

REQUEST FOR PROPOSALS #21-009

SAN FRANCISCO WATER EMERGENCY TRANSPORTATION AUTHORITY

PART B TECHNICAL SPECIFICATIONS

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000 GENERAL REQUIREMENTS

010 BACKGROUND

The San Francisco Bay Area Water Emergency Transportation Authority ("OWNER"), a local agency with multi-county jurisdiction, was established by the California State Legislature to expand regional ferry service and coordinate waterborne emergency response activities on San Francisco Bay. The OWNER's comprehensive plan to establish ferry service on seven new routes was approved by the Legislature in 2003. The OWNER's goal is to design, build and operate a seamless transit system that responds to the region's congestion management needs, serves in an emergency response capacity, develops innovative environmental solutions for ferry vessels, contributes to economic viability, and improves quality of life.

020 PURPOSE

These Technical Specifications serve (i) to help define and establish a scope of Work for the conversion of the subject Vessel, (ii) to establish WETA's requirements for certain items, equipment, materials, furnishings, and machinery, and (iii) to establish and invoke certain requirements, regulations, rules, and standards that pertain to the Work to be carried out by the CONTR.

030 OWNER'S REQUIREMENTS VS. OWNER'S PREFERENCES

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

Maintaining commonality across the Vessels in the OWNER's fleet is very desirable as it streamlines fleet operations and standardizes maintenance and spare parts inventories while minimizing downtime. 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 fleet.

For the purpose of this document, OWNERs Requirements are generally preceded by the word "shall" or presented in tabular form. Wherever an equipment manufacturer and/or model number is provided, it shall be deemed an OWNER Preference.

This specification calls out several OWNER required Condition Found Reports (CFR) these reports are used to identify and mitigate problems which may be present on the vessel. It is the responsibility of the CONTR to provide the required reports in a timely manner to the OWNER for review. The CONTR shall be responsible for providing the required written reports within five (5) days of the inspection of the specified area.

040 OVERVIEW

The Gemini Class ferry vessels M/V Gemini (Gemini), M/V Pisces (Pisces), M/V Scorpio (Scorpio) and M/V Taurus (Taurus), collectively referred as the "Gemini class" were built for WETA, by Kvichak Marine Industries and Nichols Brothers Boat Builders between 2008-2010. The Gemini class has been in service for over 10 years and are ready for a main engine conversion from EPA Tier 2 engines with aftermarket emissions control systems to EPA Tier 4 engines with manufacturer supplied EPA certified emissions control systems. This engine conversion project is required to

comply with pending future California Air Resources Board (CARB) emissions regulations and is necessary to support operation of this vessel in revenue service for its full 25-year life expectancy.

These Technical Specifications and the accompanying Contract Documents provide for the Tier 4 main engine conversion of the Gemini class vessels. The work will often be referenced in an activity that may appear to apply to one engine or one vessel. In all cases, unless only one vessel in specific is mentioned, items in the technical specifications refer to all engines on all vessels and the described scope of work will apply to all of them.

The Work shall generally comprise;

- Removal of the existing MTU 16V2000M70 engines and ZF3050 gearboxes from the vessel.
- Shipping the ZF3050 gearboxes to ZF in Mukilteo Washington for repairs and adaptation to the smaller MAN bell housing.
- Modifications to the vessels for adaptation of the Sea Water cooling systems, Hydraulic Steering systems (engine Driven Pump), fuel supply systems, exhaust and aftertreatment systems, DEF systems and Electrical Systems.
- Engine bed modifications and installation of the new MAN engines coupled to the existing ZF gearbox as assembled by RDI of Seattle Washington.
- Removal of all of the existing Study/DDEC engine controls (hardware and wiring) and installation of the new MAN engine control systems.
- Additional items that relate to routine USCG COI Dry Docking inspections and routine maintenance
- The work shall be completed to at least the same standard, fit and finish as the original construction.

The CONTR shall include the specifications as called out in these Technical Specifications as well as the Appendices attached as part of their response to this contract.

The CONTR shall be responsible for developing the design solutions and details consistent with the Technical Specifications and other requirements of the contract, including but not limited to, the identification, provision and installation of all necessary materials and obtaining ALL regulatory approvals and certifications.

Where no particular preference is stated, the CONTR should propose its best standard equipment and installation when considering regulatory requirements, good marine practice, past experience and quality.

050 PRINCIPAL CHARACTERISTICS

Principal characteristics of the Vessel are outlined below:

Characteristic	Detail	SWBS
Hull form	Catamaran	-
Hull Material	Aluminum	101
Regulatory Tonnage	Less than 100 GRT	090
Official Number	1213097(Gemini), 1213095(Pisces), 1215086(Scorpio), 1215087(Taurus)	-
Regulatory	United States Coast Guard – Subchapter K	091
Length Over All	112.3'	-

Beam	28'	-
Draft Max	6'	-
Freeboard	7'-13/16"	-
Decks	2	601
Main Engines	MTU 16V 2000	233
Propellers	CX-500 D 46" P50" LH Rotation	245
Reduction Gear	ZF Marine ZF3050	241
Generators	Northern Lights M1064T2	311
Passengers	225	-
Interior Seats (all types)	177	-
Exterior Seats	57	-
Crew	4	-
Fuel Capacity	2400 Gallons	126

070 VESSEL REGULATORY REQUIREMENTS

The Vessel was constructed in accordance with the regulatory requirements summarized in Section 070.1 and invoked throughout this specification. This specification also contains additional requirements that augment and/or exceed those of the regulatory agencies but shall in no case supersede or compromise the regulatory requirements.

070.1 REGULATORY

The Vessel is inspected and certificated by the United States Coast Guard (USCG) according to 46 CFR, Subchapter K, small passenger vessels.

The CONTR shall insure that all work performed during this project complies with USCG requirements for 46 CFR Sub Chapter K. The CONTR complete the BWE (Section 833) and submit documentation to the USCG for a lightship change determination. Preliminary weight estimates are predicting approximately 4% weight reduction that will require a new lightship survey and new stability calculations. The CONTR is responsible for all costs associated with regulatory compliance requirements.

The CONTR shall contact the USCG to arrange for the credit dry dock. The CONTR shall be responsible for filling out USCG Form 3752 Application for Inspection of U.S. Vessel. The CONTR shall perform all work associated with a credit dry dock. The CONTR shall notify the OWNER 14 days in advance of the inspection.

The USCG requirements invoked by that document have precedence over other regulatory requirements, and these contract Documents, where conflict exists. Where rule interpretations vary between USCG districts, the CONTR shall ensure that the Vessel certificates shall be valid in San Francisco Bay Area under USCG Sector San Francisco.

070.2 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, regarding passengers with disabilities. The contemplated scope of work of this project is not intended to effect items related to ADA compliance. These regulations are referenced in case any portion of this work scope intentionally, or unintentionally, has ADA compliance implications that require the CONTR to reference and adhere to said guidelines.

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, entrance and egress for wheelchairs that does not exceed the allowable slope (1:12)

073 NOISE AND 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. Readings shall be within an agreed upon range of normal deviation.

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 that were not present in the pre-construction survey, or subsequently during the warranty period. Drive train alignments shall be performed in accordance with these specifications. CONTR shall perform alignment, with written acceptance from propulsion equipment manufacturer's representative. CONTR shall not exceed the following overall frequency weighted RMS value standards.

Noise Criteria

The Vessel shall not exceed post construction noise levels by more than two (≤ 2) dBA higher than values recorded pre-construction. Readings shall be taken in the following areas:

NOISE LEVEL ¹			
DECK	ZONE	Requirement (dBA)	Preference (dBA)
PILOTHOUSE	PILOTHOUSE	65	55
2ND DECK	FORWARD INTERIOR	68	62
	FORWARD INTERIOR	70	65
	AFT INTERIOR	75	70

Notes:

1 – Underway conditions – Measurements shall be performed at the vessel's primary operating speeds of 10 knots (idling speed) and 27 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 these specifications. 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 axis:

Interior Vibration Limits, mm/sec peak, single frequency components (1 Hz bandwidth) between 2 and 80 Hz	
Test Condition	U/W @ 27kts
Pilothouse	0.5
Upper Deck Interior	1.5
Main Cabin Forward	1.0
Main Cabin Bar	1.5
Main Deck Aft Exterior	6.5

Machinery Vibration Limits, mm/sec peak, single frequency components (1 Hz bandwidth) between 2 and 100 Hz	
Test Condition	U/W @ 27kts
Engine Foundations	6.5
Generator Foundations	6.5
Transom	8.5
Rudder Stock	3.0
Frame 4	3.0

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. It is currently known that there are structural vibrations issues with this class of the vessel in the aft deck/transom area. These levels have been documented by WETA and the CONTR will not be held accountable for levels in these documented areas. The final solution for this area is still under review and will move to completion after this contract scope of work has been completed. The final solution will not be part of this Contract scope of work as the will be integrated with the vessel planned midlife overhaul scope of work.

074 WELDING AND 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's Representative prior to a welder performing welding on the Vessel.

Special attention shall be provided to joint design and welding practice 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, et cetera. All crater cracks shall be repaired in process.

Skip 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 submit a plan for the non-destructive testing of structural welds. The plan shall designate the inspection plan, the acceptance criteria, and the inspection expansion plan in the event that defective welds are discovered. The CONTR shall provide the plan to the OWNER for review.

The CONTR shall provide a written welding procedure for the isolation and protection of sensitive equipment when welding occurs onboard.

078 MATERIALS AND WORKMANSHIP

Unless otherwise noted, all hardware and fasteners used in the construction of the Vessel shall be 316 stainless steel. Unless otherwise stated in this Specification, the CONTR shall supply the necessary labor, material, skill and equipment required to complete the main engine conversion and testing of the vessel. All materials shall be new, unless specific approval to the contrary is obtained from WETA in writing.

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 WETA in accordance with good marine practice.

Defects appearing at any stage of the work shall cause for rejection even though the piece in question may have previously been passed as satisfactory.

080 TEMPORARY SERVICES

Provide gangway(s) that satisfy the requirements of OSHA for safe and efficient vessel access for personnel, equipment, and materials. In addition, the CONTR shall provide all other services required to maintain the vessel and support the work in safe and effective matter (Fire Water, Shore Power, Security, Fire Watches and other services)

084 EQUIPMENT STORAGE

All equipment temporarily removed from the vessel or purchased by the CONTR for use in the main engine conversion of this vessel or OWNER-furnished shall be securely warehoused by the CONTR and segregated from the other projects' equipment. The equipment shall be kept in a covered, clean, dry environment and relatively constant temperature. Equipment requiring special handling by its manufacturer shall be stored in the accordance with manufacturer's requirements.

The OWNER's Representative shall be provided with access to stored equipment at any time upon his/her request.

The CONTR shall adequately protect all equipment from overspray of solvents, paints, impact damage, and weld or cutting materials contact while in storage and on board. Temporary fire-resistant covers or enclosures shall be placed over all equipment where overhead or adjacent hot work is being performed. Scaffolding or work platforms shall be placed over equipment where overhead work is being performed. In no case shall the CONTR use the installed equipment to stand or walk across for access overhead or beyond. The CONTR shall immediately comply with all directives, as may be provided from the OWNER's Representative, to protect or improve the protection of installed equipment and components from physical damage.

087 CARE OF VESSEL DURING PROJECT

087.1 FIRE PROTECTION

During construction, flammable material shall not be stored on board the vessel in such a manner as to create a fire hazard. The CONTR shall exercise special care to prevent the possible outbreak of fire. A pressurized fire hose shall be available and maintained at the site of the vessel construction at all times.

Where hot work is being carried out in the vicinity of combustible material a fire watch, whose sole purpose shall be to watch for fires and keep firefighting equipment on hand, shall be constantly on duty. Fire watch personnel shall remain on duty in the same space where hot work is performed for a period of at least 30 minutes after cessation of the hot work.

Spent or partially spent portable fire extinguishers shall be immediately replaced with fully charged extinguishers. The CONTR shall ensure that there are no open fires on or within 50 feet of the vessel at all times when it is at the shipyard.

087.2 HULL PROTECTION

The CONTR shall maintain rigid control of welding and grounding for the protection of the hull, its systems and appendages during the entire time the vessel is in the custody of the CONTR. Particular attention shall be paid to the placement of ground connections, especially when the vessel is afloat.

091 SHIP-INSPECTIONS

The CONTR shall perform pre-main engine conversion ship inspection (ship check) while the vessel is in normal service prior to delivery at their facility. The purpose of this ship inspection is to witness the operability of ship services under normal operating conditions prior to dry-docking.

The ship inspection shall include:

- Pilothouse Navigation Electronics
- Bilge System
- Fire System
- Potable/Fresh Water System
- Sanitary System
- Main Engine Operation
- Auxiliary Engine Operation
- Reduction Gear Operation
- General Deck Condition

- Steering Systems
- Lighting Systems
- Public Address Systems
- SCR system

The CONTR and the OWNER representative shall sign off on the operation of the above systems prior to delivery of the vessel to the CONTR'S facility. Prior to acceptance of the vessel from the CONTR, ALL of the vessel's systems shall be inspected. Any discrepancies between the two ship inspections shall be discussed between the CONTR and the OWNER as to responsibility for repairs to any deficient systems.

091.1 INSPECTION

During construction, and any time prior to the delivery and acceptance, WETA inspectors and representatives, and inspectors of regulatory bodies, shall be given free access to the CONTR's facility for the purpose of inspecting work and materials. The inspectors and representatives will have the authority to reject any material or workmanship that does not conform to the requirements of this Specification.

100 STRUCTURE

No major structural modifications are anticipated. Miscellaneous structural work may be required to accomplish the Work as described in these Technical Specifications and or the Specifications as called out in Appendices. In all such cases structural modifications shall match the existing structure in terms of material, procedures, fit up, and weld quality. All structural work performed shall be finished to preclude sharp edges or corners, and shall not present any hazard to crew or passengers. Any welding shall meet all requirements as set forth by the USCG, including certification of welders.

All welding, welding materials, and welding methods shall be subject to the review and approval of the OWNER and the USCG.

All painted surfaces that are disturbed or modified shall be prepared and repainted to match existing and surrounding structure.

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

101 STRUCTURAL MATERIALS

All materials shall be new. Aluminum alloys used in the Vessel shall be as per Table 101.1 unless otherwise noted. Reference the SWBS sections of this specification for any overriding material requirements.

