or for Acceptance Trial approval. Intermediate testing shall be updated as construction progresses and added to the schedule as known.

G. Trials and Acceptance tests.

Failure by the CONTR to include any element of Work required for performance of the Contract shall not excuse the CONTR from completing all Work by the scheduled Final Acceptance date.

923 SCHEDULE UPDATES

The Project Schedule shall be updated whenever a Progress Payment request is submitted for payment. The updated Project Schedule shall include the dates activities were actually started and when they were completed, the physical percentage of work complete, and the estimated remaining duration for each activity in progress.

The CONTR shall also prepare a written narrative report that shall include a description of the amount of progress during the last reporting period in terms of completed activities, a description of problem areas, current and anticipated delaying factors and their estimated impact on performance of other activities and completion dates and an explanation of corrective action taken or proposed. The report shall include a forecast of key activities to be completed, started and worked during the next 15 calendar days.

The CONTR shall submit a corresponding schedule update with the Progress Payment request and will only be entitled to payments only upon OWNER approval of the Progress Payment request. The electronic and hard files provided shall be a complete copy of all information contained in the schedule.

Updating the Project Schedule to reflect actual progress made shall not be considered a revision to the Project Schedule.

924 SCHEDULE REVISIONS

If, as a result of the schedule updates, the schedule no longer represents the planned prosecution or progress of the remaining work, the OWNER may request, and the CONTR shall submit, a revision to the Project Schedule.

The CONTR may also request revisions to the Project Schedule in the event the CONTR’s planning for the remaining work is revised.

Such revised schedules or lists shall conform to the Contract Time allocated by the Contract and take into account delays that may have been encountered in the performance of the Work. In submitting a revised schedule, the CONTR shall state specifically the reason for the revision and the adjustments made in his schedule or methods of operation to ensure completion of all Work within the prescribed time.

Should the prosecution of the Work during normal Work days be discontinued for any reason, for more than two calendar days, the CONTR shall notify the OWNER at least twenty-four (24) hours in advance of resuming operations.

925 DELIVERABLE SCHEDULE

Within thirty (30) days after Contract Award and prior to Notice to Proceed, the CONTR shall submit a schedule of dates for deliverables for the Work on a spreadsheet. This Deliverable Schedule is the CONTR’s committed plan to complete the Work within the Contract Time. The Deliverable Schedule shall list all drawings, analyses, reports, Technical Specifications, purchase technical specifications, technical publications, and other deliverables that must be developed pursuant to the OWNER’s Requirements and other Contract Documents. The Deliverable Schedule shall include, but not be limited to, the various deliverables cited in these Technical Specifications and other Contract documents.
The Deliverable Schedule shall provide for various interim submittals, revisions, and a final submittal of each deliverable, and shall include columns giving the intended dates of all submittals. The quantity and timing of submittals for each deliverable shall be proposed by the CONTR in the Deliverable Schedule, and should appropriately consider the need for OWNER endorsement of intended arrangements and other salient characteristics of the design.

The Deliverable Schedule shall include columns for the following entries for each listed deliverable: scheduled dates of submittals, actual dates of submittals, latest revision (by letter), drawing size, outstanding reservations, and expected release date. The Project Schedule shall also identify deliverables that are required to be submitted to each regulatory body for approval, review and/or information, and the expected and actual dates of such approvals.

The schedule of deliverables shall, to the extent practicable, evenly distribute the submission of deliverables.

CONTR shall provide electronic copies of all drawings and data to OWNER for at least a seven (7) calendar day review and comment period. All drawings prepared for submittal to the U.S. Coast Guard shall be reviewed by OWNER prior to submittal to U.S. Coast Guard. OWNER shall receive all drawings approved by the U.S. Coast Guard.

The Deliverable Schedule shall allow at least seven (7) calendar days for OWNER review of each submitted deliverable, unless a longer review time for a particular submittal or deliverable is specified in the OWNER’s Requirements, in which case the longer review time shall be used.

The Deliverable Schedule shall be revised to show all changes, progress and delays, and shall be submitted monthly in time to be received by the OWNER not later than the 10th of each month, beginning with the month following the initial submittal. Each Deliverable Schedule revision shall be clearly identified in color.

### 931 OWNER APPROVAL OF WORK

Where the words "approved" or "for approval" are used without reference to the approving authority, they shall mean "approved by the OWNER" and "for the OWNER’s approval."

