SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS
OFFEROR TO COMPLETE BLOCKS 12, 17, 23, 24, AND 30

1. REQUISITION NUMBER	PAGE 1 OF 348

2. CONTRACT NO.	3. AWARD/EFFECTIVE DATE	4. ORDER NUMBER	5. SOLICITATION NUMBER	6. SOLICITATION ISSUE DATE

7. FOR SOLICITATION INFORMATION CALL:	a. NAME	b. TELEPHONE NUMBER *(No Collect Calls)*	8. OFFER DUE DATE/LOCAL TIME
	MICHAEL HUNTER	215-656-6774	

9. ISSUED BY CODE W912BU

US ARMY ENGINEER DISTRICT, PHILADELPHIA
CONTRACTING DIVISION
WANAMAKER BUILDING
100 PENN SQUARE EAST
PHILADELPHIA PA 19107-3390

TEL:
FAX:

10. THIS ACQUISITION IS [X] UNRESTRICTED OR [ ] SET ASIDE: _____ % FOR:

- [ ] SMALL BUSINESS
- [ ] WOMEN-OWNED SMALL BUSINESS (WOSB) ELIGIBLE UNDER THE WOMEN-OWNED SMALL BUSINESS PROGRAM
- [ ] HUBZONE SMALL BUSINESS
- [ ] EDWOSB
- [ ] SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESS
- [ ] 8(A)

NAICS: 336611

SIZE STANDARD: 1,250

11. DELIVERY FOR FOB DESTINATION UNLESS BLOCK IS MARKED	12. DISCOUNT TERMS	13a. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)	13b. RATING / 14. METHOD OF SOLICITATION
[ ] SEE SCHEDULE		[ ]	14. [ ] RFQ [ ] IFB [X] RFP

15. DELIVER TO CODE

SEE SCHEDULE

16. ADMINISTERED BY CODE

17a. CONTRACTOR/ OFFEROR CODE FACILITY CODE

TELEPHONE NO.

18a. PAYMENT WILL BE MADE BY CODE

[ ] 17b. CHECK IF REMITTANCE IS DIFFERENT AND PUT SUCH ADDRESS IN OFFER

18b. SUBMIT INVOICES TO ADDRESS SHOWN IN BLOCK 18a. UNLESS BLOCK BELOW IS CHECKED [ ] SEE ADDENDUM

19. ITEM NO.	20. SCHEDULE OF SUPPLIES/ SERVICES	21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
	SEE SCHEDULE				

25. ACCOUNTING AND APPROPRIATION DATA

26. TOTAL AWARD AMOUNT (For Govt. Use Only)

[ ] 27a. SOLICITATION INCORPORATES BY REFERENCE FAR 52.212-1. 52.212-4. FAR 52.212-3. 52.212-5 ARE ATTACHED. ADDENDA [ ] ARE [ ] ARE NOT ATTACHED

[ ] 27b. CONTRACT/PURCHASE ORDER INCORPORATES BY REFERENCE FAR 52.212-4. FAR 52.212-5 IS ATTACHED. ADDENDA [ ] ARE [ ] ARE NOT ATTACHED

[X] 28. CONTRACTOR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN 2 COPIES TO ISSUING OFFICE. CONTRACTOR AGREES TO FURNISH AND DELIVER ALL ITEMS SET FORTH OR OTHERWISE IDENTIFIED ABOVE AND ON ANY ADDITIONAL SHEETS SUBJECT TO THE TERMS AND CONDITIONS SPECIFIED.

[ ] 29. AWARD OF CONTRACT: REF. OFFER DATED . YOUR OFFER ON SOLICITATION (BLOCK 5), INCLUDING ANY ADDITIONS OR CHANGES WHICH ARE SET FORTH HEREIN, IS ACCEPTED AS TO ITEMS:

30a. SIGNATURE OF OFFEROR/CONTRACTOR

31a. UNITED STATES OF AMERICA (SIGNATURE OF CONTRACTING OFFICER)

30b. NAME AND TITLE OF SIGNER *(TYPE OR PRINT)*	30c. DATE SIGNED	31b. NAME OF CONTRACTING OFFICER *(TYPE OR PRINT)* TEL: EMAIL:	31c. DATE SIGNED

SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS (CONTINUED)		PAGE 2 OF 348

19. ITEM NO.	20. SCHEDULE OF SUPPLIES/ SERVICES	21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
	SEE SCHEDULE				

32a. QUANTITY IN COLUMN 21 HAS BEEN

☐ RECEIVED ☐ INSPECTED ☐ ACCEPTED, AND CONFORMS TO THE CONTRACT, EXCEPT AS NOTED: _____

32b. SIGNATURE OF AUTHORIZED GOVERNMENT REPRESENTATIVE	32c. DATE	32d. PRINTED NAME AND TITLE OF AUTHORIZED GOVERNMENT REPRESENTATIVE

32e. MAILING ADDRESS OF AUTHORIZED GOVERNMENT REPRESENTATIVE	32f. TELEPHONE NUMBER OF AUTHORIZED GOVERNMENT REPRESENTATIVE
	32g. E-MAIL OF AUTHORIZED GOVERNMENT REPRESENTATIVE

33. SHIP NUMBER ☐ PARTIAL ☐ FINAL	34. VOUCHER NUMBER	35. AMOUNT VERIFIED CORRECT FOR	36. PAYMENT ☐ COMPLETE ☐ PARTIAL ☐ FINAL	37. CHECK NUMBER

38. S/R ACCOUNT NUMBER	39. S/R VOUCHER NUMBER	40. PAID BY

41a. I CERTIFY THIS ACCOUNT IS CORRECT AND PROPER FOR PAYMENT		42a. RECEIVED BY *(Print)*	
41b. SIGNATURE AND TITLE OF CERTIFYING OFFICER	41c. DATE	42b. RECEIVED AT *(Location)*	
		42c. DATE REC'D *(YY/MM/DD)*	42d. TOTAL CONTAINERS

Section SF 1449 - CONTINUATION SHEET

PRICE SCHEDULE

Design, construct, and test one Medium Class Hopper Dredge (MCHD) for the Corps of Engineers, Philadelphia District for use in support of its Ready Reserve mission, in accordance with the attached specifications.

ITEM NUMBER	ITEM	QTY.	UNIT	UNIT PRICE	TOTAL PRICE
CLIN **0001**	Medium Class Hopper Dredge	1	EACH		
0001AA	PLANNING AND SCHEDULING – PHASE I (The submittals required for Planning and Scheduling are listed in contract Paragraph H02.). This item is initiated only by a Notice to Proceed issued by the Contracting Officer.	1	JOB	XXXX	$USD _____
000AB	ENGINEERING – PHASE II (The submittals for "Engineering" are listed in contract Paragraph H02.). This item is initiated only by a Notice to Proceed issued by the Contracting Officer or Contracting Officer Representative. The Contractor may not start this item until he receives a Notice to Proceed for this item.	1	JOB	XXXX	$USD _____
0001AC	CONSTRUCT & TEST – PHASE III (The submittals for "Construct, Test, and Deliver" are listed in contract Paragraph H02.). This item is initiated only by a Notice to Proceed issued by the Contracting Officer or the Contracting Officer Representative. The Contractor may not start this item until he receives a Notice to Proceed for this item.	1	JOB	XXXX	$USD _____
0001AD	TEST, SEA TRIALS, & DELIVER – PHASE IV (The submittals for "Construct, Test, and Deliver" are listed in contract Paragraph H02.). This item is initiated only by a Notice to Proceed issued by the Contracting Officer or the Contracting Officer Representative. The Contractor may not start this item until he receives a Notice to Proceed for this item.	1	JOB	XXXX	$USD _____
	TOTAL (CLIN) 0001	1	EACH		$USD _____

INSERT LOCATION OF THE FACILITY WHERE THE WORK WILL BE PERFORMED:

_____

_____

The Government may reject an offer as non-responsive if it is materially and mathematically unbalanced as to price for any offered item or combination of offered items. An offer is unbalanced when it is based on prices significantly less than cost for some work and prices, which are significantly overstated for other work.

The targeted budget for this contract is $125 Million. The target budget should be used to assist offerors with their technical trade-off decisions in order to achieve the best collective combinational balance of technical features to satisfy the MCHD's mission while at the same time considering the Government's budget considerations.

SOW

C000 GENERAL

C001 MINIMUM FLEET MISSION, AND MCFARLAND REPLACEMENT

A. USACE MINIMUM FLEET

The Corps maintains a minimum fleet that includes the hopper dredges ESSAYONS, YAQUINA, WHEELER, and MCFARLAND, pursuant to Public Law (PL) 95-269 (1978). These government hopper dredges play an important role in guaranteeing the ability of the Corps to deliver its navigation mission and enable safe, reliable, effective and environmentally sustainable waterborne transportation systems for vital national security, commerce, and recreation needs.

USACE manages the minimum hopper dredge fleet using accepted asset management principles, including a Plant Replacement and Improvement Program (PRIP) that ensures the financial capacity to fund replacement of vessels when needed.

The Corps has a long-term plan for recapitalizing its minimum fleet consistent with the financial obligations of the USACE dredge fleet. The plan is based on the importance of the minimum fleet to the mission, the age and operating condition of the vessels, and the capacity of the PRIP fund. Decommissioning of the old dredges will occur at the time of replacement.

B. READY RESERVE OPERATION

The Water Resources Development Act (WRDA) of 1996 and WRDA 2007 further directed the dredges WHEELER (WRDA 1996) and MCFARLAND (WRDA 2007) to operate in a Ready Reserve status for national defense, for emergency needs, and for contract work when private industry has failed to submit a responsive and responsible contract bid. As a reserve fleet, the WHEELER and MCFARLAND provide essential capability to the Nation in maintaining the flow of commerce, in support of national security missions, and during emergencies.

The McFARLAND was placed in a Ready Reserve status on 31 December 2009. The dredge periodically performs readiness and training exercises to ensure the ability of the vessel and crew to perform urgent and emergency dredging work. These exercises are project funded and are currently limited to the Delaware River and Bay. During the remainder of the year, the MCFARLAND is maintained pier-side by a reduced crew and remains poised for Ready Reserve call-out within 72 hours to urgent or emergency dredging requirements via direction of the USACE Director of Civil Works or his/her designees. The MCFARLAND's primary geographic areas of responsibility include the Delaware River and Bay, the Eastern seaboard and its harbors, and the Gulf of Mexico including the Southwest Pass (lower 33 miles) of the Mississippi River.

C. McFARLAND REPLACEMENT

The Marine Design Center (MDC) of the U.S. Army Corps of Engineers (USACE) has issued this solicitation to acquire a new Medium-Class Hopper Dredge (MCHD) to replace the ageing Dredge McFARLAND.

The new dredge shall have: 6000 Cubic Yard Hopper Capacity, Diesel-Electric Power System, and Azimuthing Thruster Propulsion.

The completed vessel will be placed in service with the Philadelphia District of the U.S. Army Corps of Engineers (CENAP) and will be used by the District for operations as described in Paragraph C002. As discussed above, the McFARLAND will be removed from service when the new vessel is in operation.

The completed vessel shall be ABS classed. As a United States dredge, the vessel construction, manning, and operation shall satisfy all requirements of the Jones Act/Merchant Marine Act of 1920.

The following performance-based specification and outlined operational requirements were identified to ensure the capability of the replacement MCFARLAND meets mission requirements within its Area of Responsibility (AOR).

C002 VESSEL OPERATION AND PRIMARY REQUIREMENTS

A. GENERAL DESCRIPTION

The Medium Class Hopper Dredge (MCHD) to be designed and delivered under this contract will become part of the USACE Minimum Fleet and upon delivery will be placed in a Ready Reserve status. Ready Reserve means that the dredge will generally be kept dockside on shore power in a standby mode and be expected to be versatile in capability and quick to respond when called out for dredging.

The MCHD will complete 70 days of dredging in the Delaware River on an annual basis as its training and readiness exercise. The dredge will be utilized for channel maintenance dredging to supplement the capability of the commercial industry dredge fleet when circumstances dictate, and it is called upon.

The dredge will be home ported at the USACE Fort Mifflin dock facility on the Delaware River in Philadelphia. The dredge is anticipated to operate primarily on both the East Coast and Gulf Coast of the US. However, it may be utilized anywhere in the US, as needed, to include the West Coast but excluding the Great Lakes.

Ready Reserve Mission:

"Ready Reserve" status means the MCHD can be called upon by USACE Headquarters to conduct urgent or emergency dredging. Historically, the McFARLAND has been called out from Ready Reserve to dredge approximately 60 days per year.

The primary mission of this dredge is to respond to emerging issues affecting coastal navigation in the US called out for dredging. In that regard, the dredge is expected to be designed and built to allow very fast mobilization from the time requested to the time underway. Operations needed to transition from being on shore power at the dock to vessel underway in 72 hours or less.

Being a Ready Reserve dredge, the exact conditions, locations, and circumstances for its use are variable. As a result, versatility in the design is encouraged to maximize the number of potential situations that the dredge can support.

The overall goal for the dredge is to be able to support any condition for maintenance dredging that presents itself. It is understood that there may be some trade-off between "optimum" under specified conditions and "range of operation" under more extreme conditions.

Once in a dredging mode, the goal is to maximize production in terms of Cubic Yards of material removed. Production is based on a combination of hopper load and total cycle time.

USACE experience with their existing Ready Reserve fleet has identified features that contribute to better overall operation that include:

- Maximized hopper loading capacity with 1.8 S.G In Hopper material.
- Maximized dredge maneuvering control and dredging performance in high current and wind conditions as described in the specification,
- Propulsion and Steering systems that together maximize maneuvering power (with the inclusion of a Bow Thruster) and also provide rapid response to propulsion and steering inputs.
- Ease of maintenance and equipment replacement while in ready reserve dockside status,
- Minimized need for dry docking,
- Power System Redundancy and operational flexibility that precludes being completely out of service (operating at reduced dredging capacity until repairs are affected) when there are individual component breakdowns.

Current Ready Reserve Dredge Operating Profile (MCFARLAND):

For the purpose of Offeror background information about the existing operating profile of the vessel being replaced (MCFARLAND), the following dredging operations are provided based on historical use and situations considered most likely. However, it should be understood that actual usage may vary to include differing locations, dredging depth, material, distance to the disposal site, and potential upland disposal. Offerors shall utilize this information as the basis for the Operating Profile of the new dredge, in conjunction with the technical requirements in this solicitation:

Normal Dredging Cycle:
Arrive at dredging station, Dredge with or without overflow (see specific sites below), Transit to Disposal Site, Bottom Dump or Pump out upland (see specific sites below), Return to dredging station

Primary Dredging Locations:
New Orleans District – Southwest Pass, sea buoy to Venice, lower 30 miles (30% of overall vessel dredging assignment time) [PRIMARY MISSION PURPOSE]
Mobilization from Philadelphia – twice per year to New Orleans 1700 nautical miles and 1700 nautical miles back. The dredge will travel at transit speed with the hopper empty, but free flooded.
Transit condition – fully stocked, full fuel, full potable water
Dredging Material: Two primary locations conditions:
At Head of Passes (sand)
Lower part of SW Pass – sand with much more silt (lighter material)
Minimal organics (both locations)
Dredging Depth: 42 – 55 ft. (45 ft. starting channel depth, being dredged to 50 ft.) [See Specific Requirements Below]
River Current – maximum 6 knot current
Distance to Disposal Site
Average of 4 miles to Head of Passes site one-way (shallow water) [8 Miles Round Trip]
Average of 5 miles to site outside of sea buoy one-way (deep water) [10 Miles Round Trip]
Type of Disposal - bottom dumping via hopper doors (need operational procedures to dump in shallow Head of Passes site; can almost touch bottom with loaded Dredge McFarland when site is near full – note that this site is emptied by re-handling with cutterheads to create capacity) Note: a large amount of time is spent maneuvering into and out of the disposal area and in dumping (material bridges)
Condition: Turtle deflectors are in upper position during dredging (only the weight causes propulsive resistance)
Environmental Considerations: Can overflow and in rare cases agitate by use of the overflows
Philadelphia District – Delaware River above Ship John Shoal (50% of dredging time)
Mobilization from Philadelphia dock – 5 times per year within 50 miles and back each time. The dredge will travel at transit speed with the hopper empty, but free flooded. Transit condition – fully stocked, full fuel, full potable water
Dredging Material: Varies between specific ranges in the river;
sand and gravel [See specific requirements below]
silt
C&D canal (infrequent dredging) has some clay
Dredging Depth: 36 to 47 feet
River Current: 2-3 knots
Crosswinds: 15-20 knots
Distance to Disposal Site – average 10 miles
Type of Disposal – Pump-out to upland disposal sites (various river locations)
Present Discharge pipeline –
Submerged – 150 feet of 28-inch ID steel pipeline
Shoreline – various length 29-inch ID steel pipeline
Distances/Elevation
Killcohook – 1.5 miles feet in length, 75-foot upward change in elevation
Fort Mifflin (farthest cell) 8000 feet in length, minimal change in elevation
Current time to Pump-out – varies with material; minimum 1 hour, maximum 4 hours [See Specific Requirements Below]
Condition - Turtle deflectors are in place in deflector position during dredging (drag on bottom and weight causes resistance)
Environmental Considerations – No overflow, hoppers pumped down before start of cycle; once dredging starts there is no overflow allowed
Philadelphia District – Delaware River below Ship John Shoal (10% of dredging time)

Mobilization – 2 times per year, 80 miles and 80 miles back. The dredge will travel at transit speed with the hopper empty, but free flooded. Transit condition – fully stocked, full fuel, full potable water
Dredging Material: Sand and gravel
Dredging Depth: 38 – 47 ft.
Distance to Disposal Site - from 1.5 to 20 miles (average 10 miles each way)
Type of Disposal - bottom dumping via hopper doors (deep water)
Conditions: Turtle deflectors are required in deflecting position (resistance from both drag on the bottom and weight)
Environmental Considerations - No overflow allowed (no discharge from start
Lower Eastern Atlantic Coast (10% of dredging time)
Mobilization – 1 time per year – assume 600 miles and 600 back. The dredge will travel at transit speed with the hopper empty, but free flooded. Transit condition – fully stocked, full fuel, full potable water
Geographic locations have tended to vary over the years
Dredging Material: (typical sites)
Morehead City –sand
Wilmington Harbor, Cape Fear – (river mix –sand & shallow mud, slight organics)
Dredging Depth:
Morehead City (47 ft channel) - 28 to 48 feet
Wilmington (similar) – 28 to 48 feet
Distance to Disposal Site –
Morehead City - 2 sites – offshore is deep - 8 miles, close site (1 mile) is shallow and sometimes unavailable (McFarland grounded on one occasion)
Wilmington (ocean) - 10 miles (deep)
Type of Disposal- bottom dumping via hopper doors (may need operational procedures to dump in relatively shallow sites depending on door extension below the hull)
Current – maximum 3 knots along the track, 3.5 knot cross-current
Crosswinds: 15-20 knots
Conditions: Turtle deflectors are in deflector position during dredging (resistance from both drag and weight)
Environmental Considerations - Florida monitors for turbidity (shut down if too high) – a small boat follows – less than 10% of the operating time has been affected by turbidity

A. REQUIREMENTS

The Dredge shall be designed and built according to the specifications throughout this contract.

B. SPECIFIC REQUIREMENTS

The MCHD shall have the following characteristics:
Hull
Length Overall: 320 feet or less
Beam: As best suits the design
Air-Draft: 110 feet maximum
Loaded Draft at minimum dredging freeboard: 26 feet
Hopper & Loading Capacity: The hopper volume shall be 6,000 cubic yards to the top of the overflow, at maximum overflow height.
Power System: Diesel-Electric
Propulsion: Twin or Triple Screw Azimuthing Thrusters (Z or L-drive). Thrusters shall be removable and replaceable with vessel afloat and without dry docking.
Shallow Water: for transit conditions water depth shall be taken as 3 times the Loaded Draft
Speed (w/ 50% consumables, 100% fuel):

- Transit speed, hopper empty but free flooding, minimum 12 knots, Shallow Water.
- Transit speed, hopper full, minimum 10 knots, Shallow Water.
- Dredging speed (See 3. Machinery below under Propulsion)

Bow Thruster: at least one variable speed electric motor driven tunnel bow thruster.
Environmental conditions: Temperature criteria are as follows:

	Philadelphia, PA	Southwest Pass, LA
Outside Air (cooling)	93.4°F DB, 75.1°F WB	92.8°F DB, 78.1°F WB
Indoor Air (cooling)	75°F DB @ 50% RH	75°F DB @ 50% RH
Indoor Air (heating)	75°F	75°F
Outside Air (heating)	13.8°F DB	30.7°F DB
Seawater Temperature (cooling)	80°F	85°F
Seawater Temperature (heating)	37°F	61°F

Accommodation total of 26 persons and will have the following cabins, as a minimum:

8 x double cabins
6 x single cabins
2 x Ch. Eng. sleeping cabins
Ch. Eng. day room/office
2 x Captain sleeping cabins
Captain day room/office
Hospital
Galley
Pantry
Deck Department Office
Engine Department Office
Crew mess
Officers mess
Crew lounge
Officer's lounge
Changing room
Damage control locker
Laundry
Gym
Provisions, hotel and linen stores

Range: Vessel range shall be sufficient for transit from Philadelphia to New Orleans, hopper empty but free flooding (with doors closed), at a transit speed of 12 knots, without refueling or resupply, with a reserve of at least 10% fuel and consumables. No boundary of an oil tank shall be integral with the side plate or bottom plate of the hull, nor with the sloped side plates of the hopper.

Endurance: Vessel must be able to operate without resupply or offloading of waste for a minimum of 18 calendar days for the following operating profiles;

Endurance Operating Profiles:

Profile 1:

Normal sailing condition full draft @ 10 knots: 20% of time
Dredging condition full draft @ speed over ground of 2 knots with a 6 knots counter current: 50% of time
Vessel empty but hopper flooded @12 knots: 20% of time
Idle vessel in harbor, not on shore power: 10% of time
While on Endurance Operating Profile 1 the vessel shall also be able to operate in a No Discharge mode (no discharge of wastewater).

Profile 2:

Normal sailing condition full draft @ 10 knots: 50% of time
Normal sailing condition full draft @ 12 knots: 50% of time
While on Endurance Operating Profile 2 the vessel shall also be able to operate in a No Discharge mode (no discharge of wastewater).

Profile 3:

Dredging condition full draft @ speed over ground of 2 knots with a 6 knots counter current: 100% of time

While on Endurance Operating Profile 3 the vessel shall also be able to operate in a No Discharge mode (no discharge of wastewater).

Dredging System

Drag arms: 2 drag arms, one each side, with drag heads that are equipped with water jets, adjustable visors, and removable turtle deflectors (See Contract Paragraph C510).

Dredging depth (reference to water surface) and dredging system optimization: 65 feet depth with drag arms at no more than 45 degrees from the horizontal at a light draft (hopper empty but free flooding). Maximum operating drag arm angle shall not exceed 55 degrees when dredging deeper than 65 feet. (See Contract Paragraph C502)

Dredge pumps: one inboard dredge pump per drag arm (See Contract Paragraph C504).

Loading time to fill hopper with 5000 cubic yards of 1.8 S.G. material to be between 45-75 minutes when dredging at 65 ft. (See Contract Paragraphs C512, C516, and C520).

Dredge pump spherical clearance shall be a minimum of 12 inches

Sliding Trunnions (See Contract Paragraph C510)

Bottom dumping: multiple doors hydraulically actuated (See Contract Paragraph C514)

Bottom doors shall be designed such that the doors can be fully opened when the water depth is 1.75 times the mean draft of the vessel. For dumping in shallower waters, proportional opening of the doors shall be possible.

Pump Out: Over the bow through hose (Government supplied) and pipeline to landfill with a geodetic head of 75 ft, over a length of 1.5 miles in approx. 120-240 minutes. Dredge shall be capable of weathervaning off of a mooring buoy during pump out.

Hopper pump out collection system (See Contract Paragraph C520)

Hopper jetting system (See Contract Paragraphs C518, and C519)

Drag heads shall be provided with water jetting (See Contract Paragraph C511)

Overflow adjustable system and anti-turbidity features (See Contract Paragraph C516)

Drag head turtle deflection system (See Contract Paragraph C511)

Machinery

A Diesel-Electric Power System shall provide power for all vessel operations.

The diesel engines shall meet current US environmental emissions requirements (Tier 4). Diesel engines shall run on ultra-low sulfur fuel.

Diesel engines and the generators powered by the engines shall be rated for continuous power output.

Distilling plant for making potable water

Propulsion -

Propulsion shall be twin or triple Screw afloat removable Azimuthing Thrusters (Z or L-Drives). Thrusters shall utilize fixed pitch propellers with propeller nozzles. Propulsion shall utilize electric motors powered by the vessel Diesel-Electric system. Propulsion power shall be sufficient to dredge at maximum dredging depth in sand at maximum hopper fill rate, full hopper and maximum dredging draft, against a 6-knot current, with minimum dredging speed of 2 knots over ground (8-knots through the water). Power shall also be sufficient to meet 12 and 10 knot transit speeds given above.

A minimum of one variable speed bow thruster, sized to operate in conjunction with the propulsion system to allow the vessel to turn 180 degrees within its own length (in the water, not relative to land), at full load draft, with drag arms raised. (See Paragraph C620)

The vessel Azimuthing Thruster System design, Bow Thruster System design, and related hull form features for each of the two systems should consider maneuverability to be equal in importance to transit performance.

Dredging System-

Inboard dredge pumps shall be used and sized for the hopper fill and hopper pump out rates given above.

Jetting pumps shall be used to supply a jetting system running to the drag head when dredging and to the lower hopper during pump out.

Automation, Monitoring & Control System –

(i) Vessel – Shall have a machinery control, monitoring, alarm system that meets USCG periodically unattended machinery space and ABS Automation Centralized Control Unmanned (ACCU) requirements.

Dredging System –

Shall have a dredging automation system that has, at a minimum, the following capabilities and provides outputs in accordance with USACE's Dredge Quality Management (DQM) program (see Contract Paragraph C524):

Drag arm position sensing
Hopper fill level sensing
Overflow weir position sensing
Hull draft sensing
Hull speed over bottom sensing
Hull speed through water sensing
Vessel position and track sensing
Production monitoring (velocity & density) sensing
Dredge pump: RPM, inlet vacuum and discharge pressure sensing
Jetting pump: RPM, inlet vacuum and discharge pressure sensing
Automated drag head, dredge pump & overflow weir control for:
- Most efficient production
- Least turbidity production
- Fastest Hopper Fill production
- Draft limited production
- Pump Out pressure & velocity control
- Zero overflow locations

Vessel Maneuvering control for:
- Dredge track keeping

D. STANDARDS

See Contract Paragraph C003.

C003 DESIGN STANDARDS

GENERAL DESCRIPTION

The following list contains the various standards referenced throughout Section C of the Specification. Where references are made throughout Section C to specific sections of a standard or document, this is intended to highlight key information, but does not exclude any other relevant portions of the document. The Contractor shall ensure that the design complies with all applicable requirements of ABS, USCG, SOLAS, EM 385-1-1, and this Specification.

REQUIREMENTS

Regardless of dates or years given below, the Contractor shall apply the most recent version available for all Standards and References.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

None.

STANDARDS

ABS

a. Rules for Building and Classing Marine Vessels
Guidance Notes on Cathodic Protection of Ships

Guidance Notes on Control of Harmonics in Electrical Power Systems
Guidance Notes on Ergonomic Design of Navigation Bridges
Guidance Notes on Propulsion Shafting Alignment
Guidance Notes on SafeHull Finite Element Analysis for Hull Structures
Guidance Notes on the Application of Ergonomics to Marine Systems
Guide for Ballast Water Treatment
Guide for Bridge Design and Navigational Equipment/Systems
Guide for Buckling and Ultimate Strength Assessment for Offshore Structures
Guide for Certification of Lifting Appliances
Guide for Crew Habitability on Workboats
Guide for Dynamic Positioning Systems
Guide for 'SafeHull-Dynamic Loading Approach' for Vessels
Guide for Spectral-Based Fatigue Analysis for Vessels
Guide for Vessel Maneuverability
Rules for Survey After Construction – Underwater Inspections in Lieu of Drydocking Surveys

ANSI/ASHRAE Standard 26-2010, Mechanical Refrigeration and Air Conditioning Installations Aboard Ship

API

a. Manual of Petroleum Measurement Standards, Standard Chapter 2, Section 8A
Specification 2C, Offshore Pedestal Mounted Cranes

ASHRAE

a. Handbook – HVAC Applications
Handbook – HVAC Systems and Equipment
Handbook – Fundamentals
Handbook – Refrigeration
Load Calculations Application Manual

ASME/ANSI

a. B16, Standards for Pipes and Fittings
B36.10/19, Carbon, Alloy, and Stainless-Steel Pipes – Dimensions

ASME

a. B30.7-2016, Winches
PTC 19.3 TW – 2016, Thermowells
Boiler and Pressure Vessel Code, Code for Unfired Pressure Vessels

ASTM

a. A53-20, Standard Specification for Pipe, Steel, Black, and Hot-Dipped, Zinc-Coated, Welded and Seamless
A106-19a, Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service
A307-14, Specification for Carbon Steel Bolts, Studs, and Threaded Rod
B88-20, Standard Specification for Seamless Copper Water Tube
B466-18, Standard Specification for Seamless Copper-Nickel Pipe and Tube
C971-82, Guide for Selection and Application of Insulation Systems for Heating, Ventilating, and Air Conditioning Duct Work
D178-19, Standard Specification for Rubber Insulating Matting
F683-14, Standard Practice for Selection and Application of Thermal Insulation for Piping and Machinery
F708-92, Standard Practice for Design and Installation of Rigid Pipe Hangers
F722-18, Standard Specification for Welded Joints for Shipboard Piping Systems
F825-93, Standard Specification for Drawers, Furniture, Marine, Steel
F826-94, Standard Specification for Tops, Furniture, Marine, Steel
F906-85, Standard Specification for Letters and Numerals for Ships
F994-86, Standard Specification for Design and Installation of Overboard Discharge Hull Penetration Connections
F1085-19, Standard Specification for Mattress and Box Springs for Use in Berths in Marine Vessels

F1123-87, Standard Specification for Non-Metallic Expansion Joints
F1155-10, Standard Practice for Selection and Application of Piping System Materials
F1166-07, Standard Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities
F1196-19, Standard Specification for Sliding Watertight Door Assemblies
F1197-19, Standard Specification for Sliding Watertight Door Control Systems
F1198-92, Standard Guide for Shipboard Fire Detection Systems
F1244-08, Standard Specification for Berths, Marine
F1273-91, Standard Specification for Tank Vent Flange Arresters
F1321-14, Standard Guide for Conducting a Stability Test to Determine the Light Ship Displacement and Centers of Gravity of a Vessel
G21-15, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

Department of Defense
a. MIL-STD-419, Standard Practice, Cleaning, Protecting, and Testing Piping, Tubing, and Fittings for Hydraulic Power Transmission Equipment
MIL-STD-464C, Interface Standard, Electromagnetic Environmental Effects, Requirements for Systems
MIL-STD-1310H, Standard Practice, Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility, EMP Mitigation and Safety

EPA
a. 800-R-11-002, Environmentally Acceptable Lubricants
33 USC 1251 et seq., Clean Water Act, Section 312
40 CFR Part 1045, Control of Emissions from Spark-Ignition Propulsion Marine Engines and Vessels

European Union Council Directive 98/83/EC, Drinking Water Directive
Federal Standard No. 595B, Colors Identification Numbers
IACS Guide No. 47, Shipbuilding and Repair Quality Standard

IEC
a. Publication 92-302, Electrical Installations in Ships
Specification 60794-2, Optical Fiber Cables – Part 2: Indoor Cables
Standard 60529, Degrees of Protection Provided by Enclosures (IP Code)
Standard 60945, Maritime Navigation and Radiocommunication Equipment and Systems
Standard 61537, Cable Management

IEEE
a. 45-2002, Recommended Practice for Electric Installations on Shipboard
1580-2010, Recommended Practice for Marine Cable for Use on Shipboard and Fixed or Floating Facilities
1584-2018, Guide for Performing Arc-Flash Hazard Calculations
C95.1-2019, Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz
C95.2-2018, Standard for Radio-Frequency Energy and Current-Flow Symbols

International Maritime Pilots Association Notice No. 849, Required Boarding Arrangements for Pilots
International Code of Signals

IMO
a. Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs)
International Code for Fire Safety Systems (FSS Code)
International Convention for the Prevention of Pollution from Ships (MARPOL)
International Convention for the Safety of Life at Sea, 1974 (SOLAS)
International Convention on Load Lines, 1966
International Convention on Tonnage Measurement of Ships, 1969
IC874E, International Code on Intact Stability 2008

MSC.1/Circ.1331, Guidelines for Construction, Installation, Maintenance and Inspection/Survey of Means of Embarkation and Disembarkation
Resolution A.1045(27), Pilot Transfer Operations
Resolution A.752(18), Guidelines for the Evaluation, Testing and Application of Low-Location Lighting on Passenger Ships
Resolution MSC.333(90), Adoption of Revised Performance Standards for Shipborne Voyage Data Recorders (VDRs)
Resolution A.382(X), Magnetic Compasses, Carriage and Performance Standards
Resolution A.424(XI), Performance Standards for Gyro Compasses
Resolution A.694(17), General Requirements for Shipborne Radio Equipment Forming Part of the Global Maritime Distress and Safety System (GMDSS) and for Electronic Navigational Aids
Resolution A.861(20), Performance Standards for Shipborne Voyage Data Recorders (VDRs)
Resolution MSC.116(73), Performance Standards for Marine Transmitting Heading Devices (THDs)
Resolution MSC.302(87), Performance Standards for Bridge Alert Management

ILO – Maritime Labour Convention, 2006

ISO

a. Standard 484-1, Shipbuilding – Ship Screw Propellers – Manufacturing Tolerances
Standard 4406, Hydraulic Fluid Power, Fluids – Method for Coding the Level of Contamination by Solid Particles
Standard 8861, Shipbuilding – Engine Room Ventilation in Diesel-Engined Ships
Standard 8728, Ships and Marine Technology – Marine Gyro-Compasses

NAVSEA – T9633-AT-DSP-010, Ship's Cathodic Protection Design Calculations, Design Requirements Manual

NFPA – NFPA 70, National Electrical Code

NMEA – 0183, Standard for Interfacing Marine Electronic Devices

NSRP – 0490, Industry Standards for Hull Structural Penetration Design

OSHA

a. 29 CFR Part 1910, Occupational Safety and Health Standards
29 CFR Part 1915, Occupational Safety and Health Standards for Shipyard Employment
29 CFR Part 1918, Safety and Health Regulations for Longshoring
29 CFR Part 1919, Gear Certification

SAWE

a. RP M-2:2009, Standard Coordinate Systems for Reporting Mass Properties of Marine Vehicles
RP M-4:2019, Supplier Weight Control for the Marine Industry
RP M-7:2017, Weight Control Technical Requirements for MSC and Similar Ships, Commercial Ships, and Other Small Craft
RP 14:2001, Weight Estimating and Margin Manual for Marine Vehicles
RP 17:2009, Weight Distribution and Moments of Inertia for Marine Vehicles

SMACNA – HVAC Systems Duct Design

SNAME

a. T&R Bulletin 3-51, Practices and Procedures for the Alignment of Marine Main Propulsion Shafting Systems
T&R Bulletin 4-7, Thermal Insulation Report
T&R Bulletin 4-16, Recommended Practices for Ship Heating, Ventilation & Air Conditioning Design Calculations

SSPC – SP-10, Near White Metal Blast

UL

a. UL 67, Panelboards
UL 498, Attachment Plugs and Receptacles
UL 924, Standard for Emergency Lighting and Power Equipment
UL 1104, Standard for Marine Navigation Lights

UL 1598A, Standard for Supplemental Requirements for Luminaires for Installation on Marine Vessels

USACE

a. EM 385-1-1, Safety and Health Requirements Manual

ER 385-1-100, Arc Flash Hazard Program

ER 1130-2-500, Work Management Policies

EP 1130-2-500, Work Management Guidance and Procedures

United States Code – Jones Act (USCA 55101 et seq., USACE 55109)

USCG

a. DR-68, Guidelines for the Assignment of Reduced Freeboards for Dredgers

MSC MTN 04-95, Lightship Change Determination

Navigation Rules and Regulations

NVIC 02-89, Guide for Electrical Installations on Merchant Vessels and Mobile Offshore Drilling Units

Procedure E2-06, MSC Guidelines for Electrical Load Analysis

33 CFR

(i) Subchapter O, Pollution

(ii) Part 104, Maritime Security: Vessels

(iii) Part 164, Navigation Safety Regulations

46 CFR

(iv) Subchapter F, Marine Engineering

(v) Subchapter G, Documentation and Measurement of Vessels

(vi) Subchapter I, Cargo & Miscellaneous Vessels

(vii) Subchapter J, Electrical Engineering

(viii) Subchapter Q, Equipment, Construction, and Materials

(ix) Subchapter S, Subdivision and Stability

(x) Subchapter W, Lifesaving Appliances and Arrangements

USPHS – 956, Drinking Water Standards

WHO

a. International Health Regulations

Guide to Ship Sanitation

Guidelines for Drinking Water Quality

C004 CLASSIFICATION AND CERTIFICATION

GENERAL DESCRIPTION

The Contractor shall be responsible for preparing all necessary drawings and calculations, obtaining necessary regulatory body reviews and approvals, obtaining necessary inspections and surveys during construction and for the classing and certification of the vessel as follows:

REQUIREMENTS

ABS CLASSIFICATION

a. ABS Rules for Building and Classing Marine Vessels

The vessel shall be designed, built and inspected and tested in accordance with the latest version of the ABS Rules and shall be Classed as follows: “Maltese Cross ✠A-1Ⓔ, Maltese Cross ✠AMS, ACCU, Unrestricted Service with a Vessel Description of Hopper Dredger.

ABS Guide for Crew Habitability on Workboats

The vessel shall be designed and built in accordance with the ABS Guide for Crew Habitability on Workboats, Habitability (HAB(WB)) and shall receive such notation upon completion of all tests and trials.

ABS Rules for Survey After Construction – Underwater Inspections in Lieu of Drydocking Surveys

The vessel shall be designed and built in accordance with the requirements and recommendations in the ABS Rules for Survey After Construction – Underwater Inspections in

Lieu of Drydocking (UWILD) Surveys (Part 7, Appendix 1). This shall include submission of all required plans and data to ABS for review and approval, and coordination with ABS to inspect the vessel prior to launch. The Contractor shall obtain the UWILD notation from ABS for the vessel and shall ensure compliance with ABS requirements for this notation.

ABS Guide for Certification of Lifting Appliances

Cranes and lifting equipment on the vessel shall be included in the ABS Register of Lifting Appliances under this Guide with the additional class notation CRC (OC, SP). Note that this does not include dragarm handling system.

International Convention on Load Lines (see Contract Paragraph C140 for additional details)

The Contractor shall employ ABS to survey the vessel for compliance with the International Load Lines Convention of 1966, as amended. The Contractor shall employ ABS to review the vessel for compliance with the U. S. Coast Guard's criteria for exemption or equivalency for reduced freeboard under DR-68, as allowed by Federal Register/Vol 75, No 196/Tuesday, October 12, 2010/Notices, and to issue the appropriate Certifications on behalf of the U. S. Coast Guard.

International Convention for the Safety of Life at Sea (SOLAS)

The Contractor shall employ ABS to survey the vessel for compliance with the International Convention for the Safety of Life at Sea 1974 as amended and to issue the appropriate Certifications.

International Convention on Tonnage Measurements of Ships

The Contractor shall employ ABS to survey the vessel for compliance with the International Convention on Tonnage Measurement 1969 and to issue the appropriate Certificate of Admeasurement.

The recommended ABS point of contact is: Mr. Bob Smith, who can be reached by phone, email or mail, at: (703) 519-9970, RSmith@eagle.org, or 1525 Wilson Blvd, Suite 625, Arlington, VA 22209. The Contractor shall be responsible for all costs associated with applications, plan submittals, and inspections required to obtain such certification\documentation. When steel construction commences, the Contractor shall coordinate with ABS to ensure the frequency of onsite inspections are not less than once every two weeks. See Contract Paragraph C040 Scope of Work for details on Contract Drawings and the level of effort required by the Contractor.

If the Contractor intends to launch, test, operate, or tow the vessel "out of class", the Contractor must specifically advise ABS of such intent and incorporate any and all modifications required by that agency for such operation at no additional cost to the Government and at no additional contract time. Any such modifications which, in the opinion of the COR, affect the arrangements, operability, or suitability of the vessel shall be removed from the vessel by the Contractor at no additional cost or time and the vessel returned to new condition prior to Final Acceptance. See Contract Paragraph C040 Scope of Work for details regarding deviations to the contract design.

CERTIFICATIONS, INSPECTIONS AND LICENSES

The Contractor shall be responsible for obtaining all necessary regulatory body reviews and approvals, obtaining necessary inspections, surveys during construction, and for obtaining, in addition to the following, all necessary certificates and licenses required to sail between all U. S. Ports (CONUS and OCONUS), the Panama Canal, and U. S. Territories:

a. U.S. Coast Guard Certificate of Inspection (COI) under 46 CFR Subchapter I – Cargo and Miscellaneous Vessels

The Contractor shall employ ABS to review the vessel design and construction on behalf of the U. S. Coast Guard for compliance with Subchapter I and to issue an official Hull Number and the COI. Along with the ABS ACCU notation described above, the vessel shall also satisfy the requirements for a USCG periodically unattended machinery space, and the vessel's COI/manning requirements should reflect such.

U. S. Coast Guard Ballast Water Management System under 33 CFR Part 151, Subpart D, Waters of the U.S.

If the vessel is to take on or discharge ballast water during operations, then an approved Ballast Water Management System (BWMS) shall be implemented. If ballast water treatment equipment is installed, then the Contractor shall provide certification that it is in compliance with 46 CFR Part 162.

Certification of United States Built, 46 CFR Part 67, Subpart F

The Contractor is to provide a Master Carpenter's Certificate and Builder's certification to prove the vessel was United States Built in accordance with Part 67.97 and that it qualifies to operate under the Jones Act.

API Certified Hopper Capacity Tables

The Contractor shall provide API certified total and incremental tank capacity tables compiled from field data taken from the hopper of the completed vessel by API certified surveyors.

The tank capacity tables shall include a specific entry providing fill level at 6000 Cubic Yard Capacity.

FCC Cargo Ship Radio Authorization

The Contractor shall work with the COR to obtain the U. S. Army Ship Radio Authorization.

GMDSS Certification for Communication Equipment The contractor shall provide certification that communication equipment is in compliance with SOLAS mandated GMDSS for Sea Areas A1, A2 and A3.

VESSEL OWNER AND ADDRESS

For the ABS certificate of classification and other certifications and the U.S. Coast Guard COI, the owner shall be listed as "U.S. Army Corps of Engineers, Philadelphia District". The owner's address of record shall be listed as:

US Army Corps of Engineers – PHILADELPHIA District
Fort Mifflin Project Office
6400 Hog Island Road
Philadelphia, PA 19153

ABS ENGINEERING MANAGER ACCESS AND DISCLOSURE

The Marine Design Center (CEMDC) will be the "Owner's Representative" on this project. All correspondence with ABS shall be made available to the COR. In order to facilitate the communication process and reduce the paperwork burden on all parties, the Contractor and all sub-contractors shall utilize the ABS Eagle Construct Engineering Manager Portal (02E) for all drawing submittals and correspondence. The Contractor and all sub-contractors shall make the necessary arrangements with ABS to ensure that the Marine Design Center is granted the following Oversight Permissions for this Contract:

View project and drawing status
View comments
View transmittals
Download approved drawings and review letters
E-Mail notification of approval
E-Mail notification of transmittal
Status
Disclaimer

The Marine Design Center's ID/WCN number is 615255 and the point of contact with respect to the ABS Coordination/Engineering Manager Portal (02E) is Mr. Tim Keyser, Timothy.J.Keyser@usace.army.mil, phone: (215) 656-6171.

The Contractor shall ensure that, as a part of its contract with ABS, the Contractor authorizes ABS to disclose to and discuss with the Army Corps of Engineers any Rule or certification criteria issues, design assumptions and their impact on classification and certification, and any other technical considerations on which classification is to be based or which may affect future classification or certification of the vessel.

The Contractor shall authorize ABS to provide the Army Corps of Engineers at its request with a copy of all correspondence related to classification, statutory certification, or other compliance verification for which ABS is responsible as it is promulgated and initially distributed. This is to include drawings and other engineering work requiring ABS approval as well as correspondence generated which relates to such approvals, including all such correspondence dealing with vendors. In addition, the Contractor shall copy the Army Corps of Engineers with correspondence regarding classification, statutory certification, and other compliance verification for which ABS is responsible. The Contractor shall also authorize ABS to establish and maintain contact with other certification, verification, and compliance agents involved on the vessel being built.

Upon request by the COR, the Contractor shall request ABS to furnish the Government with the project comment list. The list shall include open and closed technical and surveyor comments. The surveyor comments shall not only include comments generated during the drawing review process, but also comments generated by the ABS Surveyor during construction inspections. The comment list shall be sent directly from ABS to the COR via email as a .pdf file.

At the completion of the ABS review process, the Contractor shall download all ABS "Eagle Stamped" drawings and provide them in electronic media to the Government in .pdf format.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

ABS Class Documentation
Load Line Certificate
Certificate of Admeasurement
Certificate of Inspection
Official Hull Identification Number
BWTS Certificate of Approval
Master Carpenter's Certificate
Builder's Certification as United States Built
API Certified Hopper Capacity Tables
Certification that communications equipment complies with SOLAS

STANDARDS

See Contract Paragraph C003.

C006 VESSEL IDENTIFICATION

GENERAL DESCRIPTION

The vessel to be acquired through this solicitation has been assigned the following name and Marine Design Center hull and project numbers:

MDC Hull Number	849
MDC Project Number	3010
Vessel Name	TBD

The vessel name has not been selected at this time. For the purpose of initial documents and drawing preparation, the title used shall be:

"CENAP MEDIUM-CLASS HOPPER DREDGE"

Upon selection of the official name for the vessel by the Government, the Contractor shall incorporate the name into all "As-Built" documents and the construction drawing of the name board and hull markings. The MDC hull number shall be used in lieu of an "Official Number".

REQUIREMENTS

None.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

None.

STANDARDS

See Contract Paragraph C003.

C010 DEFINITIONS

GENERAL DESCRIPTION

The following definitions are applicable to phrases and acronyms used throughout this Contract:

ABS - American Bureau of Shipping.
ABS MVR – American Bureau of Shipping Rules for Building and Classing Marine Vessels.
AC – Alternating Current.
ACCU – Automation Centralized Control Unmanned.
AFH – Arc Flash Hazard.
AGM – Absorbed Glass Mat.
AHU – Air Handling Unit.
AIS – Automatic Identification System.
ANSI – American National Standards Institute.
API – American Petroleum Institute.
ARPA – Automatic Radar Plotting Aid.
ASA – Acoustical Society of America.
ASHRAE – American Society of Heating, Refrigerating, and Air-Conditioning Engineers.
ASME – American Society of Mechanical Engineers.
ASTM – American Society for Testing and Materials.
AWG – American Wire Gauge.
BCC – Bridge Control Console.
BERP – Bolted Equipment Removal Patch.
CCTV – Closed-Circuit Television.
CG – Center of Gravity.
CO – Carbon Monoxide.
COG – Center of Gravity.
COG – Course over Ground.
Contract Drawings – Government-provided drawings with which the Contractor shall comply.
VCG – Vertical Center of Gravity.
KG – Vertical Center of Gravity.
C&D canal – Chesapeake and Delaware Canal.
Ch. Eng. – Chief Engineer.
CFR – Code of Federal Regulations.
CL – Centerline.
CPP – Controllable Pitch Propeller.
KO - Contracting Officer - A person with the authority to enter into, administer and/or terminate contracts and make related determinations and findings.
COR - Contracting Officer's Representative - A member of the contract management and quality assurance team authorized by the Contracting Officer to perform certain administrative and managerial duties.
DC – Direct Current.

DEF – Diesel Exhaust Fluid.
DFT – Dry Film Thickness.
DGPS – Differential Global Positioning System
DPS-1 – ABS classification level for performance of Dynamic Positioning System.
DP/DT – Dynamic Positioning/Dynamic Tracking.
DTM – Digital Terrain Map (MODEL).
DTPS – Dredge Track Position System.
DQM – Dredging Quality Management.
EA – Environmentally Acceptable
EAL – Environmentally Acceptable Lubricants.
ECDIS – Electronic Chart Display and Information System.
ECR – Engineer's Control Room.
EMP – Electromagnetic Pulse.
EPA – Environmental Protection Agency.
EPDM – Ethylene Propylene Diene Monomer.
ETA – Estimated Time of Arrival.
FEA – Finite Element Analysis.
FLA – Full-Load Amperage.
FSLC – Floating Service Load Charts.
FSM – Free Surface Moment.
Fy – Yield Stress.
GFCI – Ground-Fault Circuit Interrupter.
GFE – Government Furnished Equipment - Equipment, materials or components furnished by the Government to the Contractor for installation in the vessel.
GHS – General Hydrostatics – Stability calculation software developed by Creative Systems.
GPS – Global Positioning System.
GM – Metacentric Height.
GMT – Transverse Metacentric Height.
HPU – Hydraulic Power Unit.
HT – High Temperature.
HVAC – Heating, Ventilation, and Air Conditioning.
HVM – Hencky-von Mises stress criteria.
IACS – International Association of Class Societies.
IBS – Integrated Bridge System.
IC – Internal Communications.
ID – Identification.
I.D. – Internal Diameter.
IEC – International Electrotechnical Commission.
IEEE- Institute of Electrical and Electronics Engineers.
IFLS – Integrated Forward-Looking System.
ICLL – International Convention on Load Lines.
ILO – International Labor Organization
IMACS – Integrated Monitoring, Alarm, and Control System.
IMO – International Maritime Organization.
ISO – International Organization for Standardization.
KMt – Transverse Metacentric Height above Baseline.
KVA – Kilovolt-Ampere.
LBP – Length Between Perpendiculars.
LED – Light Emitting Diode.
LHE – Load Handling Equipment.
LT – Long Ton – 2240 pounds.
LCG – Longitudinal Center of Gravity.
LMI – Load Monitoring Indication.
MARPOL – International Convention for the Prevention of Pollution from Ships.

MCHD – Medium Class Hopper Dredge.
MCT – Multi Cable Transit.
MDC - Marine Design Center.
MFD – Multifunction Display.
MSC – Marine Safety Center.
MSD – Marine Sanitation Device.
MTBF – Mean Time Between Failures.
MTN – Marine Safety Center Technical Note.
NAA – Naval Architecture Analysis.
NAVSEA – United States Naval Sea Systems Command.
NEMA – National Electrical Manufacturers Association.
NMEA – National Marine Electronics Association
NFPA – National Fire Protection Association.
NLT – Not Later Than.
NPSH – Net Positive Suction Head.
NSRP – National Shipbuilding Research Project.
NTSC – National Television System Committee.
NVIC – Navigation and Vessel Inspection Circular.
OEM – Original Equipment Manufacturer.
OSHA – Occupational Safety and Health Administration.
PA – Public Address.
PE – Professional Engineer.
PPE – Personal Protective Equipment.
ppm – parts per million.
psig – pounds per square inch gauge.
QC - Quality Control. Quality Control is a function of the Contractor. Quality Assurance (QA) is a function of the Government.
RDF – Radio Direction Finder.
Reference Drawings – Government-provided drawings intended to supply additional information.
RMS – Root Mean Square.
ROV – Remotely-Operated Underwater Vehicle.
RPE – Registered Professional Engineer.
RTD – Resistance Temperature Detector.
SAE – Society of Automotive Engineers.
SAWE – Society of Allied Weight Engineers.
SCADA – Supervisory Control and Data Acquisition System.
SG – Specific gravity.
SMACNA – Sheet Metal and Air Conditioning Contractors' National Association.
SNAME – Society of Naval Architects and Marine Engineers.
SOG – Speed Over Ground.
SOLAS – Safety of Lift at Sea.
STC – Sound Transmission Class.
Subchapter I – 46 CFR Parts 90 to 98: Cargo and Miscellaneous Vessels.
TCC – Time Current Curve.
TDH – Total Dynamic Head.
TED – Turtle Exclusion Device.
TEFC – Totally Enclosed, Fan-Cooled.
TSHD – Trailing Suction Hopper Dredge.
TPI – Tons per Inch Immersion.
T&S – Trim and Stability.
UL – Underwriter Laboratories.
USACE - United States Army Corps of Engineers.
USCG – United States Coast Guard.
USPHS – United States Public Health Service.

UTC – Coordinated Universal Time.
UV – Ultraviolet Light.
VAC – Volts Alternating Current.
VDC – Volts Direct Current.
VDR – Voyage Data Recorder.
VFD – Variable Frequency Drive.
VOC – Volatile Organic Compound.
WBS – Work Breakdown Schedule.
WERP – Welded Equipment Removal Patch.
WHO – World Health Organization.
WT – Watertight.

REQUIREMENTS

None.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

None.

STANDARDS

See Contract Paragraph C003.

C025 CONTRACTOR QUALITY STANDARDS

GENERAL DESCRIPTION

None.

REQUIREMENTS

The Contractor shall be responsible for the construction of a complete and functioning vessel.

Inspection by the Government is for the purpose of verifying the proper function of the Contractor's quality control measures and is not to be used as a substitute for control of quality by the Contractor.

Every effort shall be made during production planning to construct the vessel in an efficient sequence minimizing re-work and repair. See Section H of this Specification.

SPECIFIC REQUIREMENTS

Structural Materials

Unless otherwise specified, all structural hull material shall be in accordance with the following specifications:
American Bureau of Shipping (ABS), "Rules for Building and Classing Marine Vessels".
Welding Materials - ABS "Approved Welding Electrodes, Wire-Flux and Wire Gas Combination."
Bolts, nuts and screws – ASTM A307-14, Specification for Carbon Steel Bolts, Studs, and Threaded Rod.

Standard Parts and Materials

All articles, fittings, equipment, machinery, supplies, and materials used in the construction and outfitting of the vessel shall be new, of the highest grade, free from defects and imperfections, and be the standard product of reputable manufacturers, to the maximum extent practicable. Any material not specified shall be the best of their kind for the purpose intended. All items shall be suitable for ocean service and meet the latest requirements of standard specifications published by National Agencies. No salvaged materials shall be used in the works. Spare parts and service shall be readily obtainable.

Workmanship

All labor shall be especially skilled for each kind of work and under competent direction. Where work of one trade joins, passes through, or is on other work, there shall be no discrepancy or misfit when completed. In engaging one kind of work with another, marring or damage of previously acceptable construction shall be cause for rejection. All parts of the vessel intended to join or bear upon other parts shall have complete and solid contact and shall fit together without excessive cold work during erection. All faying surfaces shall be painted and be clean and smooth before bolting up. Shims or liners shall not be used for the purpose of overcoming a bad fit.

All frames and longitudinal members, where applicable, shall be provided with limber holes and/or snipes of adequate size to allow water in bilges to flow to the lowest point of each compartment. Limber holes shall also be provided to allow for the passage of air in tanks. Limber holes shall be located at the plate edge.

Ends of outstanding flanges shall be cropped. Lighting holes may be punched or flame-cut and all edges shall have burrs removed.

All holes for machinery mounting bolts shall be drilled or punched; burning is not acceptable. Holes in members having sharp curvature shall be avoided.

All hull castings and forgings shall be machined or ground to bear solidly against the connecting structure.

Welders

All welding under this contract shall be done only by welders who have successfully passed qualification tests accepted by the American Bureau of Shipping or other regulatory agency acceptable to ABS. The Contractor shall bear the expense of conducting these tests and shall certify by name to the Contracting Officer welders who have successfully passed the prescribed tests and hold current, valid certifications.

The list of certified welders shall be submitted during Phase II of the Contract as 849-C025-01 LIST OF CERTIFIED WELDERS. The list shall include the employee's name, certification(s), and date(s) of the most recent tests for each certification(s).

The Contractor shall require any welder to repeat these tests when, in the opinion of the COR, the work of the welder indicates a reasonable doubt of their proficiency. In such cases the welder shall be re-certified as above if they successfully passed the retest; otherwise, they shall be disqualified until they have successfully passed the retest.

The Contractor shall maintain records of the individual welder's certification during the course of the Contract. The records shall be available for examination upon request of the Contracting Officer or their representative.

Welding

All welding shall be in accordance with the current rules of the American Bureau of Shipping, except where stated otherwise. All welding equipment used on the work shall be of a modern type subject to close control. The electrodes used throughout the work shall be suitable for use with the parent metal at each weld and shall be approved by ABS.

Welding procedures, as to direction, length, numbers, and sequence of beads, shall be carefully planned to minimize lock-up stresses. Care shall be exercised to produce smooth even beads, especially on all exposed plating and fittings. Beads shall be ground where directed by the Contracting Officer or their authorized representative.

The Contractor shall employ appropriate welding procedures and grounding connections to preclude the possibility of anodic erosion of the hull after launching.

A detailed description of all welding procedures being employed in the construction shall be available to the Contracting Officer or their authorized representative.

Installation

Materials and equipment shall be installed in accordance with the approved recommendations of the manufacturer and in compliance of this specification and the Contract documents. The installation shall be accomplished by workers especially skilled for each kind of work and under competent direction.

Plate Fairness

Steel plating shall be installed using proper welding procedures and sequences to ensure fair, undistorted plating panels. The use of filler materials to surface unfair areas is not acceptable.

Maximum allowable plating distortion is depicted in the IACS "Guide No. 47". Distortion shall not exceed the amounts in this guide.

Construction Standards

All material, machinery and equipment shall be new, of current manufacture, and suitable for the marine service intended. Spare parts and service shall be readily obtainable.

All material, unless otherwise specified in this specification or in the drawings, shall be of commercial quality to ABS, ASTM, ANSI, or SAE specifications.

During construction and before delivery, the Contractor shall be responsible for protection of all material, equipment, etc., intended for the vessel.

All materials shall be free of imperfections due to manufacturing processes and from defects which adversely affect appearance or serviceability.

All plating shall be neatly cut, fitted, and welded. All sharp edges or projections which constitute a personnel hazard shall be removed or ground smooth. All notches shall have a radius to prevent stress concentrations.

Where aluminum must be attached to dissimilar metals or between dissimilar alloys of aluminum, fasteners shall be stainless steel of an approved design with insulation as required to eliminate metal to metal contact.

All galvanizing shall be done after fabrication by the hot dip process, and the zinc shall be not less than 98% pure. In instances where some types of metals cannot be hot dip galvanized, zinc silicate coating may be substituted at the discretion of the COR.

SPECIAL FEATURES

None.

DELIVERABLES

849-C025-01 LIST OF CERTIFIED WELDERS

STANDARDS

ABS Rules for Building and Classing Marine Vessels

IACS "Guide No. 47" Shipbuilding and Repair Quality Standard.

ASTM A307-14, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod.

C040 SCOPE OF WORK

GENERAL DESCRIPTION

In accordance with these specifications and design standards, the Contractor is responsible for design, construction, performance of tests and trials, and final delivery of the vessel. This work shall be performed under the four phases of the contract.

REQUIREMENTS

After the Contract is awarded, the services to be provided by the Contractor shall be structured and managed by the Marine Design Center, in the four phases as follows:

Phase I……..Planning & Scheduling
Phase II……..Engineering
Phase III……...Construction & Tests
Phase IV……Test, Sea Trials, & Delivery

During all phases of this Contract, the Contractor is authorized to use the services of Subcontractors performing under the Contractor's direction and supervision; however, the Contractor shall assume the full responsibility for the Subcontractors' work.

SPECIFIC REQUIREMENTS

Contract Phases

Phase I – Planning & Scheduling

During this phase of the contract, the Contractor shall prepare and submit their documentation for the planning and scheduling of the Contract. The documentation required is outlined in Section H of the specifications. This documentation shall be submitted to the Government for review during Phase I.

Phase II – Engineering

The Contractor shall prepare drawings and calculations for the design and classing of the vessel as required by these specifications and regulatory agencies during this phase of the contract. During the engineering phase of the contract, the Contractor shall submit drawings to the Government and regulatory agencies for review of the design.

The requirements for the Phase II drawing submissions as well as the development of the drawings are outlined in Section H of the specifications.

Phase III – Construction, Tests & Trials

During this phase, the Contractor shall construct, test, and trial the vessel. Inspection and testing requirements that must be performed for the Government include Level 1 through Level 3 tests as described in Section E of these specifications. The Contractor is responsible for ensuring that all regulatory bodies inspect and witness all tests and trials required to obtain class.

Phase IV – Delivery

During this phase, the Contractor shall test, trial, and deliver the vessel to the location identified in Section F of the Contract. Inspection and testing requirements that must be performed for the Government include Level 1 through Level 3 tests as described in Section E of these specifications. The Contractor is responsible for ensuring that all regulatory bodies inspect and witness all tests and trials required to obtain class.

SPECIAL FEATURES

Drawings Provided and Required

Contract and Reference Drawings Provided

Contract Drawings and Reference Drawings that are part of this solicitation are listed in contract Section J. All Contract and Reference Drawings will be available to the successful bidder in CAD, Excel, or PDF format as applicable.

Contract Drawings that are part of this solicitation shall be complied with. Reference Drawings that are part of this solicitation are intended to provide useful information that may have application to this procurement. The exact details presented in the Reference Drawings may not reflect the specific needs of the dredge but present the Contractor with a methodology to develop a specific system or design feature as identified in the specification. The Contractor shall not build from any Reference Drawing. It is the responsibility of the Contractor to use the written specifications along with the Contract and Reference Drawings to properly develop the final design and engineering drawings in order to construct the dredge.

Final Design Drawings Required

Contract Section H, Paragraph H12, Engineering and Drawings, contains a list with the minimum drawings/calculations required to be developed by the Contractor for the final design.

For clarification purposes, the list in contract Paragraph H12 details the drawings by action groups. The action groups distinguish between separate categories based upon the engineering requirements to be completed by the Contractor. The following is a description/definition of these categories:

Drawings to Be Developed:

> The Contractor shall develop drawings to achieve a final design to conform to the requirements of this solicitation. These drawings have been identified but do not currently exist. These drawings shall be developed and submitted to the Government and, if required for class, ABS for review and approval.

As-Built Drawings:

> The Contractor shall provide a complete “As-Built” record of the vessel. The requirements for the “As-Built” drawings are further defined in contract Paragraph H14.

As stated above, ABS may require some drawings to be submitted for review and approval in order to obtain class. It is the Contractor’s responsibility to coordinate and contract with ABS for any such reviews.

DELIVERABLES

None.

STANDARDS

See Contract Paragraph C003.

C099 DESIGN COMPENDIUM

GENERAL DESCRIPTION

The Contractor shall develop and maintain a design history of his involvement in the project. This history will be referred to as the Design Compendium.

REQUIREMENTS

The Design Compendium is intended to record and document the design and construction process. The Compendium shall capture the basis of design and/or the design decisions made, for the Government to reference at a future point.

The Design Compendium shall be organized by Contract Paragraph, including only those Paragraphs having design history content.

Design data and calculations are to be clearly presented and easy to follow, with stated introduction, purpose, assumptions, references, method of calculation, discussion of results, summary of results and conclusions. Where calculations are contained in a specific Contract Deliverable, the Contractor may reference the deliverable rather than reproduce the calculations in the Design Compendium.

The design process shall be presented in a clear path indicating the selected design data as well as the rejected or voided data, and the engineering analysis which lead to each selection/rejection. All background engineering, catalog "cut" sheets, and vendor material validation sheets are included in the Design Compendium.

The Design Compendium shall be submitted in its final form, including the construction process, as an "As-Built" document. The document shall be labeled 849-D099-01 DESIGN COMPENDIUM.

SPECIFIC REQUIREMENTS

The Design Compendium shall contain a table of contents. Each section shall contain:

Applicable rules and regulations
Correspondence/phone conversation records
Calculations
Design sketches
Equipment selection
Catalog "cut" sheets

SPECIAL FEATURES

None.

DELIVERABLES

849-D099-01 DESIGN COMPENDIUM

STANDARDS

See Contract Paragraph C003.

C100 SCIENTIFIC

GENERAL DESCRIPTION

None.

REQUIREMENTS

Each scientific report (WBS 100 Series) shall contain a Table of Contents, Executive Summary, Introduction (applicability, purpose, and principal vessel characteristics), Definitions, References, Criteria/Requirements, Calculation Notes, GHS model information/arrangements, Summary of Results, and all calculations.

All calculations/reports shall be submitted in English units.

At the request of the Contractor, the Government will furnish sample scientific reports for reference.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

None.

STANDARDS

See Contract Paragraph C003.

C101 STABILITY CALCULATION SOFTWARE

GENERAL DESCRIPTION

None.

REQUIREMENTS

All stability calculations for the vessel shall be performed using General Hydrostatics (GHS), developed by Creative Systems, Inc. of Port Townsend, WA. The Contractor shall develop the geometry (.gf) file for the vessel. The same geometry file shall be used in all stability calculations. Stability related submittals shall include the GHS Run Files (.rf) used to set up the calculations, the GHS output Print Files (.pf), and a copy of the geometry file used for the calculations. The geometry file and all GHS calculations shall use Imperial units (feet, inches, long tons, etc.). A preliminary geometry file shall be reviewed and approved by ABS and the COR during Phase II. Following the inclining experiment, the geometry file shall be updated to reflect the final as-built condition and shall receive final approval from ABS.

SPECIFIC REQUIREMENTS

The geometry file defines the shape of the entire vessel. The hull form shall be developed from the Hull Lines & Offsets (see Contract Paragraph C105). The hull form shall be divided into watertight compartments as delineated by the vessel's structural drawings.

The structure of the geometry file shall follow the recommendations of Creative Systems, including but not limited to the following:

The geometry file shall be organized in a hierarchy
Parts are the highest level. There are three kinds of parts – Displacers (hull), Containers (compartments/tanks), and Sails (portions modeled only for the purpose of generating wind heeling moments)
Each part is made up of one or more components (e.g. Hull, keel, skeg, etc.)
Components are defined by shapes
Each shape is defined by one or more sections (2-D curves)
Components on the port side shall have the .p extension

Components on the starboard side shall have the .s extension
Components which span the centerline of the vessel shall have the .c extension.

The origin used in the geometry file shall match that of the Trim and Stability Book (see Contract Paragraph C161).

The geometry file shall contain definitions for all watertight compartments of the hull, including all integral and independent tanks. Watertight compartment definitions shall include the assigned permeability in accordance with USCG Rules. Tank definitions shall include the geometry of each tank, the assigned permeability, as well as the standard specific gravity of the tank contents. The sounding tube for each tank shall be modeled in accordance with the as-built drawings. Where curved sounding tubes are used on the vessel, they shall be modeled as such in the geometry file.

The geometry file shall contain deductions for all non-buoyant areas of the hull such as sea chests, cooler voids, thruster wells, etc. The geometry file shall also contain appendages for all buoyant additions to the hull.

The superstructure, cranes, stacks, and other areas contributing to the vessel's wind profile shall be modeled as "Sail" parts. Such parts do not contribute to the vessel's buoyancy/displacement but are considered for wind heeling moment calculations.

Shell thickness shall be included for all hull parts and components to ensure accurate displacement and volume calculations.

The geometry file shall contain any and all "Critical Points" used in the stability analyses.

The deck edge shall be marked at each station in the geometry file.

SPECIAL FEATURES

The hydrostatics and stability data generated by GHS and the vessel's stability program (see Contract Paragraph C161) shall match within the tolerances specified by ABS MVR Part 3, Chapter 3, Appendix 7.
Following the API Survey of the hopper (see Contract Paragraphs C002 and C130), the Contractor shall adjust the geometry of the hopper in the GHS file as required to ensure that the volume and centers of gravity of the GHS file and the actual as-built hopper match within 1% over the entire range of hopper filling levels.

DELIVERABLES

849-C101-01 GHS GEOMTERY FILE

STANDARDS

ABS Rules for Building and Classing Marine Vessels, Part 3, Chapter 3, Appendix 7: Computer Software for Onboard Stability Calculations

C105 HULL GEOMETRY

GENERAL DESCRIPTION

The vessel shall be a round bilge monohull trailing suction hopper dredger designed for year-round maintenance dredging, at open sea and in busy waterways. Operational characteristics are further defined in Contract Paragraph C002. The hull form shall be designed and optimized for (twin or triple screw) Z-drivepropulsion in shallow water during both dredging and free sailing operations.

REQUIREMENTS

The vessel's principal characteristics shall be according the characteristics as defined in Contract Paragraph C002.

The Contractor shall develop and submit a hull lines plan and table of offsets (849-C105-01 HULL LINES & OFFSETS) to the COR during Phase II of the contract for review and approval.

The Contractor shall develop a GHS geometry file of the hull in accordance with the requirements of Contract Paragraph C101

SPECIFIC REQUIREMENTS

A raised focsle shall be provided to reduce deck wetness. The shape above the DWL shall have moderate flair to avoid wave slamming in bad weather. Bow bulbs are acceptable.

The midbody section shall have a round bilge and the hull sides (P/S) shall be as straight as practical (no shape).

The aft body shall be designed and optimized for the selected Azimuthing Thruster propulsion system, and for good maneuverability during dredging operations.

The hull shall be optimized for shallow water operation. Shallow water shall be taken as defined in Contract Paragraph C002. Special attention shall be given to assuring sufficient water flow to the propellers in shallow water at both transit speed and dredging speed.

The main deck shall have minimal forward shear.

The upper deck shall have minimal camber.

The house top shall be sloped aft.

SPECIAL FEATURES

None.

DELIVERABLES

849-C105-01 HULL LINES & OFFSETS

STANDARDS

See Contract Paragraph C003.

C115 WEIGHT ESTIMATE & CG CONTROL

GENERAL DESCRIPTION

The Contractor shall implement a careful weight estimating, control and monitoring procedure and shall conduct an inclining experiment and deadweight survey. Accurate estimation and tracking of weight and CG data are critical to ensuring the stability and load-carrying capacity of the vessel upon delivery. Weight tracking is also critical to compliance with the Jones Act (see Contract Paragraph C004). The inclining experiment prior to delivery will be witnessed by class and a client representative.

REQUIREMENTS

Weight estimation, calculation, control, reporting and monitoring shall be in accordance with SAWE RP M-2, STD M-4, RP M-7, RP 14 and RP 17. The Weight Control Program shall be Class A as defined by SAWE RP M-7. The Contractor shall use the USACE WBS, instead of the MARAD class mentioned in the SAWE standards, however, same concept and intent is to be applied.

The Contractor shall develop a weight estimating, control and monitoring plan, describing the intended weight estimate development method during the course of the project. The plan shall include items provided in SAWE M-4 plus a description of the intended method of weight monitoring and level of detail per design phase, frequency weight and CG updates, and the Contractor proposed service life margin. The sections below shall be incorporated in this plan.

The weight estimating, control and monitoring plan shall be named and numbered 849-C115-01 WEIGHT CONTROL PLAN and be submitted to the COR for review and approval.

The Contractor shall develop a Weight and CG Estimate in accordance with the standards listed above and the WEIGHT CONTROL PLAN. The Weight and CG estimate shall be named and numbered 849-C115-02 WEIGHT AND CG ESTIMATE and be submitted to the COR for review and approval.

During Phase II and III, the Contractor shall further develop the Weight and CG Estimate with at least monthly updates, to ensure no adverse weight or trim conditions occur. Weight and CG estimate updates shall reflect actual equipment, locations, quantity and location of piping and wiring runs, actual quantity and location of outfitting items, and any changes to the structural weight and centers of gravity.

SPECIFIC REQUIREMENTS

Weight and COG Margins

The Contractor shall apply appropriate margins based on the level of detail in each section. An appropriate percent margin shall be included based on the detail level of information used for the estimate. At a minimum the following guidelines shall be used:

10% margin on weights estimated from references

5% margin on weights extracted from preliminary engineering models (e.g. steel plate model)

2% margin on vendor furnished information

On all steel weight items; 5% Welding allowance + 3% Rolling margin

On total steel weight calculation from detail structural 3D design model a 2% non-integrated foundations margin

During Phase II of the Contract a 5% VCG margin shall be applied to the total weight estimate.

During Phase III of the Contract a 2% VCG margin shall be applied to the total weight estimate.

As part of the Weight Control Plan, the Contractor shall propose an appropriate Service Life Margin for approval by the COR.

Quarterly Weight Reports

The Contractor shall develop and submit Quarterly Weight Reports, in accordance with the structure and requirements provided in SAWE M-7 paragraphs 5.4 and 5.10. The report shall be named and numbered 849-C115-03 QUARTERLY WEIGHT REPORT and be submitted to the COR for review and approval.

The update shall reflect actual equipment, locations, quantity and location of piping and wiring runs, actual quantity and location of outfitting items, and any changes to the structural weight and centers of gravity.

Final Weight Reports

The Contractor shall develop and submit a Final Weight Report, in accordance with the structure provided in SAWE M-7 paragraph 6.1. The report shall be named and numbered 849-C115-04 FINAL WEIGHT REPORT and be submitted to the COR for review and approval.

Final steel weights shall reflect actual as-built scantlings. A verification of the final weight and center of gravity will be made against those determined by the inclining test and deadweight survey, inclining experiment and Deadweight Survey.

Longitudinal Weight Distribution Report

In addition to the Final Weight Report, the Contractor shall provide the Government with an as-built Longitudinal Weight Distribution Report, prepared in accordance with the requirements of SAWE RP-17. The weight distribution shall match that used for the final Longitudinal Strength calculations (see Contract Paragraph C300), as well as that used in the vessel's stability software (see Contract Paragraph C161).

The Longitudinal Weight Report shall be named and numbered 849-C115-05 LONGITUDINAL WEIGHT REPORT and be submitted to the COR for review and approval.

Weight correction non-US market specific design

For all non-US market specific designs, adequate attention shall be given assuring the weight estimation is based on US available equipment and materials. Special attention shall be given to US common available steel plate thicknesses, sizes and materials.

Steel weights shall reflect actual construction scantlings with special attention given to areas where metric sections are upsized to the nearest available US size. The weight estimate shall include vertical, longitudinal, and transverse centers of gravity.

Incline Experiment

During Phase III of the Contract, the Contractor shall develop the incline experiment plan, direct the inclining experiment, record all data, and complete the inclining experiment report.

Upon completion of all work, with the vessel in the lightship condition, the Contractor shall conduct an inclining experiment and deadweight survey in accordance with ASTM F1321-14 and in the presence of the regulatory body representative.
The Contractor shall be responsible for providing all inclining weights, pendulum setups, support equipment, and personnel at their own expense
The Contractor shall develop the inclining experiment plan and submit it to the COR and regulatory bodies (ABS and/or USCG) for approval as 849-C115-06 INCLINE TEST PLAN. Once the experiment plan is approved, the Contractor shall notify the COR and regulatory bodies ten (10) business days prior to the experiment. The experiment results shall be submitted to the COR and regulatory bodies as 849-C115-07 INCLINE TEST RESULTS.

SPECIAL FEATURES

Please note that the vessel requires a Subchapter I COI and therefore the stability of the vessel, including the lightship displacement and centers, will require approval from regulatory bodies. Approval of stability documents shall occur prior to Open Water Trials (see Contract Section E).

The lightship weight shall include the weight of liquids in piping systems (system fillings). Special attention shall be given towards dredge system liquid weights. The dredge system fluid weights shall be calculated by assuming all dredge lines below the dredge load line are filled with seawater.

DELIVERABLES

849-C115-01 WEIGHT CONTROL PLAN
849-C115-02 WEIGHT AND CG ESTIMATE
849-C115-03 QUARTERLY WEIGHT REPORT
849-C115-04 FINAL WEIGHT REPORT
849-C115-05 LONGITUDINAL WEIGHT REPORT
849-C115-06 INCLINE TEST PLAN
849-C115-07 INCLINE TEST RESULTS

STANDARDS

ASTM F1321-14, Standard Guide for Conducting a Stability Test to Determine the Light Ship Displacement and Centers of Gravity of a Vessel
SAWE RP M-2:2009, Standard Coordinate Systems for Reporting Mass Properties of Marine Vehicles
SAWE Standard M-4:2019, Supplier Weight Control for the Marine Industry
SAWE RP M-7:2017, Weight Control Technical Requirements for MSC and Similar Ships, Commercial Ships, and Other Small Craft
SAWE RP 14:2001, Weight Estimating and Margin Manual for Marine Vehicles
SAWE RP 17:2009, Weight Distribution and Moments of Inertia for Marine Vehicles

C120 RESISTANCE & PROPULSION

GENERAL DESCRIPTION

None.

REQUIREMENTS

The Contractor shall prepare a resistance and propulsion calculation 849-C120-01 RESISTANCE AND PROPULSION during Phase II of the Contract for submittal to the COR and regulatory bodies for review and approval.

The resistance and propulsion calculation shall be developed by an experienced organization with ample experience in resistance and propulsion calculations for vessels of similar size and type. All calculations shall be performed for deep water and shallow water as defined in Contract Paragraph C002 where the additional wave resistance is considered.

The resistance and propulsion calculation shall cover 6 sailing conditions:

A transit condition with a full hopper, in deep water, at maximum draft with drag head(s) onboard and bottom doors closed.
A transit condition with a full hopper, in shallow water, at maximum draft with drag head(s) onboard and bottom doors closed.
A dredging condition at maximum draft with the drag heads and turtle deflector on the seabed, at max dredging depth, and dredge piping employed and bottom doors closed
Dredging South-West Pass at 65-foot dredging depth, drag heads on the seabed and dredge piping employed and bottom doors closed, 6 knots counter current making 2 knot headway.
A transit condition, in deep water, with 100% stores and 50% consumables and hopper filled with water with drag head(s) onboard and bottom doors closed.
A transit condition, in shallow water, with 100% stores and 50% consumables and hopper filled with water, with drag head(s) onboard and bottom doors closed.

The resistance calculation shall cover the full range of operating speeds including 1.0 knot below and above the expected operating range with an interval of 0.5 knots. The calculation shall indicate the wave resistance, frictional resistance, appendage resistance, drag head and dredge piping resistance, air drag of portions above water and total resistance of the towed vessel in water and air.

Shallow water shall be taken as defined in Contract Paragraph C002.

The propulsion calculation shall cover all sailing conditions as provided above.

The propulsion calculation will cover the full range of operating speeds including 1.0 knot below and above the expected operating range with an interval of 0.5 knots. The calculation should indicate the total resistance of the vessel, drag arms and drag heads, propeller & nozzle efficiency, wake fraction, thrust deduction fraction, propeller revolutions, propeller torque, propeller tip speed, shaft power, gear efficiency and motor power and torque.

SPECIFIC REQUIREMENTS

The Speed/Power estimate shall be verified by RANS calculations as described in Contract Paragraph C121.

The Contractor shall optimize the propeller size, pitch, and blade area in relation with overall propeller efficiency, and blade cavitation. As further described in Contract Paragraph C121 and C606.

The Contractor shall develop and submit a calculation of the expected fuel consumption per day based on engine loads of main and auxiliary engines which includes propulsion power and auxiliary power demands from vessels operational systems (849-C120-02 FUEL CONSUMPTION CALCULATION) to the COR during Phase II of the contract for review and approval.

The fuel consumption is to be calculated using the operational profile as described in Contract Paragraph C002.

SPECIAL FEATURES

The propulsion drive system shall be designed such that the propeller & nozzle can provide full propulsion motor power over vessel through-the-water speed range from 8 knots to max transit speed (12 knots), with a fixed pitch propeller. The motor rated power rpm range, gearing, shafting, and propeller design shall be coordinated together such that full motor power is provided over the propeller rpm range required to absorb full motor power over the vessel speed range from 8 knots to 12 knots. See section C 605

DELIVERABLES

849-C120-01 RESISTANCE AND POWER PREDICTION
849-C120-02 FUEL CONSUMPTION CALCULATION

STANDARDS

See Contract Paragraph C003.

C121 CFD ANALYSIS AND VALIDATION

GENERAL DESCRIPTION

In addition to the resistance and powering analysis described in Contract Paragraph C120, the Contractor shall also perform CFD analysis and validation on other areas of the vessel design as described below.

Hull, Azimuthing Thusters and Bow Thruster designs all need to address multiple dredging operations, and multiple dredge-specific site conditions.

REQUIREMENTS

The Contractor shall conduct the validations listed in Sub-paragraph C for each of the six conditions listed above in Contract Paragraph C120 and the following conditions:
A maneuvering condition, full propulsion power ahead, near bollard condition (1 knot ahead), hopper full and hopper free flooded
A maneuvering condition, full propulsion power astern, near bollard condition (1 knot astern), hopper full and hopper free flooded

Validations shall be performed using Reynolds-Averaged Navier-Stokes equations (RANS) or similar viscous flow simulation software. These calculations shall be performed by the same organization used for the resistance and propulsion study in Contract Paragraph C120.

The simulations shall be based on a self-propulsion numerical model incorporating the actual propeller (or propeller with nozzle) to be used together with struts and rudders (or with azimuthing propulsor housing if used).

Vessel features that cause significant hydrodynamic effects, such as azimuthing thrusters, bow thruster openings, and hopper doors, shall be included in the hull model. In addition, for dredging operational conditions, the additional drag due to the drag heads, turtle deflectors and drag arms shall be included in the model. All calculations shall be performed for deep water and shallow water as defined in Contract Paragraph C002.

For each validation scenario, the Contractor shall use the results of the CFD calculations to calculate the predicted fuel consumption of the vessel.

SPECIFIC REQUIREMENTS

Installed Power Validation

The Contractor shall show, based on the results of CFD analysis, that the installed machinery is sufficient for dredge operations over the full operating profile range described in Contract Paragraphs C002 and C120.
The Contractor shall use RANS calculations to validate the Speed/Power estimate submitted as part of the proposal and show that it will cover all of the operating conditions required by this Contract Paragraph. These calculations shall include the additional drag due to dredging components as identified above. The Contractor shall provide reference data from similar vessels to validate the drag prediction methods of the dredging components.
The Contractor shall verify that the Diesel-Electric generator power is sufficient to supply the demands of both propulsion and dredge equipment, in the worst-case dredging conditions, without reduction in dredging system power.
The details of the power and speed analysis and validation shall be detailed in report 849-C121-01 POWER AND SPEED VALIDATION CALCULATIONS and submitted to the COR for review and approval during Phase II.

Propellers and Nozzles

Propellers shall be designed to provide cavitation free operation for all of the operational conditions identified above. It is recognized that the blade areas required for the 8 knot full motor power requirement, as well as for dredging speed conditions will reduce propeller efficiency for the higher vessel speed operations.
Nozzles shall be configured to provide good performance over the vessel speed range. Note backing profile nozzles are not required for azimuthing propulsors.
For additional propeller and nozzle requirements, see Contract Paragraph C606.

The propeller design shall be incorporated into the noise and vibration analysis in Contract Paragraph C180. If the propeller design results in excessive vibration or noise, then the propeller design shall be modified so vibration and noise are acceptable.
Propeller calculations shall be documented in report 849-C121-02 PROPELLER DESIGN AND PERFORMANCE CALCULATIONS and submitted to the COR for review and approval during Phase II.

Azimuthing Propulsors (Z or L Drive)

Propulsive power and steering force shall be developed for the full 360-degree range of propeller azimuth. Hull stern interaction with propeller outflow, and effect on thrust shall be specifically addressed for azimuth angle ranges where the propeller outflow impinges on the hull. Azimuth interaction angle ranges, where inflow and outflow from the two thrusters can interact to degrade performance or to cause vibration, shall be identified. For additional steering requirements, see Contract Paragraphs C612 and C615.
Azimuthing propulsor calculations shall be documented in report 849-C121-03 AZIMUTHING PROPULSOR DESIGN AND PERFORMANCE CALCULATIONS and submitted to the COR for review and approval during Phase II.

Bow Thruster

The flow over the bow thruster hull openings shall be modelled and identified, and the effective full rated thrust operation of the bow thruster shall be verified for maneuvering at hull through water speeds in the worst-case dredging conditions.
In addition, the bow thruster sizing (in conjunction with the Azimuthing thrusters) shall be shown to be adequate to turn the dredge, with hopper full, 180 degrees against the maximum current identified in Contract Paragraph C002.
Vessel speed through the water, at which degradation of the flow into the bow thruster reduces bow thruster performance, shall be identified.
For additional bow thruster requirements, see Contract Paragraph C620.
Bow Thruster calculations shall be documented in report 849-C121-04 BOW THRUSTER DESIGN AND PERFORMANCE CALCULATIONS and submitted to the COR for review and approval during Phase II.

Dredge Track Validation

The hull, propeller and rudder model shall be used to validate that the dredge can maintain dredging line along the length of the cut for the dredging sites in the operating profile that include cross currents and or cross winds. Performance shall be verified without use of the bow thruster. Required propulsion power levels and rudder angles shall be identified for these conditions. If differential propeller power and thrust, and/or "crabwise" vessel orientation along the dredging line is required to maintain dredging line in the cross current and cross wind condition, the specific differential power and thrust levels, rudder angles, and crab angle, shall be identified for each condition where they are required.
Forces on the hull from the cross current shall be calculated as part of the RANS analysis. Forces on the hull (above water area and shape) from the cross wind shall be calculated using RANS or similar applied for wind, and for the hull above water areas. Wind forces shall be developed using detailed modeling of the vessel above water shape.
Dredging validation calculations shall be documented in report 849-C121-05 DREDGING PERFORMANCE VALIDATION CALCULATIONS and submitted to the COR for review and approval during Phase II.

SPECIAL FEATURES

None.

DELIVERABLES

849-C121-01 POWER AND SPEED VALIDATION CALCULATIONS
849-C121-02 PROPELLER DESIGN AND PERFORMANCE CALCULATIONS
849-C121-03 RUDDER (or AZIMUTH PROPULSOR) DESIGN AND PERFORMANCE CALCULATIONS
849-C121-04 BOW THRUSTER DESIGN AND PERFORMANCE CALCULATIONS

849-C121-05 DREDGING PERFORMANCE VALIDATION CALCULATIONS

STANDARDS

See Contract Paragraph C003.

C125 HYDROSTATICS

GENERAL DESCRIPTION

None.

REQUIREMENTS

The Contractor shall prepare 849-C125-01 HYDROSTATIC CALCULATIONS during Phase II of the Contract and submit it to the COR and the regulatory bodies for review and approval.

The hydrostatic calculations shall be in tabular form and completed for draft ranges from 1-foot above baseline to the lowest point of down flooding in 3-inch increments and trim ranges that cover all expected loading conditions with 1-foot trim increments. The tabulated hydrostatic curves may be plotted on a standard D size drawing or 8-1/2" by 11" paper. Resulting calculations shall be presented in graphic form on a grid background. Hydrostatic tables and graphic are to be provided for the vessel with a closed and open hopper for both fresh and salt water.

The hydrostatic ship model should include details such as shell thickness, rudders, propellers, sea chests, bow thruster openings and the cargo (hopper) volume (See Contract Paragraph C101).

Two separate sets of tables and curves shall be included, one for sea water, one for fresh water, curves are to include as a minimum:

Displacement full and molded
Center of buoyancy (LCB, VCB)
Tons per inch immersion (TPI)
Longitudinal center of flotation (LCF)
Transverse and longitudinal metacentric heights (KM_L, KM_T)
Moment to trim one inch (MTI)
Block, prismatic and waterplane coefficients (C_b, C_p, C_w)

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

The vessel can operate:

with the hooper doors closed and sealed, for empty/dry hopper, or hopper filled with material, or:

with the hopper free flooded

Accordingly, hydrostatics shall be provided for hopper sealed, and hopper free flooded hull configurations.

DELIVERABLES

849-C125-01 HYDROSTATIC CALCULATIONS

STANDARDS

See Contract Paragraph C003.

C130 TANK CAPACITIES

GENERAL DESCRIPTION

None.

REQUIREMENTS

The Contractor shall prepare drawing 849-C130-01 CAPACITY PLAN during Phase II of the Contract for submittal to the COR and regulatory bodies for review and approval.

The Capacity Plan shall show the location of all tanks on an arrangement clearly indicating the ID, purpose, net volume, longitudinal CG, vertical CG, transverse CG and start/end frame of each tank.

A “deadweight scale” or “loading scale” shall be added to the Capacity Plan including the deadweight, displacement, moment to alter trim, TPI and KMt of the vessel for drafts ranging from 6’ above base to the deck edge.

The Contractor shall prepare drawing 849-C130-02 TANK CAPACITY TABLES and 849-C130-03 HOPPER CAPACITY TABLES during Phase II of the Contract for submittal to the COR and regulatory bodies for review and approval. Tank capacity tables shall include a complete list of operational fluids for selected equipment.

The Hopper- and Tank capacity tables shall be provided for all tanks and trim ranges that cover all expected loading conditions with 1-foot trim increments. For the Hopper capacity tables, cubic yards shall be used; for all other tanks, gallons shall be used. The tables shall be presented in tabular form with no more than one tank per page on 8 1/2” x 11” paper. Each table shall include the identity of the tank (as labeled on the Capacity Plan), its location in the vessel, the location of the sounding tube or reference point, volume, weight, Free Surface Moment (FSM), and the center of gravity (longitudinally, vertical and transversely) of the fluid at each sounding level.

The Contractor shall update the tank and hopper capacity tables to reflect the final as-built condition. All stability documentation and the stability program shall be updated to reflect the final as-built tank capacities. The Contractor shall be responsible for submitting the updated documents to the COR and regulatory bodies for review and approval prior to sea trials.

The Hopper Capacity Tables shall be updated with the results from laser scanning of the as-built hopper. Laser-scanning shall be in accordance of Chapter 2, section 8A of the API Manual of Petroleum Measurement Standard. The Contractor shall be responsible for submitting the updated documents to the COR and regulatory bodies for review and approval prior to sea trials.

SPECIFIC REQUIREMENTS

The minimum net tank capacities shall be based on continuous operation of the vessel for the duration specified in Contract Paragraph C002.

The Contractor shall develop 849-C130-04 CONSUMABLES CALCULATION and submit to the COR for review and approval during Phase II of the project. The calculations shall include, for all consumable tanks, the expected consumption/production per day and the resulting size. For Portable Water the Contractor shall include a minimum of 60 gallons per person per day.

The Black Water Holding Tank and the Grey Water Holding Tank shall have a combined net capacity greater or equal to the capacity of the Potable Water tank(s).

The net capacity of the Service Oil Tanks shall be based on the consumption of the machinery, and an intake interval of 3 times the autonomy.

The net Fuel Oil Capacity shall be based on the consumption of the main and auxiliary engines while conducting the endurance operations as specified in Contract Paragraph C002 for a duration specified in Contract Paragraph C002. The Fuel Oil Capacity should include a margin of 10%.

SPECIAL FEATURES

None.

DELIVERABLES

849-C130-01 CAPACITY PLAN
849-C130-02 TANK CAPACITY TABLES
849-C130-03 HOPPER CAPACITY TABLES
849-C130-04 CONSUMABLE CALCULATIONS

STANDARDS

API Manual of Petroleum Measurement Standards, Standard Chapter 2, Section 8A

C140 FREEBOARD

GENERAL DESCRIPTION

The vessel shall be assigned a freeboard in accordance with the load line assignment by Class to the requirements of the United States Coast Guard, including an Exemption certificate that allows the vessel to conduct operations at reduced freeboard during dredging operations.

REQUIREMENTS

The vessel shall be assigned an international load line in accordance with the International Load Line Convention, 1966.

The vessel shall be assigned a "Reduced Freeboard for Hopper Dredges" for loading, carrying, or discharging dredged material. The Reduced Freeboard shall be assigned in accordance with the Guidelines for the Assignment of Reduced Freeboards for Dredgers, DR-68 rev. 1.

The Contractor shall develop and submit a freeboard calculation (849-C140-01 FREEBOARD CALCULATION), including the Reduced Freeboard calculation.

The Contractor shall develop and submit a freeboard plan (849-C140-02 FREEBOARD PLAN), presenting the input parameters of the freeboard calculation (e.g. length/breadth of poop/raised quarter deck and fore castle), on profile view, freeboard deck view and at 85% of freeboard depth view.

The Contractor is responsible for requesting and attaining an ICLL Exemption Certification on behalf of the Client for the DR68 load line from the Coast Guard that exempts the vessel from ILLC Article 12. See Contract Paragraph C004.

SPECFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

849-C140-01 FREEBOARD CALCULATION
849-C140-02 FREEBOARD PLAN

STANDARDS

IMO International Load Line Convention, 1966
Guidelines for the Assignment of Reduced Freeboards for Dredgers, DR-68 rev. 1

C145 TONNAGE MEASUREMENT

GENERAL DESCRIPTION

None.

REQUIREMENTS

The Contractor shall obtain a Certificate of Measurement issued by the measuring organization (ABS), per 46 CFR, Part 69, Subpart B – Convention and Subpart C – Regulatory.

The Certificate of Measurement shall be provided to the COR prior to delivery of the vessel.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

Tonnage Certificate

STANDARDS

46 CFR, Part 69, Subpart B – Convention and Subpart C – Regulatory

C150 DAMAGE STABILITY

GENERAL DESCRIPTION

The vessel shall meet all applicable damage stability criteria at all operational loading conditions as required per the regulatory bodies. The Contractor shall develop a damage stability analysis, damage control booklet and damage control plan in accordance with 46 CFR Subchapter I and ABS MVR

REQUIREMENTS

Damage Stability Analysis

During Phase II, the Contractor shall develop the damage stability analysis for all required loading conditions, with bi-monthly updates including among others any changes/updates in weight estimate & center of gravity, watertight boundaries and/or location of openings.

The analysis shall be reported in a file named and numbered as 849-C150-01 DAMAGE STABILITY ANALYSIS and be submitted to the COR for review and approval.

The initial version shall be submitted to the regulatory bodies as 849-C150-01 DAMAGE STABILITY ANALYSIS for review and (preliminary) approval.

The damage stability analysis will result in a max VCG or min GMT curve to prove that all loading conditions in the intact stability booklet (See Contract Paragraph C160) comply with the damage stability regulations.

The Contractor shall also develop and submit a preliminary damage control booklet and damage control plan to the COR and regulatory bodies during Phase II as 849-C150-02 DAMAGE CONTROL BOOKLET and 849-C150-03 DAMAGE CONTROL PLAN for review and (preliminary) approval.

Final Damage Stability Analysis

Upon Delivery of the vessel, after the inclining experiment is complete and lightship values approved, the Contractor shall update the damage analysis and develop the damage control booklet with final weights and centers of gravity and as-built information.

The Contractor shall develop and submit a final damage stability booklet, to the COR and regulatory bodies named and numbered 849-D150-01 DAMAGE STABILITY ANALYSIS during Phase IV of the Contract for review and approval.

The damage stability analysis will result in a max VCG or min GMT curve to prove that all loading conditions in the intact stability booklet comply with the damage stability regulations.

The information in the damage control booklet and on the damage control plan, such as watertight boundaries, openings, etc. shall be updated during the design of the vessel and be verified after construction.

The Contractor shall develop and submit a final damage control booklet and damage control plan to COR and regulatory bodies as 849-D150-02 DAMAGE CONTROL BOOKLET and 849-D150-03 DAMAGE CONTROL PLAN during Phase IV of the Contract for review and approval.

SPECIFIC REQUIREMENTS

The analysis shall show compliance with the damage stability criteria of Chapter II-1 of SOLAS 1974, as amended by DR68.

Special attention shall be given to regulation 9 Chapter II-1 of SOLAS 1974 (“Reg. 9”). If an exemption from USCG is required for this vessel in order to comply with Reg. 9, the Contractor is responsible for receiving such an exemption during Phase II.

The damage stability analysis shall be executed using GHS (see Contract Paragraph C101). Contractor shall provide all the native files for the stability analysis with the COR.

SPECIAL FEATURES

None.

DELIVERABLES

849-C150-01 DAMAGE STABILITY ANALYSIS
849-C150-02 DAMAGE CONTROL BOOKLET
849-C150-03 DAMAGE CONTROL PLAN
849-D150-01 DAMAGE STABILITY ANALYSIS
849-D150-02 DAMAGE CONTROL BOOKLET
849-D150-03 DAMAGE CONTROL PLAN

STANDARDS

Chapter II-1 of the International Convention for Safety of Life at Sea (SOLAS), 1974
Guidelines for the Assignment of Reduced Freeboards for Dredgers, DR-68 rev. 1

C155 TRIM & INTACT STABILITY

GENERAL DESCRIPTION

The vessel shall meet all applicable intact stability criteria at all operational conditions as required per the regulatory bodies. The Contractor shall develop an intact stability analysis in accordance with the rules and regulations of Class and Flag.

REQUIREMENTS

Intact Stability Analysis

During Phase II, the Contractor shall develop the intact stability analysis for all required loading conditions, with bi-monthly updates including among others any changes/updates in weight estimate & center of gravity and/or location of openings.
The analysis shall be reported in a file named and numbered as 849-C155-01 INTACT STABILITY ANALYSIS and be submitted to the COR for review and approval.
The initial version shall be submitted to the regulatory bodies as 849-C150-01 INTACT STABILITY ANALYSIS for review and (preliminary) approval.
At a minimum the analysis shall show:
Compliance of the vessel for all loading conditions as provided in Contract Paragraph C160.
A loading condition summary table including all loading conditions from Contract Paragraph C160 showing as a minimum: the name of condition, displacement, draft aft, draft mid, draft fore, trim, heel, GM and VCG.
The analysis shall show that for all operational loading conditions the vessel's propellers, thrusters, weir boxes and sea inlets are submerged, and the inlet of the dredge pumps is below the waterline.
Forward trim shall be not more than 3 feet. Heel shall be less than 0.5 degrees Port or Starboard for all operational loading conditions

Final Intact Stability Analysis

After the inclining experiment is complete and lightship values approved, the Contractor shall update the intact stability analysis with final weights and centers of gravity, and as built openings and watertight boundaries.
The Contractor shall develop and submit a final intact stability analysis to the COR and regulatory bodies named and numbered 849-D155-01 INTACT STABILITY ANALSYSIS during Phase IV of the Contract for review and approval.

SPECIFIC REQUIREMENTS

The stability analysis shall be executed using GHS (see Contract Paragraph C101). Contractor shall provide all the native files for the stability analysis with the COR.

SPECIAL FEATURES

The vessel can float with an empty/dry hopper but can also float with the hopper open to sea.

DELIVERABLES

849-C155-01 INTACT STABILITY ANALYSIS
849-D155-01 INTACT STABILITY ANALYSIS

STANDARDS

IMO International Code on Intact Stability 2008
Guidelines for the Assignment of Reduced Freeboards for Dredgers, DR-68 rev. 1

C156 NAVAL ARCHITECTURAL ANALYSIS (LOAD-HANDLING STABILITY)

GENERAL DESCRIPTION

The Contractor shall develop a load handling analysis in accordance with EM-385-1-1, Subchapter I, and the other criteria identified below.

REQUIREMENTS

This analysis shall be submitted to the COR and regulatory bodies as 849-C156-01 NAVAL ARCHITECTURAL ANALYSIS during Phase II of the Contract for review and approval. This analysis shall be prepared for all cranes (as applicable) on the vessel (see Contract Paragraph C455). The Contractor shall develop 849-C156-02 FLOATING SERVICE LOAD CHARTS for submittal to the COR and regulatory bodies during Phase II of the Contract for review and approval as required below. This document shall contain the rated capacity for the lifting apparatus at each azimuth and boom elevation.

After the inclining experiment is complete and lightship values approved, the Contractor shall update these analyses with final weights and centers of gravity. The Contractor shall be responsible for submitting the updated analyses to the COR and regulatory bodies for review and approval prior to sea trials.

SPECIFIC REQUIREMENTS

Naval Architectural Analysis

The Contractor shall perform a naval architectural analysis (NAA) in accordance with EM385-1-1/16.L for all lifting appliances (as applicable). The load handling stability characteristics shall be evaluated as follows:
Maximum lift capacity (minimum boom radius) at 15-degree azimuth (swing) radii
Maximum lift generated moment at 15-degree azimuth (swing) radii
Maximum reach at 15-degree azimuth (swing) radii
For each lift analysis, a 40-mph adverse wind shall be applied to the model/results
For each lift analysis, the results shall demonstrate satisfactory compliance with the following criteria (reference EM385-1-1/16.L.04)
During lift operations, the stability of the floating Load Handling Equipment (LHE), or vessel and shipboard crane shall meet the requirements for "lifting" as set forth in 46 CFR 173.005 through 46 CFR 173.025, over the full range of crane slewing angles.
During lift operations, the stability of the floating LHE, or vessel and shipboard crane, shall limit floating platform heel and trim such that the resultant LHE list and trim over the full range of LHE slewing angles are within the limits identified in the LHE Floating Service Load Chart.
A minimum of 12 in (0.3 m) of freeboard shall be maintained during lift operations, over the full range of crane slewing angles.
The entire bottom area of the floating platform shall be submerged for all lifts, over the full range of crane slewing angles.
All of the load handling stability characteristics above shall be evaluated at all loading conditions identified in Contract Paragraph C160.
The NAA report shall present the analysis and results, including identifying the vessel and crane component weight and centers of gravity, the procedure, results, conclusions and recommendations.
A summary, demonstrating compliance with the criteria, shall be included as an Appendix, along with the GHS result print file(s). The ready-to-lift condition shall be documented, including the position of the crane (azimuth and radius) without a hook load, the maximum allowable draft, maximum allowable KG, and the maximum allow barge heel and trim limits.
The NAA shall explicitly state/document compliance with:

(i) EM 385-1-1/16.L.02 – Design & Construction Standards

EM 385-1-1/16.L.03 – LHE Manufacturer's Floating Service Load Chart

EM 385-1-1/16.L.04 – Stability During Lift Operation
EM 385-1-1/16.L.05 – Floating Service Naval Architectural Analysis (NAA)
EM 385-1-1/16.L.06 – Floating Service Structural Analysis
EM 385-1-1/16.L.07 – Floating Service Load Chart, LHE on Floating Platform
In accordance with EM 385-1-1.16.L, the NAA shall be stamped by a Registered Professional Engineer (RPE), qualified and competent in the field of naval architecture and floating cranes.

Floating Service Load Charts

The Contractor shall provide floating service load charts (FSLC) for all lifting appliances meeting the requirements of EM385-1-1/16.L.07. These load charts shall be based on the crane manufacturer's floating service load charts and shall be PE stamped by an RPE qualified and competent in the field of naval architecture and floating cranes.
Should the Naval Architectural Analysis of the manufacturer's floating service load charts show a condition that fails to meet the requirements, the Contractor shall de-rate the manufacturer's floating service load charts until compliance is reached at all combinations of load radius and crane azimuth. The final floating service load charts shall display safe working load and radius combinations that meet all of the requirements of section.
The FSLC shall include Naval Architect's Notes that address all of the items identified in EM 385-1-1/16.L.07.g.

SPECIAL FEATURES

Naval Architect Analysis Load handling stability analysis is not required for the drag arm davits.

DELIVERABLES

849-C156-01 NAVAL ARCHITECTURAL ANALYSIS
849-C156-02 FLOATING SERVICE LOAD CHARTS

STANDARDS

USACE EM-385-1-1, Safety and Health Requirements Manual
USCG Subchapter I, Cargo and Miscellaneous Vessels
46 CFR 173.005 through 173.025, Lifting Stability

C160 LOADING CONDITIONS

GENERAL DESCRIPTION

None.

REQUIREMENTS

At a minimum the following loading conditions shall be included in the trim and stability analysis:
"General Conditions", including:
Lightship, hopper communicating with sea (not a sailing condition)
Hopper empty and dry (not a sailing condition)
No cargo, as described in 6.1.2.3 of the DR68 Guidelines
"Dredging Conditions", vessel operating at dredging load line,
All conditions as described in 6.1.2.2 and 6.1.2.3 of the DR68 guidelines
"Lifting Conditions", including:
Vessel lifting the maximum allowable load with onboard cranes for the most unfavorable conditions of General Conditions and Dredging Conditions
"Client Conditions",
Ready for Dry Docking, close to zero trim and heel, 10% fuel, hopper communicating with sea

All loading conditions described above, excluding Lightship, shall be presented in three stages:
Departure, with full stores and consumables, crew and effects.
Intermediate, with 50% stores and consumables, with full spare parts, crew and effects.
Arrival, with 10% stores and consumables, with full spare parts, crew and effects.

All loading conditions described above shall be included in the loading condition summary table as described in Contract Paragraph C155.

SPECIFIC REQUIREMENTS

Total weight of stores, spare parts, crew and effects, technical stores shall not be less than 30 LT.

SPECIAL FEATURES

None.

DELIVERABLES

None.

STANDARDS

Guidelines for the Assignment of Reduced Freeboards for Dredgers, DR-68 rev. 1

C161 TRIM AND STABILITY BOOKLET

GENERAL DESCRIPTION

The Contractor shall utilize the results of the damage stability, intact stability, and naval architectural analysis to prepare a Trim & Stability Booklet and an onboard stability calculation program for the master.

REQUIREMENTS

The booklet shall be numbered 849-C161-01 and shall be titled TRIM & STABILITY BOOKLET. The stability program shall be delivered in digital format with (5) printed instruction manuals. A draft copy of the T&S booklet and draft configuration files for the stability program shall be submitted to the COR during Phase II for review and approval.

After the inclining experiment is complete and lightship values approved, the Contractor shall update the booklet and stability program with final weights and centers of gravity. The Contractor shall be responsible for submitting the updated booklet and stability program to the COR and regulatory bodies for review and approval prior to sea trials.

SPECIFIC REQUIREMENTS

Trim & Stability Booklet

The booklet shall be prepared in accordance with 46 CFR 170.110. The booklet shall have the method for evaluating stability, maximum KG curves and sample calculations for evaluating stability for the vessel in both the lifting and non-lifting operations mode.

For the non-lifting operations mode, the combined intact and damage stability results shall be used to develop the maximum KG curve.

The Trim & Stability Booklet shall have a specific section for Crane Lift Operations. The Crane Lift Operations section shall present the information required in sect C610.dd above. In addition the section shall present the USCG “Lift Vessel” stability analyses, and also the Naval Architectural Analyses to develop the crane offlead and sidelead match to vessel trim and heel during lift operations.

In addition to the information required by regulations, the T&S book shall also provide instructions for tracking weight growth over the life of the vessel. The instructions shall follow the guidelines given in USCG Marine Safety Center Technical Note MTN 04-95. These instructions shall include requirements for documenting weight changes/additions/deletions, allowable percentage of weight change, and the threshold for conducting a new stability test.

Stability Program

The Contractor shall work with a software developer to provide an onboard stability program for the vessel in accordance with the requirements of ABS MVR Appendix 3-3-A7. The final version of the program shall be packaged and compiled by the software manufacturer. The stability program shall be provided with a custom instruction manual, to be approved by MDC prior to printing of manuals and final software compilation.

At a minimum, the stability program shall perform the following stability calculations:

Down flooding
Intact Stability
Damage Stability

Longitudinal Strength
Load Handling Stability (including fixed and variable weights for each crane)

At a minimum, the program shall have the following user input abilities:

Current Tank Levels
Hopper Level and Specific Gravity
Standard variable weights (crew, stores, effects, etc.)
Misc. weights
Crane Loads (Including azimuth, radius, loads, etc.)
Wind Speed
Damaged Compartments

At a minimum, the program shall provide the following outputs/displays:

Vessel Display showing tank levels, floating condition, crane position, etc.
For Stability – actual conditions vs. CFR rule requirement conditions
For Crane Operations – the results shall clearly display pass/fail for the criteria set forth in EM385-1-1.16.L.04 – Stability During Lift Operations
Condition Longitudinal Strength vs Design
Generate report files in .pdf format
The program shall have the ability to save loading conditions for future use.

Five licensed standalone instances of the stability program shall be provided. Three licensed copies of the program shall be provided on laptop computers for use on the vessel. One of these computers may be integrated with one of the consoles on the bridge. The computers provided for the stability program shall be used solely for the stability program and not serve any other function. Two additional licensed copies of the stability program shall be provided on CD/flash drive/hard drive or other portable digital storage medium.

SPECIAL FEATURES

None.

DELIVERABLES

849-C161-01 TRIM & STABILITY BOOKLET
Three (3) laptop computers, each loaded with a standalone copy of the stability program
Two (2) standalone digital copies of the stability program
Five (5) printed instruction manuals for the stability program

STANDARDS

46 CFR 170.110, Stability Booklet
46 CFR 173, Special Rules Pertaining to Vessel Use
USCG MSC MTN 04-95, Lightship Change Determination
ABS MVR Appendix 3-3-A7, Computer Software for Onboard Stability Calculations
EM 385-1-1.16.L.04, Stability During Lift Operations

C170 DRY DOCKING PLAN

GENERAL DESCRIPTION

The Contractor shall develop a dry docking plan for the vessel.

REQUIREMENTS

The dry docking plan and calculations shall be submitted for review and approval by the COR and ABS during Phase II of the contract. The dry docking plan shall be designated 849-C170-01 DRY DOCKING PLAN. The dry docking plan calculations shall be designated 849-C170-02 DRY DOCKING PLAN CALCULATIONS.