Table 101.1 Structural Aluminum Material Schedule	
Component(s)	Material(s)
Plate $\geq \frac{1}{8}$ "	ASTM B928 5083, 5086, 5456-H116 or H321
Plate $< \frac{1}{8}$ "	ASTM B928 5083, 5086, 5456-H116 or H321, or 5052 of SAE AMS-QQ-A-250/8
Extrusions	ASTM B221 6061-T6, 5086, 5083, 5456-H111 or H112

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. Non-welded 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) they shall obtain approval in writing from the OWNER for the application and welding procedures.

110 PADEYES

The CONTR shall add pad eyes, as required, to remove and install the new exhaust system emissions control equipment. Each pad eye shall be rated for no less than 500lbs SWL and permanently marked as such. The pad eyes shall be designed with a safety factor of 5. The CONTR shall provide all engineering and calculations for review and approval by the OWNER prior to the start of work. All details for integration of pad eye structure shall limit to the greatest extent possible hard spots and provide for proper structural detailing.

126 TANKS

The vessel is currently fitted with tanks of capacities as noted in Table 126-1.

Table 126-1 Tanks		
Quantity	Service	Tank
2	Fuel Oil Storage	1200 gallons per side
1	Potable and Fresh Water Storage	500-gallon tank – starboard hull (See section 533)
1	Sewage	500-gallon tank – port hull
2	DEF	80-gallon tank Located under each stairwell (See section 290)
2	Lube Oil	15-gallon tank located under each stairwell

163 SEACHESTS

The CONTR shall remove and clean all marine growth from the interior of the sea chests and piping. The CONTR shall remove and replace sea chest anodes in kind as per section 633.2. The CONTR shall repair all sea chest coatings as per section 631.

200 MACHINERY - PROPULSION AND SHIP SERVICE

Main propulsion power for this Vessel is provided by propellers, each driven by a diesel engine through a reversing marine reduction gear.

Prior to redelivery, the CONTR shall clean and remove ALL debris from the engine room bilges.

233 MAIN ENGINES

The CONTR shall provide all labor, equipment and materials to convert the main engines from the existing MTU 16V2000's to the new MAN D2826LE489 main engines. This scope of work will require the CONTR to remove all of the soft patches, interferences, equipment and provide all of the rigging as required to safely complete the existing engine removals. The CONTR shall coordinate with RDI Marine (RDI) of Seattle, Washington for the commissioning of the new EPA Tier 4 main engines. RDI will be Contracted by WETA for the purchase of the main engines and engine controls. The RDI Contract will include the services outlined in the quote (can be provided for reference) and the shipping of the engines to the shipyard (schedule provided by shipyard), dock and sea trials in addition to the integration of the marine reduction gears. The CONTR shall be responsible for all coordination with RDI with adequate time for RDI to schedule.

The CONTR shall remove all of the equipment interferences on the path of engine and soft patch removal. All items removed or disconnected shall be labeled. The labeling shall be semi-permanent such that normal wear from movement and work taking place will not remove the writing from label. Where electrical wires are disconnected both sides shall be labeled with corresponding terminology such that anyone can reconnect the wires by matching the corresponding labels. This shall include but is not limited to the following equipment:

- HVAC Chiller Stbd side
- Air compressor Port side
- Various electrical
- Engine start battery and chargers
- Shaft log sea water supply piping
- Main engine exhaust piping and emission control equipment
- Engine room Ladders, brackets, foundations and misc.
- IBA's IWO crane access

The CONTR shall trim the forward portion of the centerline engine removal rail aft of bulkhead 5 on the port side only, approximately 2". The trimming of the lower forward 2" will allow the removal of the bulkhead 5 soft patch with the main deck soft patch still in place. This is not done on the starboard side as the main deck soft patch will have to be removed first to remove the HVAC chiller regardless. The OWNER will detail the amount to be trimmed at the time the work takes place.

The bulkhead 5 soft patch shall be removed and placed in the after portion of the lazarette clear of the working area. The air compressor can be removed and stored for WETA's determination on its disposition. All insulation and cladding that is removed as part of the soft patch removal shall be repaired or replaced so that after final installation it is free from holes or tears in the vapor barrier. At the completion the structural fire protection insulation has to be complete to maintain the fire boundary as required by USCG, it is the CONTR responsibility to restore it to that level.

The main engines shall be moved aft with the installed engine removal rail provided in the reference drawing S154 1121-02 - Engine Removal Rails. The detailed plan for removal shall be reviewed with the OWNER prior to the work

taking place to review all of the details required for movement of the engines. Once the engines have been located under the main deck soft patch, they will be set down on the framing installed for engine removal. The main deck soft patch shall be removed and then the crane will have access to lift the engine out. The final details of rigging shall be proposed by the CONTR and reviewed and approved by the OWNER prior to the work taking place.

MARINE GEARS

Once the existing MTU 16V2000 main engines have been removed from the vessel the shipyard will remove the ZF3050 marine gears from the engines. The removal shall follow all manufacturers recommendations and processes. Any damage to the marine gears as a part of the separation process will be repaired by ZF and paid for by the CONTR. The CONTR shall pay for and arrange shipment of the two ZF3050 marine gears to ZF in Mukilteo, Washington. The CONTR shall pay for and arrange for those gears to be converted to the size bell housing **and torsional coupling** that matches the MAN diesel engines being installed in this scope or work. The CONTR shall have the **is-coupling selection and** bell housing interface verified between RDI and ZF prior to executing the scope of work.

Additionally, the CONTR shall pay for and arrange to make some modifications to the marine gears to support the installation of the new engines. An A pad PTO shall be added to the ZF3050 gears in the rear input location. The ZF order number for this option is 3101-680-039, code number N128 set up for a 9 tooth -5/8" splined shaft. The PTO will be installed by ZF and the hydraulic pump (Section 560) will be installed by RDI when they mate the engines and gears together. The CONTR shall be required to remove the existing hydraulic pumps from the accessory drive location on the MTU 2000 series engines and ship them to RDI in Seattle for mounting.

The CONTR will pay for ZF to move the oil cooler to the MAN standard configuration that ZF has for these gears. The scope of work to move the oil coolers will include ZF's standard brackets, plumbing and fittings needed to relocate the cooler to the MAN configuration location. The CONTR shall also pay for and arrange for ZF to ship the gears to RDI in Seattle, Washington after their scope of work has been completed.

~~The CONTR shall pay for RDI to provide the interface harness between the ZF gearboxes and the MAN engines. The harness connected the gearboxes to the MAN engines will allow of the oil temperature and pressure readings to monitored and displayed on the MAN control system.~~

On the M.V. Pisces WETA will pay to have ZF rebuild the gearboxes that the CONTR will be shipping to ZF. WETA will be paying for rebuilding expenses only, the CONTR's scope of work is the same for each vessel. However, the CONTR will have to budget more time in the schedule for the rebuilding process that is assumed to take 6 weeks from date of delivery of the gears to ZF to date of shipment to RDI for mating to the engines.

The engine installation shall follow the reverse path of removal. Installation details shall be as per the reference drawings and reviewed prior to installation to the satisfaction of the OWNER. All items removed or relocated as part of the engine removal shall be replaced and reinstalled to the highest marine standards. All piping isolation shall be renewed and all electrical supports and chaffing gear shall be installed to the satisfaction of the OWNER.

The new engine/gear combination (engines) shall be installed as per the provided reference engine installation drawings. The new engines shall be mounted on the existing engine girders. The existing chock fast, damns, stops and mounting holes from the MTU16V2000 engines shall be removed. The extraneous mounted holes shall be welded filled and ground to a flush smooth uniform finish.

The new engines shall be mounted on RDI supplied engine mounts on base plates as per the reference drawings. The CONTR shall install jacking screws to move the engines in all three axis to obtain a new alignment. The final location of the engines shall provide for alignment with the existing propeller shaft as per the section below and still allowing sufficient space for a quality chock fast pour.

The installed engines shall be realigned by the CONTR and verified by a third-party alignment specialist. The alignment shall be verified by a laser alignment system. The laser alignment shall be conducted by a third party specializing in marine laser alignments. This shall be Industry Uptime Inc. of Meadow Vista, California. Contact Information for Industry Uptime is as follows;

George Dierssen
gdierssen@industryuptime.com
530-878-4855

The laser alignment system shall provide a report detailing the exact alignment of the main engine to the propeller shaft. The report will include a detail on the final wet alignment of the propeller shaft to the gearbox. The final wet alignment shall be done utilizing the laser alignment system. A smooth-running vessel is of paramount concern at the completion of this project. As such the goal shall be to have the final wet alignment within half the normal tolerance at 0.0005" per inch of coupling face, normal rule of thumb being 0.001" per inch of coupling face. As an example, a 15" diameter gear input flange would normally dictate a maximum deviation of 0.015" from any of the measurement in a complete sweep. For this Contract half of that limit will be allowed unless specifically approved by the OWNER in writing.

The CONTR and the alignment specialist shall provide all equipment and specialized tooling required to take these alignment measurements (receivers, dummy spud shafts, etc...). The CONTR shall provide the OWNER with an alignment plan prior to installation of the new propulsion engines and gears. The plan shall be approved by the OWNER prior to the start of installations. All alignment reports shall be provided to the OWNER for review and approval prior to any chock fastening of engine mounts. A final wet alignment report shall be delivered to the OWNER for use in comparison with future dry dockings. If movement of the engine and or gear is required for final wet alignments all costs associated with equipment movement and piping modifications shall be borne by the CONTR.

243 SHAFTING

The CONTR shall take alignment readings prior to removing the old propulsion engines. The CONTR shall provide a Condition Found Report (CFR) to the OWNER recording the alignment readings. The CONTR shall be responsible for providing the required written report within five (5) days of the inspection. The CONTR shall also install supports, targets or other devices needed to preserve the input flange location to the propeller shaft for the alignment of the new engines.

244 PROPULSION SHAFT BEARINGS

The CONTR shall take feeler gauge readings on all stern tube and strut bearings. Reference Appendix B Drawing #S153 6021-07- Propeller Shaft & Stern Tube Assembly. The CONTR shall provide the readings to the OWNER in a CFR for their review. The CONTR shall be responsible for providing the required written report within five (5) days of the inspection.

245 PROPELLERS

The CONTR shall clean the propellers shall of all fouling and dye penetrant tested with the OWNER in attendance. The CONTR shall perform pitch and balance inspections of the refurbished propellers and provide the results via a CFR.



(Standard Gemini Class Propellers and Rudders)

The CONTR shall plan for making a pitch adjustment to the propellers to provide for the desired 85%MRC load on the engines at full RPM. The current propellers are designed for 85% load on 1405bhp engines at 2100RPM. The new engines are 1450bhp at 2100RPM so the changes in pitch are not expected to be large. Each vessel **will be trialed prior to delivery** to determine loading and if propeller pitch changes are required. The repitched propellers shall be blue fit to the propulsion shafts to the OWNERS satisfaction. The results of the blue fit shall be provided to the OWNER. The OWNER does not require the propeller nuts to be welded. The CONTR shall renew the cotter pins in kind.

252 PROPULSION CONTROL SYSTEM

The CONTR shall remove the existing DDEC/Sturdy propulsion control system and replace it with an OWNER furnished MAN I-Sea control system. The new MAN controls will replace the engine room control box, pilot house engine displays and control heads at all three stations. The CONTR shall remove all existing control harnesses and control hardware including but not limited to the ERIM located in the vessels lazarettes, the ETIM's in the engine rooms, the backup controls in the pilot house and engines room and other hardware items rendered redundant by the change in the controls. The vessels existing start/stop and E-stop switches in the pilot house shall be re-used with the new system. The existing analog tachometers at the wing stations shall be removed and replaced with new CAN bus tachometers as per MAN requirements. The tachometers are not part of the OWNERS scope of supply and the 4 units required shall be furnished by the CONTR. The tachometers shall be VDO OceanLink, 85mm, 0-3000RPM, Black Bezel units. The final units purchased shall be reviewed and approved by RDI for integration with system.

The new control system shall require removal of all obsolete wiring, harnesses and supports. The CONTR shall provide all cables, hardware and other items not provided by the OWNER that are required to complete the installation of the new MAN engines and propulsion control system. The CONTR shall be in close communication with RDI Marine so that they know exactly what they need to supply. All main engine and propulsion control cables, wires, harnesses and electrical components shall not be routed, mounted or run with high power AC power cables and components. All wiring shall be routed to run as far as possible from the existing AC cables installed while still residing within the vessels existing main wireways. The new installation of the main engines and control systems shall require new sub wireways to be installed by the CONTR. All wireway routing and new installations shall be reviewed and approved by the OWNER prior to installation.

The CONTR shall provide the final integration required for the installation of the new control system and provide the OWNER with AS-BUILT drawings of the final configuration of all wiring, harnesses and terminations. The AS-BUILT drawing shall provide a Bill of Materials for all components purchased by the shipyard, such as the tachometers in addition to materials schedules for consumable items like wire, pins, wiring terminals and other items used to complete the system. The intention of the drawing is that maintenance personal can accurately trouble shoot the system, wiring, terminals, plug pin outs and repair and replace wiring with the similar material.

The CONTR shall be required to support all activities and testing by the USCG, RDI Marine and MAN factory for the new engines and control systems. This shall include, but is not limited to the Qualitative Failure Analysis (QFA) and Design Verification Test Procedure (DVTP) or any other name assigned to the documentation required by the USCG to verify the new engines and controls meet the USCG requirements for a microprocessor based control system. These tests take place at Dock Trials and on Sea Trials in the presence of the USCG inspector and the manufacturer's representative. The CONTR shall ensure that all parties involved in these sorts of tests have signed the testing documents at the completion of the testing to verify they witnessed the testing. The CONTR shall submit the testing documentation to the USCG Marine Safety Center (MSC) on the same day that the testing is completed with scanned copies of the signed test documents. These submissions will CC: the OWNER, local USCG Inspectors, Sector San Francisco Domestic Inspections and the Manufacturer's representatives that were present.

256 SEAWATER COOLING

All seawater piping rework shall use materials as defined in Table 256-1.