Issuance by the OWNER of a Notice to Proceed, after the Contract execution where each Contract page shall be initialed by the CONTR and the OWNER, shall give effect to the documents comprising the Contract Design Package (i.e., drawings, technical specifications, OWNER’s Requirements, General Provisions, forms, and others) as Contract Documents, shall constitute the OWNER approval of the Package, and shall oblige the CONTR to perform the Work contained in the Contract Design Package.

The Technical Specifications (revised OWNER’s Requirements) negotiated and prepared by the OWNER and CONTR as well as contractual language within the General Provisions shall clearly indicate which deliverables, drawings, plans and documents shall be submitted to the OWNER for approval.

Approval of submitted Work by the OWNER shall be solely for the purpose of conveying the OWNER’s determination that the OWNER does not object to continuing with the Project based on the submitted Work. In no event and under no circumstances shall approval of the OWNER of any aspect of the CONTR’s Work be a warranty that the Work is complete, accurate or of sound design, or that the completed Vessel, subject to inclusion of the approved Work, shall necessarily conform to the minimum functional, performance or technical requirements of the Contract, or that the Work complies with regulatory body requirements. Such characteristics of the Work shall be the CONTR’s responsibility, and any subsequent discovery of omissions or deficiencies with regard to the completeness, accuracy or soundness of the Work, and/or conformance with the Contract, and/or compliance with regulatory body requirements, shall be remedied by the CONTR to the OWNER’s satisfaction through correction of the omissions or deficiencies at the CONTR’s expense, irrespective of prior approval of the Work by the OWNER.

In conjunction with approvals, the OWNER, by virtue of such approvals, agrees that design aspects not addressed by the Contract, such as the placement of doors, and similar matters, are acceptable to the OWNER. Agreement by the
OWNER to these design aspects does not abrogate or modify the CONTR’s responsibility for ensuring the constructability of these design aspects and in no way reduces the CONTR’s obligation as to technical, regulatory, major functionality, and performance requirements as described in the OWNER’s Requirements and the Contract Design Package.

“Approved” status cannot be conferred by anyone but an authorized employee or other representative of the OWNER, and except where explicitly prescribed by the OWNER otherwise in writing, are conferred by the OWNER. The OWNER approval does not relieve the CONTR of securing regulatory body approvals as required herein.

Any submittal that is found to be substantially deficient upon review shall be rejected and returned to the CONTR for resolution of deficiencies and resubmitted. A “rejected” determination shall void any credit which may otherwise be due the CONTR with regard to meeting a deadline for submission of the material in question.

When determined to be in the best interests of the OWNER, the OWNER may accept deliverables not involving life or safety issues that have not been certified by a registered professional engineer.

932 CONFORMITY WITH CONTRACT

All Work performed and all materials furnished shall be in conformity with the contract. In the event the OWNER finds any materials furnished, Work performed or finished products that are not in conformity with any aspect of the Contract, but that reasonably acceptable Work has been produced and is in accordance with Regulatory Body requirements, he shall then make a determination if such non-conforming Work shall be accepted and remain in place. In this event, the OWNER shall document the basis of acceptance by an agreed upon Change Order which may provide for an appropriate adjustment in the Contract Price for such Work or materials as agreed in the Change Order. The OWNER shall not be obliged by this or any other portion of the Contract to accept non-conforming Work.

In certain respects, the requirements of the approved design for the Vessel may exceed the requirements of pertinent Regulatory Bodies. Such approved design requirements shall not be changed except on written approval of the OWNER.

933 COOPERATION BY CONTR

The CONTR shall maintain a minimum of two full size sets of approved plans and Contract Documents, one set of which the CONTR shall keep available on the Work site at all times.

The CONTR shall give the Work the constant attention necessary to facilitate the progress thereof in accordance with the Project Schedule, and shall cooperate with the OWNER, his Inspectors and other CONTRs in every way possible.

The CONTR shall have on the Work site at all times, as his agent, a competent Superintendent or Project Manager, thoroughly experienced in the type of Work being performed and capable of reading and thoroughly understanding the plans and specifications, who shall receive instructions from the OWNER or his authorized representatives to the extent provided elsewhere in the Contract Documents. The Superintendent or Project Manager shall have full authority to supply such materials, equipment, tools, labor and incidentals as may be required. Such Superintendent or Project Manager shall be furnished irrespective of the amount of Work subcontracted.