After the inclining experiment is complete and lightship values approved, the Contractor shall update the drawing and calculations with final weights, centers of gravity, and loading conditions. The Contractor shall be responsible for submitting the updated drawings and calculations to the COR and ABS for review and approval.

SPECIFIC REQUIREMENTS

The dry docking plan shall be developed based on two vessel conditions. The first arrangement and blocks shall be based on the vessel in the Ready to Dock Condition (see Contract Paragraph C160). The second condition shall be an emergency docking condition (tanks and stores full, hopper empty).

The sample blocks to be used for docking shall be identified on the dry docking plan for each arrangement. The docking plan shall allow for servicing, maintenance, and/or removal of the hopper doors as described in Contract Paragraph C514. The docking plan shall also allow for service, maintenance and/or removal of the propulsion Azimuthing Thrusters.

The plan shall show all major hull structure on the bottom including all transverse and longitudinal bulkheads connecting with the bottom shell, as well as bottom doors, anodes, sea chests, propulsion system components (struts, propellers, rudders, skegs, etc.), and other features which could interfere with the setting and shifting of docking blocks. The Docking Plan shall include a complete list of thru-hull shell openings. The list shall contain the function, size, and location of each shell opening. The docking plan shall provide details of the vessel's draft marks.

The plan shall also include an alternate blocking arrangement to allow for the servicing of all areas of the bottom of the vessel. No block shall remain in the same position on the alternate blocking plan as it was on the primary dry docking plan.

The blocks shall be located to evenly distribute the loads and avoid undue stresses within the hull structure. Blocks shall be located in way of main structural, longitudinal, and transverse bulkheads wherever possible. The docking plan shall clearly show the hopper doors and other areas where docking blocks are not permitted. Where blocking is located on frames other than bulkheads, appropriate docking brackets shall be designed and installed within the hull. Docking bracket details shall be shown on the structural drawings (see Contract Paragraph C300). If the end(s) of the vessel are unsupported, the Contractor shall provide calculations with the plan submittal showing that the hull strength is adequate to handle the cantilevered load.

The docking plan shall include a cross-section at the propellers to allow for verification of docking clearances as well as propulsion system (shafting, rudders, propellers, thrusters, etc.) removal clearances.

The docking plan shall include profiles and sections showing the measured variation in the height of the as-built bottom shell in way of all keel block locations.

The dry docking plan shall contain at a minimum:

Dimensioned drawing of the docking block
Total area covered by the docking blocks for each plan
The maximum block loading (kips/foot-squared)
Lightship weight, LCG, and VCG determined by the Inclining Experiment
Maximum dry docking weight and LCG as determined by the as-built Stability Calculations
Load conditions for which the plan was developed

SPECIAL FEATURES

None.

DELIVERABLES

849-C170-01 DRY DOCKING PLAN
849-C170-02 DRY DOCKING PLAN CALCULATIONS

STANDARDS

See Contract Paragraph C003.

C180 NOISE & VIBRATION

GENERAL DESCRIPTION

The Contractor shall be responsible for designing and building a vessel that is free from excessive noise and excessive vibration of its structure, machinery, equipment and outfitting. The Contractor is also responsible for preparing all necessary noise and vibration analyses and calculations, obtaining necessary COR and ABS body reviews and approvals, obtaining necessary inspections and conducting surveys and tests during construction.

REQUIREMENTS

During Phase II of the contract, the Contractor shall retain the services of an engineering consultant firm specializing in marine vessel noise and vibration assessment, abatement, and reduction to prepare vessel noise and vibration prediction estimates.

The vessel noise and vibration in habitable spaces shall comply with the requirements of the ABS Guide for Crew Habitability on Workboats, Section 3 Whole-body Vibration and Section 4 Noise, with the notation (HAB(WB)).

The Contractor shall also ensure that the noise control requirements of EM 385-1-1 are satisfied.

The noise and vibration predictions shall be documented in 849-C180-01 NOISE & VIBRATION PREDICTION AND CONTROL PLAN. The report shall include recommendations for correcting conditions where noise and vibration limits and guidelines are exceeded and shall provide revised predictions to show compliance with the Guide for Crew Habitability on Workboats, Habitability (HAB(WB)) and other criteria provided below. The Contractor shall be responsible for implementing the required noise and vibration abatement recommendations.

The vessel operating conditions for which the habitability requirements apply are as follows:

All machinery and equipment, including ventilation and hydraulic equipment and systems in full operation, as required for the following modes of operation:

Two operating modes:

- Full transit speed, hopper empty but free-flooding, defined as defined in C002
- Maximum dredging speed defined in C002 (8 knots: 6 knot current + 2 knots over ground) with drag arms deployed to maximum dredging depth and dredge pumps operating at maximum capacity and with bow thruster in full operation

The vessel hull and superstructure vibration and machinery and equipment vibration are addressed separately in Section C. below.

SPECIFIC REQUIREMENTS

Habitability

Noise Prediction for Habitability

The engineering consultant firm shall perform an airborne noise prediction analysis using commercially available noise prediction software. The airborne noise prediction analysis shall include machinery, HVAC, and topside noise during two conditions, full transit speed and maximum dredging speed as defined above in Sub Paragraph B above.

The noise prediction shall provide results for the compartments/locations listed below.

These noise limits shall be contract requirements. The Contractor shall be responsible for development of a noise treatment plan to achieve the noise limits listed below for each space.

Operating & Maintenance Spaces

Machinery Spaces	110-dB(A)
Workshops (other than in machinery spaces)	85 dB(A)
Non-Specified Workspaces	85 dB(A)
Open Decks (not otherwise specified)	85 dB(A)
Open Deck Within 30’ of Crane Cab	75 dB(A)

Navigation and Control Spaces

Wheelhouse, Bridge Wings	65 dB(A)

Radio Room	60 dB(A)
Offices	65 dB(A)
Dredge Operations Control Room	65 dB(A)
Machinery Control Room	75 dB(A)
Crane Operator Cab	65 dB(A)
Crew Accommodation Spaces and Open Deck Recreation Areas	
Crew Cabins	60-dB(A)
Sanitary Spaces, Changing Rooms (not part of cabins)	65 dB(A)
Dining (Mess) Spaces	65 dB(A)
Indoor Recreation Spaces, Lounges	65 dB(A)
Gymnasiums	65 dB(A)
Medical (Hospital)	60 dB(A)
Open Deck Recreation Areas	75 dB(A)
Service Spaces	
Food Preparation (Galley, Scullery, Pantries)	75-dB(A)
Storerooms	75-dB(A)
Laundry	75-dB(A)

Vibration Prediction for Habitability

The engineering consultant firm shall perform a forced response FEA vibration analysis which shall predict the vibration response of the hull and deckhouse (including masts) structure that result from operation of the main propulsion and other major machinery during two conditions, full transit speed and maximum dredging speed as defined above in Sub Paragraph B above.

The vibration prediction shall specifically provide results for decks supporting the human body in accommodation areas and workspaces to show compliance with the ABS Guide for Crew Habitability on Workboats (HAB(WB)). The following vibration levels contained in the Guide shall be contract requirements. The Contractor shall be responsible for development of a vibration control plan to achieve the levels listed below. The table includes the same spaces as noted in the Noise Habitability.

Vibration levels in the table are maximum weighted root-mean square (RMS) acceleration using data in the frequency range of 1 to 80 Hz as the combined multi-axis acceleration derived from the accelerations in each of the three translational axes, vertical, lateral and fore and aft.

	Maximum RMS Acceleration, mm/sec^2	
	Transit	Dredging
Operating and Maintenance Spaces		
Machinery Spaces	178	196
Workshops	178	196
Non-Specified Workspaces	178	196
Open Decks (not otherwise specified)	178	196
Open Deck Within 30' of Crane Cab	178	196
Navigation and Control Spaces		
Wheelhouse, Bridge Wings	161	178
Radio Room	161	178
Offices	161	178
Dredge Operations Control Room	161	178
Machinery Control Room	178	196

Crane Operator Cab	178	196
Crew Accommodation Areas		
Crew Cabins	161	178
Sanitary Spaces, Change Rooms (not in cabins)	178	196
Dining (Mess) Spaces	161	178
Indoor Recreation Spaces, Lounges	161	178
Gymnasiums	178	196
Medical (Hospital)	161	178
Open Deck Recreation Area	161	178
Service Spaces		
Food Preparation (Galley, Scullery, Pantry)	178	196
Storerooms	178	196
Laundry	178	196

The Contractor shall measure these accelerations in the accommodation areas and workspaces and include in a written report in accordance with Sub Paragraph 5 below. If the vibration limits are exceeded the Contractor shall correct whatever deficiencies that are identified by the excessive vibration.

Structural Vibration

The lowest natural frequency of superstructure structural assemblies and components as shown by the FEA vibration analysis shall be at least 125% times the maximum propeller blade rate frequency. The measures taken to satisfy the criteria listed above will generally result in limited structural vibrations throughout the rest of the vessel. The Contractor shall confirm that the overall structural vibration requirements for the rest of the vessel are satisfied by meeting the habitability vibration and superstructure vibration limits stated above.

Main Propulsion Machinery Vibration

The FEA vibration model shall be used to predict the main propulsion component foundation stiffnesses and natural frequencies for use in the propulsion drive system vibration analysis in paragraph C605.

Vibration levels for main propulsion machinery shall not exceed manufacturer's recommendations. In the absence of such recommendations, a recognized industry standard shall be adopted.

Auxiliary Machinery and Equipment Vibration

Vibration levels for auxiliary machinery and equipment shall not exceed manufacturer's recommendations. In the absence of such recommendations, a recognized industry standard shall be adopted.

Noise & Vibration Survey

The Contractor shall retain the services of the engineering firm that developed the noise and vibration prediction to complete a noise and vibration survey during the Tests and Trials in accordance with Contract Paragraph E05. The airborne noise and vibration levels shall be measured in all compartments, deck locations, and spaces identified above. Vibration shall be measured on main propulsion drive system to confirm vibration analyses in paragraph C605. Vibration shall also be measured auxiliary machinery and equipment to show compliance with manufacture's recommendations.

The noise and vibration survey results shall be designated 849-D180-01 and titled: NOISE & VIBRATION SURVEY. The report shall be prepared by the Contractor detailing the survey and test procedure and results. The report shall include sketches to show where noise and vibration levels were measured with results provided in tables and graphs keyed to the sketches. The Contractor shall take corrective action as necessary to achieve the required noise and vibration criteria. The

report shall designate any compartments which present a noise hazard according to OSHA regulation, 29 CFR 1910.95 “Occupational Noise Exposure”. See Contract Paragraph E05 for test requirements.

SPECIAL FEATURES

None.

DELIVERABLES

849-C180-01 NOISE & VIBRATION PREDICTION AND CONTROL PLAN
849-D180-01 NOISE & VIBRATION SURVEY

STANDARDS

OSHA regulation, 29 CFR 1910.95 “Occupational Noise Exposure”
ABS Guide for Crew Habitability on Workboats
USACE EM 385-1-1, Safety and Health Requirements Manual

C185 TEST & TRIALS

GENERAL DESCRIPTION

None.

REQUIREMENTS

This vessel and its component parts shall undergo testing and trials in accordance with Contract Section E, Paragraph E05, Trials, Tests and Demonstrations.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

None.

STANDARDS

See Contract Paragraph C003.

C200 ARRANGEMENTS

C201 VESSEL CONFIGURATION

GENERAL DESCRIPTION

None.

REQUIREMENTS

All equipment and machinery shall be positioned to avoid interference and to provide adequate access from all sides for inspection, maintenance and repair. All equipment and machinery installed within the hull shall be provided with a path for removal, further described in Contract Paragraph C290. An adequate number of pad-eyes shall be provided overhead to facilitate handling of equipment with chain-falls (see Contract Paragraph C330).

To facilitate removal for repair, every piece of equipment shall be mounted on a foundation by means of fasteners. Equipment connected to a piping system shall be provided with a means to readily disconnect the equipment from the piping system (i.e. unions or flanges), located as close as possible to the equipment.

Where required to suit the equipment removal paths, the piping within a space shall be removable without hot work so that all components may be rigged and removed for repair or replacement.

Clear finished headroom in all hull spaces shall not be less than 7'-6" while accommodating all necessary equipment, ducting, wiring and piping.

Clear finished headroom, while accommodating all necessary equipment, ducting, wiring and piping, in the deckhouse shall not be less than 7'-1" on any deck.

The Contractor shall prepare arrangement drawings for each space which shall be named and numbered according the MDC WBS system during Phase II of the Contract and submit to COR for review and approval. These drawings shall contain a bill of materials for all equipment in each space. The arrangement shall detail the location of the equipment and show dimensioned clearances between each piece of equipment and any adjacent equipment or structure. The arrangement drawings shall also delineate personnel access paths and clearances. For machinery arrangements, the service space of equipment shall also be indicated.

During Phase II of the contract, the Contractor shall develop drawing 849-C233-02 BRIDGE TOP ARRANGEMENT and submit it to the COR and ABS for approval. This drawing shall show and include a bill of materials for all items mounted on the bridge top. The arrangement shall detail the location and arrangement of all outfitting and masts as well as each antenna and radar above the bridge deck, with clearances between each item identified. Requirements to the placement of antennas, power and control sources are defined in Contract Paragraph C770.

SPECIFIC REQUIREMENTS

The vessel's arrangement shall be in compliance with ASTM F1166-07.

Crew cabins shall not share a boundary with a machinery space.

The main fuel tanks shall be separated from the hull structure, sloped hopper plating, and bottom shell with a cofferdam of at least 24", in compliance with the ER 1130-2-500 requirements. All other oil tanks shall not share any boundaries with the hull bottom plating or side plating.

The vessel's arrangement shall be in compliance with the requirements stated in EM385-1-1 Chapter 19.

The vessel shall include matching P/S fuel and oil fill lockers, a separate potable water filling station, and a separate pump-off locker (see C600s series WBSs).

A single interior staircase shall serve all levels of the deckhouse.

Each deck shall have at least two means of egress/access. These means can be a combination of external and internal stairs, ladders/inclined ladders.

The bridge shall be a single space with unobstructed view. Bridge wings shall be of the closed type. The dredging operator console shall face towards the hopper and provide an unobstructed view over the hopper.

The bridge and consoles shall have an ergonomically optimized layout according the guidelines of the ABS Guidance Notes on Ergonomic Design of Navigation Bridges, further described in Contract Paragraph C255.

SPECIAL FEATURES

The Contractor shall provide an arrangement drawing, in plan view, that locates all of the downflooding locations (as defined by the USCG and ABS) on each deck. Drawing shall be named and numbered 849-C143-01 DOWNFLOODING LOCATIONS PLAN and submitted to COR and regulatory bodies for review and approval. Each deck plan view will identify the downflooding locations with an identification number. A table shall be provided on the drawing that describes each downflooding location (e.g. 6" vent) and its longitudinal, transverse and vertical location (with respect to the origin used for the stability reports).

DELIVERABLES

849-C143-01 DOWNFLOODING LOCATIONS PLAN
849-C220-01 GALLEY & MESS ARRANGMENT
849-C230-XX QUARTER ARRANGMENTS (including staterooms, lounges, offices, and other public areas)
849-C233-01 BRIDGE ARRANGEMENT
849-C233-02 BRIDGE TOP ARRANGEMENT
849-C235-XX STOREROOM ARRANGEMENTS
849-C240-XX WORKSHOP ARRANGEMENTS
849-C245-XX MACHINERY ARRANGEMENTS
849-C250-XX DREDGING ARRANGEMENTS

STANDARDS

ASTM F1166-07 Standard Practice for Human Engineering Design for Marine Systems. Equipment, and Facilities
ER 1130-2-500, Work Management Policies
ABS Guidance Notes on Ergonomic Design of Navigation Bridges

C205 OUTBOARD PROFILE

GENERAL DESCRIPTION

None.

REQUIREMENTS

The Contractor shall develop drawing 849-C205-01 OUTBOARD PROFILE during Phase II of the Contract for submittal to the COR and ABS for review and approval. The outboard profile shall identify height of each deck, fixed (and adjustable) air draft and eye height from the main steering position(s) above the waterline, sightlines to the forward and aft main deck, and principal vessel characteristics. Outboard profile drawing shall include views from starboard, port, forward and aft.

The Contractor shall develop drawing 849-C205-02 DREDGING OUTBOARD PROFILE during Phase II of the Contract for submittal to the COR and ABS for review and approval. The dredging outboard profile shall include both a side elevation at maximum freeboard and one at minimum freeboard floating positions with the drag arm deployed from minimum to maximum dredging depth in steps of no greater than 10 feet, including callouts for both views including digging depth, lower drag arm angle and upper drag arm angle.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

849-C205-01 OUTBOARD PROFILE
849-C205-02 DREDGING OUTBOARD PROFILE

STANDARDS

See Contract Paragraph C003.

C215 GENERAL ARRANGEMENT

GENERAL DESCRIPTION

None.

REQUIREMENTS

The Contractor shall develop drawing 849-C215-01 GENERAL ARRANGEMENT during Phase II of the Contract with monthly updates for submittal to the COR and ABS for review and approval. The general arrangement shall include all major equipment and machinery, principal characteristics of the vessel, and access methods to each space. The update shall reflect the detailed space arrangements of Contract Paragraph C201, and any changes to the arrangement.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

849-C215-01 GENERAL ARRANGEMENT

STANDARDS

See Contract Paragraph C003.

C255 CONSOLE ARRANGEMENT

GENERAL DESCRIPTION

None.

REQUIREMENTS

The Contractor shall develop drawing 849-C255-01 CONSOLE ARRANGEMENT during Phase II of the Contract for submittal to the COR and ABS for review and approval.

The drawing shall provide details on the construction and instrumentation placement for the bridge control console, bridge wing consoles, dredge operator console and engineer's control room console. The console arrangement shall include a bill of materials designating the make and model of each item to be installed in the consoles.

The consoles shall contain all controls, alarms, monitoring equipment, communication, and navigation equipment necessary for the intended vessel's operation. All equipment as provided in Contract Paragraph C770 and Contract Paragraph C524 shall be incorporated in the arrangements.

All gauges, indicators, switches, etc. shall be properly labeled to indicate their function. Consoles shall be designed for maximum visibility. All gauges and indicators shall be installed with lights and dimmer switches.

The consoles shall be provided with adequate access panels to maintain and/or replace components on/in the console. Each section of the consoles shall be constructed individually to allow for removal with minimum destruction of console and to allow for modifications of panels.

The consoles shall be provided with a method of cooling that meets the cooling requirements of all equipment and components that are located within the console.

Switches for the exterior deck lights and floodlights shall be located on a light distribution panel on the bridge.

Consoles may contain overhead sections, if they do not interfere with the operator's line of sight or operations.

SPECIFIC REQUIREMENTS

Bridge Control Console

The console shall be setup to maximize view forward. The bridge and consoles shall have an ergonomically optimized layout according the guidelines of the ABS Guidance Notes on Ergonomic Design of Navigation Bridges.

Dredge Operator Console

The console shall contain all controls, alarms, monitoring equipment, and communication necessary for the dredge operation. The console shall be set-up in such way to maximize view over the hopper.

Engineer's Control Room Console

The console shall contain all controls, alarms, and monitoring equipment necessary for the vessel's operation. Visual monitoring of the main engine room shall be provided by windows and/or cameras/monitors.

Console Mockup & Construction

During Phase III of the Contract, the Contractor shall develop a physical mockup of the bridge control console, bridge wing consoles, dredge operator console and engineer's control room console prior to construction of the final consoles.

The console mockups shall contain all major displays, controls, instrumentation, and the pilot chair for review by the COR. The Contractor shall not fabricate the final consoles until the mockup is completed and the final arrangements are accepted by the COR.

SPECIAL FEATURES

None.

DELIVERABLES

849-C255-01 CONSOLE ARRANGEMENT

STANDARDS

ABS Guidance Notes on Ergonomic Design of Navigation Bridges

C290 EQUIPMENT HANDLING

GENERAL DESCRIPTION

All equipment and machinery shall have clear access for operation and maintenance.

Consumable and spare parts shall be easily transportable from their stored position to the item of equipment or machinery they belong to.

For equipment and machinery installed inside the hull a path for removal or replacement shall be considered. Equipment and machinery installed on deck shall not be blocked for removal by any permanent structure or non-removable item of equipment or machinery.

REQUIREMENTS

Provisions shall be made for lifting and further handling any item of equipment or machinery exceeding the human lift requirements of ASTM F1166-07. For items requiring infrequent maintenance or removal (> 12 months between maintenance), lifting provisions may consist of padeyes and temporary lifting gear (i.e. chainfalls, slings, etc.)

Items requiring routine maintenance shall be served by permanent lifting provisions, in accordance with Contract Paragraph C455. Routine maintenance of equipment and machinery shall be possible without removal of other items of equipment and machinery, or parts thereof.

A transport path shall be available for all items of equipment and machinery requiring routine foreseeable maintenance and repair or replacement. Items requiring routine maintenance shall be provided with permanent access, transport paths and lifting provisions, which shall be detailed on the EQUIPMENT REMOVAL PATHS drawing.

See Contract Paragraph C330 for structural requirements of lifting points.

Where equipment manufacturers specify lifting locations and/or lifting angles, the Contractor shall show that the manufacturer's requirements are satisfied by the lifting provisions documented in the EQUIPMENT REMOVAL PATHS drawing.

Equipment removal paths shall also be documented on the EQUIPMENT REMOVAL PATHS drawing for the removal of major equipment, including but not limited to engine parts, generators, and dredge pumps. Removal paths shall be designed to minimize the required removal of items such as cable ways and insulated piping, which cannot be easily removed and re-installed.

When considering the likeliness of an item of equipment needing to be removed, and considering its size and location, the removal path may include bolted or welded soft patches. Cutting away a soft patch shall not compromise the hull structural integrity considering the operational condition during the maintenance period.

The Contractor shall develop 849-C290-01 EQUIPMENT REMOVAL ROUTES and submit to the COR and ABS for review and approval during phase II of the Contract. The drawing should document the planned removal paths for all equipment described above.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

849-C290-01 EQUIPMENT REMOVAL ROUTES

STANDARDS

1. ASTM F 1166-07, Standard Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities

C300 STRUCTURE

GENERAL DESCRIPTION

The vessel structure shall be comprised of all welded steel construction, divided into compartments by means of transverse and longitudinal bulkheads as required for damaged stability and structural integrity.

REQUIREMENTS

The Contractor shall design and assemble the complete structure in accordance with the requirements and standards of ABS Marine Vessel Rules, Specifications and Procedures, and IACS No. 47 Shipbuilding and Repair Quality Standard (see Contract Paragraphs C003 & C004).

All structural scantlings shall be clearly indicated on the structural drawings and shall be validated by calculations (see Contract Paragraph C399).

Bottom and Inner Bottom Structure

The vessel shall have a double bottom extending as far forward and aft as practical. The double bottom within the length of the main engines and propulsion rooms and dredge pump rooms shall have additional floors to support the engines and pump drives and to provide structural continuity to minimize the transmission of vibration.

Single bottom areas are allowed where equipment for power generation, propulsion and dredging require a mounting height below the general tank top level.

The bilge area shall be reinforced with bilge brackets at every ordinary frame.

Bottom girders and floors shall be fitted with docking brackets where necessary to support and distribute docking loads (See Contract Paragraph C170).

Side Shell Structure

The area of the side shell in way of the drag head shall be fitted with a cofferdam of 2-ft minimum width and running full depth from bottom plating up to freeboard deck. The cofferdam length shall be from the nearest adjacent web frames forward and aft of the drag head area. The side shell and bilge plating in this area shall be of increased plate thickness – see SPECIFIC REQUIREMENTS item 4.

Deck Structure

Weather decks above the main strength deck shall have either camber or sheer.

Design Documentation

During Phase II of the Contract the Contractor shall develop full design documentation in the form of drawings and supporting calculations, and submit those to the COR and ABS for review and approval, including but not limited to:

on a monthly basis an updated 3D STRUCTURAL MODEL (849-C300-01) in a to be agreed upon viewer format.

the full scope of calculations backing up the structural drawings, to be described in 849-C300-02 STRUCTURAL DESIGN BRIEF (see Contract Paragraph C399).

the MIDSHIP SECTION drawing (849-C301-01) complete with a tabled listing of such data as the applied hogging and sagging moments, the shear force, the principle hydrostatics of the vessel and the hopper load. Furthermore, the MIDSHIP SECTION drawing shall clearly indicate the frame spacing; all strake widths and lengths; all stiffener, webs and girder scantlings and plate thicknesses.

the interaction between the hull structure and all primary equipment, represented on 849-C300-03 CONSTRUCTION PRINCIPLE PLAN, which is to include a specification of the loads and forces acting on the affected parts of the structure.

the yard construction standards and standard structural details shall be shown on 849-C306-01 CONSTRUCTION DETAILS PLAN.

SPECIFIC REQUIREMENTS

Welding

At a minimum, all welding of the hull structure shall be double continuous fillet welding unless specifically noted otherwise elsewhere in this Specification

Openings and Penetrations

Openings and penetrations in bulkheads or decks shall be designed and reinforced in accordance with NSRP 0490. Such penetrations in watertight bulkheads or decks shall be restored to watertight condition.

For penetrations through webs of transverse frame members and other structural members, the structural details shall be in accordance with NSRP 0490.

Hull Penetrations

Hull penetrations shall be located well clear of draft marks and other markings.

All overboard discharge openings through the shell plating above the waterline shall be located at or as close as practical to the full load dredging waterline.

Overboard discharge penetrations shall be in accordance with ASTM F994-86, Standard Specification for Design and Installation of Overboard Discharge Hull Penetration Connections. All discharge penetrations shall be flush with the hull plating.

Any pipe penetrating the hull below the full load water line shall be fitted with schedule 80 spool pieces and sea valves. The inboard end of the spool piece shall have a 150-lb pipe flange to bolt to the sea valve. With the exception of the sea chests, all sea valves shall be located less than 6-inches from the hull opening.

Insert Plates

At a minimum, insert plates shall have 6-inch radius corners and extend 6-inches beyond the attached item in all directions.

Areas of the side shell and bilge plating in way of the drag head, drag arm joint, sliding piece and directly below the anchor pockets shall have a wear allowance of at least 1/4-inch. The extent of these shell plating reinforcements shall be up to the weather deck. Insert plates with a ¼-inch wear allowance shall be provided for the single bottom area directly below the dredge pump(s) and overflow (skimmer) pipe.

Doubler Plates

In general, doubler plates shall be no part of the principle hull structure, other than at the ends or pillars.

Slot Welds

Slot welds may be considered in areas of insufficient access for welding from inside. Where slot welds must be used, the backing flats shall have a minimum size of 2 x 1/4-inch.

In general, slot welds shall not be used in the basic hull structure. Slot welds shall not be used for construction inside the hopper.

Vent Trunks

The vent trunks below the exhaust stacks shall be integral with the hull structure. Vent trunks shall be stiffened on the inside. Vent trunk watertightness shall be in accordance with the watertight compartment arrangement.

SPECIAL FEATURES

None.

DELIVERABLES

849-C300-01 3D STRUCTURAL MODEL
849-C300-02 STRUCTURAL DESIGN BRIEF
849-C300-03 CONSTRUCTION PRINCIPLE PLAN
849-C300-04 WELDING TABLE
849-C301-01 MIDSHIP SECTION
849-C305-01 SCANTLING PLANS
849-C306-01 CONSTRUCTION DETAIL PLAN
849-C307-01 SHELL EXPANSION
849-C309-01 TRANSVERSE STRUCTURE
849-C311-01 LONGITUDINAL STRUCTURE
849-C313-01 HULL PLATFORMS AND FLATS

STANDARDS

ABS Rules for Building and Classing Marine Vessels
IACS Publication No. 47, Shipbuilding Quality and Repair Standard

NSRP 0490, Industry Standards for Hull Structural Penetration Design
International Convention for the Safety of Life at Sea (SOLAS)
ASTM F994-86, Standard Specification for Design and Installation of Overboard Discharge Hull Penetration Connections

C315 DECKHOUSE STRUCTURE

GENERAL DESCRIPTION

The deckhouse structure shall at a minimum be comprised of:
the main house and bridge, on top of the exposed weather deck(s) of the hull structure (See Contract Paragraph C300).
all other deckhouses built on top of the exposed weather deck.

REQUIREMENTS

The Contractor shall develop drawing 849-C315-01 DECKHOUSE STRUCTURE during Phase II of the Contract and submit it to the COR and ABS for review and approval.

The Contractor shall add the structural details of the deckhouse to the CONSTRUCTION DETAIL PLAN (849-C306-01) during Phase II of the Contract and submit it to the COR and ABS for review and approval.

SPECIFIC REQUIREMENTS

Material and Welding

In general, the deckhouse plating and structure shall be comprised of ABS Grade A Steel.
The internal deckhouse plate stiffening members may be welded intermittently except where, in accordance with ABS, other weld types are required.

Construction Details

The deckhouse structure shall be easily integrated into the hull structure, by maintaining the structural spacings as much as possible, i.e. deckhouse webs shall be aligned with hull structure primary members

Deckhouse exterior

Each exposed level of the deckhouse shall have camber to shed water.
The access to the deckhouse shall be watertight or weather tight in accordance with ABS and USCG requirements to maintain the watertight integrity of the hull.

Deckhouse interior

Interior decks shall be level.
Finished areas of passageways shall be kept clear of all structural members. Brackets shall not penetrate inner ceiling levels.

Bridge

The wheelhouse structure shall include the structural parts of the bridge deck, and the technical space below the bridge deck.
No internal bulkheads shall obscure the SOLAS-required minimum field of visibility at the steering station.
The bridge top shall be provided with a visor on all sides. The visor shall extend a minimum of 4” above the bridge top to form a toeboard. See Contract Paragraph C425.

SPECIAL FEATURES

None.

DELIVERABLES

849-C315-01 DECKHOUSE STRUCTURE

STANDARDS

See Contract Paragraph C003.

C316 STACKS

GENERAL DESCRIPTION

Stack(s) include all the casings around exhaust piping and casings for ventilation, extending above the weather deck(s) of the hull structure (See Contract Paragraph C300).

REQUIREMENTS

The Contractor shall develop drawing 849-C316-01 STACK DETAILS during Phase II of the Contract for COR and ABS review and approval. The drawing shall detail the structure of the stack and all piping routed through it. The drawing shall identify final mounting bracket locations and access panel locations. The stacks shall be designed to suit the ventilation requirements of Contract Paragraph C685.

SPECIFIC REQUIREMENTS

The stack(s) shall be designed to maximize visibility to the aft corners of the vessel, and to maximize visibility to the hopper for the dredge master.

The stack(s) shall have the permanent vent supply and exhaust openings placed in accordance with SOLAS Chapter II (Reg. 19).

The exhaust piping and silencers shall be mounted on vibration isolators (see Contract Paragraph C650) inside the stack(s).

Ladders, platforms and access in/to the stack(s) shall be provided for inspection of the equipment and piping inside the stack(s).

SPECIAL FEATURES

Refer to Contract Paragraph C460 for insignia to be installed on the stack(s).

DELIVERABLES

849-C316-01 STACKS

STANDARDS

International Convention for the Safety of Life at Sea (SOLAS), Chapter II

C317 MASTS

GENERAL DESCRIPTION

Masts include the structures necessary for support of the navigation lights, navigation equipment and communications equipment.

REQUIREMENTS

The Contractor shall develop drawing 849-C317-01 MASTS during Phase II of the Contract and submit it to the COR and ABS for review and approval. The drawing shall include the mast design(s) and location(s).

SPECIFIC REQUIREMENTS

The Contractor shall design the necessary masts for navigation lights, navigation equipment, and communications equipment, including but not limited to: aft mast with aft anchor light and ensign staff, main mast with navigation lights and halyards and fwd. mast with anchor light and jack staff.

The mast arrangement shall include requirements for maximum air draft as specified in Contract Paragraph C002.

Lay-out of masts and equipment shall be in accordance with the requirements stated in Contract Paragraph C201.

The bridge top mounted navigation light mast shall incorporate a gaff and a yardarm. The gaff and yardarm shall be fitted with staples, sheaves, and a minimum of six (6) halyards in total, which shall be operated from the bridge deck. Galvanized cleats shall be provided to secure the halyards.

The Contractor shall design the foundations and masts for equipment based on the manufacturer's requirements and wind loading for each piece of equipment mounted on the mast.

The masts shall be designed to meet the vibration criteria of Contract Paragraph C180.

SPECIAL FEATURES

None.

DELIVERABLES

849-C317-01 MASTS

STANDARDS

See Contract Paragraph C003.

C320 TANKS

GENERAL DESCRIPTION

The tanks in this Paragraph include the integral tank boundaries as part of the hull structure and the independent tank boundaries.

All tanks shall be complete with hatches, access ladders, filling connections, tank level indicators, drains, vents and all necessary connecting piping, gauges and controls.

REQUIREMENTS

Tanks shall be provided and installed in accordance with Contract Paragraph C130. The tanks shall be constructed to meet applicable ABS rules and USPHS guidelines.

Integral tanks shall be part of the Contract-level ABS-approved drawings (see Contract Paragraph C300).

The Contractor shall develop drawing 849-C320-01 INDEPENDENT TANKS during Phase II of the Contract and submit it to the COR and ABS for review and approval. The drawing shall show the construction, connections, fittings, sensors, and level gauges.

The Contractor shall develop drawing 849-C320-02 ACCESS ARRANGEMENTS FOR TANKS during Phase II of the Contract and submit it to the COR and ABS for review and approval. The drawing shall show all the manhole openings and covers, ladders, steps, and platforms (including hand- and guardrails) for access to integral tanks.

The Contractor shall develop drawing 849-C320-03 TANK OUTFITTING during Phase II of the Contract and submit it to the COR and ABS for review and approval. The drawing shall show all connections, fittings, sensors, and level gauges of hull integral tanks.

SPECIFIC REQUIREMENTS

No boundary of an oil tank shall be integral with the side plate or bottom plate of the hull, nor with the sloped side plates of the hopper.

All tanks, unless otherwise stated, shall be constructed of mild plate steel and mild structural steel.

The potable water tank shall be constructed of 304L stainless steel, with stiffeners external to the tanks, and shall meet all requirements specified in EM 385-1-1.

All manhole and access opening cover plates shall be supplied with gaskets suitable for the liquid contained in the tank.

All tanks shall be complete with hatches, access ladders, filling connections, tank level indicators, drains, vents and all necessary connecting piping, gauges and controls as required by the various sections of this Specification. Drain plugs in hull integral tanks penetrating the bottom shall be flush with the bottom plating and shall be located well clear of docking block areas.

SPECIAL FEATURES

None.

DELIVERABLES

849-C320-01 INDEPENDENT TANKS

849-C320-02 ACCESS ARRANGEMENTS
849-C320-03 TANK OUTFITTING

STANDARDS

USPHS 956, Drinking Water Standards
USACE EM 385-1-1, Safety and Health Requirements Manual

C325 SEA CHESTS

GENERAL DESCRIPTION

The sea chest structures include all spaces along the hull with the function of water inlet or for placing box coolers. The structure includes the sea chest boundaries, strainer grids and the integration with the hull structure (See Contract Paragraph C300).

REQUIREMENTS

The Contractor shall include the sea chest(s) on the Contract-level ABS-approved drawings as described in Contract Paragraph C300.

Sea chests shall be designed and constructed in accordance with ABS MVR and 46 CFR Subchapter I requirements. The Contractor shall develop drawing 849-C325-01 SEA CHEST DETAILS during Phase II of the Contract for submittal to the COR and ABS.

SPECIFIC REQUIREMENTS

The Contractor shall determine the position, size and number of sea chests needed to service the dredging and mechanical systems on the vessel.

Box Cooler sea chests and sea water inlets shall remain below the waterline at every loading condition (see Contract Paragraph C160 for the description of the load cases, and C155 for the summary table of the load cases).

Sea Water Inlet Sea Chest

The sea chests shall be sized to provide water to the bilge/ballast system (Contract Paragraph C660) fire main system (Contract Paragraph C675), and other systems as necessary.
Each sea chest shall be fitted with isolation valves, sea strainers(s), compressed air connections for blowdown (Contract Paragraph C690) and raw water lines for back flushing (Contract Paragraph C645).

Box Cooler Sea Chest

The box cooler sea chests shall be constructed in accordance with the box cooler manufacturer's recommendations. The construction shall allow the box coolers to be removed through soft patches. The sea chests shall be fitted with compressed air blowdown lines (see Contract Paragraph C690) and raw water lines for backflushing (Contract Paragraph C645).

Strainer Grids

Sea chests shall be fitted with removable stainless-steel strainer grids secured to the shell with stainless steel screws or bolts.

SPECIAL FEATURES

None.

DELIVERABLES

849-C325-01 SEA CHEST DETAILS

STANDARDS

See Contract Paragraph C003.

C326 TRANSDUCER WELLS

GENERAL DESCRIPTION

A transducer well shall be provided and installed for each transducer.

REQUIREMENTS

The Contractor shall develop drawing 849-C326-01 TRANSDUCER WELLS during Phase II of the Contract for submittal to the COR and ABS. Transducer wells shall be designed and constructed in accordance with ABS MVR and 46 CFR Subchapter I requirements.

SPECIFIC REQUIREMENTS

A separate transducer well shall be provided and installed for each transducer required by Contract Paragraph C770.

The pipe, plate, housing, and fairing shall be constructed to properly secure the transducers such that the transducer heads are flush with the bottom of the fairings and the baseline of the vessel.

Transducers shall be retractable into their wells beyond an isolation spade valve, making the transducers removable while the vessel is afloat.

Pad eyes for lifting/lifting equipment shall be installed directly above the center of the transducer wells.

A Sch 80 pipe conduit shall be run from each transducer well, sized to contain the cables at a maximum of 60% fill and allowing wires and connectors to pass freely without splicing. The conduit pipes shall be routed from the transducer casings to at least 12” above deepest operating waterline and provided with an MCT or cable glands at the end of the pipe.

SPECIAL FEATURES

None.

DELIVERABLES

849-C326-01 TRANSDUCER WELLS

STANDARDS

See Contract Paragraph C003.

C330 FOUNDATIONS

GENERAL DESCRIPTION

None.

REQUIREMENTS

Suitable foundations shall be provided for all units of equipment and machinery to properly mount the item, to introduce the operational loads into the hull structure, and to avoid undue stresses and vibrations in the foundations and the hull (refer to Contract Paragraph C180).

Foundation members shall be provided with openings as necessary to permit access to all parts of the foundation for fabrication, inspection, drainage, and maintenance.

Web plates of foundations shall be duly stiffened at holding-down bolts and other points of load concentration.

During Phase II, the design drawings for all foundations, their integration into the vessel structure and any vibration and noise isolation system shall be developed and be submitted to the COR and ABS for review and approval.

The associated structural calculations shall be part of either 849-C399-01 STRUCTURAL CALCULATIONS REPORT or 849-C399-02 GLOBAL FEA REPORT pending Contractor’s choice to integrate the particular foundations structural analysis into the Global FEA Model.

For foundations of large items of equipment, dedicated individual FEA’s may be performed and be reported in dedicated individual documents typically numbered as 849-C330-XX FEA REPORT XXX FOUNDATION.

SPECIFIC REQUIREMENTS

Fasteners

Where there are no specific requirements are given by ABS or equipment manufacturers, all equipment and machinery shall be bolted to foundations using Grade #8 fasteners or better. The threaded portion of bolts shall be clear of the foundation or equipment pads. Heavy gauge flat and lock washers shall be used under all nuts. Elastic stop nuts may be substituted for lock washers except for securing rotating machinery. The nuts shall match the Grade #8 fasteners. The Contractor shall provide and install machined fitted bolts where required by equipment manufacturer's or regulatory requirements.

Vibration Isolators

Vibration isolators shall be installed where required to meet Contract Paragraph C180 requirements.

Drip Pans

Where dripping of water or oil can be expected, drip pans shall be provided below the equipment. These shall be fitted with drain plugs in accessible locations at the lowest point and quick disconnect fittings.

Diesel Engine Foundations

The Contractor shall develop foundations for the diesel engines as identified in Contract Paragraphs C180 and C602.

The geometry of the diesel engine foundations shall permit the engine oil pan to be dropped down and positioned to allow access from below the engine for maintenance and repair.

Deck Crane(s) Foundations

The Contractor shall develop structural integration(s) for the pedestal(s) of the deck crane(s) identified in Contract Paragraph C455. The structural integration(s) shall be capable to support the loads specified by the Crane(s) Vendor and effectively distribute these into the vessel structure.

Dredge Equipment Foundations

The Contractor shall develop local reinforcements for machinery and equipment dedicated to dredging, such as Dredge Pumps, Pump Drives, Dragarm Winches, Gantries, and the Bow Coupling Winch as identified in Contract Paragraph C500 and considering the requirements of Contract Paragraph C180.

The scantlings of the structures for attachment of the equipment intended for dredging operations (e.g. connection of the suction pipe to the hull, foundation of the dragarm gantries) are to be based on the service load of such equipment, as specified by the Designer or Vendor. In determining the above service load, the Contractor shall take into account additional loads imposed by ship movements (in particular pitch and heave) in the most unfavorable sea and weather conditions expected during service.

Deck Machinery Foundations

The Contractor shall develop local reinforcements for deck machinery, such as but not limited to, the Anchor Windlasses, Mooring Winches, capstans, bollards, and davits.

Vessel Machinery Foundations

The Contractor shall develop local reinforcements for all Machinery and Equipment of the Vessel systems, such as but not limited to Pumps, Filters, Compressors, Major Piping Electrical Transformers and Switchgear.

Lifting Provisions

(see Contract Paragraph C200 and C290)

Lifting pads shall be provided throughout the vessel for lifting of equipment as required during foreseeable removal for maintenance and repair or replacement.

Lifting provisions shall also be provided over sea chest hatches, transducer hatches, overhead deck hatches to facilitate equipment removal from below deck.

The Contractor shall prepare a proposal for positioning lifting provisions as required to facilitate removal of equipment and further mechanical handling. During construction, the COR may require additional lifting provisions to be installed.

The lifting padeyes and their supporting ship structure shall be designed to withstand the minimum ultimate load of the attached rigging assembly, based upon allowable stresses taken with respect to the structure's material yield strength, as defined in the latest version of the ABS Guide for Certification of Lifting Appliances.

Padeyes shall be specifically analyzed for stresses due to axial tension on gross and net sections, shear stresses including those due to tear-out, in-plane and out-of-plane bending stress, bearing and

combined stress. The shear stresses, including those due to tear-out shall not exceed 0.4Fy. The allowable bending stress shall not exceed 0.6Fy for in-plane (strong axis) bending moment, and 0.75Fy for out-of-plane (weak axis) bending moment, for solid rectangular sections. Allowable tension stress shall not exceed 0.6Fy on gross section and 0.5Fu on net section. Interaction ratio sum of actual to allowable axial tension and bending stress ratios, shall be evaluated, their sum shall not exceed 1.0. Bearing stress shall not exceed 0.9Fy. Combined stress shall be calculated in accordance with Hencky-von Mises (HVM) criteria. HVM combined stress shall not exceed 0.75 Fy. Supporting calculations shall be submitted with the lifting provisions drawing as 846-C330-10 LIFTING PROVISIONS CALCULATIONS during Phase II.
All lifting pads shall be identified and marked with their Safe Working Load.

SPECIAL FEATURES

None.

DELIVERABLES

849-C330-01 DIESEL ENGINES FOUNDATIONS
849-C330-02 DREDGE EQUIPMENT FOUNDATIONS
849-C330-03 ANCHORING & MOORING EQUIPMENT FOUNDATIONS
849-C330-04 LIFE SAVING EQUIPMENT FOUNDATIONS
849-C330-05 DECK CRANE(S) FOUNDATION
849-C330-06 VESSEL MECHANICAL EQUIPMENT FOUNDATIONS
849-C330-07 VESSEL ELECTRICAL EQUIPMENT FOUNDATIONS
849-C330-08 ENGINES EXHAUST FOUNDATIONS AND SUPPORTS
849-C330-09 LIFTING AND MECHANICAL HANDLING PROVISIONS
849-C330-10 LIFTING PROVISIONS CALCULATIONS
849-C330-XX VESSEL XXX SYSTEM FOUNDATIONS
849-C330-XX … FOUNDATIONS AND SUPPORTS
…
849-C330-XX FEA REPORT XXX FOUNDATION
…

STANDARDS

ABS Guide for Certification of Lifting Appliances.
API Specification 2C – Offshore Pedestal-mounted Cranes

C335 HOPPER STRUCTURE

GENERAL DESCRIPTION

The capacity of the hopper shall be in accordance with the requirements specified in Contract Paragraph C002.

REQUIREMENTS

The hopper geometry shall promote optimal settling and dumping of the dredged material.

The hopper capacity to the maximum hopper overflow level shall be 6,000 Cubic Yards. The API certified hopper capacity tables (Sect. C604) shall be utilized to set the maximum travel on the hopper overflow at height corresponding to 6,000 Cubic Yard capacity.

The hopper shall be open at the top with coamings all around and with 5-foot (1.5m) high splash screens over the full length. The splash screens are not to be considered for strength of the hull midship section. At the ends of the hopper the splash screens shall be of increased height to prevent splashing and spilling during loading as the ship pitches.

The hopper plating shall be inclined towards the bottom doors to promote discharge of the dredged material. As much as possible, the hopper shall be free from obstacles that may disturb the longitudinal flow of the dredged material.

The hopper shall be designed for multiple methods of emptying dredged material. The hopper shall be capable of discharging dredged material through hydraulically operated bottom doors (see Contract Paragraph C514). Alternatively, the hopper can be discharged via the HOPPER COLLECTION SYSTEM (See Contract Paragraph C520). If the HOPPER COLLECTION SYSTEM includes a self-emptying channel as an integral part of the hopper structure, the global strengths properties of the Midship Section (See Contract Paragraph C300) shall be assessed both including and excluding the contribution of the material of the self-emptying channel.

The Contractor is to develop drawing 849-C335-01 HOPPER STRUCTURE and submit to the COR and ABS for approval.

SPECIFIC REQUIREMENTS

The Contractor shall specify the required wear allowances for the hopper structure. Wear allowance shall be based on the estimated lifetime, material chosen, and the type of dredge materials as described in Contract Paragraph C002. The hopper plating wear allowance calculations shall be included in the Lifetime Calculation as specified in Contract Paragraph C502.

Due care shall be taken to provide structural continuity at the forward and aft ends of the hopper structure to cope with the change in vessel cross section. Adequate structural transitions are to be provided for introduction of global hull loads into the hopper structure and vice versa. The hopper structure and its integration into the hull structure shall be part of the global FEA model

Top and bottom openings in the hopper structure shall be fitted with corner reinforcements if and as necessary.

If a self-emptying channel is selected, additional wear resistance shall be provided over the complete surface in contact with the dredged material, either by increased wear allowance on the structural plating or by lining with wear resistant cladding plate of increased hardness.

A catwalk shall be arranged above the hopper to handle the locking mechanism of the bottom doors. Platforms for safe access to gantries and walkways to the dredge valves above the hopper shall be installed. Platforms and catwalks shall be in accordance with the requirements of Contract Paragraph C425. This catwalk may interface with those required by Contract Paragraph C512.

SPECIAL FEATURES

None.

DELIVERABLES

849-C335-01 HOPPER STRUCTURE.

STANDARDS

See Contract Paragraph C003.

C399 STRUCTURAL CALCULATIONS

GENERAL DESCRIPTION

All scantlings of the Vessel structure shall be validated by an appropriate calculation method and the results thereof shall be reported.

REQUIREMENTS

The full scope of calculations shall be described in 849-C399-01 STRUCTURAL DESIGN BRIEF. The Design Brief shall include for each particular topic of calculation or design validation a general functional description of the structure as well as the loads and effects working on it and the calculation method to be applied.

The Contractor shall report, in 849-C399-02 STRUCTURAL CALCULATIONS REPORT, the calculations performed for validation of the structural scantlings of all structural drawings not addressed in the Global FEA Report.

The report shall at a minimum include the following items:

Hull Structure - ABS Scantlings Calculation

Deckhouse Structure - ABS Scantlings Calculation

Validation of proper support or foundation of smaller equipment such as Pumps, Switchgear, Major Piping/Ventilation ducts/Exhaust gas lines. As a rule of thumb any foundation supporting a weight or load of 1 ton or more shall be validated by calculations.

Lifting Padeyes and Material Handling Provisions

Sea-fastening for tall standing and suspended equipment

Any other calculations deemed necessary by the COR or ABS for validation of the structural design

The Contractor shall report, in the 849-C399-03 GLOBAL FEA REPORT, the global FEA of the hull primary structure, including the effect of foundations for and/or integration of heavy equipment as well as reinforcements needed to introduce other significant loads into the hull structure such as, but not limited to, the hopper loads. As a rule of thumb, the effect on the global structure of any equipment providing weight or load of 10 tons or more shall be considered in the FEA model.

In determining whether calculations are required, the Contractor shall consider the weight of equipment or systems including operating fluids at their normal levels.

Topics to be explicitly addressed in Structural Calculations include, but are not limited to:

a. Deck Machinery Foundations: Mooring & Anchor Winch, Capstans, Bollards, Lifeboat(s), davits

Foundations for Main Vessel Equipment: Generator Engine, Propulsion Machinery

Foundations for Main Dredge Equipment: Dredge Pumps, Pump Drive, Drag Arm Winch, Gantry, Bow Coupling Winch

Crane Foundation / Pedestal Integration

These local structures can be merged into the Global FEA, using adequate mesh refinement or as a sub-model, or be analyzed and validated by a dedicated local FEA model. In the latter case, due care shall be taken to apply the correct combination of local and global loads and to use a local model of such extent that no significant boundary effects occur.

For the foundations of large items of equipment, dedicated individual FEA's may be performed and be reported in dedicated individual documents typically numbered as 849-C330-XX FEA REPORT XXX FOUNDATION (See Contract Paragraph C330).

Additional requirements for the dynamic analysis of machinery and equipment foundations are found in paragraph C180 Noise and Vibration and may be incorporated into the structural calculations.

SPECIFIC REQUIREMENTS

STRUCTURAL CALCULATIONS REPORT 849-C399-02

All topics addressed in this report shall be described in a section of their own, in a standardized format comprising at a minimum the following:

General introduction of the particular structural system including description of its function and use, geometry, and applied materials

Applicable individual loads and pressures, with the following specifics:

Functional loads acting on the considered local structural system

Deck cargo pressure or sea water pressure at the weather deck(s), whichever is maximum as specified by ABS. Other decks shall have deck cargo pressures as prescribed by ABS

Still water sea pressure on bottom and side shell plating and tank pressure on bottom and sides of tanks – if and as applicable

Applicable combined Loading Conditions

Acceptance Criteria for stresses and deformations

Brief description of the actual calculation, describing the applied method and/or model; for simple systems direct hand-calculation will suffice, and where available direct application of Rule formulae suffices.

Presentation of the calculation results and validation of adequacy of the structure against the acceptance criteria.

GLOBAL FEA REPORT 849-C399-03

The Contractor shall perform and report the overall structural Finite Element Analysis which shall, at a minimum, include the following items:

General introduction of the global hull structure, the principal structural grid, the applied materials, and specific characteristics of its use as a trailing suction hopper dredger.

Description of the FEA model in terms of applied element types, element size, boundary conditions and similar characteristics of an FEA Model. The Contractor shall clearly describe what level of structural detail will be included in the Global FEA model.

Applicable loads and pressures with direct effect on the global structure:

Still Water Bending Moment and still water shear force as derived from hydrostatic pressure and weights/loads of the vessel both in hogging and sagging condition

Longitudinal and Transverse Wave Bending Moments, Wave Torsional moment, Vertical and Transverse Wave Shear Forces as derived from hydrodynamic action on the hull

Deck cargo pressure or sea water pressure on the weather decks, deck cargo pressures on the other decks; tank pressure on bottom and sides of tanks; functional loads from dredging operations including static and dynamic pressures on the hopper plating – All such loads if and as applicable

Applicable combined Loading Conditions

Acceptance Criteria for stresses and deformations

Description of the actual calculation, e.g. organization of individual and combined loading conditions, method for balancing the combined loading conditions to near-zero boundary loads, etc.

Description of the FEA results and validation of adequacy of the structure against the acceptance criteria. The output shall include:

a set of visual and numerical results, showing the von Mises stresses, direct normal and bending stresses, shear stresses

discussion and explanation on peak stresses in hard spots

Fatigue and Buckling assessment

SPECIAL FEATURES

None.

DELIVERABLES

849-C399-01 STRUCTURAL DESIGN BRIEF

849-C399-02 STRUCTURAL CALCULATIONS REPORT

849-C399-03 GLOBAL FEA REPORT

STANDARDS

ABS Rules for Building and Classing Marine Vessels

ABS Guidance Notes on SafeHull Finite Element Analysis for Hull Structures

ABS Guide for ‘SafeHull-Dynamic Loading Approach’ for Vessels

ABS Guide for Spectral-Based Fatigue Analysis for Vessels

ABS Guide for Buckling and Ultimate Strength Assessment for Offshore Structures

C400 OUTFIT

C404 CORROSION PREVENTION

GENERAL DESCRIPTION

None.

REQUIREMENTS

The choice of materials, the fabrication procedures, and the coating systems to be used in the fabrication of the vessel shall indicate that careful consideration was given by the Contractor to improve corrosion resistance and life expectancy.

The structure shall be designed and fabricated to avoid corrosion. In the design, entrapment of water shall be prevented by facilitating drainage and avoiding pockets where water can accumulate, and the application of coatings shall be facilitated by eliminating non accessible voids. Protective coating systems are the primary form of corrosion prevention for the vessel.

Painting shall be performed by the builder to the highest standards in strict accordance with the paint manufacturer's recommendations. Particular attention shall be given to adequately cleaning and coating welds, corners, frames, and inaccessible crevices or openings.

Specific requirements for the preparation, application and required products for the coating system are specified in C406 Coating System. The installation of the coating systems shall be in accordance with the Contract Drawing -840-B406-01 MDC STANDARD FLOATING PLANT PAINT SCHEDULE.

Galvanic corrosion shall be prevented by insulating the contact surfaces between two dissimilar metals.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

None.

STANDARDS

See Contract Paragraph C003.

C405 CATHODIC PROTECTION

GENERAL DESCRIPTION

None.

REQUIREMENTS

During Phase II, the Contractor shall develop and submit to the COR for review and approval 849-C405-01 CATHODIC PROTECTION DESIGN CALCULATIONS and 849-C405-02 CATHODIC PROTECTION PLAN.

SPECIFIC REQUIREMENTS

The Contractor shall provide and install a complete cathodic protection system for the vessel in accordance with ABS Guidance Notes on Cathodic Protection for Ships, NAVSEA T9633-AT-DSP-010 and the vessels particular operational requirement. The cathodic protection system shall be designed for a minimum of a 3-year service life for the operational characteristics as described in Contract Paragraph C002.

The cathodic protection system shall be designed and installed in compliance with the supplier's recommendations.

The cathodic protection system shall cover the underwater parts of the external hull, rudders (if applicable), bow thruster tunnel(s), propeller nozzles (if applicable), propeller shafts (if applicable), thrusters (if applicable) and all other appendages.

If galvanic anodes are used for cathodic protection they shall be of the weld-on type.

The cathodic protection system shall be effective in both fresh and salt water.

Box coolers shall be provided with an impressed current cathodic protection system and a system to prevent fouling of the box coolers by marine growth.

Internal tanks and piping systems intended for sea seawater shall be protected by a cathodic protection system, with a protective duration of at least 5 years. Seawater piping systems shall be fitted with a galvanic anode cathodic protection system. The sea water system's protection system shall be replaceable in-water and while the piping system is intact.

SPECIAL FEATURES

None.

DELIVERABLES

849-C405-01 CATHODIC PROTECTION DESIGN CALCULATIONS
849-C405-02 CATHODIC PROTECTION PLAN

STANDARDS

ABS Guidance Notes on Cathodic Protection for Ships
NAVSEA T9633-AT-DSP-010, Ship's Cathodic Protection Design Calculations, Design Requirements Manual

C406 COATING SYSTEM

GENERAL DESCRIPTION

None.

REQUIREMENTS

The Contractor shall provide and install a coating system in accordance with the Contract Drawing 849-B406-01. The Contractor shall provide non-skid 36-mesh 0.3lbs/sq. ft. garnet grit on all exterior decks and on the bridge top.

The Contractor shall retain the services of a representative from the Paint Manufacturer. This Representative shall be responsible for witnessing and approving all surface preparation, paint storage and preparation, and paint application. The Paint Manufacturer's Representative shall sign off on all documentation required by Sub-paragraph C.12.

SPECIFIC REQUIREMENTS

Surface Preparation

Surface preparation for all structural steel shall be in accordance with Steel Structures Painting Council Standards SSPC-SP10-85 (Near White Metal Blast) throughout. Profile blasting shall be in accordance with the primer manufacturer's requirements. All mill scale, weld spatter, dirt, oil and grease shall be removed.

Immediately upon completion of surface preparation, all steel shall be coated with the coating system described in the following.

The Contractor can use either pre-construction primer or limit initial coating to base coat only. If initial coating with base coat is selected, prior to application of subsequent coats, all steel shall be sand swept clean (light blast) or water blasted and any damaged areas repaired prior to application of the remainder of the system. All areas needing repair shall be cleaned to bare metal, spot blasted to restore profile and re-coated with the base coat.

Paint Requirements

Paint shall be delivered in sealed containers with labels to indicate manufacturer, date of manufacture, contents, and any special instructions. Paints and painting materials shall be stored under cover and protected from extreme temperatures.
Paints shall not be used if they have exceeded the closed shelf or pot life, recommended by the manufacturer. Additionally, paints shall not be applied in weather or humidity conditions not recommended by the manufacturer.

Application of Coatings

Surface preparation and paint application shall be in strict compliance with the coating manufacturer's recommendations. The manufacturer's Paint Representative shall sign off on all surface and environmental conditions prior to application of coatings. The Contractor shall take particular care to ensure that coating system requirements are met in all areas, especially those difficult to coat, such as flange undersides. All painting on both the interior and exterior surfaces below the deck shall be accomplished prior to launching of the vessel.

Coating System

The system is composed of the following coating types:

- Self-priming epoxy base coat
- Abrasion resistant epoxy barrier coat
- Fade resistant urethane top coat
- Anti-fouling coat

Acceptable Coatings

Acceptable coating systems must be selected in accordance with the MIL-Spec or Industry standard listed in the MDC paint schedule. They must also be proven paint systems that have a successful service of three years on a similar Jones Act or US Government steel vessel. Manufacturer shall provide at minimum three comprehensive service records reflecting use of selected coating system. The service records must be from at least two separate owners. Application and three-year inspection records shall be provided to the USACE MDC as part of the submittal package. The Contractor may select any systems that meet these standards at their discretion. However, the systems may not be "mixed". The specific coating designations to be used are listed on the contract drawing.
If a pre-construction primer is used, only the pre-construction primers compatible with the pre-qualified coating system chosen will be accepted. The pre-construction primer shall be "weldable" and the coating thickness recommended by the paint manufacturer shall be strictly followed.

Number of Coats & Paint Schedule

The number of coats is not specified. The Contractor is required to provide the number of coats necessary to attain the DFT thicknesses in accordance with the contract drawing 849-B406-01. Thickness applied per coat may not exceed the manufacturer's recommended maximum thickness. The Contractor shall update and submit the paint schedule as 849-C406-01 PAINT SCHEDULE during Phase II to list each coat to be applied to each area of the vessel, the paint manufacturer the Contractor elects to use, the color to be applied and corresponding FS595 number, wet mils, dry mils, overcoat time, thinner, method of application, and tip size. Include any appropriate General Notes for painting.

Coating "Type" and DFT Schedule

The coating types and DFT for all areas of the vessel shall be in accordance with the Contract Drawing 849-B406-01.

Coating Color Schedule

Colors shall conform to Federal Standard No. 595B Colors Identification Numbers. The color book as well as individual paint chips (3-inch x 5-inch) may be procured from the General Services Administration/Federal Supply Service as follows:

E-Mail: www.fss.gsa.gov/pub/fedspecs/

GSA/Federal Supply Service — Phone: (703) 605-2567

FSS product Acquisition Center — FAX: (703) 605-9856

Supply Standards Division (FLAS)

Arlington, VA 22202

The coloring schedule shall be according to Contract Drawing 849-B406-01.
The "under coats" of all multiple coat applications (except the hull interior) shall be "contrast tinted" to ensure complete coverage of successive coats.
All top coating shall be thick enough to provide complete opaque color coverage. Thickness increased over the DFT minimums required above shall be provided if required for opaque color coverage.
Painted surfaces damaged in handling and installation shall be repainted.
All perforated aluminum sheathing shall be provided with a manufacturer's white coating. The sheathing shall not be painted or coated by the Contractor.

Cautionary/Safety Zones

During Phase III, the COR or their representatives will identify all caution and safety zones for the Contractor to paint yellow.

Striping Red Trim

During Phase III, the COR will identify the trim pattern (striping red color) to paint for the exterior of the vessel.

Final Inspection of Painting

The Contractor is responsible for delivering the vessel with all painted surfaces in sound condition, and in accordance with this specification.
Prior to launching of the vessel, all interior and exterior painting shall be thoroughly inspected. Notice shall be given to the COR, 14 calendar days in advance of the scheduled launching for this purpose. If there are any defects or damage in the coating of the vessel, the Contractor shall repair the coating to restore the integrity of the paint system, and to meet the requirements of this specification. All damage shall be cleaned to bare metal, spot blasted to restore profile, and re-coated with the entire system schedule.
The vessel shall not be launched until:

(i) The painting documentation as required in Sub-Paragraph C.12 below has been provided to the COR. The documentation must show compliance with this specification in all areas, and all readings taken. All documentation shall be signed and approved by the Paint Manufacturer's Representative.

(ii) The painting has been inspected by an MDC representative and approved by the COR. Contractor must provide documentation prior to MDC inspection.

If outfitting is required after launching, all interior and exterior painting shall be re-inspected prior to Provisional Acceptance, and any damaged areas of the coating shall be repaired by the Contractor as necessary to restore the integrity of the paint system.
Any additional painting required as a result of the Final Inspection shall be done as required to meet this specification at no additional cost to the Government (including costs to drydock the vessel, if necessary).

Documentation and Warranty

a. Documentation

The Contractor shall provide a written signed statement from the paint manufacturer certifying that all coating application and surface preparation is in accordance with the coating system manufacturer's requirements for the vessel, and that the coating application meets all requirements in this specification.

The Contractor shall provide documentation logs for each coating applied. The logs shall include the following parameters:
Coating (per specification) type.
Coating manufacturer's requirements for preparation, environmental conditions and applications.
Date and time of preparation and application.
Extent and location of area coated.
Surface: preparation, condition at time of coating, temperature at time of coating, dew point at time of coating.
DFT measurements for each applied coating type. Measurements shall be taken as follows:
all flat surfaces, one reading per every 200 square feet, uniformly distributed, but a minimum of once per frame, per surface.

undersides of all flanges, one reading per every 50 linear feet of flange, uniformly distributed, but a minimum of two readings per surface, per compartment.

all free-standing structural members, i.e. stanchions, truss diagonals, etc., one reading per 50 linear feet of length each surface, but a minimum of two readings per surface.

Wet film measurements may be taken and converted to DFT as an alternative to direct DFT. In areas where multiple coating types are required, the above DFT requirements are applied to each coating type.

(vii) Services provided by paint manufacturer's representative (i.e. DFT readings, dew points, etc.).

Signature of paint manufacturer's representative on site.

Warranty

For the vessel, the Contractor shall warranty the coating system for one calendar year, commencing at Final Acceptance. The Contractor shall repair any coating failures during this time period at his cost, including all drydocking costs.

Safety & Health Standards

The U.S. Occupational Safety and Health Administration Regulations (OSHA) for shipyard employees engaged in surface preparation and coatings application shall be in accordance with the OSHA regulations stated in 29 CFR, subpart C 1915.31-36.

These regulations require the Contractor to have access to a "competent person" to test compartment atmosphere quality. The "competent person" shall be in accordance with OSHA regulations, stated in 29 CFR, subpart A, 1915.7 and 29 CFR, subpart B, 1915.12.

The regulations also require that frequent testing of the atmosphere shall be made in compartments being coated or preserved (or prepared for coating or preservation) by paints and coatings dissolved in highly volatile, toxic and flammable solvents (29 CFR, subpart C, 1915.35(b)), to ensure the atmosphere is not hazardous.

Each compartment inspection and test shall be logged on OSHA Form 74, with instructions on how to maintain a safe atmosphere in these spaces until the completion of the contract. Alternatively, should the contractor elect to maintain a record of inspections and tests in their own format, the record shall be posted in the immediate vicinity of the affected operations while the work is in progress. The records shall be maintained for a period of three months from the completion date of the specific job for which they were generated as per 29 CFR 1915.7(d)(2) with instructions on how to maintain a safe atmosphere in these spaces until the completion of the contract.

On 24-hours' notice of any Government inspection, and before any representative of the U.S. Government boards the vessel for inspection, each enclosed or confined space to be inspected shall be labeled "Safe for Workers" in accordance with the OSHA regulations stated in 29 CFR 1915.31-36. The initial certificate shall be issued by a National Fire Protection Association (NFPA) certified Marine Chemist, or a competent person in the event the marine chemist is unavailable. The competent person shall comply with the criteria set forth in 29 CFR 1915.7(b)(1). A competent person may re-certify daily provided that the conditions have been maintained.

This means that in all spaces so designated:

The oxygen content of the atmosphere is at least 19.5 percent and below 22 percent by volume;

The concentration of flammable vapors is below 10 percent of the lower explosive limit (LEL);

Any toxic materials in the atmosphere are within permissible concentrations;

Any residues or materials associated with any work in the space will not produce uncontrolled release of toxic materials under existing atmospheric conditions while maintained as directed.

The Contractor shall notify the Government when this certificate has been issued for each compartment. The vessel will not be inspected and accepted by the Government without a NFPA Marine Chemist certificate for each compartment designated "Safe for Workers."

SPECIAL FEATURES

Contract Drawing - 849-B406-01 MDC STANDARD FLOATING PLANT PAINT SCHEDULE

DELIVERABLES

849-C406-01 PAINT SCHEDULE

Documentation as required by Contract Paragraph C406

STANDARDS

SSPC-SP10-85 (Near White Metal Blast)
29 CFR, Subpart B, 1915.7
29 CFR, Subpart B, 1915.12
29 CFR, Subpart C, 1915.31-36
29 CFR, Part 1915, Subpart A, 1915.7, Competent Person
29 CFR, Subpart C, 1915.35(b), Painting
Federal Standard No. 595B, Colors Identification Numbers
Contract Drawing 849-B406-01 MDC STANDARD PAINT SCHEDULE

C410 HULL OUTFIT

GENERAL DESCRIPTION

None.

REQUIREMENTS

None.

SPECIFIC REQUIREMENTS

Bulwark

The Contractor shall provide and install a bulwark on the foredeck of the vessel. The Contractor may install bulwark in other areas of the vessel as-needed. Sufficient openings shall be provided in the bulwark to permit safe line handling. Openings intended for line handling shall be fitted with chocks, all other openings shall be reinforced with round bar or steel pipe. Where chocks are used for ultra-high strength synthetic mooring lines, the wearing surface shall be of a corrosion resistant material.

Bulwarks shall be designed, placed and installed in compliance with EM385-1-1 and ABS MVR.

The Contractor shall develop drawing 849-C410-01 BULWARK and submit it to the COR and ABS during Phase II of the Contract for review and approval.

Fendering

Heavy duty rubber fendering, hollow D-type, shall be placed around the gimbal of the dragarms, on the inboard side, to prevent damage to the hull plating.

At the fixed part of the A-frame and at the deck saddle of the gantries, D-type rubber fendering shall be placed to adequately absorb shocks when the suction pipe comes inboard.

In order to prevent damage to the hull by the draghead, fendering shall be placed on the draghead.

The Contractor shall develop drawing 849-C410-02 FENDERING and submit it to the COR and ABS as applicable during Phase II of the Contract for review and approval.

SPECIAL FEATURES

None.

DELIVERABLES

849-C410-01 MAIN DECK BULWARK
849-C410-02 FENDERING

STANDARDS

See Contract Paragraph C003.

C412 GROUND TACKLE

GENERAL DESCRIPTION

None.

REQUIREMENTS

Anchor handling shall be provided for two anchors, raised and lowered with a chain windlass, through a hawse pipe on the port and starboard sides of the vessel.

An anchor system and arrangement shall be provided that prevents the anchor or chain from fouling or damaging the hull, hull appendages or equipment when weighing, dropping or riding at anchor. Arrangement shall be in accordance with requirements specified in Contract Paragraph C456.

Under all operating conditions the anchor handling shall ensure that: the anchor drops immediately upon release, the anchor does not jam the hawse pipe, the anchor is self-stowing, the anchor and chain do not foul the hull.

Anchor and anchor chain type, size and weight shall be in accordance with ABS.

Structure of the hawse pipe, chain pipe and chain locker shall be in accordance with ABS.

The Contractor shall develop during phase II of the Contract 849-C412-01 EQUIPMENT NUMBER CALCULATION and submit to COR and regulatory bodies for review and approval.

The Contractor shall develop during phase II of the Contract 849-C412-02 ANCHOR HANDLING ARRANGEMENT and submit to COR and ABS for review and approval.

SPECIFIC REQUIREMENTS

Anchors

Two identical anchors shall be installed, one port and one starboard. Anchor shall be manufactured in the United States of America.

Hawse Pipes

Hawse pipes shall be fitted between the shell bolster and the chain windlass. Diameter of the hawse pipe shall be at least 1.5 times the chain's link length. Hawse pipes shall be fitted with a fixed anchor chain washdown system and nozzles, to be fed by the fire main system (see Contract Paragraphs C640 and C675).

Anchor Chains and Chain Stoppers

Chain length, diameter and strength shall be in compliance with ABS. Anchor chain shall be manufactured in the United States of America. Each chain shall include a chain stopper and devil's claw, and other fittings necessary to make a complete and workable anchoring arrangement.

Chain Lockers and Chain Pipes

Port and starboard chain lockers shall be provided A chain pipe shall be fitted from the chain windlass to the chain locker. Diameter of such chain pipe shall be at a minimum to the diameter of the hawse pipe. On the bottom of the chain locker a mud box shall be created with a minimum height of 3 feet. The top of mud box shall be fitted with steel grating. Access to both the Chain Locker and Mud Box shall be provided.

A pad eye shall be installed in the chain locker to connect a shackle to the very last chain link to secure the chain. The strength of the connecting link between the chain and pad eye shall be designed to be less than the breaking strength of the chain, but greater than the proof load of the chain.

SPECIAL FEATURES

None.

DELIVERABLES

849-C412-01 EQUIPMENT NUMBER CALCULATION
849-C412-02 ANCHOR HANDLING ARRANGEMENT

STANDARDS

See Contract Paragraph C003.

C415 DOORS, WINDOWS, HATCHES & MANHOLES

GENERAL DESCRIPTION

The Contractor shall provide and install a complete system of doors, windows, hatches, manholes, and auxiliary items. All doors, windows, portlights, hatches, and manholes shall be in accordance with the requirements of ABS MVR, USCG Subchapter I, and EM 385-1-1.

REQUIREMENTS

The Contractor shall develop drawings 849-C415-01 DOORS, 849-C415-02 WINDOWS & PORTLIGHTS, and 849-C415-03 HATCHES & MANHOLES and submit them to the COR and ABS as applicable during Phase II of the Contract for review and approval. The drawings shall include details for all parts of this Contract Paragraph.

All door, window, hatch, and manhole openings shall be provided with headers and framing as necessary to transfer the hull and local structural stresses around the openings. The headers shall be shown on the structural drawings. All doors, windows, hatches and manholes shall be ABS Type-Approved.

All doors shall be capable of opening at least 90 degrees.

SPECIFIC REQUIREMENTS

Doors

All doors shall be suitable for the location, function, and tightness of the compartments being served. All doors shall be equivalent in tightness and fire protection rating to the adjacent structure. All doors shall meet the securing requirements of 33 CFR Part 104. Sills for all doors shall be sized in accordance with the vessel's load line requirements (See Contract Paragraph C140). At a minimum, the width of all doors shall meet the requirements of ASTM F1166-07. The Contractor shall provide double doors where necessary for movement of stores, parts, and/or equipment. All doors to machinery, auxiliary machinery, and workshop spaces shall be fitted with acoustic insulation. All doors shall be fitted with hold-backs where allowed by the Rules. Interior and exterior joiner doors should be provided by the same manufacturer to the greatest extent possible.

Specialty doors not specifically addressed below shall be provided as-needed and in accordance with all applicable Rules.

Watertight Doors

The Contractor shall provide watertight doors in accordance with the requirements of ABS MVR 3-2-9/9, SOLAS, and USCG Subchapter I.

Watertight doors shall be of the remote-controlled sliding type as-required by the Rules. Where installed, sliding watertight doors shall meet the requirements of ASTM F1196-19 and F1197-19 and shall have their operating gear installed out of the weather to the greatest extent possible.

Watertight doors in high-traffic areas shall be of the quick-acting type. All other watertight doors shall be of the multi-dog type. Where allowed by the Rules, watertight doors shall be fitted with fixed portlights and deadlight covers.

Exterior watertight doors shall be constructed of corrosion-resistant materials. Exterior watertight doors shall be provided with gutters or flashing to divert water away from the doorway opening. Hinged exterior doors shall open outward and shall have hinges installed on the forward or outboard sides as applicable.

Exterior Weathertight Doors

For exterior doorways not required by the Rules to be watertight, the Contractor may install weathertight joiner doors. Exterior weathertight doors shall be flush-type with single-lever operation, constructed of corrosion-resistant materials, and fitted with gaskets and dogs. Weathertight doors shall be completely seal-welded to prevent the intrusion of rainwater. Exterior weathertight doors shall be fitted with fixed portlights and deadlight covers. Hinged exterior doors shall open outward and shall have hinges installed on the forward or outboard sides as applicable.

Exterior weathertight doors shall be fitted with adjustable heavy-duty marine grade door closers. Exterior weathertight doors shall be provided with gutters or flashing to divert water away from the doorway opening. Doorstops shall be provided to prevent damage. Where it is not practical to install door stops, high-traffic automatic door closers with built-in stops shall be used.

Interior Doors

The Contractor shall provide and install interior joiner doors for a complete habitability arrangement. Interior doors shall be flush-type hollow steel construction, type-approved by ABS and with fire ratings as required by the Rules. The interior finish of the doors shall match the adjacent bulkheads. Doors shall be supplied with hinges, doorknobs, and locksets. All interior doors, except those to sanitary spaces and storage areas, shall be fitted with heavy-duty automatic door closers.

Doors to heads shall be fitted with fixed louvers in the bottom portion of the door. Other doors shall be fitted with shuttered ventilation louvers as necessary to suit the Contractor's HVAC design (See Contract Paragraph C685) and in accordance with ABS and USCG rules and regulations. Stateroom doors shall be fitted escape panels in the lower half of the door.

Doors to heads, storage rooms, bunk rooms, and electronics spaces shall not be fitted with windows. All other interior doors shall be fitted with wire safety glass windows.

Sills for interior doors shall be of corrosion-resistant steel. Wet spaces shall have 3" sill heights. Doorstops shall be provided to prevent damage.

Locks and Keys

All locks shall have interchangeable cores, designed as a system and procured from a single manufacturer. The lock system shall be designed on a "grand master" and "master" basis. The grand master shall open all locks on the vessel.

All non-watertight exterior doors shall be fitted with mortise cylinder locks (common key) with latch bolt and dead bolt. The dead bolt shall operate by key from both sides.

Interior joiner doors requiring locks shall be fitted with mortise cylinder locks with dead bolts. The locks shall be keyed differently. The dead bolt shall operate by key from the outside and latch from the inside. Additionally, the bunk rooms shall have suitable privacy latches (not slip bolts) matching the deadbolt hardware and operable from the inside.

Personnel lockers and drawers within bunk rooms shall be provided with locks to secure each crewperson's personal effects. Each locker and drawer set shall be keyed alike. Each "set" shall be keyed differently.

"Grand Master" keys shall be provided to open all doors.

Master keys shall be provided as follows:

Machinery spaces, electronics/plenum space - all doors associated with the engine room, engineer's control room, storage room, electronics room, and electrical/cable trucks.

Galley - all doors associated with the galley, stores, stairwell closets, and laundry.

Bridge - all doors associated with the bridge, except lockers and drawers.

Engineer's Control Room and Bridge Lockers and Drawers – all lockers and drawings within the engineer's control room and bridge.

Bunk Rooms - all doors associated with bunk rooms, except the personnel lockers.

Personnel Lockers and Drawers - all lockers and drawers within bunk rooms.

Ten keys shall be furnished for each lock and 10 blank keys of each type fitted. Ten "grand master" keys and ten of each "master" key shall be provided. All keys shall be tagged with brass tags and numbered.

A locking wall mounted key cabinet shall be located in the engineer's control room. This cabinet shall be large enough to store keys for each space, plus each master and the grand master on separate hooks.

Hasps and padlocks shall be provided for all storage and liquid lockers.

Windows and Portlights

The Contractor shall provide and install windows and portlights as required in this specification and in accordance with the requirements of ABS MVR 3-2-17 and USCG Subchapter I. Along with the exterior and interior door windows, windows and/or portlights shall be provided throughout all deckhouse spaces, as practical. All windows and portlights shall be constructed in accordance with ABS MVR requirements.

Wherever practicable, all windows shall be of the same manufacturer and construction to provide consistent styling, function, and ease of repair. All windows shall be supplied with radius corners.

The bridge shall be designed to provide 360-degree visibility, with the maximum height practical for all windows, minimizing mullions and sight-line interferences. Full-height windows shall be provided on centerline for visibility of the hopper and dredging operations.
If a window is provided in the engineer's control room (in addition to the camera system described in Contract Paragraph C765), the window shall be an A60 fire rated window. In addition, the window shall be impact safety rated and have a minimum Sound Transmission Class (STC) of 40-dB. It shall be installed in accordance with the manufacturer's recommendation to maintain the fire rating and sound damping properties.
All non-head windows except the bridge and engineer's control room windows shall be manufactured with 20% visible light transmission tint. All windows in bathrooms, showers and changing rooms shall be manufactured with frosted glass. After-market film is not permitted except on wired-safety glass where manufacturing the finish is not possible.
See-through tinted clutch springless roller shades shall be provided for each window in the bridge. All roller shades shall be installed on wire or track guides to prevent swinging in any position.
All windows (except those in the bridge and ECR) shall be provided with curtains/drapes. In staterooms and bunkrooms, curtains/drapes shall be of the "blackout" type to minimize light intrusion. Colors and patterns of curtains/drapes shall be approved by the COR prior to purchase.

Window Wipers, Washer, Defrosting Fans & Heat Trace

Independently operating windshield wipers shall be supplied and installed on all forward-facing bridge windows and other bridge windows as required for navigation and visibility of dredging operations. The wipers shall be dual arm, single blade, heavy duty pantograph marine style window wipers. The wipers shall be sized to cover as much window area as possible without the blades touching the mullions.
A window washing system shall be provided for the forward-facing bridge windows, the dredging control area windows, and other windows as necessary for navigation. The system shall consist of a reservoir, pump, and nozzles. Each wiper shall have a nozzle attached to it. Valves and drains shall be provided to isolate each line and to winterize/drain the system. The reservoir and pump shall be conveniently located to allow for filling and maintenance.
Bridge windows shall be provided with a recirculating air defogging system to ensure that all unheated windows are kept clear of moisture and fog. Defogging system fans shall have variable speed controls.
Each forward-facing window shall be manufactured with electrical heat trace elements for defrosting. Additional defrosting elements shall be provided as-necessary for visibility of dredging operations.
The wiper, defroster, and fan controls for the bridge windows shall be mounted on or in the BCC within comfortable reach of the operator. The position of the controls shall be determined as part of the Bridge Control console layout (see Contract Paragraph C255). The wiper, defroster, and fan controls for the dredge control area windows shall be mounted on the dredge control console.

Hatches & Manholes

The Contractor shall provide and install hatches and manholes for a complete habitability arrangement. Manholes shall be provided for access to all tanks, voids, and cofferdams. Design and arrangement of hatches and manholes shall be in accordance with ASTM F1166-07, Section 11.14, ABS MVR, and USCG Subchapter I. All hatches and manholes shall be ABS approved for the location installed. Manholes shall have minimum opening sizes of 15" x 23".
Manholes for tank access shall be of the bolted type and be fitted with gaskets. Spaces requiring regular entry or inspection shall be fitted with hinged hatches.
Manholes and hatches on the weather decks shall be raised and have sill heights in accordance with ABS and USCG rules and the vessel's load line (See Contract Paragraph C140). Flush hatches shall be avoided wherever practicable. Where raised hatches are provided, sufficient clear walking space shall be provided around the hatch. Where it is not practicable to provide a walkway around a hatch and thus the hatch would be a tripping hazard, the hatch shall be installed flush with the deck.
Exterior manholes and hatches shall be provided with 316 stainless steel hardware. Hinged manholes shall be provided with holdback devices for safety.
Manholes shall be located out of high traffic areas wherever possible.
All spaces below main deck shall have two means of egress. If an escape hatch is provided to satisfy this requirement, the Contractor shall provide and install a hinged, quick-acting raised hatch. Each

hatch shall have a stainless steel "T" type handle on top and round bar shaft. The escape hatch shall have an escape handle attached to the underside of the hatch. The escape hatch shall be marked on both sides with letters, at least 1-inch high, stating "EMERGENCY EXIT – KEEP CLEAR."

Soft Patches

Soft patches shall be provided as-required by Contract Paragraph C290 for equipment removal. Soft patches may be of the welded (WERP) type or the bolted (BERP) type. Where raised bolted patches are provided, sufficient clear walking space shall be provided around the hatch. Where it is not practicable to provide a walkway around a patch and thus the patch would be a tripping hazard, the patch shall be installed flush with the deck. Appropriate gaskets and sealants shall be provided to ensure the bolted soft patches remain watertight.

SPECIAL FEATURES

None.

DELIVERABLES

849-C415-01 DOORS
849-C415-02 WINDOWS & PORTLIGHTS
849-C415-03 HATCHES & MANHOLES

STANDARDS

ABS Rules for Building and Classing Marine Vessels
3-2-9/9 Watertight Doors
3-2-17 Bulwarks, Rails, Freeing Ports, Portlights, Ventilators, Tank Vents and Overflows
International Convention for the Safety of Life at Sea (SOLAS)
46 CFR Subchapter I, Cargo and Miscellaneous Vessels
33 CFR Part 104, Maritime Security: Vessels
ASTM F1166-07 – Standard Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities
ASTM F1196-19 – Standard Specification for Sliding Watertight Door Assemblies
ASTM F1197-19 – Standard Specification for Sliding Watertight Door Control Systems

C420 DECK FITTINGS

GENERAL DESCRIPTION

Deck fittings shall be provided and arranged to suit the Contractor's proposed vessel arrangement. Deck fittings are an important part of a complete mooring system, and care shall be taken to ensure that fittings of sufficient quantity and strength are provided to allow the vessel to moor safely under all expected conditions and satisfy all Regulatory requirements.

REQUIREMENTS

The Contractor shall develop drawing 849-C420-01 MOORING ARRANGEMENT during Phase II of the Contract for submittal to the COR and ABS for review and approval. The mooring arrangement shall include all equipment and outfitting used for mooring, sized in accordance with the ABS Equipment Number (see Contract Paragraph C412). The drawing shall contain a bill of materials for all mooring equipment, including the Safe Working Load. The arrangement shall detail the location of the equipment and indicate the suggested routs of mooring lines. The mooring arrangement shall satisfy all applicable requirements of the ABS MVR and 46 CFR Subchapter I.

The Contractor shall provide and install a complete system of deck fittings as shown on 849-C420-01 MOORING ARRANGEMENT. The Contractor shall develop drawing 849-C420-02 DECK FITTINGS and associated calculations 849-C420-03 DECK FITTINGS & SUPPORT STRUCTURE CALCULATIONS and submit them to the COR and ABS as applicable for review and approval. The drawings shall include details on insert plates, backup structure, installation welding, and the equipment. All structural details shall be in accordance with regulatory body requirements.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

Sharp edges which have the potential to cause chafing and excessive wear shall be eliminated. Where chocks are used for ultra-high strength synthetic mooring lines, the wearing surface shall be of corrosion resistant material.

DELIVERABLES

849-C420-01 MOORING ARRANGEMENT
849-C420-02 DECK FITTINGS
849-C420-03 DECK FITTING & SUPPORT STRUCTURE CALCULATIONS
Equipment Cutsheets

STANDARDS

ABS MVR 3-5-1: Anchoring, Mooring, and Towing Equipment
46 CFR Subchapter I, Cargo & Miscellaneous

C425 WALKWAYS, RAILINGS, FLOOR PLATES AND GRATINGS

GENERAL DESCRIPTION

The Contractor shall provide and install a complete system of walkways, railings, floor plates and gratings.

REQUIREMENTS

The Contractor shall develop drawing 849-C425-01 WALKWAYS, RAILINGS, FLOOR PLATES, AND GRATINGS and submit it to the COR and ABS as applicable during Phase II of the Contract for review and approval. The Contractor shall develop 849-C425-02 WALKWAYS, FLOOR PLATES AND GRATINGS CALCULATIONS demonstrating that floor plates satisfy the deflection criteria listed below. The calculations shall be presented to the COR and ABS during Phase II for review and approval. All walkways, railings, floor plates and gratings shall be in accordance with EM 385-1-1, ABS Marine Vessel Rules, and 46 CFR Subchapter I. The Contractor shall provide as much clearance as possible in way of boarding areas, boats, and survival craft, but shall at a minimum satisfy all Regulatory requirements.

SPECIFIC REQUIREMENTS

Walkways

A minimum 36-inch clear walkway (clear of handrails and grab rails) shall be provided along each side of each level of the deckhouse at the main deck and above. The walkway shall be extended around either the forward or aft side of the deckhouse, extending from side to side at each level. Walkways above the main deck shall be constructed of welded steel. The outer edges of the walkways shall have a flat bar coaming extending 4 inches above the walkway plate to trap rainwater. Drains shall be provided at low points with down spouts exiting onto a weather deck below. A similar coaming shall be installed at all ladder openings and all other openings in the walkway.

Railings

All railing systems identified shall be designed in accordance with the criteria identified in Part 19 of EM 385-1-1 (USACE Safety Manual).

The Contractor shall provide and install USACE Type D grab rails on the main deck level of the deckhouse at 39-inches above the deck.

For weather deck perimeter protection, where the bulwark is not installed, a USACE Type B rigid railing system with five tiers shall be provided.

The lowest tier may be omitted in way of deck fittings.

In areas of embarkation/debarkation, load handling, working over the side, etc. a USACE Type C non-tensioned railing system with five tiers and removable stanchions shall be provided. The removable connection to the deck shall preserve the rigidity of the stanchion. Spacing between

stanchions shall not exceed 8-feet. All hardware shall be stainless steel and the chains shall be hot dipped galvanized steel.
For decks above the main deck, where the bulwark is not installed, a Type A (USACE Safety Manual) pipe railing around the edge perimeter shall be installed. The top railing shall be 42-inches above the deck with an intermediate rail at 21-inches above the deck. The railings shall be set on permanent pipe stanchions located at the frames and spaced no more than 8-feet apart. A 4-inch toeboard shall be provided in way of the handrails. Provide a length of ¼-inch chain with end snap hooks at each tier in way of openings.
For the House Top, a 4-inch toeboard shall be provided all around except in way of the vertical ladder. The toeboard may be integral with the visor. The Contractor shall provide welded safety clips for harness tie-ins on top of the house. The clips shall be located so that a person wearing a safety harness with a 6-foot tether can reach/work on all areas of the house top. The Contractor shall provide local reinforcement under the safety clips.
For the interior decks, removable Type A (USACE Safety Manual) pipe railing shall be provided in way of all inclined ladder opening(s). Each removable section shall be sized to be handled by one crew member. At the top of the ladder, the Contractor shall provide a length of ¼-inch chain with end snap hooks.
All inclined ladders with open sides shall be provided with a two-tier handrail system. All interior inclined ladders with enclosed sides shall be provided with a grab rail on one side.

Floor Plates

Floor plates shall be provided for spaces where ship's structure extends above the deck plate or where equipment restricts maneuverability within the space. The floor plate system in the machinery, auxiliary machinery, and storage spaces shall consist of steel tread plating. These plates are to be sectionalized for easy removal and shall be held in place by countersunk flat head stainless steel screws. Supports shall not extend above the surface of abutting plates. Plates shall be flat and free from warp, twist, and other defects affecting their appearance and serviceability.
The floor plates shall be designed to support a minimum static load of 100 pounds per square foot without excessive deflections and shall be locally reinforced as necessary where greater loadings are expected in the removal or disassembly of machinery for overhaul and repair. Excessive deflection is defined as the lesser of ½" or span/180, where span is the greatest unsupported length of the plate.
Hinged sections of floor plate shall be provided in way of all valves, strainers, and other equipment located beneath the floor plates requiring access for operation, inspection, or maintenance. Flush type lifting rings or finger holes shall be provided in hinged sections.

Exterior Deck Grating

Hot dip galvanized steel, serrated bar type, non-skid grating of about 3/16"x1" flat bars on 1-inch centers shall installed for all grating platforms except those over the hopper. Gratings over the hopper shall be constructed of 316 stainless steel. The grating shall be installed with the grating bars running longitudinally.
Grating platforms shall meet all safety requirements contained in EM385-1-1, Part 19 including requirements for railings and fall protection.
Gratings shall be designed to support a minimum static load of 100 pounds per square foot without excessive deflections and shall be locally reinforced where heavier loads are expected. Excessive deflection is defined as the lesser of ½" or span/180, where span is the greatest unsupported length of the grating.
Gratings shall be accurately fabricated and free from paint, warp, twist, or other defects affecting their appearance or serviceability. Gratings shall be cut and banded for fitting around piping, ducting, etc., in such a manner that no sacrifice of strength results.
Gratings shall be installed in accordance with the manufacturer's recommendations. Galvanized steel clip fasteners shall be provided by the manufacturer of the grating and shall be attached to the support structure with stainless steel hex head bolts and stainless-steel locknuts with nylon inserts.

SPECIAL FEATURES

None.

DELIVERABLES

849-C425-01 WALKWAYS, RAILINGS, FLOOR PLATES, AND GRATINGS
849-C425-02 WALKWAYS, FLOOR PLATES AND GRATINGS CALCULATIONS

STANDARDS

USACE EM 385-1-1, Part 19, Floating Plant and Marine Activities
ABS Rules for Building and Classing Marine Vessels
46 CFR Subchapter I, Cargo and Miscellaneous Vessels

C427 VERTICAL AND INCLINED LADDERS

GENERAL DESCRIPTION

The Contractor shall provide and install a complete system of inclined and vertical ladders and stairs to allow safe access to all areas and compartments on the vessel.

REQUIREMENTS

Access throughout the vessel shall meet the requirements of USCG regulations and ABS Rules and Habitability Guidelines. The Contractor shall develop drawing 849-C427-01 VERTICAL AND INCLINED LADDERS AND STAIRS and submit it to the COR and ABS as applicable during Phase II of the Contract for review and approval.

All inclined and vertical ladders and stairs shall be designed and installed in accordance with EM385-1-1 (USACE Safety Manual) and ASTM F1166-07 Standard Practices for Human Engineering Design for Marine Systems, Equipment and Facilities.

All attachment hardware shall be stainless steel.

SPECIFIC REQUIREMENTS

Interior Inclined Ladders/Stairs

The vessel shall be provided with a central stairtower in the deckhouse (see Contract Paragraph C201). Stairways and inclined ladders in the interior of the deckhouse shall be designed for two people walking in opposite directions. Stairs, ladders, and railings shall be provided in accordance with ASTM F1166-07. Each stair tread shall be covered with a manufactured stair tread covering as described in Contract Paragraph C430.

For ladders in/to the machinery spaces, handrails shall be provided on both sides of the inclined ladder. The inclined ladders shall be removable. The top and front face of each nosing shall be painted yellow, along with the top landing.

Exterior Inclined Ladders

Exterior inclined ladders and stairs shall be designed for two people walking in opposite directions and sized in accordance with ASTM F1166-07. Handrails shall be provided on both side of the inclined ladders. The inclined ladders shall be removable. The top and front face of each nosing shall be painted yellow, along with the top landing.

Vertical Ladders

Vertical ladders shall be provided at all manholes, tank accesses, and escape hatches. These ladders shall be removable and designed in accordance with ASTM F1166-07. The rungs shall be covered with a nonskid surface tape to prevent slipping. Where ladders are required on bulkheads, they may be separate rungs welded to the structure. Where not extending from side to side of adjacent structure, these rungs shall be stirrup shaped to prevent slipping endwise.

SPECIAL FEATURES

None.

DELIVERABLES

849-C427-01 VERTICAL AND INCLINED LADDERS

STANDARDS

USCG 46 CFR Subchapter I, Cargo and Miscellaneous
ABS Rules for Building and Classing Marine Vessels

USACE EM385-1-1, Safety and Health Requirements Manual
ABS Guide for Crew Habitability on Workboats
ASTM F1166-07 Standard Practices for Human Engineering Design for Marine Systems, Equipment and Facilities

C430 DECK COVERINGS AND FLOOR SYSTEMS

GENERAL DESCRIPTION

The Contractor shall provide and install a complete deck covering and flooring system throughout the vessel.

REQUIREMENTS

The deck covering and flooring system shall meet the requirements of 46 CFR 164.006, Deck Coverings for Merchant Vessels.

The Contractor shall develop drawing 849-C430-01 DECK COVERINGS & FLOOR SYSTEMS and submit it to the COR and ABS as applicable during Phase II of the Contract for review and approval. The drawing shall contain details on the make and model, preparation, installation, thickness, etc.

The Contractor shall provide the COR with color/pattern options for all deck coverings and floor systems no later than 120 days after Notice to Proceed with Phase III of the Contract. If requested by the COR, the Contractor shall provide samples to assist with the decision process. The COR will make the final deck covering and flooring system decision prior to purchase and installation.

All flooring systems and underlayments shall maintain the fire-boundary rating of the deck they are installed on. The Contractor shall ensure that all floor coverings meet the fire safety requirements of ABS and USCG.

SPECIFIC REQUIREMENTS

Exterior Decks

All weather decks shall be prepared for a non-skid surface. See the coating schedule in Contract Paragraph C406. Non-skid is not required under deck grating. Non-skid shall be applied to the top of access covers and hatches.

Interior Decks

For all interior spaces that receive a floor covering (other than paint), a sanitary cove base shall be installed. The cove base shall be of similar material and color to the adjacent floor covering and shall be a minimum of 4-inches high. The cove base shall be worked around all bulkheads, cabinets and equipment. The coving shall be sealed at the top and bottom edge with a long-lasting (minimum 15 years) silicone seal. Where coving will not fit below doorways, the coving shall be trimmed to suit or sealed by other means on an instance-by-instance basis as determined on site by the COR.
Underlayment shall be applied to all interior decks to fair high and low spots, tripping hazards, and weld seams. The underlayment shall be faired flush over 1 to 2-feet of either side of any anomaly. For wet spaces, underlayment shall be applied to slope the floor down to the drains. The underlayment shall be a lightweight epoxy resin-based underlayment, suitable for use under epoxy coatings and poured floors.
Spaces below the weather deck shall be fitted with floor plates/gratings as required by Contract Paragraph C425.
The decks of machinery, storage, and electronics spaces shall be coated with a high-solids, heavy duty, two component epoxy coating with a tough finish. The coating shall have resistance to alkalies, oils, abrasion, corrosion and chemicals. The coating system shall be applied on the bulkheads, up approximately 4-inches to the underside of the insulation and sheathing. The final color shall be selected by the COR from options provided by the Contractor. The paint manufacturer shall provide a letter certifying the system was applied in accordance with their recommendations.
The interior stairs shall have a manufactured rubber stair tread covering. The stair treads shall be one-piece tread with nosing overhang, and incorporate a 2-inch abrasive non-skid strip, the color of the abrasive strip shall be selected by the COR from options provided by the Contractor (NLT 120 days after Notice to Proceed with Phase III), except for the first and last treads (landing tread) of each

flight. The abrasive strip on the first and last treads as well as the top tread/landing on each flight shall be yellow. The tiles shall be installed with adhesive in accordance with the manufacturer's recommendations.

For any potentially wet spaces with floor drains (i.e. Galley, heads, mud/changing rooms, etc.), the deck shall be covered with a polymeric decking. The decking shall be a liquid applied, joint-less, epoxy resin composition poured floor deck covering. The floor system shall include 30% hand broadcast decorative vinyl chips and sealer to create the desired finish. The floor system shall be installed 4-inches up on the surrounding bulkheads to form the cove base. The deck covering shall be sloped down to the drains. The deck covering in these spaces shall i.e. have a non-slip coating incorporated into the top surface of the floor system. The installer of this system shall provide a letter of approval from the flooring manufacturer to the COR indicating that based on previous experience they are qualified to install the system. The selected deck covering system shall be approved by the COR. The final color shall be selected by the COR from options provided by the Contractor no later than 120 days after Notice to Proceed with Phase III of the Contract.

The Contractor shall select and propose a minimum of three flooring system options to be used on the vessel's bridge during Phase II of the Contract. The COR shall select and approve the bridge flooring system during Phase II of the Contract. The final color shall be selected by the COR from options provided by the Contractor no later than 120 days after Notice to Proceed with Phase III of the Contract.

All remaining interior spaces in the deckhouse shall be covered with an ABS-approved, anti-fatigue, sound-dampening, rubber tile flooring system. The flooring system shall be easily cleaned and maintained using readily available cleaning products. The flooring system shall offer natural resistance to bacteria and fungi in accordance with ASTM G21-15. The floor tiles shall feature a raised and/or textured profile to allow dirt and water to drain off the walking surface for improvement of traction and slip resistance. The flooring system shall be PVC and phthalate-free. The Contractor shall provide certification that the flooring system was installed in accordance with the manufacturer's instructions and that all conditions of the flooring system warranty have been maintained. The selected flooring system shall be approved by the COR. The final color shall be selected by the COR from options provided by the Contractor no later than 120 days after Notice to Proceed with Phase III of the Contract. Where the rubber tile flooring system is impractical, the Contractor shall propose alternative options for the COR to choose from. No flooring system shall be purchased or installed in the vessel until approved by the COR.

Heavy-duty anti-fatigue mats shall be provided for each operating, control, and navigation station on the vessel (including engineering control stations).

Four heavy-duty anti-fatigue mats shall be provided for the galley/mess area, sized and placed at the direction of the COR.

Insulation mats shall be placed on the decks of the machinery spaces in the vicinity of electrical equipment.

A non-conductive electrical-grade switchboard mat, suitable for the switchboard voltage, shall be provided and installed at the front of each switchboard and extend the entire width in accordance with 46 CFR 111.30-11. The mat shall meet ASTM D178-19 standards and incorporate a yellow safety strip.

SPECIAL FEATURES

None.

DELIVERABLES

849-C430-01 DECK COVERINGS & FLOOR SYSTEMS

STANDARDS

46 CFR 111.30-11, Deck Coverings

ASTM D178-19, Standard Specification for Rubber Insulating Matting

46 CFR 164.006, Deck Coverings for Merchant Vessels

ASTM G21-15, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

C435 JOINERY & CEILINGS

GENERAL DESCRIPTION

The Contractor shall provide and install a complete joinery and ceiling system throughout the vessel which satisfies the requirements of 46 CFR Subchapter I, ABS MVR, SOLAS, and these specifications.

REQUIREMENTS

The Contractor shall develop drawing 849-C435-01 JOINERY & CEILINGS and submit it to the COR and ABS during Phase II of the Contract for review and approval. The drawing shall contain details on the make and model, preparation, installation, thickness, etc.

The Contractor's joinery and ceiling systems shall satisfy the noise and vibration criteria of Contract Paragraph C180.

The Contractor shall provide the COR with color/pattern options for all joinery and ceilings no later than 120 days after Notice to Proceed with Phase III of the Contract. If requested by the COR, the Contractor shall provide samples to assist with the decision process. The COR will make the joinery and ceiling system(s) decision prior to installation.

All joinery and ceilings shall satisfy the fire protection requirements of SOLAS, ABS MVR, and USCG.

There shall be no wood behind joinery or ceilings. If furring strips are used, they shall be metal.

All joinery and ceilings shall be installed in accordance with the manufacturer's instructions.

SPECIFIC REQUIREMENTS

Ceilings

Ceilings shall be provided in all accommodation spaces including but not limited to staterooms, passageways, offices, mess areas, common areas, the bridge and the galley. For storerooms and working spaces within the deckhouse, the overhead, structure, exposed piping and wireways shall all be painted in accordance with Contract Paragraph C406.

Ceilings shall be installed such that a minimum of 7'-1" of clearance is provided between the finished floor and the bottom of the ceiling system. Ceiling system shall be provided with acoustic damping and shall be adequately secured and/or isolated to prevent transmission of noise and vibration from the hull during normal operation. The ceiling system shall be USCG approved and shall be approved by the COR prior to purchase. The same ceiling system shall be used throughout the vessel to the greatest extent possible.

Removable panels shall be provided for access to valves, dampers, junction boxes, and all other regularly used equipment concealed behind the ceiling. Panels shall be labeled to indicate the equipment being concealed.

Joinery

The Contractor shall install a joiner bulkhead system in all accommodation areas of the vessel, including but not limited to: staterooms, passageways, offices, mess areas, common areas, the galley, and the bridge.

Joiner bulkheads shall be components of a standard, USCG approved marine joiner system of corrosion resistant metal. The joiner system shall be approved by the COR prior to purchase.

There shall be no wood behind joinery. If furring strips are used, they shall be metal.

Where allowed by the manufacturer, items may be mounted directly to joiner panels. All items mounted against joiner panels which exceed the manufacturer's allowable weight shall be fastened through the joiner system directly to vessel structure.

Doors, windows, lighting fixtures, and ventilation penetrations shall be integrated into the joinery system using moldings and trim pieces provided by the sheathing or joinery manufacturer for that purpose. Cuts for joiner penetrations shall be neatly executed with no jagged edges.

Removable panels shall be provided for access to valves, dampers, junction boxes, and all other regularly used equipment concealed behind the joiner system. Panels shall be labeled to indicate the equipment being concealed. Additional access panels should be provided where access behind the joiner work is desirable for maintenance. Access panels shall present a pleasing appearance and be consistent with the surrounding sheathing. Access panels shall be secured by means of stainless-steel

screws threaded into the furring or bulkhead structure. Molding strips shall be provided as necessary to conceal hardware and present a pleasing appearance.

SPECIAL FEATURES

The joinery and ceiling systems shall be designed such that any individual panel may be removed without disturbing adjacent panels for access to structure, wiring, and equipment located behind the panels. Panels shall be removable without causing any permanent damage. Where special tools are required for removal of joinery or ceiling panels, a minimum of three (3) sets of such tools shall be provided with the vessel. deliverables

DELIVERABLES

849-C435-01 JOINERY & CEILINGS

STANDARDS

46 CFR Subchapter I, Cargo and Miscellaneous Vessels
ABS Rules for Building and Classing Marine Vessels
International Convention for the Safety of Life at Sea (SOLAS)
ABS Guide for Crew Habitability on Workboats

C436 INSULATION & SHEATHING

GENERAL DESCRIPTION

The Contractor shall provide and install a complete insulation and sheathing system throughout the vessel in accordance with the requirements of 46 CFR Subchapter I, ABS MVR and SOLAS. The Contractor shall work with a COR approved marine noise consultant identified in Contract Paragraph C180 to determine the location and type of noise insulation required.

REQUIREMENTS

The Contractor shall develop drawing 849-C436-01 INSULATION & SHEATHING and submit it to the COR and ABS as applicable during Phase II of the Contract for review and approval. The drawing shall contain details on the make and model, preparation, installation, thickness, and all other details of the insulation and sheathing system. The Contractor shall give consideration to avoiding thermal breaks and thermal shorts in the insulation system.

The Contractor shall provide the COR with color/pattern options for all sheathing no later than 120 days after Notice to Proceed with Phase III. If requested by the COR, the Contractor shall provide samples to assist with the decision process. The COR will make the sheathing system(s) decision prior to the Contractor's need to order materials.

The insulation and spray-on coatings shall be selected to meet the noise, vibration, and climate control requirements identified in Contract Paragraphs C180 and C685. The Contractor shall provide an insulation system which precludes "sweating" and condensation formation on steel bulkheads and surfaces of the vessel and piping systems through air-conditioned spaces. The design to prevent condensation shall account for high ambient temperature and humidity levels, and the resultant conditions for condensation between air-conditioned areas, or ventilated areas and the non-air conditioned or ventilated ambient conditions at the boundary of the air conditioned or ventilated spaces.

SPECIFIC REQUIREMENTS

Thermal Spray-On Insulation

Where thermal spray-on insulation is used, coating shall be a type-approved water-based, low-VOC coating that is comprised of air-filled ceramic and silica beads suspended in an acrylic binder. The coating shall be applied in accordance with manufacturer's requirements.

Work production shall be scheduled and executed to minimize the need to perform hot work after the thermal coating has been applied. Damaged thermal coatings shall be removed and repaired in accordance with the manufacturer's recommendations.

The thermal spray-on coating shall have an epoxy coating applied over it in accordance with Contract Paragraph C406.

The Contractor shall notify the COR 7 days prior to the application of the thermal spray-on insulation. After the thermal spray-on insulation is applied, and prior to epoxy paint coatings being applied or fiberglass insulation installed, a manufacturer's representative shall inspect the application and provide a letter certifying it was installed in accordance with their recommendations.

Acoustic Spray-On Insulation

Where required to meet the requirements of Contract Paragraph C180, the Contractor shall apply a spray-on marine grade noise insulating coating. In particular, the Contractor shall provide an effective noise barrier around high-noise spaces to prevent noise transmission to adjacent spaces as well as reducing the contribution of reverberant noise within the space. The coating shall be a water-based, low-VOC coating that is comprised of anti-vibrational fillers with a sound absorption resin. The coating shall be applied in accordance with manufacturer's requirements.

Work production shall be scheduled and executed to minimize the need to perform hot work after the sound control coating has been applied. Damaged sound control coatings shall be removed and repaired in accordance with the manufacturer's recommendations.

The noise control coating shall have an epoxy coating applied over it in accordance with Contract Paragraph C406.

The Contractor shall notify the COR 7 days prior to the application of the acoustic spray-on insulation. After the acoustic spray-on insulation is applied, and prior to epoxy paint coatings being applied or fiberglass insulation installed, a manufacturer's representative shall inspect the application and provide a letter certifying it was installed in accordance with their recommendations.

Rigid Thermal and Noise Insulation

All rigid thermal insulation shall provide structural fire protection for a minimum fire rating as required by 46 CFR 92. Installation guidelines contained in this Specification shall in no case supersede regulatory structural fire protection requirements. The Contractor shall provide and install fiberglass marine hullboard insulation in accordance with the INSULATION AND SHEATHING drawing. The insulation shall be suitable for marine service, anticipating high levels of dampness, vibration, noise and temperature extremes. Insulation in the machinery spaces, stacks, ventilation plenums, electronics spaces and storage spaces shall be faced on the inboard surface with a fiberglass scrim reinforced mylar damage-resistant material.

All deckhouse bulkheads and overheads, interior bulkheads, stacks, ventilation plenums, machinery, auxiliary machinery, and storage spaces shall be insulated. Where allowed by regulatory requirements, insulation in spaces below the main deck shall terminate 12" above floor plates. Insulation in wet spaces shall terminate 4" above the deck (where allowed by regulatory requirements) and shall be provided with barrier material to prevent moisture wicking up into the insulation.

Installation shall be in accordance with the manufacturer's recommendations for the intended service. However, as a minimum, the mounting studs shall be welded to bulkhead/overhead structure. Adhesive mounting is not acceptable. Appropriate structural capping shall be provided where the termination of the insulation is "open."

Sheathing Installation

Sheathing shall be provided in all areas with insulation which are not covered by joiner work, except as noted within this Paragraph. Sheathing shall be installed to protect insulation in areas of high traffic or frequent damage. Sheathing need not be installed for insulation located behind joiner work. The sheathing work design shall have radius outside corners such that there are no sharp edges.

If necessary for installation, furring strips shall be mounted to stiffeners with standoffs to avoid crushing the insulation and acoustical treatments. Sufficient furring shall be provided to provide a fair surface for the sheathing. All furring shall be metal. No wood is permitted behind sheathing. Adhesive mounting is not acceptable.

Framing, furring strip, and fastener spacing shall prevent drumming and vibration of sheathing. The sheathing shall be fastened to the furring strips or the framing by self-tapping stainless-steel sheet metal screws with industrial grade caps. The fastening system may be assisted by the use of adhesive between the metal furring and the sheathing. Adhesive shall be water-based, non-flammable, low-VOC and heat resistant. However, the adhesive shall not be a substitute for effective securing of the sheathing with fasteners.

Access panels shall be provided as required for access to wiring or piping behind the sheathing. Access panels shall present an appearance consistent with the surrounding sheathing. Access panels shall be secured by means of stainless-steel screws threaded into the furring or bulkhead structure. Molding strips shall be provided where necessary to present a pleasing appearance.
All items mounted against the bulkhead panels shall be fastened through the sheathing and insulation panels directly to bulkhead support structure.