Table 256-1 Seawater Systems	
Piping, sea chest to isolation valve & overboard hull penetrations	ASTM B221 5086, 5083,5456-H111 or H112 Schedule 80 pipe and flanges
Piping, all other	ASTM B466 90/10 CuNi class 200 w/ CuNi ANSI B16.5 150# flanges, Viega MegaPress CuNi where USCG approved
Valves	Lug body butterfly valve, epoxy-coated cast iron body and highly corrosion resistant stem and disc Monel or equal
Seawater strainers	Fabricated 90/10 CuNi
Flexible Connections	Hose USCG approved J1942, Trident #321 Ocean- Flex or approved equal, <30" length
Hose connections	Barbed or weld bead on pipe
Clamps, 316SST	ZSI-Foster Brand Alpha, Omega or Beta Style

All piping work shall be done in accordance with the general piping requirements of Section 505.

256.1 SEA VALVES

The CONTR shall remove and reinstall all sea valves from the vessel and provide for USCG and OWNER inspection as part of a dry dock credit. All flange faces shall be cleaned and prepped for re-installation. All gaskets and isolation kits shall be renewed in kind. All isolations shall be checked with a multimeter in the presence of the OWNER. All gasket surfaces in contact with aluminum shall be installed with a marine Sealant approved by the OWNER. A condition found report for all valves shall be provided to the OWNER. The CONTR shall be responsible for providing the required written report within five (5) days of the inspection.

While the sea valves are removed the CONTR shall repair the Blue Seal coating system on the inlet pipes and flanges as per the requirements of section 631. The coating system shall be applied up and over the flange faces to protect the aluminum flanges from corroding/eroding. If the CONTR is concerned about valve sealing they are encouraged to build up the Blue Seal system with their reinforcement coat to build up thickness and then sand flat prior to applying the top coat. It is of principal importance that the coating system extends across the full sealing surface of the flange face.

The sea valves are as indicated in Table 256-2.

Table 256-2 Sea Valves	
Main engine intake	2 @ 5" butterfly
Main engine discharge	2 @ 5" butterfly
Generator sea chest	2 @ 2" butterfly
Generator salt water discharge	2 @ 2 ½" butterfly
Fire main	1 @ 2 ½" butterfly
HVAC sea chest	1 @ 3" butterfly
HVAC overboard	1 @ 4" butterfly
Bilge system	4 @ 2" check valve

256.2 SEA WATER SUPPLY AND DISCHARGE PIPING MODIFICATION

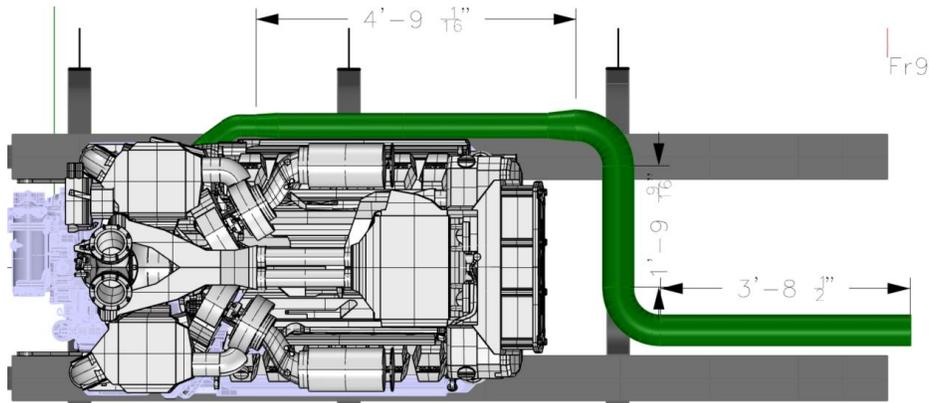
The CONTR shall make all modifications required to the supply and discharge piping to integrate the new MAN engines into the vessel. The reference drawings show the changes outlined in the system schematic.

256.2.1 Main Engine Suction Piping

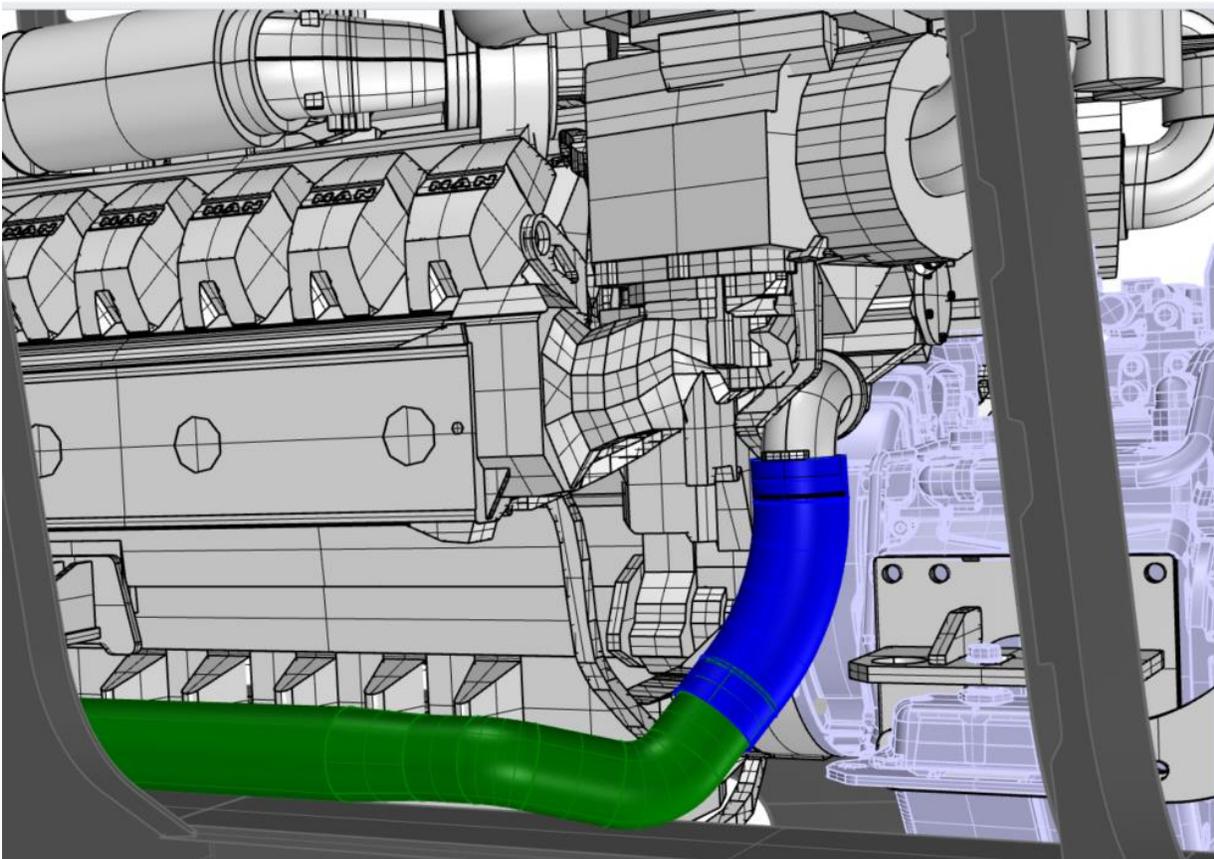
The vessels existing 5" suction piping shall be removed up to the 5" flange on the outlet of the sea water strainer, approximately at frame 9. The existing MTU engines take suction from the forward right-hand side of engines (as seen from aft looking forward) and the new MAN engine take suction on the aft left-hand side of the engine. As such the piping will have to be routed to a totally new location.

The new piping shall connect to the strainer outlet in 5" piping and transit aft and across the vessel to run down the left-hand side of the engine just inboard/outboard (depending on which engine room) of the engine girders down low supported off of the frames. As the pipe turns 90° and runs aft alongside the engine it shall transition to 4" pipe. At the rear face of the block the piping shall transition to 3.5" pipe and terminate in a 4" hose barb.

The picture below is from a rough 3D model of what the pipe could look like. The piping shown represents the STBD engine room configuration. The PORT engine room is similar with the run starting closer to centerline. The routing shown is for estimating purposes and the final pipe routing will be reviewed and approved by the OWNER once all of the interferences and final support brackets have been incorporated into the pipe routing. The final piping design will be as built by the CONTR using the vessels original drawings in CAD and updated to the same level of detail.



The piping geometry at the hose connection is very important to ensure there is flexibility of the rigid USCG approved hose to account for engine movement. The hose shall have a slight sweep to allow for flexing and the piping and a USCG compliant hose shall connect the piping to the 4" hose bard on the engine's sea water pump. The hose section shall be shorter than 30" and be routed to stay within the manufacturers hose bend radius and free from all sharp edges and other items than can cause mechanical damage. The CONTR shall install the piping so that the hose installation is long enough to provide for engine movement, easy for hose replacement and routed without having to induce undue stress on the hose. All hose connections shall be barbed and clamped with two t-bolt style hose clamps 180° offset from each other. All piping shall be supported with approved clamps every 4'.

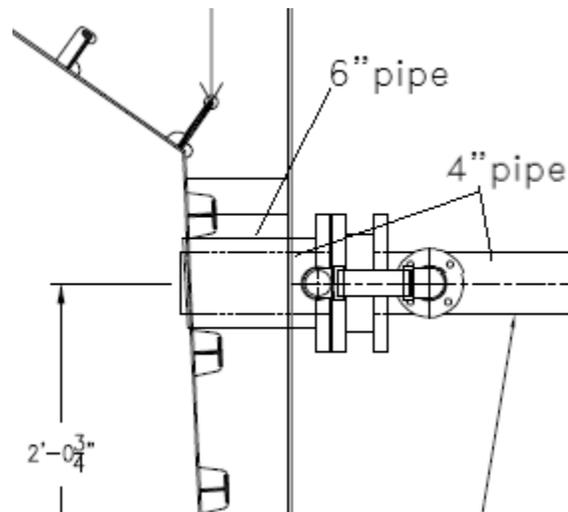


256.2.2 Main Engine Discharge Piping

The vessels existing 4" discharge piping shall be removed up to the 5" flange on the overboard valve connection at the inboard side shell. The mating flange for the 5" overboard valve shall be re-used as it is a custom plate flange for 4" pipe connecting to a 5" valve. The existing MTU engines discharges from the forward right-hand side of engines (as seen from aft looking forward) facing inboard on the STBD side and up on the PORT side and the new MAN engine discharges from the forward right-hand side of engines straight down. As such the piping will have to be routed to a totally new location to work with the new MAN cooling water connection.

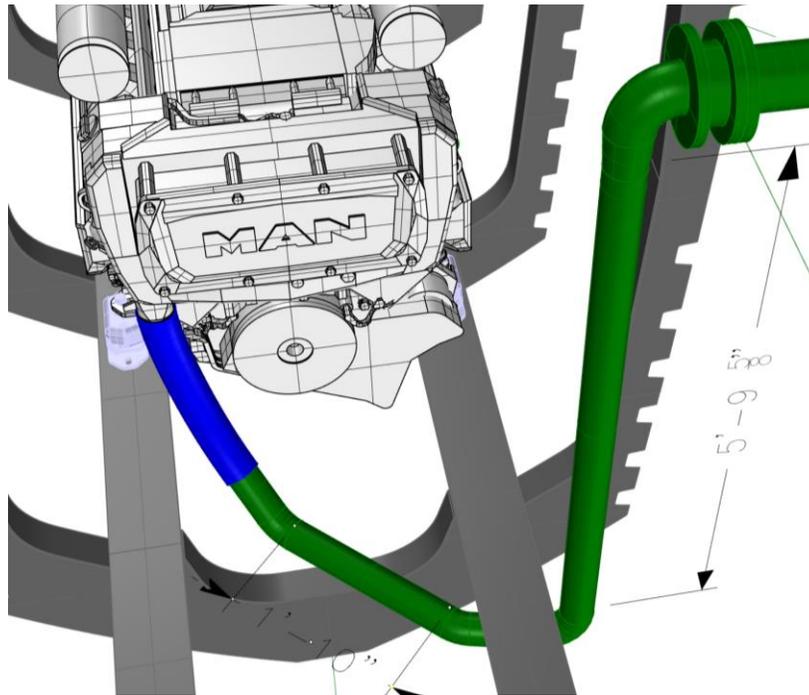
The CONTR shall connect to the new MAN engine with a 4" hose connection with barbed ends. The hose section shall be shorter than 30" and be routed to stay within the manufacturers hose bend radius and free from all sharp edges and other items than can cause mechanical damage. The CONTR shall install the piping so that the hose installation is long enough to provide for engine movement, easy for hose replacement and routed without having to induce undue stress on the hose. All hose connections shall be clamped with two t-bolt style hose clamps 180° offset from each other.

The new piping shall connect to the existing 5" overboard valve connections on the inboard side shells forward of frame 8 up high near the haunch. The existing thru-hull is a 4" CuNi piping that fits inside of a 6" aluminum overboard pipe, see reference drawings and below for details. The existing aluminum overboard pipe and the CuNi 4" pipe that fits inside of it will need to be shorted to fit the new piping run tighter to the side shell. The CONTR shall estimate that the 6" aluminum flange will be carefully removed from the 6" overboard pipe, the 6" overboard pipe shorted by 3-6" depending on final pipe routing and the 6" flange re-welded to the new shorted overboard pipe. The final length of the internal 4" CuNi pipe shall be determined after installation such that it protrudes an inch or two beyond the aluminum.



Existing Overboard Detail

The piping shall start with a 4" hose barb and be piped down, forward and inboard in 3.5" pipe (4" O.D.). The example pipe routing screen shot is shown for estimating purposes and all dimensions are approximate. If interferences allow the piping to be routed above the engine girder tops that would be preferable. The screen shot shows the piping routed through an existing lightening hole in the engine girder. Sea Water suction piping not shown for clarity. Just before the overboard the piping will flare from 3.5" to 4" pipe with a short radius elbow and tie into the custom 4" pipe 5" flange on the overboard as shorted in the previous paragraph. The Stbd side is shown, Port side would be similar but much shorter as the engine outlet and the overboard flange are on the same side. All piping shall be supported with approved clamps every 4'.