The CONTR shall bear the sole risk and the obligation to rebuild, repair, restore, replace and to otherwise make good all damage, loss or injury to all or any portion of the Vessel, and to any Work or material for the Contract, including Change Order Work, on or incorporated into the Vessel until the entire Work for both Vessel has been finally accepted by the OWNER.
934 DUTIES OF THE OWNER’S INSPECTORS

Inspectors employed by the OWNER are authorized to inspect all Work done and materials furnished. The Inspector is not authorized to issue instructions contrary to the terms of the Contract documents, or to act as foreman for the CONTR; however, the Inspector shall have the authority to reject Work and materials, which rejection the CONTR may request to be decided by the OWNER. The OWNER personnel are not to be considered as part of CONTR’s Quality Assurance personnel.

935 QUALITY ASSURANCE & INSPECTION OF WORK AT CONTR’S SITE

Nothing contained in this subsection shall in any way restrict or impair the OWNER’s rights under any warranty or guarantee.

The CONTR shall utilize a Quality Assurance (QA) program that assures that all aspects of design, construction, and completion of the Work comply with the requirements of the Contract. The program shall ensure that the latest applicable drawings, requirements, specifications and instructions defined in the Contract, as well as authorized changes, are communicated to workers and used in the Work. The program shall also include sequential and well-documented inspections and tests of completed elements of Work by the CONTR. The intent of these inspections and tests are to identify and resolve all deficiencies prior to presentation of the Work to the OWNER for acceptance. The QA program and its implementation plan (described below) shall be coordinated with the inspection and test requirements of the Contract; as well as the weight control program, noise and vibration control program, and other programs required by the Contract or otherwise developed by the CONTR to control the Work.

The personnel assigned to the development and administration of the QA program shall have independent authority and organizational freedom to identify and evaluate quality problems and initiate and recommend timely and positive solutions.

The implementation of QA procedures by a Subcontractor or Vendor does not relieve the CONTR of his responsibility to assure that the supplied items fully comply with the requirements of the Contract.

At a minimum, the Quality Assurance program shall make provision for the following or similar:

A. A status report shall be provided monthly, on a mutually pre-established date, by the CONTR, listing any and all discrepancies in a Discrepancy Report (hereinafter “DR”) and their disposition(s). Outstanding issues shall be highlighted.

B. A process utilizing a CONTR-developed standard DR form, through which the OWNER can communicate potential issues and problems to the CONTR. The form shall include, at a minimum:
   a. Independent tracking number suitable to the OWNER;
   b. Date of issue initiated or identified by the OWNER;
   c. Reference drawings/materials and revisions;
   d. Subject;
   e. Requirement references;
   f. Issue or problem description;
   g. Signature column by OWNER and date, if corrected;
   h. Response area for CONTR, sign off and date.

The CONTR shall be responsible for tracking and providing a disposition for all issues raised by the OWNER.

The CONTR shall maintain and comply with its internal QA program as reviewed by the OWNER.
936  REMOVAL OF UNACCEPTABLE AND UNAUTHORIZED WORK

All Work that does not conform to the Contract shall be considered as unacceptable Work, unless determined acceptable under the provisions of Section 932.

Unacceptable Work, whether the result of poor workmanship, use of defective, unsuitable, or unauthorized materials or equipment, or damage through carelessness or any other cause, found to exist prior to the Final Acceptance of the Work, shall be remedied or removed immediately and replaced in an acceptable manner at the CONTR’s expense.

No Work shall be done on the Vessel except as required by the Contract or directed by WETA. Work done contrary to directives, except as herein provided, or any Work done without authority, shall be considered as unauthorized and shall not be paid for under the provisions of the Contract. Work so done may be ordered removed or replaced at the CONTR’s expense.

Upon failure on the part of the CONTR to comply forthwith with any order of the OWNER made under the provisions of this section, the OWNER shall have authority to cause unacceptable Work to be remedied, or removed and replaced, unless determined acceptable under Section 932. No change in the Contract Price will be allowed in respect to any costs incurred by CONTR for such remedial work.