Sheathing – Machinery Spaces

The engine room, storage spaces, dredge machinery spaces, auxiliary machinery spaces and the electronics rooms shall be considered machinery spaces for the purpose of this Paragraph.
The sheathing shall be minimum 15 gage aluminum 3003-H14, perforated 3/16-inch diameter holes on 5/16-inch staggered centers, with a minimum of 30% open area. The perforated sheathing shall come painted white from the manufacturer. The installed sheathing shall not be coated by the Contractor except to repair minor scratches. Any surfaces that receive paint overspray shall be cleaned, repainted or replaced to the satisfaction of the COR.

Sheathing – Deckhouse

Deckhouse spaces not requiring joiner bulkheads (see Contract Paragraph C435) shall require sheathing, which shall be 18 gage aluminum sheet with vinyl finish. Sheathing for exposed vertical surfaces within the Galley, Scullery and interior refrigerated spaces shall be SST 304, 16 gauge minimum; the overhead shall be 20 gauge.
All vertical edges shall be properly sealed and trimmed with materials provided by the manufacturer of the sheathing for that purpose. The bottom edge of the sheathing shall be sealed prior to the installation of the coving (Contract Paragraph C430).
Vinyl faced aluminum trim pieces shall be installed to finish off the openings around windows. When available, trim pieces shall be provided by the same manufacturer as the sheathing.
Sheathing shall not be installed behind the shower modules.

SPECIAL FEATURES

None.

DELIVERABLES

849-C436-01 INSULATION & SHEATHING

STANDARDS

46 CFR Subchapter I, Cargo and Miscellaneous Vessels
ABS Rules for Building and Classing Marine Vessels
International Convention for the Safety of Life at Sea (SOLAS)
46 CFR Part 92, Construction and Arrangement
ASTM C971-82, Guide for Selection and Application of Insulation Systems for Heating, Ventilating, and Air Conditioning Duct Work.
ASTM F683-14, Standard Practice for Selection and Application of Thermal Insulation for Piping and Machinery.

C437 EQUIPMENT & OUTFITTING

GENERAL DESCRIPTION

The vessel shall be delivered in a fully outfitted and furnished condition.

REQUIREMENTS

The Contractor shall deliver the vessel in a functional, ready-for-service condition. As such, all spaces shall be complete with appropriate furnishings, equipment, and outfit as necessary for them to perform their intended function.

All spaces shall be outfitted to satisfy the requirements of ABS MVR, USCG Subchapter I, SOLAS, ABS Guide for Crew Habitability on Workboats, and ASTM F1166-07, F825-93 and F826-94.

All equipment shall be properly and firmly secured to the decks, countertops or bulkheads, as appropriate. Horizontal surfaces (desks, countertops, etc.) shall be installed parallel to baseline.

The Contractor shall provide furnishings as listed in Sub-Paragraph C below. This package shall be designated as the Contractor's "Base" furnishing package. During Phase II, the Contractor shall provide several options for their furnishing package, including the proposed "Base" package and any available upgrades in furnishings for all applicable spaces. The list shall be titled 849-C437-02 FURNISHINGS OPTIONS. Prices shall be included with the option lists. The Government will select a package from the available options and will modify the contract with any change in price. All items proposed by the Contractor shall be marine grade and suitable for a saltwater environment.

The final finish of all furniture, cabinets, tables and chairs shall be selected by the COR prior to Contractor purchase and installation. All desk tops, work tables, countertops, and similar horizontal surfaces shall be provided with sea rails. All bookshelves and similar storage shelving shall also be provided with sea rails.

All spaces shall be provided with lighting in accordance with the ABS Guide for Crew Habitability on Workboats and ASTM F1166-07.

During Phase II, the Contractor shall submit to the Government for review and approval 849-C437-01 FURNITURE, FURNISHINGS, & OUTFITTING. In addition to the drawing, the Contract shall submit cut sheets for all items, including the make, model, type, finish and color (if appropriate) information for the furniture and/or furnishings selected. The Contractor shall not install any furniture or furnishing item without the approval from the COR. Subdivisions for rooms below are based on an assumed general arrangement; the COR shall designate spaces for the below equipment based on the final arrangement developed by the Contractor.

Equipment listed below shall be considered minimums. Where applicable, the Contractor should maximize the stowage capacity of the space. Quantities and arrangements are to be determined by the Contractor and approved by the COR. For spaces not addressed below, the Contractor shall propose the outfitting of the space for approval by the COR.

SPECIFIC REQUIREMENTS

The Contractor shall provide their standard set of outfitting, which, as a minimum, shall include the below items. Storage and cabinets shall be provided in sufficient capacity for secure storage of standard consumables during all operations intended in their individual spaces (such as rags, loose tools, and spares as required).

Engineering Stores Spaces

Full-height heavy-duty metal shelf cabinets
Counter-height heavy-duty metal shelf cabinets
Hose racks/hangers (as required for hoses in the space)

Engineer's Workshop

Mobile tool storage cabinets (tools shall be included in the options list in drawing 849-C437-02)
Deep Sink
Workbenches (at minimum two (2))
Stools, suitable for workshop environments, at least one (1) per workbench
Hose racks/hangers (as required for hoses in the space)
Parts storage cabinets, metal with drawers
Double bench grinder

Auxiliary Machinery Spaces (including Dredge Machinery Spaces)

Oil drain tub with drain to waste oil tank
Deep Sink
Hose racks/hangers (as required for hoses in the space)
Stowage for machinery-specific tools for machinery located in the space
Workbenches (at minimum two (2))
Tool storage
Parts Storage

Engine Room

Deep Sink
Workbench(es)

Mobile tool storage cabinet(s)
Oil drain tub
Hose racks/hangers (as required for hoses in the space)

Engineer's Control Room

Console, see Contract Paragraph C255
Locking filing cabinets
Movable office chairs
UPS(s) for critical equipment and computers
Bookshelves or cabinets for stowage of manuals, parts lists, service books, etc.
Coffee Maker, installed on a cabinet w/ countertop and sink, connected to potable water supply via inline filter
Water cooler
Under-counter refrigerator

Cabins

All cabins shall be outfitted with bunks in accordance with ASTM F1244-08. All mattresses and box springs shall be furnished in accordance with ASTM F1085. All cabins shall be outfitted with full-height wardrobes complete with doors, latches, and drawers.
The cabins for the captains and chief engineers shall each have a Type I bunk and two wardrobes. The single cabins shall each have a Type II bunk, two wardrobes, and a desk with drawers and a moveable desk chair. The double cabins shall each have a Type III bunk, four wardrobes, and a desk with drawers and a moveable desk chair.

Heads

Heads shall be outfitted with toilets, vanities with sinks, medicine cabinets with mirrors, showers, and all necessary accessories to form a functional head and comply with the standards listed in Sub-Paragraph B above.

Mud Room/Changing Area

Deep Sink
Lockers for each member of the Crew
Benches (as suitable for the space).

Offices

Desks with drawers (at minimum two (2))
Movable desk chair (one (1) per desk)
Side chair(s)
Filing cabinet(s)
UPS's for computers and critical equipment
Bulkhead-mounted flat screen television, minimum 42" screen size
Dry-erase Board
Shelving

Bridge

Captain's Chair
Pilot Chair
Chart Table w/ chart storage
Coffee Maker, installed on a cabinet w/ countertop and sink, connected to potable water supply via inline filter
Water cooler
Under-counter refrigerator
UPS's for all computers and critical equipment
Filing cabinet(s)
Bookshelves
Cabinet(s) for storage

Gym

The gym shall be a separate compartment capable of containing a variety of exercise equipment including at a minimum two (2) exercise mats, one (1) training bicycle, one (1) treadmill, one (1) bench press, and one (1) utility machine with squat rack. The gym shall have wall-mounted mirrors and a mounted television. The Contractor shall supply and install gym equipment.

SPECIAL FEATURES

None.

DELIVERABLES

849-C437-01 FURNITURE, FURNISHINGS, & OUTFITTING
849-C437-02 FURNISHINGS OPTIONS

STANDARDS

ABS Rules for Building and Classing Marine Vessels
46 CFR Subchapter I, Cargo & Miscellaneous Vessels
International Convention for the Safety of Life at Sea (SOLAS)
ABS Guide for Crew Habitability on Workboats
ASTM F1166-07, Standard Practice for Human Engineering Design for Marine Systems, Equipment, & Facilities
ASTM F1244-08, Standard Specification for Berths, Marine
ASTM F1085-19, Standard Specification for Mattress and Box Springs for use in Marine Vessels
ASTM F825-93, Standard Specification for Drawers, Furniture, Marine, Steel
ASTM F826-94, Standard Specification for Tops, Furniture, Marine, Steel

C440 STEWARD OUTFIT

GENERAL DESCRIPTION

The Contractor shall provide all equipment and furnishings necessary to outfit those spaces of the vessel under control of the Chief Steward, including but not limited to the galley, scullery, crew mess, officer's mess, lounges, pantry, linen stores, provisions stores, hotel stores, and laundry facilities.

REQUIREMENTS

The Contractor shall deliver the vessel in a functional, ready-for-service condition. As such, all outfitting necessary for the Steward to perform his/her duties shall be provided. Equipment, furnishings, and spaces listed below are minimums only. During Phase II, The Contractor shall propose drawing 849-C440-01 STEWARD OUTFITTING PACKAGE for approval by the COR. Final equipment selections, colors, and installation locations shall be approved by the COR prior to purchase.

All horizontal surfaces (mess tables, work tables, countertops, serving lines, etc.) shall be installed parallel to baseline.

All steward outfitting shall be marine grade and suitable for use on a seagoing ship and shall be in compliance with ABS MVR, ABS Guide for Crew Habitability on Workboats, 46 CFR Subchapter I, SOLAS, and ASTM F1166-07.

After final selections are made by the COR, the Contractor shall produce arrangement drawings for each Steward Outfitting Space, detailing the equipment and furnishings to be installed in each one. Drawings are to be numbered sequentially, starting with 849-C440-02.

SPECIFIC REQUIREMENTS

Galley

The galley shall be designed for efficient operations and minimal manning with the capability to prepare and serve food for a crew of twice the number of crew given in C002, due to crew changes. If galley stores are located on a different deck than the galley, a dumbwaiter or elevator shall be provided. All equipment and furnishings in the galley shall comply with USPHS and NSF guidelines, and shall be food-safe and of commercial-grade.

The Contractor shall provide as much storage and workspace in the galley as practicable. All cabinets, lockers, and furnishings in the galley shall have frames constructed of stainless steel, with all exterior surfaces constructed of stainless steel. All cabinets, shelves, countertops and work tables shall be fitted with sea rails. All cabinet doors, drawers and lockers shall be fitted with stainless

hardware and latching mechanisms. All countertops and work tables located against bulkheads shall be provided with integrated stainless-steel backsplashes, at least 4" tall.
Cooking equipment shall be provided with sea rails which are removable and easily cleanable.
At a minimum, the galley shall be outfitted with the following equipment:
(2) Electric ranges with oven and griddletop
(2) Deep Fryers
(2) Industrial Air Fryers
(1) Double-stack convection oven
(1) Stand Mixer
Serving line with
- fire-rated pass-through window with roller curtain doors
- stowage for dishes and trays
- tray rail
- electric steam table
- salad bar
- sneeze guards

(2) Refrigerators
(1) Freezer
Prep tables (min. total work surface area 50 sq. ft)
(1) Prep sink
(1) Microwave, 1000 watt minimum
(1) Conveyor-type Toaster
(1) Free-standing Ice Maker, minimum 24 hr. yield of 300 lb., with bin
(2) Handwashing Sinks
Stowage for pots/pans
Galley equipment shall be furnished by the same manufacturer to the greatest extent practicable.
Galley cooking equipment shall be served by an exhaust hood, complete with fire-suppression system and washdown system as listed in Contract Paragraph C685. Ducting for the galley hood shall be accessible for cleaning.
All drains from the galley and scullery shall be led through a grease trap.

Scullery

The galley and scullery may be combined into a single space at the Contractor's discretion. The scullery shall be designed with sufficient stowage for all dishware required to suit the vessel's operating profile and complement as discussed in Contract Paragraph C002. The scullery shall be equipped with a commercial-grade, 3-basin stainless steel sink with both fixed faucets and washdown spray nozzle. One of the basins shall be fitted with a commercial-grade food-waste disposer with a power of at least ¾ HP.
In addition, the scullery shall be outfitted with a commercial-grade dishwasher. The Contractor shall supply all equipment necessary to ensure proper functioning of the dishwasher, including but not limited to additional water filtration and booster heater. The dishwasher shall be installed in accordance with the manufacturer's instructions and the installation shall be inspected/certified by a manufacturer's technician.
All drains from the galley and scullery shall be led through a grease trap.
If separate from the galley, the scullery shall have its own pass-through window with fire-rated roller curtain doors.

Pantry

A separate pantry space shall be provided adjacent to the galley, outfitted with floor-to-ceiling stainless steel wire shelving. The pantry shall provide as much storage space and shelving as practicable. The pantry shall have a minimum floor area of 40 sq. ft.

Crew Mess

The Crew Mess shall be fitted with sufficient seating to support at least 20 persons.
Mess tables shall be fixed to the deck. Mess chairs shall be movable but provided with sea-fastening connections. Mess tables shall be provided with sea rails. The Contractor shall approve the colors and materials for all mess furnishings.

The Crew Mess shall be provided with two freestanding commercial-grade stainless steel glass-front refrigerators and one freestanding commercial-grade stainless steel glass-front freezer. The crew mess shall have its own commercial-grade microwave (1000-watt min.) and 4-slice toaster.
The Crew Mess shall be fitted with a permanently-mounted 1-gallon commercial stainless-steel coffee maker. The coffee-maker shall have guard rails and be connected to the ship's potable water system via an in-line filter. The Contractor shall provide a fixed stainless-steel cabinet of sufficient size to support the coffee maker and provide stowage for coffee mugs and related supplies.
The Crew Mess shall be provided with a countertop ice/water dispenser, connected to the ship's potable water system via an in-line filter. The Contractor shall provide a cabinet and countertop of sufficient size to support the beverage dispenser and associated cups.

Officer's Mess

The Officer's Mess shall be a separate space from the Crew Mess and shall be sized for at least 15 people. The Officer's Mess shall be outfitted similarly to the Crew's Mess, though only one freestanding refrigerator is required. The COR shall have the opportunity to select separate furnishings, finishes, and colors for the Officer's Mess and the Crew Mess.

Crew Lounge

The crew lounge shall be a separate space designed to support at least 15 persons. The crew lounge shall contain at least a round table with seating for four, a couch, a coffee table, and a wall-mounted television above storage cabinets.

Officer's Lounge

The officer's lounge shall be a separate space designed to support at least 15 persons. The officer's lounge shall contain at least a round table with seating for four, a couch, a coffee table, and a wall-mounted television above storage cabinets.

Storage Spaces

The Contractor shall provide sufficient storerooms (provisions, linen, hotel, etc.) to satisfy the crew size and Operational Profile described in Contract Paragraph C002. All storerooms shall be outfitted with floor-to-ceiling shelving. Shelving shall be permanently fixed to the vessel and fitted with sea rails and adequate material securing methods. Shelving arrangements and types shall be approved by the COR prior to purchase.

Laundry

In the Laundry, the Contractor shall provide at least three pairs (washer and dryer) of commercial-grade electric laundry equipment. Equipment shall be installed in accordance with the manufacturer's instructions, with permanent foundations as-required to suit operations in a seaway. The Laundry shall be outfitted with at least one work table, with a minimum working area of 12 sq. ft. The laundry shall be fitted with at least two clothes irons and ironing boards, or equivalent arrangements. The Contractor shall provide and install a deep sink with hot and cold potable water supplies in the Laundry. Dryer vents shall be led to the weather and shall be easily accessible for cleaning.

SPECIAL FEATURES

None.

DELIVERABLES

849-C440-01 STEWARD OUTFITTING ARRANGEMENTS

STANDARDS

ABS Rules for Building and Classing Marine Vessels
46 CFR Subchapter I, Cargo & Miscellaneous Vessels
International Conventions for the Safety of Life at Sea (SOLAS)
ABS Guide for Crew Habitability on Workboats
ASTM F1166-07, Standard Practice for Human Engineering Design for Marine Systems, Equipment, & Facilities

C445 LIFESAVING AND SAFETY

GENERAL DESCRIPTION

The Contractor shall provide and install lifesaving and safety equipment required by ABS MVR, USCG Subchapter I, the International Convention for the Safety of Life at Sea (SOLAS), and USACE EM 385-1-1.

REQUIREMENTS

The Contractor shall develop drawing 849-C445-01 LIFESAVING & SAFETY and submit it to the COR and ABS during Phase II of the Contract for review and approval.

Emergency instructions and checklists shall be provided and posted in the bridge, engineer's control room and the galley/mess area and as required by the regulations listed above.

SPECIFIC REQUIREMENTS

The requirements listed below are not exhaustive, and it shall be the responsibility of the Contractor to provide all equipment necessary to comply with SOLAS, USCG Subchapter W, and EM 385-1-1 regulations.

Liferafts

The Contractor shall provide and locate liferafts in accordance with the requirements of SOLAS and 46 CFR Subchapter W. Liferafts shall be stowed such that they may be launched directly from the stowed position by one person without need for lifting or handling of the liferaft(s). The Contractor shall develop drawing 849-C445-02 LIFERAFT STOWAGE ARRANGEMENTS and submit to the COR for review and approval during Phase II.

Life Rings

30-inch diameter life rings, USCG approved, shall be provided and installed on life ring racks. Each life ring shall be provided with the USCG-required length of 3/8-inch polypropylene line. Orange rope bags shall be provided with each life ring.

Each life ring shall be international orange in color and shall be marked per USCG Rules.

Man overboard illumination marker lights with mounting bracket shall be provided with each life ring. The marker shall emit 360-degree light for a minimum 36 hours continuous operation. Each marker shall automatically right itself and activates when in water.

For the life rings on the bridge level, and one P/S pair on the main deck level the marker lights shall be attached to 6-foot lanyards with galvanized steel clips. These life rings shall also be fitted with self-activating smoke signals. All other marker lights shall be installed at the life ring stations, but not attached to the life ring with a lanyard and clip.

Life Jackets

Life jackets shall be provided in accordance with the requirements of 46 CFR Subchapter W. Life jackets shall be USCG-approved commercial vest-style. Sizes shall be selected by the COR from available sizes.

Instructive placards with for correctly donning the life jackets, work vests and automatic inflatable life jackets shall be provided in the galley/mess area and at each survival craft station.

Immersion Suits

Immersion suits shall be provided in accordance with 46 CFR 199.273. In addition to the suits required by USCG, the Contractor shall provide two spare immersion suits of each size to be stowed in a location selected by the COR.

First Aid Kit

Five large first aid kits shall be provided and installed on the vessel in addition to the first aid locker. They shall be located in the galley/mess area, engineer's control room, office, and bridge. The final kit shall be located inside the deck house in close proximity to the entrance from the weather deck working areas. Exact locations shall be approved by the COR.

Hospital Space

A fully-outfitted, dedicated hospital space shall be provided in accordance with the requirements of SOLAS and 46 CFR 92.20-35. The Contractor shall provide a first-aid locker, located in close proximity to or inside the hospital space.

Distress Signals

Distress signal kits shall be provided as-required by SOLAS and USCG Subchapter W. Each kit shall be USCG approved for the vessel size and area of operation, and contain at a minimum parachute flares, handheld flares and smoke signals. The items shall be stored in a heavy-duty waterproof case.
Instructions for using the distress signals shall be provided with each kit.

Emergency Communications Equipment

The Contractor shall provide emergency communications equipment in accordance with the requirements of SOLAS and USCG Subchapter W. See Contract Paragraph C765.

Eye Wash/Shower Stations

Eyewash and combination eyewash/shower stations shall be provided in accordance with the requirements of 6.B.02 of EM 385-1-1 and ANSI Z358.1.
An instruction placard displaying instructions for using the eye wash station shall be provided at each station.

Automated External Defibrillators

Two Automated External Defibrillators (AED) shall be provided and installed in accordance with the manufacturer's instructions. The AEDs shall be located at the direction of the COR. The AEDs shall have a self-check of all main AED components, voice instructions for guiding operators, and CPR metronome to pace chest compressions feature and at least a 4-year full battery operational replacement guarantee. Appropriate signage and wall mounting/storage shall be provided. The AEDs shall come with a 2-year full-service plan from the time of final delivery. Clear instructions shall be provided with the equipment.

Rescue Boat

The Contractor shall provide one USCG and SOLAS approved rescue boat, with a minimum rated person capacity of 8, and a minimum weight capacity of 1050-lbs. The name of the vessel shall be stenciled onto the boat hull (P/S) in a contrasting color. The COR will select the final color of the skiff from available color options.
The rescue boat shall be provided with a diesel engine. Start/Stop controls for the engine shall be on the steering console.
A hydraulic steering system shall be provided and installed, with the controls on the center console.
The motor shall be installed on the skiff with all fuel lines and steering systems installed.
An ABC 2.5-lb fire extinguisher shall be provided in the skiff.
One portable 12-gallon diesel fuel tank and one portable 6-gallon diesel fuel tank shall be provided with the skiff.
A canvas cover shall be provided over the console of the skiff. The cover shall be waterproof material and be secured at the bottom.
The Contract shall provide and install a cradle for the rescue skiff. The cradle shall be designed to fit the shape of the skiff hull, with the bow slightly higher than the stern, so that any rainwater will collect and flow out of the drain plug. The cradle shall be high enough at the stern so that the boat can be stowed with the motor and/or propellers in the normal operating position. Tie-downs and ratchet straps shall be provided.
The Contractor shall provide and install a self-contained launching and recovering system for the rescue boat that meets USCG Subchapter W and SOLAS requirements. Launching of the rescue boat shall not require use of the vessel's main crane. The launching davit shall be personnel/man rated such that the boat may be retrieved with personnel onboard. The davit shall be capable of retrieving the hook without the boat, and shall be capable of compensating for the routinely-changing drafts of the vessel.
Additional immersion suits, sized appropriately for each person assigned to the rescue boat crew, shall be provided for the rescue boat in accordance with 46 CFR Subchapter W, 199.70(c).
The rescue boat shall be outfitted in accordance with the requirements of 46 CFR Subchapter W, Table 199.175 for a Rescue Boat on an International Voyage.
The Contractor shall provide details on the rescue boat, cradle design and launching/recovery davit to the COR for review and approval. The drawing(s) shall be 849-C445-XX, RESCUE BOAT, CRADLE & DAVIT.

Miscellaneous Equipment

The Contractor shall provide and install the following items:

(i) Chargeable Flashlights, wall mounted (two on bridge, two in galley/mess, two in each machinery or auxiliary machinery space, and one in each workshop, hold space, bunk room, office, engineer's control room, electronics room(s), and up to ten additional locations to be coordinated with the COR during Phase II)

Escape Pry Bars (one mounted in each bunk room)
Two (2) Stokes Litters, storage locations to be determined by COR
Two (2) Jacobs Ladders, storage locations to be determine by COR
Two (2) Boat Hooks for each boat carried by the vessel, located in close proximity to the boat
One Line-throwing appliance that meets the requirements of 46 CFR Subchapter W, 199.170.

SPECIAL FEATURES

If the vessel has an LBP (as defined by SOLAS) of less than 85m, enclosed lifeboats are not required. Should the vessel's length exceed the SOLAS length requirements, the Contractor shall provide appropriate lifeboats and launching appliances in accordance with USCG and SOLAS requirements.

DELIVERABLES

849-C445-01 LIFESAVING & SAFETY
849-C445-02 LIFERAFT STOWAGE ARRANGEMENTS
849-C445-XX, RESCUE BOAT CRADLE & DAVIT

STANDARDS

International Convention for the Safety of Life at Sea (SOLAS)
46 CFR Subchapter I, Cargo and Miscellaneous Vessels
46 CFR Subchapter W, Lifesaving Systems for Certain Inspected Vessels, Subparts A, B, and D
USACE EM 385-1-1, Safety and Health Requirements Manual

C446 LAUNCH

GENERAL DESCRIPTION

The vessel shall be supplied with a launch boat to be used for transferring crew and supplies between the vessel and the shore. The launch boat is not a replacement for the SOLAS-required rescue boat or any required lifeboats. The launch shall be given MDC hull number 872.

REQUIREMENTS

The vessel shall be supplied with a new launch boat, designed to be carried aboard the dredge at all times. The launch shall be a monohull of welded aluminum construction and shall be powered by twin inboard diesel engines. The launch shall have a cruising speed of at least 20 knots in the fully loaded condition, with engines at 85% power. The launch shall have enclosed seating for at least 12 people (passengers) and shall have a rated personnel capacity of at least 15 persons at an assumed weight of 250 lb. each. The launch shall be designed for operation in both fresh and salt water, and in coastwise areas. The launch shall have sufficient tank capacity for 8 hours of sustained operation at full power.

The vessel shall be supplied by the Contractor in a complete, fully-outfitted and furnished, ready-to-use condition. The Contractor shall provide a complete set of vessel drawings to the COR during Phase II for review and approval. The Contractor shall submit the same drawings to ABS as applicable.

The launch shall be designed and constructed in accordance with all applicable standards of USCG Subchapter T and shall obtain a COI for USCG Subchapter T. Structure and systems shall be in accordance with high speed craft rules from one of the IACS classification societies. Design shall be adequate for 25 knot speed in 6-foot significant wave height. The Contractor shall identify both the classification standard and the design speed. The vessel shall comply with USACE EM 385-1-1. All launch drawings, specifications, and certifications shall be submitted to the COR during Phase II for review and approval.

SPECIFIC REQUIREMENTS

The launch shall be supplied with a cradle installed on the dredge and lifting mechanisms to raise and lower the launch. The cradle shall be designed to safely stow, support and secure the launch during all expected operational conditions as outlined in Contract Paragraph C002. The lifting mechanism shall consist of davit(s) and lifting points on the launch and shall be of sufficient capacity to raise and lower the vessel with consumables aboard and the full rated personnel capacity of the launch during all expected operational conditions as outlined in Contract Paragraph C002.

The launch shall be deployed by means of a hydraulically-powered 2-point davit. The 2-point davit shall consist of two independent davit arms with winches. The davit shall be personnel rated and ABS-approved. The Contractor shall provide the COR with a "Certificate of Examination and Test of Wire Rope Before Being Taken Into Use" (U.S. Department of Labor – Occupational Safety and Health Administration Form No. 5) for each continuous run of rope installed on the winches and davits. The certification shall be performed to the requirements of 29 CFR, part 1919 and be in accordance with the requirements of 29 CFR 1918.

The launch shall be provided with two separate helm stations. The main helm station shall be fully-enclosed from the weather and climate-controlled. The auxiliary helm station shall be located on the aft working deck, in the weather, and shall be designed for maneuvering operations. At a minimum, the auxiliary helm shall include controls for both the propulsion and steering systems.

The vessel shall feature a flat aft working deck of sufficient size and strength to handle at least one wrapped pallet of stores of approximately 2 long tons. Hatches on the aft deck shall be flush-type so as to not interfere with the stowage of cargo. Flush hatches shall be fitted with suitable overboard drains.

The launch shall be provided with a rubber fixed fendering system to prevent damage to the launch and the vessel during crew and cargo transfer operations. Fixed fendering shall be installed to protect the bow, stern, and sides of the vessel.

Hull markings for the launch shall be in accordance with Contract Paragraph C460 as applicable. Marking sizes shall be in accordance with EP 1130-2-500 and shall be approved by the COR prior application.

The entire hull and house exterior shall be coated with a marine epoxy and urethane coating system. The coating system shall be similar to the requirements of Contract Paragraph C406 in terms of number of coats and thicknesses. Prior to purchase, the COR will select and advise the Contractor on colors to be used for the launch.

The vessel shall be fitted with a fixed fire detection and firefighting system, to be selected by the Contractor and approved by the COR.

All enclosed spaces of the vessel intended to be occupied by personnel shall be heated and air-conditioned. Natural ventilation shall also be provided. Heating and cooling environmental requirements shall be the same as that for the dredge as identified in Paragraph C002.

The steering system of the launch shall be hydraulic and be designed in accordance with the high-speed craft rules selected above. The steering system shall be designed for fail-safe operation, and rudders shall be designed such that the stocks will remain intact (not drop out of the hull) even if the rudder is damaged.

SPECIAL FEATURES

The vessel shall be provided with a full suite of communications and navigation equipment including but not limited to: navigation lights, GPS chart plotter, depth sounder, (2) VHF radios, searchlight, compass, and horn. Equipment shall be suitable for transportation of personnel from the dredge to land within the area of operation of the dredge as defined in Paragraph C002. A list of communications and navigation equipment for the launch shall be provided to the COR for review and approval.

The Contractor shall also provide an additional land-based cradle for the launch, to be used when the launch is stowed off the vessel. The Contractor shall provide a lifting/rigging plan, and any associated lifting gear, for transferring the launch from the vessel to the pier side cradle using a crane. The Contractor shall deliver the land-based cradle to Fort Mifflin, at the address listed in Contract Paragraph C002.

DELIVERABLES

The Contractor shall provide all drawings and operational manuals sufficient for the Government to operate, maintain, and repair the launch. Two sets of each deliverable shall be provided. The following deliverables shall be provided as a minimum, in both native and .pdf format.

872-C105-01 LINES PLAN
872-C125-01 CURVES OF FORM
872-C140-01 CURVE OF ALLOWABLE DECK CARGO VS. DRAFT
872-C150-01 DAMAGED STABILITY ANALYSIS
872-C155-01 INTACT STABILITY ANALYSIS
872-C205-01 OUTBOARD PROFILE
872-C215-01 GENERAL ARRANGEMENT
872-C305-01 SCANTLING PLAN
872-C398-01 LAUNCH CRADLE (land-based)
872-C455-01 LAUNCH LIFTING AND RIGGING PLAN
872-C455-02 LAUNCH DAVIT AND CRADLE
872-C610-01 SHAFT, STERN TUBE, AND SHAFT BEARING ARRANGEMENT AND DETAILS
872-C615-01 RUDDER AND STEERING LINKAGE ARRANGEMENT AND DETAILS
872-C615-02 STEERING SYSTEM HYDRAULIC SCHEMATIC
872-C630-01 FUEL OIL SYSTEM SCHEMATIC
872-C650-01 EXHAUST SYSTEM SCHEMATIC
872-C660-01 BILGE SYSTEM SCHEMATIC
872-C705-01 ELECTRICAL SYSTEM SCHEMATIC (Separated by AC and DC)
872-C780-01 FIRE AND BILGE ALARM SCHEMATIC
Applicable documents required by 46 CFR Subchapter S – Subdivision and Stability

STANDARDS

46 CFR Subchapter T, Small Passenger Vessels
46 CFR Subchapter S, Subdivision and Stability
USACE EM 385-1-1, Safety and Health Requirements Manual
USACE EP 1130-2-500, Work Management Guidance and Procedures
High speed craft rules from an IACS classification society

C450 BOARDING

GENERAL DESCRIPTION

None.

REQUIREMENTS

The Contractor shall provide the necessary equipment and arrangements to ensure safe access to the vessel under all normal conditions of loading and operation. All boarding equipment and arrangements shall satisfy the requirements of ABS MVR, USCG Subchapter I, SOLAS, OSHA and EM 385-1-1. All boarding equipment shall be located/stowed such that it is protected from damage during routine operations. The Contractor shall develop drawing 849-C450-01 BOARDING ARRANGEMENTS AND EQUIPMENT during Phase II and shall submit to the COR and ABS during Phase II. The COR shall approve all boarding equipment prior to Contractor procurement.

Where allowed by the Rules, one piece of boarding equipment may serve more than one of the purposes listed below.

All boarding equipment addressed in this Contract Paragraph shall satisfy the requirements of IMO MSC Circular 1331, Guidelines for Construction, Installation, Maintenance and Inspection/Survey of Means of Embarkation and Disembarkation.

SPECIFIC REQUIREMENTS

Pilot Boarding

Pilot boarding arrangements and equipment shall meet the requirements of the following rules and regulations:

46 CFR 96.40 – Pilot Boarding Equipment

46 CFR 97.90 – Pilot Boarding Operations

International Convention on the Safety of Life at Sea (SOLAS) – Regulation 23 – Pilot Transfer Arrangements

IMO Resolution A.1045(27) – Recommendations on Pilot Transfer Arrangements

International Maritime Pilots Association Notice No. 849 – Required Boarding Arrangements for Pilots

Pilot boarding equipment shall be provided on both the port and starboard sides of the vessel. Pilot boarding shall not require the use of the ship's main crane.

Survival Craft Boarding

Survival craft embarkation arrangements shall be in accordance with the requirements of 46 CFR Subchapter W and SOLAS.

Workboat Boarding

For each workboat, skiff, and/or survey boat carried aboard the vessel, the Contractor shall provide a means of safe embarkation and disembarkation. The Contractor shall provide a boarding area for each workboat. Workboat embarkation arrangements shall be such that the workboat(s) can be boarded from the deck of the vessel while suspended. Accordingly, workboat launching appliances shall be personnel-rated.

Accommodation Ladders

The Contractor shall provide one accommodation ladder on each side of the vessel. The accommodation ladders and associated boarding areas shall satisfy the requirements of EM 385-1-1 Part 19.B.

Brow

The vessel shall be provided with one portable, removable brow for in-port boarding. The brow shall be constructed of aluminum and designed to move as the vessel adjusts to changing tidal conditions. The brow shall have a minimum width of 36", a minimum length of 30', and a minimum capacity of 800 lb. The brow embarkation area shall be located such that the brow can be installed using one of the vessel's stores cranes (See Contract Paragraph C455). The Contractor shall develop drawing 849-C450-02 BROW CONSTRUCTION during Phase II and submit to the COR for review and approval.

SPECIAL FEATURES

Any embarkation/disembarkation equipment which may be used while the vessel is underway shall not require the use of the vessel's main crane. Embarkation/disembarkation equipment may make use of the stores cranes, otherwise separate davits/lifting appliances shall be provided. Such appliances shall meet the requirements listed in Contract Paragraph C455 as applicable.

DELIVERABLES

849-C450-01 BOARDING ARRANGEMENTS & EQUIPMENT

849-C450-02 BROW CONSTRUCTION

STANDARDS

ABS Rules for Building and Classing Marine Vessels

46 CFR Subchapter I, Cargo and Miscellaneous Vessels

International Convention for the Safety of Life at Sea (SOLAS)

Regulation 23 – Pilot Transfer Arrangements

USACE EM 385-1-1, Safety and Health Requirements Manual, Part 19 – Floating Plant and Maritime Activities

IMO MSC Circular 1331, Guidelines for Construction, Installation, Maintenance and Inspection/Survey of Means of Embarkation and Disembarkation
46 CFR 96.40 – Pilot Boarding Equipment
46 CFR 97.90 – Pilot Boarding Operations
IMO Resolution A.1045(27) –Pilot Transfer Operations
International Maritime Pilots Association Notice No. 849 – Required Boarding Arrangements for Pilots

C455 DECK CRANES & HOISTS

GENERAL DESCRIPTION

The Contractor shall provide and install cranes and hoists for the vessel as described below.

REQUIREMENTS

The vessel shall be equipped with a deck crane, two stores cranes, davits, and overhead hoists in machinery spaces. During Phase II the Contractor shall select the cranes/hoists and develop drawings 849-C455-01 DECK CRANE, 849-C455-02 STORES CRANES, and 849-C455-03 OVERHEAD HOISTS and submit them to the COR and ABS as applicable for review and approval. Crane drawings shall show the location of the crane, swing radii and capacities in plan and elevation views. The hoist drawing shall show the location and purpose of each hoist on the vessel along with its rated capacity. For movable hoists (gantries, etc.) the drawing shall clearly show the total area covered by the hoist.

The Contractor shall provide a Naval Architectural Analysis (NAA) and Floating Service Load Chart for the cranes as required by Contract Paragraph C156.

Details on the crane foundation requirements are in Contract Paragraph C330. All cranes and hoists shall be provided in accordance with the ABS Guide for Certification of Lifting Appliances and the vessel's CRC notation. All cranes capable of lifting over the side of the vessel shall be designed and constructed in accordance with API 2C. The Contractor shall adhere to the requirements for floating cranes contained in Part 16 of EM 385-1-1.

SPECIFIC REQUIREMENTS

Deck Crane

The vessel shall be fitted with a pedestal-mounted, personnel-rated crane located on centerline and capable of lifting over either side of the vessel. The crane shall support maintenance of the dredging equipment and shall be capable of lifting and moving the heaviest parts of the dredge line including the draghead, pump housings and pump impeller. The crane shall have sufficient capacity and reach to place the heaviest component of the dredge line at least 20' beyond the side of the vessel onto the shore.

The crane shall be provided with a climate-controlled operator's cab. Access to the cab shall be by means of a vertical ladder. The ladder may be retractable if required to suit the vessel's arrangement. Operator shall have full visibility of the hopper and working areas of the vessel.

The crane shall be provided with a dedicated electric-hydraulic power pack with integral hydraulic fluid reservoir. Start and stop controls shall be located with the crane and adjacent to the hydraulic power pack, if the power pack is located remotely from the crane.

Anti-two block and load moment indicators or limiting devices shall be provided with each crane.

A crane boom and hook securing system shall be provided. The Contractor shall provide a boom rest if required to suit the selected crane.

The crane shall have a lighting system to illuminate the load at all boom positions.

The crane shall be supplied with a pedestal that bolts to a flanged foundation on the vessel.

The crane shall be designed for Shipboard (Harbor) use with a wind speed of 23 mph in accordance with the ABS Guide for Certification of Lifting Appliances.

An engraved load capacity plate shall be provided at the crane controls. The crane manufacturer shall also provide a "Personnel" rated capacity plate, engraved and installed at the controls.

The crane and its pedestal/foundation (see Contract Paragraph C330) shall be designed and fabricated in accordance with the requirements of API 2C.

Stores Cranes

The vessel shall be equipped with two identical stores cranes, one on each side of the vessel.
The stores cranes shall be electric-hydraulic deck crane.
Each stores crane shall have a minimum safe working load of 4000 pounds at an outreach of 30 feet beyond the side of the vessel. The stores cranes may also be used for handling accommodation ladders if feasible. Each stores crane shall be operated from a pedestal located so it has a clear view over the side and of the stores hatch.
The stores cranes shall be located such that fully-loaded pallets can be lowered by the stores crane, through the stores hatch and into the vessel.
The stores cranes shall be capable of operating with a significant wave height of 2ft and a wind speed of 20 knots with the ship in sheltered water. The stores crane shall be operable with a vessel list and/or trim up to three degrees.
Each stores crane shall be provided with a dedicated electric-hydraulic power pack with integral hydraulic fluid reservoir. Start and stop controls shall be located with the crane and adjacent to the hydraulic power pack, if the power pack is located remotely from the crane.
Anti-two block and load moment limiting devices shall be provided with each crane.
The crane shall be supplied with a pedestal that bolts to a flanged foundation on the vessel.
An engraved load capacity plate shall be provided at the crane controls. The main crane controls shall be located on the crane pedestal. An additional set of remote controls shall be provided with a 50 ft tether.

Davits

Davits shall be provided on each side of the vessel for handling of fueling lines and shore power cables. Each davit shall have a capacity of at least 1000 lb. at 10’ over the side and be equipped with electric winches. These davits may be omitted if it can be shown that the shore power connections and fueling hoses can be adequately managed using the stores cranes.

Hoists

Overhead hoists shall be provided in the machinery spaces to support maintenance and repair of equipment. Overhead hoists may consist of localized hoists at individual pieces of equipment, a monorail system, or an overhead gantry crane. Overhead hoists shall be sized and rated for the heaviest part, component, or piece of equipment to be served. See Contract Paragraph C290 for equipment removal paths requiring overhead hoists. Where hoists are provided in machinery spaces, drawings shall be provided showing the full coverage area of the hoist.

SPECIAL FEATURES

The Contractor shall provide the COR with a “Certificate of Examination and Test of Wire Rope Before Being Taken Into Use” (U.S. Department of Labor – Occupational Safety and Health Administration Form No. 5) for each continuous run of rope installed on the winches and cranes. The certification shall be performed to the requirements of 29 CFR, part 1919 and be in accordance with the requirements of 29 CFR 1918.

All cranes shall be provided with a programmable Load Monitoring Indication (LMI) system for the boom, with function cut-out or warning operation selected via a keyed switch on the LMI console. The LMI shall sense and at all times display:

a. Radius
Boom Angle
Hook Load
Machine List and Trim
Load Chart Selected

The LMI shall provide an alarm for near maximum load, and a safety stop at maximum load. The crane shall record and retain the stored data indefinitely in the event of a power loss.

DELIVERABLES

849-C455-01 DECK CRANE
849-C455-02 STORES CRANES
849-C455-03 OVERHEAD HOISTS

STANDARDS

ABS Rules for Building and Classing Marine Vessels
46 CFR Subchapter I, Cargo and Miscellaneous Vessels
ABS Guide for Certification of Lifting Appliances
API 2C, Specification for Offshore Pedestal Mounted Cranes
USACE EM 385-1-1, Part 16, Load Handling Equipment
29 CFR Part 1919, Gear Certification
29 CFR Part 1918, Safety and Health Regulations for Longshoring

C456 CAPSTANS, WINCHES & WINDLASSES

GENERAL DESCRIPTION

The Contractor shall provide and install capstans, winches and windlasses as required in this specification. The vessel's MOORING ARRANGEMENT (849-C420-01), developed in Contract Paragraph C420, lists the quantity and location of winches and capstans required for mooring the vessel. The vessel's ANCHOR HANDLING ARRANGEMENT (849-C412-02), developed in Contract Paragraph C412, provides the number and location of anchor windlasses required for the vessel. Contract Paragraph C420 addresses the deck fittings to be used with the mooring winches. Contract Paragraph C412 addresses the ground tackle to be used with the anchor windlasses. Winches for the dredging system are addressed in Contract Paragraph C508 of this Specification. Requirements

REQUIREMENTS

The Contractor shall develop drawing 849-C456-01 CAPSTANS, WINCHES, & WINDLASSES and submit it to the COR and ABS as applicable during Phase II of the Contract for review and approval. The mooring and anchoring arrangements, respectively, drawing shall define the location and installation of each item, along with the rope lines of action from the winches and through the mooring fittings.

SPECIFIC REQUIREMENTS

Mooring Winches

Each mooring winch shall be set up for 480-volt AC, 3-phase, 60-Hz service. Winches may be either electric or self-contained electro-hydraulic style. Winch size, line pull, and holding capacity shall be appropriate for the vessel size and service and shall be consistent with the mooring requirements as determined in accordance with USCG 46 CFR Subchapter I and ABS MVR 3-5-1.
Each winch shall include the following standard features and options:
Fully reversing crane and hoist duty motors that are totally enclosed
Drum guard to prevent slack cable from fouling gears
Factory installed, flange-mounted ball bearings for power shaft
Each winch shall have a deck control station consisting of a push button station housed in a NEMA 4 watertight enclosure with a drip proof enclosure shield over the top. A watertight seal (rubber covers) shall be provided over the buttons. Each deck control station shall be located at the respective winch, with consideration given to safety of personnel during mooring operations. The controller and breaker for each winch shall be located in close proximity to the winch. Exact locations of each control station and breaker shall be coordinated with the COR during Phase II. Each controller shall be equipped with a lockout device to allow for de-energizing the winch for maintenance purposes.
Each mooring winch shall be provided with high modulus synthetic mooring lines. The length of line provided shall be in accordance with the requirements of ABS MVR Part 3, Chapter 5, Section 1.
See Contract Paragraph C330 for details on the winch foundations and back-up structure.

Capstans

The Contractor shall provide and install deck mounted in-line capstans as required by the Mooring Arrangement. Capstans may be electric or self-contained electro-hydraulic. Size, line pull, and motor size shall be appropriate for the vessel size and service and shall be consistent with the mooring requirements as determined in accordance with USCG and ABS Rules. The capstan shall be capable of rotating in both directions.

A capstan control station shall be located in close proximity to each capstan. The control station shall consist of a push button station housed in a NEMA 4 watertight enclosure with a drip proof enclosure shield over the top. A watertight seal (rubber covers) shall be provided over the buttons. Exact locations of each control station and breaker shall be coordinated with the COR during Phase II. The controller shall be equipped with a lockout device to allow for de-energizing the capstan for maintenance purposes.

See Contract Paragraph C330 for details on the capstan foundations and back-up structure.

Anchor Windlasses

Anchor windlasses and associated equipment shall be provided and installed as shown on 849-C412-02 ANCHOR HANDLING ARRANGEMENT. Anchor windlass size and rating shall be appropriate for the vessel size and service and shall be consistent with the anchoring requirements as determined in accordance with ABS and USCG regulations. Anchor windlasses shall be hydraulically powered, horizontal type. Each shall be furnished with a hydraulic power unit, wildcat with clutch and band type friction brake, chain stripper and warping head. Anchor chains shall be stud link, sized in accordance with ABS Rules for Grade 3 material.

See Contract Paragraph C412 for details of the anchor chains and fittings, anchors and anchor handling arrangements.

See Contract Paragraph C330 for details on the windlass foundations and back-up structure.

SPECIAL FEATURES

The Contractor shall provide a certificate for each mooring line demonstrating compliance with the requirements of the purchase order as well as applicable ABS and USCG rules and regulations. The certificates shall include, at a minimum:

Product Name
Product Type
Detailed Description – size, length, diameter
Detailed description of yarn, including yarn producer and yarn grade or type
Details of coatings, jackets, and eyes as appropriate
Weight per unit measure
Minimum Breaking Load (MBL) and test method
Identification number

DELIVERABLES

849-C456-01 CAPSTANS, WINCHES, & WINDLASSES

STANDARDS

46 CFR Subchapter I, Cargo and Miscellaneous Vessels
ABS Rules for Building and Classing Marine Vessels, Part 3-5-1: Anchoring, Mooring and Towing Equipment

C460 NAMEPLATES, NOTICES & MARKINGS

GENERAL DESCRIPTION

For guidance on the draft marks, hull marking and name board letters and numerals, please refer to ASTM document F 906-85 “Standard Specifications for Letters and Numerals for Ships” for templates on the numerals (figure 2 – Type 2 Block Letters and Numerals).

REQUIREMENTS

The Contractor shall develop drawing 849-C460-01 HULL MARKINGS and submit it to the COR and ABS as applicable during Phase II of the Contract for review and approval.

The COR will provide the vessel name and homeport to the Contractor prior to fabricating the name board or hull markings.

SPECIFIC REQUIREMENTS

Vessel Draft Marks

Draft marks of raised Arabic type numerals, 6-inches in vertical height and cut from ¼-inch steel plate, shall be continuously welded to the shell plating. The draft numbers shall be located on the port and starboard sides of the vessel near the bow and stern. An additional set of draft marks shall be located on the port and starboard sides at midships. The draft marks shall be measured from the underside of the bottom plating projected to the bottom of the numerals. The bottom of the figures shall correspond to multiples of 1-foot of draft. The Contractor shall develop drawing 849-C460-01 DRAFT MARKS and submit to the COR for review and approval during Phase II.

Hull Markings

The VESSEL NAME, in Gothic letters 10-inches high shall be cut from ¼-inch plate and shall be centered and seal-welded on the stern of the vessel, on centerline.

The title CORPS OF ENGINEERS, in Gothic letters 6-inches high shall be cut from ¼-inch plate and shall be centered and seal-welded on the stern of the vessel on centerline. There shall be a 5-inch space between the vessel name and this title. The title U.S. ARMY, in Gothic letters 6-inches high shall be cut from ¼-inch plate and shall be centered and seal-welded on the stern of the vessel on centerline. There shall be a 3-1/2-inch space between CORPS OF ENGINEERS and U.S. ARMY.

The title CORPS OF ENGINEERS, in Gothic letters 7-inches high shall be cut from ¼-inch plate and shall be continuously welded to the forward main deck bulwark. The title U.S. ARMY, in Gothic letters 10-inches high shall be cut from ¼-inch plate continuously welded to the forward main deck bulwark. There shall be a 5-inch space between these two titles.

A thruster symbol shall be welded to the hull on the port and starboard sides, directly over each thruster. The outline of the symbol shall be welded with the interior fill-painted white.

The Contracting Officer's Representative shall approve the exact locations of the hull markings prior to installation.

Notices and Markings

All notices shall be stamped or engraved on brass or plastic plates. All weather exposed nameplates, notices, and markings shall be of brass.

As a minimum, the following signs shall be provided and installed by the Contractor:

Watch Quarter Station Bills (WQSB) shall be provided and installed throughout the vessel. At a minimum, the WQSBs shall be located in all public gathering areas (such as messes, lounges, and offices), the main passageway on each deck, the ECR, and the bridge. These shall be printed and framed or otherwise permanently affixed.

Eight (8) “Danger No Trespassing U.S. Government Property” signs shall be provided and installed, located at the direction of the COR.

“NO SMOKING” notices shall be placed at each fuel oil, gear oil, hydraulic oil, and lube oil fill station and vent.

All controls, gauges, switches, etc., shall be labeled with phenolic label plates to permit operation of the vessel.

Life preserves, life rings and buoyant floatation devices marked with vessel name and reflective markings in accordance with USCG 46 CFR Part 199 rules.

Life-saving and safety instructive placards. See Contract Paragraph C445.

Fire and Safety Plans. See Contract Paragraph C679.

Each General Alarm light and bell shall be marked “ATTENTION GENERAL ALARM – WHEN ALARM SOUNDS OR FLASHES GO TO YOUR STATION” in red letters at least ½-inch high on a corrosion-resistant plate or sign. The background of the plate shall be white. For General Alarm System requirements, see Contract Paragraph C780.

Confined spaces shall have a sign stating “Confined Space DANGER Permit Required” that shall be located at each entry to each tank, hull void and hold compartments. The COR will identify which spaces are classified as confined spaces.

The outer side of each doorway shall be labeled above with the compartment designation.

The outer side of each stateroom shall be labeled with the position of the occupants (e.g. Master, First Asst. Engineer, etc. There shall also be a name card holder such that the door can be labeled (and easily relabeled) with the name of the occupant(s).

For each bunk, the Contractor shall provide a card holder such that the bunk can be labeled with the station bill duties and assignments for the individual occupying the bunk.

Signage for watertight doors in accordance with 46 CFR Subchapter I.

All decks, overheads, and bulkheads, serving as fuel oil or flammable liquid tank boundaries shall indicate the tank boundary with contrasting paint and be labeled "FLAMMABLE LIQUIDS TANK – NO HOT WORK."
All escape hatches shall be marked on both sides with letters, at least 1-inch high, stating "EMERGENCY EXIT – KEEP CLEAR."
Hearing conservation warnings shall be as required by the standards in EM 385-1-1 and ER 385-1-89.
Placard prohibiting the discharge of oil, located in each machinery space and at the bilge and ballast pump controls, in accordance with 33 CFR 155.450.
MARPOL Annex V (Garbage) placard, at least 9" W x 4" H, 1/8-inch letters, in accordance with 33 CFR 151.59.
Placard containing operating instructions and/or warnings for operation of toilets, one for each toilet. Instructions and warnings shall be in accordance with the manufacturer's instructions of the selected toilet and MSD.
The vessel's official number installed on an interior structural member, in accordance with 46 CFR 67.121.
System manifold plans. See specific Contract Paragraph C601.
Oil transfer procedure placard, located at each fuel locker, fuel containment, fuel pump/manifold, and on the service and waste oil tanks, in accordance with 33 CFR 155.720.
Fuel shut-off valve operating procedures, local at valves and at remote pull stations.
Manholes, vents, fills, pump-offs and sounds shall be marked with tank identification and intended service with brass tags.
Label plates shall be attached to all valves, manifolds, pumps and mechanical equipment to indicate the system and function of the equipment.
For valves, the label plates shall be installed over the stem of the hand wheel, where possible, and shall indicate the direction of opening (or closing). The nameplate shall be 14-gauge (or heavier) brass with ¼-inch high engraved letters filled with black paint.
All piping and hoses shall be marked at each termination and at each watertight bulkhead penetration to indicate service and flow direction. See Contract Paragraph C601 for further details on pipe markings.
All bridge and engineer's control room controls, gauges, switches, etc., shall be labeled with phenolic label plates to permit operation of the vessel.
Ground-fault protected receptacles shall be conspicuously marked "GFCI PROTECTED."
All electrical equipment shall be provided with standard label plates indicating manufacturer, model number, capacity, and operating voltage, current, etc. All breakers shall be labeled. All receptacles shall be labeled with the supplying panel designator and circuit breaker number (ex: P2-14).
All interconnecting cables and wiring shall be marked at each termination and at each watertight bulkhead with circuit or system identification. Power distribution wiring shall be marked to indicate phase and polarity. All cables shall be suitably identified throughout their length with cable tags identifying the circuit designation. The tags shall be fabricated from strip aluminum or bronze with raised lettering and shall be securely fastened to the cable by banding.
The shore power receptacle shall be labeled to show the proper voltage, number of phases, and maximum current draw. Each shore power and off-vessel receptacle notice shall also describe the recommended connecting procedure.
The Contractor shall provide signs on the fantail rails, directly over the underwater location of the propeller blades, which read "Danger, Propeller, Keep Clear."
The Contractor shall provide signage and markings on the Bridge as required to suit USCG, SOLAS, and ABS Rules.

Launch Markings

The Contractor shall provide hull markings and identification for the launch (see Contract Paragraph C446) in accordance with USACE EP 1130-2-500. The Contractor shall develop drawing 849-C460-03 LAUNCH MARKINGS and submit to the COR for approval prior to installation/painting of any markings on the launch.

SPECIAL FEATURES

Name Boards

The name of the vessel shall be displayed on name boards, abreast of the bridge at the outboard rails, port and starboard.

Exact locations shall be approved by the COR prior to installation.

Nameboards shall be made of mahogany hardwood, rectangular in shape, 24-inches high, with 12-inch high Gothic letters painted in gold. The nameboards shall be provided with a 4-inch minimum border all around. The nameboards shall be fitted with mounting brackets. The name boards shall be stained to bring out the natural wood grains, trimmed with gold paint, and exterior polyurethane; semi-gloss finish (4 to 6 coats) applied.

Stack Insignia

Two Corps of Engineers "Communications Mark" devices shall be fabricated and installed on the port and starboard outboard stack sides.

The Communications Mark (also referred to as the castle and border) is detailed on Reference Drawing 656-B460-02 (to be provided by the COR).

The Contractor shall adjust the scale of the reference drawing as appropriate for insignia to be sized and installed on the stacks, such that the width of the insignia covers approximately 50% of the length of the stack, while maintaining relative proportion. The exact sizes and locations shall be approved by the COR prior to installation.

The castle and border of the insignia and the base plate shall be made of 316 stainless steel plate, minimum 3/8-inch thick and the castle and border shall be mounted on a base plate and attached to the stack with 2-inch long stainless steel standoffs. The edges of the plates shall be furnished true and smooth with no burrs.

The background for the Communications Mark shall be made of 316 stainless steel plate, minimum 3/8-inch thick, and shall be painted striping red to the same millage standards as the exterior stack (see Contract Paragraph C406).

The base plate shall be bolted to the stack bulkhead. The stack bulkhead shall be stiffened locally to support the weight of the Communications Mark. The base plate shall be sized to include the Communications Mark.

The Contractor shall develop drawing 849-C460-04 STACK INSIGNIA and submit to the COR for review and approval prior to fabrication of the insignia and/or painting of the stack.

Name Plaque

The vessel shall be provided with at least one plaque listing the name of the vessel and a biography of the person for whom the vessel is named. The plaque shall be installed in a conspicuous location such as a main deck passageway; the exact location(s) shall be approved by the COR. The plaque shall be no less than 8" x 10 ½" and shall be made of metal or wood.

DELIVERABLES

849-C460-01 DRAFT MARKS
849-C460-02 HULL MARKINGS
849-C460-03 LAUNCH MARKINGS
849-C460-04 STACK INSIGNIA

STANDARDS

ASTM F906-85, Standard Specification for Letters and Numerals for Ships
46 CFR Part 199, Lifesaving Appliances and Arrangements
33 CFR 155.450 – Vessel Equipment, Placard
33 CFR 151.59 – Garbage Pollution and Sewage, Placards
46 CFR 67.121, Official Number Marking Requirement
33 CFR 155.720, Transfer Procedures
EM 385-1-1, Safety and Health Requirements Manual
EP 1130-2-500, Work Management Guidance and Procedures
Reference Drawing 656-B460-02 COMMUNICATIONS MARK

C480 TELEVISION ANTENNA SYSTEM

GENERAL DESCRIPTION

None.

REQUIREMENTS

The Contractor shall supply and install a satellite TV system to serve the staterooms, office(s), conference room, lounge(s), and galley/mess area. The system shall be designed and installed to receive satellite TV signal, High Definition (HD), with digital video recording (DVR) at each TV identified in Contract Paragraph C437.

SPECIFIC REQUIREMENTS

The system includes the following components:

Major Equipment

At least one Omni-directional satellite television antenna system shall be supplied and installed on the house top. The system shall be included in the RF System Design Study; see Contract Paragraph C770. The Contractor shall design the antenna foundation, see Contract Paragraph C317. HD DVR receivers shall be provided for all TVs listed in C437. All other system equipment shall be installed in an audio\visual equipment rack located in the electronics/data center room, for signal distribution. If the TV antenna system is installed on the AC distribution system, it shall be provided with an uninterruptible power supply (UPS) to avoid interruption and power spikes/surges when switching power sources (generators and shore power).

Wiring

Signal, data and power cables shall be run from the antenna to the audio/visual rack, in accordance with the manufacturer's recommendations.

Video cables and jacks shall be run from the audio\visual rack located in the electronics/data center room to the video jack at each TV listed in C437. The type of cable and jack shall be in accordance with the manufacturer's recommendations. The cables shall be neatly bundled at the audio\visual rack with adequate slack.

The video jacks may terminate in a face plate shared with other data and communications systems described in this specification. Final locations to be determined in consultation with the COR.

SPECIAL FEATURES

None.

DELIVERABLES

849-C480-01 TELEVISION ANTENNA SYSTEM

STANDARDS

See Contract Paragraph C003.

C498 FORWARD LOOKING SONAR (INTEGRATED FORWARD-LOOKING SYSTEM)

GENERAL DESCRIPTION

The Contractor shall provide and install a three-dimensional forward-looking sonar (3D FLS) for navigation and displaying the seafloor and any in-water obstacles in front of the vessel. The forward-looking sonar shall be part of an Integrated Forward-Looking System (IFLS) that creates a digital terrain map (DTM) of the river bottom or seafloor. The sonar system shall meet all ABS and USCG requirements.

REQUIREMENTS

A forward-looking sonar shall be provided and installed for the dredging operation, with the transducer array mounted flush with the hull or in a cavitation-free transducer housing located forward of the hopper and installed in accordance with manufacturer’s instructions. The system shall be provided with a data acquisition unit, display, and storage system hardware and software.

An Integrated Forward-Looking System (IFLS) shall combine the on-site data generated by the multibeam bathymetric forward-looking sonar system with the Dynamic Positioning/Dynamic Tracking (DP /DT) data for the Dredge Track Position System (DTPS). See Contract Paragraphs C524 and C608.

The IFLS System shall be effective over the Operating Profiles listed in contract Paragraph C002.

The IFLS shall integrate actual real time onsite bottom mapping data with the DP/DT system for accurately steering the vessel along planned dredge tracks along the digital terrain model (DTM). It shall also use the DTM information to achieve better feed-forward control of the DP/DT system which in turn makes for better track and speed control capability at the lowest fuel consumption and emissions. Along the dredging track, soil property variations shall be used to govern vessel speed variations and automatic dredge pump, jet pump and visor control settings (see Contract Paragraph C524); thus, the suction properties are precisely adjusted to the type of soil and further enhancing the regularity of the seafloor after dredging.

The sonar system shall be powered from UPS power.

Transducer cables shall be installed as described in Contract Paragraph C326.

SPECIFIC REQUIREMENTS

The Sonar Data Acquisition units shall interface with the Navigation Equipment listed in Contract Paragraph C770 for signals as required by the sonar OEM, including DGPS and doppler speed log.

SPECIAL FEATURES

The multibeam forward looking sonar interface with navigation sensors shall provide an integrated forward-looking sonar system (IFLS) enabling dredging operation to be more precise, allowing for better tolerances to be followed which in turn evolve into an automatic dredging planner. This system shall be integrated with the dredge automation system (see Contract Paragraph C524).

DELIVERABLES

849-C498-01 Forward Looking Sonar Installation
849-C498-02 Sonar Arrangement and Details
849-C498-03 Integrated Forward-Looking System

STANDARDS

ABS Guide for Bridge Design and Navigational Equipment/Systems.
ABS Guidance Notes on the Application of Ergonomics to Marine Systems.
SOLAS, International Convention for the Safety of Life at Sea
NMEA-0183, Standard for Interfacing Marine Electronic Devices.
IEEE 45-2002, Recommended Practice for Electric Installations on Shipboard.
Code of Federal Regulations 46 CFR Subchapter I
Code of Federal regulations 33 CFR
ABS Marine Vessel Rules

C500 SPECIAL FEATURES

C502 DREDGE SYSTEM

GENERAL DESCRIPTION

The Contractor shall fabricate and furnish a complete dredging system for maintenance dredging operating at open sea and in busy waterways as described in Contract Paragraph C002.

REQUIREMENTS

The dredge system shall be designed and integrated with all identified and required vessel systems to provide optimal performance for the operational profile as defined in Contract Paragraph C002.

The Contractor shall develop 849-C502-01 PRODUCTION CALCULATION during Phase II of the Contract and submit to COR for review and approval. The Production calculation shall be based on the expected performance of the complete dredge system design. After the complete dredge system is installed, the actual performance of the system shall be verified and shall comply with this production calculation during testing/sea trails.

SPECIFIC REQUIREMENTS

The dredge system shall consist of the following elements:
Dragarm, including draghead, turning gland, gimbal and hull connection; Described in Contract Paragraphs C510 and C511.
Dredge pump including piping for loading and unloading; Described in Contract Paragraphs C504, C505, C512, C523, C525 and C526.
Dredge pump drive system and controls; Described in Contract Paragraph C506.
Gantries (draghead, intermediate and trunnion) including swell compensator and winches; Described in Contract Paragraphs C508 and C522.
Hopper, with height adjustable weir, bottom doors, jets and distribution system; Described in Contract Paragraphs C512, C514, C516 and C520.
Jet pump, including piping for draghead heel jets and for hopper unloading; Described in Contract Paragraphs C517, C518 and C519.
Dredge Automation System. Described in Contract Paragraph C524.

Dredge piping supports shall be provided over the entire piping length. Dredge pipe supports and foundations shall be designed by the Contractor and validated by calculations in accordance with Contract Paragraph C330.

SPECIAL FEATURES

The Contractor shall develop 849-C502-02 LIFETIME CALCULATION during Phase II of the Contract and submit to COR for review and approval. The calculation shall demonstrate the estimated lifetime for the dredge wear parts based on the materials chosen for the dredge parts and the type of dredge materials as described in Contract Paragraph C002. Life expectancy calculations of individual dredge piping system components such as straight pipes, elbows, wyes, etc. should target an equal life time for each element, so that all components will be worn at about the same time and can be replaced (or turned over) in one and the same maintenance period, reducing down time. Wear of the pipes is multi-variable and random. Therefore, the life expectancy prediction calculation/model shall evaluate several parameters such as pipe arrangements, material hardness, wear resistance, mixture concentrations, mixture velocity, soil composition, and relation mixture velocity to critical velocity.

To provide the COR with a complete overview of all the parts included in the dredge system and jet water system, such as fittings and piping with their material and thickness, the Contractor shall develop 849-C502-03 DREDGE PIPE ARRANGEMENT, 849-C502-04 DREDGE PIPE DIAGRAM, 849-C502-05 JET WATER PIPE ARRANGEMENT and 849-C502-06 JET WATER PIPE DIAGRAM during Phase II of the Contract and submit to COR for review and approval.

A Dredge Quality Management (DQM) system shall be installed according to the requirements provided in Contract Paragraph C524.

DELIVERABLES

849-C502-01 PRODUCTION CALCULATION
849-C502-02 LIFETIME CALCULATION
849-C502-03 DREDGE PIPE ARRANGEMENT
849-C502-04 DREDGE PIPE DIAGRAM
849-C502-05 JET WATER PIPE ARRANGEMENT
849-C502-06 JET WATER PIPE DIAGRAM

STANDARDS

See Contract Paragraph C003.

C504 DREDGE PUMPS

GENERAL DESCRIPTION

The Contractor shall furnish two, identical, same hand, single-suction, double-walled centrifugal pumps best suited for the operational conditions as described in Contract Paragraph C002.

Each dredge pump shall be provided with a drive system as required in Contract Paragraph C506.

REQUIREMENTS

The dredge pumps shall have a flowrate and head optimized for the operational conditions described in Contract Paragraph C002. The dredge pumps shall at all times operate as close to the best efficiency point as possible. The dredge pumps shall be designed to avoid cavitation while pumping a high concentration of dredged material. The dredge pumps shall have sufficient sphere passage to meet the operational conditions listed in Contract Paragraph C002.

The pumps shall be installed in a way that leaking does minimal damage to other equipment. The dredge pumps shall be installed, aligned with the gears, and secured to the foundations in accordance with the manufacturer and regulatory body requirements.

The dredge pump system shall be arranged as follows for loading and offloading:
Loading: One dredge pump shall provide suction for each dragarm.
Offloading: The dredge pumps shall be capable of working in series to offload from the hopper to the bow discharge.

For redundancy (see Contract Paragraph C002), if one of the dredge pumps is offline, it shall still be possible to dredge with either dragarm. Offloading shall also be possible with one of the pumps offline.

The single piece inner pump casing, impeller and renewable head liners shall be of highly abrasion resistant alloy. Both the impeller and the casing shall be suited for moderate impact loads. The dredge pump bearing assembly shall consist of anti-friction type bearings capable of handling radial forces and axial forces in both directions. A dedicated bearing lube oil system shall be supplied by the pump manufacturer. The bearing temperature should be controlled to keep it within the limits of the oil and bearings.

The dredge pump shaft shall be of high strength alloy steel. The pump shaft mechanical seal shall be easily replaceable and easily maintainable. The shaft seal shall be connected to the dredge pump flushing system as described in Contract Paragraph C505.

The dredge pump shaft seal shall be chosen to meet the following requirements:
Suitable for use in an environment with abrasive material.
Prevent soil mixture from entering the seal and causing premature failure
Suitable for high axial and radial movement including vibrations and shock loads normal for dredging operations.

The impeller shall be attached in such a manner as to allow removal through the suction-side head. Lifting gear and pad eyes shall be provided for removing the impeller, wear plates and pump casing in accordance with Contract Paragraph C290.

The Contractor shall develop 849-C504-01 DREDGE PUMP CURVES, 849-C504-02 GENERAL ARRANGEMENT DRAWING OF PUMPS, 849-C504-03 MATERIAL SPECIFICATION OF WEAR PARTS (LINER, IMPELLER, VOLUTE), 849-C504-04 PUMP PART DIMENSIONS, 849-C505-05 DREDGE PUMP SHAFT SEAL SPECIFICATION, and 849-C505-06 DREDGE PUMP SHAFT SEAL ASSEMBLY DRAWING during Phase II of the Contract and submit to COR for review and approval.

SPECIFIC REQUIREMENTS

Each dredge pump shall include the following inspection opening and valve necessary to create a complete and functional dredge pump assembly.

An inspection piece with top-opening clean-out connection shall be installed at the suction line near each dredge pump. The bottom surface of the opening cover shall be shaped to smoothly match the pipe cut-out to minimize turbulence at the dredge pump suction inlet.

A hydraulically operated, knife type, gate valve shall be provided in the suction line to prevent flooding of the pump room during dredge pump cleanout and maintenance operations. The valve shall be furnished with a connection to enable flushing of sand and silt from its seat. Flushing of this valve may be provided by the dredge pump flushing system (see Contract Paragraph C505) or the raw water system (see Contract Paragraph C640). The Contractor shall ensure that the water provided to the valve for flushing meets the quality standards of the valve manufacturer.

SPECIAL FEATURES

None.

DELIVERABLES

849-C504-01 DREDGE PUMP CURVES

a. Flow versus head

Flow versus efficiency

Flow versus net positive suction head required

849-C504-02 GENERAL ARRANGEMENT DRAWING OF PUMPS

849-C504-03 MATERIAL SPECIFICATION OF WEAR PARTS (liner, impeller, volute)

849-C504-04 PUMP PART DIMENSIONS

849-C504-05 DREDGE PUMP SHAFT SEAL SPECIFICATION

849-C504-06 DREDGE PUMP SHAFT SEAL ASSEMBLY DRAWING, including parts list

849-C504-07 MANUAL FOR MAINTENANCE including needed equipment

STANDARDS

See Contract Paragraph C003.

C505 DREDGE PUMP FLUSHING SYSTEM

GENERAL DESCRIPTION

Each dredge pump shall be provided with shaft seal(s) to prevent pressurized dredging soil from escaping at the drive shaft opening of the pump. To reduce wear on the shaft seal and provide cooling for the seal, the vessel shall be provided with a flushing system to flush water through the dredge pump shaft seal. The flushing system shall be designed to operate at a slightly higher pressure than the dredging system. The dredge pump flushing system shall also be used to supply water to the gland of the dredge pump.

Clean seawater shall be used for the shaft seal flushing water.

If required by the dredge pump manufacturer, the dredge pump flushing system may also be used to supply water to the void between the impeller and the head liners of the dredge pump.

REQUIREMENTS

The vessel shall be provided with a dredge pump flushing system that provides clean seawater to the dredge pump components described above.

A filter or strainer shall be added to provide the water quality as specified by the dredge pump manufacturer.

The flushing system pump(s) shall be driven by frequency-controlled drive(s) (see Contract Paragraph C750) to allow for adjustment for different pumping processes such as suction and discharge. A flow and pressure measurement system for the flushing water shall be provided. The flow of the system is to be in accordance with the dredge pump/seal manufacturer's requirements.

Dredge pump flushing system piping shall be in accordance with the requirements contained in Contract Paragraph C601 and applicable ABS and USCG regulations.

The Contractor shall develop 849-C505-01 DREDGE PUMP FLUSHING SYSTEM DIAGRAM, 849-C505-02 DREDGE PUMP FLUSHING SYSTEM CALCULATIONS, and 849-C505-03 DREDGE PUMP FLUSHING SYSTEM ARRANGEMENT AND DETAILS during Phase II of the Contract and submit them to COR and ABS for review and approval as applicable.

SPECIFIC REQUIREMENTS

The dredge pump flushing system shall be remote controlled and operated from the dredge operator console in accordance with Contract Paragraph C524.

The dredge pump flushing system may be used for flushing of the dredge line gate valves (see Contract Paragraph C525) where practicable.

SPECIAL FEATURES

None.

DELIVERABLES

849-C505-01 DREDGE PUMP FLUSHING SYSTEM DIAGRAM
849-C505-02 DREDGE PUMP FLUSHING SYSTEM CALCULATIONS
849-C505-03 DREDGE PUMP FLUSHING SYSTEM ARRANGEMENT AND DETAILS

STANDARDS

See Contract Paragraph C003.

C506 DREDGE PUMP DRIVE SYSTEM

GENERAL DESCRIPTION

Each dredge pump shall be provided with a dredge pump drive system. The dredge pump drive system shall control the speed of the dredge pump impeller within the range of the expected demand of the pump.

REQUIREMENTS

The characteristics of the drive system shall match the pump characteristics as expected during operation in conditions as described in Contract Paragraphs C002, C502 and C504. The dredge pump drive shall give reliable speed control and be controlled and monitored from the dredging control desk per Contract Paragraph C524.

If required, the Contractor shall place a (multi-speed) reduction gearbox between the Dredge Pump and Dredge Pump Drive, with appropriately sized couplings that handles the loads as described under specific requirements.

The drive system shall be capable of controlling the pump in small increments in the range from 2 to 5 RPM, or at low speed in both directions, for clearance work in the event that the impeller gets obstructed.

The Contractor shall develop 849-C506-01 DREDGE PUMP DRIVE SYSTEM GENERAL ARRANGEMENT DRAWING and 849-C506-02 PUMP CHARACTERISTIC FOR DRIVE AND PUMP COMBINATION during Phase II of the Contract and submit to COR for review and approval.

SPECIFIC REQUIREMENTS

The pump drive shall be designed to handle the following load conditions common for dredge pumps:

a. High vibrations in the dredge pump;

Frequent stops and starts of the dredge pump, e.g. due to drag head blockages;
Fluctuations in required torque due to density variations in the dredged material;
Blocking of the impeller due to debris in the dredge pump.

SPECIAL FEATURES

The dredge pump shaft shall be locked when performing maintenance on the pump. This means that the drive system shall be switched off and physically locked near the pump drive. Turning the driveshaft slowly in both directions either by hand or with turning gear, while drive system is locked, shall be possible.

DELIVERABLES

849-C506-01 DREDGE PUMP DRIVE SYSTEM GENERAL ARRANGEMENT DRAWING
849-C506-02 PUMP CHARACTERISTIC FOR DRIVE AND PUMP COMBINATION
849-C506-03 TECHNICAL MANUAL DREDGE PUMP DRIVE, including arrangement drawings

STANDARDS

See Contract Paragraph C003.

C508 DRAGARM HANDLING SYSTEM

GENERAL DESCRIPTION

The vessel shall be provided with a dragarm handling system to position the entire dragarm from transit position to dredging position. Each dragarm handling system shall consist of a draghead, intermediate and trunnion gantries, corresponding winches, and a swell compensator. The dragarm, draghead, and swell compensator are described in Contract Paragraphs C510, C511, and C522, respectively.

REQUIREMENTS

The dragarm shall be hoisted and lowered by winches via three gantries, one located near the draghead (draghead gantry), one near the gimbal joint (intermediate gantry) and one near the trunnion (trunnion gantry).

The gantries and winches shall allow for hoisting of the trailing suction pipe without contacting the hull with a vessel list angle up to5 degrees Port or Starboard.

The dragarm handling system shall have the minimal required number of moving parts as practical.

Gantries and winches shall be of adequate strength, torque and power to hoist the dragarm when it is in the outboard position and to move the dragarm from the outboard to the inboard position.

Winch hoisting capacity shall be determined as follows:

a. Load Case 1 - Nominal pull: trailing suction pipe horizontal above the water, jet pipe filled with water, taking into account the sheave bearing efficiency of the hoisting system. For the trunnion winch, an additional safety factor of at least 1.2 for the friction of the sliding piece and the hull shall be applied.

Load Case 2 - Maximum Pull: trailing suction pipe above the water filled with dredged material, draghead filled with clay and jet pipe filled with water taking into account the sheave bearing efficiency of the hoisting system, or by multiplying the nominal pull (from Load Case 1) by a safety factor of at least 2.0, whichever is the greatest.

The structural strength of the gantries and their foundations shall be based on the maximum hoisting capacity of the relevant winch, taking into account a maximum allowable stress of 65% of the yield stress of the steel applied. The Contractor shall develop 849-C508-11 GANTRIES CALCULATION REPORT during phase II of the Contract and submit to COR for review and approval.

There shall be sufficient space around the draghead, when stowed on deck, for maintenance and removing/adjusting the TED and visor. Maintenance and removing/adjusting the TED and visor shall be possible in a safe manner during transit with the dragarms stowed in the saddles.

Gantries and winches shall be controlled from the dredging control desk, per Contract Paragraph C524, and shall also have local controls.

The Contractor shall develop 849-C508-01 DRAGARM HANDLING ARRANGEMENT during phase II of the Contract and submit to COR for review and approval.

SPECIFIC REQUIREMENTS

Gantries

Inboard and outboard movement of the drag arm shall be controlled by a hydraulic cylinder at each gantry. At the end of the stroke the hydraulic cylinder shall be fitted with hydraulic buffers to gradually lower the speed of the cylinder. The hydraulic cylinder shall be linked to the gantry and to the vessel by means of spherical plain bearings.

The intermediate and draghead gantries shall be of the same design, each adapted to the specific load and outreach required. The draghead and intermediate gantries shall include saddles where the dragarm can be self-stowed. The gantries shall be adequately protected with fenders to prevent damage to and from dragarm, as required in Contract Paragraph C410.

The trunnion gantry shall be designed so that the guiding track of the hull and the trunnion for lowering the sliding piece to position are easily aligned.

Winches

The dragarm handling system shall contain winches suitable for hoisting the dragarm and draghead. Winches shall be the same make and model where practicable.

The winches shall be complete with a drum brake and a motor brake. The drum brakes shall be arranged to automatically arrest the rotation of the drums upon loss of power. The motor brakes shall be designed with a service factor of 1.5.

In addition to above stated service factors, the construction and installation of winches shall meet ASME B30.7 – Winches.

The winch shall have anti-friction type roller bearings and a complete, self-contained lubrication system for the bearings and the gears.

Winch wire shall be designed with a factor of safety as specified by ASME B30.7 - Winches. Pull of the winch shall be in accordance with the requirements described above. The drum capacity shall be sufficient to accommodate the hoisting wire in one layer with additional fastening and spare windings. The drums shall be grooved drums to support the wire rope. The wire speed shall be calculated to for hoisting the suction pipe from maximum dredging depth to the inboard position in 5 minutes.

The Contractor shall provide the COR with a "Certificate of Examination and Test of Wire Rope Before Being Taken into Use" (U.S. Department of Labor - Occupational Safety and Health Administration Form No. 5) for each continuous run of rope installed on the winches. The certification shall be performed to the requirements of 29 CFR, part 1919 and be in accordance with the requirements of 29 CFR 1918. Certifications shall be performed to verify that wire rope meets calculated required breaking strength, and also meets ABS required minimum breaking strength where applicable.

Sheaves

Sheaves shall be provided as required to suit the specifications of the wire manufacturer according to the allowed wire rope bending radius. Sheave diameter shall be at least 20 times wire diameter and sheaves shall be identical.

All sheaves shall have roller bearings. Greasing of bearings shall be accomplished from no more than two places per gantry by central nipple blocks via stainless steel grease pipelines.

Bushings and bearings shall have adequate sealing against seawater and dirt and shall be capable of being greased from an easily accessible position.

Gantry and Winch Control

The operation of the gantries and winches shall be controlled remotely from the dredge operator console as further described in Contract Paragraph C524, and locally.

An emergency stop is to be placed near each winch.

Gantry and winch control shall be provided with the following features:

a. A limit switch that will shut down the winch drive when the suction pipeline is at its highest position. After the switch stops the drive, it shall be possible to reverse the winch and lower the suction pipeline without manual reset.

A sensor that provides notification at the Dredge operator console, that the dragarm is resting in the stowage support saddles on deck.

A slack line sensor to stop line payout when a slack line condition is detected.

A sensor and control to stop the winch when amount of safety wraps is reached.

Sensors to provide required dragarm position data per Contract Paragraph C524.

Angle of gantries

Position of trunnion

SPECIAL FEATURES

In case of hoisting wire breakage, means of emergency retrieval shall be provided with the use of an emergency hoisting wire in way of the draghead gantry.

DELIVERABLES

849-C508-01 DRAGARM HANDLING ARRANGEMENT
849-C508-02 WINCHES ARRANGEMENT DRAWING
849-C508-03 GEARBOXES ARRANGEMENT DRAWING
849-C508-04 GEARBOXES ASSEMBLY DRAWING, including parts list
849-C508-05 WINCHES HYDRAULIC DIAGRAM
849-C508-06 GEARBOX CALCULATIONS
849-C508-07 WINCHES CALCULATION REPORT
849-C508-08 SLIDING PIECE ASSEMBLY DRAWING, including parts list
849-C508-09 SUCTION TUBE HOISTING ARRANGEMENT
849- C508-10 GANTRIES ARRANGEMENT
849- C508-11 GANTRIES CALCULATION REPORT
849- C508-12 DRAG HEAD GANTRY ASSEMBLY, including parts list
849- C508-13 INTERMEDIATE GANTRY ARRANGEMENT DRAWING
849- C508-14 INTERMEDIATE GANTRY ASSEMBLY, including parts list
849- C508-15 TRUNNION GANTRY ARRANGEMENT DRAWING
849- C508-16 TRUNNION GANTRY ASSEMBLY, including parts list
849- C508-17 GANTRY SHEAVES ASSEMBLY DRAWING, including part list
849- C508-18 GANTRY CYLINDERS ARRANGEMENT DRAWING
849- C508-19 GANTRY CYLINDERS ASSEMBLY DRAWING, including parts list
849- C508-20 GANTRY CYLINDERS HYDRAULIC DIAGRAM

STANDARDS

29 CFR Part 1919, Gear Certification
29 CFR Part 1918, Longshoring
ASME B30.7-2016, Winches

C510 TRUNNION & DRAGARM

GENERAL DESCRIPTION

The Contractor shall design, provide, and install two complete drag arms (including trunnions) that satisfy the requirements of Contract Paragraph C502. One dragarm shall be provided on each side of the vessel.

REQUIREMENTS

The dragarm shall consist of all components between the connection to the draghead and the vessel:
Draghead as described in Contract Paragraph C511.
A lower pipe section with connecting point for the hoisting wire as described in Contract Paragraph C508.
Turning gland, which allows for +/- 60 degrees of rotation from the horizontal of the draghead.
A gimbal with suction hose connecting the upper and lower arm. The gimbal joint shall allow the upper and lower arms to move independently.
Upper pipe section with connection point for the hoisting wire as described in Contract Paragraph C508.
Short hinged connection, connecting the upper arm with the trunnion using a flexible suction hose, allowing movement of 40 degrees to either side.
Trunnion elbow integrated in the sliding piece, compatible with the trunnion gantry as described in Contract Paragraph C508.
The trunnion shall allow the dragarm to dredge at different angles and shall provide a watertight connection to the hull. The trunnion elbow shall rotate in the sliding piece. The connection between the sliding piece and trunnion shall allow for free rotation of the trunnion with the dragarm. The wearing rings of this surface shall be interchangeable.
A jet water line shall be mounted along the suction pipe as described in Contract Paragraph C517.

The dragarm shall be designed to allow movement in order to maintain contact between the seabed and the draghead, while minimizing bending moments acting on the dragarm. The dragarm shall be impact- and shock resistant, with minimal pipeline resistance. The suction inlet in the hull shall be as low as reasonably practicable.
The dragarm shall be capable of being lowered until the trunnion is in line with the suction inlet. Lowering shall be done by means of a sliding piece. The sliding piece guides shall be flush with the outside of the side shell. The hull connection on each side of the vessel shall be identical but mirrored. The required wall thickness of the suction tube (upper dragarm, lower arm, trunnion elbow) shall be calculated. The calculated thickness of the suction tube shall be increased with a wear allowance to be determined by the Contractor and approved by the COR. The Contractor shall develop 849-C510-007 SUCTION TUBE CALCULATION REPORT, during Phase II of the Contract and submit to the COR for review and approval. The calculation shall show the added thickness for wear allowance
The draghead, lower pipe, turning gland, and upper pipe shall be connected by bolts to allow for easy maintenance and draghead replacement.
The Contractor shall develop:
849-C510-01 SUCTION TUBE ARRANGEMENT DRAWING
849-C510-02 SUCTION TUBE ASSEMBLY DRAWING
849-C510-03 SLIDING PIECE ASSEMBLY DRAWING
849-C510-04 TURNING GLAND ASSEMBLY DRAWING
849-C510-05 GIMBAL JOINTS ASSEMBLY DRAWING
849-C510-06 JET WATER PIPE ON SUCTION TUBE ARRANGEMENT
during Phase II of the Contract and submit to COR for review and approval.

SPECIFIC REQUIREMENTS

The dragarm length shall be designed to allow dredging up to at least 65 ft, with an angle from the horizontal of 45 degrees or less.

The suction pipe shall be of sufficient diameter for the dredged material mixture to stay above critical velocity and to have minimum resistance.

The suction hoses at the hinge and gimbal shall be of the same type and length making them interchangeable. The suction hoses shall be reinforced with steel rings to prevent collapse under vacuum.

The guides for the sliding piece shall not protrude out of the hull side of the vessel.

SPECIAL FEATURES

A doubler plate shall be installed on the suction pipe where the pipe rests in the gantry saddle.

DELIVERABLES

849-C510-01 SUCTION TUBE ARRANGEMENT DRAWING
849-C510-02 SUCTION TUBE ASSEMBLY DRAWING
849-C510-03 SLIDING PIECE ASSEMBLY DRAWING
849-C510-04 TURNING GLAND ASSEMBLY DRAWING
849-C510-05 GIMBAL JOINTS ASSEMBLY DRAWING
849-C510-06 JET WATER PIPE ON SUCTION TUBE ARRANGEMENT
849-C510-07 SUCTION TUBE CALCULATION REPORT

STANDARDS

See Contract Paragraph C003.

C511 DRAGHEAD AND TED/VISOR

GENERAL DESCRIPTION

Each dragarm shall be provided with a draghead designed to excavate the soil with jets (hydraulically) and with teeth (mechanically). The draghead shall be equipped with a turtle exclusion device (TED) and with tickler chains.

REQUIREMENTS

The draghead shall be equipped with (heel) jets to erode the soil. The pressurized jets shall be placed in the heel. A row of replaceable teeth shall be placed at the back side of the visor to mechanically excavate the soil.

The rotation of the visor around the heel shall be remotely adjustable and controllable by the dredge automation system (see Contract Paragraph C524).

The portions of the draghead in contact with the seabed shall be wear-resistant and replaceable.

The draghead shall be accessible when stowed on deck, with sufficient free space for the crew to do maintenance work on the draghead including adjusting, removing, and installing the TED.

During Phase II, the Contractor shall submit 849- C511-01 DRAGHEAD ARRANGEMENT DRAWING to the COR for review and approval. The drawing shall contain a full parts list of the draghead.

SPECIFIC REQUIREMENTS

To prevent damage to the ship hull by the draghead, the draghead shall be equipped with a fender.

The design of the draghead shall be such that it can be used on both the starboard and port sides. Identical parts shall be used on both drag heads.

SPECIAL FEATURES

Turtle Exclusion Device (TED)

The drag head shall be equipped with a turtle exclusion device also called TED visor. The TED shall be of a rigid design and shall be rigidly attached to the draghead. The TED shall be capable of being removed while the dredge is in the water. The TED shall meet all requirements of the “USACE Sea Turtle Deflector Checklist for Hopper Dredges for USACE and USACE/Army-permitted projects,” provided as a Reference Document. Reference Drawing “Deflector Drawing” has also been provided as reference for this requirement.

Operational requirements of the checklist shall be assumed completed by the dredge in all missions that will require the TED system. This has been identified as all locations along the Atlantic Coast and Gulf Coast. The TED shall be designed to prevent structural failure of the deflector during dredging operations, including a plowing effect of 6 inches. The TED shall have instrumentation or indicators to ensure that the approach angle of the deflector is maintained. These shall be located locally at the draghead.

The TED shall be designed to be manually adjustable for the variable dredging depths experienced by this dredge, including maximum dredging depths. The Contractor shall ensure that there are no openings between the deflector and the drag head greater than a 4 inch by 4-inch area, in all available adjustment settings.

The Contractor shall develop drawing 849-C511-02 TED VISOR SPECIFICATIONS and submit to the COR and ABS as applicable during Phase II of the contract for review and approval. The drawing shall include the assembly of the deflector. The drawing shall show deflector structural drawings, approach angle range and link lengths, saddled draghead with the longest link installed, 4" X 4" openings between the drag head and the deflector and access drawings for the saddled draghead.

DELIVERABLES

849-C511-01 DRAGHEAD ARRANGEMENT DRAWING
849-C511-02 TED VISOR SPECIFICATIONS.

STANDARDS

USACE Sea Turtle Deflector Checklist for Hopper Dredges for USACE and USACE/Army-permitted projects.

C512 HOPPER DISTRIBUTION SYSTEM

GENERAL DESCRIPTION

A hopper distribution system shall be designed and installed to evenly divide the dredged material in the hopper allowing for maximum settling of material.

REQUIREMENTS

The hopper distribution system shall start at the discharge part of the dredge pump and includes piping to the bow connection (described in Contract Paragraph C523) and the poor mixture overboard (described in Contract Paragraph C526).

At a minimum there shall be two fill points above the hopper with one at each end. A turtle filter box shall be installed at each filling point.

The loading system shall allow even loading of the hopper and be designed to reduce velocity and movement of the mixture going into the hopper in order to reduce overflow loss.

Requirements for the overflow are described in Contract Paragraph C516.

The Contractor shall develop C512-01 DREDGE PIPE DIAGRAM and C512-02 DREDGE PIPE ARRANGEMENT during phase II of the Contract and submit to the COR for review and approval. Both the diagram and arrangement shall include a Bill of Material including call-out of fittings, valves, pipe sizes, material, diameter, angle, bend radius and wall thickness. All castings for the dredge piping system shall be constructed and tested in accordance with Part 2 of the ABS Marine Vessel Rules.

SPECIFIC REQUIREMENTS

Pipe diameter shall match the pump characteristics and material shall be of sufficient wear resistance for each portion of the pipeline. Contractor shall identify pipe thicknesses and wear allowance in the lifetime calculation described in Contract Paragraph C502.

Pipeline components such as branches, bends, valves and straight pipes in the hopper distribution system and hopper collection system shall be of the same length and diameter as much as possible to reduce the amount of spare parts.

Bend radius shall be at least two times the diameter of the bend.

Hydraulically operated valves are described in Contract Paragraph C525. Hydraulically operated gate valves shall be located at the following locations:

Directly after each branch to the poor mixture overboard.
Directly after each branch to hopper filling point.
Directly after branch to bow connection
Upstream of bow connection.

SPECIAL FEATURES

Turtle Inspection Baskets

The system shall also include inspection baskets or screening installed over the hopper inflow(s) and overflow(s) and any openings that are present along the inflow pipe infrastructure in order to allow for the inspection for turtles, turtle parts, or damage.

There shall be catwalks and/or platforms to provide access to the inflow and overflow screens for personnel to enter and clean the screens. Access arrangements shall also provide for the required biologist observation positions. Observation positions shall include sufficient lighting for inspections of biological material and shall include a wall folding table for placement of biological material. Inflow screens shall have a method of opening them to allow for fast clearing using the dredge pumps.

Metal that is resistant to erosion from sandblasting will be used to fabricate baskets or screens.

The basket shall be illuminated by flood lights at all times during dredging operation. Safe access into the baskets, and to the overflow screens shall be provided to the endangered species observers.

The Contractor shall ensure that there are no openings in the baskets greater than 4 inches by 4 inches.

The Contractor shall develop drawing 849-C512-03 TURTLE INSPECTION BASKETS and submit to the COR and ABS as applicable during Phase II of the contract for review and approval. The drawing shall include the assembly of the inflow and overflow designs. The drawing shall show inflow and overflow screens structural drawing, and access drawings for the inflow screens and overflow screens. A note shall be included on appropriate lighting arrangements for the turtle screens.

Density and flow meters

A density meter and a flow velocity meter, both non-nuclear, as further described in Contract Paragraph C524, shall be installed directly downstream of each dredge pump discharge. Both meters shall be placed as required by the manufacturer, far enough from any bend and placed in a near vertical pipeline in order to assure unobstructed flow. A pipe spool shall be supplied to replace the density and velocity meters for maintenance.

DELIVERABLES

849-C512-01 DREDGE PIPE DIAGRAM
849-C512-02 DREDGE PIPE ARRANGEMENT
849-C512-03 TURTLE INSPECTION BASKETS

STANDARDS

See Contract Paragraph C003.

C514 HOPPER DOOR SYSTEM

GENERAL DESCRIPTION

The dredge shall be equipped with bottom doors, for the purpose of dumping by gravity of dredged materials.

REQUIREMENTS

Each compartment of the hopper shall be equipped with bottom doors. The Contractor shall specify the type of doors and means of operation. Doors shall be designed for dumping in shallow water as defined in Contract Paragraph C002 and be capable of unloading all types of dredged material per the requirements in Contract Paragraph C002.

The bottom doors shall be designed and installed in compliance with the requirements as stated in the Guidelines for the Assignment of Reduced Freeboards for Dredgers, DR-68 rev. 1.

The Contractor shall develop and submit 849-C514-01 HOPPER DOOR ARRANGMENT during phase II of the Contract and submit to COR for review and approval. See Contract Paragraph C655 for the hopper door hydraulic system requirements and deliverables.

SPECIFIC REQUIREMENTS

The seal of the bottom door shall prevent the loss of dredged material from the hopper and shall prevent sea water ingress allowing the hopper to be pumped dry. The rubber of the seal shall be sea water resistant and wear resistant. The seal shall be designed to be easily replaceable in drydock and readily available on the market. All parts of the door shall be accessible for maintenance and repair in drydock.

The seal shall be protected from excessive wear from dredged material when doors are opened. Full or partial opening of the hopper doors during drydock to allow for maintenance of seal and hinge points shall be possible.

SPECIAL FEATURES

At the suction location and hopper jets of the hopper self-empty system, a double plate of wear resistant steel shall be welded on the bottom door.

Bottom doors shall have means for (manual) emergency closing in the event of a hydraulic system failure. These means shall be shown on the HOPPER DOOR ARRANGEMENT, and the procedures for recovering the doors should be provided in the technical manual for the doors or the door closing system.

The bottom doors shall be provided with a means for locking the doors closed that is entirely separate from the hydraulic system.

DELIVERABLES

849-C514-01 HOPPER DOOR ARRANGEMENT
849-C514-XX Technical manual bottom doors including arrangement drawings, assembly drawings and parts list of the door and cylinders.

STANDARDS

Guidelines for the Assignment of Reduced Freeboards for Dredgers, DR-68 rev. 1

C516 HOPPER OVERFLOW SYSTEM

GENERAL DESCRIPTION

The vessel shall be provided with hopper overflow(s) to control the water flowing out of the hopper. The overflow design shall allow for even filling of the hopper and control of the filling, while ensuring low overflow losses and low turbidity to allow for optimum filling of the hopper.

REQUIREMENTS

Hopper overflows may all be adjustable or may be a combination of fixed and adjustable. The location and quantity of overflows shall allow trimming of the vessel in order to achieve maximum immersion of the dredge pump at the start of dredging cycle.

The overflows shall be continuously adjustable to control the hopper level and vessel draft.

A variable overflow shall move vertically and have a stroke which is large enough to compensate for the highest and lowest density materials outlined in Contract Paragraph C002. The variable overflow shall be of sufficient power and strength so as to be able to move through settled material in the hopper.

The movable parts of the overflow shall be accessible for maintenance and repair. Parts exposed to wear by the overflowing mixture shall be protected from wear and/ or easily replaceable. The overflow diameter shall be sized towards assuring a minimal water layer on the load. There shall be a rubber seal between the movable and fixed parts of the overflow for minimal leakage.

An adjustable anti-turbidity valve shall close the overflow sufficiently such that the inlet remains submerged and no air is entrained in the outgoing flow.

The hydraulic actuator of the anti-turbidity valve shall be situated above the maximum hopper level.

The hopper overflow maximum height shall be set to provide a maximum of 6,000 cubic yard hopper capacity to the overflow.

The Contractor shall develop 849-C516-01 OVERFLOW ARRANGEMENT and 849-C516-02 ANTI-TURBIDITY VALVE during Phase II of the Contract and submit them to the COR for review and approval.

SPECIFIC REQUIREMENTS

The overflow shall be equipped with pad eyes which allow for the overflow position to be fixed with chains.

The contractor shall provide a narrative description explaining the selected type, number, location and size of overflow(s) as part of the Proposal.

SPECIAL FEATURES

The positions of all movable parts of the overflow shall be controlled, displayed and monitored from the dredge operator console, per Contract Paragraph C524. The anti-turbidity valve shall be automated (per Contract Paragraph C524) to ensure the overflow inlet is submerged all times.

DELIVERABLES

849-C516-01 OVERFLOW ARRANGEMENT
849-C516-02 ANTI-TURBIDITY VALVE
849-C516-03 Technical manual overflow including arrangement drawings, assembly drawings and parts list of the overflow

STANDARDS

See Contract Paragraph C003.

C517 JETTING AND HOPPER FLUSHING SYSTEMS

GENERAL DESCRIPTION

The jetting system consists of the piping running from (a) the jetting pumps (described in Contract Paragraph C518) to the draghead and (b) into the hopper providing the required jetting water for the hopper collection system as described in Contract Paragraph C520.

In the fixed part of the draghead, heel jets shall be used to get the soil in suspension which reduces cutting forces and increases mixture density.

In the hopper, jetting shall be used to mobilize soil and dilute the soil mixture in the hopper for efficient unloading by hydraulic transport.

The hopper flushing system consists of the hopper flushing pump and piping from the pump to the hopper. The hopper flushing system is intended to add water to the hopper, during bow discharge, such that sufficient head on the dredge pumps is maintained and cavitation in the pumps is avoided.

REQUIREMENTS

The jetting system shall consist of two (2) jetting pumps with a suction inlet sea chest close to the pump. The sea chest and pump inlet shall be separated by a straight run of pipe of sufficient distance to avoid negative impacts on pump performance.

For the water supply to the draghead nozzles, the jetting pumps shall work in series.

The jetting system to the draghead shall consist of a separate pipe running parallel to the dredge pipe with flexible parts where necessary.

For the water supply to the hopper for mobilizing and diluting the hopper load, the pumps shall work in parallel.

During unloading, the dilution shall be such that the maximum dredged material density can be pumped while minimizing the unloading time.

The hopper jetting system shall be divided into multiple sections, with each section of jetting pipe corresponding to a section of the hopper. Each section of the hopper jetting system shall be controlled separately and per Contract Paragraph C524.

All valves in the jetting system shall be remote controlled and monitored at the dredge operator console.

A hopper flushing system, consisting of an independent hopper flushing pump and associated piping, shall be installed to avoid cavitation at the dredge pumps during unloading.

The Contractor shall develop 849-C517-01 JETTING WATER DIAGRAM, 849-C517-02 JETTING WATER ARRANGEMENT TO DRAGARM, 849-C517-03 JETTING WATER ARRANGEMENT TO HOPPER, 849-C517-04 JETTING SYSTEM CALCULATIONS, 849-C517-05 HOPPER FLUSHING SYSTEM ARRANGEMENT, and 849-C517-06 HOPPER FLUSHING SYSTEM CALCULATIONS and submit during Phase II of the Contract to COR for review and approval. The diagrams and arrangements shall include a Bill of Material including call-out of valves, pipe sizes, material, diameter, angle, bend radius and wall thickness.

SPECIFIC REQUIREMENTS

The jetting system shall have the capacity to dilute at least 2 sections of the hopper simultaneously. Diluting capacity shall be shown in 849-C517-04 JETTING SYSTEM CALCULATION.

The hopper jetting system shall dilute the load in front of the suction inlet of the hopper collection system sufficiently such that material can be hydraulically transported.

SPECIAL FEATURES

Each section of the jetting system shall be fitted with a remotely-controlled valve.

The jetting piping in the hopper shall be run horizontally at the same level with no slope, dips, or low points.

The material of the jetting system piping shall be selected to reduce maintenance of the system.

DELIVERABLES

849-C517-01 JETTING WATER DIAGRAM
849-C517-02 JETTING WATER ARRANGEMENT TO DRAGARM, including heel jet spacing and diameters
849-C517-03 JETTING WATER ARRANGEMENT TO HOPPER
849-C517-04 JETTING SYSTEM CALCULATION
849-C517-05 HOPPER FLUSHING SYSTEM ARRANGEMENT
849-C517-06 HOPPER FLUSHING SYSTEM CALCULATIONS

STANDARDS

See Contract Paragraph C003.

C518 JETTING AND HOPPER FLUSHING PUMPS

GENERAL DESCRIPTION

The jetting pumps and hopper flushing pump shall be set-up in accordance with Contract Paragraph C517.

REQUIREMENTS

Each pump shall have a flowrate and head optimized for the operational conditions described in Contract Paragraphs C002 and C517, and below in this paragraph. The pumps shall be designed to avoid cavitation and at all times operate as close to the best efficiency point as possible. Jetting and hopper flushing pump drives and controls shall be in accordance with Contract Paragraph C519.

The pumps and their drivers shall be installed in a way that leaking does minimal damage to other equipment. Placement and design of the pumps shall allow easy access for maintenance and repair.

Parts of the pumps subjected to wear shall be easily replaceable (e.g. wear plate and pump casing).

The jetting and hopper flushing pumps shall be fitted with turning gear for turning of the impeller.

Pump calculations and curves shall be included in the respective calculation deliverables listed above in Contract Paragraph C517. Calculations shall show that the jetting pumps have sufficient pressure and capacity under the worst-case conditions of Contract Paragraph C002 for:

Eroding the soil when used for jetting during trailing,

Diluting the hopper during unloading.

Calculations shall also show that the hopper flushing pump is of sufficient capacity to maintain the level in the hopper during unloading.

During Phase II, the Contractor shall submit 849-C518-01 JETTING PUMP ASSEMBLY DRAWING and 849-C518-02 HOPPER FLUSHING PUMP ASSEMBLY DRAWING to the COR and ABS for review and approval. The drawings shall contain a full parts list for each pump.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

849-C518-01 JETTING PUMP ASSEMBLY DRAWING
849-C518-02 HOPPER FLUSHING PUMP ASSEMBLY DRAWING

STANDARDS

See Contract Paragraph C003.

C519 JETTING AND HOPPER FLUSHING PUMP DRIVE SYSTEM

GENERAL DESCRIPTION

Each jetting and hopper flushing pump shall be driven by a variable speed electrical motor with a gearbox (if required), and with an appropriately sized flexible coupling.

REQUIREMENTS

The speed and power of each drive shall be properly sized to match the drag head jetting and hopper flushing pumps described in Contract Paragraph C518.

Pump motors and drives shall be provided in accordance with Contract Paragraph C750.

If required, the Contractor shall place a reduction gearbox between each pump and drive. A flexible coupling is to be mounted between the motor and the pump shaft or between the reduction gear and the pump.

The jetting and hopper flushing pump drives shall be capable of controlling speeds to -5% of maximum speed in support of maintenance of the impeller. The motors shall be powered by a variable frequency drive (VFD).

A local operator panel shall be installed for local control, alarm and monitoring. The drives shall be remotely controlled and monitored from the dredge operator console (see Contract Paragraphs C524 and C780).

The Contractor shall develop 849-C519-01 JETTING PUMP DRIVE ARRANGEMENT and 849-C519-02 HOPPER FLUSHING PUMP ARRANGEMENT and submit during Phase II of the Contract to COR for review and approval.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

During maintenance and repair it shall be possible to switch off the drive system in a way that it is safe to work on the pump.

The pump shall be capable of being slowly turned in both directions for replacing the impeller.

DELIVERABLES

849-C519-01 JETTING PUMP DRIVE ARRANGEMENT
849-C519-02 JETTING PUMP DRIVE ASSEMBLY DRAWING
849-C519-03 JETTING PUMP DRIVE GEARBOX ASSEMBLY DRAWING (if applicable)

STANDARDS

See Contract Paragraph C003.

C520 HOPPER COLLECTION SYSTEM

GENERAL DESCRIPTION

A Hopper Collection System shall be installed for emptying the hopper during pumpout operations. The jetting system will be used to dilute the dredge material before self-unloading as described in Contract Paragraph C517. The hopper flushing system will be used to maintain the water level in the hopper during discharge.

REQUIREMENTS

The Hopper Collection System shall allow for dredged material to be hydraulically transported with the dredge pump(s) to the bow connection as described in Contract Paragraph C523.

The hopper collection system shall allow for emptying of the hopper compartments one by one and shall allow for control and monitoring from the dredge operator console.

The hopper collection system shall be sized according to the requirements provided in Contract Paragraph C002.

Seawater shall be supplied to the suction line to allow for a slow start of the pump-out process and to flush the pipeline of dredged material at the end of the process.

Each suction opening for the hopper collection system shall be as close to the hopper floor as practicable.

All valves of the hopper collection system shall be proportionally controlled and monitored from the dredge control desk.

The suction line shall be designed and constructed to withstand the expected hull bending and wear from dredge material in the hopper.

The required wall thickness of the suction line shall be determined by calculations. The required thickness shall be increased with a sufficient wear allowance as described in Contract Paragraph C502. The Contractor shall develop 849-C520-01 HOPPER COLLECTION SYSTEM CALCULATION REPORT and 849-C520-02 HOPPER COLLECTION SYSTEM ARRANGEMENT during Phase II of the Contract and submit to COR for review and approval.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

849-C520-01 HOPPER COLLECTION SYSTEM CALCULATION REPORT
849-C520-02 HOPPER COLLECTION SYSTEM ARRANGEMENT
849-C520-03 ASSEMBLY DRAWING HOPPER COLLECTION SYSTEM, incl. drawings suction line, including parts list;

STANDARDS

See Contract Paragraph C003.

C522 SWELL COMPENSATOR

GENERAL DESCRIPTION

Relative motion between the ship and the draghead on the ground shall be compensated by a swell compensator to maintain a constant pressure of the draghead on the seabed.

REQUIREMENTS

Each drag arm handling system shall be provided with a separate swell compensation system.

The swell compensator shall have a sufficient stroke of approximately 9 feet to allow for the relative motion of the ship compared to the draghead for the operational conditions described in Contract Paragraph C002.

The swell compensator shall be plunger-type hydraulic cylinder. The oil of the hydraulic cylinder shall be kept under constant pressure by a gas buffer with low inertia. The cylinder shall be designed for quick blocking for pulling the draghead when needed.

The swell compensator shall be mounted in a fixed position on a foundation. The top sheave of the swell compensator shall have a radial striped color pattern and shall be visible from the dredge operator console.

The swell compensation system shall be controlled from the dredge operator console, per Contract Paragraph C524.

The Contractor shall develop 849-C522-01 SWELL COMPENSATOR ARRANGEMENT during phase II of the Contract and submit to COR for review and approval.

SPECIFIC REQUIREMENTS

The swell compensator shall be capable of maintaining a constant pressure on the seabed, meaning that the system can be adjusted to a required constant pressure with or without the use of a turtle deflector on the draghead, for different soil types and dredging depths.

SPECIAL FEATURES

None.

DELIVERABLES

849-C522-01 SWELL COMPENSATOR ARRANGEMENT
849-C522-02 SWELL COMPENSATOR CYLINDER ASSEMBLY DRAWING, including parts list
849-C522-03 SWELL COMPENSATOR SHEAVES ASSEMBLY DRAWING, including parts list
849-C522-04 SWELL COMPENSATOR HYDRAULIC DIAGRAM

STANDARDS

See Contract Paragraph C003.

C523 BOW CONNECTION AND WINCH

GENERAL DESCRIPTION

The vessel shall be outfitted with a bow connection for pumping dredged material ashore through an existing pipeline. The bow connection shall allow for quick coupling between the vessel and the existing floating pipeline connection.

REQUIREMENTS

The delivery pipe to the bow connection shall be located above deck.

The bow connection shall consist of:

Ball joint, with hydraulically operated coupling mechanism and hydraulically operated locking device.

Ball joint shall have a free movement of at least 15 degrees from the vertical, in all directions.

Female part of the ball joint shall be mounted on a bow connection gantry.

One or more male parts of the ball joint shall be suitable to be coupled to the floating discharge pipeline. Flange details of the discharge pipeline will be provided by the Government during Phase II of the Contract. The Contractor shall not begin fabrication on the bow connection before flange details have been provided.

Bow connection gantry fixed to the deck fitted with a guiding roller for the hoisting wire of the floating pipeline

Necessary stairs and railings for accessibility.

Coupling shall be accomplished by means of a remote-controlled hydraulically operated hoisting winch. Pull of the winch shall be sufficient for the coupling and floating pipeline operations. (details to be shared during Phase II of the Contract)

The expected pull of the bow connection winch is approximately 17 LT with a stepless controlled hauling speed from 0-32 ft/min. The Contractor shall not begin fabrication on the bow connection before coupling and floating pipeline operation details have been provided.

The bow connection winch shall be in accordance with ASME B30.7.

Placement of the winch control shall allow the operator ample visibility on the connection operation.

The bow connection layout shall be arranged such that the normal operation of mooring equipment shall not be hindered.

The Contractor shall develop 849-C523-01 BOW CONNECTION ARRANGEMENT during Phase II of the Contract and submit to COR for review and approval.

The Contractor shall provide the COR with a "Certificate of Examination and Test of Wire Rope Before Being Taken Into Use" (U.S. Department of Labor - Occupational Safety and Health Administration Form No. 5) for each continuous run of rope installed on the winches. The certification shall be performed to the requirements of 29 CFR, part 1919 and be in accordance with the requirements of 29 CFR 1918. Certifications shall be performed to verify that wire rope meets calculated required breaking strength, and also meets ABS required minimum breaking strength where applicable.

SPECIFIC REQUIREMENTS

The Contractor shall provide sufficient de-aeration and aeration valves in the delivery pipe to prevent under pressure in pipeline and water hammer. De-aeration and aeration valves shall be installed at the highest point in the delivery pipe, just before the bow connection.

The Contractor shall include all necessary handling equipment needed to connect the vessel to the discharge pipeline leading to the discharge area.

SPECIAL FEATURES

None.