256.2.3 Gearbox Cooler Discharge Piping

The vessels existing gearbox cooler discharge piping ties into the gearbox cooler outlet, the main engine 4" sea water overboard and the shaft seal and the stern tube. This pipe shall be retained but modified to remove the long run forward to the main engine 4" sea water overboard as it is no longer required. The connection at the 4" overboard will have been removed as part of the main engine sea water overboard piping modifications. The modifications to the piping at the gearbox shall remove the existing tee fitting that connects the for

The as modified piping shall be supplied from the outlet of the new gear cooler location hose connection and feed the shaft seal and the stern tube as it is currently plumbed. Modifications shall be limited to removal of the forward portion of the piping run as described and making the changes to tie into the new gear cooler location. The existing gear cooler location is fore and aft on the gear with the outlet facing aft. The new location will be transverse with the outlet facing to the left-hand side of the engine, see reference drawings. The Port side will require additional 1.5" piping as the new gear cooler location will have the outlet of the gear cooler facing outboard while the existing piping is located on the inboard side shell. The final pipe routing and piping modifications shall be reviewed and approved by the OWNER.

The hose section shall be shorter than 30" and be routed to stay within the manufacturers hose bend radius and free from all sharp edges and other items than can cause mechanical damage. The CONTR shall install the piping so that the hose installation is long enough to provide for engine movement, easy for hose replacement and routed without having to induce undue stress on the hose. All hose connections shall clamped with two t-bolt style hose clamps 180° offset from each other. All piping shall be supported with approved clamps every 4'.

259 ENGINE EXHAUST LAGGING

The CONTR shall replace all main engine exhaust lagging from the engine room turbos to the top of the exhaust stack in the modified portions of the exhaust piping. The CONTR shall submit to the owner any sections of the existing exhaust lagging that can be re-used for approval. Re-use of the existing lagging shall be limited to the lagging applied

to an existing portion of piping that is being re-used without modification. An example of this would be the muffler as there are no modifications or changes required therefore the existing lagging can be re-used. In no circumstance shall portions of the existing lagging be repurposed to try and fit the new piping. The exhaust lagging shall be as described in section 635 using a lagging system by:

SOS Marine
1320 E. St. Andrews Place Ste. A
Santa Ana, CA 92705

259.1 DEF SYSTEM

The definition of this section is currently on hold pending feedback from the Marine Safety Center on design issues with the system. Until such time as the USCG provides the feedback required to complete the system design the CONTR shall account for a \$10,000 reserve budget for each vessel for the integration of the DEF system to the emissions control equipment.

261 FUEL OIL SYSTEM

All fuel system materials shall be as per Table 261-1.

Table 261-1 Fuel System	
Fittings Tube, CRES	A269 Grade 316 SS, SWAGELOK or equal
Aluminum Pipe, fittings and flanges	ASTM B241 6061-T6 schedule 80
Pipe, fittings and flanges CRES welded	ASTM A 778 316L pipe, 316L fittings
Hoses	Parker 221FR, SAE J1942 –F for fuel & lube oil
Hose End Fittings	JIC SAE J1475 316 SS
Valves	Ball Type Full Port, 316 SS

The CONTR shall remove the main engine fuel piping system up to the 1" tube inlet just before the existing RACOR 75/1000MAX fuel filters. The 1" tube supply to the existing filters shall be modified to allow for a hose connection to the new MAN supplied Mann & Hummel fuel filters. All fittings attached to the existing tube run shall be SWAGELOK as per table 261-1. The CONTR shall install new 1" ball valves on the inlet and outlet connections to the vessels hard piping before and after the fuel filter hose connections. The new MAN supplied filter will be mounted in the same location as the existing RACOR 75/1000MAX filter. The final location of the filter and the details of the adaptation to the existing bracket design shall be reviewed and approved by the OWNER prior to installation.

The removed RACOR filters shall be drained, capped and returned to the OWNER for use elsewhere in the fleet. The removal shall include all of the 1" tube run to the MTU main engines from the filters, fittings, Racor Fuel Filters and associated piping, clamps, supports and anything else that is rendered unneeded by the removal of the indicated portions of the fuel piping system.

The CONTR shall install new hose connections to and from the new fuel filters in addition to the supply and return to the new MAN main engines. All hoses shall be the same 1" size no longer than 30" and routed clear of any possible sharp edges or mechanical damage. Where contact between hoses and anything is possible the hoses shall be fitting with chafe protection EPHA Brand, Orange size and length to suited to adequately protect the hose. All hose routing, length and protection shall be reviewed and approved by the OWNER.

The CONTR shall install new supply piping from the outlet hose connection from the new MAN fuel filters to the new MAN engines. The new piping shall be run in 1" sch40 CRES piping utilizing pipe bends versus fittings as much as possible. At the ends of the pipe or where absolutely needed, connections shall be welded, no direct threading of the pipe is allowed. As an example, at the connections to the new 1" sch40 pipe for the hoses the CONTR shall weld couplings on either end to connect the valve and hoses to. After the welded coupling threaded fittings are allowed but are to be kept to the minimum required to attached the isolation valve and hose on the fuel filter outlet and the hoses on the engine supply line.

The new piping shall be run down the right-hand side of the engine (as viewed from aft looking forward) in a location that does not affect maintenance access to the engine. In general, the new supply and return piping runs should be routed low, supported every 2' alongside the engine and every 4' elsewhere at a minimum. The piping shall be supported off of the engine girder without effecting the installation of the engine feet on the girder. The supports and piping will not affect the movement of the engine for maintenance or removal, $\pm 2'$. All threaded connections are to be made with high quality thread sealants designed for diesel fuel, bio-diesel and renewable diesel applications in a high vibration environment Whitlam Blue Magic or Rector Seal Tru-Blu. All pipe routing, support, camps, brackets and additional details of installation shall be reviewed and approved by the OWNER prior to installation. All clamp and support bolted connections shall be made with nylock nuts or Loctite Blue 242 to inhibit accidental loosening of the mounting bolts.

The CONTR shall install a new return fuel circuit from the outlet of the engine to the vessels existing fuel tank. Currently there is no fuel return circuit installed for the main engines. The piping run shall be plumbed in $\frac{1}{2}$ " sch40 CRES piping utilizing pipe bends versus fittings as much as possible. At the ends of the pipe or where absolutely needed, connections shall be welded, no direct threading of the pipe is allowed. As an example, at the connections to the return hose from the engine and the check valve at the tank shall be welded coupling connections. After the welded coupling threaded fittings are allowed but are to be kept to the minimum required to attached the hose on the engine return line and the check valve and flange at the tank.

The new piping shall be run down the right-hand side of the engine (as viewed from aft looking forward) in a location that does not affect maintenance access to the engine. In general, the new supply and return piping runs should be routed low, supported every 2' alongside the engine and every 4' elsewhere at a minimum. The piping shall be supported off of the engine girder without effecting the installation of the engine feet on the girder. The supports and piping will not affect the movement of the engine for maintenance or removal, $\pm 2'$. All pipe threaded connections are to be made with high quality thread sealants designed for diesel fuel, bio-diesel and renewable diesel applications in a high vibration environment Whitlam Blue Magic or Rector Seal Tru-Blu. All clamp and support bolted connections shall be made with nylock nuts or Loctite Blue 242 to inhibit accidental loosening of the mounting bolts.

The new connection to the fuel tank for the new return circuit shall be similar to the existing generator return fittings. However, the CONTR is required to gusset and support the welded aluminum pipe and flange. The connection shall be made with a $\frac{1}{2}$ " insert plate beveled to match the existing tank plating with four (4) gussets between the insert plate the and flange to support the piping. The insert plate shall be a 6" diameter at a minimum. All details of the welded connection to the fuel tank shall be reviewed and approved by the OWNER prior to installation.

Any damaged to the SFP and the sheathing in the engine rooms from these removal and installation activities shall be repaired by the CONTR with like materials as part of their bid price.

290 SELECTIVE CATALYTIC REDUCTION SYSTEM

The vessels existing system Selective Catalytic Reduction System (SCR) was designed by Engine, Fuel & Emissions Engineering Inc. (EFEE) of Sacramento, CA (GEMINI) or HUG Engineering USA of Columbus, IN (PISCES, SCORPIO & TAURUS). All old wiring and components not used in the new MAN system shall be removed by the CONTR from the vessel in their entirety. Those components shall be grouped together and provided to the OWNER for disposition. Those components include but are not limited to the following items:

- SCR Mixing / injection tube
- SCR reactor
- SCR Catalyst Modules
- SCR Control System (Delivery control)
- Plc based injection system mounted in cabinet
- Reactant supply unit
- Reactant injector
- Sensors:
 - a. Inlet and outlet NOx sensors
 - b. Inlet and outlet temperature sensors
 - c. Engine Room Display

All extraneous ports from the old SCR systems that will not be used by the new SCR systems shall be capped. All new lagging shall allow access to all capped ports for inspection and testing. MAN and the EPA will require test ports in the exhaust system. It is likely that the existing ports in the system can be utilized for these testing purposes. The CONTR shall verify with MAN/RDI that the final installed piping has the testing ports required installed. The reference drawings in the system installed show the ports that exist. It is the CONTR responsibility to review these ports with MAN/RDI and add any additional test ports required if need be. All added ports shall be of the same materials as the existing exhaust system piping. It is the intent of the OWNER to reuse the existing DEF/UREA piping to the maximum extent possible. Reference the 259.1 section for details on DEF/UREA piping.

298 OPERATING FLUIDS

Upon completion of all work defined in this contract, ALL operational fluids (including fuel **refilled to match arrival condition**) in all equipment shall be topped up with OWNER approved fluids. The Vessel shall be trialed and delivered with 100% of all equipment ready to operate according to manufacturers' recommendations. **All engine fluids shall be provided by RDI as a part of the engine purchase contract for the initial fill. Any subsequent requirements to top up fluids prior to redelivery are the requirement of the shipyard.**

The operational fluids used on the vessel are outlined in Table 298-1.

Table 298-1 Operating Fluids	
Main Engine	Mobile Delvac Multigrade SAE 5W-40 Synthetic
Reduction Gear Oil	Chevron Delo 400 Multigrade SAE 15W-40
Auxiliary Engine Oil	Chevron Delo 400 Multigrade SAE 15W-40
Main Engine and Auxiliary Engine Coolant	Chevron Delo ELC Coolant 50% mixture
Hydraulic System	Chevron Rando HD ISO 46
Selective Catalytic Reduction System	Urea/DEF 30% solution

300 ELECTRICAL SYSTEMS

305 NAMEPLATES AND LABELS – ELECTRICAL EQUIPMENT

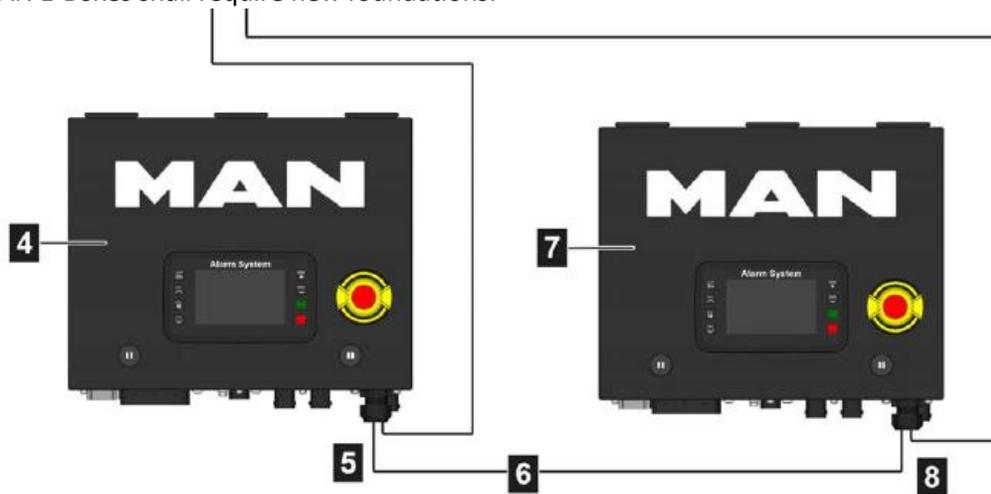
Any new circuits or electrical devices shall be fitted with identifying information. Nameplates shall be fitted on all circuit breakers, distribution panels, shore receptacles, and connection boxes. Nameplates shall show "fed from" and location on all breaker panels. Amperages of breakers shall also be marked.

The CONTR shall update circuit directory cards and panel board cards if any circuits are changed or added.

All nameplates shall be phenolic water proof tags, adhered to the equipment with a permanent marine adhesive, 3M 5200 or approved equal.

313 MAIN ENGINE 24VDC SYSTEMS

The CONTR shall remove the existing main engine starting circuits and controls but shall reuse the power feeds. The existing engine starter power supply cables shall be re-routed to the new starts on the MAN engines. The reference drawings provided detail the new configuration of the 24VDC power feeds for starting and engine controls. The CONTR shall be required to remove the existing Local Operating Panels (LOP) that were provided with the original MTU installations. The CONTR shall install the new MAN E-Box local operating panels in a similar location. It is assumed the new MAN E-Boxes shall require new foundations.



- | | |
|---|--|
| (1) Drive lever 1 | (6) CAN cross-communication |
| (2) Drive lever 2 | (7) E-box, starboard |
| (3) CAN bus terminating resistor | (8) Cable conduit for internal drive lever control unit, starboard |
| (4) E-box, port | |
| (5) Cable conduit for internal drive lever control unit, port | |

*The Gemini class vessels have 3 (three) operating stations

The existing MTU system is supplied power from two surface mounted 50A breakers in each engine room. The remainder of the power distribution is provided for in the MTU LOP's. all of this shall be removed. The new MAN engines and control system internally manage all power distribution from the starting circuit. Reference the MAIN ENGINE CONTROL SYSTEM drawing for details. The OWNER shall measure for all MAN harnesses that are require to be ordered

before the shipyard has taken delivery of the first vessel. The CONTR shall measure all other harnesses required. The CONTR shall provide as built dimensions for harnesses and update the drawing accordingly. The CONTR shall ship check the other vessels in the class to ensure the as built measurements on vessel one are applicable to the rest of the vessels in the class. If there are differences between the vessels the CONTR shall provide an as built harness log for each vessel.

The CONTR shall provide all cables, hardware and other items not provided by the OWNER that are required to complete the installation of the new 24vdc power distribution required by the installation of the new MAN engines and propulsion control system. The CONTR shall be in close communication with RDI Marine so that they know exactly what they need to supply. All main engine and propulsion control cables, wires, harnesses and electrical components shall not be routed, mounted or run with high power AC power cables and components. All wiring shall be routed to run as far as possible from the existing AC cables installed while still residing within the vessels existing main wireways. The new installation of the main engines and control systems shall require new sub wireways to be installed by the CONTR. All wireway routing and new installations shall be reviewed and approved by the OWNER prior to installation.