937  PARTIAL ACCEPTANCE

If at any time during the prosecution of the Work the CONTR completes a usable unit or portion of the Work, the use of which shall benefit the OWNER, he may request the OWNER to make an inspection of that portion or unit. In the alternative, the OWNER may at his own discretion inspect and accept a unit or portion of the Work. If the OWNER finds upon inspection that the unit has been satisfactorily completed in compliance with the Contract, he may accept it as being completed. Such acceptance by the OWNER, in order to be valid, must be in writing and signed by the OWNER. Such partial acceptance and beneficial use by the OWNER shall not void or alter any provisions of the Contract, shall not constitute the commencement of any applicable Guarantee/Warranty Period, and shall be made only at the discretion of the OWNER. The OWNER shall in no circumstances be obliged to accept a portion of the Work, even if that portion of the Work is completed.

941  CONTRACT TIME DEFINITION

Contract Time shall be the period of time, measured in calendar days, that is allocated to the CONTR to complete the design and construction Work required by the Contract and to redeliver the Vessel to the OWNER in full compliance with the Contract requirements and Preliminary Acceptance by the OWNER. Contract Time equals the number of days of time stipulated in the Contract at the time of Contract Award as proposed by the CONTR and agreed to by the OWNER, plus any additional days of time allocated during the course of the Contract by approved extensions of time, minus any days of time reclaimed by the OWNER based upon reductions in the scope or character of the Work during the course of the Contract.

The count of Contract Time expended shall begin on the date of the Notice to Proceed. The count of Contract Time, in conjunction with approved modifications or suspensions of the count of Contract Time, shall be the basis for establishing the approved scheduled date of Acceptance and for assessing liquidated damages associated with untimely Vessel Delivery as described in Section 945. Failure to complete the Work, submit all deliverables, and deliver the Vessel to the OWNER within the Contract Time may also be an event of default authorizing the OWNER to take any steps permitted by the Contract Agreement.
942 EXTENSION OF CONTRACT TIME

The OWNER may consider requests for extension of Contract Time and, if deemed warranted, approve extensions of Contract Time equal to the number of additional days considered by the OWNER to be necessary to accomplish approved change Work or Work associated with OWNER -issued directives other than Work orders. Work associated with changes and directives, or any portion of such Work, which could reasonably be accomplished within the Contract Time, as determined by the approved CONTR’s schedule, shall be completed within the established Contract Time.

The CONTR shall be responsible for promptly requesting extensions of Contract Time and for furnishing any and all information necessary to justify each proposed extension to the satisfaction of the OWNER. For changes to the Work, a request for extension of Contract Time shall be considered timely only if the request is included with the CONTR’s originally submitted Change Order.

Under no circumstances shall Contract Time be extended due to inclement weather or the results of inclement weather. However, extraordinary weather conditions for the pertinent geographical area may, but not necessarily shall, provide a basis for an extension of Contract Time. Severe weather, including hurricanes, with historical precedent in the pertinent geographical area is not extraordinary weather.

Approved change documents and OWNER -issued directives which reduce the scope of the Contract or change the character of the Work so as to justify a reduction in the amount of Contract Time allotted, may result in an agreement between the parties to the Contract, to reduce the number of days of design time or construction time, as applicable.

Extensions to Contract Time must be approved in writing by the OWNER.

A claim that insufficient Contract Time was originally specified or otherwise required by the Contract shall not constitute a valid reason for extension of Contract Time.

943 SUSPENSION OF CONTRACT TIME

The OWNER may, by written order, suspend Work on the Project, in whole or in part, for such periods as he determines to be necessary. The OWNER shall discuss impact of suspension with CONTR to determine impact on schedule. Unless an item of Work is suspended which is agreed by the OWNER to be on the Critical Path of the Project Schedule, no consideration shall be given to extending the Contract Time or stopping the count of Contract Time during the period of suspension of the Work until an item lands on the Critical Path.

In those instances where the OWNER orders suspension of the Work for failure by the CONTR to carry out contractual provisions, the count of Contract Time shall continue throughout the suspension period.

Suspension of the count of Contract Time may be allowed by the OWNER because of delays in the completion of the Work due to unforeseeable causes beyond the control of and without the fault or negligence of the CONTR, including but not restricted to acts of God or the public enemy, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and extraordinary weather or delays of Subcontractors due to such causes provided that the CONTR shall, within 10 calendar days of the beginning of any such delay, notify the OWNER in writing of the cause of delay and request suspension of the count of Contract Time. The OWNER shall ascertain the facts and the extent of the delay and the parties shall agree upon the number of days that justify such suspension.