DELIVERABLES

849-C523-01 BOW CONNECTION ARRANGEMENT
849-C523-02 BOW CONNECTION ASSEMBLY DRAWING, including part list
849-C523-03 BOW CONNECTION WINCH ASSEMBLY DRAWING, including parts list
849-C523-04 BOW CONNECTION CLAMPING DEVICE ASSEMBLY DRAWING, including parts list

STANDARDS

U.S. Department of Labor – Occupational Safety and Health Administration Form No. 5
ASME B30.7-2016, Winches

C524 DREDGING AUTOMATION SYSTEM

GENERAL DESCRIPTION

The dredging system shall be operated from the dredge control console located on the bridge. The dredging automation system shall be configured to accurately monitor the dredge system, sufficient enough to allow for dredging operations to be controlled by one person.

The dredging automation system shall be capable of controlling the drag heads, pumps, and overflows to achieve the various automation conditions described in Contract Paragraph C002.

The dredging automation system shall be integrated with the IFLS system (see Contract Paragraph 498) and the DP/DT system (see Contract Paragraph C608) to ensure a fully-automated and efficient dredging operation.

REQUIREMENTS

The dredging automation system shall allow for all pumps, valves, hydraulic cylinders, winches and other actuators of the dredge system to be monitored and controlled, either manually or automatically, from the dredge control console on the bridge. The automation system shall contain all functionality to safely operate the dredging system. Monitoring and alarms for all dredging system components shall also be incorporated in the vessels IMACS (see Contract Paragraph C780).

The dredging automation system shall be a SCADA (Supervisory Control and Data Acquisition) system with a touch screen interface and keyboard. The touch screen capabilities are to be used as much as possible. The Contractor shall develop 849-C524-01 SOFTWARE MOCK-UP, 849-C524-02 CONTROL CONSOLES/PANEL LAYOUT and 849-C524-03 DREDGE PLANT INSTRUMENTATION PLAN during Phase II of the Contract and submit to the COR for review and approval.

The dredging automation system shall interface with the communication (see Contract Paragraph C765) and navigation (see Contract Paragraph C770) systems as-required.

The dredging automation system shall have sufficient data points and monitoring capability to fulfill all requirements of the Dredge Quality Management (DQM) program outlined below in Sub-paragraph D.

Monitoring Points

The dredging automation system shall monitor the following items in real-time, at a minimum. The Contractor may add additional monitoring points as necessary. If no points are listed for an item, the system shall monitor all points that are relevant to dredging operations:

- Position of dragarm and draghead; providing both numerical position data and a visual representation of the position of the dragarm and draghead on the touch screen.
- Position of vessel, including trajectory and speed
- Dredge pump: Inlet and discharge pressure, RPM
- Dredge pump drives: on/off, RPM, temperature, Power/load
- Dredge pump flushing system pumps: pressure and flow
- Jetting pump: Inlet and discharge pressure, RPM
- Jetting pump drives; on off, RPM, temperature, Power/load
- Dredge system central hydraulic power units: on/off, power/load
- Dragarm hydraulic power units: on/off, power/load
- Production: Flow and density for each dredge pump
- Hopper level: minimum of 3 hopper level sensors
- Draft of vessel: minimum of 4 pressure sensors
- All dredge valves: position
- Dredge valve flushing system: pump inlet and discharge pressure
- All jetting valves: position
- Draghead: pressure (differential pressure), angle, visor position
- Dragarm winches: wire length, slack wire
- Dragarm gantries: position, drag arm in saddle, limit switch for sliding piece in position
- Swell compensator: measuring system in cylinder rod, position sensor.
- Bottom doors: position sensor and limit switch if doors are closed
- Overflows and anti-turbidity valve systems: position
- Alarm indications: Indication of movement of dragarm trunnion connection, broken seal, bilge alarm in pump room

Control Points

The dredging automation system shall control the following items, at a minimum. The Contractor may add additional control points as necessary. If no points are listed for an item, the system shall monitor all points that are relevant to dredging operations and necessary to achieve the level of automation described in Contract Paragraph C002:

- Position of dragarm and draghead: dredge depth and transit position
- Position of draghead visor: angle
- Dredge pump: RPM
- Dredge pump flushing system pumps: on/off, RPM
- Jetting pump: RPM
- Dredge system central hydraulic power units: on/off
- Dragarm hydraulic power units: on/off
- Overflow: draft
- All dredge valves and their flushing system
- All jetting valves
- Swell compensator: adjust pressure
- Hopper doors
- Poor mixture overboard: set value of S.G.

Reporting

The dredging automation system shall report:

- Relevant data for each trip as defined in Sub-Paragraph C524.C
- Fuel consumption as measured by engine flow meters (see Contract Paragraph C630)

Output

The dredging automation system shall generate output data to:

- Data log computer
- DP/DT System (see Contract Paragraph C608)

Automation

The dredging automation system shall automate:

- Dredge pump speed during trailing; Dredge at the most effective point for flow and density without going over the vacuum limit of pump.
- Dragarm winch control during trailing; maintain the correct draghead angle and keep the dragarm as straight as possible.
- Draft during trailing and anti-turbidity valve; Fill hopper to get highest draft for dredge pump to increase maximum S.G. in spoil. Keep layer of water on top of spoil in hopper to avoid turbidity
- Suction pipe, dredge pump and jet pump sequences for dredge operator; starting at the correct sequence depending on dredging or self-unloading.
- Optimal production; combining sailing time and loading time the optimal production is calculated and will show the best time to stop loading.

Commands/Feedback

The dredge automation system shall provide clear visual feedback of all connected signals and shall allow all basic commands. The dredge automation system shall include control switches to automatically execute the following commands:

- Move suction pipe from overboard position into saddle
- Move suction pipe from saddle to suction inlet
- Opening and Closing of bottom doors
- Lock swell compensator
- Move overflow to highest position
- Valve control

SPECIFIC REQUIREMENTS

In all instances, it shall be possible to manually override the dredge automation system and continue in manual mode or semi-automatic mode.

A safety checklist shall be provided for overriding alarms of the dredging system.

The system shall be capable of being altered and expanded with minimal modifications to the control consoles. This may be accomplished with extra space being provided in system panels, with additional memory space to support system growth, or by other means as applicable.

Dredge Plant Instrumentation Plan

The Contractor shall develop 849-C524-03 DREDGE PLANT INSTRUMENTATION PLAN (DPIP) and provide two (2) hardcopies and an electronic copy in PDF and a editable file format. This document shall describe the sensors used, configuration of the system, how sensor data will be collected, how quality control on the data will be performed, and how sensors/data reporting equipment will be calibrated and repaired if they fail. A description of computed dredge-specific and how the sensor data will be transmitted to the DQM database will also be included.

The DPIP shall include the following as a minimum and include a table of contents in the following order with tabs separating sections (each section listed below shall appear on a new page):

Cover Page
Dredge Name
Date
Photo of plant
Table of Contents
Dredge Contacts
Dredging Company
- Dredge Point of Contact on-site
- Phone Number
- E-mail Address

Dredge Monitoring System Provider
- Dredge Monitoring System Point of Contact
- Telephone Number
- E-mail Address

Table of Dredge Characteristics
Dimensions of dredge
Dimensions of hopper
Method of disposal
Capacity
Minimum and maximum digging depth
Minimum and maximum drafts and displacements
RPM and velocity range
ID of suction and discharge pipes
Sensor Data Collection Method
Any averaging
Route from sensors to DQM computer
Internet connection type and provider
Sensor Descriptions, Locations, and Calibration Methods
Positioning System
- Brand name, model, and accuracy
- Any calculation done external to the instrumentation
- Sensor location with referenced dimensions

Dredge heading instrumentation
- Brand name, model, and accuracy
- Any calculation done external to the instrumentation

Hull Status
- Brand name, model, and accuracy
- Any calculation done external to the instrumentation
- Sensor location with referenced dimensions
- Calibration procedure

Draft
- Brand name, model, and accuracy
- Any calculation done external to the instrumentation

- Sensor location with referenced dimensions
- Calibration procedure

Ullage

- Brand name, model, and accuracy
- Any calculation done external to the instrumentation
- Sensor location with referenced dimensions
- Calibration procedure

Dragarm Depths

- Brand name, model, and accuracy
- Any calculation done external to the instrumentation
- Sensor location with referenced dimensions
- Calibration procedure

Density

- Brand name, model, and accuracy
- Any calculation done external to the instrumentation
- Sensor location with referenced dimensions including pipe diameter
- Calibration procedure

Velocity

- Brand name, model, and accuracy
- Any calculation done external to the instrumentation
- Sensor location with referenced dimensions including pipe diameter
- Calibration procedure

Pump RPM

- Brand name, model, and accuracy
- Any calculation done external to the instrumentation
- Sensor location with referenced dimensions
- Calibration procedure

Pumpout

- Brand name, model, and accuracy
- Any calculation done external to the instrumentation
- Sensor location with referenced dimensions
- Calibration procedure

Calculated Parameters

Displacement

- Method used to calculate displacement
- Tables listing (fresh and salt water) displacement as a function of draft in feet and tenths of feet

Hopper Volume

- Method used to calculate hopper volume
- Table listing the hopper volume as a function of hopper ullage in feet and tenths of feet
- Description of datum for ullage sounding measurements

Drag Head Position

- Method used to calculate drag head position

Load Number

- Method used to increment load number

Quality Control

Description of quality control process

Log of sensor calibrations, repairs, and modifications

Appendices

Hydrostatic Curves

Certified Displacement and Volume Tables

Legible Dimensioned Drawings of the Dredge with units in feet

- A typical plan of the dredge showing:
    - Overall dredge and hopper dimensions

- Locations of required sensors referenced to uniform longitudinal and transverse reference points
- Distance between the draft sensors
- Distance between the ullage sensors
- Dimensions of dragarm

- A profile view of the dredge showing:
  - Overall dredge and hopper dimensions
  - Distance between draft sensors and draft marks
  - Locations of required sensors referenced to uniform vertical and longitudinal reference points
- Typical vessel cross section through hopper

Sensor Manuals and Certificates of Calibration

CCTV System

A high-resolution color CCTV system with pan/tilt and zoom ("PTZ") cameras shall be installed to provide a full overview of the vessel and the dredge operation. Camera's shall be installed in an IP68 Stainless Steel housing with heater inside. Cameras which are not easily accessible shall have wash/wipe functionality.

At a minimum, the following positions shall be covered by the CCTV system:

One (1) at each bridge wing, facing the hopper

One (1) in pump room to view each dredge pump

Two (2) with view on drag heads

One (1) mounted to provide full view over rear of the vessel

One (1) mounted to provide full view over front of the vessel

The dredging CCTV system shall be separate from the CCTV system described in Contract Paragraph C765.

Flow Meters

The flow meters shall be capable of measuring dredge slurry flow rates to the nearest 0.01 ft/sec with an accuracy of ± 0.5 ft/sec, for silt, sand and/or gravel slurry density range of at least 1.0 to 1.8 Specific Gravity at temperature ranges as described in Contract Paragraph C002. The approximate range of flow velocities measured by the device shall be from 0 to 25 ft/sec. The flow meters shall be contained in a flanged spool piece. The liner shall be polyurethane, greater than 1 in thickness and a hardness of 82 on the Shore A (Durometer) scale. The spool piece, including the polyurethane liner, shall have an inside diameter to match the inside diameter of the discharge pipe and shall present no obstruction to the flow of dredged material. Flow meters are to be installed according to Contract Paragraph C512.

Density Meters

The density meters may be combined with the flowmeter or shall be installed in a separate spool piece within the discharge pipeline. The meters shall be capable of accurately measuring dredge slurry density to the nearest 0.001 g/cm3 (1 kg/m3) with an accuracy of ± 0.01 g/cm3 (± 10 kg/m3), for silt, sand and/or gravel slurry density range of at least 1.0 to 1.8 Specific Gravity at temperature ranges as described in Contract Paragraph C002. The density meters shall be Density meters are to be installed according to Contract Paragraph C512. The density meters shall be non-nuclear.

Non-nuclear density meters shall be tested prior to installation by comparing their accuracy to nuclear density meters. Testing shall be included with Level 1 tests.

The Contractor shall include in the dredge pipe arrangement drawing (849-C512-02), a detail showing the elevation and footprint of the production meters, as well as product certification and standards that the meters meet.

Dynamic Positioning/Dynamic Tracking

The dredging automation system shall interface with the IFLS system (see Contract Paragraph C498) and the DP/DT system (see Contract Paragraph C608) such that the vessel speed, dredge pump speed, jetting pump speed, draghead position, and draghead visor settings can be adjusted for a particular track based on the data coming from the IFLS system.

SPECIAL FEATURES

Dredge Quality Management Program

System Requirements

The DQM system shall be capable of collecting, displaying, and transmitting information to the DQM database. The applicable parameters from Contract Paragraph C524.D.10, “Requirements for Reported Data.” shall be recorded as events locally and continually transmitted to the DQM database anytime an Internet connection is available. The Dredge shall be equipped with a DQM computer system, consisting of a computer, monitor, keyboard, mouse, data modem, UPS, and network hub. The computer system shall be a standalone system, exclusive to the DQM monitoring system, and will have USACE DQM software installed on it.

Computer Requirements

The Contractor shall provide a dedicated onboard computer for use by the DQM system. This computer shall run USACE software and receive data from the vessel’s data-reporting interface. This computer shall meet or exceed the following performance specifications:

CPU – Intel or AMD processor with a (non-overclocked) clock speed of at least 1.6 gigahertz (GHz)

Hard Drive – 250 gigabytes (GB); internal

RAM – 4 gigabytes (GB)

Network Card – Internal network card with an RJ-45 connector and dual band wireless

Ports – 1 free serial port with standard 9-pin connectors; 1 free USB port

Other Hardware – Keyboard, mouse, monitor

The Contractor shall install a fully licensed copy of Windows 10 Professional Operating System or later on the computer specified above. The Contractor shall also install any necessary manufacturer-provided drivers for the installed hardware.

This computer shall be located on the Bridge and oriented to allow data entry and data viewing as well as to provide access to data ports for the connection of external hardware.

Software

The DQM computer’s primary function is to transmit data to the DQM shoreside database. No other software which conflicts with this function shall be installed on this computer. The DQM computer will have the USACE-provided Dredging Quality Management Onboard Software (DQMOBS) installed on it by DQM personnel along with USACE-selected software for remote support and management.

UPS

The Contractor shall supply an Uninterruptible Power Supply (UPS) for the computer and networking equipment. The UPS shall provide backup power at 1 kVA for a minimum of ten minutes. The UPS shall interface with the DQM computer to communicate UPS status. The Contractor shall ensure that sufficient power outlets are available to run all specified equipment.

Internet Access

Internet access for the DQM computer will be through a Government-provided AIR Card.

Data Routing Requirements

Onboard sensors shall continually monitor dredge conditions, operations, and efficiency and route this information into the dredge automation) computer to assist in guiding dredge operations. Portions of this information shall be routed to the DQM computer on a real-time basis. Standard sensor data shall be sent to the DQM computer via an RS 232 9600- or 19200-baud serial interface. The serial interface shall be configured as 8 bits, no parity, and no flow control.

Data Reporting Frequency

Data shall be logged as a series of events. Each event will consist of a dataset containing dredge information as per Contract Clause C524.C.2, “Requirements for Reported Data.” Each set of measurements (time, position, etc.) will be considered an event. Any required information in Contract Clause C524.C.2 that is not an averaged variable (draft and ullage) shall be collected within 1 second of the reported time. A data string for an event shall be sent to the DQM computer every 6 to 12 seconds, and this interval shall remain constant throughout the dredging job; data strings shall never be transmitted more frequently than once per every 5 seconds. Any averaged variable must be collected and computed within this sampling interval.

Data Format

Data shall be reported as an eXtensible Markup Language (W3C standard XML 1.0) document as indicated below. Line breaks and spaces are added for readability, but the carriage return, line feed

character combination is added only to delineate records (HOPPER _DREDGING_DATA tag) for actual data transmission.