321 CABLES & CABLE INSTALLATION

The CONTR shall supply and install all cables and wiring not included with the OFE from RDI marine as part of the MAN engine and control system package that are required to fully complete the installations to the OWNER's satisfaction. The CONTR shall install all cables and wiring that are provided with the OFE from RDI Marine for the new MAN main engines and propulsion control systems.

Electrical Components shall have their wiring isolated or shielded from other cables to prevent electrical noise problems. Control, sensing and data cables shall be mounted separately from line power cables. Cables shall be IEEE 45 low smoke marine shipboard type manufactured by Tricab except for specialized data cables that Tricab does not manufacture. Cable containing asbestos or polyvinyl chloride shall not be used. Wiring and cabling shall meet the requirements of USCG and be of sufficient size to sustain enough fault current to trip the circuit breaker's instantaneous trip devices. Power distribution cabling shall be sized for a maximum voltage drop of five percent (5%).

324 SWITCHBOARDS AND PANELS

The CONTR shall install, remove and modify the following power circuits as the reference drawings and MAN requirements. The electrical circuits and motor controllers for the existing air compressor shall be removed as per the 551 section. The electrical feed to the engine block heater shall be modified to connect to the new MAN block heaters in their new location. The CONTR shall purchase the block heaters from RDI for all of the main engines. The existing circuit breaker and wire are more than sufficient to power the new MAN block heaters. The CONTR shall run the MAN block heater harness to the existing J-box for the MTU block heater and make the connections to ships power there. There is currently some connection between the MTU block heater J-Box and the MTU LOP, this circuit will be identified by the CONTR and presented to the OWNER to determine if it will be re-used or removed. Any modifications required to reuse this circuit will be addressed in the change order process. If it is decided to remove this circuit it shall be covered under the scope of this bid.

332 LIGHTING

The CONTR shall budget for moving the after two 2' fluorescent light fixtures in the engine rooms IWO the new SCR system installations. It is assumed the movement of the fixtures shall be limited to relocation of the foundations and local wireways to accommodate the new locations clear of the new SCR's. Any change in wire length would be limited to the one wire between the after two fixtures. The after two fixtures are approximately 4-6' apart. All SFP damaged or disturbed by the relocation of the lighting foundations shall be replaced or repaired to the satisfaction of the

OWNER and the USCG. The final locations and details of the movement, if needed, will be reviewed and approved by the OWNER prior to installation. Costs from this section shall be attributed to the 233 Section.

390 PROGRAM LOGIC CONTROL (PLC) SYSTEM

The currently installed Automation and Control System was designed and installed by Axis Engineering Services (AES). The CONTR shall contract with AES for all changes to the vessels installed automation system required by the new engine installations. The changes to the PLC program and HMI shall be limited to those that are tied to items that are changing with the new main engines such as run signals and voltage monitoring. Additionally, AES shall be required to re-wire and re-program the vessels VFD's on the engine room ventilation. The reconfigured system will come onto low speed when the engine room fiddley switch is closed and transition to high speed when the engines are started. The CONTR, AES and RDI Marine will be required to outfit the engines with an engine run signal for use by the VFD's. The current wiring for the engine run signal comes from the MTU LOP's and will have to be connected to the new source of the run signal. RDI Marine will provide the best solution that will be covered under their warranty which is assumed to be an engine mounted oil pressure switch. All interposing relays and wiring that is required to complete these modifications shall be designed by AES with AS-BUILT vessels drawings provided. All other changes to the Automation and Control System shall likewise be AS-BUILT by AES.

Axis Engineering Services.

Bruce Sommers

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400 COMMAND AND MONITORING

410 PILOTHOUSE

The CONTR shall remove all existing MTU electronics, hardware, cables and wiring that are not being reused as part of this repower. The removed items include, but are not limited to the following items:

- 2 each Electronic Display Modules in the centerline helm position
- 3 each throttle and gear control dual function binnacles
- 4 each analog tachometer at the wing stations
- MTU harnesses and cabling under the dash

The existing start, stop and E-stop buttons are being reused and therefore the main MTU terminal strips used for connections will be reused to connect the existing pilot house start, stop and E-Stop wiring to the new MAN E-Boxes in the engine rooms.

Where items are removed from the dash the CONTR shall make adapter plates to adapt to the new electronics installed in their place if they are smaller in any dimension than the existing holes. If any obsolete MTU components are not being replaced the hole in the dash shall be covered with a fabricated cover plate. All cover/adapter plates are to be fabricated from 1/8" minimum thickness aluminum and powder coated with flat black high quality marine grade coating. All cover/adapter plates shall be aesthetically pleasing with shapes that offer alignment (either parallel or perpendicular) with surrounding equipment with equal reveal and gaps. All edge cuts shall be sanded smooth and hard corners radius for a professional appearance. All mounting hardware shall be countersunk allen head CRES hardware.

If any of the installations require cutting new larger holes in the dash face the layout shall be reviewed prior to cutting. Any new holes shall be esthetically pleasing with shapes that offer alignment (either parallel or perpendicular) with surrounding equipment with equal reveal and gaps. All edge cuts shall be sanded smooth and hard corners radius for a professional appearance. All details that have to do with installations, removals and repairs to the pilot house dashes shall be reviewed and approved by the OWNER prior to installation.

500 AUXILIARY SYSTEMS

505 GENERAL PIPING REQUIREMENTS

All piping shall conform to USCG requirements for strength, materials, testing as well as 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 and passageways. 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.

Copper tubing is not permitted in sea water systems, and copper nickel piping shall be isolated from hull fittings. Water systems shall be constructed using the same material for piping and fittings throughout the system.

All piping system fasteners shall be 316-stainless steel.

All valving, fittings, and fasteners shall be high quality marine grade materials. Pot metal or nickel-plated components shall not be used.

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

All valves shall be high quality, quarter-turn butterfly or ball style unless required otherwise by regulatory agencies. Valves in seawater systems shall have highly corrosion resistant discs and stems i.e. Monel, Inconel, Hastelloy or equal. All piping shall be 100% isolated from the hull for galvanic protection. Testing to be performed with a multimeter in the presence of the OWNER. The CONTR shall ensure all valves handles rotate in the same direction (e.g. clockwise to close or vice versa).

All check valves shall be 100% 316 stainless steel.

Where contact between hoses and anything is possible the hoses shall be fitting with chafe protection EPHA Brand, Orange size and length to suited to adequately protect the hose. All hose routing, length and protection shall be reviewed and approved by the OWNER.

513 MACHINERY SPACE VENTILATION

The CONTR shall be responsible to investigate and tune the ventilation system operation to ensure it matches the WETA and MAN requirements to pass sea trials. AES has done this on previous vessels. The scope of work includes verify proper high speed and low speed settings, modify switching between high and low speed with engine run signals and switches as described in the 390 section of these specifications.

551 COMPRESSED AIR SYSTEMS

The CONTR shall remove the existing air compressor, all electrical and piping associated with the installed compressed air systems on the boat. The compressed air system on the boat was installed specifically for the older SCR systems and is not required for the new MAN SCR system. The electrical circuits shall be removed from the vessel and the current circuit breaker shall be re-labeled as a "SPARE". The existing Motor controller shall be removed from the switchboard and delivered to WETA as a spare unit

555 FIRE EXTINGUISHING SYSTEMS

The CONTR shall adapt the vessels existing fixed fire suppressions system to the new main engines and SCR arrangement in the engine rooms. The system piping currently runs down the centerline of the engine room but is different between the two production runs of vessels. On the GEMINI and PISCES, the FM200 bottles are in the lazarettes and run from aft forward to about frame 9. The piping forward of WTBLKHD 5 will have to be offset to the inboard side IWO the new SCR installations. The final arrangement of the offset piping shall be reviewed and approved by the OWNER prior to any work taking place.

For the purposes of estimating the CONTR should assume the piping will be offset with 2 each 45° threaded sch80 galvanized elbows and 2' of straight 1-1/2" sch80 galvanized piping meeting the requirements of the original system drawings. The original section of 1-1/2" piping should be able to be shorted and reused. The CONTR shall be responsible for all piping modifications, foundations movement, piping supports, SFP repairs and recertification by USCG.

As soon as possible after the first vessel, PISCES, enters the shipyard and the actual piping offset can be determined the CONTR shall submit this data to Global Fire and Safety (GFS) to re-run the flow calculations and determine if any orifices need be changed. Any changes to orifice plates or nozzles will be addressed in the change order process. The CONTR shall update the PISCES and GEMINI FM200 system drawings and submit them to the USCG with the updated calculations from GFS for approval. The TAURUS and SCORPIO shall only require the adaptation of the engine shut down circuits, no changes to the FM200 piping are assumed.

The system existing engine shut down circuits will be adapted to provide the USCG required shut down of the main engines, generators and ventilation systems. The CONTR shall contract with GFS for re-certification of the entire engine shut down and fire suppression system after completion of the work but prior to any sea trials.

Global Fire & Safety

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561 STEERING SYSTEMS

The CONTR shall modify the vessels existing hydraulic steering system for the new location of the hydraulic pump drive. The existing pumps are driven off of PTO's on the MTU main engines. As part of the 233 section the CONTR will have the existing ZF3050 gears retrofitted with PTO drives to support the existing hydraulic pumps. The pumps will be moved from forward left hand side of the engine to aft of the gearbox on centerline.

The CONTR will be required to modify the piping runs to account for the new location of the hydraulic pumps with the new engines. The routing of the Suction, Pressure, Case Drain and Load sensing lines shall be reviewed and approved by the OWNER prior to installation. Currently the Load Sensing lines are not shown on the system drawings. Assume the Load Sensing lines are ¼" -4 tubing and fittings for estimating purposes. The routing of the new lines shall be as direct as possible with the fewest elbows while allowing for routing to locations that do not affect equipment access or operability. When possible, pipe or tuning bends shall be used instead of elbow fittings to reduce pressure losses.

All piping details shall be as per the original installation except that all piping and fittings are to be stainless steel, 304 or 316 grade CRES. The original vessel drawings indicate stainless steel piping with steel fittings, the steel fittings were never installed, only CRES components were used in the system. No calculations are required as all of the piping runs are being drastically shortened from their current configuration. All line sizes shall remain the same as they currently are. The only change to the current system design, other than re-routing the lines for the new pump locations, shall be to add an 1/8" needle valve to the pressure line from the pump at or near the manifold on the hydraulic tank. The 1/8" needle valves shall be used for hydraulic oil sampling and shall be labeled as such. The valves shall be Swagelok or equal and shall be capped for safety.

Before the vessel is removed from the water the CONTR shall take hydraulic oil samples after the system has been running and the oil is up to temperature. Currently the only location that a sample can be taken from is from the bottom of the hydraulic tank in each engine room. To ensure a clean sample the CONTR shall drain 0.5-1 gallons of oil from the system prior to taking the samples. These samples will be sent to Blue & Gold Fleet so they can be analyzed by their laboratory. Send Samples to:

Frank Hernandez
670 W. Hornet Ave.
Alameda, CA 94501

The results of these samples will be shared with the shipyard and used to compare with post work/pre-sea trial samples to ensure the system has been cleaned. As part of this scope of work the CONTR shall clean the hydraulic head tanks and clean all new and existing hydraulic system lines prior to refilling the system. The CONTR shall use a foam plug cleaning system or approved equal to ensure the lines have been adequately cleaned. The hydraulic head tanks are located on the aft engine room bulkhead soft patches that are required to be removed to remove the engines. While the tanks are removed and all of the system lines are open, they shall be cleaned. The head tanks shall be made available for inspection by the OWNER prior to reinstallation after they have been cleaned.

Filling of the hydraulic system shall be with the approved oil in the 298 section. All filling equipment, piping and hoses shall be clean and provided to the OWNER for inspection prior to filling. The first 1 gallon of oil shall be pumped into a bucket in the engine room in the presence of the OWNER to ensure the lines are clean and free of debris. Should debris and contamination be present in that first gallon the CONTR shall continue to pump oil into clean buckets until the cleanliness is verified by the OWNER.

Once the system has been filled all lines shall be bled to ensure all air is out of the system. The suction and pump cases have to be flooded with new clean oil prior to starting the new main engines. Standby pressures and working pressures shall be verified on dock trials.

All costs associated with the 561 section shall be attributed to the 233 section in the schedule of values.

600 OUTFITTING

622 FLOOR PLATES AND GRATINGS

The CONTR shall modifications to the vessels engine room deck plates to address the changes with new engines. The aft deck plates around the gearbox may need some adjustment to account for the new location of the hydraulic pump. The exact interaction of the hydraulic pump and the deck plates is not known. Where they interfere the deck plates will be cut back just enough to clear the hydraulic pump and hoses with 0.5-0.75" of clearance for movement. If cutting of the deck plate compromises the structural integrity of the deck plate additional structure shall be added to ensure the as cut deck plate does not flex unacceptably.

Currently the vessel has a deck plate that traverses over the top of the engines approximately over the middle of the engine transversely. The new exhaust outlet will preclude the use of this deck plate. The CONTR and the OWNER will determine a new deck plate configuration mounted to the inboard side shell of each hull above the engines. The new deck plate will be attached to the frame rider bars and shall be hinged or easily removable for maintenance. Connections used to make the deck plate removable shall be made with tee handled ball lock pins 3/8" diameter stainless steel with the length to suit. The tee handle ball lock pins shall be supplied with lanyards attached to ships structure to ensure they do not get lost, McMaster-Carr #93750A515 or equal with length adjusted to suit the installation details. The deck plates shall be similar in design and construction to the existing vessel 3/16" 6061 diamond tread plate with 6061 angle framing with structural supports to suit. The CONTR and the OWNER will determine new ladder/stairs at the fwd and aft end to gain access to the new inboard raised over engine deck plate.

At the front of the new main engines there will be a 30" longitudinal gap between the new smaller MAN engines and where the existing deck plate stopped for the old larger MTU engines. The CONTR shall extend the deck plate in this area to close the ~30" long by full width hole. The new deck plate shall be the same design and construction as the existing deck plates with access hatches add as needed for valves or critical equipment. Access hatches shall be similar to existing with piano hinges and finger holes for opening. All sharp edges on plate edges and finger holes shall be softened for crew safety.