Suspension of Work by the OWNER or delays in the completion of the Work shall not constitute grounds for any claims by the CONTR for damages or extra compensation unless otherwise provided for in the Contract.

For any suspension in the count of Contract Time to be allowable, such suspension must be approved in writing by the OWNER.
944 SUSPENSIONS OF WORK ORDERED BY THE OWNER

If the performance of all or any portion of the Work is suspended or delayed by the OWNER in writing for an unreasonable period of time (not originally anticipated, customary, or inherent to the shipbuilding industry) and the CONTR believes that additional compensation and/or Contract Time is due as a result of such suspension or delay, the CONTR shall submit to the OWNER in writing a request for adjustment within 7 calendar days of receipt of the notice to resume Work. The request shall set forth the reasons and support for such adjustment.

Upon receipt, the OWNER shall evaluate the CONTR’s request. If the OWNER agrees that the cost and/or time required for the performance of the Contract has increased as a result of such suspension and the suspension was caused by conditions beyond the control of and not the fault of the CONTR, its suppliers, or Subcontractors at any approved tier, and not caused by weather, the OWNER shall make an adjustment including reasonable profit and modify the Contract in writing accordingly. The OWNER shall notify the CONTR of his determination whether or not an adjustment of the Contract is warranted.

No Contract Time adjustment are allowed unless the CONTR has submitted the request for adjustment within the time prescribed.

No Contract Time adjustment are allowed under this clause to the extent that performance would have been suspended or delayed by any other cause, or for which an adjustment is provided for or excluded under any other term or condition of this Contract.

945 FAILURE TO DELIVER ON TIME

Liquidated damages associated with untimely delivery of the Vessel shall be charged against the CONTR’s account by the OWNER beginning the day after the scheduled Final Acceptance date of the Vessel and ending on the actual Final Acceptance date of the Vessel. The day of Final Acceptance of a Vessel shall stop the accrual of liquidated damages associated with untimely delivery and shall not be included in the count of days chargeable to liquidated damages. Liquidated damages shall not apply if both parties agree that delivery is not viable due to weather or other circumstances.

Notwithstanding any other provision of this Contract to the contrary, the liquidated damages provided for in this subsection shall be the OWNER’s sole and exclusive remedy for all damages incurred by reason of the CONTR’s failure to complete the Vessel on time.

The scheduled Final Acceptance date of the Vessel shall be the date by which all contracted Work is scheduled to be completed, excluding any Work that may be necessary to correct deficiencies arising during the Warranty/Guarantee Period subsequent to Completion of Warranty Period (see below). The scheduled Final Acceptance date of the Vessel shall determine the number of days of construction time allocated and calculated in accordance with Sections 941 through 946, subject to any days of approved suspension of construction time, after Notice to Proceed.

The Final Acceptance date shall be the date on which the OWNER signs the letter of Acceptance of the Vessel and takes custody of the Vessel from the CONTR. The actual Final Acceptance date for the Vessel shall be the start date for the count of time for the warranty/guarantee period for the Vessel.

For each calendar day that the Vessel remains undelivered after the scheduled Final Acceptance date of the Vessel, the sum set forth in the agreement shall be deducted from any moneys due the CONTR. If no money is due the CONTR, the OWNER shall have the right to recover said sum from the CONTR, the surety or both. The Amounts of these deductions are to cover estimated expenses to the OWNER as a result of the CONTR’s failure to complete the Work within the time specified. Such deductions are liquidated damages and are not to be considered as penalties.
Permitting the CONTR to continue and finish the Work, or any part of it, after the scheduled Final Acceptance date of a Vessel, as approved by the OWNER, shall in no way operate as a waiver on the part of the OWNER of any of its rights under this Contract.

946 TIME IMPACT ANALYSIS

When Contract modifications are initiated by either the CONTR or the OWNER these changes shall be dealt with using standard Change Order document.

951 FINAL CLEAN-UP

Before the Preliminary Acceptance Survey, all rubbish, excess materials, temporary structures, and CONTR’s equipment shall be removed from the Vessel and, as applicable to the item, disposed of. All interior and exterior surfaces of the Vessel shall be washed, dusted, polished, vacuumed, and/or disinfected, as applicable to the surface, so as to be thoroughly clean, new, undamaged, and fit for OWNER service.