Example Data Format:

```
<?xml version="1.0"?>
  <HOPPER_DREDGING_DATA version = "2.0">
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     <HOPPER_DATA_RECORD>
       <DATE_TIME>04/11/2002 13:12:05</DATE_TIME>
       <CONTRACT_NUMBER>GDSNWP-11-G-0001</CONTRACT_NUMBER>
       <LOAD_NUMBER>102</LOAD_NUMBER>
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       <PORT_DRAG_Y coord_type = "LL">10.12335</PORT_DRAG_Y >
       <STBD_DRAG_X coord_type = "LL">-80.123339</STBD_DRAG_X >
       <STBD_DRAG_Y coord_type = "LL">10.123347</STBD_DRAG_Y >
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       <VESSEL_COURSE>258</VESSEL_COURSE>
       <VESSEL_SPEED>3.4</VESSEL_SPEED>
       <VESSEL_HEADING>302</VESSEL_HEADING>
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       <ULLAGE_FORE>10.11</ULLAGE_FORE>
       <ULLAGE_AFT>10.22</ULLAGE_AFT>
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       <EMPTY_DISPLACEMENT>2345.0</EMPTY_DISPLACEMENT>
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       <STBD_DENSITY>1.03</STBD_DENSITY>
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       <STBD_VELOCITY>23.3</STBD_VELOCITY>
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       <VALVE_2_STATUS>closed</VALVE_2_STATUS>
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       <VALVE_3_LOCATION>Port Sea Chest</VALVE_3_LOCATION>
       <VALVE_3_STATUS>closed</VALVE_3_STATUS>
       <VALVE_3_LATCHED>false</VALVE_3_LATCHED>
       <VALVE_4_LOCATION>Starboard Sea Chest</VALVE_4_LOCATION>
       <VALVE_4_STATUS>open</VALVE_4_STATUS>
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  </HOPPER_DREDGING_DATA>
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<lf>
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     <HOPPER_DATA_RECORD>
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      <VALVE_2_STATUS>closed</VALVE_2_STATUS>
      <VALVE_2_LATCHED>false</VALVE_2_LATCHED>
      <VALVE_3_LOCATION>Port Sea Chest</VALVE_3_LOCATION>
      <VALVE_3_STATUS>closed</VALVE_3_STATUS>
      <VALVE_3_LATCHED>false</VALVE_3_LATCHED>
      <VALVE_4_LOCATION>Starboard Sea Chest</VALVE_4_LOCATION>
      <VALVE_4_STATUS>open</VALVE_4_STATUS>
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      <PUMP_OUT_ON>false</PUMP_OUT_ON>
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  </HOPPER_DREDGING_DATA>
<cr>
    <lf>
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Data Backup

The Dredge Automation System data log computer shall maintain an archive of all data sent to the DQM computer during a dredging job. The data shall be stored in the XML format which would have been transmitted to the DQM computer. There shall be no line breaks between the parameters; each record string shall be on separate line. The naming convention for the files shall be <dredgename>_<StartYYYYMMddhhmmss>_<EndYYYYMMddhhmmss>.txt.

Requirements for Reported Data

Sensors installed shall be capable of collecting parameters within specified accuracies and resolutions indicated in the following subparagraphs.

Reported sensor values for ullage, draft, and draghead depth should represent a weighted average with the highest and lowest values not included in the calculated average for the given interval. This information should be documented in the DPIP sections that say “Calculations done external to the instrumentation.”

Date and Time

The date and time shall be reported to the nearest second and referenced to UTC time based on a 24-hour format: mm/dd/yyyy hh:mm:ss. The reported time shall be the time reported by the GPS in the NMEA string.

Load Number

A load number shall document the end of a disposal event. Load numbering will begin at number 1 at the start of a dredging job and will be incremented by 1 at the completion of each disposal event or emptying of the hopper. Whenever possible, the load number shall be calculated off of the sensors aboard the dredge and shall be a mathematically repeatable routine. Efforts shall be made to include logic that avoids false load number increments while also not allowing the routine to miss any disposal event. If manual incrementing of the load number is in place, extra attention shall be paid to this value in the quality control process.

Horizontal Positioning

All locations shall be obtained using a positioning system operating with a minimum accuracy level of 1 to 3 meters horizontal Circular Error Probable (CEP). Positions shall be reported as Latitude/Longitude WGS 84 in decimal degrees. West Longitude and South Latitude values are reported as negative.

Vessel Horizontal Positioning

Vessel horizontal positioning shall be recorded as geographic coordinates of the vessel as indicated by the location of the GPS antenna.

Draghead Horizontal Positioning

Draghead horizontal positioning shall be recorded as geographic coordinates of the heel on the centerline of the draghead(s). Any offset calculations from the GPS antenna should be described in the DPIP.

Hull Status

Open/closed status of the hopper doors shall be monitored. An “open” value shall indicate that the hopper doors are open. A “closed” value indicates that the hopper doors are closed.

Dredge Course

Dredge course-over-ground (COG) shall be provided using industry-standard equipment. The Contractor shall provide dredge course-over-ground to the nearest whole degree with values from 000 (true north) to 359 degrees referenced to a clockwise positive direction convention.

Dredge Speed

Dredge speed-over-ground shall be provided in knots using industry-standard equipment with a minimum accuracy of 1 knot and resolution to the nearest 0.1 knot.

Dredge Heading

Dredge heading shall be provided using industry-standard equipment. The dredge heading shall be accurate to within 5 degrees and reported to the nearest whole degree with values from 000 (true north) to 359 degrees referenced to a clockwise positive direction convention.

Tide

Tide data shall be obtained using appropriate equipment to give the water level with an accuracy of ± 0.1 foot and a resolution of 0.01 foot. Tide values above project datum described in the dredging specification shall be entered with a positive sign and those below with a negative sign.

Draft

All reported draft measurements shall be in feet, tenths, and hundredths with an accuracy of ± 0.1 foot relative to observed physical draft readings. The measurements shall be reported at a

resolution of two decimal places (hundredths of a foot). The reported forward draft value shall be equal to the sum of the visual forward port and starboard draft mark readings divided by two. The reported aft draft value shall be equal to the sum of the visual aft port and starboard draft mark readings divided by two. Forward draft, aft draft, and average draft will be reported. Sensors shall be placed at an optimum location on the vessel to be reflective of observed physical draft mark readings at any trim or list. Minimum accuracies are conditional to relatively calm water. The sensor value reported shall be an average of at least ten samples per event, with at least one maximum value and one minimum value removed, and the minimum eight remaining values averaged. When the average draft is calculated for the purpose of determining displacement, significant digits for average draft shall be maintained such that if forward draft was 0.15 and aft draft was 0.1, then the average draft would be 0.125.

Hopper Ullage Sounding

All reported ullage soundings shall be in feet, tenths, and hundredths with an accuracy of ± 0.1 foot, with respect to the combing and be representative of the forward and aft extents of the hopper as close to the centerline as is possible. The measurements shall be reported at a resolution of two decimal places (hundredths of a foot). Forward ullage and aft ullage soundings will be reported. Sensors should be mounted so as to avoid discharge flume turbulence, foam, and any structure that could produce sidelobe errors. If sensors must be offset from the centerline of the hopper, they should be offset to opposite sides of the vessel. If more than one fore or one aft sensor are used, they shall be placed near the corners of the hopper, and the average value of the fore sensors and the average value of the aft sensors shall be reported. The sensor value reported shall be an average of at least ten samples per event, with at least one maximum value and one minimum value removed and the minimum eight remaining values averaged. When the average ullage is calculated for the purpose of determining hopper volume, significant digits for average ullage shall be maintained such that if forward ullage was 0.15 and aft ullage was 0.1, then the average ullage would be 0.125.

Hopper Volume

Hopper volume shall be reported in cubic yards, based on the most accurate method available for the dredge. The minimum standard of accuracy for hopper volume is interpolation from the certified hopper volume table, based on the average fore and aft ullage soundings.

Displacement

Dredge displacement shall be reported in long tons, based on the most accurate method available for the dredge. The minimum standard of accuracy for displacement is interpolation from the displacement table, based on the average draft. The density of water used to calculate displacement shall be the water density of the specific location of the dredge job in kg/cubic meter, and it shall be used for an additional interpolation between the fresh and saltwater tables.

Fresh Water – 1000 kg/m3 (1 g/cm3)

Salt Water – 1027-1030 kg/m3 (1.027-1.03 g/cm3)

Empty Displacement

Empty displacement shall be reported in long tons and shall be the lightship value of the dredge, or the weight of the dredge with no material in the hopper, adjusted for fuel and water consumption.

Draghead Depths

Draghead depths shall be reported with an accuracy of ± 0.5 foot and a resolution to the nearest 0.1 foot as measured from the surface of the water with no tidal adjustments. Minimum accuracies are conditional to relatively calm water. The sensor value reported shall be an average of at least ten samples per event, with at least one maximum value and one minimum value removed and the minimum eight remaining values averaged.

Slurry Densities

A density-metering device, calibrated according to the manufacturer’s specifications, shall be used to record the slurry density of the material being moved to the nearest 0.001 g/cm3 (1

kg/m3) with an accuracy of ± 0.01 g/cm3 (± 10 kg/m3). If the manufacturer does not specify a frequency of recalibration, calibration shall be conducted prior to commencement of work.

Slurry Velocities

A flow-metering device, calibrated according to the manufacturer's specifications, shall be used to record the slurry velocity of the material being moved to the nearest 0.01 fps with an accuracy of ± 0.5 fps. If the manufacturer does not specify a frequency of recalibration, calibration shall be conducted prior to commencement of work. The slurry velocity shall be measured in the same pipeline inside diameter as that used for the slurry density measurement.

Pump RPM

The RPM of any pump being used to move material shall be measured with the highest level of accuracy that is standard on the vessel operational displays, either at the bridge, at the dredge control console, or in the engine room.

Sea Suction Valve for Dragarm

The status of the valve shall change from "closed" to "open" when the valve starts to open and shall register "closed" when the valve is fully closed. The sea suction location shall be reported in a standard non-changing name string of no more than 20 characters. These field values will always occur in the XML string as a set.

Pumpout

When the hopper dredge is being pumped out, a "true" value shall be reported; when it is not, a "false" value shall be reported. The only permissible values are "true" and "false."

DELIVERABLES

849-C524-01 SOFTWARE MOCK-UP
849-C524-02 CONTROL CONSOLES/PANEL LAYOUT
849-C524-03 DREDGE PLANT INSTRUMENTATION PLAN

STANDARDS

IEEE 45-2002 Recommended Practice for Electric Installations on Shipboard

C525 DREDGE GATE VALVE

GENERAL DESCRIPTION

None.

REQUIREMENTS

Dredge line gate valves shall either control the flow by proportionally opening and closing or isolate pipelines by being fully open or closed. Proportionally opening valves do not have to stop 100% of flow.

Gate valves shall be equipped with a flushing connection by the valve manufacturer. The gate valve flushing shall discharge to the hopper. The flushing is essential for proper operation of the valve body and shall only be done when valve is fully open or fully closed. Flushing for the valves may be provided by the raw water system (see Contract Paragraph C640) or by the dredge pump flushing system (see Contract Paragraph C505).

The gate valves shall be fitted with hydraulic actuators.

An emergency closing device shall be provided for the valves located in the suction line at the penetration in the shell according to the requirements of in the Guidelines for the Assignment of Reduced Freeboards for Dredgers, DR-68 rev. 1.

All gate valves shall be remote controlled from dredge control desk as described in Contract Paragraph C524. Local control shall be possible in case of failure or maintenance. A continuous position indicator shall be provided for all gate valves in the self-emptying suction line and at the suction inlet shell valve. The other valves shall be fitted with an open/closed position indicator provided locally. Positions indicators of all gate valves shall be shown at the dredge control desk as described in Contract Paragraph C524.

Gate valves shall be included in the dredge pipe arrangement and dredge pipe diagram as described in Contract Paragraph C502.

SPECIFIC REQUIREMENTS

All wear parts shall be easily replaceable.

Gate valves shall be of a robust and maintenance free design.

SPECIAL FEATURES

None.

DELIVERABLES

849-C525-XX Assembly drawing of each type of gate valve, including part list

STANDARDS

See Contract Paragraph C003.

C526 POOR MIXTURE OVERBOARD

GENERAL DESCRIPTION

All mixture of insufficient dredged material concentration (poor mixture) shall have the option to be directed overboard through the hull until the dredged material concentration is suitable to be loaded into the hopper.

REQUIREMENTS

The poor mixture shall be directed overboard via an overboard connection downstream of the density meter. The valve serving the poor mixture overboard connection shall be capable of manual operation or automatic operation by setting a poor mixture density as-described in Contract Paragraph C524.

The Contractor shall develop 849-C526-01 POOR MIXTURE OVERBOARD ARRANGEMENT Phase II of the Contract and submit to COR for review and approval.

SPECIFIC REQUIREMENTS

Poor mixture dredged material shall be directed overboard beneath the waterline through the ships bottom to prevent turbidity.

SPECIAL FEATURES

Water hammer shall be prevented.

DELIVERABLES

849-C526-01 POOR MIXTURE OVERBOARD ARRANGEMENT

STANDARDS

See Contract Paragraph C003.

C600 MACHINERY SYSTEMS

C601 GENERAL REQUIREMENTS FOR PIPING SYSTEMS & MACHINERY

GENERAL DESCRIPTION

All machinery and piping systems shall be in accordance with the regulatory bodies referenced in Contract Paragraphs C003 and C004, and shall also comply with additional regulatory bodies and standards where specified. Specific requirements concerning the dredge systems are included in the C500-series Contract Paragraphs. References made to specific sections of codes, rules and standards in these specifications are intended to emphasize specific salient items.

REQUIREMENTS

All equipment shall be suitable for sea-going marine duty service. Piping, fittings and valves shall be provided and installed in accordance with the regulatory bodies, ASTM F708-92, ASTM F722-18 and ASTM F1155-10. All pipelines shall have a minimum wall thickness according to the requirements of the ABS and USCG.

Unless otherwise specified, all pumps shall be rated for 122-degrees F, provided with mechanical seals, and shall be direct coupled to the drive. V-belt drives are not acceptable. Flex joints shall be provided at suction and discharge connections of each fixed and hard-piped pump. All pumps connected to an electric motor of 5 HP and greater shall be fitted with resilient mounts. Means for lifting (for maintenance or replacement) to be provided to pumps and electric motors with parts weighing more than 55 lb.

All centrifugal pumps shall be long couple, horizontal type and, as much as possible, horizontal split case type. The required NPSH for the selected pumps shall be checked against the available NPSH for each service and reported in the calculations as requested in the specific system Contract Paragraphs.

Machinery guards shall be provided over all rotating and hazardous machinery. The guarding shall be consistent with that required by the U.S. Army Corps of Engineers, EM 385-1-1 “Safety and Health Requirements Manual.”

Manufacturer’s recommendations, concerning fabrication and installation of equipment, shall be followed in addition to these specifications. The Contractor shall provide sufficient accessibility for and space around equipment and piping for monitoring, maintenance, removal and reassembly in accordance with ASTM F1166-07 and the manufacturer’s specified maintenance envelopes.

SPECIFIC REQUIREMENTS

Pressure & Temperature Gauges

All pressure gauges shall give readings in psig and all temperature gauges shall give readings in degrees Fahrenheit. The gauges shall be selected so the operating point is in the middle of the gauge range. All gauges shall be fitted with gauge isolation valves.

Pressure gauges shall be provided on the discharge of all pumps, and pressure/ vacuum gauges shall be provided on the suction side on all positive displacement pumps and the bilge pumps.

Temperature gauges shall be provided on all piping that transfers a medium in excess of ambient temperature and as identified in other Paragraphs of this Specification.

Piping – General Requirements

The use of the designation “line” in this specification is defined as all pipe, fittings, and valves in a piping system run between the points indicated.

All piping shall be sized and arranged to obtain optimum operating conditions for the equipment and intended service. Velocities in pipelines in general shall be in accordance with the requirements indicated by the ABS Rules. Items of piping not covered in these specifications but required for proper installation and operation shall be furnished and installed the same as if specified.

System design shall route all piping as directly as practicable (avoiding pockets as far as possible); shall not interfere with machinery access or handling gear; and shall be sufficiently flexible and supported to account for thermal expansion, shock, vibration and the working of the vessel. Piping subject to mechanical damage shall be adequately protected. Where pipes penetrate structure reinforcement of the opening may be required, for details see Contract Paragraph C300. Wherever

practicable, piping shall be run below the grating or sole level. No piping runs shall be made through access openings or across.

A sufficient number of take-down joints shall be installed in all pipe lines (for applicable systems as identified in Part 3 of this Contract Paragraph) to permit dismantling of the lines and equipment, and rigging that equipment out of the space for repair or replacement. The use of treaded unions shall be avoided as much as possible. Valves shall be installed in sufficient quantity to isolate any piece of equipment in the systems. All flange diameters and drillings shall be in accordance with ASME and ANSI standards.

Sufficient drains shall be provided to permit draining of all lines within the vessel in an even trim condition. The drains shall be provided at low spots (and pockets if applicable) in the piping, located so that they shall be readily accessible. Deaeration points to be provided on spots in systems where air can get trapped (for instance by filling of the medium).

Pipes passing through decks, watertight or oil tight bulkheads, shall have penetrations made which maintain the integrity of the bulkhead or deck and meet the applicable requirements of the regulatory bodies. Where pipes pass through watertight bulkheads or decks, the penetrations shall be watertight. Where pipes penetrate bulkheads, decks or tank-tops which are required to be fire tight or smoke tight, the penetrations are to be made by approved methods which will maintain the same degree of fire tight or smoke tight integrity.

Heat sensitive materials shall not be used in piping systems that penetrate watertight subdivisions where deterioration of such systems would, in the event of a fire, impair the watertight integrity of such bulkheads. Copper tubing that penetrates watertight bulkheads and decks shall use a suitable stuffing tube. Spool pieces with flanges shall be provided for all galvanized pipe penetrations to prevent the destruction of galvanizing due to welding.

All piping exposed in unheated spaces or to the weather and carrying fluids that can freeze shall be electrically heat traced, except that the fire main piping may be designed to be a dry system when not pressurized. Freeze protection shall be provided by installing drain plugs at all low points in all piping systems carrying fluids that can freeze.

Piping – Specific Requirements

All piping shall be Sch 40, ASTM A-53, Type S or E except where otherwise indicated or required by ABS and/or USCG.

Piping shall be sized and arranged to obtain optimum operating conditions for the equipment and intended service. Items of piping not covered in these specifications but required for proper installation and operation shall be furnished and installed the same as if specified.

All piping between the side shell and the first inboard valve shall have a minimum wall thickness as stated by the regulatory bodies. All tank penetrations shall be through Sch 80 welded sleeve unless specified elsewhere.

No cast iron valves or wafer type valves shall be used at shell connections i.e. as the first inboard valve.

All steering system hydraulic lines and fuel oil lines shall be welded or have flanged connections (flange type to be accepted by the ABS Rules). Threaded connections on these systems are prohibited. Spray shields are to be fitted around flanged joints located near or above machinery air intakes, high temperature units or other sources of ignition.

When three or more valves are located together for the same service, they shall be combined in a manifold. Manifold plans, including the general system layout/ schematic, and manifold/ valve alignment instructions shall be provided at each manifold. Refer to the specific system Contract Paragraphs contained in this Contract for further details.

Manually operated valves shall be readily operable by one person, directly or through mechanical advantage type operators.

All overboard discharge valves shall have “lock-out” ability.

Remotely operated valves shall also be operable locally. All valves must be outside stem and yoke (OS&Y) and rising stem type or fitted with open/ close indicators. They shall be clockwise closing.

Check valves shall be of a type best suited for the service condition, especially the flow velocity to ensure that the valve will fully open. A check valve shall be installed where a reversal of flow is possible and would be detrimental to the proper functioning of the system, or might be injurious to equipment.

Gate valves are intended to be fully open or fully closed and shall not be used for throttling the flow, except for gate valves installed in the dredge pipe system, see Contract Paragraph C525.
All lines leading to the overboard discharges shall be angled downward sloping toward the water line, the pipe part connected to the hull to have a sloped angle of 60-70-degrees or better.
At the written request of the Contractor, the Government will consider the use of grooved mechanical pipe joining systems and valves for the potable water system, drainage system, raw water system, bilge and ballast systems, fire main system and cooling systems. The system must be ABS and USCG approved and specific system drawings updated to reflect the pipe joining system components, and resubmitted to ABS for review and approval. The COR has final approval authority on the use and implementation of grooved mechanical pipe joining systems. When grooved mechanical pipe couplings are used on roll grooved, the grooving tool shall be of the same manufacturer as the pipe couplings, and a spare grooving tool provided with the vessel.
At the written request of the Contractor, the Government will consider the use of mechanical press pipe joining systems for the potable water system. The system must be ABS approved and specific system drawings updated to reflect the pipe joining system components, and resubmitted to ABS for review and approval. The COR has final approval authority on the use and implementation of mechanical press pipe joining systems. When mechanical press pipe couplings are used, the press tool shall be of the same manufacturer, and a spare press tool with the appropriate size clamps provided with the vessel.

Pipe Routing Instructions

Piping shall not be run over or in the vicinity of switchboards, distribution panels, or other electrical equipment unless unavoidable, in which case flanged joints, valves, etc. shall not be installed in the vicinity. If unavoidable, all fittings in the vicinity shall be welded in accordance with ASTM F722-18 and drip trays or shields shall be provided over the equipment.
Piping conveying flammable materials shall not be routed adjacent to or over hot surfaces unless unavoidable, in which case adequate shields shall be provided.

Pipe Hangers

Rigid hangers shall be designed and located in accordance with ASTM Practices for the Design and Installation of Rigid Pipe Hangers, F708-92. The hangers shall safely support the weight of the piping, its operating or test fluid (whichever is heavier), and its insulation and lagging (where installed).
The number of supports installed, the type selected and their location shall prevent excessive vibration of piping under all system operating conditions, but they shall not constrain the piping to such an extent as to cause excessive transfer of load from support to piping or from support to support. Where necessary to meet the noise and vibration requirements of Contract Paragraph C180, the Contractor shall employ flexible mounting of ventilation and service lines.
The locations and type of supports selected shall be to prevent excessive stress from being transmitted by the piping to machinery, equipment, or ship structure.
Hangers for copper pipe or tubing shall be lined with plastic. Non-ferrous metal pipes shall be insulated from direct contact with any steel structure.

Pipe Testing and Cleaning

All piping, piping appurtenances and applicable equipment shall be tested according to the requirements of ABS or if not specified by ABS at 1.5 times the working pressure of the system, after fabrication and prior to installation in the vessel.
All piping, piping appurtenances and applicable equipment shall be thoroughly cleaned after fabrication and prior to installation in the vessel in accordance with MIL-STD-00419. After complete installation, each system shall be thoroughly cleaned and flushed of all foreign matter with the applicable system's medium, or an approved substitute.
System flushing shall be conducted at the applicable system's maximum operating pressure and temperature, and above normal line velocity. However, prior to flushing operations, such units as heat exchangers, and control valves, having in-line mechanisms capable of trapping or being affected by the carryover of foreign matter, shall either be removed or blanked-off and bypassed.

Pipe Marking

The Contractor shall mark all piping in the vessel to indicate its service and usage in accordance with Contract Drawing 849-B601-01 PIPE MARKING GUIDE. The pipes shall be marked at each

termination and at each watertight bulkhead penetration to indicate service and flow direction. Piping shall also be marked at the midpoint of long compartment runs.
Standard markers, color bands and flow arrows, may be used.
The size of the legend letters and the length of the marker color field shall be as follows:

OUTSIDE DIAMETER OF PIPE OR COVERING IN INCHES	MINIMUM LENGTH OF COLOR FIELD IN INCHES	SIZE OF LEGEND LETTERS IN INCHES
¾ to 1¼	8	½
1½ to 2	8	¾
2½ to 6	12	1¼
8 to 10	24	2½
over 10	32	3½

For identification of materials in pipes of less than ¾-inch in diameter, and for valve and fitting identification, the use of a permanently legible tag is required. This tag shall be 14-gauge (or heavier) brass with ¼-inch high engraved letters filled with black paint.
When the piping layout creates or occurs in a limited area of inaccessibility or of extreme complexity, such segments of layouts may require substitute techniques to achieve positive identification. Use of substitute techniques shall be limited to such segments and shall not deviate from the concept of identification described above.
Attention shall be given to visibility with reference to pipe markings. Where pipelines are located above or below the normal line of vision, the lettering shall be placed below or above the horizontal centerline of the pipe.
Label plates shall be attached to all valves, manifolds, and pumps to indicate the system and function of the equipment.
For valves, the label plates shall be installed over the stem of the hand wheel, where possible, and shall indicate the direction of opening (or closing). The nameplate shall be 14-gauge (or heavier) brass with ¼-inch high engraved letters filled with black paint.
A laminated pipe color legend shall be installed in all technical spaces (including the engine room and pump room).

Operational Fluids

The following operational fluid tanks shall be filled to 95% capacity at the time of final acceptance:

Lube Oil
Hydraulic Oil
Gear Oil
Potable Water

See Contract Paragraph C630 for details on fuel oil at final acceptance.
Storage tanks shall not be filled until the inclining and deadweight survey is complete and accepted by the COR.

The Contractor shall develop 849-C601-01 PIPE MARKING GUIDE (in line with the Government-provided pipe marking Contact Drawing) and 849-C601-02 PIPING SPECIFICATION and submit them to the COR and ABS as applicable during Phase II of the Contract for review and approval.

SPECIAL FEATURES

None.

DELIVERABLES

849-C601-01 PIPE MARKING GUIDE
849-C601-02 PIPING SPECIFICATION

STANDARDS

USACE EM 385-1-1, Safety and Health Requirements Manual
ASTM A53-20, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM F708-92, Standard Practice for Design and Installation of Rigid Pipe Hangers

ASTM F722-18, Standard Specification for Welded Joints for Shipboard Piping Systems
ASTM F1155-10, Standard Practice for Selection and Application of Piping System Materials
ASTM F1166-07, Standard Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities
ASME/ANSI B16, Standards for Pipes and Fittings
ASME/ANSI B36.10/19, Carbon, Alloy, and Stainless Steel Pipes – Dimensions
MIL-STD-00419, Cleaning, Protecting, and Testing Piping, Tubing, and Fittings for Hydraulic Power Transmission Equipment
Contract Drawing 849-B601-01 PIPE MARKING GUIDE

C602 DIESEL ELECTRIC SYSTEM GENERATORS

GENERAL DESCRIPTION

The Contractor shall provide and install marine diesel generators a single engine manufacturer and where possible same type and model are to be used.

REQUIREMENTS

Engines shall meet the most current US EPA (Tier 4) exhaust emission standards.

Each engine shall be provided with the manufacturer's standard equipment as well as the following features and options:

Equipped with full authority electronic computer-controlled fuel injection systems.
Type approved by ABS.
EPA Emission Tier 4 Certified. See below for aftertreatment requirements (if required).
Mounted on resilient vibration isolators with limit stops.
Dry Exhaust.
Lined, stainless steel, multiple exhaust flexes on engine exhaust output flanges.
Torsional output coupling with flange.
Closed crankcase vent system. The system shall be supplied with a manometer and the drain line shall be returned directly to the engine oil sump, below the oil level.
Each engine turbocharger and exhaust manifold shall be insulated or jacketed to maintain an outer skin temperature of less than 125-degrees F.
Automatic safety shutdown in accordance with ABS Rules.
Engine mounted fuel oil pumps.
Fuel oil duplex filters.
Lube oil filters.
Engine or electric driven main lubrication pumps.
Cooling water system as described in Contract Paragraph C640, including electric jacket water heater(s).
Electric pre-lube oil pumps, including pre-heating system if required.
The cooling water, lube and fuel lines to all engine connections shall be fitted with USCG and ABS approved flexible connections.
Each main engine oil sump shall be fitted with a valve and a, preferably hard-piped connection so that oil can be drawn from the sumps.
Provided with a full-length drip pan or a recess in the structure of the vessel, under the engine (see Contract Paragraph C330).
Electric turning gear, if applicable.
Control and monitoring system in accordance with Contract Paragraph C780.
Each engine shall be supplied with lifting eyes (as further described in Contract Paragraph C290) and mounting support. The Contractor is responsible for supplying suitable foundations for the engines (see Contract Paragraph C330).
The fuel rate of the main engines shall be compared to the original factory performance specifications during the vessel's test and trials. This comparison shall be made for the entire operating range of the engines by a representative of the engine manufacturer using instrumentation to acquire real-time fuel rate and engine output.

Four (4) printed sets of operating, maintenance, and parts manuals and four (4) electronic (DVD/ CD) sets shall be supplied for the engines. See Contract Section H, Paragraph H16.
Two (2) industrial-rated laptops installed with manufacturer's software plus any required adapters and cables. Intent of laptop shall be to minimize need for local presence of manufacturer technician in case of engine issues.
Spare parts in accordance with Contract Paragraph C800.

SPECIFIC REQUIREMENTS

Generator Starting/Stopping

Each generator engine shall be provided with an air starting system. All components of the starting system shall be ABS approved.
Emergency engine shutdowns shall be supplied in accordance with ABS Rules. Normal operation shall be resumed only after manual reset of the emergency shutdowns. No automatic restarting is allowed after activation of the emergency shutdowns. All emergency shutdown buttons shall be provided with guards to prevent accidental activation.

Engine Instrumentation & Alarms

The vessel shall be assigned the ABS Maltese Cross Automatic Centralized Control Unmanned (ACCU) notation. The engine instrumentation and alarm system shall satisfy the requirements of the ACCU notation. The remote control and monitoring system shall be assembled, tested, and installed under ABS survey.
The Contractor shall supply and install the standard, local instrumentation panels, including controls, alarms, and monitoring, supplied by the engine manufacturer. The engine local instrumentation panels shall be mounted close to or on the engines.
Diesel engines instrumentation and alarms shall be connected to the vessels Integrated Monitoring, Alarm, and Control System (see Contract Paragraph C780).

Exhaust Aftertreatment

If required to meet emission standards, the Contractor shall provide and install an aftertreatment exhaust system, appropriately sized for the engines, and supplied by the engine manufacturer. The system shall be engine mounted or located in the funnel. All maintenance items, including catalyst filters/ cabinets, shall be easily accessible and maintained.
The Contractor shall provide one or more diesel exhaust fluid (DEF) storage tank(s) with a volume as prescribed by the engine manufacturer (approximately 10% of the fuel storage capacity). The tank(s) shall have all of the features and components required for a fuel oil storage tank, including a remote reading electronic tank level. See Specification Section C130 and C630.
All pumps, piping, filters, fittings and equipment to transfer DEF from the storage tank(s) to the aftertreatment unit shall be provided and installed. Materials used in the system (including the storage tanks) to be compatible with the DEF. The pump(s) shall be setup for automatic and manual operation. Manual controls shall be at the pump. Automatic operation shall be based on tank level and engine operating status.
The exhaust after treatment shall be fully functional, installed in accordance with the engine manufacturer's requirements, and calibrated and certified for use by the engine manufacturer.
See Contract Paragraph C650 for additional engine exhaust requirements and deliverables.

Requirements for generators in diesel generator sets are described in Contract Paragraph C733.

SPECIAL FEATURES

None.

DELIVERABLES

849-C602-XX Diagrams of all integrated engine systems, with numbered/ sized connections for integration with the ships system.

STANDARDS

IMO International Convention for the Prevention of Pollution from Ships (MARPOL) 73/ 78 Annex VI

40 CFR, Part 1045, Control of Emissions from Spark-Ignition Propulsion Marine Engines and Vessels
46 CFR, Part 58, Main and Auxiliary Machinery and Related Systems

C604 REDUCTION GEAR SYSTEMS

GENERAL DESCRIPTION

Gears shall be designed and provided in accordance with the requirements of ABS MVR, 46 CFR Subchapter I, and these Specifications.

REQUIREMENTS

For reduction gearing on dredge pumps and other machinery on board the vessel the design of gear trains shall be such that loose parts and/or parts that can come loose inside the gearbox are avoided as much as possible. Gearboxes shall have a rigid, oil and dust tight housing. Gears shall be approved by ABS.

Each reduction gear shall be supplied with lifting pads as further described in Contract Paragraph C290.

Each gearbox shall be installed in strict compliance with the manufacturer's recommendations.

The Contractor is responsible for supplying suitable foundations for the reduction gears, in accordance with Contract Paragraph C330. Reduction gears shall be set in place, aligned with the drive and load, and secured to the foundations by the Contractor in accordance with the guidelines of the manufacturer and ABS. Installation of the reduction gears shall be approved by the COR.

SPECIFIC REQUIREMENTS

Azimuthing Thruster Gears

Each thruster shall be fitted with its own lubrication oil system, with at least two lubricating oil pumps (of which at least one is to be independently driven). The lube oil system shall be designed to ensure proper operations under conditions and inclination angles of the vessel as stated in the ABS Rules.

The thruster gears shall be designed for "infinite service life."

Lubrication Oil Gearboxes

Audible and visual alarms are to be fitted to warn in case of a failure in the lube oil system of the thrusters. The motor drive powering to the thruster gearbox shall be fitted with an automatic stop, upon a failure in the reduction gear lube oil system. Lube oil coolers shall be connected to the auxiliary cooling water system, see Contract Paragraph C640.

The oil used in the reduction gearboxes shall be Environmentally Acceptable (EA) in accordance with the EPA Environmentally Acceptable Lubricants (EPA 800-R-11-002, November 2011).

SPECIAL FEATURES

DELIVERABLES

None.

STANDARDS

EPA 800-R-11-002, Environmentally Acceptable Lubricants

C605 PROPULSION DRIVE SYSTEM

GENERAL DESCRIPTION

The propulsion system shall be twin or triple screw afloat-removable Azimuthing Thrusters. Z or L Drive thruster configuration may be provided. .

The propulsion drive system consists of all components necessary to propel the vessel (from power source to propellers). The Contractor shall provide and install a drive system which matches the design of the vessel and its operational characteristics as provided in Contract Paragraph C002.

REQUIREMENTS

The propulsion drive system shall be designed such that the propeller & nozzle can provide full propulsion motor power over the vessel through-the-water speed range from 8 knots to max transit speed (12 knots), with a fixed pitch propeller. The motor rated power rpm range, gearing, shafting, and propeller design shall be coordinated together such that full motor power is provided over the propeller rpm range required to absorb full motor power over the vessel speed range from 8 knots to max transit speed (12 knots).

The drive system shall be ABS approved and sized for the vessel performance requirements. The drive system shall be designed to propel the vessel forward and backwards and assure sufficient maneuverability and steering capabilities of the vessel in busy waterways.

All components in the drive system shall be designed for long life and operation in sea conditions.

The drive system selected shall be installed so that no part of the propeller or nozzle extends below the vessel baseline.

The drive system and all associated equipment shall be installed in strict compliance with the equipment manufacturer's recommendations and the installation shall be approved by the manufacturer's field representative for each respective piece of equipment.

Each propulsion drive shall be capable of independent operation.

Alignment of the propulsion system shall be in accordance with Contract Paragraph C610.

Four (4) printed sets of operating, maintenance and parts manuals shall be supplied for the equipment installed in the drive system and two electronic sets (DVD/CD) of manuals and drawings for the equipment installed in the drive system shall be supplied, see Contract Section H, Paragraph H16. Four (4) printed sets of operating, maintenance and parts manuals shall be supplied for the equipment installed in the drive system and four (4) electronic sets (DVD/CD) of manuals and drawings for the equipment installed in the drive system shall be supplied, see Contract Section H, Paragraph H16.

SPECIFIC REQUIREMENTS

Drive Line and Couplings

The Contractor shall provide and install the complete propulsion drive line (including all required couplings/ bearings and seals) in close cooperation with the manufacturers of all equipment. All sizing calculations and the drive line arrangement shall be submitted to the COR and ABS for review and approval. During Phase II, the Contractor shall develop drawing 849-C605-01 PROPULSION DRIVE SYSTEM ARRANGEMENT & INSTALLATION DETAILS, including the final arrangement details, shaft size calculations and bill of materials, and submit to the COR and ABS for review and approval.

Vibration Analysis

A complete torsional vibrations, axial vibrations, and whirling vibrations analysis, as described in ABS 4.3.2 – 7.6, 7.7 and 7.9, shall be performed on the propulsion drive train, and the results shall be submitted to the COR and ABS for review and approval during Phase II.

The analyses shall include calculations of the natural frequencies, location of all critical speeds within the entire speed range of the power source, and an estimate of the maximum vibration stresses encountered within this range.

All terms and formulas used in the development of this analyses shall be explicitly indicated.

The analyses shall be numbered 849-C605-02 TORSIONAL VIBRATION ANALYSIS, 849-C605-03 AXIAL VIBRATION ANALYSIS, 849-C605-04 WHIRLING VIBRATION ANALYSIS.

The analyses shall show that each drive system is free of objectional critical speeds ("barred ranges") due to axial, torsional, and whirling vibration over the complete range of operation from 10% below idling speed to 10% above the maximum power source's speed rating.

Drive Instrumentation & Alarms

The Contractor shall supply and install the standard local and remote-controlled instrumentation panels, including controls, alarms and monitoring, provided by the drive system equipment manufacturer(s):

- One local instrumentation panel for each drive system shall be mounted on or near the propulsion drive equipment.

- One remote-controlled instrumentation panel for each drive system shall be installed in the engineer's control room
- One remote-controlled instrumentation panel for each drive system shall be installed on the bridge console.
- Drive-line instrumentation and alarms shall be connected to the vessels Integrated Monitoring, Alarm, and Control System (see Contract Paragraph C780).

The instrumentation panels shall be equipped with audible and visual alarms including the alarms in accordance with the ABS rules.

Hydraulic & Gear Oil

The gear oil and hydraulic oil used in the equipment of the drive system shall be Environmentally Acceptable (EA) in accordance with the EPA Environmentally Acceptable Lubricants (EPA 800-R-11-002, November 2011), unless deemed technically unfeasible by the manufacturer.

SPECIAL FEATURES

None.

DELIVERABLES

849-C605-01 PROPULSION DRIVE SYSTEM ARRANGEMENT & INSTALLATION DETAILS
849-C605-02 TORSIONAL VIBRATION ANALYSIS
849-C605-03 AXIAL VIBRATION ANALYSIS,
849-C605-04 WHIRLING VIBRATION ANALYSIS
849-C605-XX Electrical and mechanical diagrams of all integrated drive systems

STANDARDS

EPA 800-R-11-002, Environmentally Acceptable Lubricants

C606 PROPELLER & NOZZLES

GENERAL DESCRIPTION

The Contractor shall provide and install propellers and nozzles in accordance with Contract Paragraphs C605B, C120, C121 and operational characteristics as described in C002. Propellers shall be fixed blade mono-block construction.

REQUIREMENTS

The Contractor shall prepare propeller calculations 849-C606-01 PROPELLER CALCULATIONS to finalize the selection of the propellers. The calculations shall utilize the propulsion power (and gear ratio) selected by the Contractor.

The calculations shall verify the Constant Power Speed Range requirement in section C605B.

The calculations shall be submitted to the COR for review prior to purchase of the propeller(s) and nozzles by the Contractor.

SPECIFIC REQUIREMENTS

Propeller

The propellers and nozzles shall be:

- Wake adapted design, optimized for the hull form, operational characteristics, and thruster design, as described in Contract Paragraph C121.
- Double-sided, anti-singing propeller blade trailing edges.
- Stainless Steel Propeller construction.
- Designed for less than 10% back cavitation.
- Skewed blade shape to minimize vibration.

The Contractor shall develop drawing 849-C606-02 PROPELLERS & NOZZLES for submittal to the COR and ABS during Phase II of the Contract.

The Contractor shall provide an ABS Statement of Fact that each propeller meets all ISO R484, Class I fabrication, finish, and balance requirements. ABS certificates shall be provided to the COR for each propeller, including the spare propeller(s) (if option is awarded).

Nozzles

The nozzle design shall be optimized for the vessel function over the range of vessel dredging and transit speeds. See Paragraph C121.

Nozzle shape shall include airfoil external shape to minimize nozzle drag,

Nozzle inner surface shall be of Stainless Steel, including the leading edge out to the nozzle external surface.

The Nozzle supporting system struts shall be designed to align with propeller inflow characteristics, and shall also be arranged to avoid matching the propeller blade angle, as determined by the number of propeller blades.

The Contractor shall develop drawing 849-C606-03 NOZZLES for submittal to the COR and ABS during Phase II of the Contract.

SPECIAL FEATURES

None.

DELIVERABLES

849-C606-01 PROPELLER CALCULATIONS
849-C606-02 PROPELLERS
849-C606-03 NOZZLES
849-C606-04 NOZZLE TO Z-DRIVE SUPPORT STRUTS AND MOUNTING ATTACHMENT

STANDARDS

ISO 484, Shipbuilding – Ship Screw Propellers – Manufacturing Tolerances

C608 PROPULSION CONTROLS

GENERAL DESCRIPTION

The Contractor shall provide and install a complete propulsion control system which is capable of utilizing the full potential of the propulsion and auxiliary propulsion (e.g. bow thruster) systems. The installed control system shall meet the recommendations and practices of the engines and drives equipment manufacturers as well ABS and USCG.

REQUIREMENTS

The control system shall be set up for full electronic control with fully electronic throttle and shift. No mechanical actuators may be provided as part of the control system. Controls shall be provided locally at the propulsion drive equipment, for maintenance and troubleshooting and in the event of an emergency.

Remote control levers and propulsion control panels for normal operation shall be provided in the following locations:

- The Bridge Control Console (BCC)
- The Port Bridge Wing Console (PBWC)
- The Starboard Bridge Wing Console (SBWC)
- The Engineer's Control Room (ECR)

The main station for the control heads shall be the engineer's control room. The system shall be capable of granting/ transferring control from this station to the Bridge control heads. The system shall allow for control of the propulsion system to be taken away from the Bridge to the engineer's control room at any time. The propulsion Control System shall have an interface with the IMACS as described in Contract Paragraph C780.

The Contractor shall provide and install an autopilot system in the BCC (see Contract Paragraph C770). The autopilot shall be capable of maneuvering the vessel to the required position at speeds from 0.5 knots to maximum. The autopilot shall be connected to the navigation system for automatic navigation and course keeping. Seamless interfacing with the ECDIS/ route planning station shall be included. Visual and audible alarms, for excessive deviation from the set course, shall be provided on the BCC steering stand.

The Contractor shall provide and install a dynamic positioning and dynamic tracking control and monitoring system (DP/DT System) compliant with ABS DPS-1. The ABS DPS-1 system shall be designed to maintain vessel's position and heading under the environmental conditions as specified in Contract Paragraph C002. The DP/DT system shall meet al requirements of ABS DPS-1 but shall not be class certified.

The DP/DT system shall include two, 3-axis joystick operated, operator stations. The system shall allow the following vessel control functions:

a. Manual joystick mode with manual or auto heading

Auto Position Mode with auto heading: accurate maintenance or change of position and heading at vessel speed close to zero.

Auto Track (dredging), with waypoint interface

Auto Track (transit) with waypoint interface

Auto Pilot mode

Typical dredging related functions as-described below. For dredging, the system shall be integrated with both the IFLS (see Contract Paragraph C498) and the dredging automation system (see Contract Paragraph C524):

Auto-Track Dredging: speed and heading control during trailing according operator-adjustable set points.

Dynamic-Track Dredging: speed and heading control during trailing, automatically sailing tracks while dredging for bringing an area or trench to specified depth.

Dynamic-Track Dumping: track control at low speed, maintains ground speed and heading while dumping though bottom doors, sailing over a track.

The first DP/DT operator station shall be located at the BCC, the second shall be located at Dredge Operator's Console.

The DP/DT system shall be able to control the main thrusters/propellers and rudders, bow thruster(s).

Independent backup control and emergency telegraph shall be provided according to the requirements stated by the regulatory bodies.

During Phase II, the Contractor shall develop and submit drawing 849-C608-01 PROPULSION CONTROL SYSTEM SCHEMATIC to the COR and ABS for review and approval.

During Phase II, the Contractor shall develop and submit drawing 849-C608-02 DP/DT CAPABILITY ANALYSIS REPORT to the COR for review and approval.

SPECIFIC REQUIREMENTS

Electric Propulsion Motors

The propulsion control system shall include functionality to:

- provide constant rated motor power RPM band to meet section C605B, and
- to allow fast load reduction (frequency measurement in the VFD).

In case of emergency, local control shall be possible at the frequency converter front panel.

L/Z Drives

Full follow-up and non-follow-up controls shall be provided. The primary controls, full follow-up mode, shall be standard manufacture from the Azimuthing Thruster manufacturer. They shall provide throttle and joystick functions , steering angle indication, switches, and indicator lights mounted in a panel for installation.

The primary control head shall control propeller speed, and direction in one hand control.

Secondary controls shall be provided for a non-follow-up mode, shall consist of a spring-centered steering joystick to command the direction of rotation, and shall control the thruster rotation as long as the command is given. Motor speed shall be controlled by a turning knob.

Power for control system

Power for the control system shall be set up such that:

- The power supplied is from a clean source.
- The system is bonded to provide common potential.
- In the event of a loss of primary power, the system automatically performs a seamless transfer to the back-up source of power.

SPECIAL FEATURES

None.

DELIVERABLES

849-C608-01 PROPULSION CONTROL SYSTEM SCHEMATIC
849-C608-02 DP/DT CAPABILITY ANALYSIS REPORT

STANDARDS

IEEE 45 Recommended Practice for Electric Installations on Shipboard
ABS Guide for Dynamic Positioning Systems.

C610 AZIMUTHING THRUSTER SHAFTING SYSTEM

GENERAL DESCRIPTION

The shafting system shall consist of all components and machinery necessary to transfer the power and rotational movement of the propulsion electric motors to the propellers, without seawater entering and oil leaving the vessel. This system includes all necessary seals, bearings (thrust and line shaft) and couplings. The complete shafting system shall be in accordance with the requirements stated in the ABS and USCG regulations.

REQUIREMENTS

The Contractor shall meet ABS and USCG requirements for Azimuthing Thruster Propulsion Systems. The Contractor shall also adhere to the alignment instructions and tolerances specified by the Motor and Thruster manufacturers for the shafting and couplings between the Motor and the Thruster. This requirement pertains to either Z-drive of L-drive configurations.

During Phase II, the Contractor shall develop and submit to the COR and ABS drawing 849-C610-01 Z-DRIVE SHAFTING SYSTEM SCHEMATIC for review and approval. For z-drive configuration the Contractor shall also develop drawing 849-C610-02 SHAFTING REMOVAL showing the removal paths and process for the shafting between the z-drive and the propulsion motor..

SPECIFIC REQUIREMENTS

Based on the propulsion configuration chosen by the Contractor, the below specific requirements shall be adhered to as applicable. All equipment shall be installed in accordance with the manufacturer's recommendations. The Contractor shall provide suitable guards on all machinery in accordance with 46 CFR Subchapter F Part 58 and shall be consistent with that required by the U.S. Army Corps of Engineers, EM 385-1-1 "Safety and Health Requirements Manual".

Shaft Turning/Locking Devices

Thruster and propulsion motors shall be provided with electric turning gear with a reversible rotation direction. The turning gear shall have a local control station equipped with a locking key and shaft brake.

A shaft brake shall be provided for each Thruster. The shaft brake shall be effective up to a vessel speed of 6 knots. Interlocks and indications as per ABS rules.

Alignment

The final alignment of the entire propulsion system shall be performed with the vessel complete and afloat at a draft midway between lightship and maximum displacement. This draft shall be achieved by loading hopper with an appropriate amount of water.

The alignment shall be checked with the vessel in operational condition (i.e.) warmed up. The alignment shall comply with all requirements and tolerances of ABS and the suppliers and manufacturers of the relevant equipment.

SPECIAL FEATURES

None.

DELIVERABLES

849-C610-01 SHAFTING SYSTEM SCHEMATIC

STANDARDS

ABS Guidance Notes on Propulsion Shafting Alignment
SNAME T&R Bulletin 3-51 “Practices and Procedures for the Alignment of Marine Main Propulsion Shafting Systems”
46 CFR Subchapter F, Part 58, Main and Auxiliary Machinery and Related Systems
USACE EM 385-1-1, Safety and Health Requirements Manual

C615 STEERING SYSTEM

GENERAL DESCRIPTION

The steering system shall be designed to accommodate navigation in open sea and in all waterways as further described in Contract Paragraph C002.

L-or Z-drives shall be installed such that the propeller can swing unobstructed 360-degrees.

The steering system shall be integrated with the DP/DT system as described in Contract Paragraph C608.

REQUIREMENTS

The steering system shall, at a minimum, be compliant with the ABS rules and be SOLAS-certified. The steering system and all associated equipment shall be installed in strict compliance with the manufacturer’s recommendations.

The steering gears shall be capable of moving the thrusters to any position and holding them in any position at maximum ahead and maximum astern speed.

The steering gear shall be either electric motor or electric/hydraulic. Each thruster shall be provided with its own steering system. The steering system for each thruster shall be independent, including hydraulic reservoirs, if used.

Maximum thruster rotation time from full ahead to full astern (180 degrees) shall exceed 12 seconds.

The Contractor shall develop 849-C615-01 STEERING CONTROL SYSTEM DIAGRAM and submit to COR and regulatory bodies for review and approval.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

Controls integrated with the captain’s chair shall be avoided.

Steering system instrumentation and alarms shall be connected to the vessels Integrated Monitoring, Alarm, and Control System (see Contract Paragraph C780).

DELIVERABLES

849-C615-01 STEERING CONTROL SYSTEM DIAGRAM
849-C615-XX Steering Gear assembly/component drawings, equipment lists, etc.

STANDARDS

See Contract Paragraph C003.

C620 BOW THRUSTER

GENERAL DESCRIPTION

The Contractor shall install at least one electrically-driven, speed-controlled bow thruster in the fore ship for maneuvering, dredging and dynamic positioning.

REQUIREMENTS

Bow thruster(s) shall be adequately sized for the operational characteristics as described in Contract Paragraphs C002 and C121, and the Dynamic Positioning requirements as defined in Contract Paragraph C608. The bow thruster shall have a fixed pitch propeller. The bow thruster system shall have a minimum combined capacity of 600 horsepower, if only one (1) bow thruster is provided then that bow thruster shall have a minimum capacity of 600 horsepower.

A local operator panel shall be installed for local control, alarm and monitoring. The bow thruster shall be remote controlled from the bridge. The bow thruster shall have integrated controls as further defined in Contract Paragraph C608.

Bow thruster(s) motor speed shall be controlled by variable frequency drives from 0 to +/-100%.

The Contractor shall develop drawing 849-C620-01 BOW THRUSTER ARRANGMENT for submittal to the COR and ABS during phase II of the Contract.

SPECIFIC REQUIREMENTS

Bow thruster(s) shall be ABS type approved.

A removable protection grid shall be installed on both sides of each bow thruster (tunnel).

SPECIAL FEATURES

None.

DELIVERABLES

849-C620-01 BOW THRUSTER ARRANGEMENT

STANDARDS

See Contract Paragraph C003.

C630 FUEL OIL SYSTEM

GENERAL DESCRIPTION

The Contractor shall provide and install a complete fuel oil system in accordance with ABS, USCG Subchapter F and these specifications.

REQUIREMENTS

The Contractor shall provide and install all pumps, purifiers, filters, piping, hoses, and valves necessary to form a complete fuel oil system. The system shall serve all diesel engines and have the capability of transferring fuel between all the fuel oil tanks and to the fuel station (to fuel the onboard launches). The Contractor shall develop 849-C630-01 FUEL OIL SYSTEM DIAGRAM, 849-C630-02 FUEL OIL SYSTEM CALCULATIONS, and 849-C630-03 FUEL OIL SYSTEM ARRANGEMENT AND DETAILS and submit them to the COR and ABS as applicable during Phase II of the Contract for review and approval.

The system shall be designed to store fuel in the storage tanks, with the ability to transfer fuel to the settling tanks, day tanks or to the fuel station. The fuel for the diesel engines shall come from the day tanks. The Emergency Diesel Generator shall be provided with its own day tank. No boundary of any fuel tank shall be integral with the side plate or bottom plate of the hull, nor with the sloped side plates of the hopper (see Contract Paragraph C320 for specific tank requirements).

The vessel shall be fitted with fuel lockers on the port and starboard sides of the open deck which allow for bunkering from either side of the vessel. The fuel locker(s) shall contain the fills (with sample connection) vents and sounds for the storage fuel tanks. Vent and sounding pipes shall be routed to the fuel locker(s) as practicable, and the fuel lockers to be positioned to suit this arrangement. Each fuel locker shall be designed to act as a containment with a minimum capacity of 100 gallons. The door to the fuel locker shall be weathertight and the locker to be fitted with means of ventilation to the weather deck at the highest point of the locker. A drain with ball valve to the waste oil tank shall be provided for each fuel locker. A 2-inch pump-off/ discharge connection shall be installed inside the fuel locker. The connection shall be fitted with a ball valve and a cam-lock fitting. The cam-lock fitting shall be provided with a cap and chain. A marine fuel spill kit shall be provided in each fuel locker to clean up on-deck fuel spills.

The fuel tanks (storage, settling and day) shall be fitted with vents, fills, and sounds in accordance with ABS rules and as described in Contract Paragraph C670.

Stripping lines shall be installed on each tank, fitted approximately ½-inch from the bottom. The stripping connections shall be located in an accessible position.

An engraved set of manifold plates shall be provided at the fuel locker and at the fuel manifold. One plate shall have the basic system schematic/ layout, and the second plate shall have detailed instruction on system use, valve alignment, etc. The plate designs, layouts and locations shall be submitted to the COR for review and approval.

SPECIFIC REQUIREMENTS

Manifold, Supply & Return Lines

The manifold shall be constructed to facilitate the transfer of fuel between storage tanks, settling tanks, day tanks, and to the fuel station. The settling tanks and day tanks shall be fitted with overflow/ vent lines that run back to the storage tanks. Supply piping to the storage tanks to be sized for a maximum bunkering time of six (6) hours (from completely empty to full storage tanks). The Contractor shall assume that the fuel oil supplier is capable of delivering this bunker rate. A fuel meter/ totalizer, able to withstand the maximum working pressure and flowrate of the system in which it is installed, shall be provided and installed in the supply lines to the fuel oil storage tanks. The Contractor shall install supply and return lines for each diesel engine. The pick-up for the supply lines shall be at a height of about 1.25 times the diameter of the supply line above the bottom of the tank. The return headers shall be installed as high as possible in the respective tanks. The Contractor shall be responsible for the sizing of those pipes in accordance with the prescribed requirements of the engine manufacturers.

The Contractor shall provide and install fuel oil coolers in the return lines to the day tanks, in accordance with the prescribed requirements of the engine manufacturers. These coolers shall be served by the auxiliary cooling water circuit as prescribed in Contact Paragraph C640.

The Contractor shall be responsible for sizing, providing, and installing ABS and USCG approved flexible connections for each diesel engine for connecting to their respective fuel supply headers and fuel return headers. The flexible connections supplied shall also meet the engine manufacturer's specifications.

Transfer Pump

The Contractor shall provide and install two fuel oil transfer pumps for the system. The fuel oil transfer pumps shall be positive displacement gear pumps with an integral relief valve, capable of transferring fuel to and from all the fuel tanks at a minimum of 60-GPM. The Contractor shall provide a separate transfer pump to be used for fueling the small boats from the day tanks (see below). Cast steel simplex basket strainers shall be installed before the inlet of each pump. A drip tray (provided with a drain to the waste oil tank) to be installed underneath the filters and pumps. The transfer pumps shall be provided with controls locally at the pump, remotely from the ECR and from inside the fueling locker and shall be connected to the vessels Integrated Monitoring, Alarm, and Control System (see Contract Paragraph C780). The small boat transfer pump shall be provided with controls locally at the pump and inside the fueling station. The controls shall have start, stop, and a run indicator light. The controls inside the fueling locker and fueling station shall be rated for Class 1, Division 1 applications. An emergency pump stop control shall be installed in the fire and safety station for all fuel transfer pumps.

Fueling Station

The Contractor shall provide and install a fuel transfer station for fueling the onboard small boats (launch, lifeboat(s) and rescue boat, when positioned in their davits).

The station shall consist of a fuel oil hose with connection fittings, nozzle, reel, meter, and discharge line. All equipment for the fuel transfer shall be located inside the fuel station.

The hose reel shall be installed in the overhead or on the aft bulkhead of the fueling station. The hose reel shall have air powered rewind capability and sized for 1-inch inner diameter, 100-feet of hose. The Contractor shall provide and install 100-feet of 1-inch ABS approved fuel hose on the hose reel. The fuel hose shall have a swivel and nozzle installed. Rollers or high-density polyethylene type guides shall be installed to facilitate unwinding and rewinding of the fuel hose without chafing inside the locker or around the locker door. All controls located inside the fueling station shall be rated for a Class 1, Division 1 application.

A Marine Fuel Spill Kit shall be provided in the fueling station.

Emergency Shut-Off Valves & Isolation Valves

Each tank connection subject to a static head of fuel shall have a shut off valve at the tank with remote pull stations. In addition, each tank suction line shall have a shut-off valve with remote pull stations. The shut-off valves to be quick closing valves, connected to electric, hydraulic or pneumatic control stations. Each valve shall be operable locally at the valve, and from one (1) remote pull station located on a position outside the space in which these valves are situated. The remote control of the emergency generator fuel tank to be grouped separately from those of the other fuel tanks. Additionally, each valve release cylinder shall be equipped with a fire melting ring that will melt at temperatures above 178-degrees F and automatically shut-off the fuel supply

The Contractor shall provide and install engraved brass valve instruction plates at the valve and at the remote pull stations. The plates shall have 1-inch letters. The template for the plates and installation locations shall be provided to the COR for review and approval.

Additional valves shall be installed for the fuel oil system to allow for isolating the system for maintenance and repair.

Tank Gauging & Level Alarms

All fuel tanks shall be fitted with a liquid level gauge with integral valves. The liquid level gauges shall have all stainless-steel construction and each gauge shall be calibrated to show ¼ tank level, the ½ tank level, and the ¾ tank level.

All fuel tanks shall have a remote reading electronic tank capacity gauge or sensor shall be installed in each tank. The gauges or sensors shall transmit the tank level to a monitor in the ECR and in the bridge. The gauges or sensors shall report the soundings/ ullages and the amount of fuel remaining in each tank in gallons and percentage.

For all fuel tanks, 10% (Low-Low), 25% (Low), 90% (High) and 95% (High-High) alarms shall be installed. All alarms shall be capable of being silenced at the primary or remote panel stations and shall be connected to the vessels Integrated Monitoring, Alarm, and Control System, (see Contract Paragraph C780).

The fueling locker shall be equipped with an alarm panel (for main tanks 90% and 95% only). The remote panel station at the fueling locker shall be capable of being turned on/ off for use during fueling operations. The Contractor shall provide and install a large font/ print, engraved brass instruction plate at the fueling station. The plate shall include instructions for the personnel to activate/ turn-on the remote alarm panel prior to fueling operations. The template for the instruction plates and final locations shall be provided to the COR for review and approval.

Primary Fuel Filters

The fuel oil supply lines to each diesel engine shall be equipped with individual duplex/triplex fuel filters/water separators. The filters shall have metal housings and be approved by ABS. The Contractor shall be responsible for sizing, providing, and installing the fuel filters based on the engines selected. After filtration the fuel oil supplied to the engines shall meet the quality prescribed by the engine manufacturer’s specifications and fuel filters shall be able to handle the total fuel flow (including fuel return flow), at rated power.

A drip tray (provided with a drain to the waste oil tank) is to be installed underneath the filters.

Fuel Oil Purifiers

The Contractor shall provide and install two fuel oil purifiers, fully automatic and self-cleaning. The capacity of each unit shall be 100% of the daily fuel consumption. Purification is to be arranged from the settling tanks to the day tanks and from the day tanks back to the day tanks (recirculation). Water and sludge separated from the fuel oil shall be led to the waste oil tank. A drip tray (provided with a drain to the waste oil tank) to be installed underneath the purifier skids.

The purifiers shall be provided with local controls and shall be connected to the vessels Integrated Monitoring, Alarm, and Control System (see Contract Paragraph C780). An emergency stop control shall be installed locally and in the ECR.

Fuel

The Contractor shall provide fuel as necessary for testing and delivery. A fuel sample shall be provided to and approved by the COR prior to filling the tanks.

Upon final delivery, the Government will make payment to the Contractor for the quantity of fuel remaining in the vessel fuel tanks.

For payment, the fuel amount in the tanks shall be determined by sounding the tanks and developing the tank amounts from the tank capacity tables.

The per gallon fuel cost for payment shall be identical to the cost paid by the Contractor for the fuel fill. The Contractor shall provide the fuel fill invoice to document the cost per gallon.

SPECIAL FEATURES

The Contractor shall provide flow meters on the suction and return lines from each engine, such that the fuel consumption of each engine can be monitored. This information shall be supplied to both the dredge automation system (see Contract Paragraph C524) and the IMACS (see Contract Paragraph C780).

DELIVERABLES

849-C630-01 FUEL OIL SYSTEM DIAGRAM
849-C630-02 FUEL OIL SYSTEM CALCULATIONS
849-C630-03 FUEL OIL SYSTEM ARRANGEMENT AND DETAILS

STANDARDS

See Contract Paragraph C003.

C635 SERVICE OIL SYSTEMS

GENERAL DESCRIPTION

The Contractor shall provide and install complete service oil systems in accordance with ABS, USCG Subchapter F and these specifications.

REQUIREMENTS

The Contractor shall provide and install all pumps, filters, piping, hoses, and valves necessary to form complete systems. The service oil systems shall include the lube oil system(s), gear oil system(s) and the hydraulic oil system(s) and allow for filling up and safe operation of the equipment connected to the system (engines, gearboxes, drives, thrusters and hydraulic power units). The systems shall be designed to transfer clean lube/ gear/ hydraulic oil from their specific tanks to the equipment located in the engine room or other technical spaces. The Contractor shall develop drawing 849-C635-01 SERVICE OIL SYSTEMS DIAGRAM, 849-C635-02 SERVICE OIL SYSTEMS CALCULATIONS, and 849-C635-03 SERVICE OIL SYSTEMS ARRANGEMENT AND DETAILS and submit them to the COR and ABS as applicable during Phase II of the Contract for review and approval.

Each oil storage tank shall be filled via individual fill lines located in matching port and starboard “Oil Fill Lockers” (which can be combined with the fuel lockers located on the weather deck). Filling lines shall be provided with flow meters. Each tank vent shall terminate inside these lockers as well. The lockers shall be designed to serve as a containment (minimum capacity 55-gallons for oil-only lockers), have natural louvered ventilation, and prevent the accumulation of rain/ sea water. A drain with ball valve to the waste oil tank shall be provided for the Oil Fill Lockers.

An appropriately sized drain pipe, with a self-closing valve shall be fitted at the lowest point of each oil tank. Each drain valve shall be fitted with a bronze threaded pipe cap attached to a chain. Each drain shall be easily accessible and drain into a drip tray or funnel (connected to the waste oil tank).

A 1-inch self-closing valve shall be installed on an accessible tank face bulkhead of each oil service tank to allow for small amounts of oil to be dispensed. The valve shall be positioned so that a small can or bucket may be placed beneath it. Each drain valve shall be fitted with a bronze threaded pipe cap attached to a chain. Each dispenser valve shall be labeled with the oil type and "DISPENSER VALVE".

SPECIFIC REQUIREMENTS

Transfer Systems

The lube oil, gear oil and hydraulic oil systems shall all be independent, but generally designed with the same arrangement and equipment. The lube oil, gear oil and hydraulic oil systems require dispenser reels located in such a position that all equipment in need for this oil can be reached. Fixed/ hard-piped connections and valves for oil filling shall be provided for all main users (with an oil capacity of 40 gallons and more). Minor users (with an oil capacity less than 40 gallons) can filled using the dispenser reels.

For transferring clean oil in each system from the storage tank directly to the equipment or to a dispenser reel, the Contractor shall provide and install a transfer pump for each independent system a, with a minimum capacity of 10 GPM. A strainer shall be provided on the suction side of the pump. The pump shall be clearly labeled "FOR CLEAN 'INSERT TYPE' OIL USE ONLY". The oil transfer pumps shall have Start/ Stop controls, with run indicator lights, located locally at each pump and remotely by each hose reel. A run indicator light shall also be provided in the ECR. A drip tray (provided with a drain to the waste oil tank) shall be installed underneath the pumps and strainers. The oil supply lines shall be hard-piped from the pump to the dispenser reel/ equipment. Flexible connections shall be installed on the suction and discharge sides of the pump and at the far end of the piping between the equipment and the piping to minimize vibrations.

If the oil systems are installed with static head, a shut-off/ quick closing valve shall be installed at the tank suction, connected to an electric, hydraulic or pneumatic control station. The equipment and remote pull station(s) shall be as required for the fuel system in Contract Paragraph C630.

The Contractor shall provide and install an individual hose reel, hose and dispenser in the engine room for each of the lube oil, gear and hydraulic oil systems. The hose reels shall be a spring retractable reel, medium pressure oil reel. The reel shall be provided with 50-feet of ¾-inch, medium pressure hose, approved for the respective fluid type use. An electronic oil meter and dispenser shall be provided and installed on the free end of the reel hose.

Additional valves shall be installed in the oil systems in order to allow for isolating the system/ equipment for maintenance and repair.

To facilitate filling the hydraulic oil storage tanks, the Contractor shall provide two (2) 50-foot segments of 1½-inch I.D. black truck hose. One end of each hose shall be fitted with a brass cam-lock socket and the other end fitted with a brass cam-lock plug. For the lube oil and gear oil, two (2) hoses per system shall be provided as well with the same specifications as above, except they are specially fabricated for the use of lube/ gear oil instead of hydraulic oil. Each hose shall be provided with a braided polyester color identification sleeve. The colors shall be in accordance with the system color/marking requirements in Contract Paragraph C601. The location on the vessel for hose storage shall be determined by the COR.

Tank Gauging, Level Alarms & Sample Points

Each service oil tank shall be fitted with a liquid level gauge with integral self-closing valves. The liquid level gauges shall have all stainless-steel construction and each gauge shall be calibrated to show ¼ tank level, the ½ tank level, and the ¾ tank level.

For each service oil tank, 10% low, 90% high and 95% high-high level alarms and alarm panels shall be installed in the ECR and at the transfer pump(s) and Oil Fill Lockers. All alarms shall be connected to the vessels Integrated Monitoring, Alarm, and Control System (see Contract Paragraph C780). The remote panel station at the Oil Fill Lockers shall be capable of being turned on/off for use during filling operations. The Contractor shall provide and install a large font/print, engraved

brass instruction plate at the Oil Fill Lockers. The plate shall include instructions for the personnel to activate/ turn-on the remote alarm panel prior to filling operations. The template for the instruction plates and final locations shall be provided to the COR for review and approval.

Test cocks for oil samples shall be installed in the oil piping systems for each piece of equipment using oil. Sample points shall be positioned such that there is at least one sample point available for each piece of equipment.

Lube Oil, Hydraulic Oil & Gear Oil

The Contractor shall provide the necessary lube/ gear and hydraulic oil for the engines, gearboxes, drives, thrusters and hydraulic power units (whichever is installed) for testing and delivery. Upon delivery, the Contractor shall fill the oil storage tanks to 95% capacity. The oil types and qualities shall meet the equipment manufacturer's specifications and be approved by the COR.

SPECIAL FEATURES

None.

DELIVERABLES

849-C635-01 SERVICE OIL SYSTEMS DIAGRAM
849-C635-02 SERVICE OIL SYSTEMS CALCULATIONS
849-C635-03 SERVICE OIL SYSTEMS ARRANGEMENT AND DETAILS

STANDARDS

See Contract Paragraph C003.

C637 WASTE OIL SYSTEM

GENERAL DESCRIPTION

The Contractor shall provide and install a complete waste oil system in accordance with ABS, USCG Subchapter F, and these specifications.

REQUIREMENTS

The Contractor shall provide and install all pumps, filters, piping, hoses, valves and tanks necessary to form a complete waste oil system. Waste oils from all equipment using oil (such as engines, gearboxes and thrusters), and the drains from the fuel oil purifiers, grease trap, sewage treatment unit, leak trays and from the oil and fuel lockers, shall drain to the waste oil tank(s). The waste oil system installed shall be capable of collecting all waste oils on the vessel in waste oil tank(s) and pump out these tank(s) to the Waste Pump-Off Station(s).

The Contractor shall develop drawing 849-C637-01 WASTE OIL SYSTEM DIAGRAM, 849-C637-02 WASTE OIL SYSTEM CALCULATIONS, and 849-C637-03 WASTE OIL SYSTEM ARRANGEMENT AND DETAILS and submit them to the COR and ABS as applicable during Phase II of the Contract for review and approval.

SPECIFIC REQUIREMENTS

Waste Oil Tanks

Where practical a separate waste oil tank shall be installed for machinery spaces in the fore and one in the aft part of the vessel. These tanks(s) shall be installed as low as possible, below the engine room (grating) to allow for draining of all leak trays by gravity. The waste oil tanks shall not share any boundaries with the hull bottom plating or side plating.

Vent & Pump-off

The waste oil tank(s) shall be emptied via pump-off lines located in a Pump-Off Station located on the weather deck. The vents shall terminate inside the Oil Fill Locker(s). The pump-off lines shall be fitted with a 'standard discharge connection' as prescribed by MARPOL Annex I regulation 13.

Drain Connection

An appropriately sized drain pipe, with a self-closing valve shall be fitted at the lowest point of the tank(s). The drain valve shall be fitted with a bronze threaded pipe cap attached to a chain. It shall be arranged so that at least a 5-gallon bucket or oil can be placed beneath it to drain the tank. The drain

valve shall be easily accessible. The drain connections of all leak trays shall be fitted with check valves in order to prevent any backflow of waste oil up into the engine room via a leak tray.

Waste Oil Collection System

For collecting waste oil from the equipment using oil, the Contractor shall provide and install waste oil collection pump(s) with a minimum capacity of 10 GPM. The pump(s) shall be located in the engine room, where the installed suction hose can reach all of the machinery drain connections. A strainer shall be provided on the suction side of the pump. Flexible connections shall be installed on the suction and discharge sides of the pump to minimize vibrations. The pump shall be clearly labeled “FOR WASTE OIL COLLECTION USE ONLY”. The collection pump shall have Start/ Stop controls with a run indicator light at the pump. A pump stop and run indicator light shall also be provided in the ECR. A drip tray (provided with a drain back to the waste oil tank) to be installed underneath the pump and strainer.

The collection system shall be hard-piped between the waste oil collection pump in the engine room and the waste oil storage tank. A funnel drain with a self-closing lid and valve, shall be installed on a branch line of the collection system in the engine room. The Contractor shall provide two (2) 20-foot segments of waste oil collection hose. The hose shall be ¾-inch, clear steel wire reinforced PVC suction hose. One end of each hose shall be fitted with a quick-connect or cam-lock fitting that matches the suction line on the collection pump/ system. The other end of each hose shall be fitted with the necessary fitting(s) to be able to connect to all of the machinery oil sumps and pump-out connections, which are not equipped with a fixed/ hard piped drain system. Each hose shall be provided with a braided polyester color identification sleeve. The colors shall be in accordance with the system color/marking requirements in Contract Paragraph C601. The hose shall be stored on a hose rack in the engine room.

All main users (as defined in Contract Paragraph C635) provided with fixed service oil connections shall be provided with a fixed/ hard-piped drain system with valves, routed directly to the waste oil tank. This drain piping system shall be installed with a continuous downward slope and use the minimum number of elbows. Flexible connections shall be installed at the far end of the piping system between the equipment and the piping to minimize vibrations.

Waste Oil Transfer/Pump-Off System

For transferring collected waste oil from the waste oil tank(s) to the pump-off station, the Contractor shall provide and install a waste oil transfer pump. The waste oil pump-off system shall be designed such that the unloading time shall not exceed the fuel oil bunkering time as stated in Contact Paragraph C630. A duplex strainer shall be provided on the suction side of the pump. The pump shall be clearly labeled “FOR WASTE OIL PUMP-OFF USE ONLY”. The waste oil transfer pump shall have Start/Stop controls, with run indicator lights, located locally at the pump and remotely in at the Pump-Off Station and in the ECR. The remote controls/ light at the Pump-Off Station shall be installed on the exterior house bulkhead in a weathertight enclosure. A drip tray (provided with a drain to the waste oil tank) to be installed underneath the pump and filter.

If the waste oil systems are installed with static head, a shut-off valve with remote pull station shall be installed. The equipment and pull station shall be as required for the fuel system in Contract Paragraph C630.

Flexible connections shall be installed on the suction and discharge sides of the pump to minimize vibrations.

Additional valves shall be installed in the waste oil system in order to allow for isolating the system/equipment for maintenance and repair. All valves installed in the system shall be full bore valves.

Tank Gauging & Level Alarms

For the waste oil tank(s), 90% high level and 95% high-high level alarms and alarm panels shall be installed in the ECR and in the engine room at the pump controls. All alarms shall be connected to the vessels Integrated Monitoring, Alarm, and Control System (see Contract Paragraph C780).

SPECIAL FEATURES

None.

DELIVERABLES

849-C637-01 WASTE OIL SYSTEM DIAGRAM
849-C637-02 WASTE OIL SYSTEM CALCULATIONS
849-C637-03 WASTE OIL SYSTEM ARRANGEMENT AND DETAILS

STANDARDS

IMO International Convention for the Prevention of Pollution from Ships (MARPOL) 73/ 78 Annex I

C640 ENGINE COOLING SYSTEM

GENERAL DESCRIPTION

The Contractor shall provide and install a complete cooling system for the diesel-electric generator sets and auxiliaries in accordance with ABS, USCG Subchapter F and these specifications. Cooling systems shall utilize box coolers, designed and installed in the vessel hull such that the box coolers can be removed and replaced afloat without dry docking.

REQUIREMENTS

The Contractor shall provide and install all coolers, pumps, filters, piping, hoses, and valves necessary to form complete cooling systems. The Contractor shall develop drawings 849-C640-01 ENGINE, AUXILIARIES, & GENERATOR COOLING SYSTEMS, 849-C640-02 AUXILIARY COOLING PUMP CALCULATIONS, 849-C640-03 BOX COOLER SIZING & CALCULATIONS and 849-C640-04 BOX COOLING ARRANGEMENTS AND DETAILS and submit them to the COR and ABS during Phase II of the Contract for review and approval.

For the diesel engines, generator sets and auxiliary equipment (including but not limited to the HVAC (C687) and refrigeration (C687) equipment, VFD's (C750), HPU's (C655), fuel oil coolers (C630), etc.), the cooling pumps and box coolers shall be sized to cool the full output/ horsepower at a vessel forward speed of 0-knots and at the highest seawater temperature as listed in Contract Paragraph C002. The required box cooler(s) capacity shall be increased with 15% to compensate for fouling.

Where practical a separate fresh cooling water system for cooling of the auxiliary equipment can be installed for machinery spaces in the fore and aft parts of the vessel. If the auxiliary fresh cooling water system is split in a separate fore and a separate aft system, separate box coolers shall be installed for the fore and aft portions.

SPECIFIC REQUIREMENTS

Cooler & Expansion Tank Requirements

Each engine shall be equipped with its own box cooler(s) and shall be designed such that they meet the engine manufacturer's requirements for the separate HT (High Temperature) and LT (Low Temperature) (fresh) cooling water circuits.

Box cooler(s) for the auxiliary systems shall be designed such that the manufacturer's maximum allowable cooling water inlet temperatures for each piece of equipment are not exceeded, with all equipment running, at the highest seawater temperature listed in Contract Paragraph C002.

Each box cooler shall be provided with a cathodic protection system as described in Contract Paragraph C405. The box coolers shall be provided with 90-10 Copper Nickel tubes and set up with flanged connections.

The Contractor shall prove to the COR that the box coolers are isolated from the hull before the system is filled to ensure that the box coolers do not experience accelerated corrosion due to the dissimilarities of the metals.

Flexible connections for the cooling water on the diesel engines, generator sets, and all auxiliary equipment shall be suited for temperatures and pressures as required by the Regulatory bodies.

After installation on board, each cooling system shall be pressure tested for leaks. Each cooling system shall be filled with demineralized (fresh) water including sufficient corrosion preventive chemicals.

Expansion tanks and vents shall be sized and provided in accordance with the manufacturer's recommendations for each separate fresh cooling water system. Expansions tanks shall be fitted with level gauges, level alarms and sight glasses (at normal operating level to check for possible contamination of the cooling water) as required by the Regulatory Bodies. The final location of the expansion tanks shall be approved by the COR prior to installation. Each expansion tank shall be easily accessible and capable of being filled via a fixed (fresh) water connection (with valve). An accessible and safe arrangement shall be provided for adding (corrosion preventive) chemicals to the cooling water systems.

Piping & Valves

All piping shall be steel, non-galvanized with welded joints and fittings. The piping shall incorporate drains and isolation valves to allow for removing/ adding cooling water and to allow for maintenance on the cooling water system (of each piece of equipment separately).

Bolted flanges shall be fitted to permit removal of pipe sections at the equipment and cooler connections.

Flanged stainless steel shut-off valves shall be furnished and installed at both the inlet and outlet connections to the external box coolers. The valves shall have operating handles fitted with stops or detents for open and closed positions to indicate valve open and valve closed positions.

The Contractor shall provide and install liquid filled temperature gauges, 3-inches minimum all angle, in thermowells on all cooling pipes (inlet and outlet) at each piece of equipment installed in the cooling water system.

The Contractor shall connect the ship's cooling water piping system to the piping/ connections of the equipment, such as the separate HT/ LT and preheater systems, according the requirements of the equipment manufacturers. A by-pass connection shall be provided in the HT system of the main engines for the freshwater generators as described in Contract Paragraph C665. This by-pass shall be fitted with valves which allow for regulation of the amount of flow to the freshwater generators. Temperature and pressure indicators shall be installed the inlet and outlet branches of this by-pass connection.

Vents & Drains

All sea chests shall be vented at the main deck level or be constructed with sloped top plates in order to sufficiently vent the sea chest.

Vent points are to be installed on the highest points of the system for removal of air. Vents shall be equipped with ball type shut-off valves that may be locked in the closed position.

Drains shall be provided near each box cooler, with a ball type shut-off valve. Each fresh cooling water system to be connected to the cooling water drain tank.

Thermowells

Welded or threaded thermowells shall be provided in the inlet and outlet piping from each cooler. Thermowells shall be manufactured from stainless steel, in accordance with ASME PTC 19.3 TW-2016, from solid bar stock or double welded and machined to reduce crevice corrosion. The thermowells shall be .385-inch diameter bore to ensure the most flexibility with the instrument to be installed (Thermometer, thermocouple, RTD). The insertion length (length from the end of the well to the underside of the pipe/well intersection) shall be not less than 50% of the internal pipe diameter.

Auxiliary Cooling Pumps

The Contractor shall provide and install two cooling pumps for each auxiliary system (one pump running, one stand-by). The pumps shall be sized based on the 849-C640-02 AUXILIARY COOLING PUMP CALCULATIONS and the manufacturer's requirements of all equipment in need of water cooling. The pumps shall have a cast iron housing and bronze impeller. The pumps shall be capable of being started and stopped locally at the pump and shall be equipped to interface to the vessel remote control and monitoring system, see Contract Paragraph C780. A run indicator light for each pump shall also be provided in the ECR. The pumps shall be located in accordance with the auxiliary equipment manufacturer's recommendations and the final location shall be approved by the COR. The motor controllers for the pumps shall be set-up with low-voltage release, see Contract Paragraph C750.

Diesel Engine Cooling Pumps

Each diesel engine (excluding the EDG) shall be supplied with cooling pump(s) per ABS regulations and the engine manufacturer's requirements. Engine cooling pumps may be engine driven or (stand-

alone) electric motor driven pumps. The pumps shall be sized based on the required engine cooling and the engine manufacturer's requirements. The pumps shall automatically turn on and off with the engines or generators being on or off. A run indicator light for each pump shall also be provided in the ECR. The pump(s) shall be located in accordance with the machinery manufacturer's recommendation. The motor controllers for the pumps shall be set-up with low-voltage release, see Contract Paragraph C750.

Cooling Water Drain Tank

A dedicated cooling water drain tank shall be installed (in the double bottom) to allow draining of the cooling water systems to the tank in case of maintenance on the system. A dedicated cooling water transfer pump shall be provided to pump the tank content back to the system. The tank shall be provided in accordance with the requirements of Contract Paragraphs C130 and C320.

Installation & Inspection

The box coolers shall be designed to be removed and reinstalled from the top of the sea chest, preferably with the vessel afloat. To inspect the (void) space around the cooler installation, watertight bolted plate manhole inspection ports shall be provided in the machinery spaces. The bolted plate covers shall be installed with a gasket and stainless-steel hardware.

SPECIAL FEATURES

None.

DELIVERABLES

849-C640-01 ENGINE, AUXILIARY, & GENERATOR COOLING SYSTEMS.
849-C640-02 AUXILIARY COOLING PUMP CALCULATIONS.
849-C640-03 BOX COOLER SIZING & CALCULATIONS
849-C640-04 BOX COOLING ARRANGEMENTS AND DETAILS

STANDARDS

ASME PTC 19.3 TW-2016, Thermowells

C645 RAW WATER SYSTEM

GENERAL DESCRIPTION

The Contractor shall provide and install a complete raw water system, in accordance with ABS, USCG Subchapter F and these specifications. This system shall serve any equipment requiring raw water which is not addressed in a separate Contract Paragraph. The raw water system includes the sea chests, the main seawater crossover line, and any piping between the crossover and pumps of systems requiring raw water.

REQUIREMENTS

The Contractor shall provide and install all filters, piping and valves necessary to form a complete raw water system. The Contractor shall develop drawings 849-C645-01 RAW WATER SYSTEM DIAGRAM, 849-C645-02 RAW WATER SYSTEM CALCULATIONS, and 849-C645-03 RAW WATER SYSTEM ARRANGEMENT AND DETAILS and submit them to the COR and ABS as applicable during Phase II of the Contract for review and approval.

SPECIFIC REQUIREMENTS

The vessel shall be fitted with two raw water sea chests, one on each side of the vessel. Sea chests shall be located to prevent the suction of sand/ mud/ particles as much as possible. Potential sources of mud/ sand/ particles include but are not limited to the bottom doors, overflow outlet, and the poor mixture overboard. Between the port and starboard sea chest, a cross over line shall be installed. Each sea chest connection shall be designed for 100% of the system's capacity, based on the maximum demand of raw water. The raw water pipes shall enter the chests through the side wall of the chest and at a height which will prevent them from drawing air, in all operational conditions. Each raw water pipe shall be equipped with an inlet valve and a sea strainer. Valves installed at the sea inlets and overboard connections shall be positioned as and approved by the Regulatory bodies. The strainer shall be designed and installed such that it can be isolated, be opened and have the filter basket hoisted out for cleaning. The Contractor shall provide hoisting provisions for the strainer basket (see Contract Paragraph C330 for pad eye requirements). The Contractor shall provide a sea strainer cleaning area with a drain to the bilge and a bilge suction mouth in the vicinity. Strainer baskets shall be constructed of AISI 316 stainless steel.

The sea valves shall be remote operated and controlled by the vessels Integrated Monitoring, Alarm, and Control System (see Contract Paragraph C780). Sea valves shall be provided with a manual override and a local and remote position indication.

The raw water system shall be designed and sized to provide raw water for the following systems/ equipment:

- Gland Seal Flushing Water System — Contract Paragraph C505
- Flushing Water System (Gate Valves) — Contract Paragraph C525 (if required)
- Ballast system — Contract Paragraph C660 (if required)
- Fresh Water Generator Feed Water — Contract Paragraph C665
- Fire Main System — Contract Paragraph C675
- Anchor Chain Washdown System — Contract Paragraph C412
- Sea Chest Backflush — Contract Paragraph C325

SPECIAL FEATURES

None.

DELIVERABLES

849-C645-01 RAW WATER SYSTEM DIAGRAM
849-C645-02 RAW WATER SYSTEM CALCULATIONS

STANDARDS

See Contract Paragraph C003.

C650 ENGINE EXHAUST SYSTEMS

GENERAL DESCRIPTION

The Contractor shall provide and install a complete exhaust system for all diesel engines and generator sets in accordance with ABS, USCG Subchapter F and these specifications.

REQUIREMENTS

The Contractor shall develop drawings 849-C650-01 ENGINE & GENERATOR EXHAUST SYSTEMS DIAGRAM, 849-C650-02 ENGINE & GENERATOR EXHAUST SYSTEMS CALCULATIONS, and 849-C650-03 ENGINE & GENERATOR EXHAUST SYSTEMS ARRANGEMENT AND DETAILS, and submit them to the COR and ABS as applicable during Phase II of the Contract for review and approval.

SPECIFIC REQUIREMENTS

System Sizing Requirements

The system shall be designed and sized to not exceed the engine manufacturer's recommended maximum allowed backpressure. System installations shall be in strict accordance with the engine manufacturer's recommendations.

Exhaust System Requirements

Each exhaust system shall be independently routed from each engine exhaust outlet flange up into the stacks. Exhaust piping shall be supplied with a sufficient number of take down joints or bolted connections for easy installation and maintenance.

Each silencer shall have the following features:

35-db reduction minimum.

Spark arrestor.

High temperature corrosion resistant exterior coating.

Brackets for mounting the mufflers.

Cleanouts piped to an accessible location.

Drain capability in an accessible location.

The silencers and exhaust line flanges shall be to ASA 125-lb standards complete with high temperature gaskets and bolts.

The exhaust system of each engine and shall be provided with water trap drains at the lowest point of each exhaust pipeline. Traps shall be a 6″ long, 2″ Schedule 80 pipe nipple with a 2″ valve. The valves shall be operable from the walking flat but kept clear from walking and working areas. Exhaust trap drains shall be led directly to the bilge tank.

If the diesel engines require an exhaust aftertreatment system, further described in Contract Paragraph C602, that affects the sound reduction, the Contractor shall fit the aftertreatment system with appropriate silencers to achieve the same level of sound reduction as shown above.

Suitable flanged adapters shall be provided and installed at each engine exhaust outlet. Pipe taps, 1/4-inch, shall be provided near each engine outlet to allow for the checking of the system backpressure. Steel plugs shall be provided for each tap. The Contractor shall provide the equipment necessary to test each system’s backpressure at the exhaust elbows during tests and trials. See Contract Section E.

Flanged, lined stainless steel bellows type expansion sections shall be provided, and shall be sized and located in order to prevent over stressing of the engine connecting flanges, anchor points, and piping. The joints shall use multi-ply bellows construction.

Exhaust System Features

The piping runs between each diesel engine silencer outlet and the “ends” shall incorporate the following:

Rain proof slip joint seals at the stack top exhaust pipe penetrations.

A 45-degree elbow and a 45-degree mitered pipe, facing up aft, and outboard.

The exhaust pipe and fittings exposed to weather shall be stainless steel.

Each exhaust system shall be suitably insulated. The insulation shall be non-asbestos type pre-fabricated insulating mattresses positioned around bellows, connection flanges or equipment which requires periodic maintenance or inspection. The mattresses shall be made of silicone impregnated fiberglass cloth, with stainless steel wire mesh and lacing anchors. The thermal mattresses shall be filled with rockwool. The other part of the exhaust piping system to be covered with rockwool and (removable) aluminum sheathing. The insulation thickness shall be such that the surface temperature of the insulation does not exceed 125-degrees F.

Exhaust System Mounting & Isolation

The exhaust system for the engines and generators shall be designed around the selected equipment, focusing on minimizing vibration (see Contract Paragraph C180). Sufficient mounting supports to be fitted so that the weight of the exhaust piping shall not rest on the engines, silencers or expansion elements. Mounting supports shall include fixed and sliding supports installed such that no tension is built up due to thermal expansion of the exhaust pipes. All diesel engine and generator exhaust lines and exhaust silencers shall be mounted using rubber mount/ hanger vibration isolators, and low frequency wire rope/ cable style mount vibration isolators, to suspend the exhaust system free of any direct contact with the vessel's structure.

SPECIAL FEATURES

None.

DELIVERABLES

849-C650-01 ENGINE & GENERATOR EXHAUST SYSTEMS DIAGRAM

849-C650-02 ENGINE & GENERATOR EXHAUST SYSTEMS CALCUALTIONS
849-C650-03 ENGINE & GENERATOR EXHAUST SYSTEMS ARRANGEMENT AND DETAILS

STANDARDS

See Contract Paragraph C003.

C655 HYDRAULIC SYSTEM

GENERAL DESCRIPTION

None.

REQUIREMENTS

The Contractor shall design and install a central constant pressure hydraulic system. The system shall be designed and installed to meet all requirements of ABS MVR and 46 CFR Subchapter F.

The hydraulic system shall consist of a hydraulic unit which delivers hydraulic oil to a ring main line that runs throughout the vessel. The ring main shall have branches for each of the consumers on board.

The central hydraulic system shall service at least the following consumers:

Gantries, further described in Contract Paragraph C508
Hopper Door System, further described in Contract Paragraph C514
Overflow(s), further described in Contract Paragraph C516
Gantry winches, further described in Contract Paragraph C508
Bow Connection, further described in Contract Paragraph C523
Gate valves, further described in C525

A separate hydraulic system shall be provided for the draghead-mounted hydraulics as described in Contract Paragraph C511.

Hydraulic blocks and valves to operate consumers shall be located as close as possible to the consumer, easily accessible, and either below deck or in a watertight enclosure.

The hydraulic system shall be sized to meet the operational requirements specified by the respective equipment manufacturers.

In accordance with EPA rules, EAL hydraulic fluids shall be used for all oil-to-sea interfaces.

All hydraulic piping, fittings and valves shall be of stainless steel.

All hydraulic oils used or supplied by any manufacturer shall comply with the cleanliness code ISO 4406 class 17/15/12

All hydraulic piping systems are to be cleaned and flushed to the satisfaction of the COR and ABS, and until a cleanliness level is achieved in line with ISO 4406 class 17/15/12 prior to attaching to any hydraulic equipment, filling with hydraulic oil or use.

The Contractor shall develop 849-C655-01 HYDRAULIC SYSTEM DESCRIPTION and submit it to the COR and ABS during Phase II of the Contract for review and approval. The system description shall explain the function of system for the different items being controlled. The description shall include the movements and forces (static and dynamic), simultaneity, required actuation time, etc. The Description should also address the intended redundancy of the system.

The Contractor shall develop 849-C655-02 HYDRAULIC SYSTEM FUNCTIONAL BLOCK DIAGRAM and submit it to the COR and ABS during Phase II of the Contract for review and approval. The block diagram shall show the system layout at the functional block schema level, shall indicate how system is divided and where each section is located. The system then consists of several functional blocks (e.g. bottom doors, suction arm movements, etc.);

The Contractor shall develop 849-C655-03 HYDRAULIC SYSTEM FUNCTIONAL DESCRIPTION and submit it to the COR and ABS during Phase II of the Contract for review and approval. Functional Description of the different functional blocks shall include the associated functions, behavior at startup, behavior at failure and transitions between different functions. This will be the functional input specification for the suppliers of the hydraulic systems.

The Contractor shall develop 849-C655-04 HYDRAULIC SYSTEM CALCULATIONS and submit it to the COR and ABS during Phase II of the Contract for review and approval. The Calculations shall support all of the other deliverables and demonstrate compliance with all applicable Rule requirements.

The Contractor shall develop 849-C655-05 HYDRAULIC SYSTEM ARRANGEMENT & DETAILS and submit it to the COR and ABS during Phase II of the Contract for review and approval.

SPECIFIC REQUIREMENTS

Hydraulic Main Power Units

The central hydraulic system shall be served by two independent hydraulic power units, arranged in a primary/standby configuration for redundancy. The pumps, tanks, filter and cooler of each hydraulic power unit shall be mounted on a skid. Each unit shall be fitted with main pump(s), hydraulic cooling/filter/transfer pump(s), duplex hydraulic oil filter, a hydraulic oil cooler, all valves and all necessary temperature, level and filter clogged measurement for fully automated service.

The main pump(s) shall be remotely adjustable, varying between idle and maximum. Pressure control in the hydraulic system shall either be accomplished hydraulically or electronically.

The capacity of the main pump(s) shall be determined by the greatest required capacity of the following operational conditions:

Hoisting at nominal pull the suction pipe from maximum dredging depth to the inboard position, in 5 minutes

Moving all gantries for one suction pipe inboard/outboard in 3 minutes

Open or close all bottom doors in 3 and 3 minutes respectively.

Hydraulic Consumers Main System

If hydraulic powered winches are selected for the dredging system, isolation valve(s) shall be fitted between the main system and the power pack and the hydraulically driven dredge pipe winches, which shall allow for operation of the winches without pressurizing the whole system.

All consumers on the ring main shall be capable of being isolated from the hydraulic system by means of manual ball valves.

Hydraulic Draghead Power Units

Dedicated skid-mounted hydraulic units shall be installed to supply the cylinders and valves for each active draghead, one HPU per draghead. The size and capacity shall be determined according to the draghead manufacturer’s requirements, further described in Contract Paragraph C511.

Emergency Closing System

At a minimum, an emergency closing device shall be installed for the suction inlet valve, the self-emptying suction inlet valve, the jet discharge to the suction pipes and the inlet valves of the jet pumps.

The emergency closing system shall consist of a hydraulic accumulator which is pressurized by the main system, and a set of separate directly controlled solenoids which can be activated from the bridge. The emergency closing device shall be active at all times, even when the HPU is off. The emergency closing device shall be provided with means for depressurizing the accumulator for service.

Hydraulic Control

The complete dredging hydraulic system and all its consumers shall be remote controlled from the dredging control console as further described in Contract Paragraph C524.

Local control shall be provided for the swell compensation system (push buttons), bow coupling winch (wireless) and gantry winches (wireless)

Proportional speed control shall be provided for the gantry winches, gantries and overflow.

Pulse Traps

The Contractor's noise and vibration analyses (see Contract Paragraph C180) shall specifically identify all vessel hydraulic systems. For each system, noise and vibration frequency or frequency ranges (for variable pump speed systems) together with vibration forces and sound pressure levels for the frequency or frequency ranges shall be provided.

Hydraulic noise attenuation devices, such as PULSCO Pulse Traps, shall be provided for hydraulics systems that cause noise or vibration levels in excess of those allowed by the ABS Crew Habitability standards identified in this specification.

SPECIAL FEATURES

None.

DELIVERABLES

849-C655-01 HYDRAULIC SYSTEM DESCRIPTION
849-C655-02 HYDRAULIC SYSTEM FUNCTIONAL BLOCK DIAGRAM
849-C655-03 HYDRAULIC SYSTEM FUNCTIONAL DESCRIPTION
849-C655-04 HYDRAULIC SYSTEM CALCULATIONS
849-C655-05 HYDRAULIC SYSTEM ARRANGEMENT AND DETAILS

STANDARDS

ISO 4406, Hydraulic Fluid Power – Fluids – Method for Coding the Level of Contamination by Solid Particles, class 17/15/12

C660 BILGE & BALLAST SYSTEMS

GENERAL DESCRIPTION

The Contractor shall provide and install a complete main bilge and ballast (if applicable) system in accordance with ABS, USCG Subchapter F, and these specifications.

REQUIREMENTS

The Contractor shall provide and install all pumps, filters, piping, hoses, and valves necessary to form complete systems.

The Contractor shall develop drawings 849-C660-01 MAIN BILGE SYSTEM DIAGRAM, 849-C660-02 BALLAST SYSTEM DIAGRAM (if applicable), 849-C660-03 MAIN BILGE SYSTEM CALCULATIONS, 849-C660-04 BALLAST SYSTEM CALCULATIONS (if applicable), 849-C660-05 MAIN BILGE SYSTEM ARRANGEMENT AND DETAILS, 849-C660-06 BALLAST SYSTEM ARRANGEMENT AND DETAILS (if applicable), and 849-C660-07 BALLAST WATER MANAGEMENT PLAN (if applicable) and submit them to the COR and ABS as applicable during Phase II of the Contract for review and approval.

The vessel shall be furnished with a separate main bilge system for dewatering compartments and a separate ballast system (if required) for trimming out the vessel.

SPECIFIC REQUIREMENTS

Main Bilge System

The Contractor shall provide and install all pumps, manifolds, strainers, valves, piping, and gauges necessary to form a complete main bilge and emergency bilge system in accordance with ABS rules. The oily bilge system is described in Contract Paragraph C662.

The Contractor shall provide and install a main bilge suction manifold. The Contractor shall minimize the footprint of the main bilge suction manifold, while ensuring that all valves are readily accessible and free from interference during valve operation. The manifold shall be located close to the main bilge pump.

A duplex strainer shall be installed on the inlet side of the main bilge pump.

The Contractor shall supply and install self-priming, centrifugal main bilge pumps with a GPM and TDH capacity to satisfy the ABS rules.

The pumps shall be capable of being started and stopped locally at the pump and shall be connected to the vessel's IMACS (see Contract Paragraph C780). The alarms of the main bilge system shall be connected to the IMACS as well.

Ballast System (if applicable)

If required to meet the trim and heel requirements for the operational conditions as described in Contract Paragraph C155 the Contractor shall provide and install (a) pump(s), a ballast water treatment system (approved by the Regulatory bodies), manifold, strainers, valves, piping, and

gauges necessary to form a complete ballast system. The ballast system shall be installed in accordance with ABS and USCG rules.
The ballast system shall be set up for the following operations:
Filling ballast tanks
Discharging ballast tanks overboard
Transferring water between ballast tanks
A suitably sized water ballast treatment plant shall be installed. The system shall be fully compliant with the requirements of the Authorities and come with a type approval certificate (see Contract Paragraph C004).
The ballast water treatment plant shall be integrated in the piping system to fill/ drain any water from ballast tanks but shall be capable of being easily bypassed by remote operated valves.
The manifold shall be installed to allow the tanks to be lined up to the discharge or suction of the ballast pump. The Contractor shall minimize the footprint of the ballast manifold, while ensuring that all valves are readily accessible and free from interference during valve operation. The manifold shall be located close to the ballast pump.
Each ballast tank shall be serviced by a single combined suction/ discharge line. A suction bellmouth shall be provided at the termination of each line. The bellmouth shall be located as close as practical to the lowest point in tank to facilitate shallow water level suction.
A simplex strainer shall be installed on the inlet side of the ballast pump(s) for each sea chest line.
Start/ Stop/ Run Indicating Light controls shall be provided locally at the pump. A ballast pump run indicating light shall be provided in the ECR.

Ballast Tank Level System & Inclinometers

For each ballast tank, a remote reading electronic tank capacity gauge or sensor shall be installed. The gauges or sensors shall transmit the tank level to a monitor at the ballast manifold/ pump station and to a monitor in the engineer's control room and at the bridge. The gauges or sensors shall report the soundings/ullages and the volume of ballast water in each tank in gallons and percentage. Ballast tank level sensors shall be integrated with the vessels IMACS (see Contract Paragraph C780).
The Contractor shall provide inclinometers as required in Contract Paragraph C770.

System Instruction/Diagram Plates

The Contractor shall provide and install a set of engraved instruction plates for the bilge and ballast systems. Each set shall consist of a plate with the basic system layout, and a second plate with instructions on valve alignment, cross-over and priming, if applicable. The Contractor shall submit the plate designs and final locations to the COR for review and approval.

SPECIAL FEATURES

None.

DELIVERABLES

849-C660-01 MAIN BILGE SYSTEM DIAGRAM
849-C660-02 BALLAST SYSTEM (if applicable)
849-C660-03 MAIN BILGE SYSTEM CALCULATIONS
849-C660-04 BALLAST SYSTEM CALCULATIONS (if applicable)
849-C660-05 MAIN BILGE SYSTEM ARRANGEMENT AND DETAILS
849-C660-06 BALLAST SYSTEM ARRANGEMENT AND DETAILS (if applicable)
849-C660-07 BALLAST WATER MANAGEMENT PLAN (if applicable)

STANDARDS

ABS Guide for Ballast Water Treatment
33 CFR Subpart D, Ballast Water Management for Control of Nonindigenous Species in Waters of the United States
46 CFR 162.060, Ballast Water Management Systems

C662 OILY BILGE SYSTEM

GENERAL DESCRIPTION

The Contractor shall provide and install a complete oily bilge system. Besides the main bilge system described in Contact Paragraph C660, required by Class, the oily bilge system shall have additional fixed suction branches from the bilges of any machinery space containing equipment that uses oil.

REQUIREMENTS

The Contractor shall provide and install all tanks, pumps, separation equipment, manifolds, strainers, valves, piping, and gauges necessary to form a complete oily bilge system, to be used for daily operations, in compliance with ABS MVR and 46 CFR Subchapter F. Where practical a separate oily bilge system shall be installed for machinery spaces in the fore and aft part of the vessel.

Each oily bilge suction line shall be connected to the oily bilge system through a foot valve with strainer or by means of a mud-box and a stop-check valve. Valves shall be locally and remotely operated and connected to the vessel remote control and monitoring system, see Contract Paragraph C780.

The Contractor shall develop drawing 849-C662-01 OILY BILGE SYSTEM DIAGRAM, 849-C662-02 OILY BILGE SYSTEM CALCULATIONS and 849-C662-03 OILY BILGE SYSTEM ARRANGEMENT AND DETAILS and submit them to the COR and ABS as applicable during Phase II of the Contract for review and approval.

SPECIFIC REQUIREMENTS

Oily Bilge Pump & Hoses

The oily bilge pump(s) shall be air operated, double diaphragm pump(s) with a minimum capacity of 90 GPM. A suction strainer shall be installed for each oily bilge pump. The oily bilge pump(s) shall be able to pump bilge water from machinery space bilges to the bilge water settling and bilge water holding tanks and from these tanks to the shore discharge connections (located in the Oil Fill & Pump-Off Stations). The pumps shall be capable of being started and stopped locally at the pump and shall be equipped to interface to the vessel remote control and monitoring system, see Contract Paragraph C780.

Additionally, for operational/ cleaning purposes, the Contractor shall provide a valved connection with a brass cam-lock cap on the suction side of the pump(s). The Contractor shall provide four (4) 25-foot lengths of 1-inch wire reinforced PVC hose. Each segment shall be provided with the appropriate brass cam-lock fittings to connect to the suction side of the oily bilge pump(s) or other hose segments. Each hose segment shall be provided with a braided polyester color identification sleeve. The colors shall be in accordance with the system color/ marking requirements as described in Contract Paragraph C601.

The final location of oily bilge pumps and collection hoses shall be approved by the COR.

The pump(s) shall be clearly labeled “FOR OILY BILGE WATER COLLECTION USE ONLY”. Similar labels shall be provided on the hoses.

Bilge Water Tanks

The Contractor shall provide and install a bilge water settling tank and a bilge water holding tank, see Contact Paragraph C320 for specifications concerning these tanks. For both tanks, 90% high level and 95% high-high level alarms shall be installed, connected to the Integrated Machinery Alarm and Monitoring System, see Contract Paragraph C780.

Both tanks shall be provided with drains to the waste oil tank. The bilge water settling tank shall be provided with means of ‘skimming off’ oil from the top layer of the bilge water and draining this oil the waste oil tank.

In areas where it is not possible to pump clean bilge water overboard it shall be possible to lead treated bilge water to the bilge water holding tank. This tank shall be of sufficient capacity to permit continuous operation of the vessel for the period of endurance stated in Contract Paragraph C002.

Bilge Water Separator

One automatic bilge water separator shall be installed. The bilge water separator shall be sized to process all bilge water expected during the vessel operations as described in Contract Paragraph C002. The bilge water separator shall be able to process bilge water from the bilge water settling tank and from the holding tank and pump the treated water overboard though its 15-ppm monitor. The bilge water separator shall be fully compliant with the requirements of the Authorities and come with USCG type approval certificate.

SPECIAL FEATURES

None.

DELIVERABLES

849-C662-01 OILY BILGE SYSTEM DIAGRAM
849-C662-02 OILY BILGE SYSTEM CALCULATIONS
849-C662-03 OILY BILGE SYSTEM ARRANGEMENT AND DETAILS

STANDARDS

ABS Rules for Building and Classing Marine Vessels
46 CFR Subchapter F, Marine Engineering

C665 POTABLE WATER SYSTEM

GENERAL DESCRIPTION

The Contractor shall provide and install a complete potable water system, including freshwater generator(s) in accordance with, ABS, USCG Subchapter F, EM 385-1-1and these specifications. Per EM 385-1-1, drinking water on all Army floating vessels shall be provided according to 40 CFR 141 and Chapter 6 of Navy Medical (NAVMED) P-5010.

REQUIREMENTS

The Contractor shall provide and install all pumps, filters, piping, hoses, valves and tanks, necessary to form a complete potable water system. The Contractor shall develop drawing 849-C665-01 POTABLE WATER SYSTEM DIAGRAM, 849-C665-02 POTABLE WATER SYSTEM CALCULATIONS, and 849-C665-03 POTABLE WATER SYSTEM ARRANGEMENT AND DETAILS and submit them to the COR and ABS as applicable during Phase II of the Contract for review and approval.

Potable water shall be distributed throughout the vessel from the potable water tank to the sinks, toilets, showers, galley- and laundry equipment, technical installations and hose bibbs. The vessel shall be able to generate potable water out of seawater and take on potable water from an off-vessel source.

All of the potable water tank filling connections and hoses, and pump-off connections and hoses shall be unique to the Potable Water System to avoid contamination from other system(s) filling/ pump-off hoses.

The potable and hot water systems shall be sized for the crew and endurance requirements listed in Contract Paragraph C002.

SPECIFIC REQUIREMENTS

Fresh Water Generators

Two fresh water generators of the evaporative type shall be provided and installed. The fresh water generators shall be heated by HT cooling water of the main engines as described in Contract Paragraph C640. Each fresh water generator shall be provided with a sea water pump of the centrifugal type (located below the light ship waterline or provided with self-priming possibilities. For requirements concerning the (raw) feed water connection of the fresh water generators, see Contract Paragraph C645. The materials and construction of fresh water generators shall be in accordance with the manufacturer's standards.

The fresh water generators shall be complete with their own (local) controls and alarm monitoring and shall be equipped to interface the Integrated Machinery Alarm and Monitoring System, see Contract Paragraph C780.

Distribution System

A potable water distribution system shall be supplied and installed to provide service to all fixtures on the vessel requiring potable water. The system installed shall comply with all applicable guidelines set forth by EM 385-1-1. The system shall be arranged so that the entire system can be gravity drained for cold weather lay-up.

Cold-water service shall be supplied to all sinks, showers, toilets, clothes washers, hot water heaters, hose bibbs, and other consumers as required.

Hot water service shall be supplied to all sinks, showers, washing machines, dishwashers, and other consumers as required.

Stainless steel pipe shall be used for the potable water tank fill lines and from the tank to the pressure set. From the pumps to the remainder of the system the piping material shall be ASTM B-88, type K, seamless copper. All valves shall be bronze. If solder connections are used, they shall be lead free.

To assist in maintenance and repair, shut-off valves shall be supplied and installed at all hot and cold water piping outlets. These valves shall be quarter-turn ball valves, with each being easily accessible without special tools.

Since the vessel operates in cold climates, no piping shall be run on or against exterior bulkheads. All potable water-piping running through unheated spaces or the weather shall be heat traced and insulated. All hot water piping shall be insulated.

The installation shall be provided with a permanently installed system for chlorination of potable water. The chlorine dosage point shall be located at the tank's filling or recirculation pipe.

Potable Water Pressure Set

The Contractor shall provide and install (a) potable water pressure set(s) (pumps and tank). The potable water pressure set with two pumps shall be provided and installed with all required pressure switches, pressure gauges, and pressure relief valves. The pumps shall be of the in-line, centrifugal type, closed coupled and have a SS316 mechanical seal. Impeller and housing shall be made of stainless steel or bronze. Bronze pumps must have a motor with 316 stainless steel shaft extension. The potable water system shall be set up such that the pressure at any tap should be at least 15-PSI. Differential between high pressure cut-out and low pressure cut-in shall be adjustable and set at 20-PSI.

Alternatively speed controlled pumps with a variable capacity can be used to maintain the required system pressure. Appropriate pressure reducing or regulating devices shall be provided, where needed, depending upon the pressure limitations of individual items to which potable water will be supplied.

The pressure set shall be ASME approved and furnished with a pre-charged water tank. The pre-charged water tank shall be supplied with a relief valve, which is capable of discharging the full output of the pump. The pressure tank shall be equipped with a valved connection so that it can be recharged, if required, from a compressed air service outlet. The pumps shall be sized appropriately for the system based on the Contractor's system calculations (849-C665-02 POTABLE WATER SYSTEM CALCULATIONS). A suitable hose shall be provided for recharging the water tanks. The hose shall be stowed on a rack adjacent to the pressure sets. The pressure tank shall be provided with a turbulator to prevent stagnation. Pressure tank shall have stainless steel system connections and all parts in contact with water shall be coated with a durable epoxy coating.

The potable water pressure set shall be complete with their own (local) controls and alarm monitoring and shall be equipped to interface to the Integrated Machinery Alarm and Monitoring System, see Contract Paragraph C780.

Hot Water System

The Contractor shall provide and install a Hot Water System, which can either be a hot water recirculating system with calorifiers or a system with hot water heaters installed in-line in the cold potable water system.

If a hot water recirculating system is installed, the circulation pumps shall be maintenance free and have a bronze housing with ceramic impeller and the calorifier(s) shall be heated by an indirect thermostatically controlled electrical heating coil. The calorifier will consist of a double walled tank, and have a capacity as required for the complement. Hot water shall have a temperature of at least 160°F at the heater outlet.

The calorifier(s)/in-line hot water heaters shall be complete with their own (local) controls and alarm monitoring and shall be equipped to interface the Integrated Machinery Alarm and Monitoring System (see Contract Paragraph C780).

Water Filters

The Contractor shall provide and install in-line, simplex strainer filters in all potable water tank inlet lines. The filters shall have 1/16-inch perforation and shall be provided at each fill inside the containment.

The outlet of the potable water pressure set tank shall be fitted with two high flow, heavy-duty whole house water filters with drop in style cartridges. The filter shall reduce sediment, scale and chlorine taste and odor. The filter housing shall be made of stainless steel. In addition to the mechanical filtration an ultraviolet disinfection installation shall be fitted after these filters. Sample petcocks shall be provided before and after the filtration and disinfection unit(s). Isolation valves shall be installed in the inlet and outlet of each filter housing, for ease of maintenance.

Additional in-line filtration shall be provided in the system for supplying water to the galley equipment. The galley system shall be a reverse osmosis drinking water filtration system with four-stage filtration.

Potable Water Tank(s)

See Contract Paragraph C130 for potable water tank capacities. The potable water tank(s) shall be 304L stainless steel free standing or integral with the hull and shall not be positioned against the shell plating below the deepest load line (details of the construction can be found in Contract Paragraph C320).

The tank(s) shall be marked with minimum ½-inch letters “POTABLE WATER TANK” on all sides. Sample petcocks shall be provided on the tank(s). They shall be turned down and labeled.

The tank(s) shall be provided with an ABS approved tubular liquid level sight gauge with integral valves, suitable for potable water service. The liquid level gauges shall have all stainless-steel construction and each gauge shall be calibrated to show ¼ tank level, the ½ tank level, and the ¾ tank level.

The potable water tank shall have a 10% (Low-Low) alarm connected to the Integrated Machinery Alarm and Monitoring System (see Contract Paragraph C780).

A backflow-preventer shall be installed between the potable water tank and the pressure set.

The potable water tank shall be filled to capacity for provisional acceptance at the Contractor’s facility. The potable water tank and fresh water shall be sterilized, chlorinated and tested for “Full Potability.” The “Full Potability” test shall include testing for metals, anions and bacteria. The Contractor shall provide a certificate for an independent testing agency indicating that the tank and fresh water are serviceable for “Full Potability/ Drinking” water.

Potable Water Fill Stations

The potable water filling station(s) shall be located on the open deck.

At each filling station, the fill line shall terminate with a brass screw cap fastened by a chain to an adjacent bulkhead or fixture in such a manner that the cap will not touch the deck when hanging free. The filling connection shall be clearly marked by means of ½-inch lettering (minimum), stamped on a non-corrosive label plate, or equivalent.

A weather-tight enclosure shall be provided for the fill station with a lockable hinged door with staple to hold it open. The door shall be provided with a gasket to prevent the intrusion of water.

Two (2) 1½-inch filling hoses, each 50-foot in length shall be provided for loading potable water from shore sources. The threads of the filling connections shall match the hose sources. The hose shall be mounted on a portable rack in such a manner as to provide a means for easy pay-out. The hose shall be suitable and approved for potable water service, label with the appropriate designation, and stored separately from all other hoses.

Hose Bibbs & Fixtures

All fixtures (sinks, etc) are described in Contract Paragraph C437.

The Contractor shall supply and install freeze-proof hose bibbs on each deck. The hose bibbs shall be located in such way that any location of the deck can be reached with a 75’ hose. The freeze-proof hose bibbs shall be outfitted with a vacuum breaker.

Interior hose bibbs shall also be installed in the engine room, machinery, technical and aux machinery spaces. Interior hose bibbs in the spaces listed above shall be located such that all portions

of the space may be reached by a 75' hose. The hose bibbs furnished shall be outfitted with a vacuum breaker.
Up to (10) additional hose bibbs shall be provided and installed at the direction of the COR.

SPECIAL FEATURES

None.

DELIVERABLES

849-C665-01 POTABLE WATER SYSTEM DIAGRAM
849-C665-02 POTABLE WATER SYSTEM CALCULATIONS
849-C665-03 POTABLE WATER SYSTEM ARRANGEMENT AND DETAILS

STANDARDS

International Health Regulations (IHR) of WHO
European Union (EU), Drinking-Water Directive (DWD) 98/83/EC
MLC 2006 (Standard A3.2-Food & Catering)
World Health Organization (WHO), Guide to Ship Sanitation, 3rd Edition, 2011
WHO Guidelines for Drinking Water Quality, 2008

C667 SANITARY, SEWAGE & GREYWATER SYSTEM

GENERAL DESCRIPTION

The Contractor shall provide and install a complete sanitary, sewage and greywater system in accordance with ABS MVR, 46 CFR Subchapter I and F and these specifications.

REQUIREMENTS

The Contractor shall provide and install all pumps, filters, piping, hoses, and valves necessary to form complete systems. The Contractor shall develop drawing 849-C667-01 SANITARY, SEWAGE, & GREYWATER SYSTEM DIAGRAM, 849-C667-02 SANITARY, SEWAGE, & GREYWATER SYSTEM CALCULATIONS, and 849-C667-03 SANITARY, SEWAGE, & GREYWATER SYSTEM ARRANGEMENT AND DETAILS, and submit it to the COR and ABS during Phase II of the Contract for review and approval.

A Marine Sanitation Device (MSD) for treatment of the sanitary, sewage and grey water discharge shall be provided and installed which shall meet the requirements of the Regulatory bodies. The capacity of the complete system and MSD shall be based on a domestic system for the number of persons on board and satisfy the endurance as described in Contract Paragraph C002.

The sanitary, sewage and greywater system shall be of "freeze proof" design. All horizontal greywater and sewage piping shall be installed with a slope of at least ¼-inch per foot and use the minimum number of elbows (long radius or 2x 45°). The system shall also be installed with cleanout connections and low point drains and be arranged so that the entire system can be gravity drained for cold weather lay-up.

All plumbing fixture (i.e. toilets, sinks (where possible) and shower) drains shall be connected to the sanitary, sewage and grey water system. Technical (HVAC for instance) equipment drains shall be connected to the sanitary and grey water system. Each plumbing fixture and technical equipment drain shall be separately trapped by a water seal trap, placed as close as possible to the fixture outlet, except where fixtures have integral traps. No fixture shall be double-trapped. All traps shall be easily accessible. All drain lines shall all be vented to the atmosphere at the bridge top level through a gooseneck via the main collector/ riser pipe(s). Special attention shall be given to the location of the vents, to assure that no smells occur near or in the crew quarters or other continuously manned areas.

The (treated) sewage/ grey water holding tank(s) shall be equipped with a pump-off/ suction connection located in the Waste Pump-Off Station. The connection shall have a cap fitted to the end of the pipe. The system shall be designed so that the vessel can pump-off (treated) sewage or greywater via the transfer pump or a landed-based suction truck can connect and evacuate the fluid. The holding tanks shall be equipped with flushing pipes. The tank capacities shall be in accordance with the endurance stated in Contract Paragraph C002.

SPECIFIC REQUIREMENTS

Sewage & Grey Water System

The sanitary and grey water from all sink drains, shower drains, washing machines and technical equipment drains shall be led into a main collector discharge pipeline, connected to the MSD and to the grey water holding tank(s).

Drain pipes from the galley (from the food grinder and from the potato peeler) shall be separated and led directly to the MSD with a branch with valves enabling direct discharge to overboard. This drain line shall be as direct and straight as possible, with a minimum nominal diameter of 3". This drain line shall be fitted with a grease trap, located in an accessible space. Drain requirements are described in Contract Paragraph C669.

The sewage water and grey water piping systems shall be separate systems. All (sewage and grey) water from the hospital shall be led separately but directly to the MSD. The sewage and grey water systems shall contain the required, isolation valves and cleaning plugs (stainless steel) to enable maintenance and unclogging. Inspection openings shall be located in such a way as to ensure that the piping can be reached at all points. Inspection points shall be located between 50 and 75 ft apart.

If a vacuum system is installed, the collecting pipes of the sewage water system shall be subdivided and led as main branches to the vacuum tank, enabling shut off of main branches for finding leaks (at least one branch is provided for each deck level). Vacuum gauges shall be fitted on the vacuum collector pipe and on each of the main branches.

If a 'gravity' system is installed, the collecting pipes of the sewage system shall be led into a main collector discharge pipeline connected to the sewage installation (MSD).

Piping material used for the main part of the sanitary, sewage and grey water piping shall be PVC, except those parts of the system that have different requirements according to Class (i.e. overboard connections).

Marine Sanitation Device

The MSD shall be equipped with a transfer pump to pump the treated sewage/ grey water to either the (treated) sewage/ grey water holding tank(s) or directly overboard or to a Waste Pump-Off Station. Sludge of the MSD shall be piped into the waste oil tank. The MSD shall be complete with (local) controls and alarm monitoring and shall be connected to the vessels Integrated Monitoring, Alarm, and Control System (see Contract Paragraph C780)

SPECIAL FEATURES

None.

DELIVERABLES

849-C667-01 SANITARY, SEWAGE, & GREYWATER SYSTEM
849-C667-02 SANITARY, SEWAGE, & GREYWATER SYSTEM CALCULATIONS
849-C667-03 SANITARY, SEWAGE, & GREYWATER SYSTEM ARRANGEMENT AND DETAILS

STANDARDS

IMO International Convention for the Prevention of Pollution from Ships (MARPOL) 73/ 78 Annex IV
Section 312 of the Clean Water Act

C669 DRAINAGE SYSTEM

GENERAL DESCRIPTION

The Contractor shall provide and install a drainage system for all exterior (weather) decks and all interior decks/ spaces, to facilitate water draining and avoid pockets of standing water, in accordance with ABS and these specifications.

REQUIREMENTS

The Contractor shall provide and install all components, piping, deck drains, and valves necessary to form a complete drainage system for all exterior and interior decks as specified below.

The Contractor shall develop drawing 849-C669-01 DECK DRAINAGE SYSTEM DIAGRAM and 849-C669-02 DECK DRAINAGE SYSTEM ARRANGEMENT AND DETAILS and submit them to the COR and ABS as applicable during Phase II of the Contract for review and approval.

All scupper and drain lines are to be sloped at least ¼" per ft and provided with sufficient connections (at the discretion of the COR) for inspection and flushing. The Contractor shall provide at least one cleanout on each deck. Internal drains, where an adequate downslope is not feasible, may be routed to a bilge well.
Internal deck drains shall be located in all technical and accommodation spaces where no waste water drains (as described in Contract Paragraph C667) or bilges are fitted, such as the galley/ mess area, provision stores, HVAC room, laundry, heads and so on. All internal deck drains shall be provided with siphons and led to common sloped collection pipes, routed to the grey water tank.
Separate drains and a stainless-steel grease trap are to be provided between the galley and the grey water tank. The grease trap shall be fitted with a drain routed to the waste oil tank.
Drains for cleaning water shall be installed with gutter ways directly in front of all storeroom doors.
All drains shall be supplied with corrosion resistant, removable strainer plates. External deck drains and scuppers shall be provided on all outside decks. Each deck drain shall be piped down the side of the deckhouse to the level below for discharge. Sufficient deck drains/ scuppers shall be provided to ensure all water collected on the decks drains properly overboard in the intended trim conditions (as described in Contract Paragraph C155).
At the discretion of the COR, the Contractor shall install a minimum of ten (10) additional drains/ scuppers on each deck to minimize/ eliminate water "pooling" areas.
The main deck bulwark shall be designed with the necessary freeing ports to satisfy ABS and USCG rules.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

849-C669-01 DECK DRAINAGE SYSTEM DIAGRAM
849-C669-02 DECK DRAINAGE SYSTEM ARRANGEMENT AND DETAILS

STANDARDS

See Contract Paragraph C003.

C670 VENTS, SOUNDS, FILLS, AND OVERFLOWS

GENERAL DESCRIPTION

The Contractor shall provide and install a complete system of vents, sounds, fills and overflows in accordance with ABS, USCG Subchapter F and these specifications.

REQUIREMENTS

The Contractor shall develop drawing 849-C670-01 VENTS, SOUNDS, FILLS, & OVERFLOWS DIAGRAM, 849-C670-02 VENTS, SOUNDS, FILLS, & OVERFLOWS CALCULATIONS, and 849-C670-03 VENTS, SOUNDS, FILLS, & OVERFLOWS ARRANGEMENT AND DETAILS and submit them to the COR and ABS as applicable during Phase II of the Contract for review and approval.

Refer to the respective system Contract Paragraphs for specific details on vents, sounds, fills and overflows.

All vents, fills, and sounding pipes shall be located such that they do not obstruct any walkways or maintenance spaces. Vent pipes shall not be combined with sounding pipes. Where practicable, the vent pipes of all tanks containing oil shall be routed to the fuel lockers. Vents of other tanks, voids and cofferdams to be routed to open deck.

SPECIFIC REQUIREMENTS

Vents

Each vent shall terminate by way of a return bend or utilize a vertical ball-type check valve. Vent construction, size and height shall be in accordance with ABS rules.

All tanks, voids, cofferdams (and other spaces which are not fitted with alternative ventilation arrangements) shall be provided with vents.

All oil tanks shall have a stainless-steel flame screen installed on all vents in accordance with ASTM F1273-91. All potable water, sanitary, sewage and greywater tank, sea chest, ballast tank, void, cofferdam and inner bottom vents shall be fitted with stainless steel insect screens. Vent pipes of black and grey water tanks to be located away from any air intake or openings and to assure that no smells occur near or in continuously manned areas.

Fills

Fills shall be properly sized and separate from vent and sounding pipes. Filling connection locations and details shall be in accordance with the respective Contract Paragraphs for each system and regulatory body requirements. Fill locations shall be approved by the COR during Phase II.

Each filling pipe to be provided with a shut-off valve, a pressure indicator, a spool-piece with a connection flange, a blind flange and a sampling flange.

The fuel oil fill system shall be provided with overpressure valves as required, discharging to the fuel oil overflow system.

Filling pipes on the deck shall be provided for all consumable tanks with a capacity of more than 275 gallons. Filling pipes shall be routed to the “oil fill lockers” and or “fuel lockers” or dedicated “potable water fill stations”, for arrangement see Contract Paragraph C201. The potable water filling station will be separated from the other filling and discharge pipes.

Sounding Tubes

Sounding tubes shall be provided and installed where required by the regulations and in accordance with the respective system Contract Paragraphs. Sounding tube locations shall be approved by the COR during Phase II.

Sounding tubes which terminate in engine rooms and other machinery spaces shall be supplied with a standpipe and bronze self-closing sounding cock.

Each sounding tube shall be run as straight as practical. Below the sounding tube, at the tank bottom, there shall be a 6” x 6” striking plate of at least 3/16-inch thickness, seal welded to the tank bottom.

Two sounding tapes shall be provided for every different type of fluid stored on board the vessel, for manual sounding.

Remote Sounding

In addition to the manual sounding tubes a remote sounding system shall be installed on all fuel tanks, ballast tanks (if applicable) and on the potable water tanks. See Contract Paragraph C780 for specific information on this remote sounding system.

Overflow

An overflow system shall be installed where required by the regulations and in accordance with the respective system Contract Paragraphs. Overflows to be sized based on the size of the filling line/ capacity of the filling pump(s), and shall be large enough to prevent structural damage by over pressurization. Overflows shall be approved by the COR during Phase II.

SPECIAL FEATURES

None.

DELIVERABLES

849-C670-01 VENTS, SOUNDS, FILLS, & OVERFLOWS DIAGRAM
849-C670-02 VENTS, SOUNDS, FILLS, & OVERFLOWS CALCULATIONS
849-C670-03 VENTS, SOUNDS, FILLS, & OVERFLOWS ARRANGEMENT AND DETAILS

STANDARDS

ASTM F1273-91, Standard Specification for Tank Vent Flame Arresters.

C675 FIREMAIN

GENERAL DESCRIPTION

The fire main system shall be designed to protect the vessel in the event of a fire in any space or area of the vessel. The fire main system shall service all fire stations.

REQUIREMENTS

The Contractor shall provide and install two separate, complete fire main systems, each in accordance with ABS, USCG Subchapter I and these specifications. A crossover line shall be provided so either system can be supplied by either pump. The Contractor shall provide and install all components, piping, pumps, valves, and vents necessary to form a complete fire main system. The Contractor shall develop drawing 849-C675-01 FIRE MAIN SYSTEM DIAGRAM, 849-C675-02 FIRE MAIN SYSTEM CALCULATIONS, and 849-C675-03 FIRE MAIN SYSTEM ARRANGEMENT AND DETAILS for submittal to the COR and ABS as applicable during Phase II of the Contract for review and approval. The Contractor shall design the fire main system to be a dry system which shall only be under pressure during use.

SPECIFIC REQUIREMENTS

Fire Stations

At a minimum, fire stations shall be supplied in accordance with ABS and USCG requirements.

Fire Pumps

The Contractor shall supply and install two fire pumps sized and located in accordance with ABS and USCG Subchapter I requirements. The pumps shall be identical self-priming, centrifugal pumps. The pumps shall be electric drive type, with the pump and motor furnished as a matched set from the pump manufacturer. The motor controller for each pump shall be set-up with low-voltage release. The flexible connections/expansion joints to the pump and throughout the system shall be single sphere EPDM flame resistant in accordance with ASTM F1123-87. The joints shall be wrapped in an A-60 equivalent fire rate blanket, aluminum faced, ABS type approved.

A relief valve shall be provided and installed on the discharge of each fire pump that relieves overboard of the vessel. The relief valve shall be provided with isolation valves and an emergency bypass valve. A pressure gauge and transducer shall be fitted on the discharge side of each fire pump. The electrical overload protection on the fire pump shall be removed.

A placard shall be located at the fire pump indicating that the isolation valve downstream of the fire pump shall always remain open, except for during maintenance periods. Valves between the sea chest and fire pump shall be locked open.

International Shore Connections

The vessel shall be provided with an International Shore Connection on each side of the vessel (P/S) in accordance with 46 CFR 95.10-10.

Controls and Monitoring

Controls and monitoring of the fire main system shall be in accordance with ABS MVR, Parts 4-7 and 4-9-6.

SPECIAL FEATURES

The fire main shall also be capable of being used as a raw water washdown for the weather decks. In addition, the fire main shall supply water to the anchor chain washdown system (see Contract Paragraph C412).

DELIVERABLES

849-C675-01 FIRE MAIN SYSTEM DIAGRAM
849-C675-02 FIRE MAIN SYSTEM CALCULATIONS
849-C675-03 FIRE MAIN SYSTEM ARRANGEMENT AND DETAILS
Equipment Cutsheets

STANDARDS

46 CFR Subchapter I, Cargo and Miscellaneous Vessels
ASTM F1123-87, Standard Specification for Non-Metallic Expansion Joints
ABS MVR, Parts 4-7 and 4-9-6
46 CFR 95.10-10, Fire Hydrants and Hose

C677 FIRE EXTINGUISHING SYSTEMS

GENERAL DESCRIPTION

The Contractor shall provide fixed fire extinguishing systems in accordance with the requirements of 46 CFR Subchapter I Subpart 95.05-10. In addition, the Contractor shall provide and install a fixed fire extinguishing system for the spaces/compartments where the dredge pump motors are installed. The systems shall be designed and installed in accordance with the standards set forth by the USCG in 46 CFR, subchapter I, subpart 95.

REQUIREMENTS

The Contractor shall develop fixed fire extinguishing deliverables in accordance with subsection E of this specification section. The drawings shall be submitted to ABS and the COR for review and approval.

The Contractor shall coordinate pull station locations with the COR during Phase II.

System piping shall be galvanized steel, ASTM A53-20 or A106. Location and number of the nozzles shall provide the necessary quantity and uniform distribution of the extinguishing agent.

The system shall incorporate lockout valve(s) to be normally locked open, and only locked closed during system maintenance.

SPECIFIC REQUIREMENTS

Location of Cylinders

Firefighting agent cylinders shall be located in a dedicated space(s), accessible from the weather. The cylinders shall be mounted in accordance with USCG Rules as defined in 46 CFR Subpart 95. The door to the cylinder space shall be in accordance with specification section C415. Provisions shall be made for the removal and installation of the cylinders. Weighing bars shall be installed for each rack to allow for the weighing of the cylinders, as applicable.

Alarms & Shutdowns

Audible and visual alarms shall be provided in the spaces protected which will automatically sound prior to discharge of firefighting agent into the spaces.
A discharge delay of at least 20 seconds shall be provided in order to allow personnel in these spaces time to evacuate and allow the ventilation system time to wind down. Actual discharge delay, based on space location, size, and means of egress, shall be coordinated with the COR during Phase II. Provisions shall be made for the automatic shutdown of all air handler units, ventilation fans and closure of the louvers when the fixed firefighting system is activated. See Specification section C685.

Instructions and Warnings

Instructions and warnings shall be posted in accordance with USCG requirements. As a minimum, the following shall be posted:

At each pull/operating station, clear instructions relating to the operation of the system.
Warnings of protection at the entrance to the space protected.
At the entrance to the cylinder room(s), a warning sign that reads, "CAUTION: FIREFIGHTING AGENT IS STORED IN THIS SPACE. KEEP DOOR CLOSED AT ALL TIMES."

SPECIAL FEATURES

None.

DELIVERABLES

849-C677-01 FIXED FIRE EXTINGUISHING SYSTEM DIAGRAM
849-C677-02 FIXED FIRE EXTINGUISHING SYSTEM CALCULATIONS
849-C677-03 FIXED FIRE EXTINGUISHING SYSTEM ARRANGEMENT AND DETAILS

STANDARDS

46 CFR, Subchapter I, Subpart 95.05-10, Fixed Fire Extinguishing Systems
46 CFR, Subchapter I, Subpart 95, Fire Protection Equipment

C678 FIRE DETECTION & ALARM SYSTEM

GENERAL DESCRIPTION

The Contractor shall provide and install an approved, fully addressable fire detection system with a central display unit in the Navigation Bridge indicating presence and location of fire/smoke in any compartment or space on the vessel except tanks and voids. A similar display shall be installed in the Engine Control Room. All components necessary to form the complete electrical fire detection and alarm system shall be USCG approved and in compliance with ABS and SOLAS.

REQUIREMENTS

The fire detection system shall be powered from its own dedicated DC power source with battery charger, fed from both a primary ship service power source and a secondary emergency power source. The system battery bank shall be sized in accordance with regulatory body requirements for an emergency transitional power source of 30 minutes duration and shall be oversized by 20% to allow for growth.