After all equipment has been installed and piping run the as modified deck plates shall provide an equivalent level of safety to the existing installation. This section describes as best possible the known deck plate modifications needed. However, given the complex interactions between equipment, piping, wiring and structure in the machinery rooms it is likely that small deviations from these descriptions will be required after review by the CONTR and the OWNER to determine the final details of the modifications and installations.

631 PAINT & COATINGS

The CONTR shall provide the coating services as per these specifications. All coating systems shall be legal in the State of California. All surface preparation and painting shall meet the requirements of the paint system manufacturer, including temperature and humidity requirements, dry film thickness, and curing time between coats.

Paint performance, including but not limited to antifoulant performance, shall be fully warranted by the CONTR.

631.1 EXTERIOR PAINT - KEEL TO BOOT-TOP

The CONTR shall apply a new foul release coating system to the underwater body and boot-top. The foul release coating system shall consist a minimum of two (2) spot coats of anticorrosive epoxy primer, one (1) spot coat of antifouling, overcoated with one (1) full coat of antifouling. All four (4) coats shall be of a contrasting color as per table 631-1. The

SSPC-3 preparation requirement shall apply to all areas where coatings are damaged or not tight such that the SSPC-3 power tool cleaning shall prepare those areas to bare metal with an acceptable profile free of all visible dust dirt, oxides, chlorides, loose coatings and other foreign matter to the satisfaction of the OWNER and the paint manufacturer's requirements. All details, products and atmospherics shall be reviewed and approved by the OWNER and the coating system Manufacturer.

Table 631-1 Keel to Boot-Top				
Surfaces to Be Preserved	Surface Preparation	Coating System	DFT (mils)	Color
Hull Underwater Body to Boot-top	High pressure wash 3-4k psi. SSPC-3 with 36grit and SSPC-1 solvent wash post SSPC-3 as per manufacturer's requirements.	1) INTERSHIELD 300V-Spot Coat	5.0-6.0	Bronze
		2) INTERSHIELD 300V-Spot Coat	5.0-6.0	Aluminum
		3) INTERSPEED 5640-Spot Coat	5.0	Red
		4) INTERSPEED 5640-Full Coat	5.0	Black

631.2 EXTERIOR PAINT - BOOT-TOP AND UP

The CONTR shall repair all coatings damaged as part of the engine and exhaust system installations. The four (4) vessels in this class are a mix of vinyl films and paint. The GEMINI, PISCES & TAURUS have 3M Vinyl film coating the areas above the waterline except for the areas that are black, those areas are a mixture of paint and vinyl. If the CONTR wants to know exactly which vessels have their black paint a detailed ship check by the CONTR will be required. The SCOPRIO is 100% painted above and below the waterline. The CONTR shall crop out and repair all coatings that are damaged by welding or other means as per the tables below. The SSPC-3 preparation requirement shall apply to all areas where coatings are damaged or not tight such that the SSPC-3 power tool cleaning shall prepare those areas to bare metal with an acceptable profile free of all visible dust dirt, oxides, chlorides, loose coatings and other foreign matter to the satisfaction of the OWNER and the coating manufacturers requirements. All details, products and atmospherics shall be reviewed and approved by the OWNER and the coating system Manufacturer. ~~The 3M ElectroCut Vinyl film called out may be obsolete, the CONTR shall supply to the OWNER the marine grade vinyl film to be used for review and approval. The submission shall be accompanied by a letter of recommendation from the manufacturer or their representative for that film in this application. All vinyl repairs shall as best possibly overlap to provide the best water proof membrane. The top shall lap over the bottom, the forward side shall lap over the aft side.~~

The CONTR shall repair all damaged vinyl films with paint as per table 631-2. All damaged vinyl areas shall be cropped out to clean geometric shape before paint is applied.

Table 631-2 Boot-Top and Up				
Surfaces to Be Preserved	Surface Preparation	Coating System	DFT (mils)	Color

Hull Boot-top and up PAINT	High pressure wash 3-4k psi. SSPC-3 with 36grit and SSPC-1 solvent wash post SSPC-3 as per manufacturer's requirements.	1) INTERSHIELD 300V 2) INTERSHIELD 300V 3) INTERTHANE 990HS, 990W37R/A1gl Or INTERTHANE 990HS, 990W37U/A1gl Or INTERTHANE 990HS, 99037T/A1gl Or INTERTHANE 990HS, TBD Or INTERTHANE 990HS, TBD	5.0 5.0 5.0 5.0 5.0 5.0 5.0	Bronze Aluminum Dark Blue Light Blue Green White Black
Hull Boot top and up VINYL	Cut out damaged vinyl film, clean and solvent wiper as per 3M Application Instructions for Watercraft, Instruction Bulletin 5.42.	3M ElectroCut Graphic Film #225-20 3M ElectroCut Graphic Film #225-12 3M ElectroCut Graphic Film #225-57 3M ElectroCut Graphic Film #225-37 3M ElectroCut Graphic Film #220-196	N/A	Gloss White Gloss Black Olympic Blue Sapphire Blue Apple Green

631.5 PIPING - THRU-HULLS & SEACHESTS

All inlet pipes, stern tubes and rudder tubes are coated with Blue Seal epoxy coating system and antifoulant as per Table 631-5. The seachests are coated with epoxy AC and AF as per table 631-5. The Blue Seal coating systems shall be applied to the inside of the piping and over the flange faces to protect the aluminum flanges from corroding/eroding. If the CONTR is concerned about valve sealing they are encouraged to build up the Blue Seal system with their reinforcement coat to build up thickness and then sand flat prior to applying the top coat. It is of principal importance that the coating system extends across the full sealing surface of the flange face.

The CONTR shall only be required to repair loose or damaged coatings in these areas with the one full top coat of AF as per the table below. Where damaged or loose coatings exist in the thru-hulls and sea chests they shall be prepared with hand power tools, SSPC-3. The SSPC-3 preparation requirement shall apply to all areas where coatings are damaged or not tight such that the SSPC-3 power tool cleaning shall prepare those areas to bare metal with an acceptable profile free of all visible dust dirt, oxides, chlorides, loose coatings and other foreign matter to the satisfaction of the OWNER and the coating manufacturers requirements. All details, products and atmospherics shall be reviewed and approved by the OWNER and the coating system Manufacturer.

Table 631-5 Thru-hulls & Seachests				
Surfaces to Be Preserved	Surface Preparation	Coating System	DFT (mils)	Color
Blue Seal Thru-hulls	High pressure wash 3-4k psi. SSPC-3 with 36grit and SSPC-1 solvent wash post SSPC-3 as per manufacturer's requirements.	1) Basecoat-Spot Coat 2) Reinforcement coat -Spot Coat 3) Topcoat-Spot Coat 4) INTERSPEED 5640-Spot Coat 5) INTERSPEED 5640-Full Coat	10.0 AR 10.0 5.0 5.0	Blue Gray Blue Red Black
Seachests	High pressure wash 3-4k psi. SSPC-3 with 36grit and SSPC-1 solvent wash post SSPC-3 as per manufacturer's requirements.	1) INTERSHIELD 300HS epoxy-Spot Coat 2) INTERSHIELD 300HS epoxy-Spot Coat 3) Antifoulant, Non-Copper-Spot Coat 4) Antifoulant, Non-Copper-Full Coat	5.0-6.0 5.0-6.0 5.0 5.0	Bronze Aluminum Red Black

633 CATHODIC MONITORING SYSTEM

The CONTR shall remove and replace the existing Cathodic Monitoring systems reference cells for the Electro-Guard 125A metering system in each hull. The reinstalled reference cells shall be checked in the presence of the OWNER to ensure they are not grounded to the hull through their mounting hardware.

633.1 ANODES

The CONTR shall provide a Conditions found report to the OWNER on the Anode condition after high pressure water washing. Replacement of the anodes shall be addressed in the change order process if required.

The CONTR shall use nylock 316SS nuts and 316SS bolts to secure the anodes in place. Ensure that all paint is completely removed from the mounting surfaces in order to provide proper conductivity between the anode and the vessel hull. Anodes shall be tested for proper continuity with the vessel hull in the presence of the OWNER prior to undocking.

635 INSULATION

The CONTR shall renew the lagging on the portions of the exhaust system run that are new from each main engine to the mufflers. The new sections that require new lagging include but are not limited to the following areas:

- Engine collector flange to SCR's
- The SCR's
- From the SCR's the connection to the existing riser just above the the main deck
- The new Wye pipe that will replace the old SCR on the 02 deck

The lagging shall consist of a multi part system made up of:

- A silicon/fiberglass outer cloth (Alpha Maritex Style #3259-2-SS)
- A two (2) inch temperature mat
- A high temperature inner cloth (Alpha Sil Style 600)
- A knitted stainless-steel wire tubular fabric (Alpha Maritex #91160) which is in direct contact with the pipe wall.

The CONTR shall replace all insulation that is damaged or disturbed by the removal of the old and the installation of the new SCR's and exhaust systems. All insulation that is repaired shall be repaired with matching materials provided in the reference drawings.

800 MANAGEMENT AND 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. All 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 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 Gemini Class vessels.

810 DESIGN & ENGINEERING

All drawings shall conform to the Ship Work Breakdown Structure (SWBS) numbering system as established in these TECHNICAL SPECIFICATIONS.

The CONTR shall provide all ~~Contract Design, Detail Design and~~ Production level engineering services necessary for the work in accordance with the Specification. Services shall include ~~technical calculations, surveys, material selection, preparation of diagrams, sketches, schedules, and~~ preparation of all production drawings **required by the CONTR and**, as-built drawings and all USCG approvals **as required, see table 810-1 for further clarification.** The **production As Built** engineering services shall only be provided by qualified engineering resources.

All drawings shall be submitted in electronic formats as Adobe® Acrobat .pdf version of the AutoCAD files as well as .dwg versions. 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 11 x 17 inches.

All data created from this project shall be provided to and reviewed by the OWNER, including all information provided to USCG. The CONTR shall be responsible for taking progress meeting minutes and emailing a brief synopsis of each meeting including all decisions made and any action items including the party responsible for the item.

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. Drawings that include systems with plumbing that is not 100% detailed shall include a material schedule table in the drawing. The material schedule table shall provide the shipyard with all the guidance necessary to procure parts and plumb the system indicated. Drawings shall show enough detail 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, and NEMA, as appropriate.

Table 810-1 Engineering Matrix					
SWBS	Description	Contract Level	Production Engineering	As-Built	USCG Submission
233	Propulsion Engine Install Drawing	WETA	Yard Preference	Major Changes only	WETA Submitted, No additional submissions needed
252	Control QFA & DVTP	WETA	N/A	Yes, Each Vessel*	WETA will submit procedures for approval, CONTR will submit tests and results as witnessed by OCMI each vessel.
256	Engine Cooling System	WETA	Yard Preference	Yes, Each Vessel*	Contract Drawing submitted, As built only if there are changes related to regulatory
259	Engine Exhaust System	WETA	Yard Preference	Yes, Each Vessel*	Contract Drawing submitted, As built only if there are changes related to regulatory
259.1	DEF System	Pending	Yard Preference	Yes, Each Vessel*	Contract Drawing will be submitted, As built only if there are changes related to regulatory
261	Fuel System	WETA	Yard Preference	Yes, Each Vessel*	Contract Drawing submitted, As built only if there are changes related to regulatory
313	Main Engine DC & Control System	WETA	Yard Preference	Yes, Each Vessel*	Contract Drawing submitted, As built only if there are changes related to regulatory
324	AC Electrical	N/A	Yard Preference	Yes, Each Vessel*	As built only if there are changes related to regulatory, Assume local USCG approval
390	PLC Systems	N/A	Yard Preference	Yes, Each Vessel*	No
555	Fixed Fire Extinguishing System	N/A	Yard Preference	Yes, Each Vessel*	Yes if Global Fire & Safety and OCMI require it
561	Hydraulic Steering System	N/A	Yard Preference	Yes, Each Vessel*	As built only if there are changes related to regulatory, assume local OCMI approval of piping mods
833	Weight Control	WETA	Yes	N/A	Yes, submit to USCG on weights off and on for regulatory
843	Lightship & Stability	N/A	Lightship Survey Procedure	Survey & stability	Yes, approve survey procedure, Lightship and Final Stability

The OWNER will review the CONTR's ~~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 are 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 initialed 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 may be more informal but the status of the drawing will be made clear to the OWNER prior to reviewing. 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. **Calculations shall only be required for approved material deviations and major system arrangement changes that warrant supporting calculations.** ~~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 OWNER 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 terminations and equipment data matching the drawing BOM's.

820 TECHNICAL DOCUMENTS

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

- A complete set of all As-Built drawings for the vessel in .dwg version on USB Flash Drive
- Manufacturer's drawings and schematics – minimum one (1) copy in .dwg version on USB Flash Drive
- Vendor and sub-CONTR drawings – minimum one (1) copies in .dwg version on USB Flash Drive
- Machinery, equipment and parts manuals – minimum two (2) copies of each document.

The manufacturer's standard installation, operation and technical manual documentation which are provided with all the equipment shall be provided. All documentation shall be on hard copy and an identical electronic format as Adobe® Acrobat .pdf version on USB Flash Drive.

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 OWNER will be furnishing the new MAN D2862LE489 main engines, their emissions control equipment and MAN's iSea Propulsion control system for all four (4) vessels in the class. Any questions on the exact scope of supply can be answered by RDI Marine of Seattle Washington

RDI Marine

Brian Cook

bcook@manengines.com

(206) 286-1230

2225 West Commodore Way

Seattle, WA 98199

830.1.7 "Or Equal" Material

Where a specific vendor, brand name and/or model is required by the Contract design package the indicated brand name shall be provided unless OWNER approval of an "or equal" is obtained. To request OWNER approval of an "or equal", 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 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" 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". 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”. The OWNER’s determination shall be considered final. For use of an “or equal” to be considered approved, it must have the unambiguous written approval of the OWNER. The OWNER’s approval of an “or equal” allows the CONTR the option of procuring that item or services. In each case where the request is disapproved by the OWNER, the CONTR shall provide the specified vendor or 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”, over and above the cost of the originally specified, 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”. The OWNER shall not be responsible for any delay resulting from a substitution request.

833 WEIGHT CONTROL

The CONTR shall minimize weight growth during the contract work. 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). 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. Weight growth or migration shall be brought to the attention of the OWNER. CONTR invoices shall not be paid unless the updated BWE has been submitted for the most current month.