Immediately prior to the Final Acceptance Trials of the Vessel, all surfaces that require re-cleaning as a result of use during the Preliminary Acceptance Trials or other cause shall be washed, dusted, polished, vacuumed, and/or disinfected, as applicable to the surface, so as to be thoroughly clean, new, undamaged, and fit for OWNER service, throughout the Vessel.

952 COMPLETION OF WARRANTY PERIOD

Following completion of the Guarantee/Warranty Period required by Section 960 and all provisions stated therein and upon receipt of the executed final estimate, CONTR’s Release, settlement of all claims and proof of payment of any applicable sales, payroll and revenue taxes, the OWNER shall issue the letter of Completion of Warranty releasing the CONTR from further performance under the Contract subject to rights and remedies reserved in the Contract Agreement. Completion of Warranty Period shall be withheld until the CONTR furnishes all certificates, guarantees, releases, affidavits, and other documentation required by the Contract.

953 SEQUENCE OF EVENTS LEADING TO FINAL ACCEPTANCE OF VESSEL

<table>
<thead>
<tr>
<th>Sequence of Events</th>
<th>Location of Events</th>
<th>Function (description includes but is not limited to the following functions)</th>
<th>Reference Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dock and Sea Trials</td>
<td>CONTR’s Facility</td>
<td>Verification equipment / systems perform satisfactory / establish readiness for Acceptance</td>
<td>833 834</td>
</tr>
<tr>
<td>Preliminary Acceptance</td>
<td>CONTR’s Waters</td>
<td>CONTR states readiness for Acceptance Survey.</td>
<td>836</td>
</tr>
<tr>
<td>Drydocking</td>
<td>San Francisco Bay</td>
<td>Drydocking location depends on CONTR location. Acceptance Trials prior to Acceptance by the OWNER. Acceptance whereby The OWNER accepts the Vessel as satisfying all the requirements of the Contract, except the warranty, and signals start of warranty period.</td>
<td>835 837</td>
</tr>
<tr>
<td>Final Acceptance Trials</td>
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<td>Final Acceptance</td>
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</table>
### 960 WARRANTY

The CONTR shall propose a written warranty procedure acceptable to the OWNER that describes the process to accomplish warranty repairs after the Vessel is delivered.

Neither Final Acceptance or payment, nor any provision in the Contract Documents, nor partial or entire use of the Vessels by the OWNER shall constitute an acceptance of Work not done in accordance with the Contract Documents or relieve the CONTR of liability for faulty materials or Workmanship.

The CONTR shall furnish the OWNER with all warranties, including manufacturer’s warranties, specified in the OWNER’s Requirements and General Provisions, and submit them to the OWNER prior to Final Acceptance of the Vessel. All warranties shall be provided by and processed through the CONTR. All warranties shall commence after Final Acceptance of the Vessel by the OWNER.

It is understood and agreed that the OWNER does not waive any warranty, either express or implied, in Sections 2312 through 2317, inclusive, of the California Commercial Code, or any liability of the manufacturer or CONTR as may be determined by a decision of the court of the State of California or of the United States.

The OWNER shall give notice to CONTR of deficiencies on each of the Vessels. CONTR guarantees and warrants that all equipment and components in each of the Vessels shall conform to the requirements of the Contract.

The CONTR shall also guarantee all material and workmanship entering into the Vessels and furnished by him, or any Subcontractors, suppliers or vendors on his account, against defects in material or workmanship, or latent defects which may develop within 365 calendar days following the date of Final Acceptance of the Vessel by the OWNER.

Any items of material or workmanship found defective, or found not to operate in accordance with the requirements of the Contract, shall be repaired or replaced at CONTR’s option by the CONTR at the CONTR’s expense. The CONTR shall pass through any optional extended warranties exercised by the OWNER on the entire power train, engines, and gears to the OWNER. The CONTR does not have any additional warranty responsibility after the warranty period expires, except to assist the OWNER with extended warranty issues.

If, in the opinion of the OWNER, immediate repairs or replacements are essential to keep a Vessel on its scheduled operations, these repairs may be made by the OWNER and back-charged to the CONTR. The OWNER shall give prompt notice to the CONTR that the immediate corrective action is being taken and provide clear documentation of the deficiency, the action taken and the cost attributable to the deficiency.