Ship shall be divided into main vertical and horizontal zones by thermal and structural boundaries complying with the rules and the fire detection system shall be installed throughout. Machinery spaces shall be separate zones.

All detection and alarm system components shall be supplied by the manufacturer of the central control/processing/display units. The system shall have, at a minimum, the following:

Addressable, dynamic supervision of intelligent devices and status reporting
16 zones minimum and expansion capabilities
Control functions for normal responses readily accessible without opening panel
Common detector mounting base for same series devices (interchangeability)
Programmable relay bases.

The system shall be provided with one remote command/display unit installed in the Engine Control Room and at least one other in a location to be determined by the COR's chosen representative or the Government. The panels shall be provided with means of acknowledging all alarm and fault signals, with capability to manually silence audible alarms. Fire detection panels must clearly distinguish between normal, alarm, acknowledge alarm, fault, and silence conditions.
Activation of any detector or manual call station shall be alarmed at the central and remote control/display panels. The manual call station circuits shall not include an automatic alarm verification sequence applicable to the detectors. If signal is not acknowledged within two (2) minutes, an audible alarm shall automatically sound throughout the crew accommodations, service spaces, control stations and Category A machinery spaces.

The detection system shall be designed to sound an audible alarm to be heard throughout the vessel when a fire has been detected. The audible alarm tone shall be different than the General Alarm audible sound.

Manually Operated call points shall be located at Deckhouse exits and readily accessible in passageways of each deck such that no part is more than 65 feet away from a manually operated call point.

If a fire has been detected in any space other than the engine room, the system shall be set up to automatically shut down the HVAC system serving these spaces as well as any ventilation fans to these spaces. The means provided for stopping power ventilation to machinery spaces is to be entirely separate from means provided for stopping ventilation for other spaces and in compliance with ABS rules in the case of fire or other emergency.

CO monitors/detectors shall be installed in all enclosed occupied spaces.

Automatic fire detection system alarm horn/strobe units shall be installed as required by SOLAS regulations. The alarm horn/strobes shall be activated in accordance with the regulations. A red indicating strobe light shall be installed on the bridge top in order to give a visual signal of the activation of the fire detection system.

The electrical fire detection and alarm system components shall be listed by Factory Mutual and UL for the intended application

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

849-C678-01 FIRE DETECTION & ALARM SYSTEM

STANDARDS

ABS Rules for Building and Classing Marine Vessels
IMO- International Code for Fire Safety Systems (FSS Code)
International Convention for the Safety of Life at Sea (SOLAS)
ASTM F1198-92, Standard Guide for Shipboard Fire Detection Systems
Code of Federal regulations.

C679 FIRE SAFETY EQUIPMENT

GENERAL DESCRIPTION

Contractor shall supply all fire safety equipment in accordance with SOLAS, ABS and USCG Rules.

REQUIREMENTS

The Contractor shall provide all fire safety equipment to bring the vessel into compliance with the requirements listed in Contract Paragraph C004.

SPECIFIC REQUIREMENTS

The Contractor shall provide, at a minimum, all equipment listed below. The list below is not exhaustive, and the Contractor shall supply any additional equipment required by regulatory authorities.

The vessel shall be provided with at least five emergency gear lockers, one of which shall contain the fireman's outfit. The Contractor shall make an effort to distribute the gear lockers evenly throughout the vessel. Exact locations of gear lockers shall be approved by the COR.

Portable Fire Extinguishers

The Contractor shall supply and install portable fire extinguishers in accordance with 46 CFR Subchapter I, Subpart 95.50, ABS MVR 4-7-2/3.5, and ABS MVR 4-7-3/15.

At a minimum, the Contractor shall provide the following types and quantities of fire extinguishers, with stowage locations to be identified by the COR During Phase III:
20# ABC – Qty. 35
20# BC – Qty. 30
The Contractor shall also supply sufficient spare extinguishers to satisfy the requirements of ABS MVR 4-7-3/15.1.2. Spare extinguishers shall be distributed evenly among the five fire gear lockers. In addition to the extinguishers listed above to be located on the vessel, each small boat shall (launch, rescue boat) be provided with a 2.5# ABC portable fire extinguisher.
All extinguishers shall be USCG approved, and supplied with racks or holders for mounting in accordance with USCG rules and satisfy the requirements of USCG Subchapter I.

Fire Axes

Ten fire axes shall be provided and installed in accordance with 46 CFR Subchapter I, Subpart 95.60. Fire axe mounting locations are to be coordinated with the COR during Phase II. The fire axes shall have a pick head and mounting brackets.

Fire Blankets

The Contractor shall provide five 56”x80” wool fire blankets in bags. One fire blanket shall be stowed in each emergency gear locker.

Damage Control Kits

The Contractor shall provide five pre-packaged damage control kits, one for each emergency gear locker. Damage control kits shall be of appropriate size for the vessel and shall be approved by the COR prior to purchase.

IR Temperature Guns

The Contractor shall provide five high-temperature, non-contact infrared thermometers, one for each emergency gear locker. IR thermometers shall be capable of measuring temperatures of at least 1000°F, shall be actuated by a single, large trigger, and shall have an easy-to-read digital display.

Fireman’s Outfit

The Contractor shall provide at least six complete sets of fireman’s outfit, as defined by ABS MVR 4-7-3/15.5. Fireman’s outfit shall be stowed in a single emergency gear locker, the location of which shall be approved by the COR during Phase II.

Emergency Escape Breathing Devices (EEBD)

The Contractor shall provide EEBD’s in accordance with ABS MVR 4-7-3/15.7. In addition, the Contractor shall provide up to five additional EEBD’s to be located by the COR during Phase III.

Fire and Safety Plans

The Contractor shall produce a Fire and Safety Plan for the vessel. The Fire and Safety Plan shall contain all elements required for a Fire Control Plan in accordance with the ABS Marine Vessel Rules (4-7-1/9) and 46 CFR Subchapter I, Subpart 91.55-5. The Plan shall also document the locations of all of the vessel’s safety equipment, as listed in Contract Paragraph C445.
The draft Fire and Safety Plan shall be submitted for review and approval by the COR and ABS during the Phase II. During Phase III, the Contractor shall update the drawing to reflect the final equipment list and locations. This drawing shall be approved onsite by the COR, or their designated representative, and also submitted to ABS for final review and approval.
After approval, framed paper copies of the plan shall be provided and installed. There shall be a printed Fire and Safety Plan posted in the main passageway of each deck, one in the ECR, one on the bridge, and up to four additional locations to be selected by the COR during Phase II. In addition, two printed copies shall be installed in watertight enclosures on the exterior of the deckhouse, one on each side of the vessel, located in close proximity to the International shore connection where practicable. An additional laminated copy shall be placed under the Plexiglass chart table top on the bridge. The plans shall be plotted large enough to easily read all of the features and details, and in color. The final size of each plan shall be approved by the COR. The initial drawing during Phase II shall be numbered 849-C679-01 FIRE AND SAFETY PLAN.

SPECIAL FEATURES

None.

DELIVERABLES

849-C679-01 FIRE AND SAFETY PLAN

STANDARDS

46 CFR Subchapter I, Subpart 95.50, Hand Portable Fire Extinguishers and Semiportable Fire Extinguishing Systems, Arrangements and Details
ABS Marine Vessel Rules (4-7-2/3.5), Portable Extinguishers
46 CFR Subchapter I, Subpart 95.60, Fire Axes
ABS Marine Vessel Rules (4-7-3/15), Miscellaneous Fire Fighting Equipment
ABS Marine Vessel Rules (4-7-1/9), Fire Control Plan
46 CFR Subchapter I, Subpart 91.55-5, Plans and Specifications Required for New Construction

C685 HVAC

GENERAL DESCRIPTION

The Heating, Ventilation, and Air Conditioning system shall be calculated and designed in accordance with Regulatory Body requirements for year-round comfort under the environmental conditions listed in the Operating Profile of the vessel (See Contract Paragraph C002). The system shall be installed and commissioned complete with all components and controls necessary for satisfactory operation and performance.

REQUIREMENTS

The Contractor shall perform heating, cooling and ventilation load calculations in order to size the air conditioning, heating and ventilation system for the vessel. The heating, cooling and ventilation load calculations along with cutsheets of the equipment selected shall be submitted in Phase II for review and acceptance by the COR prior to the purchase of any equipment by the Contractor.

The drawings and calculations to be developed by the Contractor and submitted to the COR and ABS for review and approval in Phase II are:

849-C685-01 HVAC SYSTEM DIAGRAM
849-C685-02 MACHINERY SPACES VENTILATION SYSTEM
849-C685-03 ACCOMMODATION AND BRIDGE HVAC SYSTEM
849-C685-04 DECKHOUSE HEATING & COOLING LOAD CALCULATIONS
849-C685-05 MACHINERY SPACES HEATING & VENTILATION LOAD CALCULATIONS

The heating and cooling loads shall be based on criteria from SNAME Technical and Research Bulletins 4-7 and 4-16, ISO 8861:1998 Shipbuilding – Engine-Room Ventilation in Diesel-Engined Ships – Design Requirements and Basis of Calculations and from the ASHRAE Load Calculations Application Manual. The vessel HVAC load calculations shall be based on the environmental conditions listed in the Operating Profiles (See Contract Paragraph C002) and ensure that the HVAC system is adequate for the entire range of operating conditions.

Air -conditioning shall be provided by a centralized chilled water system serving various air handling units (AHUs). Conditioned ventilation air shall be supplied to each conditioned space on the basis of 15 cfm/person, with some outside air mixed with the recirculated air.

The heat load calculations shall also account for the electrical and electronics equipment in the Bridge, electronics room(s), office(s), engineer's control room, and any other space. These calculations shall allow for the required circulation of conditioned air per the ASHRAE manual and shall be sufficient for all selected equipment.

Any equipment selected shall be able to meet the temperature criteria and shall be suitable for shipboard extreme motions, vibrations, and the corrosive marine environment.

All Air Handling Units shall be dual wall, constructed of marine grade materials, with condensate collection pan of adequate design to prevent sloshing and spillage caused by ships motions with minimum ¾" diameter drain. AHUs shall be insulated to prevent secondary condensation. Each AHU shall have its own thermostat to regulate the supply air temperature to a temperature between 55 degrees and 70 degrees F.

All heating units shall be of good commercial marine quality and constructed in accordance with regulatory body requirements.

All duct joints shall be tight and all penetrations through spaces shall be sealed. Duct penetrations shall maintain the fire and watertight boundary requirements of the adjacent structure.

SPECIFIC REQUIREMENTS

Deckhouse and Bridge HVAC

The HVAC systems serving the accommodation spaces shall consist of centralized AHUs with terminal reheat systems ducted to each space served and with adjustable, programmable bulkhead mounted thermostats located within each compartment. The bridge shall be served by an independent AHU.

Each air handler shall be provided with controls linked to the fire detection and alarm system. All of the air handlers shall shutdown with the activation of the fire detection and alarm system (See Contract Paragraph C678).

System commissioning and startup shall be performed by the HVAC equipment manufacturer and/or manufacturer authorized factory representative.

Galley

A dedicated air handler, supply fan, exhaust fan, and ductwork system shall be provided for the galley. In addition, a commercial marine quality exhaust hood with integral grease extractor, grease collection, wash system and fire extinguishing system shall be provided. The Galley HVAC shall operate with a slight negative pressure during all modes of operation.

Engine Room Ventilation/Machinery Space(s) Ventilation

The Contractor shall provide and install mechanical supply and exhaust ventilation systems for the engine room and other machinery spaces.

Ventilation Calculations

The ventilation system shall be designed to:

- Ensure the Engine Room temperature doesn't exceed 122°F (50°C) with all engines operating at MCR. Other machinery spaces shall be ventilated to ensure space temperature does not exceed 113°F (45°C) with equipment operating at full load and maximum ambient conditions.
- Provide positive pressure to the entire space at all times.
- Account for carrying away the radiated heat of all diesel engines operating at the engines' maximum rating at the same time. For other machinery spaces, the ventilation system shall account for carrying away radiated heat of electro-mechanical equipment (pumps, drives, HPUs, chiller plants)
- Account for the combustion air requirements of all diesel engines.
- Supply and carry away the proper amount of air for all other equipment operating in the space.
- During the heating season, heat shall be provided by unit heaters to maintain a minimum temperature of 40°F (5°C) in all machinery spaces with all ventilation secured and no equipment running.

The Contractor shall perform calculations to determine the sizes of the supply inlets and exhaust outlets required and the size of the supply and exhaust fans required based on Heat Load Calculations and ASHRAE Handbook Fundamentals and SMACNA HVAC Systems Duct Design. The calculations along with cutsheets of the equipment selected shall be submitted during Phase II for review and acceptance by the COR prior to the purchase of any equipment by the Contractor.

Supply Fans

Supply fan(s) shall be installed with watertight intake cowling. Intake louvers shall be positioned to minimize noise along the exterior sides of the vessel and shall be fitted with an automatic, balanced type louver with blade seal and stainless-steel insect screen. The intake louvers shall close automatically upon activation of the fixed fire suppression system. See Contract Paragraph C677.

The supply fans provided shall be marine type duct axial blowers, with TEFC, 480-volt AC, three phase motor. The motor controllers shall be VFDs, sized for the full rating and operating speed range of the fans. The motor controllers for the fans shall be set-up with low voltage release. See Contract Paragraph C750.

Diffusers in the space(s) shall be installed as required to ensure adequate air flow to all areas in the compartment.

Exhaust Fans

Exhaust fan(s) shall be provided and mounted with gaskets and their outlet be fitted with an automatic balanced type louver with blade seal and stainless-steel insect screen. The exhaust louvers shall close automatically upon activation of the fixed fire suppression system. See Contract Paragraph C677.

The exhaust fan(s) provided shall be marine type duct axial blowers, with TEFC, 480-volt AC, three phase motors. The motor controllers shall be VFDs, sized for the full rating and operating speed range of the fans. The motor controller for each fan shall be set-up with low voltage release. See Contract Paragraph C750.

Fire Suppression System Interconnection

Provisions shall be made for the automatic shutdown of the supply and exhaust ventilation fans and the automatic closure of the louvers of the supply and exhaust ventilation fans for the engine room and/or machinery spaces upon activation of the fixed fire suppression system. See Contract Paragraph C677.

Emergency Stop Buttons

The Contractor shall provide and install emergency stop buttons for the supply and exhaust fans exterior to the engine room and machinery spaces, respectively, and provide remote shutdown in accordance with USCG and ABS requirements.

Engineer's Control Room (ECR)

The ECR shall have a self-contained air conditioning unit sized to meet equipment and personnel heat loads with all equipment operating at full capacity. Air shall be exhausted, and outdoor replenishment air shall be supplied to the space to maintain air quality.

Additional Requirements for all Fans/Louvers

All supply and exhaust fans shall be mounted on manufacturer supplied spring vibration isolators and shall be isolated from the duct with flanged flexible duct connectors.

Louvers/dampers shall open while fans are operating and close when secured. All dampers shall include a motorized actuator to open/close the damper, as well as a spring closure so that the damper closes upon loss of power.

All exterior bulkhead penetrations for supply air (make-up air) and exhaust fans shall include louvers with stainless steel insect screens and exterior hinged closures.

Heating

Unit Heaters shall be the horizontal discharge marine type, with individually adjustable, rattle-free louvers, thermostatically controlled fan motors, single speed. Unit heaters shall have a final maximum air temperature of 125°F (51°C). Unit heaters shall not be installed in accommodation spaces.

All heaters shall be provided with factory installed integral thermostats, "summer-fan" switch, factory mounted 30A rated disconnect switch, and factory wall/ceiling mounting bracket kit.

Provisions shall be made for the automatic shutdown of heaters upon activation of the fire detection system. See Contract Paragraph C678.

Provisions shall be made for the automatic shutdown of heaters upon activation of the fixed fire suppression system. See Contract Paragraph C677.

SPECIAL FEATURES

Console Fans

Ship's consoles shall be provided with console ventilation fans to avoid overheating of internal equipment (see Contract Paragraph C255).

Ventilation and Duct Mounting

Where necessary to suit the noise and vibration requirements of Contract Paragraph C180, the Contractor shall provide flexible mounting of ventilation ducts.

DELIVERABLES

849-C685-01 HVAC SYSTEM DIAGRAM
849-C685-02 MACHINERY SPACES VENTILATION SYSTEM ARRANGEMENT AND DETAILS
849-C685-03 ACOMMODATION AND BRIDGE HVAC SYSTEM ARRANGEMENT AND DETAILS
849-C685-04 DECKHOUSE HEATING & COOLING LOAD CALCULATIONS
849-C685-05 MACHINERY SPACES HEATING & VENTILATION LOAD CALCULATIONS
849-C685-06 DECKHOUSE AIR CONDITIONING DUCT PRESSURE LOSS CALCULATIONS
849-C685-07 MACHINERY SPACES VENTILATION SYSTEM DUCT PRESSURE LOSS CALCULATIONS
HVAC Equipment Cutsheets

STANDARDS

SNAME Technical and Research Bulletins 4-7, Thermal Insulation Report
SNAME Technical and Research Bulletin 4-16, Recommended Practices for Ship Heating, Ventilation & Air Conditioning Design Calculations
ASHRAE Load Calculations Application Manual
ASHRAE Handbook – Fundamentals
ASHRAE Handbook – Refrigeration
ASHRAE Handbook – HVAC Applications
ASHRAE Handbook – HVAC Systems and Equipment
ANSI/ASHRAE Std 26-2010, Mechanical Refrigeration and Air Conditioning Installations Aboard Ships
SMACNA HVAC Systems Duct Design
ISO 8861 Shipbuilding – Engine Room Ventilation in Diesel-Engined Ships

C687 REFRIGERATION

GENERAL DESCRIPTION

Two (2) separate marine refrigeration systems using EPA-approved, non-ozone-depleting refrigerants shall be provided and installed to serve the air conditioning system and the ship service refrigeration system.

REQUIREMENTS

The Contractor shall develop drawings and calculations for each refrigeration system to be submitted to ABS and the COR for review and approval during Phase II.

Refrigeration units shall be resiliently mounted.

The refrigeration equipment shall be provided with remote monitoring capability by the Integrated Monitoring and Control System (IMACS) at the ECR.

EPA approved refrigerant type shall be standardized between the chilled water plants and the ship service refrigeration system plants. Refrigerants on the EPA phase-out list of ozone-depleting substances will not be accepted. The number of refrigerants and lubricating oils shall be minimized to the maximum extent practicable.

SPECIFIC REQUIREMENTS

Air Conditioning System

A marine air conditioning system shall consist of a packaged multi-stage water chiller or multiple packaged single-stage units sized to provide at least 60% of the complete air-conditioning system requirements with any one unit or stage non-operational. Each unit or stage shall include compressor(s), motor(s), condenser, receiver, and water chiller on a common base, with the necessary interconnecting piping, instrumentation, wiring and controls. A multistage unit shall be configured such that a failure of any one stage will not prevent the continued operation of the other stages.

The liquid refrigerant receiver for marine service shall be sized to 120% of the system fluid capacity and be provided with all necessary connections including drains and liquid level indicator.

Marine type copper nickel condensers provided shall be designed to a 0.0005 ft^2-hr-°F/Btu fouling factor. Condenser tubes, tube sheets, and heads shall be 90-10 Cu-Ni Condenser body shell shall be steel.

The air conditioning plant shall supply chilled water for the air conditioning system described in Contract Paragraph C685. Two identical chilled water pumps shall be provided for each chiller or chiller stage, each sized for the entire capacity of the water chilling plant and able to circulate the chilled water throughout the vessel. The pumps shall be automatically brought online and offline in coordination with the water chiller staging and operation. The chilled water system shall be designed for a 20% propylene glycol solution with corrosion inhibitors. The chilled water system shall be a supply and return pipe system with two- or three-way modulating type thermostatic control valves at each cooling coil. A fresh water expansion tank, sized to accommodate fluid expansion, shall be installed at the high point in the system. The expansion tank shall be provided with sight glass, vent, overflow, drain, and funnel for fill and water treatment, and with a low-level alarm function to the IMACS (see Contract Paragraph C780).

Cooling water for the air conditioning plant shall be supplied from the auxiliary cooling system (see Contract Paragraph C640)

Ship Service Refrigeration Plants

The ships provisional stores shall be cooled by a dedicated central refrigeration plant consisting of two identical marine units sized such that only one unit operates during normal conditions with the second unit as standby. The units shall be designed and installed to provide cooling to the vessel's walk-in refrigerator and freezer; shall be packaged skid-mounted condensing units that include a compressor and motor, pressure control switches, relief valve, crankcase heater, low ambient pressure control, and condenser/receiver. Each packaged unit shall include all necessary interconnecting piping, instrumentation and wiring for fully automatic operation.

Each refrigeration unit shall have a horizontal shell and straight integral tube marine type combination condenser/receiver designed with a 0.0005 ft^2-hr-°F/Btu fouling factor. The condensers shall be oversized to act as receivers for the system, with adequate capacity to provide a liquid seal and hold the entire charge of the refrigerant during system pump-down. Condenser tubes, tube sheets and heads shall be 90-10 Cu-Ni. Condenser body shell shall be steel. The condenser cooling water shall be supplied from the auxiliary cooling water system (see Contract Paragraph C640)

Separate refrigerant circuits shall serve each refrigerated storage space(s) and appliance. Fan coil units shall be used to cool refrigerated storage spaces to a design temperature:

Chilled Stores = 33°F

Frozen Stores = 0°F

Thermometers shall be provided to display interior temperature of the refrigerated stores.

The freezer doors shall be arranged for electric defrosting.

The following automatic control equipment shall be provided and installed:

- Two dual pressurestats, or separate high- and low-pressure switches which are adjustable.
- Necessary controls for unloading and reduced capacity operation.
- One oil pressure failure switch for each compressor.
- One automatic water regulating valve for each condenser with manual bypass.
- One liquid line king solenoid valve for each compressor.

One liquid solenoid valve and contact maker with thermostatic element for each piece of refrigerated equipment.

One externally adjustable thermostatic expansion valve for each piece of refrigerated equipment with manual bypass.

One suction pressure regulating valve complete with pressure gage and valve in the suction line from the walk-in chiller and freezer

Remote reading temperature gage and temperature alarm for each chill box(es) to the IMACS (see Contract Paragraph C780).

Automatic controls and electric elements for defrost cycles, including trace heat on drain pans and drain lines.

Refrigerant Piping

Refrigerant pipe or tube shall conform to ASTM B88-20 with a wall thickness not less than that required for the hard-drawn type L cooper pipe. Liquid and suction lines shall be not less than 3/8 inch outside diameter. Fittings shall be wrought cooper or bronze and shall be kept to a minimum. Refrigeration piping shall be insulated with closed cell foam thermal insulation in its entirety. (See Contract Paragraph C436)

SPECIAL FEATURES

None.

DELIVERABLES

849-C687-01 CHILLED WATER SYSTEM DIAGRAM
849-C687-02 CHILLED WATER SYSTEM CALCULATIONS
849-C687-03 SHIP SERVICE REFRIGERATION DIAGRAM
849-C687-04 SHIP SERVICE REFRIGERATION CALCULATIONS

STANDARDS

ABS Rules for Building and Classing Marine Vessels
ANSI/ASHRAE Standard 26 Mechanical Refrigeration Installations Aboard Ships
ASHRAE Handbook – Refrigeration
ASHRAE Handbook – HVAC Applications
ASHRAE Handbook – HVAC Systems and Equipment
ASTM B466-18, Standard Specification for Seamless Copper-Nickel Pipe and Tube
ASTM B88-20, Standard Specification for Seamless Copper Water Tube

C690 COMPRESSED AIR SYSTEM

GENERAL DESCRIPTION

The Contractor shall provide and install complete compressed air systems in accordance with ABS MVR, USCG Subchapter I and these specifications.

REQUIREMENTS

The Contractor shall provide and install all equipment, piping, pumps, valves, and vents necessary to form complete compressed air systems. The Contractor shall develop drawing 849-C690-01 COMPRESSED AIR SYSTEM DIAGRAM, 849-C690-02 COMPRESSED AIR SYSTEM CALCULATIONS, and 849-C690-03 COMPRESSED AIR SYSTEM ARRANGEMENT AND DETAILS and submit them to the COR and ABS as applicable during Phase II of the Contract for review and approval.

The compressed air system shall be divided into two independent systems – one for starting air and one for ship's service air. Each system shall be fitted with a minimum of two compressors and two receivers for redundancy.

The starting air system shall provide starting air for all internal combustion engines (as-required), in accordance with ABS MVR 4-6-5/9. The ship's service air system shall provide service air for the air tool stations, blowdown air for the sea chests (See Contract Paragraph C325), and other consumers requiring compressed air service.

SPECIFIC REQUIREMENTS

Air Compressor/Receivers

The Contractor shall provide a minimum of two air compressors for each system, sized in accordance with the system calculations and applicable regulatory requirements. Each compressor shall be provided with an hour meter. The compressors shall be provided with both automatic and manual controls. Compressors shall have an automatic unloader for load-less starting. The compressors for the starting air system shall be identical. The compressors for the ship's service air system shall be identical.

Each compressor shall be mounted on vibration isolators with a design transmissibility of 20% or less.

The system shall include separate receivers for starting and ship-service air. Size and quantity of receivers shall be in accordance with regulatory requirements and system calculations.

Each receiver a shall be:

Constructed and certified in accordance with the ASME Code for Unfired Pressure Vessels. The receiver shall be stamped and an ASME Certificate of Inspection shall be furnished with the receiver.

The design, fabrication, and testing of the air receiver shall be in accordance with the ABS Rules (which also requires survey at the plant of manufacture for fabrication and testing). Each receiver shall be certified and stamped by ABS.

Supplied with an automatic condensate drain valve to allow for the removal of accumulated oil and water.

Provided with a pressure gauge and relief valve.

Piping & Equipment

All piping and equipment shall be provided in accordance with 46 CFR Subchapter F, Marine Engineering, and Part 4, Chapter 6 of the ABS MVR. Piping for the compressed air system shall be seamless black iron, ASTM A106-19a. Portions of the compressed air system piping exposed to the weather shall be stainless steel, including all fittings unless otherwise noted.

A separator/filter with automatic drain shall be provide immediately downstream of each compressor.

Refrigerated air dryers shall be provided to serve both the starting air and the ship's service air system. Air dryers do not need to be redundant, though a bypass line should be installed around each air dryer such that the systems are still fully functional while the air dryers are being serviced.

Reducing stations shall be supplied and installed as necessary to reduce the system air from receiver to the pressures required for the sea chest blow-down and for the air tool stations. The air tool stations shall be supplied with 100-psig air.

There shall be a normally-closed cross-connect line between the two systems for use in emergency situations. The cross-connect shall be fitted with a check valve to prevent air from flowing from the starting air receivers into the ship's service air system.

Air Tool Stations

Air tool stations shall be provided such that any working area of the vessel can be supplied with ship's service air through a 50' air hose. Ten additional stations may be required, to be coordinated with the COR during Phase II. Air tool stations in machinery, auxiliary machinery, and workshop spaces shall be supplied with hoses and hose reels.

Non-hose reel air stations shall be provided with a ½" stainless steel ball valve, and a filter/regulator/lubricator designed for air pressure from 0-125 psi.

Hose reel air tool stations shall be equipped with a filter/regulator/lubricator unit rated to operate between 0 to 125-psig and a quick connect fitting. Each air tool station shall have a lockable rapid action hose reel mounted on a bracket. Each hose reel shall have 50-feet of 3/8-inch air hose rated for 250-psi. A ¾" universal coupling (Chicago fitting) with a galvanized ¾" plug shall feed the hose reel. A 1" stainless steel ball valve and ¼" brass female air coupling shall also be provided at these stations.

SPECIAL FEATURES

Sea Chest Blowdown

A 1-inch line with valves shall be installed from the ship's service air system to each sea chest. This line shall be used to blowdown the systems.

Air Horn System

The requirements for the air horn system shall be in accordance with Contract Paragraph C770 for navigation equipment.

DELIVERABLES

849-C690-01 COMPRESSED AIR SYSTEM DIAGRAM
849-C690-02 COMPRESSED AIR SYSTEM CALCULATIONS
849-C690-03 COMPRESSED AIR SYSTEM ARRANGEMENT AND DETAILS

STANDARDS

ABS Rules for Building and Classing Marine Vessels
46 CFR Subchapter I, Cargo and Miscellaneous Vessels
ABS MVR, 4-6-5/9, Starting Air System
ASME Boiler and Pressure Vessel Code, Code for Unfired Pressure Vessels
46 CFR Subchapter F, Marine Engineering
ABS MVR, Part 4, Chapter 6, Piping Systems
ASTM A106-19a, Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service

C700 ELECTRICAL

C701 GENERAL REQUIREMENTS

DIESEL-ELECTRIC SYSTEM

A Diesel-Electric Power System shall provide power for all of the vessel's electrical equipment and system components. The Diesel Electric system design and installation shall meet all ABS and USCG rules.

System power and redundancy shall be adequate for all vessel operational modes, including dredging with one generator off line.

GENERAL DESCRIPTION OF SHIPBOARD POWER SYSTEMS

The Vessel Ship Service Electrical System, Propulsion System, and Dredge System shall be powered from the Diesel Electric system. These systems shall utilize AC equipment, and the voltages provided for the three systems shall be as best suits the proposor's design.

The overall vessel electrical system consists of an AC Power Section that comprises the Ship Service, Propulsion, and Dredge systems (Contract Paragraph C705) and a DC 12 and 24 Volt Power Section (Contract Paragraph C706).

Electrical generating and distribution equipment shall be fitted with alarms, indicators, and controls to meet ABS classification ACCU and as required by Contract Paragraph C780.

REQUIREMENTS

The design, construction and installation of all electrical system components shall be suitable for marine service as described in the Endurance Operating Profiles in Contract Paragraph C002 and the intended application. All system components shall be furnished new and unused. Electrical installations and equipment shall satisfy all applicable requirements of ABS MVR, USCG Subchapter J, IEEE-45, NFPA-70 and NVIC 02-89.

All machinery, equipment, materials and installation shall be in accordance with all applicable sections of the Codes, Rules, and Design Standards cited in Contract Paragraphs C003 and C004. All the equipment furnished shall bear the approval of the Underwriters Laboratories, where applicable.

The design ambient temperature for all electrical equipment in engine rooms shall be 122°F (50°C) and all current carrying conductors shall be copper. The design ambient temperature for motors is 122°F (50°C) defined in Contract Paragraph C750. Non-machinery spaces shall have equipment designed to operate at ambient temperature of 104°F (40°C)

All controllers and equipment indicators shall be installed in marine weathertight, corrosion-resistant enclosures, unless otherwise required in the specification. Enclosures in interior locations shall be at a minimum IP22. Enclosures in weather and/or corrosive damp environment, including machinery spaces shall be IP66 or IP67 (if exposed to immersion). Explosion proof enclosures shall be installed in hazardous areas.

Equipment shall be located and oriented as conveniently as practicable for operation and maintenance. Equipment locations shall be approved by the COR. All equipment shall be accessible for removal, servicing and adjustment without dismounting or removal of other equipment.

Equipment shall be treated to provide protection against corrosion, moisture, mold, and other destructive agents to which the equipment may be exposed.

All panels, switchgear, relays, contactors, circuit breakers, motor starters, receptacles, etc., shall be provided from the same manufacturer and meet the degree of protection (IP code) per the rules. Circuit breakers shall adhere to the requirements of UL Standard 498 including the marine supplement and applicable regulation.

The Contractor shall provide a grounding conductor for all installed electrical equipment (AC & DC) which shall be grounded to the isolation ground bus at each panel. Connections shall be made from the isolation ground bus of the distribution panels back to the isolation ground bus in the switchboard. Grounding shall then be made to the diesel engine single point grounding. The switchboard frame shall be grounded to the vessel structure.

The conductivity of connections shall not be less than the conductivity of the connected cable. All bolts, screws, nuts, and washers shall be made of corrosion-resistant metal of adequate size for their functions. Lock washers or equivalent shall be used to prevent loosening of bolted connections throughout the electrical system.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

Drawings, Manuals, and Documentation for the electrical equipment and systems.

STANDARDS

ABS Rules for Building and Classing Marine Vessels
46 CFR Subchapter J, Electrical Engineering
USCG NVIC 02-89, Guide for Electrical Installations on Merchant Vessels and Mobile Offshore Drilling Units.
UL Standard 498, Attachment Plugs and Receptacles
IEEE 45-2002, Recommended Practice for Electric Installations on Shipboard
NFPA-70, National Electric Code
IEC Std 60529 Degrees of Protection Provided by Enclosures (IP Code)

C702 ELECTRICAL EQUIPMENT & CABLING MARKING

GENERAL DESCRIPTION

None.

REQUIREMENTS

None.

SPECIFIC REQUIREMENTS

Designation System

All designation of circuits, panelboards, nameplates, etc. shall be in accordance with Annex B of IEEE Standard 45.

Equipment Marking Requirements

All electrical equipment shall be provided with standard label plates indicating manufacturer, model number, and electrical characteristics (including but not limited to operating voltage, phase, and amperage). The nameplates, serial number plates, identification tags, etc. that are installed on the equipment shall remain in place on the equipment as furnished by suppliers. High Voltage equipment that may be accessed for work/repair shall be provided with Arc Flash data label and required PPE indication. Damaged or painted nameplates or tags shall be replaced prior to Final Acceptance.
All nameplates and notices shall be stamped or engraved on brass or plastic plates. Any special instructions or precautions shall be included on the label plate or on a separate plate on or adjacent to the equipment. All weather exposed nameplates, notices, and markings shall be of brass. See Contract Paragraph C460.
All distribution panels shall be labeled with designation plates. All breakers in the distribution panels shall be numbered and the panel identification cards filled out to identify the breaker's service. See USCG, 46 CFR, subchapter J, paragraph 111.40-11. Blank nameplates shall be provided for spare feeder switches and circuit breakers. Switchboard and distribution panel busses shall be stamped in a readily visible location with phase identification or polarity.
All electrical outlets shall be labeled with circuit identification.
All controls, instruments, and equipment shall be labeled with phenolic label plates indicating the purpose, function, position or condition as required to permit operation of the vessel.

Cable Marking

All interconnecting cables and wiring shall be marked at each termination and at each watertight bulkhead or deck (both sides) with circuit or system identification. Power distribution wiring shall be marked to indicate phase and polarity. All cables shall be tagged throughout their length with cable tags identifying the circuit designation. The distance between tags should not exceed 50 feet. The tags shall be fabricated from strip aluminum or bronze with raised lettering and shall be securely fastened to the cable by metal banding.

Cable identification materials on the exterior shall be UV stabilized. Individual conductors shall be provided with nylon sleeves and unique identifiers for each conductor in a cable.

Identification of Motor Controllers

Each motor controller and motor control center shall be marked in accordance with USCG, 46 CFR, subchapter J, Paragraph 111.70-3(d). Controllers shall have an external label indicating the controller name, circuit number, motor horsepower, and circuit breaker rating.

Shore Power Identification

The Contractor shall install an identification plate for each of the shore power in accordance with the USCG Subchapter J and ABS MVR (4-8-2/11.1) The Contractor shall install an operation plate for the shore power receptacle in close proximity.

SPECIAL FEATURES

None.

DELIVERABLES

None.

STANDARDS

IEEE 45-2002, Annex B
46 CFR, subchapter J, paragraph 111.40-11, Panelboards
46 CFR, subchapter J, Paragraph 111.70-3(d), Identification of Controllers
USCG Subchapter I, Cargo and Miscellaneous
ABS Rules for Building and Classing Marine Vessels, 4-8-2/11.1, Shore Connection

C705 AC ELECTRICAL SYSTEMS

GENERAL DESCRIPTION

The Contractor shall supply and install AC electrical systems for the vessel in accordance with USCG Subchapters I and J. The equipment and design shall comply with the requirements of ABS, NFPA-70, and recommendations of IEEE Std 45.

REQUIREMENTS

The system components shall be sized based on the requirements determined by the AC Electrical Load Analysis (see Contract Paragraph C710). The details of the AC electrical system shall be as-depicted on the One-line diagram (see Contract Paragraph C720).

SPECIFIC REQUIREMENTS

Vessel AC power system shall be an AC, 3-phase, 3-wire, 60-Hz, ungrounded system (see Contract Paragraph C733). Power to this system shall be supplied by the generator(s) or through the shore power connection (see Contract Paragraph C760).

Secondary Power System

The secondary power system supplied for the vessel shall be rated as a 208Y/120-volt AC, 3-phase, 4-wire, 60-Hz, grounded system. Power to this system shall be redundant and supplied from the main switchboard through transformers.

Auxiliary Power System

An auxiliary AC power system, 3 phase, 3-wire, 60 Hz, ungrounded, operating at a higher voltage rating than the Ship Service Power system, may be provided in support of higher voltage large electrical power consumers, such as propulsion and dredging systems.

System Grounding and Ground Fault Detection

The AC electrical system shall be designed and installed using a single point grounding methodology. The system is required to have an isolation grounding bus, in panel and switchboard, for all equipment grounds.
All cables shall be provided with a grounding conductor to provide a path for all equipment grounds back to the isolation grounding bus located in the switchboard. Any equipment with a case ground shall be ensured that the ground is electrically isolated from the hull of the vessel to prevent multiple point grounding. Case grounded equipment can provide alternate ground paths for current to flow. Isolation of galvanic currents is required.
A ground fault detection system (with ammeter) and low insulation alarm shall be provided and installed as described in Contract Paragraph C740).
No AC or DC current shall flow through the hull.

SPECIAL FEATURES

Power consuming equipment shall operate within the following tolerances:

CHARACTERISTICS	LIMITS
NOMINAL FREQUENCY	60 Hz
FREQUENCY TOLERANCES	± 3 %
VOLTAGE (LINE TO LINE)	± 5 %
LINE VOLTAGE UNBALANCE	3%

DELIVERABLES

None.

STANDARDS

USCG Subchapter J, Electrical Engineering
USCG Subchapter I, Cargo and Miscellaneous
ABS Rules for Building and Classing Marine Vessels
IEEE Standard 45-2002, Recommended Practice for Electrical Installations on Shipboards.
ABS Guidance Notes on Control of Harmonics in Electrical Power Systems
NFPA 70, National Electric Code

C706 DC ELECTRICAL 12 AND 24 VOLT SYSTEMS

GENERAL DESCRIPTION

The Contractor shall supply and install multiple DC electrical systems for the vessel in accordance with USCG Subchapters I and J. The equipment and design shall comply with the requirements of ABS, NFPA-70, and recommendations of IEEE Std 45.

REQUIREMENTS

The systems shall be furnished with double pole breakers to allow for isolation of the positive and negative for each circuit when opening the breakers. Double pole transfer switches allow for the isolation of separate DC systems and prevent multiple point grounding.

The system components shall be sized based on the requirements determined by the DC Electrical Load Analysis (see Contract Paragraph C710). The details of the DC electrical system shall be depicted on the One Line diagram (see Contract Paragraph C720).

12-volt DC and 24-volt DC electrical systems shall be supplied and installed to provide power for the communication, navigation, and other equipment as required for normal vessel operation, and meeting the requirements of USCG Subchapter J.

The 12-volt and 24-volt DC system power supplies and battery chargers shall be in accordance with IEEE 45. Batteries shall be stored in racks and provided with transfer and disconnect switches, and monitoring instrumentation according to the rules. The 12-volt and 24-volt DC distribution panels shall be provided and installed as required by Contract Paragraph C745.

Redundancy shall be provided in the supply of 24VDC power for ship's systems, dredging systems, and battery charging requirements under normal operating conditions. Each redundant system shall be capable of carrying both the battery charging and DC loads. Units shall be provided with rheostat adjustments and DC voltmeter and ammeter. The rectifiers shall be monitored by the Integrated Monitoring and Control System (see Contract Paragraph C780).

SPECIFIC REQUIREMENTS

Batteries & Battery Chargers

Battery Requirements

All batteries provided shall be suitable for marine use and shall be rated for a minimum of 200-ampere-hours. All batteries shall be sealed, maintenance free gel-cell or AGM type.

Battery Chargers

Battery chargers shall have the following features:

Settings for flooded, gel, or AGM batteries
Battery Equalization
Temperature-compensated charging
Battery temperature sensor
Drip Proof housing
UL Approved

Each charger supplied shall be USCG listed for marine service and built to carry continuous loads. The battery chargers for all DC systems shall be sized to meet the power requirements for that respective system's batteries. The battery chargers shall be located with the respective battery banks and suitable for operating in 122°F (50°C).

All battery chargers shall be supplied with a DC voltmeter and ammeter. All DC system battery chargers shall receive power from the AC system; these connections shall be depicted on the One-Line Diagram (see Contract Paragraph C720).

All battery charger installations shall have a monitoring and alarm system in compliance with ABS Rules

Overload & Reverse Current Protection

Overload and reverse current protection for the battery conductors shall be in accordance with USCG, 46 CFR, subchapter J, paragraph 111.15-25.

System Grounding & Fault Detection

System Grounding

Grounding and bonding shall be provided for all DC electrical equipment on the vessel.

All AC/DC cables shall be provided with a grounding conductor to provide a path for all equipment grounds back to the isolation ground bus.

The DC electrical system shall be designed and installed using a single point grounding methodology for the entire vessel DC electrical system (i.e. negative grounded system at only one point on the vessel).

No DC and AC currents shall flow through the hull.

Ground Fault Detection

Ground fault detection system(s) (with ammeter and test switch) shall be provided for each DC system(s) and located in the ECR.

Electrically Isolated Equipment & Equipment with Case Grounds

Electrically Isolated Equipment

All machinery and equipment on the vessel shall be electrically isolated (free of internal negative grounds). Use of machinery or equipment with internal negative grounds is not acceptable without prior written approval by the COR.

Equipment with Case Grounds

In order to prevent alternative grounds, all case grounded equipment shall:

Be electrically isolated from the hull and house, or

The case ground shall be removed and replaced with a ground conductor to the single ground point, such that there is no alternative ground path

Emergency Diesel Generator Starting Batteries

A 24VDC diesel engine starting battery and charger system with the configuration and battery capacity to meet ABS/USCG regulations shall be provided and installed to automatically start the emergency diesel genset and open ventilation fire damper(s). Starting battery system shall be located in the Emergency Generator Room, with batteries inside battery box(es) secured to a foundation.

SPECIAL FEATURES

None.

DELIVERABLES

None.

STANDARDS

USCG Subchapter I, Cargo and Miscellaneous
USCG Subchapter J, Electrical Engineering
ABS Rules for Building and Classing Marine Vessels
IEEE Standard 45-2002, Recommended Practice for Electrical Installations on Shipboards
NFPA 70, National Electric Code

C710 LOAD ANALYSIS

GENERAL DESCRIPTION

None.

REQUIREMENTS

The Contractor shall develop load analyses for the AC and DC systems based on the actual equipment selected and in accordance with ABS MVR 4-8-2/5.1. In addition, the load analysis shall include the degraded dredging redundancy scenario identified in Contract Paragraphs C002 and C733. The drawings shall be 849-C710-01 ELECTRICAL LOAD ANALYSIS (AC) and 849-C710-02 ELECTRICAL LOAD ANALYSIS (DC). During Phase II, the Contractor shall submit the drawings to the COR and ABS for review and approval.

SPECIFIC REQUIREMENTS

AC Load Analysis

The Contractor shall develop the Electrical Load Analysis for the various Volt AC electrical systems. The load analysis shall be set up for the following modes:
In-Port (see Contract Paragraph C760)—Summer Day/Winter Night
Transit—Summer Day/Winter Night
Maneuvering – Summer Day/Winter Night
Dredging—Summer Day/Winter Night
Shore Pump-out—Summer Day/Winter Night
Bottom Dumping—Summer Day/Winter Night
Emergency—Summer Day/Winter Night
Operation at Reduced Dredging Capacity with one genset off-line (C733 Special Features)

DC Load Analysis

The Contractor shall develop the Electrical Load Analysis for the 24-volt DC and 12-volt DC systems. Each load analysis shall be set up for the following modes:
In-Port (see Contract Paragraph C760)—Summer Day/Winter Night
Transit—Summer Day/Winter Night
Maneuvering – Summer Day/Winter Night
Dredging—Summer Day/Winter Night
Shore Pump-out—Summer Day/Winter Night
Bottom Dumping—Summer Day/Winter Night
Emergency—Summer Day/Winter Night
Degraded Dredging Redundancy Scenario (see Contract Paragraph C002.D) – Summer Day/Winter Night

SPECIAL FEATURES

None.

DELIVERABLES

849-C710-01 ELECTRICAL LOAD ANALYSIS (AC)
849-C710-02 ELECTRICAL LOAD ANALYSIS (DC)

STANDARDS

46 CFR Subchapter J, Electrical Engineering
IEC 92-302, Electrical Installations in Ships
ABS Rules for Building and Classing Marine Vessels
MSC Procedure E2-06, Guidelines for Electrical Load Analysis

C715 FAULT CURRENT ANALYSIS, CIRCUIT BREAKER COORDINATION, ARC FLASH ANALYSIS & ELECTRICAL EQUIPMENT HAZARDOUS AREA PLAN

GENERAL DESCRIPTION

None.

REQUIREMENTS

During Phase II, the Contractor shall prepare a complete detailed fault current analysis, circuit breaker coordination study, arc flash analysis and an electrical equipment hazardous area plan and submit it to ABS and the COR for review and approval. The drawings shall be:

849-C715-01	FAULT CURRENT ANALYSIS
849-C715-02	PROTECTIVE DEVICE COORDINATION STUDY
849-C715-03	ELECTRICAL EQUIPMENT ARRANGEMENT
849-C715-04	ARC FLASH ANALYSIS
849-C715-05	ELECTRICAL EQUIPMENT HAZARDOUS AREA PLAN

The Contractor shall update the analyses and one-line diagram throughout the construction phase to account for any design changes that may affect the results of the studies.

All drawings, excluding the ELECTRICAL EQUIPMENT HAZARDOUS AREA PLAN, shall be completed using the latest release of EasyPower software.

The contractor shall obtain approval of the PROTECTIVE DEVICE COORDINATION STUDY from the COR and ABS before purchasing any electrical equipment.

SPECIFIC REQUIREMENTS

Fault Current Analysis

The fault current analysis shall demonstrate that all protective devices such as fuses and circuit breakers have sufficient short circuit breaking and making capacities. A listing of all protective devices, their locations, use, manufacturer, model, and interrupting rating shall be submitted with the fault current analysis.
The fault current analysis shall compare circuit breaker interrupting ratings and available fault current to verify that equipment is rated to safely handle short circuit currents without creating hazardous conditions. An equipment duty report shall be included with the fault current analysis in

addition to a one-line diagram computer output showing the short circuit results for each location in the electrical system.

Using the EasyPower software, the fault current analysis shall include the maximum symmetrical fault current value for every breaker and bus, listed as the ½ duty momentary value in the EasyPower LV MOMENTARY REPORT. This is the value that shall be used to validate the PROTECTIVE DEVICE COORDINATION STUDY in accordance with IEEE 45 5.9.2.

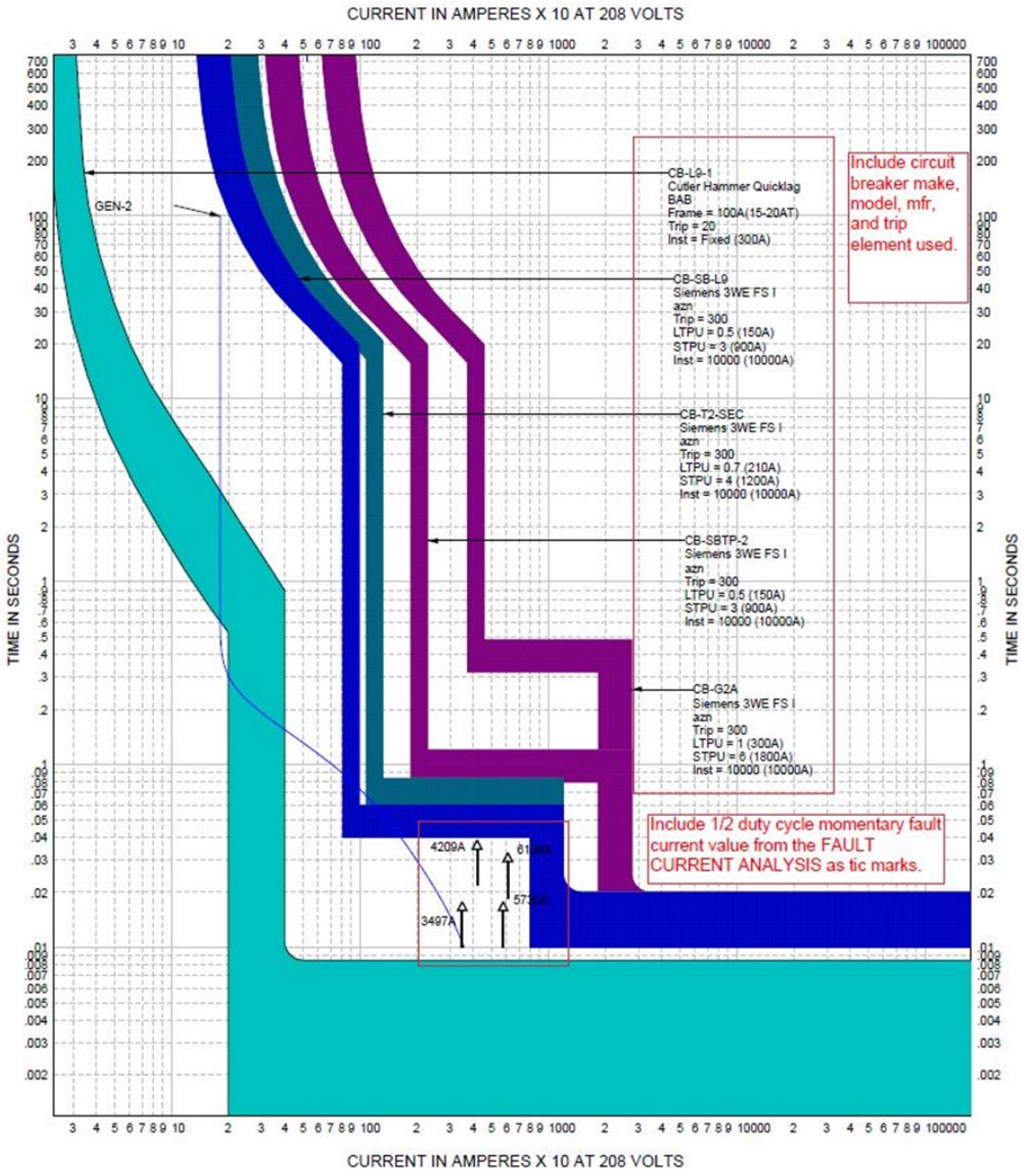
Protective Device Coordination Study

The protective device coordination study shall compare upstream and downstream protective devices to ensure proper electrical system reliability and that USCG and ABS coordination requirements are met. Protective device coordination and selectivity shall be provided so that, for a fault on any part of the system, the fault is cleared by the protective device that is closest to the point of fault without tripping upstream breakers in accordance with USCG, 46 CFR, subchapter J, subpart 111.51. Circuit breaker trip elements shall be used to ensure that each breaker is rated for values up to and including the maximum symmetrical fault current value determined in the FAULT CURRENT ANALYSIS without tripping any upstream breakers.

Time-current plots shall be included in the study showing the time-current curves (TCC) of all protective devices for each major path in the electrical system. These time-current curves shall be generated using EasyPower software. Time ‘tic marks’ shall be placed on the curves to show the maximum symmetrical fault current value for each individual breaker. This includes individual plots for all protective devices between the generator and each vital load fed directly from the main switchboard, and for all protective devices between the generator and one branch circuit load in each of the distribution panelboards.

Electronic trip and other circuit breaker elements shall be provided where required for proper coordination.

See the image below for a sample TCC curve:



As a minimum, each TCC plot shall include a one-line diagram for the given plot in addition to the following breaker information:
Device ID
Manufacturer
Trip element type/model
Frame size
Trip rating (thermal magnetic trip units)
All other breaker settings (electronic trip units)
For breakers with electronic trip units, the Contractor shall verify the settings of the installed breakers are consistent with the settings of the final coordination study prior to testing and commissioning.

Arc Flash Hazard Analysis

The Contractor shall provide a detailed incident energy arc flash hazard analysis for the entire electrical installation in accordance with ER 385-1-100 Arc Flash Hazard Program. The analysis shall be completed for all electrical equipment and locations where the potential for an AFH exists as defined by ER 385-1-100. The detailed incident energy analysis shall be conducted using EasyPower and the IEEE 1584-2018 method of Arc-Flash Hazard calculations.
The arc flash hazard analysis shall be provided with a report to summarize the results and provide recommendations for mitigating hazards where alternative designs cannot bring the risk to an acceptable level. As a minimum, the report shall contain the following sections:
Executive Summary

The executive summary shall include an overview of the current system, a listing of the number of devices in each hazard/risk category, and a summary of the results of the analysis.

Detailed Information

The detailed portion of the report shall contain the following:
A matrix and explanation of all operating scenarios evaluated.
A list and explanation of assumptions made.

Results Summary

A discussion of the results of the analysis.

Recommendations

For equipment and locations with high incident energies, mitigation solutions shall be provided to reduce the hazard/risk category to Level 2, or less in accordance with ER 385-1-100, Chapter 5-3.b. These recommendations may include, but are not be limited to:
The use of alternative operating scenarios during periods of maintenance.
Temporary settings to be used during periods of maintenance.
Change in work practices and/or system configurations.

The computer model used to perform the analysis shall be based on the actual equipment selected for installation and operational requirements; including the settings from the protective device coordination study and using the result of the fault current analysis.

All data files along with system model used to perform the analysis shall be provided in the electronic format necessary to easily update the Government's computer model. The system model shall be provided in EasyPower *.dez file format. Additional files to be provided are the report and the following EasyPower computer outputs:
One-line diagram of the existing system (base case).
One-line diagrams for all analyzed scenarios with AF results.
Arc flash worst-case scenario report.
Arc flash full scenario report.

All electrical equipment where the potential for an AFH exists shall have arc flash warning labels affixed and clearly visible along with PPE required indication. Labels shall contain at a minimum the following:
Arc Flash Boundary
Incident Energy at 18 inches
Hazard/Risk Category Level
Working Distance
Nominal System Voltage
Equipment ID
Date

Electrical Equipment Arrangement & Hazardous Area Plan

The electrical equipment arrangement and electrical equipment hazardous area plan shall be developed in accordance with ABS rules and shall be submitted to the COR and ABS for approval during the Engineering Phase (Phase II).

SPECIAL FEATURES

None.

DELIVERABLES

849-C715-01	FAULT CURRENT ANALYSIS
849-C715-02	PROTECTIVE DEVICE COORDINATION STUDY
849-C715-03	ELECTRICAL EQUIPMENT ARRANGEMENT
849-C715-04	ARC FLASH ANALYSIS
849-C715-05	ELECTRICAL EQUIPMENT HAZARDOUS AREA PLAN

STANDARDS

IEEE 45 Recommended Practice for Electrical Installations on Shipboard
46 CFR, Subchapter J Electrical Engineering
USACE EM 385-1-1, Safety and Health Requirements
UASCE ER 385-1-100, Arc Flash Hazard Program
IEEE 1584-2018, Guide for Performing Arc-Flash Hazard Calculations
ABS Rules for Building and Classing Marine Vessels

C720 ONE-LINE DIAGRAM

GENERAL DESCRIPTION

The Contractor shall develop complete AC and DC one-line diagrams based on the final equipment selections.

REQUIREMENTS

The Contractor shall submit the drawings identified in subsection E of this section during Phase II to the COR and ABS for review and approval.

SPECIFIC REQUIREMENTS

For details of the AC and DC systems, see Contract Paragraphs C705 and C706 of this specification, respectively.

SPECIAL FEATURES

None.

DELIVERABLES

849-C720-01 ELECTRICAL SYSTEM ONE-LINE DIAGRAM (AC)
849-C720-02 ELECTRICAL SYSTEM ONE-LINE DIAGRAM (DC)

STANDARDS

See Contract Paragraph C003.

C725 CABLING

GENERAL DESCRIPTION

Electrical distribution cable shall meet the specifications of IEEE-1580-2010, IEC, and be approved by USCG & ABS suitable for shipboard use. All insulation shall be type low smoke LSE or LSX; and suitable for operation with 90°C (194°F) conductors. Cable jacketing shall be halogen free, type 370 L or TPO, PVC free, flame retardant.

REQUIREMENTS

The Contractor shall develop a complete voltage drop and cable schedule for the AC and DC systems based on the actual equipment selected for installation and ABS Rules.

For each AC circuit, a 5% maximum voltage drop is allowed from the switchboard to the connected load.

For each DC circuit, a 5% maximum voltage drop is allowed from the DC power source to the connected load.

Feeder cables shall be sized to include 20% growth at the panelboards.

The following drawings shall be developed and submitted during Phase II to the COR and ABS for review and approval:

849-C725-01 CABLE SCHEDULE & VOLTAGE DROP (AC)
849-C725-02 CABLE SCHEDULE & VOLTAGE DROP (DC)
849-C725-03 CABLE SCHEDULE & VOLTAGE DROP (EM LIGHTING)

No conductor smaller than #14 AWG (2.5 mm^2) shall be used for general power and lighting service. Special cable may be used for electronic equipment as recommended by the equipment manufacturer or equivalent.

Fiber-optic cables shall meet the construction/flame propagation requirements of ABS and shall be of robust marine grade construction.

Unarmored cable shall be used in all locations where practicable, including in the weather. Cables which may be subject to mechanical damage are to be armored and may be additionally protected by removable plates, pipes, or other mechanical approved methods to provide effective protection to the cables. Where armored cable is used, it shall be aluminum armored.

Cables for VFD applications (from drive to load) shall be VFD-rated including all shielding and termination in accordance with manufacturer requirements.

SPECIFIC REQUIREMENTS

Cable Installation

Run all cable as directly as practicable, avoiding hazardous or otherwise undesirable locations. Cables connected to equipment in hazardous zones shall be provided with explosion-proof fittings. Of prime consideration in planning electrical distribution is the control and treatment of electrical noise. Install power and lighting cables in separate wireways from communication, alarm, monitoring, signal, control, and other cables affected by electromagnetic interference. Segregate critical circuits as recommended by the associated equipment manufacturer and as required by 46 CFR Subchapter J.

A detailed cable routing and management plan shall be developed and submitted for COR review during Phase II as 849-C725-04 CABLE ROUTING AND MANAGEMENT PLAN. This plan shall be maintained and updated throughout construction and submitted quarterly to the COR.

Cables to flexibly mounted equipment shall have sufficient slack so as not to constitute a noise "short."

No cabling shall be bent at a radius less than eight times the cable's diameter.

Replace in its entirety any cable or wire that is damaged in any way during construction. Splices are not permitted as a means to repair or extend cables.

Cableways and Hangers

Cables shall be supported by "open" cableways generally consisting of steel angle or square tube downcomers with angle cross tiers spaced in accordance with regulatory requirements to minimize cable sag, and retention devices (metallic and/or plastic banding in accordance with 46 CFR Subchapter J) installed in accordance with IEEE 45 and IEC 61537. Cableways shall be designed to support all cabling required to pass through them in a single layer (per tier). Cables may be installed two layers per tier when required; however, those cables' ampacity shall be de-rated in accordance with the regulations. Cable hangers shall be welded to the ship structure or affixed with welded studs, nuts, and washers.

Cableways shall be sized to provide 20% unused capacity available for future installations.

Penetrations

Cable penetrations through bulkheads and decks not required to be watertight, weathertight or fire-tight, shall be lined with flat bar or structural tubing to form collars that provide ample bearing surface. In decks, collars shall extend above the finished deck no less than 6 inches. Deck penetrations susceptible to damage shall have kick-tubes or extended casings that are a minimum of 9 inches above the finished deck.

Cable penetrations through watertight, fire-tight and weathertight decks or bulkheads shall use multi-cable transits which meet the tightness rating of the associated deck or bulkhead. Stuffing tubes shall be used for individual cable penetrations.

Cable transits shall be installed with capacity for future addition of 15% of the average cable size within the transit. However, for primary cable runs, this margin shall be 25%. MCTs installed in the Bridge Deck under each console and below control, monitoring, communications, signal, and power enclosures shall have 50% unused capacity.

Cable Identification

Cables shall be identified in accordance with C702.

SPECIAL FEATURES

None.

DELIVERABLES

849-C725-01 CABLE SCHEDULE & VOLTAGE DROP (AC)
849-C725-02 CABLE SCHEDULE & VOLTAGE DROP (DC)
849-C725-03 CABLE SCHEDULE & VOLTAGE DROP (EM LIGHTING)
849-C725-04 CABLE ROUTING AND MANAGEMENT PLAN

STANDARDS

IEEE 45-2002, Recommended Practice for Electric Installations on Shipboard.
IEEE 1580-2010, Recommended Practice for Marine Cable for Use on Shipboard and Fixed or Floating Facilities
46 CFR Subchapter I, Cargo and Miscellaneous Vessels
46 CFR Subchapter J, Electrical Engineering
ABS Rules for Building and Classing Marine Vessels
ABS MVR Part 4, Chapter 8, Section 2 “System Design”
IEC 60794-2, Optical Cable Fibers – Part 2: Indoor Cables
IEC 61537, Cable Management
MIL-STD-464C, Electromagnetic Environmental Effects Requirements for Systems.
MIL-STD-1310, Standard Practice for Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility, EMP Mitigation and Safety

C730 LIGHTING AND RECEPTACLES

GENERAL DESCRIPTION

The Contractor shall provide and install complete lighting and receptacle systems in order to adequately light the vessel and provide access to receptacles for general use. Lighting shall be provided to maintain the illumination values indicated in the ABS Guide for Crew Habitability on Ships.

All lighting fixtures shall be UL 1598A listed, except as otherwise required. Emergency lighting fixtures in accommodation areas and public spaces shall be drip-proof as a minimum and meet UL 1598A.

REQUIREMENTS

The lighting and receptacle systems shall consist of:

Interior and Exterior Lighting
Emergency Lighting
Equipment and Convenience Receptacles
Floodlights
Search Lights
Navigation Lights
Switches

During Phase II, the Contractor shall develop the following drawings and submit them to the COR and ABS for review and approval:

a. 849-C730-01 GENERAL LIGHTING PLAN

b. 849-C730-02 EMERGENCY LIGHTING PLAN
c. 849-C730-03 RECEPTACLE PLAN
d. 849-C730-04 NAVIGATION LIGHT

SPECIAL REQUIREMENTS

Interior and Exterior Lighting

All fixtures shall be marine type and made of corrosion resistant materials and shall be spaced evenly to provide proper distribution of light. Adequate deck & working space illumination shall be provided and controlled from the bridge. Fixture installation shall be such that the low point of all fixtures is above the lowest structural members.

All lighting switches shall be marine type, weather tight where required by location, and shall be mounted for convenient operation.

Interior Lighting

Interior lighting fixtures shall be LED, recessed mounted or surface mounted fixtures, controlled by a switch at each entrance to the compartment (multiple switches if multiple entrances). LED lights installed over the mirrors in the restroom shall be on GFCI protected circuits.

Red (night) lighting shall also be provided in the bridge.

LED explosion proof light fixtures shall be provided and installed in hazardous material spaces/lockers.

Each bunk shall be furnished with an LED bunk light with outlet.

Exterior Lighting

Exterior deck lighting shall be provided and installed to provide sufficient lighting and maintain an illumination level on the decks for safe operation at night.

Weather tight, bulkhead mounted LED type fixtures shall be installed along the sides and ends of the deckhouse(s). Additional fixtures shall be installed for illumination of the hopper and working decks as described below. The switches shall be located on the console in the bridge.

Emergency Lighting

The emergency lights shall actuate automatically upon failure of the main lighting system by having individual battery backup power or be connected to the emergency lighting system in accordance to the rules established in 46 CFR Part 112, UL 1598A, UL 924, and SOLAS A.752(18).

Equipment and Convenience Receptacles

Interior Receptacles

All interior convenience duplex receptacles shall be rated for 2-pole, 3-wire, 20-amp, 120 VAC service, all receptacles, including GFCI receptacles, shall be hospital and/or industrial/institutional grade receptacles.

The Contractor shall provide a minimum of two (2) receptacles per space (except heads which shall have at least one (1)). Additional receptacle requirements will be determined in coordination with the COR during Phase II.

Machinery space and all wet space duplex receptacles shall be watertight, cast marine brass, with threaded receptacle caps. The breaker providing protection for the engine room and all other hold space receptacles shall be GFCI type. These receptacles shall be located three feet above the deck.

For all appliances, individual receptacle circuits shall be provided.

All fixed electric equipment in machinery spaces and workshops shall have individual receptacle circuits.

Each individual equipment/appliance receptacle shall be clearly labeled with its size and intended function. The location of each receptacle shall be approved by the COR.

Ground fault protected receptacles shall be conspicuously marked "GFCI PROTECTED."

Exterior Receptacles

All exterior convenience receptacles shall be rated for 2-pole, 3-wire, 20-amp, 120 VAC service. Exterior receptacles shall be provided with IP66 rated enclosures with mating plugs to maintain the receptacle watertight integrity, cast marine brass, with threaded receptacle caps. The breaker providing protection for all exterior receptacles shall be GFCI type.

Exterior receptacles shall be located where they are accessible, protected from direct impact of boarding seas and equipment and do not pose an obstruction.

The receptacles installed on the exterior shall be located three feet above the deck.

Duplex receptacles shall be provided on all accessible weather decks including all platforms, the base of the main mast, and top and bottom of the foremast. A minimum of two (2) duplex receptacles shall be provided for each deck area, and shall be located such that it is possible to reach any part of the deck using a 25 ft. extension cord.

A total of three (3) 480VAC 100A GFCI welder's receptacle shall be installed on the weather deck (specific location to be coordinated with COR) and shall receive power either from the main switchboard or the 480VAC distribution panelboards.

Floodlights

The Contractor shall provide and install watertight marine LED floodlights rated for marine service to illuminate the working deck areas and water alongside the vessel. Each floodlight shall have a dedicated switch located in the bridge.

Marine floodlights to illuminate the exterior muster stations, life rafts, boat stations, and the water below each of the before listed, shall be provided and installed per the regulations listed in Subsection F of this specification section. Survival craft LED floodlights with corrosion-resistant enclosure shall be powered from an emergency source with control panel located in the bridge.

Watertight LED marine floodlights to illuminate the bow/anchor windlass area, bow connection area, weather deck dredge equipment and the hopper shall be provided and installed.

Watertight LED marine floodlights, constructed of corrosion and erosion resistant material and suitable for the hopper environment, shall be provided to illuminate all turtle inspection baskets as described in Contract Paragraph C512.

Searchlights

The Contractor shall provide and install three (3) 480-volt AC, 1.0-kW, three phase, Xenon searchlights rated for marine service. The searchlights shall be mounted on the bridge top, with two lights mounted equal distance from the port and starboard sides of the bridge top and one on CL, all facing forward. The searchlights shall be installed with distant electric controls for operation from the BCC, the Bridge wing consoles, and the Dredge control console.

The exterior surfaces of each searchlight shall be finished in white enamel. Each searchlight shall be provided with a canvas storage cover.

Navigation Lights

The vessel shall be furnished with a complete system of navigation lights in accordance with the USCG Navigation Rules, International and Inland, International Regulations for Prevention of Collisions at Sea (COLREGS), and UL 1104 standard for Marine Navigation Lights. The navigation lighting system shall also include USCG lights required for a "dredging vessel" and a vessel "restricted in its ability to maneuver."

The navigation lighting system shall be set up for 24-volt DC. All navigation lights provided shall be LED navigation lights. Dual bulbs shall be provided for the upper and lower mast head lights, side running lights and the stern light.

A regulatory-approved supervised solid-state navigation light panel shall be supplied and installed in the bridge. The navigation light panel shall be provided with an integrated fixed graphic display (mimic) on a pictorial representation of the ship. The mimic display shall be back-lit, with separate

dimmers for display and navigation light indicator lights. The navigation light controls shall include "tell-tale" panel alarms to indicate the failure of any light. The alarm shall be audible (with silence button) and visual.

Switches

All lighting shall be switched, unless prohibited by the regulations. Light switches shall be provided and installed inside the space (except where required outside the space as identified in this specification section), near each door entering the space. Light switches shall be appropriately rated for the compartment in which they are installed, for instance, for hazardous material lockers switches shall be explosion proof.

SPECIAL FEATURES

None.

DELIVERABLES

849-C730-01 GENERAL LIGHTING PLAN AND LIGHTING CALCULATIONS
849-C730-02 EMERGENCY LIGHTING PLAN
849-C730-03 RECEPTACLE PLAN
849-C730-04 NAVIGATION LIGHTS
Vendor cutsheets

STANDARDS

USCG Navigation Rules, International and Inland
ABS Guide for Crew Habitability on Ships
International Regulations for Prevention of Collisions at Sea ('72 COLREGS as amended)
UL 1104, Standard for Marine Navigation Lights
UL 1598A, Standard for Supplemental Requirements for Luminaires for Installation on Marine Vessels
46 CFR Subchapter I, Part 112 Emergency Lighting and Power Systems
UL 924, Standard for Emergency Lighting and Power Equipment
IMO Resolution A.752(18), Guidelines for the Evaluation, Testing, and Application of Low-Location Lighting on Passenger Ships

C733 ELECTRICAL POWER PLANT

GENERAL DESCRIPTION

The vessel electric power generating system shall be diesel-electric and designed to comply with ABS and IEEE-45 requirements.

Multiple gensets shall be provided.

System voltage shall be as best suits the design.

Frequency for all equipment shall be 60 Hz, except for motors with variable speed drives. Frequency for variable speed drive motors shall be as best suits the design requirements.

REQUIREMENTS

A marine-rated electric power plant sized to provide the full anticipated electrical load for each operating condition (see Contract Paragraph C710) shall be provided in accordance with the ABS and Flag state rules and regulations. The ship service electrical system shall include, at a minimum, a 15% generating power demand growth.

Detailed cut-sheets of the generators selected shall be provided to ABS and the Government for review and approval.

Each generator shall be equipped with an amortisseur winding and shall be capable of delivering 110 percent load for two hours without exceeding permissible limits of temperature rise, etc. Each generator, along with its regulation and excitation systems, shall be capable of supporting overload conditions as well as maintaining short circuit currents of such magnitude and duration as required to properly actuate selective tripping of downstream protective devices as described in Contract Paragraph C745.

Each voltage regulator shall be a solid-state volts-per-hertz voltage regulator and shall be capable of automatically maintaining constant rated generator voltage throughout the load range of the generator. Each voltage regulator shall be capable of maintaining steady state regulation within 1 percent of rated voltage from no load condition to 110 percent rated load condition and shall include a voltage-adjusting rheostat with a plus and minus 10 percent adjustment range.

The voltage dip on each generator shall not exceed 25 percent while starting the largest motor on the vessel across-the-line with the main bus load at 30 percent capacity.

Each generator(-set) shall be provided with the following features and options. Specific diesel engine requirements are defined in Contract Paragraph C602:

Approved by ABS.

Designed and constructed for use in an onboard marine environment, IP67 at open deck, IP56 in pump rooms and IP54 in enclosed spaces.

Voltage droop on each generator that is adjustable for parallel operation.

A drip proof, guarded enclosure for the generator, and shall be air cooled and self-ventilated.

A brushless excitation system and an automatic solid-state voltage regulator.

Dedicated DC control system including battery and charger for controls and automatic shutdowns.

Emergency stop pushbutton.

Each alternator supplied with an electric winding heater.

Switchgear controls and instrumentation shall be provided and installed as outlined in Contract Paragraph C740. Connection of the alternators to the ship's electrical distribution system(s) shall be shown on drawing 849-C720-01.

Load bank testing of all diesel engines and generators shall be in accordance with Section E of the Contract.

Two printed sets of operating, maintenance, and parts manuals and two electronic sets shall be supplied generator sets. See Contract Section H, Paragraph H16.

Spare parts in accordance with Contract Paragraph C800.

SPECIFIC REQUIREMENTS

Diesel-electric propulsion

The system shall be sized so that reduced capacity dredging can be performed as described previously, with one generator off-line.

Generator Set Starting/Stopping

Each generator set shall be set up for starting and stopping locally, at the generator set.

Each ship service generator diesel engine shall be equipped with a starting system as outlined in Contract Paragraph C602.

Each generator shall have an emergency stop station located on the forward deckhouse bulkhead by the CO2 pull station, on the console in the engineer's control room and on the Bridge Control Console.

Generator Set Alarms & Instrumentation

Alarms shall be provided for each generator set in accordance with ABS and Flag state rules and regulations. See Contract Paragraph 780 for integration with the vessel's IMACS.

Emergency Diesel Generator

An emergency generator shall be sized, placed and installed in accordance with the ABS and USCG rules and regulations. If an emergency generator is used for harbor operation the generator should synchronize automatically for take over as described in Contract Paragraph C740. The emergency diesel generator shall comply with applicable requirements of EPA. The emergency generator shall be sized to include a 10% growth margin and shall be connected to the ship's electrical distribution system.

The emergency diesel generator shall have a 24-volt DC electric starter. For electric starting the system(s) shall be 24-volt DC including starter motor, batteries, battery charging alternator, ammeter, and regulator.

The starting batteries shall be marine, heavy duty, rated in accordance with the engine manufacturer's recommendations. The Contractor shall provide and install a battery box with cover for the emergency genset engine starting batteries. The battery box shall be located in the emergency generator room.

The emergency diesel generator engine shall be radiator cooled with electric actuated louver for exhausting air to outside the space. The engine shall draw combustion and cooling air via a supply louver sufficiently sized to provide both combustion air and radiator cooling per engine's manufacturer's specifications. Both sets of louvers shall be fitted with motorized fire dampers actuated open when the emergency generator has signal to start and powered from the 24VDC emergency diesel starting battery system.

SPECIAL FEATURES

Operation at Reduced Dredging Capacity with one genset off-line:
In addition to the other vessel operating requirements, the Diesel-Electric System shall also be sized to provide the vessel capability to dredge with one genset off-line at reduced dredging capacity. The reduced capacity shall be as follows: dredging at 2 knot speed over bottom, against 2 Knot current, with one drag arm, and one dredge pump plus jetting power sufficient for one drag head. Hopper fill time shall be as attainable with the one drag arm, one dredge pump, and jetting for one drag head.

DELIVERABLES

849-C720-01 ONE LINE DIAGRAM
849-C710-01 ELECTRICAL LOAD ANALYSIS (AC)
849-C710-02 ELECTRICAL LOAD ANALYSIS (DC)

STANDARDS

IEEE 45-2002 Section 7.4.2
ABS Rules for Building and Classing Marine Vessels
USCG 46 CFR Subchapter I, Cargo and Miscellaneous Vessels

C740 SWITCHBOARD & POWER CONTROL

GENERAL DESCRIPTION

Switchboard(s) shall be provided for control of the generator sets, connection to the shore power, and distribution of 60 Hz power at the various design voltages for Ship Service and/or Auxiliary Power. A separate switchboard section shall be provided for each distribution service voltage range. An Emergency Switchboard shall be provided for control and operation of the emergency generator and distribution of emergency power.

All Switchboards shall be provided by the same manufacturer, with UL 891 facility approval. When approval is not possible for the switchboards, all documents and material provided shall be according to UL 891 specification. The switchboards shall meet the requirements of USCG, ABS, and IEEE 45.

REQUIREMENTS

Switchboards shall be provided and installed for the Ship Service and Auxiliary Power (if applicable) electrical systems. Emergency switchboards are to be provided according to ABS requirements.

During Phase II, front layouts, catalog cut-sheets of major components, and diagrams of the switchboards shall be submitted to ABS and the COR for review and approval as drawing 849-C740-01 SWITCHBOARD ARRANGEMENT & DETAILS. The purchase of the switchboard equipment is not permitted until the design is approved.

The switchboards shall be configured to contain:

A generator control section
A shore power section (only for Ship Service)
A dedicated distribution section for each voltage range

The generator control section shall enable paralleling of all generators. The switchboard shall also be configured to prevent paralleling between the shore power and either generator set.
The switchboard shall be designed, constructed, and installed in accordance with ABS rules. The switchboard shall be designed for 50-degrees C ambient temperature.

The switchboard shall be accessible and fully serviceable from the front and back, shall be freestanding and adequately supported to resist vibration.
Space heaters for the switchboard sections shall be provided to prevent condensation within the enclosure during idle periods. The space heaters shall be energized from the ship's service electrical system. Space heater switches with indicating lights shall be incorporated into the switchboard.

SPECIFIC REQUIREMENTS

Generator Set Switchboard Sections (Parallel Operation)

The switchboard shall include sections for monitoring and control of each generator set as well as a synchronizing section for paralleling of the generator sets. For each generator set, the associated switchboard section shall include the following components and features:
Automatic synchronizer.
"AUTO-MANUAL" synchronizer selector switch.
Generator power available indicating light.
Voltage regulator control rheostat.
Speed control rheostat.
Voltmeter and selector switch.
Ammeter and selector switch.
Frequency meter.
Wattmeter.
Multifunctional Amp transducer.
Multifunctional Volt transducer.
Multifunctional Watt transducer.
Frequency transducer.
Manual "ON-OFF" switch with indicating light for the switchboard space heater.
"ON-OFF-AUTO" switch with indicating light for the associated generator space heater. When in the "AUTO" position, the space heater shall be energized whenever the associated generator breaker is open.
The synchronizing section of the switchboard shall include the following components:
Synchroscope.
Selector switch to select the incoming generator.
Generator breaker "CLOSE" pushbutton for each generator.
Speed control rheostat for each generator.
One voltmeter for each generator.
One frequency meter for each generator.
An automatic synchronizer shall be provided for each generator that will automatically synchronize the incoming generator, as selected by the generator selector switch, with the AC bus and close the generator breaker when the power sources are synchronized. Automatic synchronization, breaker closing and load balancing, shall occur:
When the breaker close pushbutton is pressed and the synchronizer selector switch is in the "LOCAL AUTO" position.
When the synchronizer selector switch is in the "REMOTE AUTO" position.
When in the "MANUAL" position, pushing the close pushbutton will by-pass the automatic synchronizer and close the breaker of the selected generator.
Each generator breaker shall be provided with reverse power protection that will trip the generator under reverse power conditions. For diesel engine driven generators, the setting shall be between 8% and 15% of the main generator rating. Each generator breaker shall also be interlocked such that the generator breaker cannot be closed unless its associated generator is generating power. Each generator breaker shall also open if its associated generator voltage collapses.
The above switchboard description shall be applicable to both the Ship Service power system switchboard and, if applicable, the Auxiliary Power system for Large Power Consumers operating at a higher voltage than the Ship Service Power System. (See Contract Paragraph C705). In the case that both the Ship Service and the Auxiliary Power Service are required, the both power systems shall be able to provide power to one another via a properly sized power transformer and bus tie breakers at both switchboards.

Shore Power Operation – Ship Service Switchboard Section

The Ship Service switchboard shall include a section for monitoring the incoming shore power. The shore power section of the switchboard shall include the following components and features:

Shore power available indicating light.

Voltmeter.

Ammeter.

Frequency meter.

Phase sequence/loss system.

The phase sequence/loss system for the shore power connection consists of:

A phase sensing relay with correct phase light (green), neutral position, and incorrect phase (red)

Shore power reversed phase indicating light.

Three-position shore power phase reversal switch with “normal” and “reversed” settings separated by an “OFF” switch position.

To prevent paralleling between the shore power and the ship service generator sets, electrical and mechanical (safe/run device for the shore power service) interlocking shall be provided. The main bus shall only be energized at any given time by the generator sets or the shore power. The synchronizing section of the Ship Service switchboard shall allow for momentary paralleling of the shore power with ship’s power for bumpless power transfer (see Contract Paragraph C760).

Isolation Ground Bus & Ground Detection

The switchboard shall also incorporate an isolation ground bus. Connections shall be made from AC system distribution panels back to the isolation ground bus in the switchboard. Grounding shall then be made to one of the diesel generator engines.

For ground detection, the switchboard shall also include:

Insulation monitoring and alarm system for each of the AC main switchboard distribution buses with visual and audible alarms for low insulation values in accordance with ABS Marine Vessels Rules Part 4 Chapter 8 Section 3 Table 5.

Three phase ground fault detection lights and bulb test switch for each of the AC main switchboard distribution buses in accordance with IEEE 45 section 5.9.7.2.

A spring return 2-position selector switch with one set of normally open contacts and one set of normally closed contacts to switch between the insulation monitoring and alarm system and the three-phase detection light systems for each AC main switchboard distribution bus. The spring return feature shall ensure that the insulation monitoring system is in the normally closed position.

Ground detection lights, ammeter and test switch for all AC distribution sections.

Switchboard Breakers

General Circuit Breaker Requirements

The interrupting rating of each circuit breaker shall be suitable for the maximum short circuit current available at the point of application as determined by fault current analysis (see Contract Paragraph C715). The circuit breakers provided shall have a minimum interrupting rating of 10,000A RMS symmetrical at their respective voltage level, and shall be capable of interrupting without damage, the maximum fault current at the breaker from the system.

Circuit breaker coordination and selectivity shall be provided so that, for a fault on any part of the system, the fault is cleared by the protective device that is closest to the point of fault without tripping upstream breakers in accordance with USCG, 46 CFR, subchapter J, subpart 111.51.

Generator Sets, Bus-Tie, & Shore Power Sections

The generator breakers shall be draw-out type and provided with adjustable time delay under voltage trip devices. The generator and shore power breakers shall be provided with trip characteristics to provide maximum selective coordination with downstream circuit breakers and motor operations.

The switchboard shall contain molded case, electronic trip device circuit breakers for the generators, and for the shore power service.

Distribution Sections

The main sections of the switchboard shall contain, as a minimum, the breakers for the generator sets, the shore power breakers, the transformer feeders, and the feeds to the AC distribution section. The switchboard design shall allow for at least 20% future expansion, and at least two (2) spare breakers of each frame size utilized shall be provided in the Distribution Sections.

Molded case circuit breakers shall be provided for all of the equipment required for control of the distribution systems.

The distribution bus circuit breakers shall be manually operated and provided with inverse time, ambient-temperature-compensated, thermal magnetic trips and shall have interchangeable thermal trip units and adjustable magnetic trips in ratings where available.

As a minimum, the design shall allow for at least 20% future expansion and at least four (4) spare breakers of each size and quantity shall be provided. The spare breakers shall have trip ratings representative of the trip ratings furnished for other loads connected to the main switchboard.

Any remaining "spaces" for circuit breakers shall be fitted with plug-in assemblies of appropriate frame size and blank cover plates.

Single-phase loads shall be distributed as evenly as possible among the three phases of the three-phase, 4-wire system, to achieve optimum phase current balance.

Power Management System

A Power Management System (PMS) shall be included in the main generated power switchboard for the generating plant. The generators shall be configured to allow power management. The PMS includes all electrical power sources and consumers. The PMS shall be installed in accordance with the manufacturer's recommendations and all applicable regulatory requirements. The PMS shall provide these functions:

Fault-dependent and Load-dependent start/stop of generators.
Individual selection of stand-by sequence, including shore power.
Automatic load shedding (selectable).
Power limit, adjustable and selectable.
Power plant control with status and alarm presentation to a touch-screen panel at the Switchboard and ECR.
Asymmetric load.
Automatic synchronization.
Frequency control and voltage control.
Communication to the ICAMS for indication of power plant status and alarms.
Breakers as described in Contract Paragraph C755, emergency switchboard supply and bus ties shall be remote controlled from the IMACS (Contract Paragraph C780).
The power plant shall be controlled by means of graphical mimic schemes and keyboard. PMS control stations shall be installed at the bridge and the Engine Control Room.
The PMS shall operate in any condition of the bus ties (open or closed).

SPECIAL FEATURES

The switchboard(s) shall be designed to meet ABS ACCU Rules.

DELIVERABLES

849-C740-01 SWITCHBOARD ARRANGEMENT & DETAILS
Switchboard Component Cutsheets

STANDARDS

ABS Rules for Building and Classing Marine Vessels
IEEE 45-2002, Section 5.9.7.2, Ground Detection Lamps on Ungrounded Systems
46 CFR, Subchapter J, Subpart 111.51, Coordination of Overcurrent Protective Devices

C745 DISTRIBUTION PANELBOARDS

GENERAL DESCRIPTION

Power and lighting panelboards shall be used to supplement the distribution section of the switchboard for all of the electrical loads on the vessel. Panelboards shall be in accordance with UL67, Standard for Panelboard (Marine Supplement).

REQUIREMENTS

Panelboards shall be located so that they are readily accessible and shall have a door with lock, all keyed the same. All panelboards shall be minimum IP22, unless specified otherwise. Panelboards serving loads located out in weather shall be located in interior spaces. All panelboards and circuit breakers to be installed as per vendor specification.

During Phase II, front layouts, catalog cut-sheets of major components, and diagrams of the panelboards shall be submitted to ABS and the COR for review and approval as drawing 849-C745-01 PANELBOARDS ARRANGEMENT & DETAILS. The purchase of the panelboard equipment is not permitted until the design is approved.

The panelboards shall be dead front circuit breaker type equipped with molded case circuit breakers. All panelboards shall be fitted with isolation ground bars for all equipment grounds. The isolation ground bus shall have a conductor ground back to the switchboard ground bus. Buses shall be of hard-drawn commercially pure cooper and be arranged to maintain phase sequence; dual voltage panelboards shall be provided with a neutral bus.

All panelboards shall be equipped with main circuit breakers for the feed into the panelboard.

All panelboards and breakers shall be marked in accordance with Contract Paragraph C702. Each panelboard shall have circuit card pockets and circuit cards with list of circuits.

SPECIFIC REQUIREMENTS

AC System Circuit Breakers

The distribution panelboards shall be connected to feeder circuit breakers in the main switchboard as well as to the transformer feed to other switchboards.

As far as practicable, load distribution should be such that the distribution panelboards shall feed electrical loads that are located in their respective areas.

Single-phase loads shall be distributed as evenly as possible among the three phases of the 3-phase, 4-wire system, to achieve optimum phase current balance.

The panelboards shall be equipped with molded case circuit breakers with ratings and the number of poles to satisfy system requirements. Stab (plug in) type circuit breakers shall be used.

The circuit breakers in all the panelboards shall have quick make, quick break, and trip-free mechanisms. The interrupting rating of each circuit breaker shall be suitable for the maximum short circuit current available at the point of application as determined by the fault current analysis (see Contract Paragraph C715). The circuit breakers provided shall have a minimum interrupting rating of 10,000-RMS symmetrical amperes at their respective voltage levels and shall be capable of interrupting without damage to the fault current available at the breaker from the system.

In addition, each of the distribution panelboards shall be provided with a minimum of four spare breakers or 20% spare breakers, whichever is the greater, with trip ratings representative of trip ratings furnished for other loads. Cables powering panelboards shall be sized for full utilization with spare breakers.

Circuit breakers for the motor controllers shall be in accordance with Contract Paragraph C750.

Breakers for the transformer(s) shall be in accordance with Contract Paragraph C755.

DC System Distribution Panelboards

A DC distribution panel shall be provided and installed for each DC system. The DC panels shall include, but not be limited to the following basic components and features:

Power available light with dimmer switch

Battery selector switch

Line voltage meter

Load current meter

Power available light for each load

Ground fault detection system
Visible indicators at the panels and at the batteries shall be provided that indicate when a battery is discharging and when the automatically controlled emergency power source is supplying the load.

SPECIAL FEATURES

None.

DELIVERABLES

849-C745-01 PANELBOARDS ARRANGEMENT & DETAILS
Panelboard Cutsheets

STANDARDS

IEEE-45-2002, Recommended Practice for Electric Installations on Shipboard
UL 67 (with Marine Supplement), Panelboard

C750 MOTORS AND CONTROLLERS

GENERAL DESCRIPTION

None.

REQUIREMENTS

None.

SPECIFIC REQUIREMENTS

Motors

All motors shall be drip-proof protected, except those exposed to the weather, which shall be IP66, corrosion-resistant, equipped with sealed insulation and provided with heaters within the enclosures.
All motors shall meet the efficiency rating for NEMA ultra-premium efficiency motors and shall be sized and designed for continuous operation of the driven auxiliary equipment at rated capacity.
All motors shall be designed for a maximum ambient temperature of no less than 50-degrees C.
All motors shall be equipped with anti-friction bearings. All motors using grease-lubricated bearings shall be provided with grease nipples and shall have positive means for preventing grease from being forced out upon the motor windings.

Controllers

All controllers shall be sized to the power rating of the controlled motor. All controllers shall have a manually reset thermal overload protection, line disconnect device, and integral start/ stop push-button set. Controllers arranged for automatic or remote operation shall also be provided with a 'Hand-Auto' or 'Local-Remote' selector switch. For all equipment inside the hull or deckhouse the motor controllers shall be located close to the equipment and have at minimum IP22 enclosures. For equipment located outside, (in the weather) motor controllers shall be located inside the vessel (out of the weather) with remote controls local to the equipment as far as practicable. Controllers exposed to weather shall have a minimum rating IP66, corrosion-resistant enclosure. Controllers in hazardous zones shall be explosion proof.
Space heaters shall be provided for all motors of 10 HP and larger.
Motors shall have a continuous horsepower rating in accordance with NEC, NEMA, UL, standards.
Motor starters shall be across-the-line starters for all motors of 10 HP and below. Motors above 15 HP shall have reduced voltage, auto-transformer type starters with a closed transition soft start.
Remote control of motors shall be as specified on the One Line Diagram (See Contract Paragraph C720). Motor controllers shall be provided by a single marine equipment supplier to the greatest extent practicable.
Motor controllers shall have pushbuttons, switches, and indicator lights; remote operating stations shall also be provided with pushbuttons and lights for controlling the load locally. Motor controllers shall have provisions for control and indication from the Integrated Monitoring and Control System (see Contract Paragraph C780).

SPECIAL FEATURES

Motor Controller – Breaker Coordination Circuits

Switchboard breakers and panelboard breakers for motors and motor controllers shall be sized and installed in accordance with the ABS Marine Vessels Rules Pt.4, Ch.8, Sec. 2, 9.17.1 and the following:

(i) Synchronized and Squirrel-Cage Motors

All motor feeder circuit breakers whose motor has a reduced voltage starter shall be rated near to and not more than 200% of the motor FLA.

All other motor feeder circuit breakers whose motor does not have a reduced voltage starter shall be rated to and not more than 250% of the motor FLA

Round-Type Motors

All motor feeder circuit breakers whose motor is a wound rotor-type motor shall be rated near to and not more than 150% of the motor FLA.

The motor control circuits shall be in accordance with MDC Sketch #750A. See MDC Sketch #750B for motor circuit logic.

Motor Under-Voltage Protection

All motor controllers shall be provided protection against an under-voltage condition. Protection against under-voltage shall be either low-voltage protection (LVP) or low-voltage release (LVR). Unless a motor control for a vital propulsion auxiliary can be started from a central control station, motor controllers shall be provided and installed with LVR as dictated by the Rules.

All motor controllers not having LVR shall be provided and installed with LVP unless the motor is less than 2-HP.

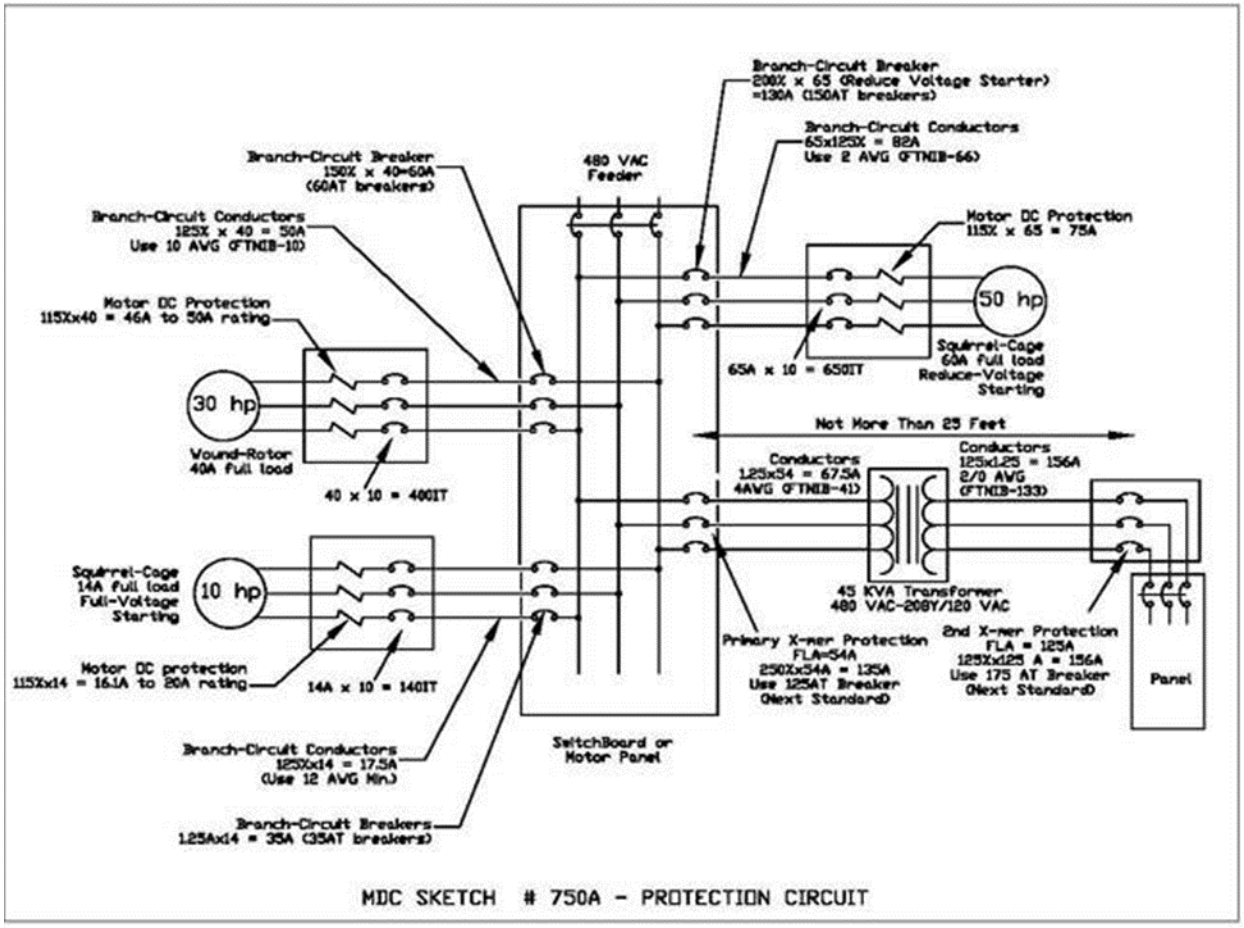
Variable speed motor controllers shall have filtering circuits to minimize harmonic distortion on the power system.

DELIVERABLES

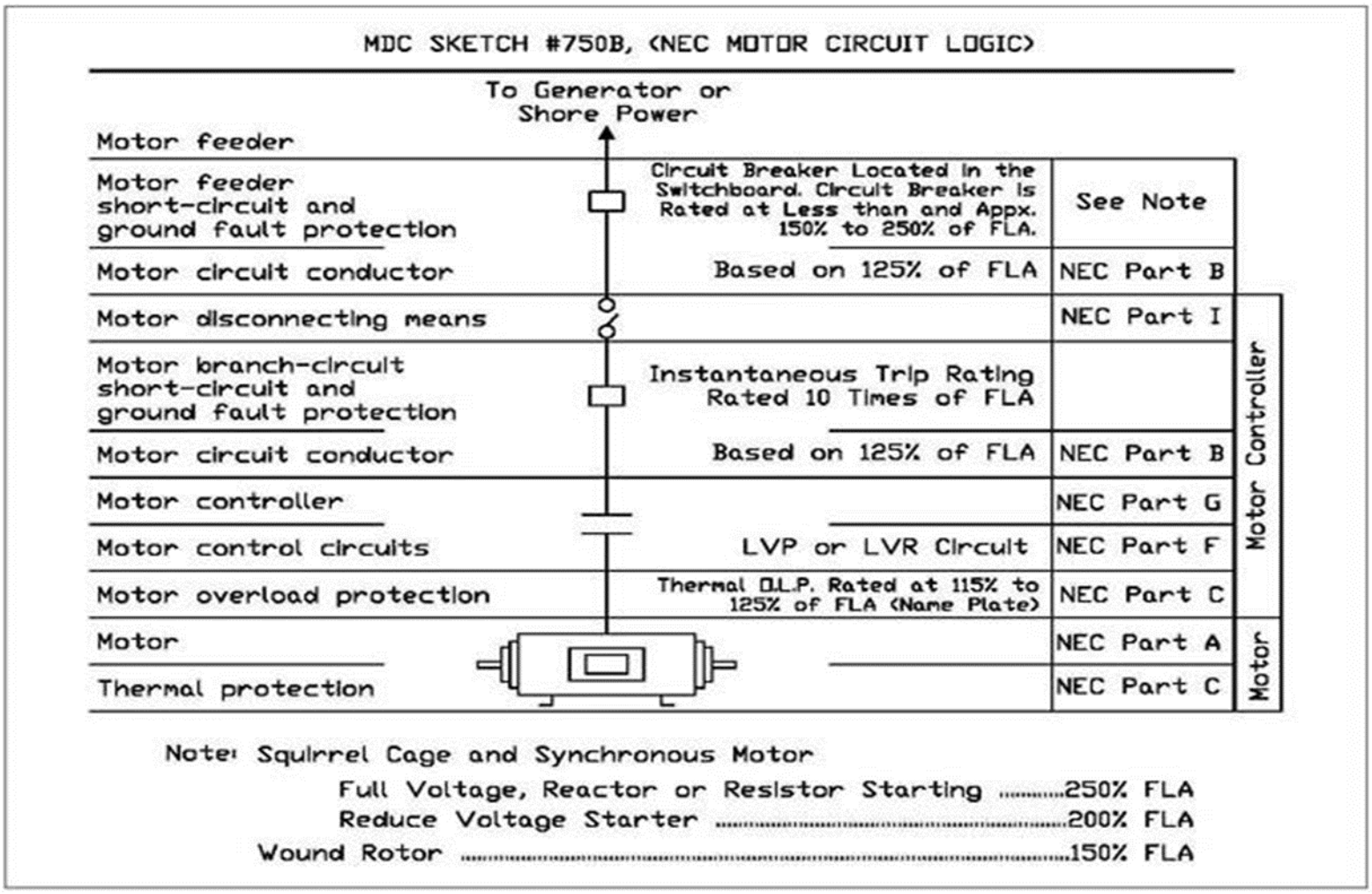
Motor and Controller cutsheets

STANDARDS

NFPA-70, National Electric Code
NEMA
UL
ABS Marine Vessel Rules 4-8-2/9.17.1, Protection of Motor Circuits
USCG regulations



MDC SKETCH # 750A - PROTECTION CIRCUIT



C755 TRANSFORMERS

GENERAL DESCRIPTION

None.

REQUIREMENTS

The Contractor shall provide and install transformers to connect all distribution sections as described in Contract Paragraph C740. For redundancy two transformers shall be installed to connect distribution sections.

Transformers shall satisfy all applicable requirements of ABS MVR and 46 CFR Subchapter J.

The transformers shall be sized based on the AC system load analysis as indicated in Contract Paragraphs C710 and C733.

Each transformer shall be 3-phase, 60-Hz, marine dry type, sized to satisfy system requirements. Transformers shall be placed in well ventilated areas, close to their respective loads. All transformers shall be energy efficient and constructed in accordance with IEEE 45. All low voltage transformers shall be rated for maximum 115 degree C rise.

The secondary system shall be bonded at the transformer.

The Contractor is responsible for providing a foundation beneath each transformer as described in Contract Paragraph C330.

SPECIFIC REQUIREMENTS

Insulation

Each transformer shall have class H insulation and copper conductors. The design ambient temperature shall be a maximum of not less than 50oC-. Each transformer shall be designed to deliver rated KVA continuously without the benefit of internal fans to circulate air. All insulating materials shall be in accordance with IP standards.

Provisions shall be made to completely isolate the core and coil from the enclosure. There shall be no metal-to-metal contact. Rubber vibration isolating pads shall be installed by the manufacturer between the core and the enclosure. The core shall then be visibly grounded to the enclosure by means of a flexible grounding conductor.

Construction

Each enclosure shall be constructed of heavy gauge sheet steel, shall be drip-proof, and shall be given a suitable corrosion resisting treatment. The entire assembly shall be rigid self-supporting construction. Panels shall be capable of being readily open or removed for access to interior for installation, maintenance, and repair.

Transformer Circuit Breakers

The transformer feeder primary and secondary circuit breakers shall be sized in accordance with NFPA-70, 450.3.

Circuit Isolation

Isolation transformers shall be placed where power is transferred between circuits that supply a large numbers of motor controllers and/or have motor controllers with a significant higher rating.

SPECIAL FEATURES

Loads shall be balanced between phases.

DELIVERABLES

Transformer cutsheets

STANDARDS

IP

NFPA-70, 450.3, Maximum Rating or Setting of Overcurrent for Transformers Over 1000 Volts

C760 SHORE POWER SERVICE

GENERAL DESCRIPTION

The vessel shall be set up to accept shore power through each of two (2) Shore Power Stations, one Port and one Starboard. The shore power shall be 480-volt AC, 3-phase 3-wire, 60 Hz, and amperage as determined by the Load Analysis (see Contract Paragraph C710) for the In-Port maximum electrical load demand.

REQUIREMENTS

The Contractor shall develop drawing 849-C760-01 SHORE POWER DETAILS during Phase II and submit it to the COR and ABS for review and approval.

The maximum electrical load demand must support in-port operations, to be provided by the Government during Phase II.

The shore power stations shall be provided with a power inlet receptacle (male) with watertight closure and matching plug (female) for the shore power cable. Shore power cable shall be rated for 600VAC and shore amperage supply (to be provided by the Government during Phase II), three-conductor with ground, and shall be provided with a length of 75M (250 ft). The shore side end of the cable shall be provided with lugs or a cable connector to match the existing shore power receptacle as directed by the COR. Each Shore power station shall be connected to the respective section of the Ship Service Switchboard (See Contract Paragraph C740) with appropriately sized cables; each cable shall be protected by fuses with disconnecting means or circuit breaker located at each shore connection box. The Contractor shall provide means for raising, lowering, and installing the shore power cable aboard the vessel (i.e. davit, reel, etc.). Where such means include lifting appliances, they shall be provided in accordance with Contract Paragraph C455.

Shore power monitoring of voltage, frequency, and phase sequence shall be provided on the 480 VAC Ship Service Switchboard along with synchronizing equipment to allow for momentary paralleling of shore power with ship's power for bumpless power transfer to and from shore power. The Shore Power circuit breakers shall be motor operated for auto-paralleling, with Auto-Off-Manual selector switch (See Contract paragraph C740). Switchboard breaker interlocks shall prevent manual paralleling of the ship service bus and shore power and shall prevent the automatic transition when voltage is not present on both the ship service bus and the shore power feeder. Interlocks shall also prevent the transitioning from generator to shore power when the load on the ship service bus exceeds the capacity of the shore power supply. The switchboard automation shall open the shore power circuit breaker upon shore power voltage failure (See Contract Paragraph C740). The switchboard shall be provided with "Shore Power Available" and Breaker Closed" indication lights and shall interface with the PMS and Integrated Machinery Alarm and Monitoring System (C780).

An information plate shall be provided at or near each Shore Power Station with complete information on the system of supply and the nominal voltage and frequency of the vessel's system and the recommended procedure for carrying out the connection. The shore power receptacles shall be labeled for operation in accordance with Contract Paragraph C702.

Cable hangers shall be provided above the shore power station locations to route and support cable to vessel side(s). The COR shall determine the storage location for the shore power cable. If not accessible by the stores' cranes, the Contractor shall provide davits for handling of shore power cables over the side of the vessel. See Contract Paragraph C455.

SPECIFIC REQUIREMENTS

None.

SPECIAL FEATURES

None.

DELIVERABLES

849-C760-01 SHORE POWER DETAILS

STANDARDS

ABS Rules for Building and Classing Marine Vessels
IEEE 45-2002 Recommended Practice for Electrical Installations on Shipboard

C765 COMMUNICATION EQUIPMENT

GENERAL DESCRIPTION

The dredge shall be provided with communication equipment as required by the regulatory bodies and SOLAS regulations, as well as equipment described in this section. All communications equipment shall be installed per manufacturer's recommendations and shall be powered from UPS sources and/or DC batteries.

REQUIREMENTS

The Contractor shall develop during Phase II drawing 849-C765-01 INTERIOR COMMUNICATION SYSTEMS and 849-C765-02 EXTERNAL COMMUNICATION SYSTEMS and submit it to the COR and ABS for review and approval.

A complete integrated communications system, including internal communications (IC) two-way calling and public address (PA) system, shall be provided and installed by the Contractor as described below. The systems shall be installed complete with network controllers, amplifiers (if necessary), back-up/reserve battery power sources, desk or wall mounted phones, PA speakers and horns, indicator lights and buzzers, noise cancelling headsets and PA microphones.

The systems shall be designed and installed so that the loss of one component of the system does not disable the rest of the system.

The IC and PA systems shall have a main and back-up power supply. The IC and PA systems shall be provided with a back-up/reserve power supply that is independent of the vessel's electrical system. In the event of the loss of primary power supply, the systems shall automatically switch to the back-up power supply. The back-up power supply shall be sized to support the systems for 18 hours (per 46 CFR 112.05).

The systems shall give an alarm or notification on the bridge when the back-up/reserve power supply is low or requires replacement.

The numbers for each station being served by the IC system shall be designed and arranged logically with respect to the arrangements and shall be approved by the COR. All IC stations on respective decks shall start with the same number.

The PA dial number shall be an easily recognized number.

The Contractor shall provide and install engraved plastic directory plates at every IC station. The directory shall include numbers to all stations and the PA dial call feature number. The directories shall be either bulkhead mounted or secured to a desk with damage free, adhesive mounting, The COR shall approve the mounting method during installation.

SPECIFIC REQUIREMENTS

Interior Communications

Sound-Powered Telephone System

The Contractor shall provide and install a common talk, selective ring, sound powered phone system as required by the regulations and meeting IEC 60945. All sound powered phone stations shall be drip-proof with integral selector switch, hand crank (magneto) and bell. Stations in machinery spaces shall be installed in sound deadening enclosures and fitted with rotating blue beacons and audible bells powered from the nearest emergency lighting circuit.

Earmuff type headsets shall be provided for machinery space stations, stowed in boxes adjacent to the station. Headset with plug-in jack shall have sufficient cable length to allow for hands-free emergency operation.

Phone stations located on Weather decks shall be mounted in IP66 or IP67 (if exposed to immersion) enclosures that do not require tools to open hinged access door.

The sound powered telephone system primary circuit (1JV) shall allow, at a minimum, for communication between the following stations/spaces:

Bridge (all Bridge Control Stations)
Captain's SR
Chief Engineer's SR
Engine Room
Engine Control Room
Auxiliary Machinery Spaces
Steering Gear Room
Emergency Generator Room

The system shall have capacity to add up to two (2) additional stations.

Dial Telephone System

The Contractor shall provide and install an ABS type-approved, VoIP-based, PABX dial telephone system complying with ABS requirements for voice communication and configured as an emergency communications system per SOLAS. It shall consist of a digital automatic dial telephone system suitable for marine installation and capable of handling all rooms/spaces on the vessel (excluding storage and void spaces) and also allow for 20% phone extensions growth. The dial telephone system shall be software configurable, upgradable and expandable and be provided with cables, phone jacks, and patch panels as required to create a functional system.

Dial telephone stations shall be installed in the deckhouse common spaces and workspaces (except heads), engine room, ECR, auxiliary machinery spaces and others as determined by the COR. Locations of telephones in spaces shall be reviewed and approved by the COR.

The system shall be integrated with the PA/GA system.

PA/GA System

The Contractor shall provide and install a type-approved integrated Public Address/ General Alarm/ Talkback ICP duplex system throughout the vessel that complies with USCG, SOLAS and ABS regulations. The system shall be integrated with and accessible through the telephone system. The system shall be addressable by zones and be complete, with redundant amplified systems, and provided with UPS and battery back-up. The main PA/GA station shall be in the Bridge.

The system shall include tone generators for the general alarm and shall support use of prerecorded messages to be loaded into the system. The system shall also be capable of providing an external signal to allow public address announcements to be mimicked by visual signage.

An intelligent digital control head shall provide the user with a series of PA/GA control menus displayed on a high-resolution, fully dimmable, color LCD screen with touch panel. This control panel shall be located for easy access in the Bridge.

General Alarm Contact makers shall be provided, at a minimum, in the Bridge, the ECR and the Emergency generator Room.

The system shall be provided with loud hailers on top of the Bridge.

Machinery spaces shall be provided with visual and audible annunciation that consolidate all communication calls and system alarms (see Contract Paragraph C780) into single, multicolor, tower units with different tone and color associated to an event, alarm or call.

Cellular Amplifier & Repeater System

The Contractor shall provide and install two (2) cellular amplifier and repeater systems each with the following system components:

- Marine omni-directional antenna mounted on Bridge Top Mast,
- Cellular amplifier or repeater to boost signal
- Indoor antennas to rebroadcast signal throughout the interior (Bridge, Office(s), Berthing, Mess, Workshop(s) and crew common spaces at a minimum) and exterior (weather) spaces on the vessel.

The amplifier system shall be compatible with all major US carriers.

Exterior Communications

VHF Radio

The Contractor shall provide and install two (2) 25-Watt marine VHF-DSC radios. Each radio shall be located at each Bridge Wing Console, with respective antennas located on Bridge top,

on the same side of the ship as the radios. These are in addition to the VHF radios in the GMDSS system.

The Contractor shall also provide six (6) handheld 40-channel VHF radios with battery packs, belt clips, and chargers.

Global Maritime Distress and Safety System (GMDSS)

The Contractor shall provide and install one complete GMDSS radio station for Sea Area A1, with INMARSAT equipment. The following shall be part of the GMDSS equipment:

- NAVTEX receiver, located at the Bridge Central Console BCC (see Contract Paragraph C770)
- Two (2) VHF radios (IMO GMDSS approved), located at the BCC
- Three (3) hand-held VHF radios (IMO GMDSS approved) with battery chargers
- At least one (1) GPIRB
- Two (2) Search and Rescue transponders (SART)
- One (1) distress panel in the BCC with single activation button with protection for inadvertent activation

VSAT

The Contractor shall provide installation support for a Government furnished marine VSAT system. Details of the VSAT system will be provided by the Government during Phase II. This system shall interface with the PABX and dial telephone.

The Contractor shall provide and install the antenna foundation (see Contract Paragraphs C317 and C330), power and control cables to the antenna (see Contract Paragraph C725), server rack(s) for the VSAT control equipment and servers, and cables to wall mounted data points at each phone location. VSAT equipment shall be included in the RF System Design Study and the ANTENNA ARRANGEMENT DRAWING (see Contract Paragraph C770).

IRIDIUM Satellite Communications

The Contractor shall provide installation support for a Government-furnished Iridium Satellite telephone system with data and PABX interfaces.

Automatic Identification System (AIS)

A self-contained AIS transceiver in accordance with SOLAS regulations shall be provided. It shall incorporate a GPS system and VHF transceiver and shall interface with navigation equipment (Contract Paragraph C770)

Video Monitoring System (CCTV)

An IP based Closed-Circuit Television System shall be provided and installed on the vessel. All cameras shall have remote controls for pan/tilt/zoom. Cameras for exterior or wet locations shall be IP67 rated. Exterior cameras and interior cameras in wet paces shall have internal heaters. The system shall have DVR recording capability with sufficient capacity to store feed from all cameras for one week. Surveillance monitors shall be provided in the Bridge (BCC), in the ECR, and up to three additional locations as determined by the COR.

This system shall be separate from the dredging CCTV system described in Contract Paragraph C524.

Cameras shall be located for maximum viewing angle without interference and/or blockage in the following areas:

- Machinery Spaces
- Vessel access points (P/S)
- Common Passageways and Stair Towers accesses
- Launch and Rescue Boat deployment areas
- Mast Top (bird’s eye view forward and aft) (see Contract Paragraph C770)
- Bow Connection Point (Contract Paragraph C523)
- Mooring areas

Boarding Areas

Final camera quantity and location shall be approved by the COR.

SPECIAL FEATURES

Four spare through-deck stuffing tubes (1-inch) with pull wires shall be installed through the bridge top in positions selected by the COR during the construction phase.

DELIVERABLES

849-C765-01 INTERIOR COMMUNICATION SYSTEMS
849-C765-02 EXTERNAL COMMUNICATION SYSTEMS

STANDARDS

USCG International and Inland Rules-of-the-Road
46 CFR 112.05, Emergency Power Source
ABS Guide for Bridge Design and Navigational Equipment/Systems
SOLAS, International Convention for the Safety of Life at Sea
NMEA-0183, Standard for Interfacing Marine Electronic Devices
IEEE 45-2002, Recommended Practice for Electric Installations on Shipboard
IEEE C95.1-2019, IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz
IEEE C95.2-2018, IEEE Standard for Radio-Frequency Energy and Current-Flow Symbols.
33 CFR Part 164 Navigation Safety Regulations
IEC Standard 60945, Maritime Navigation and Radiocommunication Equipment and Systems
IEC Std 60529 Degrees of Protection Provided by Enclosures (IP Code)

C770 NAVIGATION

GENERAL DESCRIPTION

The new MCHD shall be equipped with a state-of-the-art Navigation and Integrated Bridge System (IBS), as outlined below and in accordance with all applicable regulatory authority requirements. All equipment under this section shall be fully supported and available in the United States. All navigation equipment is to comply with USCG Navigation Safety Regulations and the vessel shall meet the requirements of SOLAS Safety of Navigation regulations.

REQUIREMENTS

During Phase II, the Contractor shall develop drawing 849-C770-01 NAVIGATION EQUIPMENT OVERVIEW and submit it to the COR and ABS if applicable for review and approval. Cutsheets for all components listed in the Paragraph shall be provided to support the drawing. The drawing shall identify the equipment and one-line control/interface logic.

All navigation and communications equipment installed on the AC distribution system shall be provided with a universal power supply (UPS) to avoid interruption and power spike/surges when switching power sources (generators and shore power). Power supplies, internal power distribution, and battery chargers shall be provided as-required by regulations and be designed for redundancy.

The IBS shall integrate propulsion machinery controls, control and monitoring functions, and navigation instrumentation in an ergonomic configuration. This configuration shall maximize the effective utilization of the equipment, with appropriate interfaces to the integrated monitoring, alarm and control system (IMACS) (See Contract Paragraph C780).

The IBS shall include 27” dimmable multifunction displays (MFDs) at each conning station to display navigation, steering, and propulsion data as well as alarms on operator-selected data display graphic pages. The number of displays at each station shall be coordinated with the COR during Phase II. The IBS shall include:

AutoPilot
Propulsion Control System, Bow Thruster Control, and Dynamic Positioning
Radar System (w/ Automatic Radar Plotting Aid ARPA)

Electronic Chart Display and Information System (ECDIS)
Conning Display
Multi-Operator Stations
Standardized Consoles
Sensor Integrators
Navigation Sensors
Voyage Data Recorder
Bridge Navigational Watch and Alarm System (BNWAS)
Automatic Identification System (AIS)
Depth Sounder
Speed Log
Anemometer
Barometer

The IBS command and control system shall function in accordance with ABS NIBS classification and USCG Vital System Automation.

SPECIFIC REQUIREMENTS

The equipment listed below shall be provided by the same manufacturer to the extent possible. During Phase II the Contractor shall prepare 849-C770-02 RF SYSTEM DESIGN STUDY and 849-C770-03 ANTENNA ARRANGEMENT DRAWING in order to show minimization of antenna interference.

At a minimum, the following equipment shall be provided and installed:

Main Navigation Station

The Main Navigation Station of the Integrated Bridge System shall be the Bridge Control Console (BCC) located on centerline on the Bridge. The BCC shall host the following:
Propulsion Controls, Steering Controls, Bow Thruster Controls, Dynamic Positioning and Integrated Controls
Centralized Machinery control and monitoring system
Electronic Navigation Systems
Interior and Exterior Communication Systems and CCTV monitors
Safety Systems including navigation lights, watertight door indication and controls, and main ventilation shut-down
Gyrocompass repeater

Bridge Wing Consoles

The Port and Starboard Bridge Wing Consoles (PBWC /SBWC), located on the extreme sides of the bridge, shall host the following:
Propulsion Controls, Bow Thruster Controls, Dynamic Positioning and Integrated Controls
Gyrocompass repeater
Interior and exterior communications

Engineer's Control Room Consoles

The ECR Consoles shall contain all the indication, monitoring, and control equipment for the gensets as required for ABS and ACCU classification, and shall include:
Diesel Engine Controls
Propulsion Controls, Steering Controls, Bow Thruster Controls
Gyrocompass Repeater
Radar Repeater
Interior communications, CCTV monitors
Centralized Machinery control and monitoring system
Tank Level Indication
Control of ballast, bilge, compressed air, fire, fuel, water, and ventilation systems

Radars

The radar systems shall form part of the IBS and be incorporated into the MFDs.
The Contractor shall provide and install two X-band radars with ARPA capabilities, interfaced with the IBS and meeting the requirements of 33 CFR, part 164, Navigation Safety Regulations. The

radars to be supplied must meet the applicable requirements for a vessel engaged in ocean and inland transit and dredging.
The Contractor shall provide and install one S-band radar, with ARPA capabilities, with output to IBS.
The radars shall be provided with the following features:
Multiple means of data communication (NMEA, MITS, or PICIES Ethernet) as -required for communication with other navigation equipment.
Outputs of ARPA tracked target data to the ECDIS and voyage data recorder
ARPA capability to track up to 100 targets at relative speeds of up to 150 knots
11 range scales (0.125 – 96 nm)
Manual and automatic clutter suppression
Communication link to the ECDIS for receiving and displaying chart and/or route data (radar overlay)
Remote control of autopilot in heading, course, and track control modules

Electronic Chart Display and Information System (ECDIS)

A complete, type-approved (with certificate) ECDIS shall be provided as part of the navigation suite complete with computer processor and 27" color monitor (installed in BCC). ECDIS shall be capable of interfacing with the radar, gyrocompass, autopilot, DGPS, speed log, echo sounder, anemometer and IBS MFDs. All required electronic charts for areas of operation shall be included (US East and Gulf Coasts and all bays, sounds, and navigable rivers from Maine to Texas). The approved ECDIS chart system shall also provide the following features:
Variable brightness and contrast controls
Trackball control
Auto-sensing control switch for trackball control
Vessel information display including:

- Wind Speed and Direction
- Vessel Speed and Heading
- Water Depth
- Thruster Steering Position
- DGPS Position and Course-Made-Good
- Time and Date

Universal chart manager, capable of displaying IMO type-approved ECDIS vector and raster charts, including:

- S57
- C-Map
- ARCS
- PRIMAR

Group alarms from the IMACS
Navtex interface capability
Voyage recording and replay
Track control steering capability – The combined ECDIS and Autopilot system shall ensure that the vessel automatically follows the planned route in any type of waters by providing automatic adjustment of the steering in relation to the planned route, both on straight courses and during turns from one course leg to another.
ARPA target data receiving/display capability
Capability to transmit and receive data transmission on two levels (NMEA and Ethernet or equivalent)

Doppler Speed Log

A Doppler Speed Log shall be provided with displays in the BCC and chart table. The system shall have a single transducer configuration located forward and be capable of being replaced while the vessel is afloat. The system shall provide NMEA outputs as-required to supply data to the radar, autopilot, gyrocompass, ECDIS, and IMACS.

Satellite Compass

A satellite compass complying with IEC 60945 Ed.4, ISO requirements (for SOLAS vessels) and IMO MSC.116(73) shall be provided and installed. It shall be integrated with IBS.

Echo Sounder & Transducer

The vessel shall be equipped with two independent echo sounder systems, each able to plot to paper, and meet the requirements for alerts and interconnection with Bridge Alert Management in IMO MSC.302 (87). Displays shall be capable of showing up to 30 minutes of information with continuous digital display indicating the water depth. The two main displays and controls shall be located at the BCC, with slave readouts at the chart table.

Two discrimination sounder boxes shall be provided and installed in the electronics room, or location recommended by the manufacturer, to interface with the transducer and display and provide the operators with bottom composition information (rock, gravel, sand, mud). Discrimination sounders shall be dual-frequency (50/200 kHz) with multiple range scales up to 3900 ft and selectable output power of 600W or 1 kW.

GPS/DGPS Receiver & Antenna

The Contractor shall provide and install a GPS/DGPS system complete with differential receiver and NMEA RS232/442 outputs to required navigation/monitoring equipment. Receiver shall have a position accuracy of 33 feet or better. Receiver shall be waterproofed to IEC60529 IP 56. Integrated displays shall be mounted at the BCC with slave displays at the chart table.

Compass

The Contractor shall provide one compass, magnetic plate type, installed in the BCC, and which meets the requirements of IMO Resolution A.382(X).

Gyrocompass

The Contractor shall provide a master fiber-optic gyrocompass unit, compass monitor, slave repeaters, and bearing repeaters. The transmission unit shall be provided with on/off switches to control the repeater outputs, and sufficient quantity of outputs to allow for future expansion. The main readout shall be located in the BCC with slave repeaters located in the bridge wing consoles, the ECR console, and in the Dredging Control Console. A bearing repeater, with column stand, gimbal bracket, 360° card, and prismatic azimuth device, shall be located beside each bridge wing console. The gyrocompass shall provide five additional serial data outputs and one six-steps/degree output for interfacing with the radar systems, autopilot, dynamic positioning system, DGPS, ECDIS, magnetic compass and other navigation/communications equipment as required. The gyrocompass system shall satisfy international requirements for a type-approved marine gyrocompass and comply with IMO regulations A.424(XI) and A.694(17) as well as the ISO standard 8728 and is Wheelmark type-approved. Required features for the gyrocompass are as follows:

Rate-of-turn output
High speed transmission and follow-up system 100°/sec.
Heading data transmission by shaft encoder
Self-aligning repeater compasses with serial interface IEC-1162-1 / RS 422
+/- 180° electronic alignment error correction in setup program (mechanical correction not necessary)
High MTBF (40,000 hours)
No maintenance required during service life
Monitoring and alarm functions for all voltages
Gyroscope current and follow-up system
Permanent storage of operational data (temperature, elapsed operation time)
Service locations worldwide

Automatic Identification System (AIS)

The Contractor shall provide and install a Class A self-contained Automatic Identification System (AIS). The system shall meet the USCG AIS Carriage Requirements set forth in 33 CFR 164. The AIS shall consist of a control unit, radio transceiver (transponder), and GPS antenna. The control unit shall meet IMO installation guidelines and be located on the bridge. The transceiver is to be remotely mounted. The system shall provide vessel position, speed, and course over ground, as well as static and voyage-related information. The system shall interface with the ECDIS and radar. The AIS target information shall be easily superimposed on the graphic display unit for the ECDIS. The vessel's primary GPS receiver shall interface with the AIS and be used as the main positioning source. This

unit shall also incorporate an “all-in-view” GPS receiver which can be used as a back-up for the primary GPS receiver. The AIS shall provide:
Ship Name/Call Sign/MMSI/IMO Number
Date and time in UTC
Time of composition of message
Position WGS84
Latitude/Longitude in degrees & minutes
Course over ground (COG) in degrees
Speed over ground (SOG) in knots 1/10 knots
Destination/ETA
Actual maximum draft in feet and inches
Ship/Cargo (static and voyage related data)
Length/Beam
Number of persons on board
The Contractor shall be responsible for obtaining the official U.S. Coast Guard hull number and registration for the AIS system.

Complete Weather Stations

A complete ultrasonic weather station shall be furnished and installed on top of the bridge. The complete weather stations shall be capable of measuring apparent and true wind speed and direction, barometric pressure, wind chill temperatures, relative humidity, dew point temperature, lat/long, pitch/roll and heading. The weather station shall interface with the navigation system and display units.

Network Satellite Weather and Radio Receiver

A network satellite weather and radio receiver shall be provided and installed. The unit shall interface with the navigation system and display units. The Contractor shall arrange a two-year satellite subscription for the weather service.

Night Vision Camera (see Contract Paragraph C765)

Infrared night vision cameras shall be provided and installed on top of the bridge mast with bird’s eye views forward and aft. Each camera shall have a thermal sensor with a minimum resolution of 320 x 240, a minimum field of view of 24° x 18° (NTSC), a water-proof enclosure (IPx6 minimum), and an automatic defroster. The cameras shall interface with the navigation system and display units. Electric pan, tilt and zoom controls shall be provided on the bridge console.

Forward-looking Sonar

A sonar or sub-bottom profiler system shall be provided for the dredging operation in accordance with Contract Paragraph C498. The system shall be provided with a transducer array mounted flush with hull and located forward. Data from the forward-looking sonar shall be integrated with the navigation equipment and displayed on the bridge.

Voyage Data Recorder (VDR)

A complete IMO-approved voyage data recorder, with features and capabilities in accordance with IMO Resolution MSC.333(90), shall be provided and installed. The VDR shall be capable of interfacing with the IMACS and navigation systems to record the information required by regulatory bodies. The VDR shall be ABS-approved for annual certification. The VDR shall record 12 hours of data in a continuous loop. The VDR shall be complete with data acquisition unit (located on the bridge), replay and evaluation unit, bridge alarm unit, protective memory capsule, and all other ancillary equipment per the regulations.
Data may be derived from the individual indicating alarm/equipment or, as practicable, from the IMACS.
The protective memory capsule shall be located in a clear section of the house top to allow access by a diver or ROV

Radio Direction Finder

A programmable VHF radio direction finder (RDF), shall be provided and installed in the BCC.

NAVTEX Receiver

A NavTex Receiver shall be located at the BCC.

Air Horn

The Contractor shall provide and install one (1) air Dual Horn in compliance with IMO and USCG ('72 COLREGS as amended), brass/bronze construction with a solenoid valve and automatic whistle presets. Air for the horn shall be supplied from a dedicated air compressor and receiver as part of the Air Horn system.

The air horn receiver shall be:

Constructed and certified in accordance with the ASME Code for Unfired Pressure Vessels. The receiver shall be stamped and an ASME Certificate of Inspection shall be furnished with the receiver.

The design, fabrication, and testing of the air receiver shall be in accordance with the ABS Rules (which also requires survey at the plant of manufacture for fabrication and testing). Each receiver shall be certified and stamped by ABS.

Supplied with an automatic condensate drain valve to allow for the removal of accumulated oil and water. The valve shall empty into a drain pan located beneath the receiver.

Provided with a pressure gauge and relief valve.

Fog/Ship's Bell

The Contractor shall provide and install a bracket-mounted polished brass fog bell in compliance with IMO and USCG ('72 COLREGS, as amended). The fog bell shall be engraved with the vessel's name. The clapper shall be provided with a lanyard.

Ship's Clock

The Contractor shall provide Three (3) 6-inch quartz movement, solid brass, flanged case, screw bezel clocks and install one each in the bridge, lounge, and ECR.

Binoculars

Vessel shall be provided with 4 sets of binoculars in the Bridge (2 Port/2 Stbd).

Barometer

The Contractor shall provide two (2) 6-inch, solid brass, flanged case, screw bezel barometers. Barometers shall be installed adjacent to the Bridge and Lounge clocks.

Clinometers and Trim Indicators

Three (2) sets of clinometers and trim indicators of the bubble-in-tube type, graduated in degrees, shall be provided and installed in the bridge, ECR, and at the ballast manifold.

Printed/Electronic Publications

One (1) printed hardcopy and one (1) digital copy on DVD/CD, of each of the following shall be provided:

Flags & Signals

Provide a set of navigational day shapes, and associated rigging as required by USCG, that allow the vessel to display the following vessel/operational conditions:

- Anchored
- Constrained by Draft
- Aground
- Not Under Command
- Restricted in Ability to Maneuver
- Vessel Towing
- Vessel Being Towed

Provide a complete set of flags (letters and numbers) in accordance with the International Code of Signals and USCG Navigation Rules. Flags shall be stowed in a locker on the bridge.

SPECIAL FEATURES

The vessel's DP/DT system (see Contract Paragraph C608) shall be integrated with the equipment and sensors described in this section as necessary. The DP/DT system shall be controlled from the bridge.

Interface with the Dredge Control and Automation System (see Contract Paragraph C524).

DELIVERABLES

849-C770-01 NAVIGATION EQUIPMENT OVERVIEW
849-C770-02 RF SYSTEM DESIGN STUDY
849-C770-03 ANTENNA ARRANGEMENT
List of Equipment and Sensors
Equipment Cutsheets

STANDARDS

ABS Guide for Bridge Design and Navigational Equipment/Systems
ABS Guidance Notes on the Application of Ergonomics to Marine Systems
SOLAS, International Convention for the Safety of Life at Sea
IMO Resolution MSC.333(90), Adoption of Revised Performance Standards for Shipborne Voyage Data Recorders (VDRs)
NMEA-0183, Standard for Interfacing Marine Electronic Devices
IEEE 45-2002, Recommended Practice for Electric Installations on Shipboard
IEEE C95.1-2019, IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz
IEEE C95.2-2018, IEEE Standard for Radio-Frequency Energy and Constant-Flow Symbols
33 CFR, Part 164, Navigation Safety Regulations
IMO Resolution A.382(X), Magnetic Compasses, Carriage and Performance Standards
IMO Resolution A.424(XI), Performance Standards for Gyro Compasses
IMO Resolution A.694(17), General Requirements for Shipborne Radio Equipment Forming Part of the Global Maritime Distress and Safety System (GMDSS) and for Electronic Navigational Aids
IMO Resolution A.861(20), Performance Standards for Shipborne Voyage Data Recorders (VDRs)
ISO Standard 8728, Ships and Marine Technology – Marine Gyro-Compasses
IMO Resolution MSC.116(73), Performance Standards for Marine Transmitting Heading Devices (THDs)
IMO Resolution MSC.302(87), Performance Standards for Bridge Alert Management
IEC Standard 60945, Maritime Navigation and Radiocommunication Equipment and Systems
International Code of Signals

C780 MONITORING, ALARM & CONTROL SYSTEM

GENERAL DESCRIPTION

An Integrated Machinery Monitoring, Alarm and Control System (IMACS) that complies with all applicable USCG regulations and ABS rules, and is approved, shall be provided and installed. System shall have ABS ACCU certification and USCG vital system automation in unattended machinery plants certification.

The IMACS shall be designed and integrated to interface with the navigation and maneuvering system equipment in the Integrated Bridge System (IBS) of Contract Paragraph C770. It shall also be designed and integrated with the communications system equipment of Contract Paragraph C765.

The IMACS shall be complete, including provisions for redundant power supply UPSs.

REQUIREMENTS

The IMACS system shall be a shipboard microprocessor-based redundant system (hardware and software) with combination of graphical user interface output displays and analog instruments mounted in the ECR and Bridge consoles. The IMACS shall be provided by a major ship control system vendor, and integrate seamlessly with the Integrated Bridge System (see Contract Paragraph C770)

The system shall integrate the requirements of the regulatory bodies, the ship electrical power and propulsion system, firefighting controls, the hotel/accommodation systems, dredging systems and other machinery signals from field instruments or serial data generated by equipment control processors. The system shall monitor all vital temperatures, pressures, levels, electric load characteristics, rate of fuel consumption, and equipment status. System shall also control Auto start of standby pumps and/or blackout recovery.

The computer based IMACS shall utilize touch screen, trackball, and keyboard input to acknowledge alarms, open/close valves, start/stop pumps and fans, and monitor the vessel's machinery plant. At a minimum, all equipment in the machinery spaces shall be monitored for power, unit in operation, and alarm condition. HVAC equipment shall also be monitored.

The IMACS shall be provided with an Information Management System (IMS) keeping historical and trend analysis, a propulsion monitoring interface and a dredging monitoring interface, with all functions integrated to form a vessel management system.

All communication busses and field busses shall communicate using either dual LAN or CAN bus, and be provided with galvanic isolation of all bus, fieldbus, and network connections. Ground fault isolation of 24VDC power supplies to hardware modules shall be provided via DC/DC power converters.

An I/O list shall be developed and provided to the COR during phase II. The IMACS shall be provided with 20% additional data points included in the system. The system architecture shall depend on Data Acquisition Units (DAUs) collecting I/O functions. with cabling to the sensors and system controllers. Multiple DAUs shall be linked to area controllers via fiber optic rings to assure system immunity to EMI/RFI.

Display/computer-type operating stations shall be provided in the Bridge, the ECR and the Chief Engineer's Stateroom, each with keyboard and trackball. The Bridge and the Chief Engineer's SR workstation touch screens shall be dimmable. The Chief Engineer shall have a desktop style system with 27" monitor and KVM switch. The workstations and the redundant servers shall be linked via redundant Ethernet fiber optic rings.

ACCU alarm indicating and call stations shall be provided in the Mess and Assistant Engineer(s) SR(s) and shall integrate the regulatory body requirements for the engineer's assistant alarm, engineer's call signal system and fire alarm.

Screen configurations for each display shall be submitted to the COR for review and approval. Process images (mimic screens) shall graphically present the monitored functions with simplified system diagrams and deck and/or space arrangements.

UPS systems shall be provided and installed in support of the Integrated Machinery Monitoring, Alarm and Control System, powered from both main and emergency source, and sized to supply power to all system components.

The IMACS shall be capable of characterizing an input to convert it to customary units (such as tank level to gallons), introducing time delays (such as bilge level sensors), and performing control algorithms for outputs to motor starters and valve actuators. The system shall be capable of and configured for determining alarm points from analog signals, performing calculations, and performing associated actions. Duplicate equipment shall have the capability of being automatically operated sequentially, and/or back-up unit being automatically started upon failure of primary unit. The system shall be able to select which unit is primary or back-up. Vital machinery shall be configured for automatic restart following recovery from a blackout.

Machinery, electrical and equipment alarms shall be provided as required in the specific Paragraphs of this specification. Machinery, electrical and equipment alarms shall be provided as required in the specific Paragraphs of this specification.

SPECIFIC REQUIREMENTS

System Functions:

The system shall integrate as many of the ship vital monitoring and control functions as practical and designated by the rules and regulations. At a minimum:

ACCU Required Control and Monitoring: shall provide control and monitoring as required by the rules and regulations

Power Management System (PMS) Interface: shall provide full monitoring, control, and set-point adjustment interface with the PMS located in the main Switchboard (See Contract Paragraph C740)

Propulsion System Interface: shall interface with the propulsion system and bow thruster (See Contract Paragraph C608)

Bilge Alarm System: shall provide bilge high level and bilge pump long run alarms to the IMACS. The Engine room and other machinery spaces located below the waterline shall have four (4) water level sensors located one in each corner of the space. Other spaces shall have at least two (2) water level sensors. Sensors shall be float type with protective covers. (See Contract Paragraph C660)

Watertight Door Indicator & Alarm (if applicable): shall provide status (open/close) indication for each watertight door to the IMACS. A Sliding Watertight Door indication and control system (if sliding watertight doors are installed) shall be provided and installed in the Bridge, shall include a ship's plan mimic with LED indication of door open/close status, and means to close each door. Emergency closure and door status shall also be provided in the ECR

Firefighting Station: The controls required at the fire control station located in the Bridge shall be incorporated into the IMACS to the greatest extent allowed by the regulations, with Manual back-up safety devices provided at the Emergency control station. (See Contract Paragraph 678)

Auxiliary Systems Monitoring and Control: The IMACS shall provide remote monitoring and control of seawater pumps, ballast pumps, tank level indications, alarms from A/C chillers and refrigeration equipment, and other systems and equipment contained in the C600-series paragraphs of this Specification. The IMACS shall control all auxiliary equipment necessary to suit the ACCU notation.

Information Management System (IMS): IMS shall collect and store all the IMACS' incoming/outgoing data in a date/time sequence format; it shall group and record printable information required to satisfy regulatory machinery logs. System shall assist in evaluating machinery performance and running trend analysis and data storage for future analysis and maintenance planning. System shall be capable of storing data for five (5) years. Data access shall only be allowed by approved User/Officer. Data download means and method shall be approved by the COR.

Computer/Network: Redundant servers shall be provided, with one located in the ECR. The servers shall be the interface between the Human Machine Interface (HMI) operator workstations and system controllers and shall be linked via fiber optic ring with data storage units.

Data Acquisition Units (DAU): shall be provided throughout machinery spaces to interface in monitoring and controlling the auxiliary machinery and systems, monitoring the propulsion and power generation system.

Engine Control Room (ECR): The workstations shall be integrated into the control console.

Bridge Alerter System: shall be provided to extend ECR alarms for vital systems that require immediate attention of the bridge watch officer for the safe navigation of the vessel. These shall also be extended to the engineer's accommodations.

Emergency Response: The IMACS shall provide a single page integrating all emergency response and shutdown functions.

Emergency Fuel Shutdown System: shall be provided for the fuel purifier(s), fuel transfer pump(s), lube oil transfer pump(s), waste oil pump(s), oily waste pump, and diesel engines as required by the regulations through the IMACS and Emergency Control Station. (See Contract Paragraph C630, C635, and C637)

Ventilation Shutdown System: shall be provided with remote shutdowns for the ventilation systems and operators for the fire dampers per the regulations and operable via the IMACS and the Emergency Control Station. (See Contract Paragraph C685)

Tank Level Monitoring System: shall be provided with high/low level alarms and level indication for all tanks and displayed in IMACS. The remote tank level indicating system shall be designed for marine service, with float type level switches with intrinsically safe relays as required. All tank level alarms, and level switches shall be provided with built-in adjustable time delay to avoid alarm triggers by fluid sloshing in heavy seas. Fuel oil tanks shall have level displays and high-level alarms at the transfer manifolds. (See Contract Paragraph C670)

Dredge Automation Control System Interface to monitor dredge plant system alarms (See Contract Paragraph C524).

SPECIAL FEATURES

None.

DELIVERABLES

The Contract Deliverables Drawings for this paragraph shall be organized such that drawing 849-C780-01 serves as the System Block and Wiring Diagram of the integrated system and references each individual alarm and monitoring system interface. Drawing 849-C780-02 shall be in tabular form and shall list all points monitored by the system. Drawing 849-C780-03 serves as a central arrangement of the integrated system as a whole. Drawings 849-C780-04 and above shall be of individual systems connected to the main system.

849-C780-01 INTEGRATED MACHINERY MONITORING, ALARM & CONTROL SYSTEM BLOCK AND WIRING

849-C780-02 I/O LIST INTEGRATED MACHINERY MONITORING, ALARM & CONTROL SYSTEM

849-C780-03 INTEGRATED MACHINERY MONITORING, ALARM & CONTROL SYSTEM ARRANGEMENT AND DETAILS

849-C780-04 BILGE ALARM SYSTEM

849-C780-05 WATERTIGHT DOOR INDICATION & ALARM SYSTEM

849-C780-06 AUXILIARY SYSTEMS ALARM & CONTROL SYSTEM

849-C780-07 TANK LEVEL INDICATION SYSTEM

STANDARDS

ABS Rules for Building and Classing Marine Vessels

ABS Guidance Notes on the Application of Ergonomics to Marine Systems

USCG Code of Federal Regulations (CFR)

IEEE 45-2002 Recommended Practice for Electrical Installations on Shipboard

C800 SPARE PARTS

GENERAL DESCRIPTION

The Contractor shall provide spare parts as required below, along with a priced spare parts list as described.

REQUIREMENTS

INCLUDED SPARES

The Contractor shall provide all spare parts listed in the ABS Rules as a guidance for vessels intended for unrestricted service. These areas have been identified as:

Main Propulsion Diesel Engines and Auxiliary Diesel Engines (ABS Marine Vessel Rules 4-2-1/Appendix 11)

Gears for Propulsion and Maneuvering (ABS Marine Vessel Rules 4-3-1/Appendix 2)

Generators and Motors (ABS Marine Vessel Rules 4-8-4/31)

In addition, the Contractor shall provide one mooring buoy and 200' of floating hose to allow for over the bow pump out operations on the Delaware River.

SPARE PARTS LIST

During Phase II, the Contractor shall provide a complete list of spare parts for the vessel including all items provided per ABS guidance above, and all consumable or replaceable items such as filters, HVAC, light bulbs, and similar items. The list shall also include all propulsion, dredging and automation system components not directly listed in ABS Rules. At a minimum, the list shall identify the piece of equipment, the manufacturer of the equipment and/or parts, prices, quantities, frequency of replacement, country of origin, and relevant points of contact for placing orders in the future.

The spare parts list shall be organized by WBS system. For example, any spare parts for the fuel oil system shall be organized under WBS C630.

SPECIFIC REQUIREMENTS

The final spare parts list shall be submitted to the COR as 849-C800-01 SPARE PARTS LIST for review and approval during Phase II. The Government will review the spare parts list and may choose to purchase additional spare parts not currently required per the contract prior to delivery and would do so via modification.

SPECIAL FEATURES

None.

DELIVERABLES

849-C800-01 SPARE PARTS LIST

STANDARDS

ABS Rules for Building and Classing Marine Vessels, 4-2-1/Appendix 11 – Guidance for Spare Parts

ABS Rules for Building and Classing Marine Vessels, 4-3-1/Appendix 2 – Guidance for Spare Parts

ABS Rules for Building and Classing Marine Vessels, 4-8-4/31 – Guidance for Spare Parts

PACKING AND MARKING

Section D – Packaging and Marking

D01 PACKAGING

All spare parts shall be packaged by the Contractor for delivery and storage.

All spare parts shall be placed aboard the vessel or loaded on trucks furnished by the Contractor after being packaged and marked in accordance with the requirements of this section.