The initial BWE has been submitted to the USCG for a Lightship Change Determination. The BWE shall show the percentage change in the vessel’s lightship displacement and centers of gravity. The preliminary weight estimate indicates the vessels will get approximately 4% lighter which will require the CONTR to provide a new lightship survey and updated USCG subchapter K Compliance stability calculations.

835 DRYDOCKING

Following delivery to the WETA facilities in San Francisco Bay, the CONTR must arrange at its expense for the subject vessel to be drydocked in the San Francisco Bay area if the operation, machinery or running gear related vibrations have significantly changed during the delivery of the vessel from outside the San Francisco Bay Area. The drydocking operation shall include having the underwater appendages examined, bottom cleaned, and any damages from delivery repaired. Bottom paint anti-fouling shall be touched up, if damaged during delivery and anodes inspected. Sea chests shall be opened for examination and cleaning if the deficiency is cooling system related. 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 periodic under water inspection requirements and witnessing the corrective actions to address the faulty conditions that required the dry docking.

All costs associated with this drydocking shall be borne by the CONTR.

836 PRELIMINARY ACCEPTANCE, SURVEY & TRIALS

Prior to Re-Delivery of each vessel, the CONTR shall conduct a Preliminary Acceptance Survey and Preliminary Acceptance Trials for each vessel at or near the CONTR's facilities. The OWNER will issue Preliminary Acceptance when all of the following requirements are fulfilled to the OWNER's satisfaction:

- A. Allowing for a small quantity of minor deficiencies (see below), all physical work is 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 (MAN) 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 is complete, 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 and MAN.
- F. Any prerequisite tests to Preliminary Acceptance Trials and/or Preliminary Acceptance is complete, with results demonstrating compliance with the Contract, and approved by the OWNER.
- G. Correction of all known deficiencies including deficiencies that develop or are identified after Preliminary Acceptance Trials.

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 on each vessel, testing and clean-up provided for under the Contract. The Preliminary Acceptance Survey shall precede the Preliminary Acceptance Trial for each 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 each Vessel Delivery (see below), each Vessel with the contract scope of work completed and presented is acceptable to the OWNER.

A Preliminary Acceptance Survey for each Vessel shall be a prerequisite to the Delivery of each Vessel to the OWNER's location.

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 subject Vessel is complete; the form, fit and function of installed materials are satisfactory, and the subject 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 and Trials for each 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 the Final Acceptance Trials of the Vessel, and which discrepancies, if any, may be deferred for accomplishment after Final 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 related to the contract scope of work or conditions the CONTR created during the scope or work, 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 related to the contract scope of work or conditions the CONTR created during the scope or work.

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.

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.

837 FINAL ACCEPTANCE, SURVEY & TRIALS

Following successful completion of Preliminary Acceptance Survey and Trials for each vessel, issuance of Preliminary Acceptance, and Delivery, the CONTR shall conduct Final Acceptance Trials on each vessel. The OWNER will issue Final Acceptance when the following requirements are fulfilled to the OWNER's satisfaction:

- USCG Sector approval.
- The Final Acceptance Survey described herein is completed, with the results supporting a conclusion by the OWNER that each Vessel is complete, clean, free of deficiencies, and in compliance with the Contract to the satisfaction of the OWNER.
- Final Acceptance Trials are completed.
- Final Acceptance of the fourth (4th) vessel will be conditional on the Final Acceptance of all previous vessels.

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 Final Acceptance.

If the Final Acceptance Trials and Final Acceptance Survey reveal only minor defects or deficiencies that WETA determines do not prohibit it from placing the subject Vessel in revenue service, then WETA may at its sole discretion place the Vessel into revenue service prior to Final Acceptance. Alternatively, WETA may at its sole discretion Finally Accept the subject Vessel, in which case OWNER will provide CONTR with written notice of unsatisfactory or incomplete Work which must be corrected or completed prior to Completion of the Warranty Period, Section 952. Correction of discrepancies, if any, may be deferred until after Final Acceptance Trials, but before Completion of the Warranty Period. In connection with this notice, it must be recognized that under the terms of the Contract, the CONTR is required to deliver a completed Vessel that is free of all deficiencies related to the contract scope of work or conditions the CONTR created during the scope or work, 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 related to the contract scope of work or conditions the CONTR created during the scope or work.

WETA will certify Final Acceptance by issuing Contractor a Certificate of Final Acceptance for each vessel.

Following Final Acceptance, the completed Vessel shall be turned over to WETA's Operator in Vallejo, California. The CONTR shall fill all fuel tanks, top up all fluids, and present a vessel ready and fit for service to WETA.

Final Acceptance Payment for each vessel against the Contract shall be made by the OWNER within 30 calendar days of the OWNER's issuance of a Certificate of Final Acceptance for the subject vessel.

840 TESTING AND QUALITY ASSURANCE (QA)

The CONTR shall implement a complete and thorough testing and quality assurance program. The purpose of this program is to ensure that all workmanship is satisfactory, all equipment has been properly installed, all systems are functioning properly, and 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.

Measurements of shaft diameter and radial run-out shall be recorded. The CONTR shall align the shafts to reduction gears and main engines.

In the presence of the OWNER, all new 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, switchboard 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 shall manage and approve the installation of the various interior sub-CONTRs and will review and coordinate approval

with the OWNER of all interior samples. The CONTR shall also be responsible for verifying proper operation of various equipment and systems including appliances, lighting, and sanitary systems.

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 (72) 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 System Testing and after correction of all defects by the CONTR to the satisfaction of the OWNER, the CONTR shall begin Vessel Testing.

840.1 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.

841 TESTING AND 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 successful CONTR shall provide a Master Test Plan and Index for OWNER's approval before agreement signing. No less than ten (10) days prior to beginning any test, the CONTR shall provide test procedures to the OWNER for approval.

Tests shall be conducted to the requirements and satisfaction of the OWNER, classification society inspector, and USCG Officer in Charge Marine Inspections (OCMI) and shall consist of the following phases:

- Factory Acceptance Testing
- Quality Assurance & Component Testing
- Dock Trials (System Testing), see Section 982.1
- Sea Trials (Vessel Testing), see Section 982.2

Following completion of Sea 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's Representative can require the CONTR to check all the instruments, gauges and thermometers, whether ship or test instruments, used on the test in question.

The CONTR is responsible for all costs associated with all testing and trials. IF for any reason, additional sea trial(s) are required due to CONTR or vendor issues, the CONTR shall be responsible and bill vendor directly.

841.1 TRIALS CONDITION

90% tankage of fuel, potable water and sewage shall be on board prior to getting underway for the sea trial.

843 STABILITY

~~The CONTR shall provide equipment and assistance to the OWNER for the completion of~~ complete a lightship survey after the completion of all installation activities just prior to dock trials. The lightship survey shall take place early in the morning at the CONTR facility when the weather is clear and there is little to no wind. The CONTR shall coordinate with the USCG so they can be present while taking freeboard measurements and documenting the vessels condition for the lightship survey. The CONTR shall provide a small skiff for use in taking freeboard measurements. All personnel will be off the vessel while the lightship survey is taking place. All materials, equipment, tools, lights, extension cords, garbage, dunnage and other items belonging to the shipyard that are not going to be installed on the vessel shall be removed from the vessel prior to the lightship survey. The CONTR shall ensure that the vessels tanks are in the following condition for the lightship survey:

- Fuel Tanks Full
- DEF Tanks Full
- Water Tank Full
- Sewage Tank Empty
- Hydraulic Tanks Full
- Engines full of fluids

860 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 this RFP, 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.

In determining the cause of the defect, the Contractor must perform such investigations and tests as WETA may require to determine the cause, and to verify that such redesign, repairs, and replacements comply with the requirements of the Technical Specification. All costs associated with such investigation, redesign, repair, replacement and testing, including, but not limited to, the removal, replacement, and reinstallation of equipment and materials necessary to gain access, will be borne by the Contractor. Should the Contractor fail to promptly make the necessary investigation, redesign, repair, replacement, and test, WETA may perform or cause to be performed the same at the Contractor's expense.

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.

In the event that a warranty claim implicates an underwater deficiency, the cause of which cannot be determined without drydocking the Vessel, the Contractor is responsible for the cost of drydocking as part of its obligation to determine the cause of a failure or defect. Provided, however, that WETA will pay for all drydocking costs associated with regular maintenance pursuant to its normal drydocking schedule.

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 remedying 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 CONTR's 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. Further, Contractor is responsible for damage to or failure of any part of the Vessel that may be caused, directly or indirectly, by a deficiency subject to this warranty.

On Site Repair Permitted. Subject to the approval of WETA, Contractor personnel may use WETA facilities and special equipment to perform warranty work, provided that such work does not interfere with other WETA activities, and is performed in accordance with WETA policies and directions. WETA will designate which facilities and equipment may be used, and the schedule thereof. WETA reserves the right to require the Contractor for expensed incurred using WETA facilities and equipment. If WETA in its sole discretion determines that its facilities or special equipment cannot be made available, Contractor will be responsible for obtaining its own facilities and special equipment at Contractor's cost. Damages to WETA's property caused by the Contractor, or its subcontractors or suppliers, will be the sole responsibility of the Contractor, and will be corrected at the Contractor's expense.

Use of WETA Spare Parts. At the sole discretion of WETA, as determined on a case-by-case basis, WETA owned spare parts may be utilized by the Contractor for correction purposes. The Contractor must replace each borrowed part with a new part within thirty (30) calendar days. All costs associated with replacing the spare parts will be borne by the Contractor.

Back Charge. If WETA determines, in the reasonable exercise of its discretion, that immediate repairs or replacements are essential to keep a Vessel in service, WETA may make any such repairs and charge the costs to the Contractor. WETA will give prompt notice to Contractor or its determination to conduct any repairs and will provide documentation of the deficiency, the action taken, and the costs that the Contractor must reimburse WETA. Contractor will reimburse WETA within thirty (30) calendar days or provide notice that it disputes the back-charge.

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 each Vessels' 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 ensure completion of the Work within prescribed time (See Sections 941 through 946).

910 MANAGEMENT REVIEW & PROGRESS MEETINGS

The CONTR shall present Management Reviews to the OWNER. The reviews shall be scheduled at least once per week at a location in or near the repair yard and shall be coordinated so that they are held concurrently with the progress

meetings. The first review is to be held within seven (7) 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. OWNER-responsible 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. OWNER-responsible actions that affect the CONTR shall also be included.
- C. Rebuild schedule, issues and status. Actions taken to resolve any issues shall be addressed. OWNER-responsible 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 prepare an agenda and submit the agenda to the OWNER for review, input and comment. The OWNER may comment and provide input for the agenda. OWNER's input shall be provided within one week of receipt of the proposed agenda from the CONTR. The OWNER may also request additional topics for the Management Review and the CONTR shall address those topics as part of the Management Review. A copy of the final agenda and any supporting documentation shall be provided to the OWNER not less than 24 hours prior to each scheduled meeting date.

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 contactors 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 of each vessel, 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.
- H. Delivery and Redelivery windows for each vessel with float allowed for reasonable weather impacts

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. The terms of the Carl Moyer Grant have strict time limits that all work on all vessels needs to be completed by. Failure of the CONTR to complete the work by the Carl Moyer Deadline will result in the loss of grant funds. Should the CONTR not complete the contract scope of work within the Carl Moyer required time frame due to their own negligence the grant funds lost will be the responsibility of the CONTR. The Carl Moyer Deadline is 1st May 2023. For planning purposed the CONTR must plan to have a significant buffer on this deadline. To ensure that the deadline is not missed all proposed plans shall have **all work completed by 2nd January 2023** to provide for a sufficient buffer.

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 fifteen (15) 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 Vessels, 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 Vessels 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 Vessels, and to any Work or material for the Contract, including Change Order Work, on or incorporated into the Vessels until the entire Work for all Vessels has been finally accepted by the OWNER. The OWNER will provide Final Acceptance for each vessel at the completion of the scope of work for each vessel.

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.

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 take delivery and redeliver all of the Vessels 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 for the contract. 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 Delivery of all Vessels as described in Section 945. Failure to complete the Work, submit all deliverables, and deliver the Vessels 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. The CONTR's Change Orders must be submitted in the WETA approved

Change Order Format for this contract. The Change Order template is provided in the contract reference documents, **RFP 21-009 Change Order Detail Worksheet.xlsx**.

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 final Vessel shall be enforced as per the terms of the agreement.

946 TIME IMPACT ANALYSIS

When Contract modifications are initiated by either the CONTR or the OWNER these changes shall be dealt with using WETA's approved Change Order Format for this contract. The Change Order template is provided in the contract reference documents, *RFP 21-009 Change Order Detail Worksheet.xlsx*. The documentation provided by the CONTR shall show the CONTR's estimated labor, materials, subcontractor expenses and markups in sufficient detail so that the OWNER can determine if the Change Order is fair and reasonable. The OWNER is required to validate all contract modifications or change orders with Independent Cost Estimates (ICE). Should the ICE deviate to far from the proposed change order the CONTR shall provide all information required to determine if the ICE is not accurate or if the CONTR's proposal is not accurate. It is not permissible or in any way acceptable for the CONTR to provide change orders not in the WETA approved Change Order Detail Worksheet.

Any contract modifications that propose to change the time of performance have to be justified against the CONTR's resource loaded schedule. If the change in the time of performance is being justified by a limitation to the CONTR's yard wide resources then the CONTR will need to provide documentation of the yards entire resource loaded schedule to prove the limitation. The CONTR cannot prove resource limitation simply by allocating WETA contract resources to a different project at their discretion. The baseline resource loaded schedule will be used to determine if the CONTR has chosen to under resource the project versus being resource limited.