Where the OWNER’s action results in the betterment of material, the CONTR shall not be responsible for the reimbursement for the betterment. If immediate repairs are not necessary, the CONTR shall be notified and given fourteen calendar days to examine and provide a written plan of rectification complete with a detailed time schedule, subject to the approval of the OWNER. If the defects are not addressed sufficiently or a detailed rectification plan is not provided by the CONTR and approved by the OWNER within this period, the OWNER may correct the defects and back-charge the correction costs, including labor, to the CONTR.
Immediately prior to expiration of the Guarantee/Warranty Period set forth in this subsection and prior to Final Acceptance and payment on the Contract, a Guarantee Survey shall be conducted for the purpose of determining remaining deficiencies to be corrected in compliance with the requirements of the guarantee. The Survey shall be made by the OWNER, CONTR’s representative(s), and applicable regulatory body representatives. The time and place for the Guarantee Survey shall be at the convenience of the OWNER, having due consideration for the Vessels schedule and commitments. All fees/expenses required by regulatory bodies for their participation shall be borne by the CONTR.

Upon expiration of the 365 calendar day Guarantee/Warranty Period, all remaining product guarantees as originally obtained by the CONTR for materials and equipment from vendors and suppliers shall be assigned or reassigned to the OWNER.

If any materials or equipment from vendors or suppliers fails after the 365 calendar day Guarantee/Warranty Period, but before the expiration of remaining vendor, supplier, or manufacturer product guarantees, CONTR shall cooperate with the OWNER to assist in enforcing the remaining product guarantees from vendors, suppliers, and manufacturers.

For determination of underwater deficiencies, the OWNER, at its expense, may drydock the Vessels or carry out an underwater survey, during the Guarantee/Warranty Period. The OWNER shall pay for the haul day, re-float day and any days required to accomplish the Vessels’ normal drydocking maintenance; provided, however, that if a warranty deficiency is discovered which requires additional drydocking time, the CONTR, in addition to the cost of the correction of the warranty deficiency, shall pay for each additional drydocking lay day due to correcting the warranty deficiency. If it becomes necessary to drydock the Vessels solely for the correction of a warranty deficiency, the CONTR shall be liable for the entire drydocking charge required for correction of the warranty deficiency as well as the cost of remediing the warranty deficiency.

Should any disagreement arise in connection with warranty deficiencies, the CONTR may dispute any action taken by the OWNER in the manner set forth in, and subject to the terms of the contract.

In addition, CONTR warrants that, for a period of 365 days after the Final Acceptance of the Vessel, the Vessel shall be free from Defects. As used herein “Defect” means (a) a material variance between the Vessel as delivered and the Vessel as required in this Agreement, the Plans and Specifications, modified by mutually approved change orders, (b) an instance in which the CONTR’s design of or workmanship in the Vessel is not equal to or better than the general standard of design or workmanship that prevails in the commercial passenger only Vessel industry, or (c) a defect in workmanship or materials under normal use and service provided, however the following are not defects, and the CONTR’s warranty does not apply to or include defects, damages or claims to the extent caused by:

a) failure of OWNER to perform required maintenance and servicing;
b) normal expected wear and tear during warranty period, also abuse, misuse, accident, vandalism, neglect, and improper operation by OWNER;
c) repairs or replacements not authorized by CONTR in violation of warranty terms;
d) any OWNER Furnished Equipment, except that the CONTR warrants its Workmanlike installation of OWNER Furnished Equipment in accordance with the manufacturer’s specifications, good shipbuilding practice and approved marine construction practices

The CONTR shall also guarantee all material and Workmanship entering into the Vessels and furnished by him during the warranty period. If a Vessel is not operational due to warranty repairs, replacements or other Work required, by a fault of the CONTR’s Workmanship, the warranty period for the CONTRs workmanship shall automatically be extended for a period of time equal to the number of calendar days that the Vessel is non-operational as a result of warranty Work.
If during the warranty period the OWNER determines that equipment or component parts fail to satisfy the terms of the warranty, the CONTR must promptly repair or replace the failed equipment or component part to the satisfaction of the OWNER.