Spare parts and materials are divided into two types based on their manner of long-term storage. All spares and materials shall be packaged for long term "protected" storage.
"Consumables" such as bulbs, filters, paint and hardware shall be stored aboard the vessel and do not need to be marked in accordance with Paragraph D02.
"PROTECTED" Storage spare parts are intended to be stored for extended (two to five years) periods of time in unheated warehouses.
"PROTECTED" Storage spare parts shall be coated with paint and other preservative coating systems as recommended by the manufacturer and acceptable to the COR and packaged for mechanical and physical protection as accepted by the Contracting Officer's Representative.

D02 MARKING

All spare parts and materials shall be marked or labeled by the Contractor.
All "PROTECTED" spare parts and equipment shall be fitted with a plastic nametag, engraved plastic nameplate or other device acceptable to the Contracting Officer's Representative with the following information completed by the Contractor:

NAME OF PART & PART NUMBER
VESSEL NAME
CONTRACT NUMBER
NAME OF EQUIPMENT OF WHICH ITEM IS A PART
DRAWING REFERENCE
MANUFACTURER
YEAR OF MANUFACTURE
OTHER IDENTIFYING INFORMATION

In addition, where individual spare parts are packaged in crates or other containers, the crate or container shall be labeled with a stencil, in paint of a contrasting color, on at least three sides. The stenciled labels shall provide the same information as the part identification tag.
Where multiple spare parts are packaged in a crate or container, the requirement for stenciling the crate as stated in the previous paragraph shall apply, but, in addition, the crate shall contain an inventory card affixed to the inside cover of the container. The inventory card shall list each item in the container, including all information on the individual item tags.

INSPECTION/ACCEPTANCE

SECTION E – INSPECTION AND ACCEPTANCE

E01 INSPECTION

The Contract will be managed by the Marine Design Center (MDC) of the U.S. Army Corps of Engineers (USACE) and is subject to inspection by its appointed representatives to ensure strict compliance with the terms of the Contract. No Government Representative, except the Contracting Officer, is authorized to change any provision of the specifications, nor shall the presence or absence of a Government Representative relieve the Contractor from any requirements of the Contract.

The Contractor shall provide ″Safe for Workers″ labels, in accordance with the OSHA regulations stated in 29 CFR 1915.11-12, for all confined and enclosed spaces prior to permitting entrance for work or inspection. This procedure shall be reflected in the Contractor's Safety Plan. See Contract Section H, Paragraph H07.

Entry shall not be permitted to any confined or enclosed space that does not have a current ″Safe for Workers″ label.

E02 LAUNCHING

The Contractor shall be responsible for the satisfactory launching of the vessel at the time and date selected and mutually agreed upon by the Contractor and the COR. The Contractor shall ensure that the vessel is suitable for

launching, including completion of hull structure, and finalization of all components that would be difficult to perform while in the water.

The Contractor shall provide a written notice to the COR 10 calendar days prior to the launching, this shall include launch calculations to ensure a safe launch of the vessel. Prior to launching, all painting below the main deck (interior and exterior) must be completed. The hull interior and exterior surfaces shall be thoroughly inspected by an authorized Government representative to verify compliance with the requirements of the specification. The vessel shall not be launched until the hull painting has been approved by the COR and the paint manufacturer's on-site representative. The Contractor shall schedule 3 days between hull inspection and launch to allow any new paint on the hull interior and exterior to cure properly.

The condition of the vessel shall be recorded at the time of launch. This shall include the levels of all tanks, draft and freeboard readings at the port and starboard forward, midship, and aft locations, a list of shipyard equipment on board, an estimate percent of the vessel complete, and the time and date of the launch.

After launching, all tanks and voids shall be inspected for damage and leaks, and their conditions shall be recorded.

Upon completion of Level 5 testing, including approval of test results by the COR, the Contractor shall drydock the vessel prior to delivery. The Contractor shall inspect the vessel for damage, shall be responsible for completing any repairs, shall clean the vessel, and shall apply final paint coating to the hull exterior. All damage to the hull and appendages shall be repaired as directed. Prior to applying final paint, the Contractor shall fill the hopper partially with water, in order to visually inspect for leakage caused by the trials. Any issues shall be corrected, and upon completion of repairs the hopper shall be filled to the same level to ensure the issue has been corrected.

Upon completion of repairs, the hull exterior and appendages shall be cleaned, and all damaged paint surfaces touched up with original coatings to present a smooth, unbroken surface. Paint shall be in accordance with the requirements in Section C, Paragraph C406. The Contractor shall re-launch the vessel upon acceptance of the drydock repairs by the COR.

E03 QUALITY CONTROL AND INSPECTION

A. GENERAL

After Notice To Proceed with Phase I "PLANNING & SCHEDULING" the Contractor shall develop a Contractor Quality Control (CQC) and Inspection Program for the work required in this Contract. This program shall contain two sub-programs which will provide for review and quality control of the "Engineering and Scheduling" submittals and regular inspection and testing of the construction work in progress and the preparation and maintenance of documentation and records.

The first sub-program, (CQC of the engineering phase), must be submitted within 14 calendar days after the Notice To Proceed with the Phase I "PLANNING & SCHEDULING" phase of the Contract.

The second sub-program, (CQC of the construction phase), must be submitted and accepted in the "PLANNING, & SCHEDULING" phase of the Contract. The Notice To Proceed with Phase III "CONSTRUCTION & TESTS", will not be issued until this document is accepted.

The documentation and records of sub-program 1 shall:

- Define the review and correction process for all "Planning & Scheduling" and "Engineering" phase submittals with particular attention given to the Final Design Drawings.

The documentation and records of sub-program 2 shall:

- Define Contractor tests and inspections to be accomplished for each work item of the Contract. Such tests and inspections shall be keyed to the appropriate level of testing and contract paragraph requirements.
- Be commensurate with the complexity of the work in the specification and adequate to assure the Contractor that the product or subproduct offered conforms to the requirements of the Contract.
- Be available to the Government Representative at all times and contain recorded data of all Contractor conducted inspections and tests conducted to date. All Quality Control reports, including those of subcontractors and regulatory agencies will be maintained and included in the Test Report of Contract Paragraph E05.
- List by name and title, the Contractor's representatives who are authorized to witness or perform and sign for each test and inspection.

The following are the minimum requirements for data to be recorded:

Type of inspection or test (e.g., visual, mechanical, liquid penetrant, radiographic), accept/reject criteria, and a statement as to whether the inspection was satisfactory or unsatisfactory.

Number and type of deficiencies of material or workmanship found in the product or subproduct inspected and corrective action taken to correct the deficiencies and, for repetitive deficiencies, to preclude recurrence.

Date and signature of the Authorized Contractor Representative who witnessed or performed the test or inspection.

Responsible authorized personnel shall inspect the work in progress and all completed work, conduct necessary tests and record the data required. An Authorized Contractor Representative shall sign the records attesting to the validity of the information.

Contractor certified inspection is an integral part of all work, therefore the COR will consider the entire Contract incomplete if Contractor documentation and records signed by the Contractor's Authorized Representative are not complete.

B. SUBCONTRACTORS

Work subcontracted and/or performed away from the shipyard is covered by this inspection system. The prime Contractor cannot delegate the authority to witness or perform, and sign for tests and inspections conducted away from the shipyard, without approval of the COR.

If the subcontractor has an established Quality Control program with designated organization and personnel, the prime Contractor may designate an appropriate individual in that organization as his authorized representative. Such designation shall clearly indicate that the individual is an employee of a subcontractor and his appointment shall be subject to the approval of the COR.

C. TESTING

When any workmanship, material, or apparatus fails to pass any test or inspection, it shall be fully retested only after all known faults have been eliminated. Where directed by the COR, such failed material or apparatus shall be completely removed from the work and renewed. Any defects in workmanship or material shall be remedied by the Contractor at no additional cost to the Government, except where work was performed on material furnished by the Government.

D. ABS ONSITE INSPECTION

The Contractor shall provide a schedule for the ABS Onsite Inspections. The schedule shall include the scheduled inspection date(s), actual inspection date(s), and signature blocks for the ABS Inspector and Contractor, and notes for what inspection(s) were conducted. This report shall be kept current and upon request be made available to the COR.

E04 FACILITIES FOR PERSONNEL

The Contractor shall provide a set of at least three rented office trailers at the shipyard for use by a Government staff of approximately seven (7) personnel. Trailers shall be within close proximity of the vessel construction. The trailers shall all have lockable doors, and Government staff shall be provided keys by the Contractor upon arriving on site. There shall be at minimum three (3) sets of keys for Government use for each trailer.

The trailers shall have electric power, and be air conditioned, heated, ventilated, well maintained, and well secured. The trailers shall be equipped with:

- High-speed internet & Wi-Fi
- 7 Desks with storage drawers
- 15 surge protectors
- 1 free standing large white board
- 1 conference table (sits eight personnel)
- 2 waist height cabinets for storage and to house microwave/ coffee machine
- 16 ergonomic rolling chairs
- 5 folding chairs
- 7 commercial telephones (with speaker phone capability) per desk with commercial phone service nation-wide during entire contract.

- Two restrooms – The contractor shall be responsible for the supply of all toiletries and sewage service.
- Potable water for restrooms
- One potable water cooler. Shipyard is responsible for water cooler service during the contract.
- One full-size refrigerator with ice maker
- One microwave
- One industrial coffee maker and pot
- One high-speed printer with blue tooth capability
- One standalone photocopier. Shipyard is responsible for photocopier service during the contract.
- Two wall mounted 72" HD T.V.s with supporting ancillary HDMI cords and wall mount to allow for presentations.
- One free standing closet with office supplies (i.e., printer paper, pens, staples, etc.) The shipyard shall supply the Government Office with paper print products and various office supplies as needed during the contract.
- The space and facilities shall be suitable for both male and female staff.
- Custodial service for cleaning and garbage removal shall be covered by the contractor.

Government Representatives attending the construction may bring with them communication equipment, cameras, and various items of test equipment. The Contractor shall permit unencumbered ingress and egress to and from the shipyard and vessel with such equipment.

The Contractor shall furnish an up-to-date paper set of drawings for exclusive use of USACE personnel while in the shipyard. The Contractor shall ensure that these drawings reflect any changes made to the drawings throughout the construction.

In addition, the Contractor shall also furnish seven (7) parking spaces within the shipyard, in safe locations and accessible to the assigned office space.

E05 TRIALS, TESTS AND DEMONSTRATIONS

GENERAL REQUIREMENTS

1. Levels of Testing

The Contractor shall perform tests on all equipment, machinery, and systems; individually, and integrated as a whole. The tests shall be performed as necessary to demonstrate satisfactory compliance with the Specification requirements contained in Section C, "DESCRIPTION/SPECIFICATION/WORK STATEMENT," of this Contract.

The Contractor shall perform seven levels of testing as follows:

PHASE III – CONSTRUCT & TEST	Level 0	Factory Acceptance Tests (FAT)
	Level 1	Pre-Trial Tests
	Level 2	Builder's Dock Trials
	Level 3	Dock Trials
PHASE IV – TEST, SEA TRIALS, & DELIVER	Level 4	Open Water Trials
	Level 5	Dredging Trials
	Level 6	Final Acceptance Demonstrations

All demonstrations, tests, and trials shall be performed as specified herein and as specified in Section C of the Contract. The Contractor shall furnish all labor, materials, tools, and test equipment as necessary and perform the testing, trials, and demonstrations specified. This shall include the required services of vendors, subcontractors, and consultants as necessary.

The Contractor shall complete the prior level of testing before moving on to subsequent levels.

During Phase II, the Contractor shall provide a list of equipment and systems to be tested and the phase(s) they are to be tested in. All tests required by ABS, USCG, SOLAS, and equipment manufacturers shall be included. All systems and equipment shall be inspected and tested to verify proper installation and workmanship; demonstrate full functionality of all features, controls, monitoring and alarm points; and to verify the performance in accordance with the approved design, The Contractor shall utilize the SNAME Technical and Research Bulletins 3-39: Guide for Shop and Installation Tests (2018), and Bulletin 3-47: Guide for Sea Trials (2015) as a guide for the development and execution of the tests, trials and demonstrations. For equipment and systems not specifically identified in the SNAME

Guides, or as tests below in this section, the Contractor shall employ a testing methodology consistent with the SNAME Guides for the respective testing.

2. Consumables and Operating Fluids

The Contractor shall furnish all fuel oil, hydraulic oil, lubricating oil, gear oil, engine anti-freeze, treatment chemicals, degreasing agents, gases, potable water and any other consumables required to perform the tests and demonstrations, and as required in Contract Section C.

3. Test Documentation

The Contractor shall prepare an Agenda and Test Memorandums of the required tests and trials for the vessel in accordance with the requirements set forth herein. The Agenda and Test Memorandums shall be submitted to the COR for review and approval 120 days prior to the scheduled testing (see Contract Section H, Paragraph H02). Level 3, Level 4, and Level 5 testing shall not commence without written approval of the Test Memorandum from the COR.

Test Agenda

For the vessel, the Contractor shall prepare a Test Agenda for Level 3, Level 4, and Level 5 Tests and Trials. The Agenda shall be a complete, detailed schedule of all tests, trials and demonstrations specified in this contract paragraph. The Test Agenda shall be arranged by day, not date, and shall list the specific tests, trials, and demonstrations, and the sequence in which these will be performed. Separate schedules shall be prepared for dock, open water, and dredge trials. The schedule shall also state where the open water trials will take place, along with any launch points as applicable. A separate Test Agenda shall be provided for testing the launch vessel for obtaining the Subchapter T COI.

Levels of testing and certain details of testing requirements have been described by the Government throughout this Contract Section, however it is possible that due to conditions at the Contractor's facility and other factors that these requirements may not be achievable as currently stated. In this event, the Contractor shall provide alternative arrangements for obtaining the testing requirements per the objectives of the individual trials. This may be achieved through alternative locations, procedures, or timelines. The Contractor shall provide a report on the alternative arrangements, including identification of the reason the trial cannot occur as stated, and the proposed solution. Report(s) shall be titled 849-E05-MOD-CXXX EQUIPMENT OR SYSTEM NAME and shall be submitted to the COR for review and approval.

Contract
Test Memorandums

For the vessel, the Contractor shall prepare Test Memorandums for all systems and equipment tested under the Levels 0, 1, 2, 3, 4, 5, and 6 test and trial requirements of this contract paragraph. Test Memorandums shall adhere to all manufacturer testing requirements and shall seek to demonstrate the successful construction of the dredge per the requirements in Contract Section C.

The Test Memorandums shall describe the actual test procedures and data to be recorded. The procedures shall be in accordance with the "start-up" procedures for the equipment, as delineated in the operating manuals furnished for the equipment by the manufacturer. The Contractor shall incorporate demonstrations of all applicable controls, monitoring, instruments, and alarms, into each system's Builder's Dock Trials, Dock Trials, Open Water Trials, Dredging Trials, and Final Acceptance Demonstrations sections of the Test Memorandums. Data recorded in time intervals shall be tabular so that data trends can be easily recognized.

Each Test Memorandum shall:

- List the major equipment
- Include a space for nameplate data, make, model and serial number of equipment, etc.
- List the characteristics of equipment (i.e. impeller size, motor size hp and amp., flow capacity, line pull capacity, cfm, etc.)
- Reference the manufacturer's manual(s) used to format the test procedure
- Describe instrumentation for each test
- Describe the test procedure
- List the Pass/Fail limits
- List the expected results
- Include a space for the actual results

- Include a space for the ambient conditions
- Include signature blocks for Contractor Representative, Government Representative, and any required Manufacturer's Representative witness signatures, times and dates
- Include a space for writing comments

The Test Memorandums shall be typed on 8½-inch by 11-inch sheets of paper, single side, in three-ring notebook, with dividers for each section. Each page shall include the Marine Design Center project number (i.e. 3010) and hull number (#849) at the top. An electronic copy of the Test Memorandums shall also be provided to the Government, titled 849-E05 Test Memorandum.

The memorandums shall be arranged by system and equipment, with each level of testing for a specific system or piece of equipment recorded under the respective heading. Equipment and systems shall be organized by their respective WBS number as specified in Section C. If testing memorandum are submitted for individual pieces of equipment or systems for approval, they shall be titled 849-E05-CXXX EQUIPMENT OR SYSTEM NAME – Level X Testing Memorandum. Multiple systems may be tested within a single item, however both WBS numbers shall be clearly identified on the memorandum. Combination of system testing is dependent on written approval from the COR.

The memorandums shall be arranged by system and level of testing similar to the following outline:

X. System (or equipment)
   a. Factory Acceptance Tests
   b. Pre-Trial Tests
   c. Builder's Dock Trials
   d. Dock Trials
   e. Open Water Trials
   f. Dredging Trials
   g. Final Acceptance Demonstrations and Training

4. Test Reports

Completion of system or vessel testing shall be reported to the COR in the following manner:

- Within two days of the completion of any tests, a copy of the memorandum for that specific test shall be available for review at the request of the COR.
- Upon completion of any level of testing, the COR shall be notified that the specific level of testing has been completed. At his discretion, the COR may request to review the Test Memorandums for that level of testing.
- With completion of subsequent levels of testing, all Test Memorandums shall be filled-in, and placed in the Test Report. Results of all vendors' tests shall be filed with the applicable test section. The Test Report, with all prior test results, must be current at all times, and shall be available for review at the request of the COR at any time.

The Test Report shall be reviewed and approved by both the Contractor and the COR at the conclusion of each level of testing. Review and approval of the Test Report by the Contractor and the COR is a precondition of moving to the next level of testing.

Within 10 calendar days following the successful completion of Final Acceptance Demonstrations (Level 6), the Contractor shall submit the Final Acceptance Demonstrations report to the COR for review.

The final version of the Test Report, including results of the previous four levels of the tests and trials, shall be bound in three ring binders and two copies shall be submitted, within 30 calendar days following successful completion of the Level 6 demonstrations, and prior to Final Payment. A scanned version of the final Test Report shall be provided to the Government. The Test Report shall be in .pdf file format.

5. Deficiencies

The COR will compile a list of deficiencies which will be given to the Contractor. All deficiencies shall be corrected. Final Acceptance of the vessel will be made following remedy of all deficiencies.

The successful completion of all tests, trials, demonstrations and remedied deficiencies, shall be determined by the COR.

FACTORY ACCEPTANCE TESTS (FAT) (LEVEL 0) – PHASE III

All equipment required by ABS, USCG and SOLAS, including propulsion equipment and cranes, required to have FAT shall be documented in the Test Memorandums and Reports. FAT tests performed at the manufacturer's facility for dredging equipment shall be documented in the Test Memorandums and Reports. Satisfactory FAT Test Reports shall be provided.

PRE-TRIAL TESTS (LEVEL 1) - PHASE III

The Pre-trial tests are designed to ensure proper construction, and installation of all equipment, shaft alignment, piping, and electrical systems, tanks, and exterior and interior bulkheads. Pre-trial tests shall be performed during the course of construction and prior to the beginning of Level 2 testing (Builder's Dock Trials).

The COR shall be notified at least 24 hours in advance of any such testing and may, at his discretion, send a Government representative to witness any or all tests. The Contractor shall coordinate with ABS and USCG to ensure that they are present for all tests required to be witnessed for class. The Contractor shall also coordinate with equipment manufacturers to undergo commissioning, initial start-up and shutdown. Testing items shall be performed by the manufacturer's representative with the assistance from the Contractor (such as providing access to equipment, running machinery per representative request, and supply of consumables to run tests).Documentation of all pre-test inspections shall be in accordance with the requirements of Contract Paragraph E03 (Quality Control and Inspection). All deficiencies, including cracks, leaks, and grounds detected in new circuits, or poor workmanship shall be corrected prior to commencement of the Builder's Dock Trials.

BUILDER'S DOCK TRIALS (LEVEL 2) - PHASE III

Builder's Dock Trials are a preliminary "run-through" of all required Dock Trials (Level 3) by the Contractor. The intent of this testing is to provide both the Contractor and the COR reasonable assurance that all equipment and systems have been thoroughly prepared and are ready for formal testing in Dock Trials (Level 3).

For the vessel, Builder's Dock Trials shall be conducted at the Contractor's facility listed in Section B of the Contract. The COR shall be notified, in writing, at least 3 working days prior to the scheduled commencement date of Builder's Trials. The Test Report must be current prior to commencing Builder's Dock Trials.

The trials shall be of sufficient scope and duration to assure that all machinery and equipment is operable and all systems are complete. The trials need not be carried out to the same degree as the Level 3 testing.

DOCK TRIALS (LEVEL 3) - PHASE III

1. General

Dock Trials are the operability tests the Contractor must perform in the presence of the Government Representative to demonstrate the proper installation, performance, operation, control, and performance of all outfitting, furnishings, equipment, machinery, and systems installed as part of this Contract.

In addition, each test or demonstration shall include control, monitoring instrumentation and alarm operation as applicable.

Prior to the start of Dock Trials, all construction and installations must be complete (except for final cleaning and touch-up painting), and all Level 1 and Level 2 testing must be successfully completed and documented. If required, Level 0 FAT reports shall be completed and documented. Please note that there are specific test items and system cleaning that shall be completed prior to the vessel's launch (See Section E02). The Test Report shall be current through the three levels of testing.

The Commencement of Dock Trials shall not be sooner than one full working day after completion of Builder's Dock Trials. The COR shall be notified immediately of any condition which would delay the conduct of Dock Trials.

The COR shall be notified in writing 10 working days in advance of the date set for testing of the vessel. Results of the Level 2 Testing shall be transmitted to the COR, at least one day prior to the start of the Dock Trials, if Level 2 Testing was not attended by a Government Representative.

In addition to the testing above, tests and trails shall be conducted in the presence of vendor representatives for the following equipment at minimum:

- C180 – Preliminary Noise survey
- C445 – Rescue and work boats

- C446 – Launch
- C455 – Deck crane(s)
- C456 – Winches, hoists, windlass and davits
- C504 – Dredge pumps and drives
- C508 – Dragarm Handling System
- C512 – Hopper and other dredge piping, including valves, hoists, and hopper door system
- C517 – Jet pumps and drives
- C524 – Dredge Automation System
- C602 – Main diesel engines
- C605 – Z/L-drive thruster units, if applicable
- C606 – Propellers (including CPP actuation time) and rudders (including hard-over time), if applicable
- C615 – Steering System
- C620 – Bow thruster and variable speed motor drives
- C655 – Hydraulic System
- C665 – Potable water
- C667 – Black water, greywater
- C678 – Fire detection, alarm & extinguishing System
- C685 – HVAC Systems
- C690 – Compressed Air System
- C705 – AC Electrical System
- C706 – DC Electrical System
- C733 – Electrical Power Plant
- C740 – Main switchgear
- C765 – Communication and Navigation Systems
- C780 – Control, monitoring and alarm systems

The cost to have vendor representatives on-site during testing shall be the responsibility of the Contractor.

The tests shall be conducted in accordance with the Agenda.

The Contractor shall indicate on the Test Memorandums which tests will be performed using the electrical power plant and which tests will be performed using the shore power.

The success of all tests and the existence of any deficiencies shall be determined by the COR. Deficiencies discovered during the Dock Trials shall be remedied prior to start of Open Water Trials (Level 4).

2. Safety Requirements

During dock trials and thereafter, the atmosphere in spaces being prepared for, and preserved by, paints and tank coatings dissolved in highly volatile, toxic, and flammable solvents (29 CFR 1915.35(b)), shall be tested frequently and shall be in accordance with the U.S. Occupational Safety and health Agency Standards regulations stated in CFR 1915.31-36.

Within 24 hours of final inspection, and before any representative of the U.S. Government boards the vessel for such duties, each compartment or space to be inspected shall be certified “SAFE FOR WORKERS” by the National Fire Protection Associations (NFPA) certified Marine Chemist. This means that in the compartment or space so designated:

- The oxygen content of the atmosphere is at least 19.5 percent and below 22 percent by volume;
- The concentration of flammable vapors is below 10 percent of the lower explosive limit (LEL);
- Toxic materials in the atmosphere are within permissible concentrations;
- Any residues or materials associated with any work in the space shall not produce uncontrolled release of toxic materials under existing atmospheric conditions while maintained as directed on the Marine Chemist’s certificate.

The Contractor shall notify the Government when this certificate has been issued. The vessel will not be inspected and accepted by the Government without an NFPA Marine Chemist certificate for each hull compartment designated “SAFE FOR WORKERS.” The Contractor’s competent person(s) shall maintain the certificate(s) daily as required. If

a certificate is not maintained in accordance with the space requirements, or the conditions in the space change, the Marine Chemist shall be required to re-certify the space and issue a new certificate.

SPECIFIC DOCK TRIALS AND DEMONSTRATIONS (LEVEL 3) - PHASE III

In addition to satisfying the overall testing of the vessel's systems and equipment as identified in E05.A.1 above, the Contractor shall ensure that the following test requirements are included in the Level 3 trials for their respective systems. Dock tests (Level 3) shall include dredge pump tests to verify installation, but not to the extent as during the open water trials (Level 4). The dock test schedule shall also include all final piping hydrostatic tests.

1. C445 and C446 – Rescue and Launch Vessels

The Contractor shall test the operation and deployment of the launch and rescue vessels. Testing for all vessels shall include speed tests, a one (1) hour endurance test, verification of all required safety equipment per CFR Rules, and verification of loading capacities. The launch shall also be tested for safe deployment and retrieval of the launch with the davits located on the dredge. The Contractor shall ensure that the Subchapter T Certificate of Inspection is obtained prior to delivery of the dredge. All testing shall be performed to ensure that the launch is built and can receive CFR Subchapter T Certificate of Inspection. If this certificate is intended to be obtained during this test, the Contractor shall ensure that proper representatives are present including regulatory bodies and the COR or their chosen representatives.

2. C504 – Dredge Pumps and Drives – Endurance

The Contractor shall test the endurance operation of the dredge pumps and drives for a minimum of four (4) hours at 100% load, or as close as possible while pumping water without overheating the equipment. The Contractor shall provide orifices or other suitable means to throttle the discharge to obtain this loading. Hopper doors shall be left open or partially during this test to avoid filling hopper. The Contractor shall record the suction and discharge pressures, motor RPMs, and pressures and temperatures of all relevant equipment and fluids. Pumps shall continue to be operated at full flow until four (4) hours of operation have been completed without issue in the pumps or their auxiliary systems.

3. C504 – Dredge Pumps and Drives – Performance

The Contractor shall conduct tests as necessary to verify the dredge pump head curve of one dredge pump. This shall be done at the rated full load speed of the pump drive. The objectives of this performance trial shall be to develop a maximum vacuum characteristic of the dredge pumps. This shall result in the development of a NPSH curve showing the flow and head of the system, with a line showing the limit of the pump at 5% cavitation.

The Contractor shall provide orifices or other suitable means to throttle the discharge at not less than three (3) different pressures. Discharge rates shall be recorded for all pressures.

This test may be omitted if the pump supplier can furnish certified pump performance curves based either on model testing or previous testing of a prototype pump. This shall be provided to the COR for review and approval no later than 60 days prior to beginning Level 3 testing. If test is sought to be omitted, the Contractor shall clearly highlight this in their submission of testing agenda and documentation. Regardless of omission of testing, the Contractor shall provide a maximum vacuum characteristic of the dredge pump as described above.

4. C514 - Hopper Doors

The Contractor shall fill the hopper to maximum overflow position with water. This level shall be measured at five (5) points along both the starboard and port sides of the hopper, and at five (5) points along both the forward and aft sides of the hopper, for a total of 20 points. The Contractor shall record the water level reduction every two hours over a 12-hour period at each of the previous 20 points. The Contractor shall ensure that the average reduction is not greater than 1 foot measured at even list and trim, or as close as practical.

5. C733 – Electrical Power Plant – Load Bank Testing

All of the dredge's power generation plant shall be load bank tested. An authorized representative from the plant's manufacturer shall be present for the load bank test and shall sign off on the completion of the test. Operate each plant at 1/4, 1/2, 3/4 and full loads (85%) in 15-minute intervals, 100% rated load (with the use of a load bank) for 2 hours, and 110% rated load (with the use of a load bank) for 2 hours. All equipment parameters shall be recorded at 5-minute intervals for the partial and full load periods, and at 15-minute intervals for the 100% and 110% load period.

Demonstrate the abilities of the electrical system including parallel operations (if applicable) and reverse power protection trips.

If applicable, operate the electrical power plant in parallel at 1/4, 1/2, 3/4 and 100% of the combined rated load (with the use of a load bank) in 15-minute intervals. Record all equipment parameters at 5-minute intervals.

If the arrangements of the electrical power plant are better tested through Open Water Trials due to cooling availability, the Contractor shall identify which plant are to be tested during that level of testing.

6. C740 – Switchboard and Power Control

The Contractor shall demonstrate the successful operation of the electrical system, including ability to run equipment from both shore power and electrical power plant. The tests shall also include demonstration of the Power Management System as described in Contract Section C Paragraph C740.C5.

OPEN WATER TRIALS (LEVEL 4) - PHASE IV

1. General

After all items on the schedule of Dock Tests (Level 3) have been satisfactorily completed and any deficiencies corrected to the satisfaction of the COR, the Contractor shall commence a program of Open Water Trials. NOTE: Any work performed after pre-trial tests that is negatively affected by other work must be retested. Open Water Trials (Level 4) shall include dredge pump tests to verify installation, to a greater extent than the Dock Tests (Level 3). The open water trial schedule shall cover the entire trial agenda with approximate time of day for each event.

Prior to the start of Open Water Trials, the Contractor shall host a meeting at their facility with all intended participants of the trials. This shall include at minimum Government representatives, vendor representatives, dredge equipment manufacturer, and Contractor representatives. The meeting shall serve to discuss trial logistics including the intended agenda, access to accommodations and facilities, and identification of roles of all representatives. The Contractor shall be responsible for the operation of the dredge during all Open Water Trials, including dredging operations. The Contractor shall also be responsible for all provisioning during the trials, including provisions for regulatory and Government representatives.

The Contractor's personnel shall operate the vessel and shall make all observations and record all data. The Contractor shall provide appropriately licensed personnel as may be required by the USCG for conduct of trials. The Contractor shall coordinate with ABS and USCG to assure that all trials required to be witnessed for class are witnessed.

Commencement of Open Water Trials shall not be sooner than one full working day after completion of Dock Tests.

The COR shall be notified immediately of any condition which would delay the conduct of the Open Water Trials.

The COR shall be notified in writing 10 working days in advance of the date set for the trials.

All testing and trials shall be conducted in the presence of Government representatives and any vendor representatives required by the Contract. The Government will coordinate the required personnel for certification of DQM items and GFE radio equipment. The trials shall follow the agenda prepared under paragraph A.3 (a).

2. Trial Location

The site of the trials shall be such that accurately placed targets can be readily observed for the purpose of computing speeds. The site of the trials shall also be free from fog and traffic, with a depth of water of at least three times the maximum loaded draft unless given written approval by the COR. The Contractor shall take the vessel to the nearest mile range that will provide the required minimum depth and permit operation of the vessel at full speed.

3. Trial Conditions

The vessel shall be complete and ready for trials, with a trial crew aboard, with tools and miscellaneous equipment. The Contractor shall ensure that the trial includes all personnel required to operate the vessel, including personnel capable of fixing any minor issues that may be identified during the trials in order to minimize any downtime. The Government will have representatives onboard for trials.

Speed and maneuverability trials shall be conducted at the following trial conditions:

- Full (100%) fuel oil in all tanks (as close as practical)
- Full (100%) lube oil
- Full (100%) gear oil
- Full (100%) hydraulic oil
- Full (100%) potable water
- Empty waste oil tank, oily bilge totes, black/greywater tank

- All machinery with normal operating fluids
- All machinery cooling systems and expansion tanks at normal operating levels
- Hopper free flooding or at a free flooding level

The Contractor shall provide the consumables to meet the above trial conditions.

Before trials, record both soundings and electronic levels for all tanks on the dredge, including fuel tanks and hopper water levels. Ensure all waste collection and holding tanks are empty, as practical.

Record drafts at the draft marks and read the hull freeboards at forward, midship, and aft draft marks on both sides of the dredge. These draft readings shall be used to calculate the displacements and LCG. Compare these values to that obtained from the inclining experiment.

After trials are completed, again read the drafts and take the freeboards as a double check on the trial displacement and trim. Record the fuel soundings and electronic fuel levels. Calculate the fuel (volume) consumed during the trial period. Compare the fuel consumed to the engine and electrical power plant fuel system readings.

Record all other vessel tank levels that were taken prior to the trial including hopper sounding.

4. General Trial Data

The following general data shall be furnished by the Contractor. This data shall be recorded at the location of the runs:

- Location of trial course and direction of runs
- Depth of water
- Density of the water
- Wind velocity, air temperature and wind direction relative to the course
- Displacement of vessel at beginning of trials
- Draft readings of the vessel forward, midship, and aft
- Freeboard forward, midship, and aft
- Fuel consumption for each pair of runs (Volume of fuel)
- Total number/weight of people on board
- Ballast carried (if applicable)
- Propeller diameter, pitch and style (if applicable)

The above data shall be recorded for each day of the open water trials. The total fuel consumed (volume of fuel) shall be calculated and recorded for each day of the open water trials.

5. Engine Performance Test & Commissioning Test

A performance and engine commissioning test shall be performed for the main engines and electrical power plant. For the performance test, the fuel rate of the equipment shall be compared to the original factory performance specifications during the vessel's test and trials. This comparison shall be made for the entire operating range of the equipment by the equipment manufacturer's representatives using instrumentation to acquire real-time fuel rate and equipment output.

If equipped, the exhaust level (aftertreatment) monitored readings for the equipment shall be recorded.

The Government shall be provided a copy of each engine and electrical power plant performance and commissioning test report.

6. ACCU Demonstration

Any test or demonstration necessary to obtain ACCU classification shall be performed.

7. Speed Trials

Speed trials are to be run with the vessel in the trial condition described above over a measured distance in both directions to determine the speed of the vessel. The objective of the speed trials shall be to verify the speeds as required in Contract Section C Paragraph C002. The vessel shall be run at five (5) intervals between Slow Ahead and maximum Full Ahead. Intervals shall include power designations as suggested by SNAME T&R Bulletin 3-47.

The trial course selected shall be laid out over a depth in excess of three times the maximum loaded draft of water. Two runs over the course shall be made at each of the engine speeds, reversing the direction after each trial run.

Speed trials shall be organized to satisfy the trial objectives in SNAME T&R Bulletin 3-47 Section 1.5, and the test documentation shall highlight which objectives are sought during each test. Multiple objectives may be met with a single test.

After completion of speed trials, the Contractor shall develop calculations to adjust the dredge's speed based on the wind and sea conditions during the trial. These calculations shall be provided to the COR for review and approval.

8. Maneuverability Trials

During Phase II, the contractor shall provide maneuverability trial requirements and descriptions to fully test and verify the design, construction and installation of the propulsion drive system, and to determine the maneuverability characteristics of the vessel in the trial conditions described above. The trials shall be submitted to the COR for review and approval and titled 849-E05-C605 Maneuverability Trials. Maneuverability trials shall be organized to satisfy the recommended trials in SNAME T&R Bulletin 3-47 Table 1. The Contractor shall identify the trials that are to be exempted from this list due to not being relevant to the dredge, however the Contractor shall assume that all recommended trials shall be performed, unless given written approval from the COR.

Maneuverability trials shall demonstrate the full range of the propulsion and steering systems, shall include extreme operations, along with documentation of the vessel's performance and developing the maneuverability characteristics of the vessel.

Maneuverability trials shall be carried out in accordance with the approved 849-E05-C605 document and any manufacturer requirements and procedures.

A single page, double sided report in compliance with IMO A601(15) and IMO MSC.137(76) describing the maneuvering characteristics of the vessel at various rpms shall be provided at final delivery. Three laminated copies of the report shall be provided in the pilothouse. Hard copies and electronic copies of the report shall be provided with the final Test Report. The Contractor shall also provide and install permanent markings or boards in the pilothouse that describe the maneuvering characteristics.

9. Bow Thruster Requirements

During the maneuverability trial identified above, the Contractor shall demonstrate the operation of the bow thruster and determine limitations of use during maneuvering operations. The Contractor shall record the relevant speeds, directions, and other metrics for the bow thruster during this trial. Trial data shall be provided in permanent placards in the bridge.

10. Crash Stop

The vessel shall be brought from full speed ahead to full speed astern to bring the vessel to a stop as quickly as possible. Record the distance the vessel travels, and the time for each event.

The vessel shall be brought from full speed ahead to full speed astern to create a full "astern" maneuver, as quickly as possible. Record the distance the vessel travels, and the time for each event.

11. Clear Water Dredging Performance

While operating the vessel at dredging speed, lower the dragarms below the water line and conduct a performance test on each dredge pump using clear water. The objectives of these performance trials shall be to demonstrate operation of the dredge pumps, engines and gears, pump controls, gear lube oil cooling system, and gland flushing system. The trial shall seek to verify the production calculations developed in Contract Section C Paragraph C502, as is possible to be demonstrated using clear water in lieu of dredged material.

Operating at full, ¾ and ½ speeds, use each pump individually to fill the hopper a total of 3 trials per pump, during which the Contractor shall measure and record the pump suction and discharge pressures, dredge pump reduction gear lube oil and cooling water pressures and temperatures, and the pressure of gland flushing water pumps.

After the hopper has been filled, the Contractor shall demonstrate the discharge of the hopper through all means available, identified as: normal hopper door dump, emergency hopper dump, and through the bow connection. The Contractor shall record the time to empty the hopper and shall identify the capacity level and discharge method.

Additional fills of the hopper shall be required for demonstration of the dredge's capability to operate in the event of maintenance or failure of dredge driving equipment as described in Section C, Paragraph C002. The Contractor shall demonstrate their solution to these requirements after completion of the previous fills of the hopper. The Contractor shall fill the hopper to non-overflow capacity and shall identify which discharge method to use during the trial.

DREDGING TRIALS (LEVEL 5) - PHASE IV
General

After all items on the schedule of Open Water Trials (Level 4) have been satisfactorily completed and any deficiencies corrected to the satisfaction of the COR, the Contractor shall commence a program of Dredging Trials.

The Contractor shall assume that the location of this test is within 100 nautical miles their facility for the purpose of bidding. Prior to beginning Level 5 testing, the Government will define the location of this trial, and modify the contract to account for the new location. The Government will secure the necessary permits for the dredging trials.

Prior to the start of Dredging Trials, the Contractor shall host a meeting at their facility with all intended participants of the trials. This shall include at minimum Government representatives, vendor representatives, dredge equipment manufacturer, and Contractor representatives. The meeting shall serve to discuss trial logistics including the intended agenda, access to accommodations and facilities, and identification of roles of all representatives. The Contractor shall be responsible for the operation of the dredge during all Dredging Trials, including dredging operations. The Contractor shall also be responsible for all provisioning during the trials, including provisions for regulatory and Government representatives.

The Contractor's personnel shall operate the vessel and shall make all observations and record all data. The Contractor shall provide appropriately licensed personnel as may be required by the USCG for conduct of trials. The Contractor shall coordinate with ABS and USCG to assure that all trials required to be witnessed for class are witnessed.

Commencement of Dredging Trials shall not be sooner than one full working day after completion of Open Water Trials.

The COR shall be notified immediately of any condition which would delay the conduct of the Dredging Trials.

The COR shall be notified in writing 10 working days in advance of the date set for the trials.

All testing and trials shall be conducted in the presence of Government representatives and any vendor representatives required by the Contract. The trials shall follow the agenda prepared under paragraph A.3 (a).
12. Trial Conditions

The vessel shall be complete and ready for trials, with a trial crew aboard, with tools and miscellaneous equipment. The Contractor shall ensure that the trial includes all personnel required to operate the vessel, including personnel capable of fixing any minor issues that may be identified during the trials in order to minimize any downtime (i.e. key trades such as electricians, pipefitters, and machinists). The Contractor shall also ensure that the dredge equipment manufacturer has a representative on the dredge during the trials. The Contractor shall be responsible for the safe operation of the dredging operations. The Government will have representatives onboard for trials.

Dredging trials shall be conducted at the following trial conditions:

- Full (100%) fuel oil in all fuel main and day tanks, or as close to full as practical
- Full (100%) lube oil
- Full (100%) gear oil
- Full (100%) hydraulic oil
- Full (100%) potable water
- Empty waste collection and holding tanks
- All machinery with normal operating fluids
- All machinery cooling systems and expansion tanks at normal operating levels
- Hopper free flooding or at a free flooding level

Before trials, record both soundings and electronic levels for all tanks on the dredge, including fuel tanks and hopper water levels. Ensure that waste collection and holding tanks are empty, as practical. Ensure that all monitoring systems are properly calibrated, including velocity and density meters.

After trials are completed, record the fuel soundings and electronic fuel levels. Calculate the fuel (volume) consumed during the trial period. Compare the fuel consumed to the engine and electrical power plant fuel system readings.

Record all other vessel tank levels that were taken prior to the trial including hopper sounding.

After completion of testing the Contractor shall sound the fuel tanks and the Government will purchase fuel to fill the fuel tanks to 95% capacity through modification.

13. General Trial Data

The following general data shall be furnished by the Contractor. This data shall be recorded at the location of the dredging site:

- Location of trial course and direction of runs
- Depth of water
- Density of the water
- Wind velocity, air temperature and wind direction relative to the course
- Displacement of vessel at beginning of trials
- Draft readings of the vessel forward, midship, and aft
- Freeboard forward, midship, and aft
- Total number/weight of people on board
- Ballast carried (if applicable)

The above data shall be recorded for each day of the dredging trials. The total fuel consumed (volume of fuel) shall be calculated and recorded for each day of the dredge water trials.

14. Primary Dredging Trial Requirements

The dredging trials shall consist of five (5) 24-hour days of dredging operations, not including time to/from transit to the testing location from the Contractor's facility. Trials shall include filling of the hopper through the dragarms, transiting to a dumping location, unloading the hopper, and transiting back to the dredging location. Trial time shall not include time down due to issues found during trials, maintenance required, repair, system operational adjustments, draghead adjustments, or any other downtime preventing testing the dredging system.

The objectives of these performance trials shall be to demonstrate operation of the dredge while pumping sand into the hopper and to demonstrate the discharge of the hopper. The full functionality and testing of all dredging and automation system features shall occur during the Dredging Trials. The test agenda shall be developed to indicate how each feature (i.e. drag arm winches, overflows, jetting system, swell compensator, etc.) will be demonstrated and tested.

Additionally, the trials shall be setup to demonstrate the endurance of the dredging system and the operation of the vessel while dredging under a variety of conditions. Based on the dredging location and restrictions, variable testing and demonstrations conditions shall include dredge operations during day and night, with and against current, variable dredging depths, no overflow hopper fills, overflow hopper files, partial hopper door opening/bottom discharge, normal bottom discharge, emergency dump, discharge through bow connection, automated dredging controls, manual dredging controls, simulated emergencies/equipment malfunctions, and other dredge performance/operational features. Dredging shall also be conducted to demonstrate the dredge's capability to operate in the event of maintenance or failure of dredge driving equipment as described in Section C, Paragraph C002. The Contractor shall demonstrate their solution to these requirements after completion of the previous fills of the hopper.

During these trials, the Contractor shall measure and record the relevant temperatures, pressures, pumping speeds, efficiencies, hopper fill and discharge times, hopper densities, draft/freeboards, total material dredged, dredging speed over ground, and all other performance variables.

Due to the inability to test the bow connection through a dredge pipeline at the location of the dredging trials, in addition to the above test of the bow connection, the Contractor shall support the testing of the pipeline connection as described in Paragraph E08.C.

15. Noise & Vibration Survey

A noise and vibration survey shall be conducted on the vessel by the Contractor. The survey shall consist of the taking of sufficient noise and vibration measurements in each of the listed spaces to determine respective levels. A report shall be prepared containing the survey results.

The Contractor shall retain the services of the acoustic engineering firm that prepared the noise and vibration prediction report (849-C180-01).

The following conditions must be met for the noise and vibration survey:

- The vessel must be structurally, electrically and mechanically complete with all systems operational.
- The noise and vibration surveyor(s) must be able to request the shipyard (at any time) to operate any or all machinery at any required speeds. Sufficient support must be available from the shipyard to accomplish this. Note that this includes operating for extended periods of time.
- No activity, which may interfere with the survey, shall be conducted in or near the vessel.
- The vessel shall be in the trial condition described above.

The noise and vibration survey shall test and report airborne noise levels and vibration levels for spaces/locations listed in Contract Section C, Paragraph C180.

For each outside area and interior space, measurements of the overall dB(A) sound pressure levels shall be taken and recorded at a sufficient number of points to provide an accurate record of the noise characteristics of the entire space.

For each location where vibration measurements are required, they are to be taken at a sufficient number of points tp provide an accurate record of the vibration characteristics in that location in three translational axes (x-fore and aft, y-lateral, z-vertical) as maximum weighted root-mean-square acceleration for a frequency range of 1 to 80 Hertz.

The noise and vibration survey shall be conducted under the conditions as described in Contract Section C, Paragraph C180.

The noise and vibration survey shall be performed in accordance with the ABS Guide for Crew Habitability on Workboats. Care shall be taken to note the existence of intermittent or cyclical characteristics of the noise and vibration environment and to take appropriate measures to account for this.

The noise and vibration survey report shall meet the requirements of the ABS Guide for Crew Habitability on Workboats and shall include at least the following information:

- A narrative description of the survey procedure, the findings, and conclusions or observations.
- Identify any spaces or open areas which present a noise hazard according to OSHA regulation, 29 CFR 1910.95 “Occupational Noise Exposure” and where noise hazard signs must be posted.
- A tabulation of the actual raw data taken in the survey for noise.
- A tabulation of the actual raw data taken in the survey for vibrations.
- Reduced data in the form of A-weighted sound pressure levels for each operating condition indicated in the approximate location of the reading, on plan view drawings or sketches of each space.
- Reduced data from vibration three axis raw data for each operating condition with calculated multi-axis acceleration level with the location of the measurements on plan view drawings or sketches. Where vibration limits are exceeded provide frequency spectrum plots for all three axes.
- A tabular comparison of actual sound and vibration levels compared to the limits in Contract Section C, Paragraph C180.

16. Dredge Pump Requirements

During the dredging identified above, the Contractor shall demonstrate the operation of the dredge pumps, and dredge pump driving equipment. The trial shall seek to verify the production calculations developed in Contract Section C Paragraph C502. The Contractor shall record the relevant temperatures, pressures, pumping speeds, efficiencies, and all other pump performance variables during this trial.

17. Jetting and Hopper Flushing Pumps Requirements

During the dredging identified above, the Contractor shall demonstrate the operation of the jetting and hopper flushing system, including jetting pumps, hopper flushing pumps, and their driving equipment. The Contractor shall record the relevant temperatures, pressures, pumping speeds, efficiencies, and all other pump performance variables during this trial.

18. Controls and Monitoring Requirements

During the dredging identified above, the Contractor shall demonstrate all controls and monitoring equipment for the dredging systems. This shall include demonstration of automation controls and monitoring points as required in Paragraph C524. The Contractor shall develop a list of controls to be verified during this trial and shall include in the trial agenda. This list shall include all points of automation, monitoring, and controls for the dredging system.

19. Poor Mixture Overboard Requirements

During the dredging identified above, the Contractor shall demonstrate the operation of the poor mixture overboard system, including automatic and manual means of operation. The Contractor shall record the relevant temperatures, pressures, pumping speeds, efficiencies, and all other pump performance variables during this trial.

20. Swell Compensator Requirements

During the dredging identified above, the Contractor shall demonstrate the operation of the swell compensator, including the ability to respond to changes in sea levels. The Contractor shall record the ram response times along with relevant pressure levels during this trial.

21. Bow Thruster Requirements

During the dredging identified above, the Contractor shall demonstrate the operation of the bow thruster and determine limitations of use during dredging. The Contractor shall record the relevant speeds, directions, and other metrics for the bow thruster during this trial. Trial data shall be provided in permanent placards in the bridge.

22. Drag Arm Requirements

During the dredging identified above, the Contractor shall demonstrate the operation of the drag arm system. The Contractor shall record the relevant pressures, temperatures, and winch performance data during this trial.

23. Drag Head Visor and Turtle Excluding Deflector (TED) Requirements

During the dredging identified above, the Contractor shall demonstrate the operation of the drag head visor, and the successful calibration of the TED. The Contractor shall demonstrate the drag head visor and TED functioning per the requirements in Paragraph C511 during this trial.

E06 FINAL INSPECTION

When all work and testing has been satisfactorily completed at the builder's yard, the Contractor and a Government Representative shall make a complete physical inspection and inventory of the vessel. A "punch list" of deficiencies (if any) will be developed and presented to the Contractor for corrective action.

All corrective action necessary to eliminate the "punch list" deficiencies shall be completed at the Contractor's facility. The Contractor shall give the COR 7 working days' notice prior to the desired date of reinspection.

Prior to any inspection or reinspection, the vessel and all its equipment shall be thoroughly cleaned and all painting and finishes required to be performed by the Contractor put in first class condition.

E07 PROVISIONAL ACCEPTANCE AND DELIVERY

Delivery of the vessel may not be started until Provisional Acceptance of the vessel has been made. The vessel will be Provisionally Accepted at the builder's yard upon satisfactory completion of the following:

- Tests and trials (through Level 5)
- Correction of all "punch list" deficiencies

Delivery of the vessel may not be started until Provisional Acceptance of the vessel is made at the Contractor's facility. Provisional acceptance may be issued with Contracting Officer sanctioned non-safety related outstanding minor deficiencies that the contractor shall fix at a later date with appropriate withholding of payment.

The Contractor shall deliver the vessel to Government's facility as required in Contract Section F, Paragraph F03. The Contractor shall assume all costs associated with the delivery of the vessel. The vessel shall be subject to a complete inspection at the time of delivery.

E08 FINAL ACCEPTANCE

FINAL ACCEPTANCE DEMONSTRATIONS AND TRAINING (LEVEL 6) - PHASE IV

Final Acceptance Demonstrations are tests the Contractor must perform following the delivery of the vessel to demonstrate to the operating staff the proper operation, and performance of all the equipment, machinery, and electrical systems functioning as an "integrated whole" as described herein.

The Contractor shall be responsible for training the crew of 26 personnel prior to final acceptance, assuming a classroom size of 20 personnel at one time. This will be further defined through Contract Modification. For the purpose of bidding the Contractor shall assume six (6) weeks of classroom training divided among dredge, propulsion, control and automation, and other systems on the vessel, and shall also assume on-board training during trials. Training shall ensure that the crew has sufficient knowledge and understanding of the operations of all areas of the vessel to complete their mission, as described in Section C, Paragraph C002.

Final Acceptance Demonstrations shall be conducted following successful completion of Level 5 tests, correction of all deficiencies and delivery of the vessel to the designated delivery point. Final Acceptance Demonstrations and Training shall not begin until the approved Operations and Maintenance Manual, along with all equipment OEM manuals, are delivered. Final Acceptance Demonstrations must be performed in the presence of a representative of the Contracting Officer.

The Contractor shall provide sufficient personnel and resources to operate all of the equipment and demonstrate its proper installation.

Test memorandums for this level of testing shall consist of a simplified checklist of each vessel system and each system's relevant features (i.e. start-up procedures, alarms, controls, etc.).

FINAL ACCEPTANCE

Final Acceptance will be made upon delivery of the vessel, afloat and "Ready for Service" at the delivery point.

At the time of Final Acceptance, the vessel will be "Ready for Service", which is defined as:

- clean inside and out
- all trash, dunnage, lashing, and delivery related material disposed of
- loose items of outfit in place
- all electrical and mechanical systems operational
- equipment properly adjusted
- instruments and electronics calibrated or aligned
- tanks filled in accordance with Contract Section C
- all waste tanks empty
- damaged paint touched up
- completion of Final Acceptance Demonstrations (Level 6 Testing)
- all required contract deliverables (including Dredge ABS Class Certificate and Launch COI)

The Contractor shall provide necessary personnel, equipment and materials and assumes all costs to make the vessel "Ready for Service".

At Final Acceptance, the vessel shall be subject to a complete inspection with every space, compartment, and deck of the vessel shall be cleaned to the satisfaction of the COR.

At the discretion of the Contracting Officer, final acceptance may be issued with sanctioned non-safety related outstanding minor deficiencies that the contractor shall fix at a later date with appropriate withholding of payment.

BOW CONNECTION VERIFICATION

Due to the inability to test the bow connection through a dredge pipeline at the location of the dock, open water, or dredging trials, the Contractor shall support the testing of the pipeline connection within 90 days after Final Acceptance. This shall include correction of any items that prevent the use of the pipeline connection as required in Contract Section C Paragraph C523. The Government will be responsible for the operation of the dredge, connection of the bow connection to the pipeline, and loading of the hopper prior to verification of the system. The Contractor shall provide guidance on the setup of the connection and shall ensure the presence of the dredge equipment manufacturer's representative for this test. Testing will include operation of the dredging system as required to operate the bow connection and relevant equipment.

E09 COMMERCIAL WARRANTY OF SUPPLIES

The Contractor shall assign, in writing, all commercial warranties for equipment provided under this Contract to the Government. The effective date of all commercial warranties shall be the date of Final Acceptance. Manufacturer

warranties shall cover equipment for at minimum one (1) year from Final Acceptance. The Contractor shall obtain extended warranties from suppliers as required to satisfy the date beyond Final Acceptance. The Contractor shall consolidate all warranty information to include component names and quantities, warranty period, and point of contacts for all equipment.

E10 RESPONSIBILITY FOR SUPPLIES

The following, clause 52.246-16, "Responsibility for Supplies" (Apr 1984), is incorporated by full test.

52.246-16 RESPONSIBILITY FOR SUPPLIES (APR 1984)

(a) Title to supplies furnished under this Contract shall pass to the Government upon formal acceptance, regardless of when or where the Government takes physical possession, unless the Contract specifically provides for earlier passage of title.

(b) Unless the Contract specifically provides otherwise, risk of loss of or damage to supplies shall remain with the Contractor until, and shall pass to the Government upon--

(1) Delivery of the supplies to a carrier, if transportation is f.o.b. origin; or

(2) Acceptance by the Government or delivery of the supplies to the Government at the destination specified in the Contract, whichever is later, if transportation is f.o.b. destination.

(c) Paragraph (b) of this section shall not apply to supplies that so fail to conform to contract requirements as to give a right of rejection. The risk of loss of or damage to such nonconforming supplies remains with the Contractor until cure or acceptance. After cure or acceptance, paragraph (b) of this section shall apply.

(d) Under paragraph (b) of this section, the Contractor shall not be liable for loss of or damage to supplies caused by the negligence of officers, agents, or employees of the Government acting within the scope of their employment. (End of clause)

E011 VESSEL STARTUP SUPPORT

During the first twelve months following delivery of the vessel, the contractor shall provide 180 calendar days of onsite vessel optimization support. The goal of this support is to best match the capability of the vessel to the specific conditions encountered by adjusting and adapting the dredging systems to the USACE mission. Support time segments will consist of scheduled and unscheduled periods of time during the first year to align with dredging activities along the Eastern Seaboard and the Gulf of the United States. Support will consist of two dredge expert technical representatives supported by reach back capability from the designer of record as well as the dredge equipment and automation suppliers. One technical representative shall be an operator with experience operating a dredge from the bridge and the second shall be an engine department representative capable of making physical adjustments to equipment and systems. Support activities may include but are not limited to - staff re-training, advice and support regarding maintenance challenges, component and system optimization activities, and technical issue trouble shooting in case of breakdowns. The 180 day support is not vessel warranty. Any activities handled as part of vessel warranty while representatives are on site shall be excluded from the 180-day calculation.

Lodging and accommodations shall be the responsibility of the Contractor except while the vessel is underway; while the vessel is underway, the Government shall provide room and board for the technical representatives. Scheduling shall be accomplished at time of vessel delivery but will be structured to be in no less than 14 days increments, with no single period lasting more than 60 consecutive days without a break. Contractors shall plan attendance and travel to their home site on this basis. Actual scheduling will be based on the schedule of the vessel, post-delivery.

DELIVERIES OR PERFORMANCE

F03 PLACE OF DELIVERY

The contractor shall deliver the vessel, its components, materials, and spare parts to the following location:

Fort Mifflin
6400 Hog Island Rd,
Philadelphia, PA 19153

Fort Mifflin Piers
Delaware River Mile (RM): 91.43

SPECIAL CONTRACT REQUIREMENTS
Section H – Special Contract Requirements

H01 CONTRACT ORGANIZATION

A. PLANNING AND SCHEDULING

ITEM 0001AA PHASE I – Planning and Scheduling commences only after receipt by the Contractor of a Notice of Contract Award (Award) and a Notice to Proceed (NTP), "PLANNING AND SCHEDULING," respectively. In this first phase of the contract, the Contractor is required to present planning information that demonstrates a logical, orderly and workable approach to the contract and develop the contract schedule.

B. ENGINEERING

ITEM 0001AB PHASE II – Engineering commences only after receipt by the Contractor of a Notice To Proceed (NTP) with, "ENGINEERING." It is intended, but not required, that NTP will be issued on after completion of the Planning and Scheduling phase. During this second phase of the contract, the Contractor is required to perform engineering and make submittals as required by the contract.

C. CONSTRUCT & TEST

ITEM 0001AC PHASE III – Construct & Test will commence only after receipt by the Contractor of Notice to Proceed with "CONSTRUCT & TEST." It is intended, but not required, that NTP will be issued only after completion of the Engineering phase. During this third phase of the contract, the Construction Progress Chart shall be updated and maintained, the vessel constructed, and tests performed.

D. TEST, SEA TRIALS, & DELIVER

ITEM 0001AD PHASE IV – Sea trials and Deliver will commence only after receipt by the Contractor of Notice to Proceed with "TEST, SEA TRIALS, & DELIVER.". It is intended, but not required, that NTP will be issued only after completion of the Construction phase. During this fourth phase of the contract dredge and sea trials shall be performed as well as delivery. Delivery will commence only after completion of construction punch list items, final testing, training, sea trials, and receipt by the Contractor of a letter of PROVISIONAL ACCEPTANCE. This phase of the contract is completed with receipt by the Contractor of a letter of FINAL ACCEPTANCE and submittal of all final documents.

Failure of the Contractor to perform all phases of the work in the allotted time will result in the application by the Government of Liquidated Damages. See Section F of the contract.

E. PHASE SEQUENCING

It is intended that the four phases will be performed sequentially.

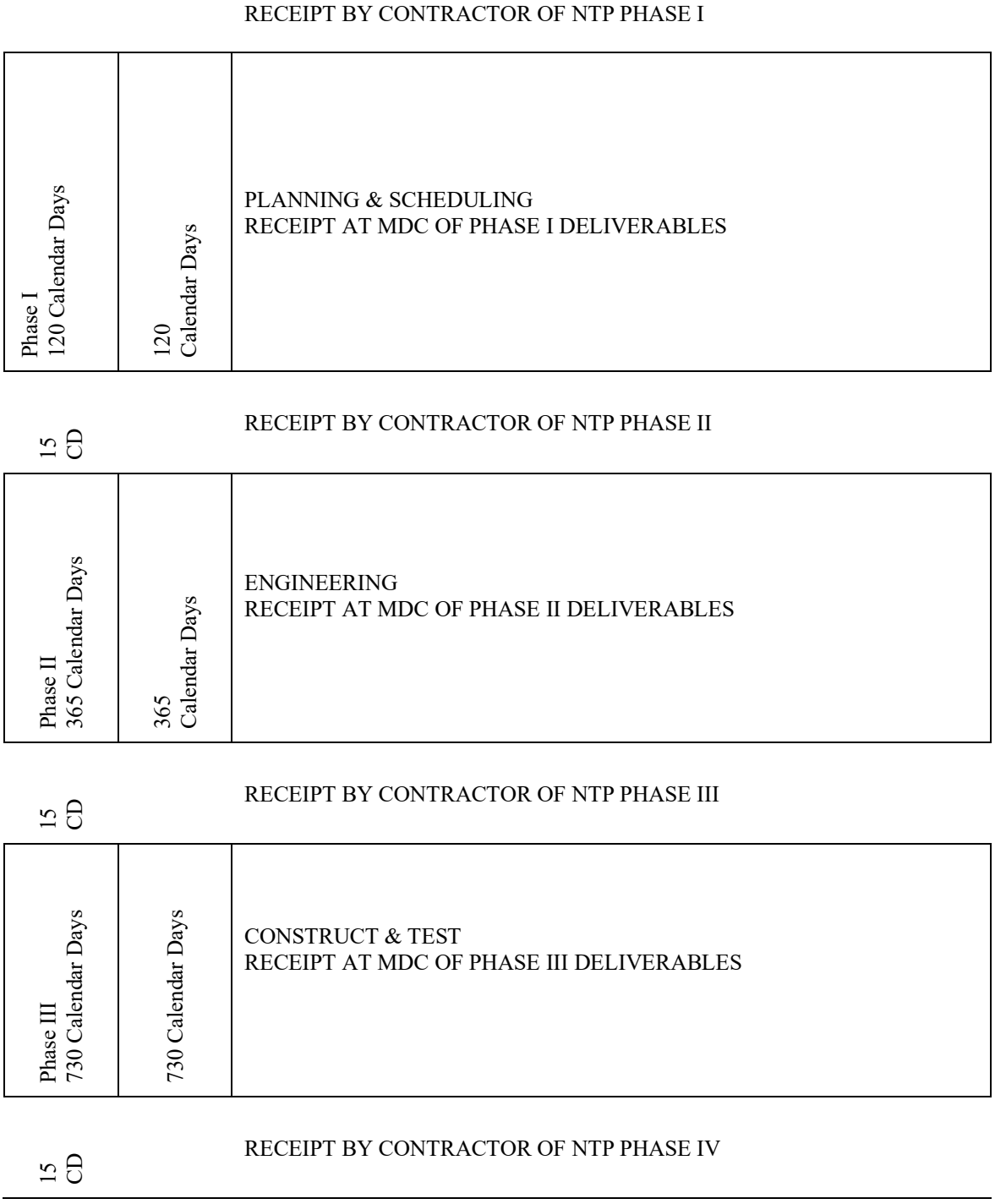
The time allotted in contract section F for each phase spans an interactive process involving both the Contractor and the Government. This process includes preparation, review and approval of the phase submittals, contract administration, mailing, preparation and issuance of Notices to Proceed.

The Government will require a maximum of 28 days after submittal to review Contractor initial submittals or re-submittals and provide comments or acceptance.

The Contractor must be aware that the quality, completeness, and detail of the submittals have a direct bearing on the approval process. Extended review iterations will increase the time required to receive approval of the submittals and will subject the Contractor to assessment of Liquidated Damages or Termination for Default. It is the Contractor's responsibility to properly account for the time required for review iterations and acceptance of all submittals within the period of performance for each phase defined in Contract Paragraph F02.

Refer to contract Paragraph H05 for information concerning the submittal review process.

CONTRACT PHASE SEQUENCING



Phase IV 120 Calendar Days	120 Calendar Days	TEST, SEA TRIALS, & DELIVER RECEIPT AT MDC OF PHASE IV DELIVERABLES TRAINING AND FINAL ACCEPTANCE	H02

CONTRACTOR SUBMITTALS

A. ITEM 0001AA PHASE I – PLANNING AND SCHEDULING PHASE SUBMITTALS

The following is a summary of the items that the Contractor must submit during the Planning And Scheduling Phase of this contract. All items must be received, reviewed and approved by the COR before a Notice to Proceed (NTP) will be issued for the Engineering phase of the contract. The following items are required to be submitted during this phase:

SUBMITTAL ITEM	CONTRACT PARAGRAPH REFERENCE
• Contractor Quality Control Program (Engineering Phase)	E03
• Construction Plan	H06
• Contractor's Safety Plan	H07
• Procurement Plan	H08
• Subcontracting Plan	H09
• Submittal Schedule	H11

B. ITEM 0001AB PHASE II – ENGINEERING PHASE SUBMITTALS

The following is a summary of the items that the Contractor must submit during the Engineering Phase of this contract. All items must be received, reviewed, and approved by the COR before a Notice to Proceed (NTP) will be issued for the Construct, Test, and Deliver phase of the contract. The following items are required to be submitted during this phase:

SUBMITTAL ITEM	CONTRACT PARAGRAPH REFERENCE
• Contractor Quality Control Program (Construction Phase)	E03
• Material & Equipment Schedule	H10
• Engineering Drawings/Calculations	H12
• Substitutions List (if required)	H15
• Certified Welder List	C025.E

C. ITEM 0001AC PHASE III– CONSTRUCT& TEST SUBMITTALS

The following is a summary of the items that the Contractor must submit after a Notice To Proceed (NTP) with the Construct, Test, and Deliver phase of the contract is issued. All items must be received and approved by the COR before Final Acceptance and Final Payment will be made. The following items are required to be submitted during this phase:

SUBMITTAL ITEM	CONTRACT PARAGRAPH REFERENCE
• Test Agenda & Test Memoranda	E05
• ABS Certificates	C004
• Paint Certification	C406.L
• Wire Rope Certs	C456.C & C554.B
• Test Report	E05
• Commercial Warranties	E09
• Purchase Orders\Specifications	H10
• Engineering Drawings/Calculations	H12
• As-Built & ABS Drawings	H14
• Manufacturer or Sub Contractor Drawings and Manuals	H16
• Operator's Manual	H17
• Record Photographs	H18

D. ITEM 0001AC PHASE IV–TEST, SEA TRIALS, & DELIVER SUBMITTALS

The following is a summary of the items that the Contractor must submit after a Notice To Proceed (NTP) with the Construct, Test, and Deliver phase of the contract is issued. All items must be received and approved by the COR before Final Acceptance and Final Payment will be made. The following items are required to be submitted during this phase:

SUBMITTAL ITEM	CONTRACT PARAGRAPH REFERENCE
• Test Agenda & Test Memoranda	E05
• Dredging Trial Plan & Test Memoranda	E05
• Sea Trial Plan & Test Memoranda	E05
• Delivery Plan	E05

H03 NOT USED

H04 CONTRACTOR SUBMITTAL REQUIREMENTS

The Contractor shall comply with the requirements of the design embodied in the Contract. Prior to submission of plans, calculations and designs to MDC or any regulatory agency as part of this Contract, the Contractor must thoroughly review them internally to ensure proper quality control and conformance to the contract.

H05 REVIEW OF CONTRACTOR SUBMITTALS

The Marine Design Center (MDC) will review the drawings, data and other material submitted by the Contractor in the various contract phases for the vessel.

Submittals from the Contractor must be clear as to what the submittal represents and the action the Contractor requests the Government perform.

The Government's review is intended to be limited to the functional aspects of the submittals to ensure compliance with the contract specifications and will include technical review to ensure that sound naval architecture and marine engineering practices are followed. This does not relieve the Contractor from any engineering, design, or quality assurance responsibility.

The Contractor shall comply with the requirements of the design embodied in the contract. Where review, approval, classification or certification by ABS is a provision of the contract, Government review of Contractor submittals may not address the requirements of those agencies. It is implicit that Government acceptance of submittals will be contingent upon satisfactory fulfillment of those requirements.

Submittals found to be completely acceptable to the Contracting Officer's Representative without comment will be marked "ACCEPTED."

Submittals found to be generally acceptable to the Contracting Officer's Representative with qualifying comments will be marked "ACCEPTED WITH COMMENTS" but may or may not require resubmission depending on the COR's assessment of the criticality of the comments.

"ACCEPTED WITH COMMENTS" submittals being resubmitted will be reviewed only to ensure that the previous comments have been adequately incorporated. Resubmission requirements will be clearly marked on the return.

Submittals unacceptable to the Contracting Officer's Representative will be marked "NOT ACCEPTED." Submittals not accepted will always require full and complete re-submittal. Such re-submittal will result in a full and complete review as though it was a first submittal.

Submittals furnished for information only or for which the Contractor has not indicated the required review action will be marked "EXAMINED."

The Contractor shall insure that all review comments are incorporated in corrected submittal documents or are rebutted in separate correspondence. The Contractor is encouraged to completely discuss all submittal comments with the MDC author in order to insure complete and effective communication.

The Contractor shall not use the drawing review or submittal process for contract deviations. Changes in equipment, materials, construction techniques or details must be the subject of separate, specific correspondence. Any such request made by the Contractor must be specific and clear as to what is contractually required, the proposed change, location and/or extent, benefits resulting from the change and effect on contract cost and delivery.

Contractors shall plan their submittal schedules so as not to affect contract performance.

H06 CONSTRUCTION PLAN

After receipt of the Notice to Proceed with ITEM 0001AA PHASE I, the Contractor shall develop and submit to the Contracting Officer's Representative (COR) the Contractor's proposed plan for the design, construction, testing, and delivery of the MCHD.

The proposed plan shall consist of a Master, Design, Production, Outfitting, Outsourcing, Integration, Risk Management, and Earned Value Management plan to the extent to which it shall result in the design and production of a high quality MCHD. The Government will evaluate the maturity and comprehensiveness of the plans including areas like engineering, material purchasing, production, resource allocation, and testing. The Government will review the planned approaches to assess the extent to which completion of the proposed effort can be accomplished within the four phases of this contract.

Master Plan: At a minimum, the Master Plan shall contain an executive summary, comprehensive overview of the project strategy across all supporting plans, a shipyard facility overview, and an overview of the MCHD production flow model in conjunction with site layout. The plan shall include completion dates of key milestones in the shipbuilding project, such as keel laying, launching, and delivery.

Design & Engineering Plan: At a minimum, this plan shall contain an all-inclusive summary of engineering management, design change management, design quality control, and supporting data for the critical path Integrated

Master Schedule of the planned approach, addressing the different vessel design stages and planned reviews with the Government. Design areas to address include:

- Concept
- Functional Design
- Detailed Design
- ABS Review

Production Plan: At a minimum, the production plan shall contain a comprehensive overview of production management, production change management, quality control, resourcing, and supporting data for the critical path Integrated Master Schedule of the planned approach addressing the various production areas of the hull and superstructure. For example, items to highlight may include:

- Panel Construction
- Section Assembly
- Block Building
- Erection
- Launching

Outfitting Plan: The outfitting plan shall contain a detailed summary of outfitting management, outfitting change management, quality control, resources, and supporting data for the critical path Integrated Master Schedule of the planned approach addressing the various outfitting areas of the vessel. For example, items to address may include:

- Pre-outfitting
- Painting
- Slipway Outfitting
- Quay Outfitting

Outsourcing Plan: The outsourcing plan shall contain a comprehensive overview and planned approach to outsourcing from the shipyard to subcontractors. Outsourcing should be addressed in the critical path Integrated Master Schedule. For example, the plan may address items like:

- Total outsourcing
- Peak outsourcing
- Long lead time items

Integration Plan: The Integration plan shall contain a comprehensive overview and planned approach to integration from the shipyard to subcontracted and internal integration teams. The integration plan shall be included in the critical path Integrated Master Schedule. The plan shall address areas like:

- Automation
- Dredging System & Components
- Electrical System

Risk Management Plan: The Contractor shall establish and execute a Risk Management Plan describing the Contractor's management strategy and processes for identifying, analyzing, and mitigating program risks and opportunities. The Contractor shall develop and maintain a Risk Database that documents each risk, the assessment results, recommended risk severity, the risk mitigation plans, and the progress against the mitigation plans. Milestones associated with approved risk mitigation plans shall be reflected in the Integrated Master Schedule. The Contractor shall integrate risk management efforts and elements into new or revised design deliverables, including referencing and addressing project moderate and high risks, including associated mitigation actions, into contract deliverables.

Earned Value Management System: In the performance of this contract the Contractor shall establish, maintain, and use an integrated performance management system. Central to this integrated system, the contractor shall use an Earned Value Management System (EVMS). This specification is structured to define the goals and objectives of the EVMS approach to address cost and schedule performance, while attempting to maximize contractor flexibility to develop their own approach to best match their internal business processes. As a result, this specification shall focus on the outputs from the Contractor's EVMS system that the Government requires to surveil, monitor, and react to contractor performance.

The goal and objective of the Government is to ensure that adequate tools are in place to allow both the contractor and the Government to monitor progress, foresee any issues that are arising early on, and to provide meaningful reporting that allows all stakeholders to assess project status.

The EVMS shall be coordinated with the scheduling requirement in this contract so that all scheduled activities and all contractor costs are included in the EVMS. A baseline submittal shall be prepared and submitted.

The Contractor shall provide output reports from their EVMS system monthly. Submittals shall be coordinated with payment requests so that EVMS results can be reflected in progress payments.

Monthly Outputs:

EVMS monthly reporting shall include the following:

- An overview narrative discussing progress since the previous reporting period
- A discussion of the critical path and progress on all critical path activities, including risks/concerns
- A tabular status-ing of all activities

A plotted S curve showing:

- The baseline
- Actual Cost of Work Performed (ACWP)
- Budgeted Cost of Work Performed (BCWP) or (EV)
- Budgeted Cost of Work Scheduled (BCWS)
- Budget at Completion (BAC)
- Estimate at Completion (EAC)

Calculated Variances:

- Cost Variance (CV) - BCWP-ACWP
- Schedule Variance (SV) – BCWP-BCWS
- Cost Variance percent - (BCWP—ACWP)/BCWP
- Schedule Variance percent – (BCWP-BCWS)/
- Variance at Completion BAC-EAC BCWS

Performance Indices:

- Cost Performance Index (CPI) – BCWP/ACWP
- Schedule Performance Index (SPI) – BCWP/BCWS

Overall Status:

- Percent Scheduled – BCWScum /BAC
- Percent complete - BCWPcum/BAC
- Percent budget spent – ACWPcum/BAC
- Work Remaining (WR) - BAC-BCWPcum

Assessing Progress:

- Activities with a firm milestone at the end may be progressed up to 100%
- Activities that do not have a firm milestone at end shall be limited to 95%
- Significant subcontractors and suppliers or ones on the critical path shall be contacted at least weekly

Initial Discussions: The contractor shall schedule a meeting at their facility within 60 days after award of contract. The purpose of this meeting shall be for Contractor and Government representatives to discuss the Contractor's proposed approach to this EVMS requirement so that when the EVMS process is implemented both the Contractor's and the Government's needs shall be met. It is not intended for the Contractor to produce their EVMS system at that time.

MASTER SCHEDULE DETAILED REQUIREMENTS:

The **Master Schedule** shall be prepared as a critical path Master schedule using **Primavera.** This contract shall use a total of four types of Master schedules: 1) Preliminary, 2) Initial, 3) Baseline, & 4) Updates

Qualifications: Designate an authorized representative to be responsible for the preparation of the schedule and all required updating and production of reports. The authorized representative must have a minimum of 2 years' experience scheduling vessel construction projects similar in size and nature to this project with scheduling software that meets the requirements of this specification. Representative must have a comprehensive knowledge of critical path method (CPM) scheduling principles and application.

General requirements: Prepare, for approval, a Project Schedule as specified herein. Show in the schedule the sequence in which the Contractor proposes to perform the work and dates on which the Contractor contemplates starting and completing all schedule activities. The scheduling of the entire project, including the design and construction sequences, is required. The scheduling of construction is the responsibility of the Contractor. Contractor management personnel shall actively participate in its development. Subcontractors and suppliers working on the project shall also contribute in developing and maintaining an accurate Project Schedule. The schedule must be a forward planning, as well as a project monitoring tool. Ensure the schedule captures ABS reviews, testing, and inspections during all phases of the contract.

Critical Path Method: Use the Critical Path Method (CPM) of network calculation to generate the Project Schedule.

Activity Durations: The time estimate of the duration of the activities shall be logical and consistent with the Contract Documents and shall be based on realistic and available resources (manpower, materials, tools, and equipment, etc.), of the Contractor. The unit time for measuring the duration of activities is the "Day." Activity durations shall not exceed 60 days in length. Longer duration activities shall be broken down to stay within the sixty-day length to validate progress with the exception of costed administrative items which run the length of the contract.

Procurement Activities: The schedule must include activities associated with the submittal, approval, procurement, fabrication and delivery of long lead materials, equipment, fabricated assemblies, and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over ninety calendar days. A typical procurement sequence includes the string of activities: submit, approve, procure, fabricate, and deliver.

Contract Changes/Requests for Equitable Adjustment (REA) Coding: Assign Activity code to any activity or sequence of activities added to the schedule because of a Contract Modification, when approved by the Contracting Officer, with a Contract Changes/REA Code. Key all Code values to the Government's modification numbering system (i.e. P0001, P0002, etc.). Any activity or sequence of activities added to the schedule because of alleged constructive changes made by the Government may be added to a copy of the current schedule, subject to the approval of the Contracting Officer. Assign Activity codes for these activities with a Contract Changes/REA Code (i.e. REA0001, REA0002). Approval to add these activities does not necessarily mean the Government accepts responsibility and therefore liability for such activities and any associated impacts to the schedule, but rather the Government recognizes such activities are appropriately added to the schedule for the purposes of maintaining a realistic and meaningful schedule. Such activities shall not be Responsibility Coded to the Government unless approved. An activity shall not have more than one Contract Changes/REA Code.

Schedule Constraints and Open-Ended Logic: Constrain completion of the last activity in the schedule by the contract completion date. Schedule calculations shall result in a negative float when the calculated early finish date of the last activity is later than the contract completion date. Include as the last activity in the project schedule an activity called "End Project". The "End Project" activity shall have a "LF" constraint date equal to the contract completion date for the project, and with a zero-day duration or by using the "project must finish by" date in the scheduling software. The schedule shall have no constrained dates other than those specified in the contract. The use of artificial float constraints such as "zero free float" or "zero total float" are prohibited. There shall only be two open ended activities: Start Project (or NTP) with no predecessor logic and End Project with no successor logic. Under this contract the project owns the float. Float of the master schedule gets used on a first come first served basis as issues arise.

Out-of-Sequence Progress: Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) shall be allowed only on a case-by-case basis. Propose logic corrections to eliminate all out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule. Correct out of sequence progress that continues for more than two update cycles by logic revision, as approved by the Contracting Officer.

Integrated Master Schedule submissions: Provide the submissions as described below.

Preliminary Integrated Master Schedule Submission:

- Due within 30 calendar days of phase one NTP
- Contains detail for phases I and II of the contract
- Contains summary activities for the remaining phases.
- 1 activity per level 2 WBS structure
- Used for payment purposes
- Afterwards only Govt. approved updated Initial Schedule shall be used.

Initial Integrated Master Schedule Submission:

- Detailed schedule for the entire project.
- Submitted within 60 days of phase I NTP
- Shall be appropriate level of detail for the complexity of the project
- Shall address all supporting plans (engineering, production, outfitting, outsourcing, testing, and integration).
- A planning document shall be submitted with the initial schedule identifying all schedule development assumptions, constraints, limitations, and applicable notes.
- Activities represent work activities under each WBS through the entire project
- Activities shall be resourced (i.e. material, labor, and equipment resources and costs). Resource data such as cost and required codes must be entered for activities. The schedule data can be ordered in different sorts and compiled into specific reports for management purposes. Actual progress must be entered once work commences. Based on this progress with actual start dates, actual finish dates, percent complete, and remaining duration recorded, progress payments can be calculated.
- Activities shall correspond and be synched with the submittal, materials, and equipment schedule.
- The schedule shall be used as a primary planning and event progressing tool. It shall show and logically connect critical milestone events and accomplishments for both the prime and subcontractors through the last required delivery or end of the contract performance period, whichever is later.
- The schedule shall be integrated with and used for EVMS calculations and reporting.
- Subsidiary plans and schedules required herein shall be integrated with the Master Plan and Master Schedule.
- The schedule shall show the order in which the contractor proposed to do the work, the start date on the salient features (including procurement of materials, plant, and equipment) and contemplated dates for completing the same.
- Progress on the contract must be shown. Progress shall show dollar amounts for various phases of work that directly relate to those items on the payment estimate. The Master Schedule and its support documents shall include a list of pay activities that the Contractor shall develop in conjunction with the construction schedule. The sum of all pay activities shall be equal to the total contract amount, including modifications. Pay activities shall be grouped by phases, and the sum of the activities shall equal the amount of each phase. The total of all phases equals the Contract Amount.
- The Government has 28 days for approval.

Baseline Integrated Master Schedule:

- All percent complete =0
- Approved at the end of phase one
- Signed by contractor and COR

Integrated Master Schedule Updates:

- The schedule must be updated and submitted monthly with the Progress Payment Request.
- **Only additional time approved through modification (KO approved) can be added to the schedule update. **

Every Integrated Master Schedule Submission requires: (This includes schedule updates each month)

- Narrative
    - Activity description along the two most critical paths
    - Descriptions of current & anticipated problem areas
    - Description of delaying factors
    - All known Impacts
    - Explanations of corrective actions in maintaining or regaining schedule. If there are project schedule changes in the schedule submission that have not been previously approved, there shall be a pending approval version of the schedule and the currently approved schedule.
    - The Narrative Report shall specifically reference, on an activity-by-activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.
- S-Curve
- Earned Value Management Metrics shall be provided with S-Curve
- Precedence Diagram Method (PDM) Diagram
- Activity/WBS Progress Report
- Float Report
- Logic Report
- 1 Electronic PDF file of schedule
- 1 Electronic native file of schedule
- Schedule Reports: Typically reports shall contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. The following lists typical reports that shall be requested.

The Master critical path schedule shall capture the Contractor's proposed starting date, duration in calendar days, ending date, and percentage completion (both as planned and as achieved) for all of the major activities of the contract. The plan shall also show the amount of the total bid price (percent and actual dollars) associated with each activity. The plan shall also have the progress "S" curve plotted (both as planned and as achieved).

The activities shown on the chart shall be developed by the Contractor and shall include, as a minimum, the following respective line items:

- All WBS items as identified in Section C (Levels 1, 2, & 3)
- Planning & Support
- Bonding
- Scheduling
- ABS Fees (Engineering Review, Inspection, Surveys, Testing, Vessel & Material Certificates)
- Launch – Labor & Material
- Pre-Trial Tests – Labor & Material
- Builder's Dock Trials – Labor & Material
- Dock Trials & Crane Tests – Labor & Material
- Delivery
- Final Acceptance Demonstrations – Labor & Material
- Overhead & Profit

In addition, the following milestone events shall be marked on the schedule:

- Award of Contract
- Notice to Proceed with Planning and Scheduling
- Notice to Proceed with Engineering
- Notice to Proceed with Construct & Test
- Notice to Proceed with Test, Sea Trials, & Deliver
- Launch

- Tests and Trials
- Provisional Acceptance
- Final Acceptance
- Delivery

Periodic Schedule Update Meetings: Conduct periodic schedule update meetings for the purposes of reviewing the Contractor's proposed out of sequence corrections, determining causes for delay, correcting logic, maintaining schedule accuracy, and determining earned value. Meetings shall occur at least monthly within five calendar days of the proposed schedule data date and after the Contractor has updated the schedule with Government concurrence respecting actual start dates, actual finish dates, remaining durations, and percent complete for each activity intended to status. The meeting shall be a working interactive exchange which shall allow the Government and the Contractor the opportunity to review the updated schedule on a real time and interactive basis. The Contractor's Project Manager and/or the Authorized Scheduler shall attend the meeting.

Requests for Time Extensions: In the event the Contractor believes it is entitled to an extension of the contract performance period, completion date, or any interim milestone date, furnish the following for a determination by the Contracting Officer: written justification, project schedule data, and supporting evidence as the Contracting Officer may deem necessary. Submission of proof of excusable delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is a condition precedent to any approvals by the Government. In response to each Request for Proposal issued by the Government, the Contractor shall submit a schedule impact analysis demonstrating whether or not the change contemplated by the Government impacts the critical path.

Justification of Delay: The project schedule shall clearly display that the Contractor has used, in full, all the float time available for the work involved with this request. The Contracting Officer's determination as to the number of allowable days of contract extension shall be based upon the project schedule updates in effect for the time period in question, and other factual information. Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay,shall not be a cause for an extension to the performance period, completion date, or any interim milestone date.

Payment: No separate payment shall be made for work under this section and all costs shall be included in the overall contract price.

H07 CONTRACTOR HEALTH AND SAFETY PLAN

After Notice to Proceed with ITEM 0001AA PHASE I, the Contractor shall submit a Health and Safety Plan for the facility at which the work is to be performed.

The Contractor’s Health and Safety Plan shall outline the procedures used by the Contractor to ensure the safety of his employees and minimize lost-time accidents. The safety plan shall also explicitly address the orientation/training required for visitors, specifically Government employees performing quality assurance functions within the Contractor’s facility. The Contractor shall adhere to all CDC health and safety recommendations to prevent the spread and exposure of COVID-19.

The Health and Safety Plan shall identify by name and title the Contractor’s Safety Officer who is responsible for enforcing the Contractor’s safety rules and the Contractor’s designated “Competent Person” (29 CFR 1915.7) who is responsible for testing the atmosphere in confined and enclosed spaces. In the event that the Contractor has no designated “competent person,” a statement that a Marine Chemist will perform the tests and inspections that require a “competent person” shall be included with the Safety Plan, and the name of the Marine Chemist shall appear in the Safety Plan.

In addition, the employer shall train employees on entering confined and enclosed spaces or other dangerous atmospheres in accordance with 29 CFR 1915.12(d) through 29 CFR 1915.12(d)(5)(iii). Note on paragraph (e)(1)(iii): If the team performs an actual rescue during the 12-month period, an additional practice drill for that type of rescue is not required.

The Health and Safety Plan shall also identify rescue teams in the event of a required evacuation from a confined and enclosed space. The employer shall either establish a shipyard rescue team or arrange for an outside rescue team which will respond promptly to a request for rescue service as per 29 CFR 1915.12(e), (e)(1), and (e)(2).

H08 PROCUREMENT PLAN

After Notice To Proceed with ITEM 0001AA PHASE I, the Contractor shall submit a Procurement Plan for the vessel. The Procurement Plan shall identify the major or schedule controlling components and equipment in the contract, estimated delivery time for each, the selected vendor and planned date of ordering. The plan may also be used to obtain purchasing approval of significant items from the KO to allow contractors to lock in pricing.

The Procurement Plan shall be in spreadsheet format and will later be developed into the Material and Equipment Schedule of Paragraph H10.

Upon written approval of the Procurement Plan by the COR, the Contractor may commence procurement of any or all of those items on the plan.

H09 SUBCONTRACTING PLAN

After Notice To Proceed with ITEM 0001AA PHASE I, the Contractor shall submit a Subcontracting Plan for the contract. This should not be confused with the SUBCONTRACTING PLAN required of Large Business as a part of their affirmative action responsibilities.

The Subcontracting Plan shall identify the areas or features of the contract or vessel which will be performed, all or in part by SubContractors. The plan shall identify the scope of work, SubContractor firm's name, and reference the SubContractor's proposal or letter of intent.

The Contractor shall provide copies of all pre and post contract correspondence between themselves and their representatives and all potential SubContractors when requested by the Contracting Officer's Representative.

The Subcontracting Plan shall specifically address the Contractor's plan for design and engineering.

If any part of the Contractor's engineering is to be subcontracted, the Contractor shall also submit the SubContractor's qualifications, the scope of work and the contract, purchase order, or letter of intent.

The Subcontracting Plan shall be in "spreadsheet" format and will be incorporated into the Material & Equipment Schedule of Paragraph H10.

Upon written approval of the Subcontracting Plan by the Contracting Officer's Representative, the Contractor is authorized to proceed to place the subcontracts listed on the plan.

H10 MATERIALS & EQUIPMENT SCHEDULE

After Notice To Proceed with ITEM 0001AB PHASE II, the Contractor shall develop a schedule of all items, including major stock materials (excluding nuts, bolts, gaskets, consumables, etc.), to be used in the construction of the dredge. The schedule shall be prepared in "spreadsheet" format and contain the following information for the dredge:

- Component/equipment
- Quantity
- Vendor name and address
- Make, model, and options
- Drawing references (if appropriate)
- Purchase Order or Contract Number
- Scheduled order date

- Actual order date
- Scheduled (promised) receipt at shipyard
- Actual receipt at shipyard

After submittal to the COR the schedule shall be updated and submitted to the Government monthly.

Upon written approval of the schedule by the Contracting Officer's Representative, the Contractor is authorized to proceed with procurement of all items and materials in the schedule.

Final submission to MDC shall include priced copies of all purchase orders, purchase specifications, and receipts.

At any time during the contract, the COR may request and the Contractor shall furnish, correspondence, telephone conversation records, priced copies of purchase orders, purchase specifications and material receipts or other records between the Contractor and the various subcontractors and vendors.

H11 SUBMITTAL SCHEDULE

After receipt of Notice to Proceed with 0001AA PHASE I, the Contractor shall develop a submittal schedule for all Contractor submittals required by the contract (Refer to Paragraph H02).

The schedule shall be in "spreadsheet" format and contain the following minimum information for the vessel:

- Drawing number (if any)
- Name or title of submittal
- Scheduled submittal date(s)
- Actual submittal date(s)
- Submittal letter number
- Reply letter number
- Reply letter date

For drawings or items with repetitive submittals (monthly, etc.) the schedule must allow for drawing review iterations or repetitive submissions.

After review, subsequent revision and approval by the COR, the schedule will be updated and submitted with the monthly Progress Payment Request for the life of the contract.

H12 ENGINEERING & DRAWINGS

A. ENGINEERING

The Contractor shall perform engineering (prepare calculations, drawings, etc.) in order to:

- Develop the Final Design
- Launch, construct, and deliver the vessel
- Obtain regulatory body approval
- Obtain COR approval(s)
- Finalize Construction Drawings
- Complete As-Built Drawings

All drawings and documents prepared by the Contractor or substantively modified by the Contractor shall be forwarded to the Marine Design Center for review, comment, and acceptance.

It is the responsibility of the Contractor to schedule submission of the listed drawings/documents to allow for review by MDC, without adversely affecting the construction schedule or submittals to regulatory bodies (refer Contract Paragraph H02).

B. DRAWINGS FORMAT

All drawings shall be prepared in CADD form and shall conform to the American National Standards Institute (ANSI) Standard Y14. Drawing size shall be format A (horizontal or vertical) D, or E as defined by ANSI Y14.1. In no case will drawings of any other size or format be accepted. Drawings of two or more sheets shall have follow-on sheets titled according to ANSI Y14.1 for continuation sheets and shall not be separately titled.

Title blocks shall conform to ANSI dimensions and shall be submitted to the COR for approval before use.

Drawings shall comply generally with the types of engineering drawings described in ANSI Y14.24. Drawings may combine several types of drawings if applicable. The table in sub-paragraph D of this paragraph seeks to define the type of each required submission, however additional or different types of drawings may be acceptable. The following definitions are given for the letters used in the table:

- A – Arrangement Drawing
- AS – Assembly Drawing
- D – Detail Drawing
- EFB – Electrical/Electronic Functional Block Diagram
- EOL – Electrical/Electronic Single-Line
- ES – Electrical/Electronic Schematic
- .GF / .IGS / Other – Specific File Types
    - Engineering submissions that require specific file formats to be reviewed by the Government in support of construction efforts through this Contract, and in support of future maintenance efforts after conclusion of the Contract.
- L – Layout Drawing
- I –Installation Drawing
- MS – Mechanical Schematic
- R – Report
    - Report is not defined in ANSI Y14.24. Reports shall include calculations and analysis of its respective system, in order to provide evidence to the Government that a system is properly sized to meet the requirements of the Contract. Reports shall also include any relevant cut-sheets or equipment specifications to verify the values used in any calculations.

Drawing files shall be named based on the drawing phase, WBS number, task number, sheet number, and revision number. The following example will illustrate the naming convention:

- For a single or multi-sheet drawing with a drawing number of 849-C215-01 and a revision of "C" the drawing filename would be 849-C215-01C.DWG or .pdf.

The direct relationship between the drawing number and the drawing filename is as follows:

	IN DRAWING #	IN DRAWING FILENAME
Hull Number	The first through third characters, *849* in the example	The first 3 characters, *849*
Break	The fourth character - in the example	The fourth character, -

Design Phase	The fifth character *C* in the example	The fifth character, *C*
WBS Indicator	The sixth through eighth characters, *215* in the example.	The sixth through eighth characters, *215*.
Break	The ninth character **-** in the example	The ninth character, **-**
Task Number	The tenth and eleventh characters, *01* in the example.	The tenth and eleventh characters, *01*.
Revision Indicator	The twelfth character, *C* in the example.	The twelfth character, *C*.
File Extension		*.DWG*

C. SUBMITTAL DETAILS

All drawings, documents, and calculations prepared by the Contractor shall be forwarded to the Government for review, comment, and acceptance.

It is the responsibility of the Contractor to schedule submission of the listed drawings/documents to allow for review by the Government, without adversely affecting the construction schedule or submittals to regulatory bodies.

The Government prefers that the Contractor shall make submittals of the drawings, documents, and calculations in electronic format as (.pdf) files (unless required otherwise by the contract). If the transmission of large files via e-mail is prohibitive, the Government will establish a file exchange method for large file submittals.

All transmissions from the Contractor shall be sent via e-mail to the:

- Contracting Officer's Representative (COR)
- Project Manager
- Technical Manger

The above individuals will be defined by the Government at the time of contract award.
No submittals shall be accepted as hard copies. All submittals must be digital.

Review actions on all documents will be returned to the Contractor from the Government via e-mail.

D. REQUIRED DRAWINGS

The Contractor shall provide the following drawings during ITEM 0001AB Phase II of the contract (see respective Contract Section for specific requirements). Note that several drawings listed below denote the format for additional drawings that are not defined at this time, however multiple drawings shall be provided to accurately describe their system. Additionally, the Contractor may at their discretion separate drawings listed below into multiple drawing titles, and shall follow the established numbering conventions (i.e. if drawing 849-C309-01 is separated they would be numbered 849-C309-01, 849-C309-02, 849-C309-XX, sequentially). Drawing titles shall describe the content of the drawing, including the sub-system drawn (i.e. drawing title Transverse Structure – Frames 0 through XX, or Transverse Structure – Machinery Space).
PHASE II

Drawings To Be Developed:

Contract Section	Drawing	Title	Type
C025	849-C025-01	List of Certified Welders	R
C101	849-C101-01	GHS Geometry File	.GF File
C105	849-C105-01	Hull Lines and Offsets	L / A
C115	849-C115-01	Weight Control Plan	R
C115	849-C115-02	Weight and CG Estimate	R
C115	849-C115-03	Quarterly Weight Report	R
C115	849-C115-04	Final Weight Report	R
C115	849-C115-05	Longitudinal Weight Report	R
C115	849-C115-06	Incline Test Plan	R
C115	849-C115-07	Incline Test Results	R
C120	849-C120-01	Resistance and Power Prediction	R
C120	849-C120-02	Fuel Consumption Calculation	R
C121	849-C121-01	Power and Speed Validation Calculations	R
C121	849-C121-02	Propeller Design and Performance Calculations	R
C121	849-C121-03	Rudder (or Azimuth Propeller) Design and Performance Calculations	R
C121	849-C121-04	Bow Thruster Design and Performance Calculations	R
C121	849-C121-05	Dredging Performance Validation Calculations	R
C125	849-C125-01	Hydrostatic Calculations	R
C130	849-C130-01	Capacity Plan	L
C130	849-C130-02	Tank Capacity Tables	R
C130	849-C130-03	Hopper Capacity Tables	R
C130	849-C130-04	Consumable Calculations	R
C140	849-C140-01	Freeboard Calculation	R
C140	849-C140-02	Freeboard Plan	L / A
C143	849-C143-01	Downflooding Locations	L / A

C150	849-C150-01	Damage Stability Analysis	R
C150	849-C150-02	Damage Control Booklet	R
C150	849-C150-03	Damage Control Plan	R
C155	849-C155-01	Intact Stability Analysis	R
C156	849-C156-01	Naval Architectural Analysis	R
C156	849-C156-02	Floating Service Load Charts	R
C161	849-C161-01	Trim & Stability Booklet	R
C170	849-C170-01	Dry Docking Plan	L / A
C170	849-C170-02	Dry Docking Plan Calculations	R
C180	849-C180-01	Noise & Vibration Prediction and Control Plan	R
C205	849-C205-01	Outboard Profile	L / A
C205	849-C205-01	Dredging Outboard Profile	L / A
C215	849-C215-01	General Arrangement	L / A
C220	849-C220-01	Galley and Mess Arrangement	L / A
C230	849-C230-XX	Quarters Arrangements	L / A
C233	849-C233-01	Bridge Arrangement	L / A
C233	849-C233-02	Bridge Top Arrangement	L / A
C235	849-C235-XX	Storeroom Arrangements	L / A
C240	849-C240-XX	Workshop Arrangements	L / A
C245	849-C245-XX	Machinery Arrangements	L / A
C250	849-C250-XX	Dredging Arrangements	L / A
C255	849-C255-01	Console Arrangement	L / A
C290	849-C290-01	Equipment Removal Routes	R
C300	849-C300-01	3D Structural Model	.IGS/similar
C300	849-C300-02	Structural Design Brief	R
C300	849-C300-03	Construction Principle Plan	R
C300	849-C300-04	Welding Table	R

C301	849-C301-01	Midship Section	L / I
C305	849-C305-01	Scantling Plans	L / I
C306	849-C306-01	Construction Detail Plan	L / I
C307	849-C307-01	Shell Expansion	L / I
C309	849-C309-01	Transverse Structure	L / I
C311	849-C311-01	Longitudinal Structure	L / I
C313	849-C313-01	Hull Platforms and Flats	L / I
C315	849-C315-01	Deckhouse Structure	L / I
C316	849-C316-01	Stacks	L / I
C317	849-C317-01	Masts	L / I
C320	849-C320-01	Independent Tanks	L / I
C320	849-C320-02	Access Arrangements	L / A
C320	849-C320-03	Tank Outfitting	L / I
C325	849-C325-01	Sea Chest Details	L / I
C326	849-C326-01	Transducer Wells	L / I
C330	849-C330-01	Diesel Engines Foundations	L / I
C330	849-C330-02	Dredge Equipment Foundations	L / I
C330	849-C330-03	Anchoring and Mooring Equipment Foundations	L / I
C330	849-C330-04	Life Saving Equipment Foundations	L / I
C330	849-C330-05	Deck Crane(s) Foundation	L / I
C330	849-C330-06	Vessel Mechanical Equipment Foundations	L / I
C330	849-C330-07	Vessel Electrical Equipment Foundations	L / I
C330	849-C330-08	Engine Exhaust Foundations and Supports	L / I
C330	849-C330-09	Lifting and Mechanical Handling Provisions	L / I
C330	849-C330-10	Lifting Provisions Calculations	R
C330	849-C330-XX	Vessel XXX System Foundations	L / I
C330	849-C330-XX	Foundations and Supports	L / I

C330	849-C330-XX	FEA Report XXX Foundation	R
C335	849-C335-01	Hopper Structure	L / I
C399	849-C399-01	Structural Design Brief	R
C399	849-C399-02	Structural Calculation Report	R
C399	849-C399-03	Global FEA Report	R
C405	849-C405-01	Cathodic Protection Design Calculations	R
C405	849-C405-02	Cathodic Protection Plan	L / A
C406	849-C406-01	Paint Schedule	R
C410	849-C410-01	Main Deck Bulwark	L / I
C410	849-C410-02	Fendering	L / I
C412	849-C412-01	Equipment Number Calculation	R
C412	849-C412-02	Anchor Handling Arrangement	L / I
C415	849-C415-01	Doors	L / I
C415	849-C415-02	Windows & Portlights	L / I
C415	849-C415-03	Hatches & Manholes	L / I
C420	849-C420-01	Mooring Arrangement	L / I
C420	849-C420-02	Deck Fittings	L / I
C420	849-C420-03	Deck Fitting & Support Structure Calculations	R
C425	849-C425-01	Walkways, Railings, Floor Plates, And Gratings	L / I
C425	849-C425-02	Walkways, Floor Plates And Gratings Calculations	R
C427	849-C427-01	Vertical And Inclined Ladders	L / I
C430	849-C430-01	Deck Coverings and Floor Systems	L / I
C435	849-C435-01	Joinery and Ceilings	L / I
C436	849-C436-01	Insulation and Sheathing	L / I
C437	849-C437-01	Furniture, Furnishings, & Outfitting	L / I
C437	849-C437-02	Furnishings Options	R
C440	849-C440-01	Steward Outfitting Arrangements	L / I

C445	849-C445-01	Lifesaving and Safety	L / I
C445	849-C445-02	Liferaft Stowage Arrangements	L / I
C445	849-C445-XX	Rescue Boat Cradle and Davit	L / A / I
C450	849-C450-01	Boarding Arrangements & Equipment	L / I
C450	849-C450-02	Brow Construction	L / I
C455	849-C455-01	Deck Crane	L / I
C455	849-C455-02	Stores Cranes	L / I
C455	849-C455-03	Overhead Hoists	L / I
C456	849-C456-01	Capstans, Winches and Windlasses	L / I
C460	849-C460-01	Draft Marks	L / I
C460	849-C460-02	Hull Markings	L / I
C460	849-C460-03	Launch Markings	L / I
C460	849-C460-04	Stack Insignia	L / I
C480	849-C480-01	Television Antenna System	L / I
C498	849-C498-01	Forward Looking Sonar Installation	L / I
C498	849-C498-02	Sonar Arrangement and Details	L / I
C498	849-C498-03	Integrated Forward-Looking System	L / I
C502	849-C502-01	Production Calculation	R
C502	849-C502-02	Lifetime Calculation	R
C502	849-C502-03	Dredge Pipe Arrangement	L / A / I
C502	849-C502-04	Dredge Pipe Diagram	MS
C502	849-C502-05	Jet Water Pipe Arrangement	L / A / I
C502	849-C502-06	Jet Water Pipe Diagram	MS
C504	849-C504-01	Pump Curve Dredge Pumps	R
C504	849-C504-02	General Arrangement Drawing of Pumps	L / A / I
C504	849-C504-03	Material Specification of Wear Parts	R
C504	849-C504-04	Pump Part Dimensions	D

C504	849-C504-05	Dredge Pump Shaft Seal Specification	R
C504	849-C504-06	Dredge Pump Shaft Seal Assembly Drawing	AS
C504	849-C504-07	Manual for Maintenance	R
C505	849-C505-01	Dredge Pump Flushing System Diagram	MS
C505	849-C505-02	Dredge Pump Flushing System Calculations	R
C505	849-C505-03	Pump Flushing System Arrangement and Details	L / I
C506	849-C506-01	Dredge Pump Drive System Arrangement	L / A / I
C506	849-C506-02	Pump Characteristic For Drive and Pump Combination	R
C506	849-C506-03	Technical Manual Dredge Pump Drive	R
C508	849-C508-01	Dragarm Handling Arrangement	L / A / I
C508	849-C508-02	Winches Arrangement Drawing	L / A / I
C508	849-C508-03	Gearboxes Arrangement Drawing	L / A / I
C508	849-C508-04	Gearboxes Assembly Drawing	AS
C508	849-C508-05	Winches Hydraulic Diagram	MS
C508	849-C508-06	Gearbox Calculations	R
C508	849-C508-07	Winches Calculation Report	R
C508	849-C508-08	Sliding Piece Assembly Drawing	AS
C508	849-C508-09	Suction Tube Hoisting Arrangement	L / A / I
C508	849-C508-10	Gantries Arrangement	L / A / I
C508	849-C508-11	Gantries Calculation Report	R
C508	849-C508-12	Drag Head Gantry Assembly	AS
C508	849-C508-13	Intermediate Gantry Arrangement Drawing	L / A / I
C508	849-C508-14	Intermediate Gantry Assembly	AS
C508	849-C508-15	Trunnion Gantry Arrangement Drawing	L / A / I
C508	849-C508-16	Trunnion Gantry Assembly	AS
C508	849-C508-17	Gantry Sheaves Assembly Drawing	AS
C508	849-C508-18	Gantry Cylinders Arrangement Drawing	L / A / I

C508	849-C508-19	Gantry Cylinders Assembly Drawing	AS
C508	849-C508-20	Gantry Cylinders Hydraulic Diagram	MS
C510	849-C510-01	Suction Tube Arrangement Drawing	L / A / I
C510	849-C510-02	Suction Tube Assembly Drawing	AS
C510	849-C510-03	Sliding Piece Assembly Drawing	AS
C510	849-C510-04	Turning Gland Assembly Drawing	AS
C510	849-C510-05	Gimbal Joints Assembly Drawing	AS
C510	849-C510-06	Jet Water Pipe on Suction Tube Arrangement Drawing	L / A / I
C510	849-C510-07	Suction Tube Calculation Report	R
C511	849-C511-01	Draghead Arrangement Drawing	L / A / I
C511	849-C511-02	TED Visor Specifications	L / A / I
C512	849-C512-01	Dredge Pipe Diagram	MS
C512	849-C512-02	Dredge Pipe Arrangement	L / A / I
C512	849-C512-03	Turtle Inspection Baskets	L / A / I
C514	849-C514-01	Hopper Door Arrangement	L / A / I
C514	849-C514-XX	Technical Manual Bottom Doors	R
C516	849-C516-01	Overflow Arrangement	L / A / I
C516	849-C516-02	Anti-Turbidity Valve	L / A / I
C516	849-C516-03	Technical Manual Overflow	R
C517	849-C517-01	Jetting Water Diagram	MS
C517	849-C517-02	Jetting Water Arrangement to Dragarm	L / A / I
C517	849-C517-03	Jetting Water Arrangement to Hopper	L / A / I
C517	849-C517-04	Jetting System Calculation	R
C517	849-C517-05	Hopper Flushing System Arrangement	L / A / I
C517	849-C517-06	Hopper Flushing System Calculations	R
C518	849-C518-01	Jetting Pump Assembly Drawing	AS
C518	849-C518-02	Hopper Flushing Pump Assembly Drawing	AS

C519	849-C519-01	Jetting Pump Drive Arrangement	L / A / I
C519	849-C519-02	Jetting Pump Drive Assembly Drawing	AS
C519	849-C519-03	Jetting Pump Drive Gearbox Assembly Drawing	AS
C520	849-C520-01	Hopper Collection System Calculation Report	R
C520	849-C520-02	Hopper Collection System Arrangement	L / A / I
C520	849-C520-03	Assembly Drawing Hopper Collection System	AS
C522	849-C522-01	Swell Compensator Arrangement Drawing	L / A / I
C522	849-C522-02	Swell Compensator Cylinder Assembly Drawing	AS
C522	849-C522-03	Swell Compensator Sheaves Assembly Drawing	AS
C522	849-C522-04	Swell Compensator Hydraulic Diagram	MS
C523	849-C523-01	Bow Connection Arrangement	L / A / I
C523	849-C523-02	Bow Connection Assembly Drawing	AS
C523	849-C523-03	Bow Connection Winch Assembly Drawing	AS
C523	849-C523-04	Bow Connection Clamping Device Assembly Drawing	AS
C524	849-C524-01	Software Mock-Up	EFB
C524	849-C524-02	Control Consoles/ Panel Layout	L / A
C524	849-C524-03	Dredge Plant Instrumentation Plan	L / A
C525	849-C525-XX	Assembly drawing of each type of gate valve	AS
C526	849-C526-01	Poor Mixture Overboard Arrangement	L / A / I
C601	849-C601-01	Pipe Marking Guide	R
C601	849-C601-02	Piping Specification	R
C602	849-C602-XX	Diagrams of all integrated engine systems	MS
C605	849-C605-01	Propulsion Drive System Arrangement and Installation Details	L / I
C605	849-C605-02	Torsional Vibration Analysis	R
C605	849-C605-03	Axial Vibration Analysis	R
C605	849-C605-04	Whirling Vibration Analysis	R
C605	849-C605-XX	Electrical and Mechanical diagrams of all integrated drive systems	MS / EFB

C606	849-C606-01	Propeller Calculations	R
C606	849-C606-02	Propellers	D
C606	849-C606-03	Nozzles	D
C608	849-C608-01	Propulsion Control System Schematic	EFB / EOL
C608	849-C608-02	DP/DT Capability Analysis Report	R
C610	849-C610-01	Shafting And Sealing System Schematic	MS
C610	849-C610-02	Propeller And Shafting Removal	L / I
C612	849-C612-01	Rudder and Rudder Stock Arrangement	L / I
C612	849-C612-02	Rudder and Rudder Stock Calculations	R
C615	849-C615-01	Steering Control System Diagram	EFB / EOL
C615	849-C615-XX	Steering Gear Assembly/Component Drawings	AS
C620	849-C620-01	Bow Thruster Arrangement	L / I
C630	849-C630-01	Fuel Oil System Diagram	MS
C630	849-C630-02	Fuel Oil System Calculations	R
C630	849-C630-03	Fuel Oil System Arrangement and Details	L / I
C635	849-C635-01	Service Oil Systems Diagram	MS
C635	849-C635-02	Service Oil Systems Calculations	R
C635	849-C635-03	Service Oil Systems Arrangement and Details	L / I
C637	849-C637-01	Waste Oil System Diagram	MS
C637	849-C637-02	Waste Oil System Calculations	R
C637	849-C637-03	Waste Oil System Arrangement and Details	L / I
C640	849-C640-01	Engine, Auxiliary, & Generator Cooling Systems	MS
C640	849-C640-02	Auxiliary Cooling Pump Calculations	R
C640	849-C640-03	Box Cooler Sizing & Calculations	R
C640	849-C640-04	Box Cooler Arrangements and Details	L / I
C645	849-C645-01	Raw Water System Diagram	MS
C645	849-C645-02	Raw Water System Calculations	R

C645	849-C645-03	Raw Water System Arrangement	L / I
C650	849-C650-01	Engine and Generator Exhaust Systems Diagram	MS
C650	849-C650-02	Engine and Generator Exhaust Systems Calculations	R
C650	849-C650-03	Engine and Generator Exhaust Systems Arrangement and Details	L / I
C655	849-C655-01	Hydraulic System Description	R
C655	849-C655-02	Hydraulic System Functional Block Diagram	EFB / EOL
C655	849-C655-03	Hydraulic System Functional Description	R
C655	849-C655-04	Hydraulic System Calculations	R
C655	849-C655-05	Hydraulic System Arrangement and Details	L / I
C660	849-C660-01	Main Bilge System Diagram	MS
C660	849-C660-02	Ballast System	MS
C660	849-C660-03	Main Bilge System Calculations	R
C660	849-C660-04	Ballast System Calculations	R
C660	849-C660-05	Main Bilge System Arrangement	L / I
C660	849-C660-06	Ballast System Arrangement and Details	L / I
C660	849-C660-07	Ballast Water Management Plan	R
C662	849-C662-01	Oily Bilge System Diagram	MS
C662	849-C662-02	Oily Bilge System Calculations	R
C662	849-C662-03	Oily Bilge System Arrangement and Details	L / I
C665	849-C665-01	Potable Water System Diagram	MS
C665	849-C665-02	Potable Water System Calculations	R
C665	849-C665-03	Potable Water System Arrangement and Details	L / I
C667	849-C667-01	Sanitary, Sewage & Greywater System	MS
C667	849-C667-02	Sanitary, Sewage & Greywater Calculations	R
C667	849-C667-03	Sanitary, Sewage & Greywater System Arrangement and Details	L / I
C669	849-C669-01	Drainage System Arrangement and Details	MS
C670	849-C670-01	Vents, Sounds, Fills, & Overflows Diagram	L / I

C670	849-C670-02	Vents, Sounds, Fills, & Overflows Calculations	MS
C670	849-C670-03	Vents, Sounds, Fills, & Overflows Arrangement and Details	R
C675	849-C675-01	Fire Main System Diagram	L / I
C675	849-C675-02	Fire Main System Calculations	MS
C675	849-C675-03	Fire Main System Arrangement and Details	R
C677	849-C677-01	Fixed Fire Extinguishing System Diagram	L / I
C677	849-C677-02	Fixed Fire Extinguishing System Calculations	MS
C677	849-C677-03	Fixed Fire Extinguishing System Arrangement and Details	R
C678	849-C678-01	Fire Detection & Alarm System	L / I
C679	849-C679-01	Fire and Safety Plan	L / I
C685	849-C685-01	HVAC System Diagram	L / I
C685	849-C685-02	Machinery Spaces Ventilation System Arrangement and Details	MS
C685	849-C685-03	Accommodation And Bridge HVAC System Arrangement and Details	L / I
C685	849-C685-04	Deckhouse Heating & Cooling Load Calculations	L / I
C685	849-C685-05	Machinery Space Heating & Ventilation Load Calculations	R
C685	849-C685-06	Deckhouse Air Conditioning Duct Pressure Loss Calculations	R
C685	849-C685-07	Machinery Spaces Ventilation System Duct Pressure Loss Calculations	R
C687	849-C687-01	Chilled Water System Diagram	R
C687	849-C687-02	Chilled Water System Calculations	MS
C687	849-C687-03	Ship Service Refrigeration Diagram	R
C687	849-C687-04	Ship Service Refrigeration Calculations	MS
C690	849-C690-01	Compressed Air System Diagram	R
C690	849-C690-02	Compressed Air System Calculations	MS
C690	849-C690-03	Compressed Air System Arrangement and Details	R
C710	849-C710-01	Load Analysis (AC)	L / I
C710	849-C710-02	Load Analysis (DC)	R
C715	849-C715-01	Fault Current Analysis	R

C715	849-C715-02	Protective Device Coordination Study	R
C715	849-C715-03	Electrical Equipment Arrangement	R
C715	849-C715-04	Arc Flash Analysis	L / I
C715	849-C715-05	Electrical Equipment Hazardous Area Plan	R
C720	849-C720-01	Electrical System One Line Diagram (AC)	L / I
C720	849-C720-02	Electrical System One Line Diagram (DC)	EOL
C725	849-C725-01	Cable Schedule & Voltage Drop (AC)	EOL
C725	849-C725-02	Cable Schedule & Voltage Drop (DC)	R
C725	849-C725-03	Cable Schedule & Voltage Drop (EM Lighting)	R
C725	849-C725-04	Cable Routing And Management Plan	R
C730	849-C730-01	General Lighting Plan And Lighting Calculations	L / I
C730	849-C730-02	Emergency Lighting Plan	R
C730	849-C730-03	Receptacle Plan	L / I / EOL
C730	849-C730-04	Navigation Lights	L / I / EOL
C740	849-C740-01	Switchboard Arrangement & Details	L / I / EOL
C745	849-C745-01	Panelboards Arrangement and Details	L / I
C760	849-C760-01	Shore Power Details	L / I
C765	849-C765-01	Interior Communication System	L / I / EOL
C765	849-C765-02	External Communication Systems	L / I
C770	849-C770-01	Navigation Equipment Overview	L / I
C770	849-C770-02	RF System Design Study	R
C770	849-C770-03	Antenna Arrangement	R
C780	849-C780-01	Integrated Machinery Alarm & Monitoring System Block and Wiring	L / I
C780	849-C780-02	I/O List Integrated Machinery Alarm & Monitoring System	EFB
C780	849-C780-03	Integrated Machinery Alarm & Monitoring System Arrangement and Details	R
C780	849-C780-04	Bilge Alarm System	L / I / EOL
C780	849-C780-05	Watertight Door Indication & Alarm System	L / I

C780	849-C780-06	Auxiliary Systems Alarm & Control System	L / I
C780	849-C780-07	Tank Level Indication System	L / I
C800	849-C800-01	Spare Parts List	L / I

The following drawings shall be developed for the Launch Vessel as described in Contract Section C Paragraph C446.

Contract Section	**Drawing**	**Title**	**Type**
C446	872-C105-01	Lines Plan	L / A
C446	872-C125-01	Curves of Form	L / A
C446	872-C140-01	Curve of Allowable Deck Cargo vs Draft	L / A
C446	872-C150-01	Damaged Stability Analysis	R
C446	872-C155-01	Intact Stability Analysis	R
C446	872-C205-01	Outboard Profile	L / A
C446	872-C215-01	General Arrangement	L / A
C446	872-C305-01	Scantling Plans	L / I
C446	872-C398-01	Launch Cradle (Land-Based)	L / I
C446	872-C455-01	Launch Lifting and Rigging Plan	L / I
C446	872-C455-02	Launch Davit and Cradle	L / I
C446	872-C610-01	Shaft, Stern Tube, and Shaft Bearing Arrangement and Details	L / I
C446	872-C615-01	Rudder and Steering Linkage Arrangement and Details	L / I
C446	872-C615-02	Steering System Hydraulic Schematic	MS
C446	872-C630-01	Fuel Oil System Schematic	MS
C446	872-C650-01	Exhaust System Schematic	MS
C446	872-C660-01	Bilge System Schematic	MS
C446	872-C705-01	Electrical System Schematic	EOL
C446	872-C780-01	Fire and Bilge Alarm System	L / I / EOL

Note – in addition to the lists above, any drawings requiring update due to equipment or material substitutions as described in H15 shall also be submitted for approval during Phase II.

The Contractor shall provide the following drawings/calculations during Item 0001AC Phase III of the contract (see respective Contract Section for specific requirements):

PHASE III

Drawings to Be Developed:

Contract Section	**Drawing**	**Title**	**Type**
C099	849-D099-01	Design Compendium	R
C180	849-D180-01	Noise & Vibration Survey	R

As-Built Drawings:

See Contract Section H14.

H13 TECHNICAL DATA

The Government has determined its minimum needs for this acquisition shall include:

a. License of the technical data provided under this contract is for the purpose of only maintaining, repairing and modifying the vessel, systems, equipment, and hull for the entire in-service life of the vessel. The Government shall not use the technical data to manufacture additional hopper dredge vessels.

b. The Government shall have unlimited rights, in all drawings, designs, specifications, notes and other works developed in the performance of this Contract, including the right to use same on any other Government design or construction to upkeep the vessel as outlined in sub-paragraph H13 (a) above without additional compensation to the Contractor. The Contractor hereby grants to the Government a paid-up license throughout the world to all such works to which he may assert or establish any claim under design patent or copyright laws. Any costs associated with furnishing the data license shall be included in 0001AC PHASE III. The Contractor for a period of three (3) years after completion of the project agrees to furnish the original or copies of all such works on the request of the Contracting Officer.

    - The Contractor agrees that the Government, and other persons to whom the Government may have released or disclosed technical data delivered or otherwise furnished under this contract, shall have no liability for any release or disclosure of technical data that are not marked to indicate that such data are licensed data subject to use, modification, reproduction, release, performance, display, or disclosure restrictions.

    - In other Governmental work outside of this contract to upkeep the vessel, the United States Government will provide in any contract or purchase order for such purposes that the party receiving the data will use the data only for the purposes described in sub-paragraph H13 (a) above and the receiving party will return the data to the United States Government when the work under the contract or purchase order has been completed.

c. The Government shall not have rights to proprietary or copyrighted data, designs, notes, and other works developed outside of the performance of this contract. If the Government desires to obtain additional rights in technical data, the Contractor agrees to promptly enter negotiations with the Contracting Officer to determine whether there are acceptable terms for transferring or allowing access to such rights. All technical data in which the Contractor has granted the Government additional rights shall be listed or described in a special license agreement made part of this contract. The license shall enumerate the additional rights granted the Government in such data.

d. In reference to data not first produced in the performance of this contract, The Contractor shall not, without prior written permission of the Contracting Officer, incorporate in data delivered under this contract any data not first produced in the performance of this contract and that contain the copyright notice of 17 U.S.C. 401 or 402, unless the Contractor identifies such data and grants to the Government, or acquires on its behalf, a license of the same scope. The use of this data shall only be for the purposes outlined in sub-paragraph H13 (a) above.

e. At some time during the contract, the Contractor may require entering into a non-disclosure agreement directly with the Government, so that the Government may evaluate the contractor's use of copyrighted and / or proprietary data. In such an event, a non-disclosure agreement shall be placed to address the restrictions and use of said data. The Contractor shall inform the Government of this requirement no later than 30 days after NTP for Phase II.

f. Where there are valid reasons why an Offeror must develop entirely at private expense or provide previously developed technical data under this contract, the Offeror may not be required, either as a condition of being responsible to this Solicitation or as a condition for award to sell or otherwise relinquish to the Government any proprietary rights in technical data or computer software developed at private expense, except for items identified at DFARS 227.7103-5(a)(2) and (a)(4) through (a)(9), DFARS 227.7203-5(a)(3) through (6) and DFARS 227.7102-1.

H14 "AS-BUILT" DRAWINGS

The Contractor shall update the contract drawings as required to reflect the as-built condition. In addition any drawings developed by the Contractor shall be updated to reflect the final as-built condition. As-built drawings shall be designated by changing the MDC drawing number from a B or C version to a D version. For example, drawing 849-C205-01 would be designated as as-built drawing 849-D205-01.

The as-built drawings for the dredge shall be delivered as follows:

1. Prior to Final Inspection, the Contractor shall submit one set of prints (hard copy) and electronic copies of the as-built drawings of the dredge and spuds for review and approval.

2. Prior to Final Acceptance, the Contractor shall provide the following:

    a. Two full size, hard-copy (paper) sets of black or blue line prints of all as-built" drawings for the dredge.
    b. Two sets of electronic as-built drawings for the dredge.

Electronic files shall be either emailed or uploaded to the Government File Share Site ARL SAFE at https://safe.arl.army.mil/

H15 SUBSTITUTIONS

NOT USED.

H16 MANUFACTURER OR SUBCONTRACTOR DRAWINGS AND MANUALS

The Contractor shall provide four complete sets of drawings and manuals and four electronic (DVD/CD) sets for each piece of machinery and equipment provided by the Contractor; that clearly describe the operation, construction, maintenance, repair, adjustment, lubrication, parts lists and "trouble shooting" of every item of machinery and equipment. This shall include Detailed Fabrication Drawings where they exist.

Manuals shall be in the English language with all dimensions in the foot-pound-second systems of units. Manuals shall be no larger than 8 inches x 11 inches, and bound in hard covers of durable materials.

Manufacturer or subcontractors' drawings may be included in the manual but must be folded to page size.

At least 15 days prior to Final Inspection of the vessel, one set of the manuals shall be submitted to the Contracting Officer's Representative for review, comment and/or approval. This set of manuals will be returned to the Contractor with approval or comments. Final submittal of the manuals shall consist of three sets of the manuals and electronic versions of the manuals shall be completed prior to Final Acceptance of the vessel.

If photocopies (Xerox or similar) of parts lists, text, diagrams, etc., are furnished, one of the sets shall be a "Master" and must be made up of all "original" sheets and be clearly identified as the "Master" copy. Photocopies will be clear with high black/white contrast, sharp lines, full sheet reproduction, and no background shadow or clutter.

Where catalog "cut-sheets" are provided, all information not pertinent to the equipment or machinery provided shall be omitted.

H17 OPERATOR'S MANUAL

The Contractor shall prepare and furnish Vessel Operator's Manual(s). The manual(s) shall be a guide to the operation, maintenance, and utilization of the various systems on the vessel and the vessel itself. In addition to the Vessel Operator's Manual for all of the systems and equipment onboard, the Contractor shall prepare separate manuals for the following integrated systems:

- Propulsion System
- Electrical Generation System
- Dredging System
- Alarm, monitoring, control, and automation systems
- Planned Maintenance System**

Each manual shall be arranged such that an operator can get a thorough overview and understanding of a system and its operation, with specific steps and guidelines to clearly affect system actuation, control, monitoring, troubleshooting, adjustment, startup and shutdown.

Each manual for the alarm, monitoring, control, and automation systems shall include identification and explanation of I/O points as presented on screens, a troubleshooting guide to cover a range of possible failures, block and wiring diagram of the system (drawing 849-C780-01), cable connection guide, and backup copies of custom software and configuration files (three (3) optical media backups).

Each manual shall also include specific maintenance instructions for each system, and item of equipment as a supplement to the manufacturer's manuals.

Each manual shall include a description and procedures for each system as installed. Every gauge, meter and indicator shall include interpretive information such as expected parameters and procedures to follow if the information is outside the specified parameters. Information specific installation (OEM) shall be captured, including but not limited to fluid types, capacities, filters, special required tools and supplies.

References to manufacturer's manuals shall be included, but it is not the intent to "Cut and Paste" from manufacturer's manuals. In all cases where the manufacturer's manual describes options, the operator's manual shall describe/identify the options installed.

Each manual shall also include specific maintenance schedule matrix and instructions for each system, and item of equipment.

Each manual shall contain simplified and reduced size arrangement and schematic and/or diagrammatic-on-arrangement drawings of each system.

The language and level of detail for the operating, monitoring, maintenance, and troubleshooting procedures shall be targeted to a professional mariner crew.

Each manual shall be bound in hard cover binders of a durable material.

**The planned maintenance system shall support the Government operators to plan, perform, and document vessel maintenance at intervals complying with Class and manufacturer requirements. The objective is to ensure safe and reliable vessel operations, including equipment, in addition to compliance with all applicable regulations. A systematic approach to maintenance will be based on risk assessment and begins with the establishment of a complete database of machinery, equipment, and fittings. The system must address both planned and unplanned maintenance, defect reporting, and technical asset and data management. A planned maintenance system streamlines the planning, documentation and implementation of maintenance work and surveys onboard ship.

The Government will be building out its planned maintenance system using the USACE Facility Equipment Maintenance (FEM) Program. The Contractor shall support this effort by providing timely information to the Government regarding purchased equipment. Information shall include, but not limited to, purchase orders, vendor/manufacturer information, equipment make/model/serial numbers, equipment manuals and vendor contacts. This information shall be provided on a monthly basis.

At least 15 day prior to Level 3 Dock Trial of the vessel, one set of the manuals shall be submitted to the Contracting Officer's Representative for review, comment and/or approval. This set of manuals will be returned to the Contractor with approval or comments. Final submittal of the manuals shall consist of three sets of the manuals and electronic versions of the manuals shall be completed prior to Final Acceptance of the vessel. One copy shall be the "Master" copy and shall contain the original typed or reproducible version of the manual. An electronic copy of the "Master" shall be provided. The electronic copy shall be in .pdf and also include editable files for the future updates.

H18 RECORD PHOTOGRAPHS

A. CONSTRUCTION PROGRESS PHOTOGRAPHS

The Contractor shall provide weekly photographs deliverable in digital format. The photographs shall document the construction progress, the launching, and tests and trials of the vessel.

The photographs shall be in JPG file format of at least SVGA Resolution, 24-bit color depth, and at a compression ratio no greater than 25% (75% Quality).

Approximately 15 or 20 photographs shall be provided weekly. The quantity of photographs shall be commensurate with the level of production.

B. FINAL PHOTOGRAPHS

The Contractor shall furnish the services of a professional photographer to take digital color photographs upon completion of the vessel, as described below:

Exterior shots (not less than 20 shots of the vessel shall be taken) shall include:

- Each side
- Each end
- Port and Starboard 3/4 views (end-on)
- Elevated 3/4 views
- Action shots of the launching

Interior shots shall be provided from various angles (4 minimum) for each space/compartment documenting equipment, outfitting, and layout.

The Contractor shall provide the digital files for each shot. The camera to be used shall be a Professional Grade DSLR or Full Frame Mirrorless with a minimum of 24 MP.

The Contracting Officer Representative will select two shots of the vessel. The Contractor shall have the selected shots custom printed in 11" x 14" size by Cibachrome process, mounted, double matted and framed under clear glass in suitable wooden frame. Three sets of these pictures shall be furnished to the Contracting Officer's Representative (total of six matted & framed color photographs).

C. SCALE MODEL

The Contractor shall provide one (1) scale model of the Medium-Class Hopper Dredge, scale 1/4"=1'0" in display cases with bases. Each model shall include all deck machinery and external outfitting such as dragarms, railings, ladders and companionways, rescue and launch boat, hopper distribution piping and overflow weirs, walkways, davits and masts. During Phase III the Government will provide further information on the specific arrangements of the model, including any internal views of the dredge. A nameplate shall be provided on each model, identifying the vessel as identified in Contract Section C Paragraph C006. Upon selection of the official name for the vessel, the Contractor shall update the nameplate to incorporate this.

H19 GOVERNMENT PROPERTY

All Government-Furnished Equipment and equipment for which the Government has made payment or partial payment shall be considered Government Property.

The Contractor shall accept all risk for Government property in his possession.

All Government Property shall be stored in enclosed, weather tight secure, warehouse buildings. Security shall consist of restricted access, locked and fenced storage. Warehouse buildings shall be heated above freezing and ventilated to prevent condensation or sweating.

H20 PROGRESS PAYMENT BASED ON PERCENTAGE OR STAGE OF COMPLETION

The Government shall pay the Contractor the contract price as provided in this contract.

The Government shall make progress payments monthly as the work proceeds, or at more frequent intervals as determined by the Contracting Officer, on estimates of work accomplished which meets standards of quality established under the contract, as accepted by the Contracting Officer. If requested by the Contracting Officer, the Contractor shall furnish a breakdown of the total contract price showing the amount included therein for each principal category of work, in such detail as requested, to provide a basis for determining progress payments. In the preparation of estimates, the Contracting Officer may authorize payment for material delivered to the site and at locations other than the site may also be taken into consideration if:

- Consideration is specifically authorized by this contract; and
- The Contractor furnishes satisfactory evidence that it has acquired title to such material and that the material will be used to perform this contract.

If the Contracting Officer finds that satisfactory progress was achieved during any period for which progress payment is to be made, the Contracting Officer shall authorize payment to be made in full. However, if satisfactory progress has not been made, the Contracting Officer may retain a maximum of fifteen percent (15%) of the amount of the payment until satisfactory progress is achieved. When the work is substantially complete, the Contracting Officer

may retain from previously withheld funds and future progress payments that amount the Contracting Officer considers adequate for protection of the Government and shall release to the Contractor all remaining withheld funds.

All material and work covered by progress payments made shall, at the time of payment, become the sole property of the Government, but this shall not be considered as:

- Relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work; or

- Waiving the right of the Government to require the fulfillment of all of the terms of the contract.

In making these progress payments, the Government shall, upon request, reimburse the Contractor for the amount of premiums paid for performance and payment bonds (including co-insurance and reinsurance agreements, when applicable) after the Contractor has furnished evidence of full payment to the surety. The retainage provision preceding shall not apply to that portion of progress payments attributed to bond premiums.

The Government shall pay the amount due the Contractor under this contract after:

- Completion and acceptance of all work; and

- Presentation of a properly executed voucher.

Notwithstanding any other provision of this contract, progress payments shall not exceed eighty percent (80%) on work accomplished on undefinitized contract actions. A "contract action" is any action resulting in a contract as defined in FAR Subpart 2.1, including contract modifications for additional supplies or services, but not including contract modifications that are within the scope and under the terms of the contract, such as contract modifications issued pursuant to the Changes Clause, or funding and other administrative changes.

H21 PROJECT MEETINGS

Fluid communication is paramount to the success of this contract. To help ensure sound communication between the Government, contractor, subcontractors, customer, and key stakeholders regularly occurring meetings shall be instituted for this project. The meetings listed below shall be part of the project execution (LOCATION):

- Planning Phase Kickoff meeting (Shipyard)
- Design Phase Kickoff meeting (Designer of Record Location)
- Construction Phase Kickoff meeting (Shipyard)
- Testing & Trials Phase Kickoff meeting (Shipyard)
- Project Closeout meeting (Shipyard)
- Weekly planning phase meetings (Virtual)
- Weekly design phase meetings (Virtual)
- Weekly construction/ production/ Supply chain meetings (Shipyard/Virtual)
- Safety meetings per Contractor Safety Plan (Shipyard)
- Monthly project and schedule overview meetings (Shipyard/Virtual)
- Ad hoc Contract modification meetings (Shipyard/Virtual)
- Ad hoc Customer, Leadership, and Key stakeholder meetings (Shipyard/Virtual)
- Ad hoc meetings to address evolving issues, lessons learned, and coordination (Shipyard/Virtual)
- Meetings outlined in other specification sections (Shipyard/Virtual)

DOCUMENTS EXHIBITS AND OTHER
Section J – List of Documents Exhibits and Other Attachments

J01 CONTRACT DRAWINGS & DOCUMENTS

The following contract drawings and documents shall form a part of this solicitation. All drawings will be provided to the successful bidder in electronic file form.

Drawing Number	Title
849-B406-01	MDC STANDARD PAINT SCHEDULE
849-B601-01	PIPE MARKING GUIDE

J02 REFERENCE DRAWINGS

The following reference drawings shall form a part of this solicitation. All drawings will be provided to the successful bidder in electronic file form.

Drawing Number	Title
656-B460-01	COMMUNICATIONS MARK
N/A	DEFLECTOR DRAWING
N/A	DEFLECTOR INSPECTION CHECKLIST

J03 NOT USED

J04 PERFORMANCE EVALUATION FOR SERVICE & SUPPLY CONTRACTS

In accordance with FAR 42.15, AFAR 42.15, and Army Acquisition Letter 98-1, this contract action is subject to the requirement for Contractor performance evaluation in the elements listed on the attached form.

At a minimum, the performance evaluation shall be completed within 45 days of completion of each year's performance. Additional (Interim) evaluations may be prepared if any element listed is being performed unsatisfactorily.

The period of evaluation will begin on the date of acknowledgment of receipt of the Notice to Proceed and will run concurrent with the performance period of the contract.