951 FINAL CLEAN-UP

Before the Preliminary Acceptance Survey on each vessel, 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 each 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 on each vessel required by Section 860 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 for that specific vessel 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

The CONTR shall develop, in cooperation with the OWNER, a comprehensive testing and trials plan. The following table outlines the minimum required tests and trials for each vessel:

Required Test or Trial	Location	Purpose	Reference Section
Shipyards Internal QA and Testing Plan	CONTR Facility	Routine and ongoing QA and inspection using the shipyard's standard processes and documentation.	840
Factory Acceptance Tests	CONTR or OEM Facility	Test and verification of certain components and equipment with prior approval from the OWNER.	840.1
Dock Trials	CONTR's Facility	Verification equipment / systems perform satisfactory / establish readiness for Sea Trials,	982.1
Sea Trials	CONTR's Facility	Confirm the vessel meets all requirements and functions properly prior to Delivery.	982.2
Preliminary Acceptance	CONTR's Facility	CONTR states readiness for Acceptance Survey and Delivery	836
Delivery	WETA Facility	CONTR shall deliver vessel to the specified WETA facility in San Francisco Bay	983

Drydocking	San Francisco Bay	CONTR shall dry dock vessel in San Francisco Bay should Delivery related damages warrant it.	835
Final Acceptance	San Francisco Bay	Vessel to be tested to verify post Delivery performance. Acceptance whereby The OWNER accepts the Vessel as satisfying all the requirements of the Contract, except the warranty, and signals start of warranty period.	837

981.1 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's 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 each Vessel to preclude the formation of molds and/or other deleterious substances.

981.2 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.

982 TRIALS

The CONTR shall plan, prepare for, and conduct all required Dock and Sea Trials. The CONTR is responsible for all costs associated with performance of these trials. These trials include all trials required by RDI Marine and the MAN factory for prove the successful installation of the subject engines in each vessel to the satisfaction of RDI Marine, the Man factory, USCG and the OWNER.

982.1 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 on each vessel, the CONTR will present an agenda to the OWNER for review and comment.

Generator start-up, running and testing under load will be completed 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 shall be verified to be functioning properly prior to the start of the contract work. A check list of navigation and communication equipment shall be reviewed between the CONTR and the OWNER. After the completion of the contract work, all navigation and communication electronics shall be verified to be functioning properly. Any discrepancies shall be discussed between the OWNER and the CONTR as to the responsible party for correction.

It will be the responsibility of the CONTR to have all necessary spare parts for their systems (i.e. filters, fuses, gaskets, relays, valves) readily available so as to not delay dock or sea trails if such failure should or does occur and these parts are needed.

As per the 252 Section of these specifications all required automation and propulsion controls testing required by the USCG and MAN shall be completed and document prior to sea trials.

The dock trials will consist of the following (not necessarily all-inclusive) list:

- Weather/water tightness of hatches, windows, port lights, doors, and shell doors.
- Steering gear
- Ventilation and heating system
- HVAC system
- Electrical systems and generators, load tests
- Generator to Generator switching. Shore power to generator switching and vice versa
- Bilge and fire-fighting systems
- Bridge and navigation equipment
- Hydraulic equipment
- Alarm tests for safety systems
- Inspect lifesaving equipment
- Fire shutdown systems for ventilation, valves and required pumps
- Working tests of all machinery
- Complete electrical lighting systems
- Thermographic Survey of electrical installations
- Communication equipment
- P/A and CCTV camera / monitoring equipment
- Navigation equipment that can be pre-tested in port
- USCG Lightship survey and propulsion controls related testing
- Harbor condition noise and vibration level measurements

The shore fuel, sewage and water connections will be separately verified and tested.

982.2 SEA TRIALS

Following completion of dock trials, Sea Trials will be conducted to demonstrate the performance of the Vessel and proper function of new propulsion engines, controls and systems underway. Every effort shall be made to replicate a “working” scenario at sea.

Sea Trials shall be Performance Trials to demonstrate contractual performance and proper functioning of all systems to the OWNER and to RDI Marine and the MAN factory. 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 and vibration 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 (3) 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 Engine Commissioning Trials (all RPM and time intervals required by RDI and MAN)
- Speed Trials (at full range of RPM)
- Ahead Steering (at full speed ahead)
- Astern Operation and Steering (up to maximum safe speed, not to exceed 12 knots)
- Turning Circle (at full speed ahead)
- Zigzag Maneuver (at full speed ahead)
- Auxiliary Systems Testing (underway testing of systems, as required)
- Noise and Vibration Survey (underway portion; see Section 073)
- Navigation and Communications Systems Testing (underway testing, as required; i.e. GPS, depth sounder, RADAR, integration, et cetera)
- Propulsion Control System Commissioning and USCG required testing and verification
 - 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
- SCR Emissions System testing as required by MAN and EPA/CARB

All domestic items that would normally be in use during service conditions are to be run and tested while on the trials, including but not limited to: HVAC, heads and miscellaneous equipment throughout the Vessel to be sure that they function normally under sea conditions.

Additional trials may be required if the conditions are not favorable due to excessive wind or waves.

The CONTR shall be responsible for all costs associated with Sea Trials including provision of crew, fuel oil, lube oil, water provisions, food 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.

983 DELIVERY & REDELIVERY

The CONTR must take Delivery of the Vessels at its shipyard or at one of WETA's San Francisco Bay Area facilities if the CONTR's shipyard is outside the San Francisco Bay Area. CONTR is fully and solely responsible for each Vessel once it takes delivery and until redelivery of each vessel. Upon completion of the work, including the inspection and testing, the OWNER will accept Redelivery of each 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 Deliver from and Redeliver each Vessel to one of WETA's San Francisco Bay Area facilities (as directed by the OWNER) as a condition of completion of the work. All costs associated with the Delivery and Redelivery of all the Vessels to and from one of WETA's San Francisco Bay Area

facilities from outside of the San Francisco Bay Area shall be the sole responsibility of the CONTR. Contractor may not commence Re-Delivery of each Vessel from its location until WETA has approved Preliminary Acceptance at Contractor's location. Contractor may not commence Re-Delivery until WETA has issued an Authorization for Re-Delivery to the Contractor. Re-Delivery will be considered complete after WETA conducts a post-delivery inspection and will be acknowledged by WETA's issuance of a Post-Delivery Receipt.

Re-Delivery does not constitute Acceptance, nor does Re-Delivery include a transfer of any risk of loss or transfer of title. The OWNER will make the vessels available such that the Redelivery crew may also take Delivery of the next vessel if so desired. The CONTR may not take Delivery of more than one (1) GEMINI class vessel at a time unless specifically approved by the OWNER. The CONTR will be required to obtain a Notice To Proceed on each vessel prior to taking Delivery of that vessel. The order of vessel Delivery shall be as follows:

1. PISCES
2. TAURUS
3. SCORPIO
4. GEMINI

The OWNER may require up to three OWNER's Designated Representatives (OR) onboard for all legs of deliveries at OWNER's expense.

The OWNER, at its expense, will Deliver and Redeliver the Vessels 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 Vessels become the CONTR's responsibility upon taking possession of the Vessels from the OWNER at the OWNER's Bay Area facilities. Upon taking possession of the Vessels for Delivery until the Vessels have 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.

Insurance during Delivery and Redelivery. The CONTR retains full responsibility, including risk of loss or damage to the Vessel, until the completion of Re-Delivery. CONTR is responsible for providing all necessary insurance, security, safety maintenance and operation of the Vessel at all time, including during delivery. The CONTR must procure and maintain and provide proof of insurance against any loss of or damage to the vessel or personal injury or death or damage to or loss of property caused during the delivery voyage including without limitation full form hull and machinery insurance in an amount equal to the Total Contract Price, and full form protection and indemnity insurance. Such insurance and proof must be at the CONTR 's sole expense, including all deductibles. WETA must be named as an additional insured under any such insurance.

Protection of Vessel during Delivery and Re-Delivery. The CONTR is fully responsible for adequately preparing the Vessel for open ocean and local transport. Whenever the CONTR sails the Vessel under its own power, the Vessels must be under the command of an experienced Captain, holding a valid USCG license with a rating acceptable for the delivery voyage from the Contractor's facility.

Damage to Vessel During Delivery and Re-Delivery. Contractor must report to WETA any allision, collision, grounding, or other incident that may have caused damage to the Vessel during the delivery voyage. WETA may require that its

representative be onboard at all times while the Vessel is underway. WETA's representative will not be in command of the Vessel. If at any time during the voyage, WETA's representative observes an allision, collision, grounding, or other incident that may have caused damage to the Vessel, WETA has the right, as a condition of completion of Re-Delivery, to require a dry-dock inspection to ascertain any suspected damage. The cost of this inspection and any necessary repairs are the responsibility of the Contractor.

984 OPEN & INSPECT

Provide labor, material and equipment to open the four (4) Voids and two (2) Forepeaks for inspection by the USCG Inspectors. The CONTR shall provide all resources required for a full USCG COI inspection on all vessels while in dry dock undergoing the contract scope of work.

Provide, and maintain for the duration of the Work, a Marine Chemist certificate for SAFE FOR MEN TO ENTER, and SAFE FOR HOT WORK, and all required ventilation and temporary lighting for inspection, any additional work resulting from inspection, and any other work required by this Work.

Upon completion of inspection and work, the CONTR shall close up the voids and forepeaks in good order following successful inspection after undocking as part of Dock Trials, using new gaskets for the Forepeak exterior hatches. Thoroughly clean the seating flange prior to closure.

993 MATERIAL HANDLING & REMOVAL

The CONTR shall be responsible for all material handling, wrapping, packing, crating, trucking, freight, shipping, and transportation charges in connection with this Work. This includes shipment of removed and spare components back to the OWNER'S facility in San Francisco, California. The CONTR shall be responsible for the shipment of the marine gears from the vessel to the ZF Marine Facility in Mukilteo, WA and from there to RDI Marine's facility in Seattle, WA. RDI Marine will handle all shipping charges for delivery of the engines, gears, control systems and auxiliary equipment from their Seattle facility to the CONTR's shipyard. RDI will only ship one shipset of equipment at a time. It is the CONTR's responsibility to coordinate all logistics with RDI.

The CONTR shall be responsible for proper disposal of any items deemed to be discarded by the OWNER during the course of the Work. CONTR shall be responsible for the proper disposal of all wastes generated within its facility during the course of the Work.

993.1 CARL MOYER INSPECTIONS & DISPOSAL

As a requirement of the Carl Moyer Grant that WETA received to repower these vessels the CONTR will be required to provide for Bay Area Air Quality Management District (BAAQMD) inspections and disposition of the removed MTU Tier 2 engines as required by the terms of the Grant.

As part of the kickoff meetings for this project the CONTR shall work with the OWNER and BAAQMD to develop the regulatory plan for inspections and disposals of the Tier 2 MTU engines meet all of the Carl Moyer and BAAQMD requirements. The CONTR will be required to follow this regulatory plan to obtain OWNER approval for every step. Should the CONTR disregard the plan and violate any portion of the Carl Moyer Grant agreement in doing so the CONTR will be liable for any lost grant funds.

The Required District Destruction-Inspection Protocol for Destroyed Engines and/or Equipment Prior to Disposal document by BAAQMD will be provided as a reference. For estimating purposes, the CONTR shall plan on punching a large jagged hole at least 3" at its narrowest point in addition to removing a portion of the Oil pan flange in each engine.

This matches BAAQMD item #1 on the reference document. The CONTR and the OWNER will arrange for inspection of the as destroyed engines for each vessel by BAAQMD. After successful inspection the CONTR shall have the engine shipped to a scrap yard approved by BAAQMD for disposal. As per the reference documents the Project Implementation Report (PIR) will require an OWNER and Scrap Yard staff signature verifying the engines were permanently destroyed. All of these items will require the CONTR to coordinate these activities with the OWNER and BAAQMD at least seven (7) days in advance of the event taking place. Should either the OWNER or BAAQMD not be able to attend with the required advance notice the event will be reschedule to a time where the OWNER and BAAQMD can attend.

994 CLEANING

After the Work is complete, and just prior to Acceptance, the CONTR shall thoroughly clean the entire Vessel, keel to mast, stem to stern, interior and exterior, all to the satisfaction of the OWNER.

All bilges shall be dry and free of debris prior to sea trials and delivery to WETA.

997 DRY DOCKING

Docking plans are attached see Appendix B ICO502-150 (GEMINI & PISCES) or ICO725-150 (SCORPIO & TAURUS) Docking Plan.

While in dry dock the CONTR shall connect all required utilities including shore power, and provide for personnel access to the Vessels.

Tug assistance during undocking is required until the propulsion system is stabilized.

The designated CONTR'S Project Manager shall meet with OWNER personnel and jointly ship check each vessel at least five (5) days prior to the docking. The Project Manager shall meet with the OWNER once per week during the project for progress reports. The CONTR shall provide minutes from the meeting in electronic form outlining all aspects of the project. Additional meetings shall be held if necessary, by mutual agreement.

At least seven (7) days prior to dry docking, the CONTR shall provide to the OWNER a written report which details the status of all material ordered for the Work. The CONTR shall then update the status of all material as requested by the OWNER.

Provide and maintain electricity (shore power), a safely illuminated gangway, and trash removal services while Vessel is in dry-dock and alongside at the CONTR'S facility.

Provide safety and security for the entire Vessel throughout the Work until such time as the OWNER has accepted the Vessel. Every reasonable precaution shall be taken to protect the Vessel from the hazards of fire, flooding, pilferage, malicious damage, and other events including cataclysmic phenomena of nature.

Provide and maintain comprehensive and effective fire prevention and fire detection, and firefighting programs and systems sufficient to ensure the safety and integrity of the Vessel. Provide personnel trained in shipboard firefighting techniques and also trained to cooperate with and assist local firefighting organizations. Provide sufficient shore fire hoses to ensure an adequate supply of firefighting water, at sufficient pressure, and maintain an adequate number of tested fire-hoses aboard the Vessel to effectively fight fires at any location in the Vessel.

Provide and maintain portable fire extinguishers in sufficient quantity, and of the appropriate type, to combat local fires of any class. Provide sufficient fire watches, including roving watches as may be required, to ensure that fires that may be inadvertently started by welding sparks or heat, electrical malfunction, or spontaneous combustion are detected, reported and promptly extinguished.

Provide labor, material and equipment to clean and gas free any spaces that will require hot work associated with any of the Work list items contained herein, as necessary, and obtain a Marine Chemist certificate for Safe for Men and Safe for Hot Work. Maintain the certificate during the course of the work. Provide fire watches as required.

Prior to installing shore power, or performing any welding on the Vessel or on the dock, ensure that the San Francisco Bay Ferry Welding Check List has been completed and countersigned by the OWNER.

Provide labor, material, and equipment to restore and repair any surfaces, equipment, or furnishings that may have been damaged during all Work described herein to the as-arrived condition.

All costs associated with this dry docking shall be borne by the CONTR.