The OWNER, by determining that Final Acceptance has been achieved, does not waive any warranty, express or implied, under Sections 2312 to 2317 of the California Code with respect to any materials, equipment or supplies manufactured, supplied Commercial or assembled by the CONTR pursuant to this Contract.

CONTR shall be responsible for consequential damages due to a warranty Defect as described herein, to the extent not disclaimed in the contract agreement.

960.1 Additional 365 Day Vessel Warranty

The CONTR shall, upon exercising of this option by the OWNER, extend the Vessel warranty as per these specifications an additional 356 days. The Vessel warranty as described in these specifications after exercising this option shall be 730 calendar days following the date of Final Acceptance of the Vessel by the OWNER.

970 SPARE PARTS

The OWNER typically maintains a comprehensive inventory of spare parts for its other fleet assets. Commonality with the machinery components of the OWNER’s existing fleet assets is desirable to minimize the quantity of spare parts required on hand. Given the requirements to match the PYXIS Class the OWNER will not require additional spares. However, deviations from the PYXIS Class may require the CONTR to provide spares if the substituted equipment is not in use in the fleet and determined to be critical to Vessel operations.

In addition, the main engine dealer spare parts supply shall be guaranteed to be on hand by the engine distributor 50 miles from San Francisco. Supplies shall be available for the foreseeable items which might require immediate replacement, for example, injectors, filters, cooler parts, ECM’s, etc. CONTR is to provide a current list of available spares for the engines provided for these new Vessels.

981 PROTECTION AND RESTORATION OF PROPERTY

The CONTR shall be responsible for all damage or injury to property of any character, resulting from any act, omission, neglect, or misconduct in his manner or method of executing the Work, or at any time due to defective Work or materials, during the prosecution of the Work, and said responsibility shall not be released until the Project shall have been completed and accepted.

The CONTR shall safeguard the Vessel’s machinery and electrical equipment, the use of which shall be made only upon the express written approval of the OWNER, and under supervision of competent, trained personnel.

The CONTR shall at all times, insofar as conditions of the Work permit, keep the openings of the Vessel closed against the weather. Deck openings, permanent and/or temporary shall be protected by a watertight coaming with a securely fastened cover.

During the course of the Work, the CONTR shall maintain adequate heating and ventilation throughout the Vessel to preclude the formation of molds and/or other deleterious substances.

982 CHARACTER OF WORKERS, METHODS AND EQUIPMENT

The CONTR shall at all time employ sufficient labor and equipment for prosecuting the several classes of Work to full completion in the manner and time required by this Contract.

All workers and management personnel shall have sufficient skill and experience to perform properly the Work assigned to them. Workers engaged in special Work or skilled Work shall have sufficient experience in such Work and in the operation of the equipment required to perform all Work properly and satisfactorily.
Any person, whether worker or superintendent, employed by the CONTR or by any Subcontractor whom the OWNER deems incompetent, careless, insubordinate, or otherwise objectionable, or whose continued employment on the Work is deemed to be contrary to the public interest shall, at the written request of the OWNER, be removed forthwith by the CONTR or Subcontractor employing such person, and shall not be employed again in any portion of the Work without the approval of the OWNER. The OWNER shall notify the CONTR in writing at least five days before submitting a written request to remove any worker and shall cite the reason for the impending removal in the notice.

Should the CONTR fail to remove such person or persons as required above, or fail to furnish suitable and sufficient personnel for the proper prosecution of the Work, the OWNER may suspend the Work by written notice until such orders are complied with.

No convict labor shall be employed and no materials manufactured or produced by convict labor shall be used in connection with the Work. This provision shall not be construed as applying to convicts on parole or probation.

The CONTR shall not discriminate against any person because of sex, race, creed, color, sexual orientation, or national origin.

All equipment which is proposed to be used shall be of appropriate size and in such mechanical condition as to meet the requirements of the Work and to produce a satisfactory quality of Work.

When the methods and equipment to be used by the CONTR in accomplishing the construction are not prescribed in the Contract, the CONTR is free to use any methods or equipment that he demonstrates to the satisfaction of the OWNER shall accomplish the Work in conformance with the requirements of the Contract, except as provided above.

When the Contract or manufacturer's instruction specifies that the construction be performed by the use of certain methods and equipment, such methods and equipment are used unless others are authorized.

END OF 900 SECTION
APPENDIX B REFERENCE MATERIALS