The Contractor shall be provided sixty (60) days to submit comments, rebut statements, or provide additional information before the final performance evaluation is issued. This period may be shortened if an interim unsatisfactory evaluation is being contemplated and time does not allow for a full sixty (60) days.

The Contractor may appeal a final performance evaluation to the Commander of the Contracting Activity. The appeal must be made within sixty (60) days, and must be a written request to the Contracting Officer stating the reasons why a further review of their performance evaluation is justified, and the circumstances which may be cause the Government to revise its performance rating. Interim evaluations are not subject to appeal.

CONTRACT ADMINISTRATION
Contract Administration

1. Contract Administration is retained by the Contracting Officer:

U.S. Army Engineer District, Philadelphia
Attn: CENAP-CT
Wanamaker Building, Room 643
100 Penn Square East
Philadelphia, Pennsylvania 19107-3390

Telephone: (215) 656 - 6924

2. Contract Management will be performed by the Marine Design Center:

Correspondence and Invoices shall be forwarded to:

U.S. Army Corps of Engineers
Attn: CEMDC (Michelle Bertoline, COR)
Wanamaker Building, Room 630 South
100 Penn Square East
Philadelphia, Pennsylvania 19107-3391

Telephone: (215) 656 - 6850

Note: The Marine Design Center is the "Designated Billing Office".

An ENG Form 93 shall be submitted for all progress payments to Michelle.J.Bertoline@usace.army.mil and copy to Sharon.R.Campolongo@usace.army.mil. There is no requirement as to the frequency of progress payments, however when progress payments are submitted they shall be submitted between the 1st and 10th of the month.

3. After approval of the payment by the Marine Design Center, payment will be processed by:

U.S. Army Corps of Engineers Finance Center
5720 Integrity Drive
Millington, TN 38054-5005

4. Accounting and Appropriation Data: To be furnished at time of award.

INSTRUCTION TO OFFERORS

SECTION L
INSTRUCTIONS, CONDITIONS, AND NOTICES TO OFFERORS

1. INTRODUCTION

The Offeror's proposal shall be submitted electronically, as described below.
INSTRUCTIONS FOR SUBMITTING ELECTRONIC PROPOSALS:

DOD SAFE: To reduce paperwork and cost, **all proposals** shall be submitted electronically through the SAFE site using the following link:

https://safe.apps.mil/

Instructions for the SAFE website appear below.

UPLOAD LINK: Offerors must email Contract Specialist Michael Hunter at Michael.J.Hunter@usace.army.mil, AND Contracting Officer Robert Hutcheon at Robert.W.Hutcheon@usace.army.mil **no later than five (5) working days prior to the proposal due date** to receive a request code which will allow for file uploads via the SAFE site. **The code will expire 14 days after the Contract Specialist or Contracting Officer sends the code via the SAFE site**. Offerors that fail to email to request a code five (5) working days before proposal submission date may not be able to receive a request code in time to upload their submission.

ADDRESSING PROPOSALS: Please send proposals using the link above to Contract Specialist Michael Hunter at Michael.J.Hunter@usace.army.mil, and to Contracting Officer Robert Hutcheon at Robert.W.Hutcheon@usace.army.mil.

FILE SUBMISSION: You are limited to a maximum of five (5) files per upload (total size cannot exceed 2GB). If you have too many files, the Government recommends that you combine or ZIP your files before uploading to the SAFE site. Offerors may use compression utility software such as WinZip or PKZip to reduce file size and facilitate transmission. All submissions shall be grouped by volume.

FILE DESCRIPTION: Include a "File Description" for each file(s) you upload. The "File Description" will be included in the email notice to each of the recipients you choose to have access your file(s). NOTE: Do NOT enter Privacy Act Data (Personal Identification Information (PII)) in the File Description.) The Offeror's proposal shall not contain classified data. The use of hyperlinks in proposals is prohibited. Content provided in hyperlinks will not be used in the evaluation process described herein.

NOTE: The only authorized transmission method for proposals in response to this solicitation is via electronic upload to the DOD SAFE website provided above. NO OTHER TRANSMISSION METHODS (EMAIL, FACSIMILE, REGULAR MAIL, HAND CARRIED, ETC) WILL BE ACCEPTED. The DOD SAFE user guide will be provided for prospective Offeror's convenience in the solicitation announcement on Sam.gov.

It is the Offeror's responsibility to ensure that their full proposal is received by the Government in the DOD SAFE system by the date/time specified in the solicitation.

INSTRUCTIONS TO FOLLOW ON THE DoD SAFE WEBSITE:

1. Once at the SAFE website select the "Drop-off" icon. Offerors should access the DoD SAFE site as a guest.

2. After selecting the "Click Here" link you will be prompted to add your personal information, file information, recipient (Government representatives identified above) information and email settings.

3. When completing your file information for transmittal via the SAFE website, you will be required to enter the email address for all recipients. For this solicitation, the recipients are the Contract Specialists and the Contracting Officer. The Contract Specialist for this solicitation is mailto:Michael.J.Hunter@usace.army.mil. The Contracting Officer is Robert.W.Hutcheon@usace.army.mil. The email address of the Government Employee who initiated the request code will be automatically entered. The Offeror must enter the E-Mail address for both the Contracting Officer and Specialists. The Offeror can enter an additional E-Mail address if desired. After entering the email address, click the ADD button to add the person(s) email to the "Recipients List" of your proposal. When your proposal is submitted, a notification will be sent to the recipients you added.

NOTE: Drop-Off File button should only be used after all proposal submission files are uploaded. SAFE codes and links will expire once Drop off is completed. Do NOT send the SAFE site packages to group email accounts.

Even if you successfully upload your proposal to the SAFE site, notification will not be sent to the Government recipients until you verify your email address. Entering an incorrect email may result in the rejection of your submission for lateness. An Offeror can confirm proper submission by the 'Drop-Off Completed" screen which generates based on proper file submission.

NOTE: It has been reported that documents are more quickly uploaded into the SAFE website when using a Firefox web browser. The Government cannot verify that this is true and offers no guarantee that Offerors will have more success utilizing any particular browser.

RECEIPT OF SUBMISSIONS: For the purposes of establishing whether a proposal submission is considered timely, the government uses the date and time when the submission is completely uploaded and submitted to the Government on the SAFE website. Following submission on the SAFE system, an automated email will be generated for the Government and Offeror with the date and time of submission. Upon complete upload the SAFE system issues a date time group notification via email. For proposals larger than the 2GB capacity of the SAFE website and require multiple submissions, the Government will consider the date and time the last submission is completely uploaded into the SAFE website. Do not assume that electronic communication is instantaneous. It can take several minutes or even hours in some cases.

The Government will not be responsible for submissions delivered to any location or to anyone other than those designated to receive proposals. Offerors are responsible for ensuring that proposals are submitted so as to reach the designated recipients. Offerors are responsible for allowing sufficient time for the proposal to be received in accordance with the instructions provided.

2. PROPOSAL SUBMISSION REQUIREMENTS

The offeror's proposal shall consist of four (4) volumes. The volumes are:

- Volume I – Technical (Factors 1, 2, 3)
- Volume II – Past Performance (Factor 4)
- Volume III – Small Business Participation (Factor 5)
- Volume IV – Price (Factor 6)

No cost information shall be included in Volumes I, II and III to allow for a fair and impartial "non-price factor" review.

a. Each volume shall be submitted in digital format. Any pages that are changed (as a result of discussions or proposal revisions) shall be of a different color and shall have changed information clearly marked by a vertical line in the right margin of the page. The revised pages shall be dated. Each volume shall be clearly labeled with its title. Each volume shall be in separate files.

b. Each volume shall be single spaced. Each paragraph shall be separated by at least one blank line. A standard, 12-point minimum font size applies. Arial or Times New Roman fonts are required. Tables and illustrations may use a reduced font size no less than 8-point and may be landscape oriented.
c. The page limits apply to each volume:

Volume Title	Maximum Pages

I – Technical (Factors 1, 2, & 3)	150 total
II – Past Performance (Factor 4)	N/A
III – Small Business Participation (Factor 5)	N/A
IV – Price (Factor 6)	N/A

NOTE: All pages submitted will be counted in the page calculation, except for Past Performance Questionnaires, CPARS records, resumes, drawings, letters of commitment, Joint Venture agreement or other teaming agreement, and catalog cut sheets. Pages that exceed the above noted page limitations will be removed, not read, and will not be evaluated by the Government. Any tables, pump curve charts, calculations, illustrations, or graphics included in the submittal shall be counted towards the total page count.

Offerors are cautioned that ***"parroting"*** of the technical requirements of the specifications with a statement of intent to perform does not reflect an understanding of the requirement or capability to perform. Offerors are responsible for including sufficient details to permit a complete and accurate evaluation of each proposal. Proprietary information shall be clearly marked.

Offerors may submit multiple proposals. All proposals must be complete, clearly identified, and fully independent of any other proposals (self-contained). Each proposal must use its own electronic SAFE submission.

BID BOND SUBMISSION: A bid bond must be received by USACE Contracting Division on or before the proposal due date and time of solicitation closing, or the proposal will be deemed non-responsive. Each proposal shall include a bid bond submission. In the event an Offeror submits more than one proposal, the Offeror shall coordinate with the bonding company to substantiate the requirement and provide the requisite documentation to the Government. Please send bid bonds to the following address:

U.S. Army Corps of Engineers District, Philadelphia
Contracting Division
ATTN: Robert W. Hutcheon
7th Floor, RM 749,
Wanamaker Building
100 Penn Square east
Philadelphia, PA 19107-3390

3. PROPOSAL FILES

a. Format

The submission shall be clearly indexed and logically assembled. Each volume shall be clearly identified and shall begin at the top of a page. All pages of each volume shall be appropriately numbered and identified by the complete company name, date, and RFP solicitation number in the header and/or footer. PDF files shall use the following page setup parameters:

Page Size, Width – 8.5 inches
Page Size, Height – 11 inches

All drawings submitted for review shall be in a readable electronic format.

Page Size, Width – 11inches
Page Size, Height – 17 inches

b. File Packaging

All of the proposal electronic files shall be submitted in PDF format, with the exception of the price worksheets, which shall be submitted in Excel format. All price breakdown information to aid in the price evaluation shall be submitted in Microsoft Office Excel Read/Write format and viewable in Microsoft Excel 2007. CDs, DVD, Zip disks or USB drives are not permitted.

****Please note – Self extracting exe files are <u>not</u> acceptable. **** Also, electronic links to website data are not acceptable; all information must be included in the body of the proposal.

c. <u>Content Requirement</u>

All information shall be confined to the appropriate file. The offeror shall confine submissions to essential matters, sufficient to define the proposal in a concise manner, to permit a complete and accurate evaluation of each proposal. Each file of the proposal shall consist of a Table of Contents, Summary Section, the Narrative discussion, and drawings or catalog literature where appropriate. The Summary Section shall contain a brief abstract of the file. Proprietary information shall be clearly marked.

The information requested as part of the offeror's proposal will be evaluated using only the criteria outlined below. Offerors are advised that the proposal submission shall comply with the specification requirements outlined in Section C.

<u>VOLUME I – Factors 1-3:</u>

In support of factors 1 through 3 submission requirements, the Offeror shall develop and provide a Preliminary Design for the proposed dredge.
The Offeror's preliminary design shall be presented in a Preliminary Design Report. The level of detail in the report shall be as described in Chapter 5, Section 5.2.3 of ***Ship Design and Construction***, published by the Society of Naval Architects and Marine Engineers (SNAME).
The **Preliminary Design Report** shall provide the following:

- Lines Drawing – Shall define hull shape and buoyancy characteristics
- General Arrangement Drawings (to individual compartment level) – Shall show in plan the horizontal arrangements inside the vessel.
- Outboard Profile Drawing – Shall show in profile the vertical arrangements of the vessel exterior.
- Inboard Profile Drawing – Shall show inboard arrangements of the vessel interior.
- Payload Definition to include:
    - Hopper volume capacity table to max overflow height at 6,000 cubic yard capacity considering deductions for structure, piping systems, and overflow weir.
    - Hopper fill level to 5000 cubic yards of 1.8 SG material
    - Hopper fill level to the volume capacity of 1.8 S.G. material to be provided by the proposer within the threshold to objective capacity range between 5000 to 6000 cubic yards of 1.8 S.G. material.

  Shall show the fill heights of material in hopper for threshold, objective, and proposed amounts of hopper capacity of 1.8 S.G. material.
- Description of principal ship systems and features – Shall explain what systems are provided on board the vessel and how they work.
- Weight Report (3-digit level, KG and LCG) – Shall define the weight and center of gravity for the vessel including hopper load.
- Structural midship section – Shall show the type and physical dimension of the hull structure in the hull, where the hopper is located.
- Preliminary Scantling Drawings (hull & house) – Shall show the structural arrangements of the vessel, in areas beyond the midship section.
- Diesel-Electric Power System one line diagram – Shall show how the diesel electric system distributes electricity throughout the vessel.
- Diesel-Electric Power System analysis – Shall explains how the diesel-electric system operates to generate and distribute power throughout the vessel.

- Z-drive Propulsion System analysis – Shall explain how the selected z-drives are sized, and how they provide the propulsion power required for the vessel operation.
- Dredge Pump and Jetting Pump systems analysis – Shall explain how the selected dredge pumps, jet pumps, and their drive motors are sized, and how they provide the dredge and jet pumping capacities required for hopper fill and hopper pump out operations.
- Machinery Arrangement Drawing – Shall show where machinery components are located throughout the vessel.
- Electric load analysis for the following conditions:
    - Dredging – Filling Hopper
    - Dredging - Pumping Out Hopper

  Shall show much power the diesel electric power system must provide for hopper fill and hopper pump out operations.
- Preliminary master equipment list – Shall identify the sizes and capacities for vessel major equipment such as generators, dredge pumps, propulsion equipment, etc.
- Speed power curves at max draft – Shall define the propulsion power needed for the vessel operational envelope.
- Endurance fuel and water analysis - Shall define the amount of fuel and water that must be carried in the full load condition.
- Stability analysis, intact and damage at maximum loaded draft – Shall show that the vessel will remail upright and safe when in operation, when evaluated IAW USCG and USACE intact and damage stability standards.

(i) VOLUME I – Factor 1 – Hopper Capacity

For factor one submission requirements, the Offeror shall use the assumed vessel departure condition:

- Full stores and consumables
- Full Crew and effects

The submission requirements to evaluate hopper capacity are:

- **Hopper Capacity Narrative**: In a comprehensive narrative, the Offeror shall provide a technical summary detailing how the Offeror developed its proposed maximum hopper capacity at 1.8 S.G. as well as the hopper capacities by volume (Cubic Yards) and weight (Long Tons) at minimum and maximum overflow heights (Maximum dredging draft shall be listed). The narrative shall reference plans and drawings from the preliminary design.
- **Preliminary Design** as stated earlier. Areas of the design to be evaluated are called out in Section M.

(ii) VOLUME 1 – Factor 2 – *Hopper Loading Time and Propulsion*

For factor two submission requirements, the Offeror shall use the assumed dredging condition outlined below in the development of submitted materials:

- Dredging Sand 1.8 Specific Gravity (S.G.) in hopper material
- Dredging against 6 Knot current, while maintaining 2 Knot speed over ground.
- Dredging in water depth (65 Foot depth)
- Dredging with hopper full in the vessel maximum draft full load condition.

The submission requirements to evaluate hopper loading time and propulsion are:

- **Hopper Loading Time & Propulsion Narrative:** In a comprehensive narrative, the offeror shall identify and explain the projected hopper loading time and propulsion power required to be evaluated as discussed in in Section M. The narrative shall reference plans and drawings from the preliminary design.
- **Preliminary Design** as stated earlier**.** Areas of the design to be evaluated are called out in Section M.

(iii) VOLUME 1 – Factor 3 – Hopper Pump out Time and Propulsion

For factor three submission requirements, the Offeror shall use the assumed Pump Out Condition for pump out time evaluation in the development of submitted materials:

- Dredge discharge connected to a floating hose (150 feet) with buoy, pumping out 1.8 S.G. material, through 1.5 miles of 28-inch Inside Diameter (ID) discharge pipeline, with 75 feet above water elevation between the dredge pump out and the pipeline discharge.
- Weathervaning is used from the single point buoy during pump out. Propulsion power adequate to safely weathervane, and to prevent excessive tension on the floating hose system.

The submission requirements to evaluate hopper pump out time and propulsion are:

- Hopper Pump Out time and Propulsion Narrative: In a comprehensive narrative, the offeror shall identify and explain the projected hopper pump out time and propulsion power required as outlined in Section M. The narrative shall reference plans and drawings from the preliminary design.
- **Preliminary Design** as stated earlier**.** Areas of the design to be evaluated are called out in Section M.

(v) VOLUME 2 –Factor 4 - Past Performance

The Proposal must include at least three (3), projects using the attached Past Performance Questionnaire (PPQ) forms (in Section J of the specification), representing the key members of the Offeror's proposed team's recent and relevant Past Performance. In lieu of submitting Past Performance questionnaires, offerors may provide completed questionnaires from the Contractor Performance Assessment Reporting System (CPARS) on a "one for one" basis. In other words, one (1) completed CPARS questionnaire shall satisfy the requirement for one (1) PPQ.

Past performance pertains to how well an Offeror has performed relevant past work that is an indicator of future performance. Past performance information is not the same as experience information. Experience information pertains to what types of work an Offeror has performed. Past performance pertains to how well an Offeror performs project work. As used in this paragraph, "relevant" refers to projects that include one of the following:

- Projects that included the design of steel ocean going hopper dredges over 200 feet in length.
- Projects for the construction of self-propelled ocean-going steel vessels over 200 feet in length in the United States.
- Projects that involved integration of complex control and monitoring into steel vessels over 200 feet in length in the United States.

Offerors are encouraged to submit Questionnaire's that collectively reflect projects which contain all of the aspects discussed above, but at least two must address the past performance of the designer, at least two must address performance of the prime contractor, and at least two must address the organization constructing the vessel; whether as prime contractor or key subcontractor. In cases where one firm may serve more than one role in the teaming arrangement, additional questionnaire's do not need to be submitted (i.e., if the production facility is also the prime contractor, two of the above requirements may be addressed by one questionnaire).

The Past Performance Questionnaire (PPQ) included in the solicitation is provided for the Offeror to submit to the client for each project that the Offeror includes in its proposal for Factor 3 (Past Performance). The Offeror shall ensure that correct phone numbers and email addresses are provided for the client point of contact. Completed Past Performance Questionnaires shall be submitted with your proposal. If the Offeror is unable to obtain a completed PPQ from a client for a project(s) before proposal closing date, the Offeror should complete and submit with the proposal the first page of the PPQ, which will provide contract and client information for the respective project(s). Offerors should follow-up with clients/references to ensure timely submittal of questionnaires. If the client requests, questionnaires may be submitted directly to the Government's point of contact, via email at

Michael.J.Hunter@usace.army.mil prior to proposal closing date. Offerors shall not incorporate by reference into their proposal PPQs previously submitted for other RFPs. However, this does not preclude the Government from utilizing previously submitted PPQ information in the past performance evaluation.

In addition to the above, the Government may review any other sources of information for evaluating past performance. Other sources may include, but are not limited to, the Past Performance Information Retrieval System (PPIRS), Federal Awardee Performance and Integrity Information System (FAPIIS), Electronic Subcontract Reporting System (eSRS), or other databases; the Defense Contract Management Agency; and interviews with Program Managers, Contracting Officers, and Fee Determining Officials.

(v) VOLUME III – Factor 5 - Small Business Participation Plan – Submission Requirements

ALL LARGE BUSINESS OFFERORS ARE REQUIRED TO SUBMIT A SMALL BUSINESS PARTICIPATION PLAN. **NOTE: PER 13 C.F.R. § 125.3(G)(3), SMALL BUSINESS OFFERORS NEED NOT SUBMIT ANY INFORMATION IN CONNECTION WITH THIS FACTOR AND SHALL RECEIVE THE MAXIMUM RATING UNDER THIS EVALUATION FACTOR.** Offerors should propose the level of participation of small businesses (as a small business prime, joint venture, teaming arrangement, and/or small business subcontractors) in the performance of the acquisition relative to the objectives/goals set forth in the evaluation of this area.

The Small Business Participation Plan shall be based on the offeror's best effort to utilize small business and is required to address each of the following areas individually:

- The extent to which the small business firms listed in FAR 19 (small business, small-disadvantaged business, woman-owned small business, HUBZone, service-disabled veteran owned small business, etc.) are specifically identified in the Small Business Participation Plan. Use section (d) of the SBPP Proposal Format for this element. (Note: Small Business subcontractors specifically identified by name within the SBPP should also be listed within the corresponding subcontracting plan.)

- The extent of participation of the small business prime offeror and small business firms in terms of percentages of the value of the total acquisition. Use section (b) and (c) of the SBPP Proposal Format for this element.

IAW the Army Source Selection Supplement (AS3), the SSEB will evaluate the extent to which the offeror meets or exceeds small business participation goals specific to this requirement. These goals are a percentage of the value of the total acquisition. The goals for this procurement are as follows:

Small Business Categories	Goal
Small Business (SB)	25%
Small Disadvantaged Business (SDB)	5%
Woman Owned Small Business (WOSB)	Best effort %
HUBZone Small Business	Best effort %
Veteran Owned Small Business (VOSB)	Best effort %
Service-Disabled Veteran Owned Small Business (SDVOSB):	Best effort %

- The extent of an offeror's commitment to use such firms (for example, through submission of enforceable commitments, such as signed teaming agreements), will be considered. Use section (e) of the SBPP Proposal Format for this element.

- The complexity and variety of the work small firms are to perform on this acquisition will be considered. Use section (d) of the SBPP Proposal Format for this element.

The Small Business Participation Plan shall be organized as follows:

SMALL BUSINESS PARTICIPATION PLAN

(a) Check the applicable size and categories for the PRIME Offeror only -- Check all applicable boxes:

( ) Large

Or

( ) Small Business Prime; also categorized as a
( ) Small Disadvantaged Business (SDB)
( ) Woman-Owned Small Business (WOSB)
( ) Historically Underutilized Zone (HUB Zone) Small Business
( ) Veteran Owned Small Business (VOSB)
( ) Service-Disabled Veteran Owned Small Business (SDVOSB)

Percentage of your participation as a prime contractor: _____%

NOTE: Small Business primes' self-performance counts as small business participation, and small business primes may achieve small business participation goals through their own performance/participation as a prime and/or through subcontracting to other small businesses.

(b) Submit the total combined dollar value and percentage of work to be performed by both large and small businesses (include the percentage of work to be performed both by Prime, joint venture, teaming arrangement, and subcontractors):

Example: If the Prime proposes a price of $1,000,000 (including all options), and small business(es) will provide $250,000 in services/supplies as a prime, joint venture, teaming arrangement, or subcontractor, the % planned for small businesses is 25%; and 75% for large business, equaling 100%.

Total Percentage planned for Large Business(es) __75_% = $ 750,000
Total Percentage planned for Small Business(es) __25_% = $ 250,000
100% = $ 1,000,000

Total Percentage planned for Large Business(es) _% = $_

Total Percentage planned for Small Business(es) _% = $_

100% = $_

(c) Please indicate the total percentage and dollar value of participation to be performed by each type of small business. The percentage of work performed by Small Businesses that qualify in multiple small business categories may be counted in each category:

Example: Victory Prop Mgt (WOSB and SDVOSB) performing 2%; and Williams Group (SDB, HubZ and WOSB) performing 3%. Results equate to: SB 5%; SDB 3%; HubZone 3%; WOSB 5%; SDVOSB 2%; VOSB 2%;). SDVOSBs are also VOSBs automatically; however, VOSBs are not automatically SDVOSBs.

	% of Participation	$ of Participation
Small Business (SB)	_%	$_
Small Disadvantaged Business (SDB)	_%	$_
Woman Owned Small Business (WOSB)	_%	$_
HUBZone Small Business (HUBZone)_	_%	$_
Veteran Owned Small Business (VOSB)	_%	$_

Service-Disabled Veteran Owned Small Business (SDVOSB):	_%	$_

NOTE: The sum of the percentages of socio-economic small business categories does not have to total the small business category, as a firm may count for multiple socio-economic categories.

Each percentage above shall be accompanied by detailed supporting documentation regarding individual commitments. If an Offeror is unable to meet the SB participation goal or proposes a zero percent goal for ANY of the socioeconomic categories (SDB, HUBZone, WOSB, VOSB and/or SDVOSB), the Offeror must provide a detailed explanation as to why the participation goal(s) cannot be met.

(d) Identify the Prime Offeror and type of service/supply that the Prime Offeror will provide. Then list each of the intended subcontractors and principal supplies/services to be provided by that subcontractor. Provide the Commercial and Government Entity (CAGE) code for the Prime and each intended subcontractor. Also, provide the anticipated NAICS codes(s) that the Prime Offeror believes best describes the product or services being acquired by its subcontracts with each intended subcontractor. Small business Primes and small business subcontractors that qualify as small businesses in multiple small business categories should be listed in each applicable small business category.

Example: If a Small Business qualifies as a WOSB and a SDVOSB, you can add them to each category below in which they qualify.

	Name of Company (Include Cage Code)	Anticipated NAICS Code for Each Subcontractor	Type of Service/Supply
Prime Offeror			
Large Business			
Small Business (Non-Disadvantaged)			
Small Disadvantaged Business (SDB)			
Woman Owned Small Business (WOSB)			
HUBZone Small Business			
Veteran Owned Small Business (VOSB)			
Service-Disabled Veteran Owned Small Business (SDVOSB):			

Notes: Pursuant to Sections 8(d) of the Small Business Act, a business is considered small for Government procurements if it does not exceed the size standard for the NAICS code that the prime contractor believes best describes the product or services being acquired. In other words, the size of the prime's suppliers is determined by the applicable NAICS code of their joint venture, teaming partner, or subcontract, which may or may not be the same NAICS code as the one for your prime contract with the Government.

(e) Describe the extent of commitment to use small businesses (e.g., what types of commitments, if any, are in place for this specific acquisition either – small business prime, written contract, verbal, enforceable, non-enforceable, joint venturing, mentor-protégé, etc.). Provide documentation regarding commitments to small business for this effort. Copies of such agreements should be provided as part of your small business participation plan and will not count against the page limitation for this volume. Any information concerning long-term relationships with Small Business subcontractors, such as mentor-protégé relationships, should also be provided. Discuss and submit proof of any specific outreach efforts performed in support of this requirement if applicable (e.g. holding internal or external

meetings with potential small business subcontractors, ads, any conference attendance or host) that demonstrates the offerors' effort to identify small business subcontractors specifically in support of this requirement.

Note: Enforceable commitments are: (1) is with a small business, (2) include the socioeconomic type of the small business and the services/supplies to be provided, (3) be specific to the subject requirement, and (4) include legible signature blocks and signatures from BOTH parties acknowledging the business relationship.

(f) Small Business Subcontracting Plan: Each Large Business Offeror shall provide a Small Business Subcontracting Plan that contains all of the elements required by FAR Clause 52.219-9 Dev (Alt II). This Plan shall be submitted separately from the Small Business Participation information required above which applies to both Large and Small Businesses. The Subcontracting Plan is not a requirement for evaluation in source selection but rather a requirement for award to a Large Business. The approved Small Business Subcontracting Plan will be incorporated into any resultant contract(s).

(vi) VOLUME IV – Factor 6 - Price

This volume shall consist of any and all information related to Price. Offerors are reminded that no price information is to be included in Volumes I, II, or III.

The information submitted in this volume shall comply with the requirements set forth below. There are no page limitations for this volume. The offerors proposal shall contain the following elements:

(1) Section I – Cover Letter, SF1449, Solicitation, Offer, and Award

(a) A cover letter containing:

(i) Solicitation Number
(ii) Name, address, email, telephone number, and fax number of the offeror
(iii) CAGE Code
(iv) DUNS Number
(v) Names, Title, email, telephone number, and fax number of persons authorized to negotiate on the offeror's behalf with the Government in connection with this RFP.
(vi) Name, title, and signature of the person authorized to sign the proposal
(vii) A statement specifying agreement with all terms, conditions, and provisions included in this RFP.

(b) The SF 1449 duly executed with an original signature by an official authorized to bind the company. Include the Offeror's CAGE and DUNS number in Block 15.

(c) Offeror must acknowledge all amendments by the date specified in the solicitation (or as amended) by one of the following methods: in the space provided on the SF 33, or by signing the block 15 of the SF30 and including as part of their proposal.

(d) All offerors shall be registered in the System for Award Management (SAM) database prior to award of the contract in accordance with DFARS 252.204-7004, if an offeror is not registered prior to the closing date of this solicitation they shall provide all information required by FAR 52.204-8(c)(1)(i) as a tab in this volume.

(e) All offerors shall provide a bid bond or bid guarantee with the bid. It must be in the form of a firm commitment such as a bond or irrevocable letter of credit. See section I of the specification for further details.

(2) Section II – Priced Bid Schedule

The offeror shall complete and submit Section B of the specification in its entirety.

EVALUATION FACTORS

PART IV – REPRESENTATIONS & INSTRUCTIONS – SECTION M
EVALUATION FACTORS FOR AWARD

A. BASIS FOR AWARD

This is a Best Value Trade Off (BVTO) procurement where the Contracting Officer will award a firm fixed priced supply contract to the Offeror who represents the best overall value in accordance with all the requirements in the solicitation. The principal objective of the evaluation process is to award a single firm fixed price contract to a single contractor. The award will be made in accordance with FAR 15.101-1 "Trade off Process" based on proposals that are determined to be the best overall (i.e., best value) that is the most beneficial to the Government, with appropriate consideration given to all the evaluation factors identified below. The Government reserves the right to make an award to other than the lowest priced offeror or to other than offerors with the highest technical rating if the Contracting Officer determines that to do so would result in the best value to the Government.

The Government's intent is to make the award without conducting discussions, but the Government reserves the right to set a competitive range and discuss aspects of proposals with Offerors if the Government determines it to be necessary to do so. Offerors should be aware that the Government may make award without discussions, clarifications, or any contact concerning the proposals received; therefore, proposals should be submitted initially on the most favorable terms from a price and technical standpoint. Offerors should not assume that they will be contacted or afforded an opportunity to clarify, discuss or revise their proposals. In addition, if the Contracting Officer determines that the number of proposals that would otherwise be in the competitive range exceeds the number at which an efficient competition can be conducted, the Contracting Officer may limit the number of proposals in the competitive range to the greatest number that will permit an efficient competition among the most highly rated proposals.

During evaluations of each proposal, the Government will assign an adjectival rating to each factor, except for "price", and write a narrative evaluation reflecting the identified findings.

B. FACTORS TO BE EVALUATED

The following evaluation factors will be used to evaluate each proposal:

Factor 1: Hopper Capacity – Each offeror's proposal will be reviewed and evaluated in accordance with Paragraph E of this document. A detailed explanation of the criteria for the evaluation is set forth in the "Evaluation Approach", Paragraph E.1 of this section.

Factor 2: Hopper Loading Time & Propulsion - Each offeror's proposal will be reviewed and evaluated in accordance with Paragraph E of this document. A detailed explanation of the criteria for the evaluation is set forth in the "Evaluation Approach", Paragraph E.2 of this section.

Factor 3: Hopper Pump Out Time & Propulsion - Each offeror's proposal will be reviewed and evaluated in accordance with Paragraph E of this document. A detailed explanation of the criteria for the evaluation is set forth in the "Evaluation Approach", Paragraph E.3 of this section.

Factor 4: Past Performance - Each offeror's past performance will be reviewed and evaluated to determine recency, relevancy, and quality to perform a confidence assessment in accordance with paragraph E.4 of this section.

Factor 5: Small Business Participation – Each offeror's small business participation plan will be reviewed and assessed in accordance with paragraph E.5 of this section.

Factor 6: Price – Price will be evaluated in accordance with paragraph E.6 of this document.

C. RELATIVE IMPORTANCE OF THE EVALUATION FACTORS

All non-price factors when combined (Factors, 1,2,3,4, & 5) are approximately equal to Price (Factor 6).
The five non-price factors are listed below in descending order of importance:

Factor 1 –Hopper Capacity
Factor 2 –Hopper Loading Time & Propulsion
Factor 3 –Hopper Pump Out Time & Propulsion
Factor 4 – Past Performance
Factor 5 – Small Business Participation

Factor 1 (Hopper Capacity) is more important than Factor 2 (Hopper Load Time & Propulsion). Factor 2 (Hopper Load Time & Propulsion) is more important than Factor 3 Hopper Pump Out Time & Propulsion). Factor 3 (Hopper Pump Out Time & Propulsion) is more important than Factor 4 (Past Performance). Factor 4 (Past Performance) is more important than Factor 5 (Small Business).

To receive consideration for award, a rating of no less than "Acceptable" must be achieved for all non-price Factors except Past Performance. Past Performance must be rated other than "No Confidence."

D. DEFINITIONS:

1. ADJECTIVAL RATING DESCRIPTIONS:

Factor 1 –Hopper Capacity, Factor 2 –Hopper Load Time & Propulsion, Factor 3 –Hopper Pump Out Time & Propulsion, excerpted below focus on the strengths, deficiencies, weaknesses, and risks of the offeror's proposal. The color rating depicts how well the offeror's proposal meets the Technical Factor requirements.

RATINGS FOR FACTOR 1, 2, & 3 – TECHNICAL/RISK		
Color Rating	**Adjectival Rating**	**Description**
Blue	Outstanding	Proposal indicates an exceptional approach and understanding of the requirements and contains multiple strengths, and risk of unsuccessful performance is low.
Purple	Good	Proposal indicates a thorough approach and understanding of the requirements and contains at least one strength, and risk of unsuccessful performance is low to moderate.

Green	Acceptable	Proposal meets requirements and indicates an adequate approach and understanding of the requirements, and risk of unsuccessful performance is no worse than moderate.
Yellow	Marginal	Proposal has not demonstrated an adequate approach and understanding of the requirements, and/or risk of unsuccessful performance is high. Proposal is un-awardable.
Red	Unacceptable	Proposal does not meet requirements of the solicitation, and thus, contains one or more deficiencies, and/or risk of unsuccessful performance is unacceptable. Proposal is un-awardable.

The Past Performance Factor Ratings (Factor 4) excerpted below focus on the level of Confidence the Government has that Offeror will successfully perform the required effort. The Government will make a Performance Confidence Rating for the offeror, selecting the most appropriate rating from the "Performance Confidence Assessment" chart below. As part of the process to determine the Past Performance - Factor 4 (Performance Confidence) rating, the Government considers the assessed quality of the relevant/recent efforts gathered. Although not rated separately, relevancy and recency will be evaluated as part of the process. The tables to be utilized for assessing recency and relevancy are also provided below.

Performance Confidence Assessment	
Rating	**Definition**
Substantial Confidence	Based on the offeror's recent/relevant performance record, the Government has a high expectation that the offeror will successfully perform the required effort.
Satisfactory Confidence	Based on the offeror's recent/relevant performance record, the Government has a reasonable expectation that the offeror will successfully perform the required effort.
Neutral Confidence	No recent/relevant performance record is available, or the offeror's performance record is so sparse that no meaningful confidence assessment rating can be reasonably assigned. The offeror may not be evaluated favorably or unfavorably on the factor of past performance.
Limited Confidence	Based on the offeror's recent/relevant performance record, the Government has a low expectation that the offeror will successfully perform the required effort.
No Confidence	Based on the offeror's recent/relevant performance record, the Government has no expectation that the offeror will be able to successfully perform the required effort.

Past Performance Recency Assessment	
Rating	**Definition**
Very Recent	For Projects reflecting design efforts: Present/past performance effort was delivered within the past five (5) years from the date of this solicitation. The five-year threshold date is based upon when the completed design was provided to the customer. For Projects reflecting production efforts: Present/past performance effort was delivered within the past five (5) years from the date of this solicitation. The five-year threshold

	date is based upon when the completed vessel was delivered to the customer.
Recent	For Projects reflecting design efforts: Present/past performance effort was delivered within the past ten (10) years from the date of this solicitation. The ten-year threshold date is based upon when the completed design was provided to the customer. For Projects reflecting production efforts: Present/past performance effort was delivered within the past ten (10) years from the date of this solicitation. The ten-year threshold date is based upon when the completed vessel was delivered to the customer.
Somewhat Recent	For Projects reflecting design efforts: Present/past performance effort was delivered within the past twenty (20) years from the date of this solicitation. The twenty-year threshold date is based upon when the completed design was provided to the customer. For Projects reflecting production efforts: Present/past performance effort was delivered within the past twenty (20) years from the date of this solicitation. The twenty-year threshold date is based upon when the completed vessel was delivered to the customer
Not Recent	For Projects reflecting design efforts: Present/past performance effort was delivered beyond (20) years from the date of this solicitation. The twenty-year threshold date is based upon when the completed design was provided to the customer. For Projects reflecting production efforts: Present/past performance effort was delivered beyond (20) years from the date of this solicitation. The twenty-year threshold date is based upon when the completed vessel was delivered to the customer

Past Performance Relevancy Assessment	
Rating	**Definition**
Very Relevant	Present/past performance effort involved essentially the same scope and magnitude of effort and complexities this solicitation requires.
Relevant	Present/past performance effort involved similar scope and magnitude of effort and complexities this solicitation requires.
Somewhat Relevant	Present/past performance effort involved some of the scope and magnitude of effort and complexities this solicitation requires.
Not Relevant	Present/past performance effort involved little or none of the scope and magnitude of effort and complexities this solicitation requires.

The Small Business Participation Factor Ratings (Factor 4) are excerpted in the table below

Color Rating	Adjectival Rating	Description
Blue	Outstanding	Proposal indicates an exceptional approach and understanding of the small business objectives.
Purple	Good	Proposal indicates a thorough approach and understanding of the small business objectives.
Green	Acceptable	Proposal indicates an adequate approach and understanding of small business objectives.
Yellow	Marginal	Proposal has not demonstrated an adequate approach and understanding of the small business objectives.
Red	Unacceptable	Proposal does not meet small business objectives.

2. FINDINGS DEFINITIONS:

Significant Strength - an aspect of an offeror's proposal that has significant merit or appreciably exceeds specified performance or capability requirements in a way that will be advantageous to the Government during contract performance.

Strength - an aspect of an offeror's proposal that has merit or exceeds specified performance or capability requirements in a way that will be advantageous to the Government during contract performance

Weakness - a flaw in an offeror's proposal that increases the risk of unsuccessful contract performance (Per FAR part 15.001)

Significant Weakness - a flaw that appreciably increases the risk of unsuccessful contract performance (Per FAR part 15.001)

Deficiency - a material failure of a proposal to meet a Government requirement or a combination of significant weaknesses in a proposal that increases the risk of unsuccessful contract performance to an unacceptable level (Per FAR part 15.001)

Uncertainty. Any aspect of a non-cost/price factor proposal for which the intent of the offeror is unclear (e.g., more than one way to interpret the offer or inconsistencies in the proposal indicating that there may have been an error, omission, or mistake).

Adverse_Past_Performance. Past performance information that supports a less than satisfactory rating on any evaluation.

Risk - The potential for unsuccessful contract performance. The consideration of risk assesses the degree to which an Offeror's proposed approach to achieving the technical factor may involve risk of disruption of schedule, increased cost or degradation of performance, the need for increased Government oversight, and the likelihood of unsuccessful contract performance.

E. EVALUATION APPROACH

The information submitted by the Offeror in accordance with Section L of the specification will be evaluated by the Government in accordance with the procedures set forth within this section and using the tables listed earlier. The overarching evaluation approach of submitted information for all factors is as follows:

a. Adequacy of Response. The proposal will be evaluated to determine whether the offeror's methods, understanding, and approach have adequately and completely considered, defined, and satisfied the requirements specified in the RFP. The proposal will be evaluated to determine the extent to which each requirement has been addressed in the proposal in accordance with the proposal submission section of the RFP.

b. Feasibility of Approach. The proposal will be evaluated to determine the extent to which the proposed approach is workable and the end results achievable. The proposal will be evaluated to determine the extent to which successful performance is contingent upon proven devices and techniques. The proposal will be evaluated to determine the extent to which the offeror is expected to be able to successfully complete the proposed tasks and technical requirements within the required schedule.

- **FACTOR 1 – Hopper Capacity**

The Government will evaluate the Offeror's technical hopper capacity narrative and the areas of the preliminary design listed below to determine technical adequacy, feasibility of approach, and risk of unsuccessful performance.

The Offeror must demonstrate that its proposed vessel will at least achieve carrying the minimum/threshold requirement of 5,000 cubic yards of 1.8 specific gravity material. The Government has an objective hopper carrying capacity of 6,000 cubic yards of 1.8 specific gravity material. Once the minimum requirement of 5,000 cubic yards of 1.8 specific gravity material has been achieved, additional volume of 1.8 specific gravity material up to the ceiling of 6,000 cubic yards of 1.8 specific gravity material will receive additional consideration. **NOTE:** The "C" Section (technical requirements) of this solicitation requires every design to achieve a hopper capacity by volume of 6,000 cubic yards to the top of the overflow regardless of specific gravity. For precision of volume, the 6,000 cubic yard ceiling amount may be achieved by setting hard limits on the overflow height as identified through the API sanctioned process identified in Section C of the specification for volume validation. **PROPOSALS WILL BE REJECTED IF CAPACITY BY VOLUMED EXCEEDS 6,000 CUBIC YARDS.**

Preliminary Design Areas of Evaluation:

- **Payload Definition**. The offered hopper volume capacity table will be checked to verify that 6000 cubic yard capacity is provided, but not exceeded. The hopper fill level to 5000 cubic yards of 1.8 SG material will be checked to determine that the minimum capacity has been provided. The hopper fill level provided by the Offeror will be checked and identified for best value Hopper Capacity factor.
- **Lines Drawing:** The proposed lines drawing will be used to verify the buoyancy characteristics used in the stability analysis.
- **Weight Report (3-digit level, KG and LCG):** The offered weight report will be used to verify the weight and Center of Gravity characteristics used in the stability analysis.
- **Stability analysis, intact and damage at maximum loaded draft:** The presented stability analysis results will be evaluated for compliance with USCG and USACE intact and damage stability requirements. The stability analysis will be reviewed to assess the risk that the vessel will not meet stability standards for safe operation in all conditions with the stated hopper capacity.
- **Endurance fuel and water analysis:** The endurance fuel and water analysis will be checked to ensure that the stability analysis incorporates consistent weights of fuel and water.
- **Structural midship section:** The offered structural midship section will be used to evaluate how the structure of the hopper is integrated into the remaining hull structure. The structural midship section will be reviewed to assess the risk that the structure is not adequate for the loads imposed by the fully loaded hopper.
- **Preliminary Scantling Drawings (hull & house):** The proposed scantling drawings will be used to evaluate how the structure of the hopper is integrated into the remaining hull structure. The scantling drawing will be reviewed to assess the risk that the structure is not adequate for the loads imposed by the fully loaded hopper.

- **General Arrangement Drawings (to individual compartment level):** The presented general arrangement drawings will be used to evaluate how effectively the vessel hopper design addresses the limit on vessel length to provide space for the required vessel machinery, tankage, and crew spaces. The general arrangement will be reviewed to assess the risk that hopper capacity cannot be achieved within the general arrangement of the vessel.
- **Machinery Arrangement drawings:** The offered machinery arrangement drawings will be used to evaluate how effectively the vessel hopper design, addresses the limit on vessel length to provide space for the required vessel machinery, tankage, and crew spaces. The machinery arrangement will be reviewed to assess the risk that hopper capacity cannot be achieved within the machinery arrangement of the vessel.
- **Outboard Profile Drawing:** The presented Outboard Profile drawing will be used to evaluate how effectively the vessel hopper design, addresses the limit on vessel length to provide space for the required vessel machinery, tankage, and crew spaces. This evaluation is used because some dredge designs extend the hopper above the main deck level, and this will be clearly depicted on the outboard profile drawing, along with the adjacent hull areas at either end of the hopper. The profile drawing will be reviewed to assess the risk that hopper capacity cannot be achieved within the vertical arrangement of the vessel.
- **Inboard Profile Drawing:** The offered inboard drawings will be used to evaluate how effectively the vessel hopper design addresses the limit on vessel length to provide space for the required vessel machinery, tankage, and crew spaces. The inboard drawing will be reviewed to assess the risk that hopper capacity cannot be achieved within the inboard arrangement of the vessel.

- **FACTOR 2 – Hopper Loading Time & Propulsion**

The Government will evaluate the Offeror's technical narrative and the areas of the preliminary design listed below to determine technical adequacy, feasibility of approach, and risk of unsuccessful performance.

The Offeror must demonstrate that its proposed vessel will at least achieve the loading time minimum requirement to fill the hopper (5,000 cubic yards) within 75 minutes with sand at 1.8 specific gravity when dredging at 65 ft in depth. The Government has an objective to fill the hopper (5,000 cubic yards) within 45 minutes with sand at 1.8 specific gravity when dredging at 65 ft in depth. **NOTE:** For assessing proposals, loading time will be based upon 5,000 cubic yards at 1.8 specific gravity irrespective of whether the vessel can carry a larger quantity of 1.8 specific gravity material. However, actual hopper load time of the vessel's entire hopper must meet the minimum/threshold requirement of 75 minutes.

Preliminary Design Areas of Evaluation:

- **Description of principal ship systems and features.** The offered description of principal ship systems and features will be applied to determine the ship systems that are required to be in operation during hopper fill dredging operations. The principal ship systems and features will be reviewed to assess the risk that the loading time cannot be achieved due to the total energy needed for the identified ship systems and features exceeding the available power on the vessel.
- **Dredge Pump and Jetting Pump systems analysis.** The dredge pump and jetting pump systems analysis will be used to determine the power required for the main dredging equipment during hopper fill operations. The dredge pump and jetting pump system will be reviewed to assess the risk that the loading time identified will not be achieved using the pump sizes identified**.**
- **Preliminary Master Equipment list.** The proposed Preliminary Master Equipment List will be used to determine the power requirements for the operating ship systems. This will be used to check the completeness of the electric load analysis for hopper loading.
- **Z-drive Propulsion system analysis.** The presented z-drive propulsion system analysis at max draft will be used to determine the propulsion power required during the hopper fill operation. The Z-drive propulsion system analysis will be reviewed to assess the risk that the loading time cannot be achieved due to the total energy needed for propulsion during loading.
- **Speed Power curves at max draft.** The offered speed power curves at max draft will be used to determine the propulsion power required during the hopper fill operation. The speed power curves will be reviewed to

assess the risk that the loading time cannot be achieved due to the total energy needed for propulsion during loading.

- **Electric load analysis for Dredging – Filling Hopper.** The proposed Electric Load Analysis will be checked against the information in the two above evaluations to determine that the overall vessel power levels required for the hopper fill operation are properly identified in the load analysis. The electric load analysis for dredging will be reviewed to assess the risk that the loading time cannot be achieved within the limits of the diesel electric propulsion system.
- **Diesel-Electric Power System analysis.** The offered Diesel-Electric Power System Analysis will be used to check that the required power levels can be provided by the Diesel-Electric power system. The diesel electric power system analysis will be reviewed to assess the risk that the loading time cannot be achieved within the limits of the diesel electric propulsion system.
- **Diesel-Electric Power System one line diagram.** The proposed Diesel-Electric Power System one line diagram will be used to check that the vessel electric power distribution system is capable of providing the required amounts of electric power to the machinery and service systems in use during the hopper fill operation. The diesel electric power system one line diagram will be reviewed to assess the risk that the loading time cannot be achieved within the limits of the diesel electric propulsion system.

- **FACTOR 3 – Hopper Pump Out Time & Propulsion**

The Government will evaluate the Offeror's technical Offeror's technical narrative and the areas of the preliminary design listed below to determine technical adequacy, feasibility of approach, and risk of unsuccessful performance.

The Offeror must demonstrate that its proposed vessel will at least achieve the pump out time minimum requirement of 5,000 cubic yards material at 1.8 specific gravity from an over the bow connection, through 150 feet of 28-inch Inside Diameter (ID) submerged steel pipeline, and 1.5 miles in length including a geodetic head increase of 75 ft of shoreline –29-inch ID steel pipeline within 240 minutes. The Government has an objective pump out time of 5,000 cubic yards material at 1.8 specific gravity from over the bow connection, through 150 feet of 28-inch ID submerged steel pipeline, and 1.5 miles in length including a geodetic head increase of 75 ft of shoreline –29-inch ID steel pipeline within 120 minutes. **NOTE:** For assessing proposals, pump out time will be based upon unloading 5,000 cubic yards at 1.8 specific gravity irrespective of whether the vessel can carry a larger quantity of 1.8 specific gravity material. However, actual hopper pump out time of the vessel's entire hopper must meet the minimum/threshold requirement of 240 minutes.

Preliminary Design Areas of Evaluation:

- **Description of principal ship systems and features.** The offered description of principal ship systems and features will be applied to determine the ship systems that are required to be in operation during the hopper pump-out dredging operation. The principal ship systems and features will be reviewed to assess the risk that the pump out time cannot be achieved due to the total energy needed for the identified ship systems and features exceeding the available power on the vessel.
- **Dredge Pump and Jetting Pump systems analysis.** The proposed dredge pump and jetting pump systems analysis will be used to determine the power required for the main dredging equipment during hopper pump-out operations. The dredge pump and jetting pump system will be reviewed to assess the risk that the pump out time identified will not be achieved using the pump sizes identified**.**
- **Preliminary Master Equipment List.** The presented Preliminary Master Equipment List will be used to determine the power requirements for the operating ship systems. This will be used to check the completeness of the electric load analysis for pumping out.
- **Z-drive Propulsion system analysis.** The offered z-drive propulsion system analysis will be used to determine the propulsion power required during the hopper pump-out operation. The Z-drive propulsion system analysis will be reviewed to assess the risk that the pump out time cannot be achieved due to the total energy needed for propulsion during pump out.
- **Speed Power curves at max draft.** The presented speed power curves at max draft will be used to determine the propulsion power required during the hopper pump-out operation. The speed power curves will be reviewed to assess the risk that the pump out time cannot be achieved due to the total energy needed for propulsion during pump out.

- **Electric load analysis for Dredging – Pumping Out Hopper.** The offered Electric Load Analysis will be checked against the information in the two above evaluations to determine that the overall vessel power levels required for the hopper pump-out operation are properly identified in the load analysis. The electric load analysis for dredging will be reviewed to assess the risk that the pump out time cannot be achieved within the limits of the diesel electric propulsion system.
- **Diesel-Electric Power System analysis.** The proposed Diesel-Electric Power System Analysis will be used to check that the required power levels can be provided by the Diesel-Electric power system. The diesel electric power system analysis will be reviewed to assess the risk that the pump out time cannot be achieved within the limits of the diesel electric propulsion system.
- **Diesel-Electric System One Line Diagram.** The offered Diesel-Electric Power System one line diagram will be used to check that the vessel electric power distribution system can provide the required amounts of electric power to the machinery and service systems in use during the hopper pump-out operation. The diesel electric power system one line diagram will be reviewed to assess the risk that the pump out time cannot be achieved within the limits of the diesel electric propulsion system.

4. FACTOR 4 - Past Performance

The Government will evaluate the offeror's record of past performance to ascertain the probability of successfully performing the required efforts of the Solicitation. There are three aspects to the past performance evaluation: recency, relevancy, and quality. The evaluation of this factor will result in a single "Performance Confidence Assessment" rating (details below).

Evaluation of past performance shall be in accordance with this factor utilizing the forms and questionnaires set forth in Appendix B.

The Government will focus its inquiries on the offeror's identified teaming arrangement's record of performance as it relates to all solicitation requirements, including price, schedule, performance, and management of subcontractors. A significant achievement, problem, or lack of relevant data in any element of the work can become an important consideration in the evaluation process. Therefore, offerors will be reminded to include the most recent and relevant efforts in their proposals. Absent any recent and relevant past performance history ***or when the performance record is so sparse that no meaningful confidence assessment rating can be reasonably assigned***, the offeror will be assigned a "neutral confidence rating" and its proposal will not be evaluated either favorably or unfavorably on past performance. The Government may use data provided by the offeror in its proposal and data obtained from other sources, including data in Government files or data obtained through interviews with personnel familiar with the contractor and his current and past performance under Federal, State or Local government or commercial contracts for same or similar products.

(i) RECENCY: The first aspect of the past performance evaluation is to evaluate the recency of the offeror's past performance. Recency is generally expressed as a time period during which past performance references are considered relevant and is critical to establishing the relevancy of past performance information. Recency is not separately rated, but the criteria listed in the table earlier in this section will be used to establish what is recent.

(ii) RELEVANCY: The second aspect of the past performance evaluation is to assess the offeror's past performance to determine how relevant a recent effort accomplished by the offeror is to the effort to be acquired through the source selection. Relevancy is not separately rated; but the criteria listed in the table earlier in this section will be used to rate relevancy, which shall include the similarity of design effort compared to the hopper dredge design effort required by this project, the scale and scope of production efforts compared to the production of this hopper dredge, and the integration of complex control and monitoring systems compared to the efforts required for this hopper dredge. Projects that include more than one of the aspects identified above may receive greater consideration.

(iii) QUALITY ASSESSMENT: The third aspect of the past performance evaluation is to establish the overall quality of the offeror's past performance. The Government will assess the quality of the offeror's past performance on those recent efforts that were determined relevant by determining how well the contractor performed on the contracts. Documented results from Past Performance Questionnaires, interviews, CPARS, and documented assessments or reviews from other Federal contracts. The baseline for quality for past performance is a satisfactory

or above. Therefore, anything below will be considered unacceptable. Quality is not separately rated; however, the past performance confidence assessment rating is based on the offeror's overall record of recency, relevancy, and quality of performance.

(iv) PERFORMANCE CONFIDENCE ASSESSMENT: The Government will make a performance confidence assessment for the offeror, selecting the most appropriate rating from the table listed earlier in this section. This rating considers the assessed quality of the relevant/recent efforts gathered.

5. FACTOR 5 – Small Business Participation

The Offeror's Small Business Participation Plan will be evaluated in accordance with the table identified earlier in this section to assess the offeror's best effort in utilizing small business and the various subcategories of small business identified in the submittal requirements in Section L of this solicitation, to best support the use of small business. Plans that identify formal commitments, signed teaming agreements, or other assurances of small business participation will be considered more significant than just stated intentions. **NOTE: PER 13 C.F.R. § 125.3(G)(3), SMALL BUSINESS OFFERORS NEED NOT SUBMIT ANY INFORMATION IN CONNECTION WITH THIS FACTOR AND SHALL RECEIVE THE MAXIMUM RATING UNDER THIS EVALUATION FACTOR.**

6. FACTOR 6 - Price

The principal objective of the evaluation process is to award a firm fixed price contract. The government will compare each offerors proposal against the competition, historical data, prevailing market conditions, and an Independent Government Estimate (IGE) to determine if the price is fair and reasonable and has no signs of unbalanced pricing.

The Government will evaluate price proposals, represented by the completed bid schedule (Section B of the specification) for all line items to determine whether the offered price reflects a sufficient understanding of the contract requirements and the risk inherent in the offeror's approach. Proposals found to have an unreasonable price may be deemed to be unacceptable and may not receive further consideration. Price will also be a factor in establishing the competitive range prior to discussions and in making the final best value determination for award.

F. DISCUSSIONS:

GENERAL INFORMATION. In accordance with FAR 15.306(d), discussion sessions with each offeror may be held; should discussions take place, all offerors in the competitive range will be allowed a minimum of 3 calendar days to submit Final Proposal Revisions.

DISCUSSION SCHEDULING. When discussions are conducted, the Contracting Officer will schedule the discussion sessions, and each offeror will be notified of the time and place at least two (2) business days prior to their discussion session. The discussion sessions will take place via conference call, or by written notification. The Contracting Officer will provide additional instructions with the notification.

STIPENDS

STIPENDS

PURPOSE: The purpose of authorizing a Stipend in Medium Class Hopper Dredge (MCHD) procurement is to stimulate competition and innovation within the dredging and shipyard industry.

Each Offer, except the contract awardee, who meets the conditions listed below is eligible for an award of a firm fixed price stipend.

1. The Offeror competed in the MCHD solicitation evaluation process and was unsuccessful in receiving the contact award.

2. The Offeror's proposal is otherwise rated acceptable in the source selection process. To receive consideration for a stipend, a rating of no less than "Acceptable" must be achieved for all non-price factors except past performance which must be rated other than "No Confidence."
3. The amount authorized for each stipend award is a firm fixed price of $300,000.00.
4. Unsuccessful Offerors eligible to receive the stipend, shall be notified within 30 calendar days of contract award to invoice for stipend.
5. Only one stipend will be provided to each offeror regardless if the offeror submitted more than one proposal for evaluation.
6. Maximum stipend pool is $3 Million to allow for up to 10 potential $300,000 stipends. In the unlikely event more than 10 acceptable proposals are received, each eligible offeror shall receive an equal per capita share of the stipend pool ($3 Million).

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0001		1	Each		
	3010 Medium Class Hopper Dredge FFP Design, construct, and test one Medium Class Hopper Dredge (MCHD) for the Corps of Engineers, Philadelphia District for use in support of its Ready Reserve mission, in accordance with the attached specifications. FOB: Destination PSC CD: 1955				

NET AMT

INSPECTION AND ACCEPTANCE TERMS

Supplies/services will be inspected/accepted at:

CLIN	INSPECT AT	INSPECT BY	ACCEPT AT	ACCEPT BY
0001	N/A	N/A	Destination	Government

DELIVERY INFORMATION

CLIN	DELIVERY DATE	QUANTITY	SHIP TO ADDRESS	DODAAC / CAGE

0001	N/A	N/A	N/A	N/A

CLAUSES INCORPORATED BY REFERENCE

52.203-12	Limitation On Payments To Influence Certain Federal Transactions	JUN 2020
52.204-7	System for Award Management	OCT 2018
52.204-13	System for Award Management Maintenance	OCT 2018
52.204-16	Commercial and Government Entity Code Reporting	AUG 2020
52.204-18	Commercial and Government Entity Code Maintenance	AUG 2020
52.204-21	Basic Safeguarding of Covered Contractor Information Systems	DEC 2021
52.204-25	Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment	DEC 2021
52.209-7	Information Regarding Responsibility Matters	OCT 2018
52.219-4	Notice of Price Evaluation Preference for HUBZone Small Business Concerns	SEP 2021
52.219-9 Alt II	Small Business Subcontracting Plan (NOV 2021) Alternate II	NOV 2016
52.222-19 (Dev)	Child Labor - Cooperation with Authorities and Remedies (DEVIATION 2020-O0019)	JUL 2020
52.222-25	Affirmative Action Compliance	APR 1984
52.222-50	Combating Trafficking in Persons	DEC 2021
52.225-1	Buy American--Supplies	DEC 2021
52.229-11	Tax on Certain Foreign Procurements--Notice and Representation	JUN 2020
52.232-1	Payments	APR 1984
52.232-39	Unenforceability of Unauthorized Obligations	JUN 2013
52.232-40	Providing Accelerated Payments to Small Business Subcontractors	DEC 2021
52.242-15	Stop-Work Order	AUG 1989
52.242-17	Government Delay Of Work	APR 1984
52.243-1	Changes--Fixed Price	AUG 1987
52.243-6	Change Order Accounting	APR 1984
52.245-1	Government Property	SEP 2021
52.245-9	Use And Charges	APR 2012
52.246-16	Responsibility For Supplies	APR 1984
52.247-34	F.O.B. Destination	NOV 1991
252.203-7000	Requirements Relating to Compensation of Former DoD Officials	SEP 2011
252.203-7002	Requirement to Inform Employees of Whistleblower Rights	SEP 2013
252.203-7003	Agency Office of the Inspector General	AUG 2019
252.203-7005	Representation Relating to Compensation of Former DoD Officials	NOV 2011
252.204-7003	Control Of Government Personnel Work Product	APR 1992
252.204-7012	Safeguarding Covered Defense Information and Cyber Incident Reporting	DEC 2019
252.204-7015	Notice of Authorized Disclosure of Information for Litigation Support	MAY 2016
252.204-7016	Covered Defense Telecommunications Equipment or Services -- Representation	DEC 2019
252.204-7017	Prohibition on the Acquisition of Covered Defense Telecommunications Equipment or Services -- Representation	MAY 2021

252.204-7018	Prohibition on the Acquisition of Covered Defense Telecommunications Equipment or Services	JAN 2021
252.204-7019	Notice of NIST SP 800-171 DoD Assessment Requirements	NOV 2020
252.204-7020	NIST SP 800-171 DoD Assessment Requirements	NOV 2020
252.204-7021	Contractor Compliance with the Cybersecurity Maturity Model Certification Level Requirement	NOV 2020
252.205-7000	Provision Of Information To Cooperative Agreement Holders	DEC 1991
252.211-7007	Reporting of Government-Furnished Property	AUG 2012
252.211-7008	Use of Government-Assigned Serial Numbers	SEP 2010
252.215-7008	Only One Offer	JUL 2019
252.215-7010 (Dev)	Requirements for Certified Cost or Pricing Data and Data Other Than Certified Cost or Pricing Data. (DEVIATION 2020-O0020)	AUG 2020
252.215-7998 (Dev)	Pilot Program to Accelerate Contracting and Pricing Processes (DEVIATION 2020-O0020)	AUG 2020
252.219-7000	Advancing Small Business Growth	SEP 2016
252.219-7003	Small Business Subcontracting Plan (DOD Contracts)	DEC 2019
252.223-7008	Prohibition of Hexavalent Chromium	JUN 2013
252.225-7001	Buy American And Balance Of Payments Program-- Basic	DEC 2017
252.225-7013 (Dev)	Duty-Free Entry (DEVIATION 2020-O0019)	JUL 2020
252.225-7025	Restriction on Acquisition of Forgings	DEC 2009
252.225-7048	Export-Controlled Items	JUN 2013
252.225-7051	Prohibition on Acquisition of Certain Foreign Commercial Satellite Services.	SEP 2021
252.225-7974 (Dev)	Representation Regarding Business Operations with the Maduro Regime (DEVIATION 2020-O0005)	FEB 2020
252.226-7001	Utilization of Indian Organizations and Indian-Owned Economic Enterprises, and Native Hawaiian Small Business Concerns	APR 2019
252.227-7013 Alt II	Rights in Technical Data--Noncommercial Items (FEB 2014) Alternate II	MAR 2011
252.227-7015 Alt I	Technical Data--Commercial Items (FEB 2014) Alternate I	DEC 2011
252.227-7037	Validation of Restrictive Markings on Technical Data	SEP 2016
252.232-7003	Electronic Submission of Payment Requests and Receiving Reports	DEC 2018
252.232-7010	Levies on Contract Payments	DEC 2006
252.232-7015	Performance-Based Payments--Representation	APR 2020
252.232-7016	Notice of Progress Payments or Performance-Based Payments	APR 2020
252.232-7017	Accelerating Payments to Small Business Subcontractors--Prohibition on Fees and Consideration	APR 2020
252.243-7001	Pricing Of Contract Modifications	DEC 1991
252.243-7002	Requests for Equitable Adjustment	DEC 2012
252.244-7000	Subcontracts for Commercial Items	JAN 2021
252.246-7003	Notification of Potential Safety Issues	JUN 2013
252.246-7008	Sources of Electronic Parts	MAY 2018
252.247-7023	Transportation of Supplies by Sea	FEB 2019

CLAUSES INCORPORATED BY FULL TEXT

52.204-8 ANNUAL REPRESENTATIONS AND CERTIFICATIONS (JAN 2022)

(a)(1) The North American Industry Classification System (NAICS) code for this acquisition is 336611.

(2) The small business size standard is 1,250.

(3) The small business size standard for a concern that submits an offer, other than on a construction or service acquisition, but proposes to furnish an end item that it did not itself manufacture, process, or produce is 500 employees if the acquisition--

(i) Is set aside for small business and has a value above the simplified acquisition threshold;

(ii) Uses the HUBZone price evaluation preference regardless of dollar value, unless the offeror waives the price evaluation preference; or

(iii) Is an 8(a), HUBZone, service-disabled veteran-owned, economically disadvantaged women-owned, or women-owned small business set-aside or sole-source award regardless of dollar value.

(b)(1) If the provision at 52.204-7, System for Award Management, is included in this solicitation, paragraph (d) of this provision applies.

(2) If the provision at 52.204-7, System for Award Management, is not included in this solicitation, and the Offeror has an active registration in the System for Award Management (SAM), the Offeror may
choose to use paragraph (d) of this provision instead of completing the corresponding individual representations and certifications in the solicitation. The Offeror shall indicate which option applies by
checking one of the following boxes:

( ) Paragraph (d) applies.

( ) Paragraph (d) does not apply and the offeror has completed the individual representations and certifications in the solicitation.

(c) (1) The following representations or certifications in SAM are applicable to this solicitation as indicated:

(i) 52.203-2, Certificate of Independent Price Determination. This provision applies to solicitations when a firm-fixed-price contract or fixed-price contract with economic price adjustment is contemplated, unless—

(A) The acquisition is to be made under the simplified acquisition procedures in Part 13;

(B) The solicitation is a request for technical proposals under two-step sealed bidding procedures; or

(C) The solicitation is for utility services for which rates are set by law or regulation.

(ii) 52.203-11, Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions. This provision applies to solicitations expected to exceed $150,000.

(iii) 52.203-18, Prohibition on Contracting with Entities that Require Certain Internal Confidentiality Agreements or Statements--Representation. This provision applies to all solicitations.

(iv) 52.204-3, Taxpayer Identification. This provision applies to solicitations that do not include the provision at 52.204-7, System for Award Management.

(v) 52.204-5, Women-Owned Business (Other Than Small Business). This provision applies to solicitations that—

(A) Are not set aside for small business concerns;

(B) Exceed the simplified acquisition threshold; and

(C) Are for contracts that will be performed in the United States or its outlying areas.

(vi) 52.204-26, Covered Telecommunications Equipment or Services--Representation. This provision applies to all solicitations.

(vii) 52.209-2, Prohibition on Contracting with Inverted Domestic Corporations--Representation.

(viii) 52.209-5, Certification Regarding Responsibility Matters. This provision applies to solicitations where the contract value is expected to exceed the simplified acquisition threshold.

(ix) 52.209-11, Representation by Corporations Regarding Delinquent Tax Liability or a Felony Conviction under any Federal Law. This provision applies to all solicitations.

(x) 52.214-14, Place of Performance--Sealed Bidding. This provision applies to invitations for bids except those in which the place of performance is specified by the Government.

(xi) 52.215-6, Place of Performance. This provision applies to solicitations unless the place of performance is specified by the Government.

(xii) 52.219-1, Small Business Program Representations (Basic, Alternates I, and II). This provision applies to solicitations when the contract will be performed in the United States or its outlying areas.

(A) The basic provision applies when the solicitations are issued by other than DoD, NASA, and the Coast Guard.

(B) The provision with its Alternate I applies to solicitations issued by DoD, NASA, or the Coast Guard.

(C) The provision with its Alternate II applies to solicitations that will result in a multiple-award contract with more than one NAICS code assigned.

(xiii) 52.219-2, Equal Low Bids. This provision applies to solicitations when contracting by sealed bidding and the contract will be performed in the United States or its outlying areas.

(xiv) 52.222-22, Previous Contracts and Compliance Reports. This provision applies to solicitations that include the clause at 52.222-26, Equal Opportunity.

(xv) 52.222-25, Affirmative Action Compliance. This provision applies to solicitations, other than those for construction, when the solicitation includes the clause at 52.222-26, Equal Opportunity.

(xvi) 52.222-38, Compliance with Veterans' Employment Reporting Requirements. This provision applies to solicitations when it is anticipated the contract award will exceed the simplified acquisition threshold and the contract is not for acquisition of commercial products or commercial services.

(xvii) 52.223-1, Biobased Product Certification. This provision applies to solicitations that require the delivery or specify the use of USDA-designated items; or include the clause at 52.223-2, Affirmative Procurement of Biobased Products Under Service and Construction Contracts.

(xviii) 52.223-4, Recovered Material Certification. This provision applies to solicitations that are for, or specify the use of, EPA- designated items.

(xix) 52.223-22, Public Disclosure of Greenhouse Gas Emissions and Reduction Goals--Representation. This provision applies to solicitations that include the clause at 52.204-7.)

(xx) 52.225-2, Buy American Certificate. This provision applies to solicitations containing the clause at 52.225-1.

(xxi) 52.225-4, Buy American--Free Trade Agreements--Israeli Trade Act Certificate. (Basic, Alternates I, II, and III.) This provision applies to solicitations containing the clause at 52.225- 3.

(A) If the acquisition value is less than $25,000, the basic provision applies.

(B) If the acquisition value is $25,000 or more but is less than $50,000, the provision with its Alternate I applies.

(C) If the acquisition value is $50,000 or more but is less than $92,319, the provision with its Alternate II applies.

(D) If the acquisition value is $92,319 or more but is less than $100,000, the provision with its Alternate III applies.

(xxii) 52.225-6, Trade Agreements Certificate. This provision applies to solicitations containing the clause at 52.225-5.

(xxiii) 52.225-20, Prohibition on Conducting Restricted Business Operations in Sudan--Certification. This provision applies to all solicitations.

(xxiv) 52.225-25, Prohibition on Contracting with Entities Engaging in Certain Activities or Transactions Relating to Iran—Representation and Certification. This provision applies to all solicitations.

(xxv) 52.226-2, Historically Black College or University and Minority Institution Representation. This provision applies to solicitations for research, studies, supplies, or services of the type normally acquired from higher educational institutions.

(2) The following representations or certifications are applicable as indicated by the Contracting Officer:

[Contracting Officer check as appropriate.]

(i) 52.204-17, Ownership or Control of Offeror.

(ii) 52.204-20, Predecessor of Offeror.

(iii) 52.222-18, Certification Regarding Knowledge of Child Labor for Listed End Products.

(iv) 52.222-48, Exemption from Application of the Service Contract Labor Standards to Contracts for Maintenance, Calibration, or Repair of Certain Equipment--Certification.

(v) 52.222-52 Exemption from Application of the Service Contract Labor Standards to Contracts for Certain Services--Certification.

(vi) 52.223-9, with its Alternate I, Estimate of Percentage of Recovered Material Content for EPA-Designated Products (Alternate I only).

(vii) 52.227-6, Royalty Information.

(A) Basic.

(B) Alternate I.

(viii) 52.227-15, Representation of Limited Rights Data and Restricted Computer Software.

(d) The Offeror has completed the annual representations and certifications electronically in SAM accessed through https://www.sam.gov. After reviewing the SAM information, the Offeror verifies by submission of the offer that the representations and certifications currently posted electronically that apply to this solicitation as indicated in paragraph (c) of this provision have been entered or updated within the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard applicable to the NAICS code referenced for this solicitation), as of the date of this offer and are incorporated in this offer by reference (see FAR 4.1201); except for the changes identified below [offeror to insert changes, identifying change by clause

number, title, date]. These amended representation(s) and/or certification(s) are also incorporated in this offer and are current, accurate, and complete as of the date of this offer.

FAR Clause	Title	Date	Change
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Any changes provided by the offeror are applicable to this solicitation only, and do not result in an update to the representations and certifications posted on SAM.

(End of provision)

52.204-24 REPRESENTATION REGARDING CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT (NOV 2021)

The Offeror shall not complete the representation at paragraph (d)(1) of this provision if the Offeror has represented that it "does not provide covered telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument" in paragraph (c)(1) in the provision at 52.204-26, Covered Telecommunications Equipment or Services--Representation, or in paragraph (v)(2)(i) of the provision at 52.212-3, Offeror Representations and Certifications-Commercial Products and Commercial Services. The Offeror shall not complete the representation in paragraph (d)(2) of this provision if the Offeror has represented that it "does not use covered telecommunications equipment or services, or any equipment, system, or service that uses covered telecommunications equipment or services" in paragraph (c)(2) of the provision at 52.204-26, or in paragraph (v)(2)(ii) of the provision at 52.212-3.

(a) Definitions. As used in this provision-

Backhaul, covered telecommunications equipment or services, critical technology, interconnection arrangements, reasonable inquiry, roaming, and substantial or essential component have the meanings provided in the clause 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

(b) Prohibition.

(1) Section 889(a)(1)(A) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2019, from procuring or obtaining, or extending or renewing a contract to procure or obtain, any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. Nothing in the prohibition shall be construed to--

(i) Prohibit the head of an executive agency from procuring with an entity to provide a service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(ii) Cover telecommunications equipment that cannot route or redirect user data traffic or cannot permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(2) Section 889(a)(1)(B) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2020, from entering into a contract or extending or renewing a contract with an entity that uses any equipment, system, or service that uses covered

telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. This prohibition applies to the use of covered telecommunications equipment or services, regardless of whether that use is in performance of work under a Federal contract. Nothing in the prohibition shall be construed to--

(i) Prohibit the head of an executive agency from procuring with an entity to provide a service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(ii) Cover telecommunications equipment that cannot route or redirect user data traffic or cannot permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(c) Procedures. The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (https://www.sam.gov) for entities excluded from receiving federal awards for "covered telecommunications equipment or services."

(d) Representations. The Offeror represents that--

(1) It [___] will, [___] will not provide covered telecommunications equipment or services to the Government in the performance of any contract, subcontract or other contractual instrument resulting from this solicitation. The Offeror shall provide the additional disclosure information required at paragraph (e)(1) of this section if the Offeror responds "will" in paragraph (d)(1) of this section; and

(2) After conducting a reasonable inquiry, for purposes of this representation, the Offeror represents that--

It [___] does, [___] does not use covered telecommunications equipment or services, or use any equipment, system, or service that uses covered telecommunications equipment or services. The Offeror shall provide the additional disclosure information required at paragraph (e)(2) of this section if the Offeror responds "does" in paragraph (d)(2) of this section.

(e) Disclosures.

(1) Disclosure for the representation in paragraph (d)(1) of this provision. If the Offeror has responded "will" in the representation in paragraph (d)(1) of this provision, the Offeror shall provide the following information as part of the offer:

(i) For covered equipment--

(A) The entity that produced the covered telecommunications equipment (include entity name, unique entity identifier, CAGE code, and whether the entity was the original equipment manufacturer (OEM) or a distributor, if known);

(B) A description of all covered telecommunications equipment offered (include brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); and

(C) Explanation of the proposed use of covered telecommunications equipment and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(1) of this provision.

(ii) For covered services--

(A) If the service is related to item maintenance: A description of all covered telecommunications services offered (include on the item being maintained: Brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); or

(B) If not associated with maintenance, the Product Service Code (PSC) of the service being provided; and explanation of the proposed use of covered telecommunications services and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(1) of this provision.

(2) Disclosure for the representation in paragraph (d)(2) of this provision. If the Offeror has responded "does" in the representation in paragraph (d)(2) of this provision, the Offeror shall provide the following information as part of the offer:

(i) For covered equipment--

(A) The entity that produced the covered telecommunications equipment (include entity name, unique entity identifier, CAGE code, and whether the entity was the OEM or a distributor, if known);

(B) A description of all covered telecommunications equipment offered (include brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); and

(C) Explanation of the proposed use of covered telecommunications equipment and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(2) of this provision.

(ii) For covered services--

(A) If the service is related to item maintenance: A description of all covered telecommunications services offered (include on the item being maintained: Brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); or

(B) If not associated with maintenance, the PSC of the service being provided; and explanation of the proposed use of covered telecommunications services and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(2) of this provision.

(End of provision)

52.204-26 COVERED TELECOMMUNICATIONS EQUIPMENT OR SERVICES--REPRESENTATION (OCT 2020)

(a) Definitions. As used in this provision, “covered telecommunications equipment or services” and "reasonable inquiry" have the meaning provided in the clause 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

(b) Procedures. The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (https://www.sam.gov) for entities excluded from receiving federal awards for “covered telecommunications equipment or services”.

(c) Representations.

(1) The Offeror represents that it [___] does, [___] does not provide covered telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument.

(2) After conducting a reasonable inquiry for purposes of this representation, the offeror represents that it [___] does, [___] does not use covered telecommunications equipment or services, or any equipment, system, or service that uses covered telecommunications equipment or services.

(End of provision)

52.211-8 TIME OF DELIVERY (JUN 1997)

Total period of performance for CLIN 0001 is 1380 calendar days from receipt of the Notice to Proceed issued by the Contracting Officer for CLIN 0001. This includes the 15 calendar days between each Phase of work for MDC review of Submittals as outlined in Section H) All work shall proceed in accordance with the following schedule

(a) The Government requires completion of all work and delivery to be made in accordance to the following schedule:

REQUIRED DELIVERY SCHEDULE

ITEM NUMBER	DESCRIPTION	QUANTITY	WITHIN DAYS AFTER DATE OF NOTICE TO PROCEED
000AA	PLANNING, SCHEDULING (PHASE I)	1 job	120 calendar days
0001AB	ENGINEERING (PHASE II)	1 job	365 calendar days
0001AC	CONSTRUCT, TEST (PHASE III)	1 job	730 calendar days
0001AD	TEST, SEA TRIALS, & DELIVER (PHASE IV)	1 job	120 calendar days

The Government will evaluate equally, as regards time of delivery, offers that propose delivery of each quantity within the applicable delivery period specified above. Offers that propose delivery that will not clearly fall within the applicable required delivery period specified above, will be considered non-responsive and rejected. The Government reserves the right to award under either the required delivery schedule or the proposed delivery schedule when an earlier delivery schedule than required above. If the offeror proposes no other delivery schedule, the required delivery schedule above will apply.

OFFEROR'S PROPOSED DELIVERY SCHEDULE

ITEM NUMBER	DESCRIPTION	QUANTITY	WITHIN DAYS AFTER DATE OF NOTICE TO PROCEED
0001AA	PLANNING, SCHEDULING (PHASE I)	1 job	XXX calendar days

0001AB	ENGINEERING (PHASE II)	1 job	XXX calendar days
0001AC	CONSTRUCT, TEST (PHASE III)	1 job	XXX calendar days
0001AD	TEST, SEA TRIALS, & DELIVER (PHASE IV)	1 job	XXX calendar days

(b) Attention is directed to the Contract Award provision of the solicitation that provides that a written award or acceptance of offer mailed, or otherwise furnished to the successful offeror, results in a binding contract. The Government will mail or otherwise furnish to the offeror an award or notice of award not later than one day after the award is dated. Therefore, the offeror should compute the time available for performance beginning with the actual date of Notice To Proceed rather than the date the written notice is received from the Contracting Officer through the ordinary mails. However, the Government will evaluate an offer that proposes delivery based on the Contractor's date of receipt of the contract or notice of award by adding five days for delivery of the award through the ordinary mails. If, as so computed, the offered delivery date is later than the required date, the offer will be considered non-responsive and rejected.

(End of Clause)

52.211-11 LIQUIDATED DAMAGES--SUPPLIES, SERVICES, OR RESEARCH AND DEVELOPMENT (SEP 2000)

(a) If the Contractor fails to deliver the supplies or perform the services within the time specified in this contract, or any extension, the Contractor shall, in place of actual damages, pay to the Government as fixed, agreed, and liquidated damages, for each calendar day of delay the sum of:

For Line Item 0001 ..... $2,395.71

(b) If the Government terminates this contract in whole or in part under the Default--Fixed-Price Supply and Service clause, the Contractor is liable for liquidated damages accruing until the Government reasonably obtains delivery or performance of similar supplies or services. These liquidated damages are in addition to excess costs of repurchase under the Termination clause.

(c) The Contractor will not be charged with liquidated damages when the delay in delivery or performance is beyond the control and without the fault or negligence of the Contractor as defined in the Default--Fixed-Price Supply and Service clause in this contract.
(End of clause)

52.212-1 INSTRUCTIONS TO OFFERORS--COMMERCIAL PRODUCTS AND COMMERCIAL SERVICES (NOV 2021)

(a) North American Industry Classification System (NAICS) code and small business size standard. The NAICS code(s) and small business size standard(s) for this acquisition appear elsewhere in the solicitation. However, the small business size standard for a concern that submits an offer, other than on a construction or service acquisition, but proposes to furnish an end item that it did not itself manufacture, process, or produce is 500 employees if the acquisition--

(1) Is set aside for small business and has a value above the simplified acquisition threshold;

(2) Uses the HUBZone price evaluation preference regardless of dollar value, unless the offeror waives the price evaluation preference; or

(3) Is an 8(a), HUBZone, service-disabled veteran-owned, economically disadvantaged women-owned, or women-owned small business set-aside or sole-source award regardless of dollar value.

(b) Submission of offers. Submit signed and dated offers to the office specified in this solicitation at or before the exact time specified in this solicitation. Offers may be submitted on the SF 1449, letterhead stationery, or as otherwise specified in the solicitation. As a minimum, offers must show--

(1) The solicitation number;

(2) The time specified in the solicitation for receipt of offers;

(3) The name, address, and telephone number of the offeror;

(4) A technical description of the items being offered in sufficient detail to evaluate compliance with the requirements in the solicitation. This may include product literature, or other documents, if necessary;

(5) Terms of any express warranty;

(6) Price and any discount terms;

(7) "Remit to" address, if different than mailing address;

(8) A completed copy of the representations and certifications at Federal Acquisition Regulation (FAR) 52.212-3 (see FAR 52.212-3(b) for those representations and certifications that the offeror shall complete electronically);

(9) Acknowledgment of Solicitation Amendments;

(10) Past performance information, when included as an evaluation factor, to include recent and relevant contracts for the same or similar items and other references (including contract numbers, points of contact with telephone numbers and other relevant information); and

(11) If the offer is not submitted on the SF 1449, include a statement specifying the extent of agreement with all terms, conditions, and provisions included in the solicitation. Offers that fail to furnish required representations or information, or reject the terms and conditions of the solicitation may be excluded from consideration.

(c) Period for acceptance of offers. The offeror agrees to hold the prices in its offer firm for 30 calendar days from the date specified for receipt of offers, unless another time period is specified in an addendum to the solicitation.

(d) Product samples. When required by the solicitation, product samples shall be submitted at or prior to the time specified for receipt of offers. Unless otherwise specified in this solicitation, these samples shall be submitted at no expense to the Government, and returned at the sender's request and expense, unless they are destroyed during preaward testing.

(e) Multiple offers. Offerors are encouraged to submit multiple offers presenting alternative terms and conditions, including alternative line items (provided that the alternative line items are consistent with FAR subpart 4.10), or alternative commercial products or commercial services for satisfying the requirements of this solicitation. Each offer submitted will be evaluated separately.

(f) Late submissions, modifications, revisions, and withdrawals of offers:

(1) Offerors are responsible for submitting offers, and any modifications, revisions, or withdrawals, so as to reach the Government office designated in the solicitation by the time specified in the solicitation. If no time is specified in the solicitation, the time for receipt is 4:30 p.m., local time, for the designated Government office on the date that offers or revisions are due.

(2)(i) Any offer, modification, revision, or withdrawal of an offer received at the Government office designated in the solicitation after the exact time specified for receipt of offers is “late” and will not be considered unless it is received before award is made, the Contracting Officer determines that accepting the late offer would not unduly delay the acquisition; and--

(A) If it was transmitted through an electronic commerce method authorized by the solicitation, it was received at the initial point of entry to the Government infrastructure not later than 5:00 p.m. one working day prior to the date specified for receipt of offers; or

(B) There is acceptable evidence to establish that it was received at the Government installation designated for receipt of offers and was under the Government's control prior to the time set for receipt of offers; or

(C) If this solicitation is a request for proposals, it was the only proposal received.

(ii) However, a late modification of an otherwise successful offer, that makes its terms more favorable to the Government, will be considered at any time it is received and may be accepted.

(3) Acceptable evidence to establish the time of receipt at the Government installation includes the time/date stamp of that installation on the offer wrapper, other documentary evidence of receipt maintained by the installation, or oral testimony or statements of Government personnel.

(4) If an emergency or unanticipated event interrupts normal Government processes so that offers cannot be received at the Government office designated for receipt of offers by the exact time specified in the solicitation, and urgent Government requirements preclude amendment of the solicitation or other notice of an extension of the closing date, the time specified for receipt of offers will be deemed to be extended to the same time of day specified in the solicitation on the first work day on which normal Government processes resume.

(5) Offers may be withdrawn by written notice received at any time before the exact time set for receipt of offers. Oral offers in response to oral solicitations may be withdrawn orally. If the solicitation authorizes facsimile offers, offers may be withdrawn via facsimile received at any time before the exact time set for receipt of offers, subject to the conditions specified in the solicitation concerning facsimile offers. An offer may be withdrawn in person by an offeror or its authorized representative if, before the exact time set for receipt of offers, the identity of the person requesting withdrawal is established and the person signs a receipt for the offer.

(g) Contract award (not applicable to Invitation for Bids). The Government intends to evaluate offers and award a contract without discussions with offerors. Therefore, the offeror's initial offer should contain the offeror's best terms from a price and technical standpoint. However, the Government reserves the right to conduct discussions if later determined by the Contracting Officer to be necessary. The Government may reject any or all offers if such action is in the public interest; accept other than the lowest offer; and waive informalities and minor irregularities in offers received.

(h) Multiple awards. The Government may accept any item or group of items of an offer, unless the offeror qualifies the offer by specific limitations. Unless otherwise provided in the Schedule, offers may not be submitted for quantities less than those specified. The Government reserves the right to make an award on any item for a quantity less than the quantity offered, at the unit prices offered, unless the offeror specifies otherwise in the offer.

(i) Availability of requirements documents cited in the solicitation.

(1)(i) The GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29, and copies of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained for a fee by submitting a request to--GSA Federal Supply Service Specifications Section, Suite 8100, 470 East L'Enfant Plaza, SW, Washington, DC 20407, Telephone (202) 619-8925, Facsimile (202) 619-8978.

(ii) If the General Services Administration, Department of Agriculture, or Department of Veterans Affairs issued this solicitation, a single copy of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained free of charge by submitting a request to the addressee in paragraph (i)(1)(i) of this provision. Additional copies will be issued for a fee.

(2) Most unclassified Defense specifications and standards may be downloaded from the following ASSIST websites:

(i) ASSIST (https://assist.dla.mil/online/start/).

(ii) Quick Search (http://quicksearch.dla.mil/).

(3) Documents not available from ASSIST may be ordered from the Department of Defense Single Stock Point (DoDSSP) by--

(i) Using the ASSIST Shopping Wizard (https://assist.dla.mil/wizard/index.cfm);

(ii) Phoning the DoDSSP Customer Service Desk (215) 697-2179, Mon-Fri, 0730 to 1600 EST; or

(iii) Ordering from DoDSSP, Building 4, Section D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Telephone (215) 697-2667/2179, Facsimile (215) 697-1462.

(4) Nongovernment (voluntary) standards must be obtained from the organization responsible for their preparation, publication, or maintenance.

(j) Unique entity identifier. (Applies to all offers that exceed the micro-purchase threshold, and offers at or below the micro-purchase threshold if the solicitation requires the Contractor to be registered in the System for Award Management (SAM).) The Offeror shall enter, in the block with its name and address on the cover page of its offer, the annotation "Unique Entity Identifier" followed by the unique entity identifier that identifies the Offeror's name and address. The Offeror also shall enter its Electronic Funds Transfer (EFT) indicator, if applicable. The EFT indicator is a four-character suffix to the unique entity identifier. The suffix is assigned at the discretion of the Offeror to establish additional SAM records for identifying alternative EFT accounts (see FAR subpart 32.11) for the same entity. If the Offeror does not have a unique entity identifier, it should contact the entity designated at www.sam.gov for unique entity identifier establishment directly to obtain one. The Offeror should indicate that it is an offeror for a Government contract when contacting the entity designated at www.sam.gov for establishing the unique entity identifier.

(k) Reserved.

(l) Debriefing. If a post-award debriefing is given to requesting offerors, the Government shall disclose the following information, if applicable:

(1) The agency's evaluation of the significant weak or deficient factors in the debriefed offeror's offer.

(2) The overall evaluated cost or price and technical rating of the successful and the debriefed offeror and past performance information on the debriefed offeror.

(3) The overall ranking of all offerors, when any ranking was developed by the agency during source selection.

(4) A summary of the rationale for award;

(5) For acquisitions of commercial products, the make and model of the product to be delivered by the successful offeror.

(6) Reasonable responses to relevant questions posed by the debriefed offeror as to whether source-selection procedures set forth in the solicitation, applicable regulations, and other applicable authorities were followed by the agency.

(End of provision)

ADDENDUM TO 52.212-1 INSTRUCTIONS TO OFFERORS--COMMERCIAL ITEMS (JUN 2020)

Paragrah (c) Period for acceptance of offers is hereby deleted and replaced with the following:

The offeror agrees to hold the prices in its offer firm for **120 calendar days** from the date specified for receipt of offers, unless another time period is specified in an addendum to the solicitation.

(End of provision addendum)

52.212-3 OFFEROR REPRESENTATIONS AND CERTIFICATIONS--COMMERCIAL PRODUCTS AND COMMERCIAL SERVICES (NOV 2021) ALTERNATE I (OCT 2014)

The Offeror shall complete only paragraph (b) of this provision if the Offeror has completed the annual representations and certification electronically in the System for Award Management (SAM) accessed through https://www.sam.gov. If the Offeror has not completed the annual representations and certifications electronically, the Offeror shall complete only paragraphs (c) through (v) of this provision.

(a) *Definitions.* As used in this provision--

"Covered telecommunications equipment or services" has the meaning provided in the clause 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

"Economically disadvantaged women-owned small business (EDWOSB) concern" means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States and who are economically disadvantaged in accordance with 13 CFR part 127. It automatically qualifies as a women-owned small business eligible under the WOSB Program.

"Forced or indentured child labor" means all work or service—

(1) Exacted from any person under the age of 18 under the menace of any penalty for its nonperformance and for which the worker does not offer himself voluntarily; or

(2) Performed by any person under the age of 18 pursuant to a contract the enforcement of which can be accomplished by process or penalties.

"Highest-level owner" means the entity that owns or controls an immediate owner of the offeror, or that owns or controls one or more entities that control an immediate owner of the offeror. No entity owns or exercises control of the highest level owner.

"Immediate owner" means an entity, other than the offeror, that has direct control of the offeror. Indicators of control include, but are not limited to, one or more of the following: Ownership or interlocking management, identity of interests among family members, shared facilities and equipment, and the common use of employees.

"Inverted domestic corporation," means a foreign incorporated entity that meets the definition of an inverted domestic corporation under 6 U.S.C. 395(b), applied in accordance with the rules and definitions of 6 U.S.C. 395(c).

"Manufactured end product" means any end product in product and service codes (PSCs) 1000-9999, except—

(1) PSC 5510, Lumber and Related Basic Wood Materials;

(2) Product or Service Group (PSG) 87, Agricultural Supplies;

(3) PSG 88, Live Animals;

(4) PSG 89, Subsistence;

(5) PSC 9410, Crude Grades of Plant Materials;

(6) PSC 9430, Miscellaneous Crude Animal Products, Inedible;

(7) PSC 9440, Miscellaneous Crude Agricultural and Forestry Products;

(8) PSC 9610, Ores;

(9) PSC 9620, Minerals, Natural and Synthetic; and

(10) PSC 9630, Additive Metal Materials.

"Place of manufacture" means the place where an end product is assembled out of components, or otherwise made or processed from raw materials into the finished product that is to be provided to the Government. If a product is disassembled and reassembled, the place of reassembly is not the place of manufacture.

"Reasonable inquiry" has the meaning provided in the clause 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

"Restricted business operations" means business operations in Sudan that include power production activities, mineral extraction activities, oil-related activities, or the production of military equipment, as those terms are defined in the Sudan Accountability and Divestment Act of 2007 (Pub. L. 110-174). Restricted business operations do not include business operations that the person (as that term is defined in Section 2 of the Sudan Accountability and Divestment Act of 2007) conducting the business can demonstrate—

(1) Are conducted under contract directly and exclusively with the regional government of southern Sudan;

(2) Are conducted pursuant to specific authorization from the Office of Foreign Assets Control in the Department of the Treasury, or are expressly exempted under Federal law from the requirement to be conducted under such authorization;

(3) Consist of providing goods or services to marginalized populations of Sudan;

(4) Consist of providing goods or services to an internationally recognized peacekeeping force or humanitarian organization;

(5) Consist of providing goods or services that are used only to promote health or education; or

(6) Have been voluntarily suspended.

"Sensitive technology"—

(1) Means hardware, software, telecommunications equipment, or any other technology that is to be used specifically—

(i) To restrict the free flow of unbiased information in Iran; or

(ii) To disrupt, monitor, or otherwise restrict speech of the people of Iran; and

(2) Does not include information or informational materials the export of which the President does not have the authority to regulate or prohibit pursuant to section 203(b)(3) of the International Emergency Economic Powers Act (50 U.S.C. 1702(b)(3)).

"Service-disabled veteran-owned small business concern"—

(1) Means a small business concern—

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a service-disabled veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

"Small business concern"—

(1) Means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria in 13 CFR part 121 and size standards in this solicitation.

(2) Affiliates, as used in this definition, means business concerns, one of whom directly or indirectly controls or has the power to control the others, or a third party or parties control or have the power to control the others. In determining whether affiliation exists, consideration is given to all appropriate
factors including common ownership, common management, and contractual relationships. SBA determines affiliation based on the factors set forth at 13 CFR 121.103.

"Small disadvantaged business concern, consistent with 13 CFR 124.1002," means a small business concern under the size standard applicable to the acquisition, that--

(1) Is at least 51 percent unconditionally and directly owned (as defined at 13 CFR 124.105) by--

(i) One or more socially disadvantaged (as defined at 13 CFR 124.103) and economically disadvantaged (as defined at 13 CFR 124.104) individuals who are citizens of the United States; and

(ii) Each individual claiming economic disadvantage has a net worth not exceeding $750,000 after taking into account the applicable exclusions set forth at 13 CFR 124.104(c)(2); and

(2) The management and daily business operations of which are controlled (as defined at 13 CFR 124.106) by individuals, who meet the criteria in paragraphs (1)(i) and (ii) of this definition.

"Subsidiary" means an entity in which more than 50 percent of the entity is owned—

(1) Directly by a parent corporation; or

(2) Through another subsidiary of a parent corporation.

"Veteran-owned small business concern" means a small business concern—

(1) Not less than 51 percent of which is owned by one or more veterans(as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

"Women-owned business concern" means a concern which is at least 51 percent owned by one or more women; or in the case of any publicly owned business, at least 51 percent of the its stock is owned by one or more women; and whose management and daily business operations are controlled by one or more women.

"Women-owned small business concern" means a small business concern --

(1) That is at least 51 percent owned by one or more women or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and

(2) Whose management and daily business operations are controlled by one or more women.

"Women-owned small business (WOSB) concern eligible under the WOSB Program (in accordance with 13 CFR part 127)," means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States.

(b)

(1) Annual Representations and Certifications. Any changes provided by the Offeror in paragraph (b)(2) of this provision do not automatically change the representations and certifications in SAM.

(2) The offeror has completed the annual representations and certifications electronically in SAM accessed through http://www.sam.gov. After reviewing SAM information, the Offeror verifies by submission of this offer that the representations and certifications currently posted electronically at FAR 52.212-3, Offeror Representations and Certifications--Commercial Products and Commercial Services, have been entered or updated in the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard(s) applicable

to the NAICS code(s) referenced for this solicitation), at the time this offer is submitted and are incorporated in this offer by reference (see FAR 4.1201), except for paragraphs __.

[Offeror to identify the applicable paragraphs at (c) through (v) of this provision that the offeror has completed for the purposes of this solicitation only, if any.

These amended representation(s) and/or certification(s) are also incorporated in this offer and are current, accurate, and complete as of the date of this offer.

Any changes provided by the offeror are applicable to this solicitation only, and do not result in an update to the representations and certifications posted electronically on SAM.]

(c) Offerors must complete the following representations when the resulting contract is to be performed in the United States or its outlying areas. Check all that apply.

(1) *Small business concern.* The offeror represents as part of its offer that it [____] is, [____] is not a small business concern.

(2) Veteran-owned small business concern. [Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.] The offeror represents as part of its offer that it [____] is, [____] is not a veteran-owned small business concern.

(3) Service-disabled veteran-owned small business concern. [Complete only if the offeror represented itself as a veteran-owned small business concern in paragraph (c)(2) of this provision.] The offeror represents as part of its offer that it [____] is, [____] is not a service-disabled veteran-owned small business concern.

(4) Small disadvantaged business concern. [Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.]The offeror represents that it [____] is, [____] is not, a small disadvantaged business concern as defined in 13 CFR 124.1002.

(5) Women-owned small business concern. [Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.]The offeror represents that it [____] is, [____] is not a women-owned small business concern.

Note: Complete paragraphs (c)(8) and (c)(9) only if this solicitation is expected to exceed the simplified acquisition threshold.

(6) WOSB concern eligible under the WOSB Program. [Complete only if the offeror represented itself as a women-owned small business concern in paragraph (c)(5) of this provision.] The offeror represents that—

(i) It [____] is, [____] is not a WOSB concern eligible under the WOSB Program, has provided all the required documents to the WOSB Repository, and no change in circumstances or adverse decisions have been issued that affects its eligibility; and

(ii) It [____] is, [____] is not a joint venture that complies with the requirements of 13 CFR part 127, and the representation in paragraph (c)(6)(i) of this provision is accurate for each WOSB concern eligible under the WOSB Program participating in the joint venture. [The offeror shall enter the name or names of the WOSB concern eligible

under the WOSB Program and other small businesses that are participating in the joint venture: ____ .] Each WOSB concern eligible under the WOSB Program participating in the joint venture shall submit a separate signed copy of the WOSB representation.

(7) Economically disadvantaged women-owned small business (EDWOSB) concern. [Complete only if the offeror represented itself as a WOSB concern eligible under the WOSB Program in (c)(6) of this provision.] The offeror represents that—

(i) It [____] is, [____] is not an EDWOSB concern, has provided all the required documents to the WOSB Repository, and no change in circumstances or adverse decisions have been issued that affects its eligibility; and

(ii) It [____] is, [____] is not a joint venture that complies with the requirements of 13 CFR part 127, and the representation in paragraph (c)(7)(i) of this provision is accurate for each EDWOSB concern participating in the joint venture. [The offeror shall enter the name or names of the EDWOSB concern and other small businesses that are participating in the joint venture: ____ .] Each EDWOSB concern participating in the joint venture shall submit a separate signed copy of the EDWOSB representation.

(8) Women-owned business concern (other than small business concern). [Complete only if the offeror is a women-owned business concern and did not represent itself as a small business concern in paragraph (c)(1) of this provision.] The offeror represents that it [____] is, a women-owned business concern.

(9) *Tie bid priority for labor surplus area concerns.* If this is an invitation for bid, small business offerors may identify the labor surplus areas in which costs to be incurred on account of manufacturing or production (by offeror or first-tier subcontractors) amount to more than 50 percent of the contract price:

____

(10) HUBZone small business concern. [Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.] The offeror represents, as part of its offer, that--

(i) It [____] is, [____] is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material changes in ownership and control, principal office, or HUBZone employee percentage have occurred since it was certified in accordance with 13 CFR part 126; and

(ii) It [____] is, [____] is not a HUBZone joint venture that complies with the requirements of 13 CFR part 126, and the representation in paragraph (c)(10)(i) of this provision is accurate for each HUBZone small business concern participating in the HUBZone joint venture. [*The offeror shall enter the names of each of the HUBZone small business concerns participating in the HUBZone joint venture*: ____ .] Each HUBZone small business concern participating in the HUBZone joint venture shall submit a separate signed copy of the HUBZone representation.

(11) (Complete if the offeror has represented itself as disadvantaged in paragraph (c)(4) of this provision.)

[*The offeror shall check the category in which its ownership falls*]:

___ Black American.

___ Hispanic American.

___ Native American (American Indians, Eskimos, Aleuts, or Native Hawaiians).

___ Asian-Pacific American (persons with origins from Burma, Thailand, Malaysia, Indonesia, Singapore, Brunei, Japan, China, Taiwan, Laos, Cambodia (Kampuchea), Vietnam, Korea, The Philippines, Republic of Palau, Republic of the Marshall Islands, Federated States of Micronesia, the Commonwealth of the Northern Mariana Islands, Guam, Samoa, Macao, Hong Kong, Fiji, Tonga, Kiribati, Tuvalu, or Nauru).

___ Subcontinent Asian (Asian-Indian) American (persons with origins from India, Pakistan, Bangladesh, Sri Lanka, Bhutan, the Maldives Islands, or Nepal).

___ Individual/concern, other than one of the preceding.

(d) Representations required to implement provisions of Executive Order 11246 --

(1) Previous contracts and compliance. The offeror represents that --

(i) It [____] has, [____] has not, participated in a previous contract or subcontract subject to the Equal Opportunity clause of this solicitation; and

(ii) It [____] has, [____] has not, filed all required compliance reports.

(2) *Affirmative Action Compliance*. The offeror represents that --

(i) It [____] has developed and has on file, [____] has not developed and does not have on file, at each establishment, affirmative action programs required by rules and regulations of the Secretary of Labor (41 CFR parts 60-1 and 60-2), or

(ii) It [____] has not previously had contracts subject to the written affirmative action programs requirement of the rules and regulations of the Secretary of Labor.

(e) *Certification Regarding Payments to Influence Federal Transactions* (31 U.S.C. 1352). (Applies only if the contract is expected to exceed $150,000.) By submission of its offer, the offeror certifies to the best of its knowledge and belief that no Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress or an employee of a Member of Congress on his or her behalf in connection with the award of any resultant contract. If any registrants under the Lobbying Disclosure Act of 1995 have made a lobbying contact on behalf of the offeror with respect to this contract, the offeror shall complete and submit, with its offer, OMB Standard Form LLL, Disclosure of Lobbying Activities, to provide the name of the registrants. The offeror need not report regularly employed officers or employees of the offeror to whom payments of reasonable compensation were made.

(f) *Buy American Certificate.* (Applies only if the clause at Federal Acquisition Regulation (FAR) 52.225-1, Buy American – Supplies, is included in this solicitation.)

(1) (i) The Offeror certifies that each end product, except those listed in paragraph (f)(2) of this provision, is a domestic end product.

(ii) The Offeror shall list as foreign end products those end products manufactured in the United States that do not qualify as domestic end products.

(iii) The terms "domestic end product," "end product," "foreign end product," and "United States" are defined in the clause of this solicitation entitled "Buy American-Supplies."

(2) Foreign End Products:

Line item No.	Country of origin
___	___
___	___
___	___

[List as necessary]

(3) The Government will evaluate offers in accordance with the policies and procedures of FAR Part 25.

(g)

(1) *Buy American -- Free Trade Agreements -- Israeli Trade Act Certificate*. (Applies only if the clause at FAR 52.225-3, Buy American -- Free Trade Agreements -- Israeli Trade Act, is included in this solicitation.)

(i) (A) The Offeror certifies that each end product, except those listed in paragraph (g)(1)(ii) or (iii) of this provision, is a domestic end product.

(B) The terms "Bahrainian, Moroccan, Omani, Panamanian, or Peruvian end product," "domestic end product," "end product," "foreign end product," "Free Trade Agreement country," "Free Trade Agreement country end product," "Israeli end product," and "United States" are defined in the clause of this solicitation entitled "Buy American--Free Trade Agreements--Israeli Trade Act."

(ii) The Offeror certifies that the following supplies are Free Trade Agreement country end products (other than Bahrainian, Moroccan, Omani, Panamanian, or Peruvian end products) or Israeli end products as defined in the clause of this solicitation entitled "Buy American--Free Trade Agreements--Israeli Trade Act."

Free Trade Agreement Country End Products (Other than Bahrainian, Moroccan, Omani, Panamanian, or Peruvian End Products) or Israeli End Products:

Line item No.	Country of origin
___	___
___	___
___	___

[*List as necessary*]

(iii) The Offeror shall list those supplies that are foreign end products (other than those listed in paragraph (g)(1)(ii) of this provision) as defined in the clause of this solicitation entitled "Buy American--Free Trade Agreements--

Israeli Trade Act." The Offeror shall list as other foreign end products those end products manufactured in the United States that do not qualify as domestic end products.

Other Foreign End Products:

Line item No.	Country of origin
___	___
___	___
___	___

[*List as necessary*]

(iv) The Government will evaluate offers in accordance with the policies and procedures of FAR Part 25.

(2) *Buy American—Free Trade Agreements—Israeli Trade Act Certificate, Alternate I.* If Alternate I to the clause at FAR 52.225-3 is included in this solicitation, substitute the following paragraph (g)(1)(ii) for paragraph (g)(1)(ii) of the basic provision:

(g)(1)(ii) The offeror certifies that the following supplies are Canadian end products as defined in the clause of this solicitation entitled "Buy American—Free Trade Agreements—Israeli Trade Act":

Canadian End Products:

Line item No.
___
___
___

[List as necessary]

(3) *Buy American—Free Trade Agreements—Israeli Trade Act Certificate, Alternate II.* If Alternate II to the clause at FAR 52.225-3 is included in this solicitation, substitute the following paragraph (g)(1)(ii) for paragraph (g)(1)(ii) of the basic provision:

(g)(1)(ii) The offeror certifies that the following supplies are Canadian end products or Israeli end products as defined in the clause of this solicitation entitled "Buy American--Free Trade Agreements--Israeli Trade Act":

Canadian or Israeli End Products:

Line item No.	Country of origin
___	___
___	___
___	___

[*List as necessary*]

(4) *Buy American—Free Trade Agreements—Israeli Trade Act Certificate, Alternate III.* If Alternate III to the clause at 52.225-3 is included in this solicitation, substitute the following paragraph (g)(1)(ii) for paragraph (g)(1)(ii) of the basic provision:

(g)(1)(ii) The offeror certifies that the following supplies are Free Trade Agreement country end products (other than Bahrainian, Korean, Moroccan, Omani, Panamanian, or Peruvian end products) or Israeli end products as defined in the clause of this solicitation entitled "Buy American—Free Trade Agreements—Israeli Trade Act":

Free Trade Agreement Country End Products (Other than Bahrainian, Korean, Moroccan, Omani, Panamanian, or Peruvian End Products) or Israeli End Products:

Line item No.	Country of origin
___	___
___	___
___	___

[*List as necessary*]

(5) *Trade Agreements Certificate*. (Applies only if the clause at FAR 52.225-5, Trade Agreements, is included in this solicitation.)

(i) The offeror certifies that each end product, except those listed in paragraph (g)(5)(ii) of this provision, is a U.S.-made or designated country end product as defined in the clause of this solicitation entitled "Trade Agreements."

(ii) The offeror shall list as other end products those end products that are not U.S.-made or designated country end products.

Other End Products

Line item No.	Country of origin
___	___
___	___
___	___

[*List as necessary*]

(iii) The Government will evaluate offers in accordance with the policies and procedures of FAR Part 25. For line items covered by the WTO GPA, the Government will evaluate offers of U.S.-made or designated country end products without regard to the restrictions of the Buy American statute. The Government will consider for award only offers of U.S.-made or designated country end products unless the Contracting Officer determines that there are no offers for such products or that the offers for such products are insufficient to fulfill the requirements of the solicitation.

(h) *Certification Regarding Responsibility Matters (Executive Order 12689)*. (Applies only if the contract value is expected to exceed the simplified acquisition threshold.) The offeror certifies, to the best of its knowledge and belief, that the offeror and/or any of its principals--

(1) [____] Are, [____] are not presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

(2) [____] Have, [____] have not, within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a Federal, state or local government contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating Federal criminal tax laws, or receiving stolen property; and

(3) [____] Are, [____] are not presently indicted for, or otherwise criminally or civilly charged by a Government entity with, commission of any of these offenses enumerated in paragraph (h)(2) of this clause; and

(4) [____] Have, [____] have not, within a three-year period preceding this offer, been notified of any delinquent Federal taxes in an amount that exceeds the threshold at 9.104-5(a)(2) for which the liability remains unsatisfied.

(i) Taxes are considered delinquent if both of the following criteria apply:

(A) *The tax liability is finally determined.* The liability is finally determined if it has been assessed. A liability is not finally determined if there is a pending administrative or judicial challenge. In the case of a judicial challenge to the liability, the liability is not finally determined until all judicial appeal rights have been exhausted.

(B) *The taxpayer is delinquent in making payment.* A taxpayer is delinquent if the taxpayer has failed to pay the tax liability when full payment was due and required. A taxpayer is not delinquent in cases where enforced collection action is precluded.

(ii) Examples.

(A) The taxpayer has received a statutory notice of deficiency, under I.R.C. §6212, which entitles the taxpayer to seek Tax Court review of a proposed tax deficiency. This is not a delinquent tax because it is not a final tax liability. Should the taxpayer seek Tax Court review, this will not be a final tax liability until the taxpayer has exercised all judicial appear rights.

(B) The IRS has filed a notice of Federal tax lien with respect to an assessed tax liability, and the taxpayer has been issued a notice under I.R.C. §6320 entitling the taxpayer to request a hearing with the IRS Office of Appeals Contesting the lien filing, and to further appeal to the Tax Court if the IRS determines to sustain the lien filing. In the course of the hearing, the taxpayer is entitled to contest the underlying tax liability because the taxpayer has had no prior opportunity to contest the liability. This is not a delinquent tax because it is not a final tax liability. Should the taxpayer seek tax court review, this will not be a final tax liability until the taxpayer has exercised all judicial appeal rights.

(C) The taxpayer has entered into an installment agreement pursuant to I.R.C. §6159. The taxpayer is making timely payments and is in full compliance with the agreement terms. The taxpayer is not delinquent because the taxpayer is not currently required to make full payment.

(D) The taxpayer has filed for bankruptcy protection. The taxpayer is not delinquent because enforced collection action is stayed under 11 U.S.C. §362 (the Bankruptcy Code).

(i) Certification Regarding Knowledge of Child Labor for Listed End Products (Executive Order 13126). [The Contracting Officer must list in paragraph (i)(1) any end products being acquired under this solicitation that are included in the List of Products Requiring Contractor Certification as to Forced or Indentured Child Labor, unless excluded at 22.1503(b).]

(1) Listed End Product

Listed end product	Listed countries of origin
___	___
___	___
___	___

(2) Certification. [If the Contracting Officer has identified end products and countries of origin in paragraph (i)(1) of this provision, then the offeror must certify to either (i)(2)(i) or (i)(2)(ii) by checking the appropriate block.]

[____] (i) The offeror will not supply any end product listed in paragraph (i)(1) of this provision that was mined, produced, or manufactured in the corresponding country as listed for that product.

[____] (ii) The offeror may supply an end product listed in paragraph (i)(1) of this provision that was mined, produced, or manufactured in the corresponding country as listed for that product. The offeror certifies that is has made a good faith effort to determine whether forced or indentured child labor was used to mine, produce, or manufacture any such end product furnished under this contract. On the basis of those efforts, the offeror certifies that it is not aware of any such use of child labor.

(j) *Place of manufacture.* (Does not apply unless the solicitation is predominantly for the acquisition of manufactured end products.) For statistical purposes only, the offeror shall indicate whether the place of manufacture of the end products it expects to provide in response to this solicitation is predominantly—

(1) [____] In the United States (Check this box if the total anticipated price of offered end products manufactured in the United States exceeds the total anticipated price of offered end products manufactured outside the United States); or

(2) [____] Outside the United States.

(k) Certificates regarding exemptions from the application of the Service Contract Labor Standards. (Certification by the offeror as to its compliance with respect to the contract also constitutes its certification as to compliance by its subcontractor if it subcontracts out the exempt services.) [The contracting officer is to check a box to indicate if paragraph (k)(1) or (k)(2) applies.]

(1) [____] Maintenance, calibration, or repair of certain equipment as described in FAR 22.1003-4(c)(1). The

offeror [____] does [____] does not certify that—

(i) The items of equipment to be serviced under this contract are used regularly for other than Governmental purposes and are sold or traded by the offeror (or subcontractor in the case of an exempt subcontract) in substantial quantities to the general public in the course of normal business operations;

(ii) The services will be furnished at prices which are, or are based on, established catalog or market prices (see FAR 22.1003-4(c)(2)(ii)) for the maintenance, calibration, or repair of such equipment; and

(iii) The compensation (wage and fringe benefits) plan for all service employees performing work under the contract will be the same as that used for these employees and equivalent employees servicing the same equipment of commercial customers.

(2) [____] Certain services as described in FAR 22.1003-4(d)(1). The offeror [____] does [____] does not certify that—

(i) The services under the contract are offered and sold regularly to non-Governmental customers, and are provided by the offeror (or subcontractor in the case of an exempt subcontract) to the general public in substantial quantities in the course of normal business operations;

(ii) The contract services will be furnished at prices that are, or are based on, established catalog or market prices (see FAR 22.1003-4(d)(2)(iii));

(iii) Each service employee who will perform the services under the contract will spend only a small portion of his or her time (a monthly average of less than 20 percent of the available hours on an annualized basis, or less than 20 percent of available hours during the contract period if the contract period is less than a month) servicing the Government contract; and

(iv) The compensation (wage and fringe benefits) plan for all service employees performing work under the contract is the same as that used for these employees and equivalent employees servicing commercial customers.

(3) If paragraph (k)(1) or (k)(2) of this clause applies—

(i) If the offeror does not certify to the conditions in paragraph (k)(1) or (k)(2) and the Contracting Officer did not attach a Service Contract Labor Standards wage determination to the solicitation, the offeror shall notify the Contracting Officer as soon as possible; and

(ii) The Contracting Officer may not make an award to the offeror if the offeror fails to execute the certification in paragraph (k)(1) or (k)(2) of this clause or to contact the Contracting Officer as required in paragraph (k)(3)(i) of this clause.

(l) *Taxpayer identification number (TIN) (26 U.S.C. 6109, 31 U.S.C. 7701)*. (Not applicable if the offeror is required to provide this information to SAM to be eligible for award.)

(1) All offerors must submit the information required in paragraphs (l)(3) through (l)(5) of this provision to comply with debt collection requirements of 31 U.S.C. 7701(c) and 3325(d), reporting requirements of 26 U.S.C. 6041, 6041A, and 6050M, and implementing regulations issued by the Internal Revenue Service (IRS).

(2) The TIN may be used by the government to collect and report on any delinquent amounts arising out of the offeror's relationship with the Government (31 U.S.C. 7701(c)(3)). If the resulting contract is subject to the payment reporting requirements described in FAR 4.904, the TIN provided hereunder may be matched with IRS records to verify the accuracy of the offeror's TIN.

(3) Taxpayer Identification Number (TIN).

[____] TIN: ____ .

[____] TIN has been applied for.

[____] TIN is not required because:

[____] Offeror is a nonresident alien, foreign corporation, or foreign partnership that does not have income effectively connected with the conduct of a trade or business in the United States and does not have an office or place of business or a fiscal paying agent in the United States;

[____] Offeror is an agency or instrumentality of a foreign government;

[____] Offeror is an agency or instrumentality of the Federal Government;

(4) Type of organization.

[____] Sole proprietorship;

[____] Partnership;

[____] Corporate entity (not tax-exempt);

[____] Corporate entity (tax-exempt);

[____] Government entity (Federal, State, or local);

[____] Foreign government;

[____] International organization per 26 CFR 1.6049-4;

[____] Other ____ .

(5) Common parent.

[____] Offeror is not owned or controlled by a common parent:

[____] Name and TIN of common parent:

Name ____

TIN ____

(m) *Restricted business operations in Sudan*. By submission of its offer, the offeror certifies that the offeror does not conduct any restricted business operations in Sudan.

(n) Prohibition on Contracting with Inverted Domestic Corporations—

(1) Government agencies are not permitted to use appropriated (or otherwise made available) funds for contracts with either an inverted domestic corporation, or a subsidiary of an inverted domestic corporation, unless the exception at 9.108-2(b) applies or the requirement is waived in accordance with the procedures at 9.108-4.

(2) Representation. The Offeror represents that--

(i) It [___] is, [___] is not an inverted domestic corporation; and

(ii) It [___] is, [___] is not a subsidiary of an inverted domestic corporation.

(o) Prohibition on contracting with entities engaging in certain activities or transactions relating to Iran.

(1) The offeror shall email questions concerning sensitive technology to the Department of State at CISADA106@state.gov.

(2) Representation and Certification. Unless a waiver is granted or an exception applies as provided in paragraph (o)(3) of this provision, by submission of its offer, the offeror—

(i) Represents, to the best of its knowledge and belief, that the offeror does not export any sensitive technology to the government of Iran or any entities or individuals owned or controlled by, or acting on behalf or at the direction of, the government of Iran;

(ii) Certifies that the offeror, or any person owned or controlled by the offeror, does not engage in any activities for which sanctions may be imposed under section 5 of the Iran Sanctions Act; and

(iii) Certifies that the offeror, and any person owned or controlled by the offeror, does not knowingly engage in any transaction that exceeds the threshold at FAR 25.703-2(a)(2) with Iran's Revolutionary Guard Corps or any of its officials, agents, or affiliates, the property and interests in property of which are blocked pursuant to the International Emergency Economic Powers Act (50(U.S.C. 1701 et seq.) (see OFAC's Specially Designated Nationals and Blocked Persons List at https://www.treasury.gov/resource-center/sanctions/SDN-List/Pages/default.aspx).

(3) The representation and certification requirements of paragraph (o)(2) of this provision do not apply if—

(i) This solicitation includes a trade agreements certification (e.g., 52.212-3(g) or a comparable agency provision); and

(ii) The offeror has certified that all the offered products to be supplied are designated country end products.

(p) Ownership or Control of Offeror. (Applies in all solicitations when there is a requirement to be registered in SAM or a requirement to have a unique entity identifier in the solicitation.

(1) The Offeror represents that it [___] has or [___] does not have an immediate owner. If the Offeror has more than one immediate owner (such as a joint venture), then the Offeror shall respond to paragraph (2) and if applicable, paragraph (3) of this provision for each participant in the joint venture.

(2) If the Offeror indicates "has" in paragraph (p)(1) of this provision, enter the following information:
Immediate owner CAGE code: _____.
Immediate owner legal name: _____.
(Do not use a "doing business as" name)
Is the immediate owner owned or controlled by another entity: _ Yes or _ No.

(3) If the Offeror indicates "yes" in paragraph (p)(2) of this provision, indicating that the immediate owner is owned or controlled by another entity, then enter the following information:
Highest-level owner CAGE code: _____.
Highest-level owner legal name: _____.
(Do not use a "doing business as" name)

(q) Representation by Corporations Regarding Delinquent Tax Liability or a Felony Conviction under any Federal Law.

(1) As required by sections 744 and 745 of Division E of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235), and similar provisions, if contained in subsequent appropriations acts, The Government will not enter into a contract with any corporation that—

(i) Has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability, where the awarding agency is aware of the unpaid tax liability, unless an agency has considered suspension or debarment of the corporation and made a determination that suspension or debarment is not necessary to protect the interests of the Government; or

(ii) Was convicted of a felony criminal violation under any Federal law within the preceding 24 months, where the awarding agency is aware of the conviction, unless an agency has considered suspension or debarment of the corporation and made a determination that this action is not necessary to protect the interests of the Government.

(2) The Offeror represents that—

(i) It is _ is not _ a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability; and

(ii) It is _ is not _ a corporation that was convicted of a felony criminal violation under a Federal law within the preceding 24 months.

(r) Predecessor of Offeror. (Applies in all solicitations that include the provision at 52.204-16, Commercial and Government Entity Code Reporting.)

(1) The Offeror represents that it [___] is or [___] is not a successor to a predecessor that held a Federal contract or grant within the last three years.

(2) If the Offeror has indicated "is" in paragraph (r)(1) of this provision, enter the following information for all predecessors that held a Federal contract or grant within the last three years (if more than one predecessor, list in reverse chronological order):

Predecessor CAGE code: ____ (or mark "Unknown").

Predecessor legal name: ____.

(Do not use a "doing business as" name).

(t) Public Disclosure of Greenhouse Gas Emissions and Reduction Goals. Applies in all solicitations that require offerors to register in SAM (12.301(d)(1)).

(1) This representation shall be completed if the Offeror received $7.5 million or more in contract awards in the prior Federal fiscal year. The representation is optional if the Offeror received less than $7.5 million in Federal contract awards in the prior Federal fiscal year.

(2) Representation. [Offeror to check applicable block(s) in paragraph (t)(2)(i) and (ii)]. (i) The Offeror (itself or through its immediate owner or highest-level owner) [___] does, [___] does not publicly disclose greenhouse gas emissions, i.e., makes available on a publicly accessible Web site the results of a greenhouse gas inventory, performed in accordance with an accounting standard with publicly available and consistently applied criteria, such as the Greenhouse Gas Protocol Corporate Standard.

(ii) The Offeror (itself or through its immediate owner or highest-level owner) [___] does, [___] does not publicly disclose a quantitative greenhouse gas emissions reduction goal, i.e., make available on a publicly accessible Web site a target to reduce absolute emissions or emissions intensity by a specific quantity or percentage.

(iii) A publicly accessible Web site includes the Offeror's own Web site or a recognized, third-party greenhouse gas emissions reporting program.

(3) If the Offeror checked "does" in paragraphs (t)(2)(i) or (t)(2)(ii) of this provision, respectively, the Offeror shall provide the publicly accessible Web site(s) where greenhouse gas emissions and/or reduction goals are reported: ___ .

(u)(1) In accordance with section 743 of Division E, Title VII, of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235) and its successor provisions in subsequent appropriations acts (and as extended in continuing resolutions), Government agencies are not permitted to use appropriated (or otherwise made available) funds for contracts with an entity that requires employees or subcontractors of such entity seeking to report waste, fraud, or abuse to sign internal confidentiality agreements or statements prohibiting or otherwise restricting such employees or subcontractors from lawfully reporting such waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.

(2) The prohibition in paragraph (u)(1) of this provision does not contravene requirements applicable to Standard Form 312 (Classified Information Nondisclosure Agreement), Form 4414 (Sensitive Compartmented Information Nondisclosure Agreement), or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

(3) Representation. By submission of its offer, the Offeror represents that it will not require its employees or subcontractors to sign or comply with internal confidentiality agreements or statements prohibiting or otherwise restricting such employees or subcontractors from lawfully reporting waste, fraud, or abuse related to the performance of a Government contract to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information (e.g., agency Office of the Inspector General).

(v) Covered Telecommunications Equipment or Services--Representation. Section 889(a)(1)(A) and section 889 (a)(1)(B) of Public Law 115-232.

(1) The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (https://www.sam.gov) for entities excluded from receiving federal awards for "covered telecommunications equipment or services".

(2) The Offeror represents that--

(i) It [___] does, [___] does not provide covered telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument.

(ii) After conducting a reasonable inquiry for purposes of this representation, that it [___] does, [___] does not use covered telecommunications equipment or services, or any equipment, system, or service that uses covered telecommunications equipment or services.

(End of provision)

52.212-4 CONTRACT TERMS AND CONDITIONS--COMMERCIAL PRODUCTS AND COMMERCIAL SERVICES (NOV 2021)

(a) Inspection/Acceptance. The Contractor shall only tender for acceptance those items that conform to the requirements of this contract. The Government reserves the right to inspect or test any supplies or services that have been tendered for acceptance. The Government may require repair or replacement of nonconforming supplies or reperformance of nonconforming services at no increase in contract price. If repair/replacement or reperformance will not correct the defects or is not possible, the Government may seek an equitable price reduction or adequate consideration for acceptance of nonconforming supplies or services. The Government must exercise its post-acceptance rights-

(1) Within a reasonable time after the defect was discovered or should have been discovered; and

(2) Before any substantial change occurs in the condition of the item, unless the change is due to the defect in the item.

(b) Assignment. The Contractor or its assignee may assign its rights to receive payment due as a result of performance of this contract to a bank, trust company, or other financing institution, including any Federal lending agency in accordance with the Assignment of Claims Act (31 U.S.C. 3727). However, when a third party makes payment (e.g., use of the Governmentwide commercial purchase card), the Contractor may not assign its rights to receive payment under this contract.

(c) Changes. Changes in the terms and conditions of this contract may be made only by written agreement of the parties.

(d) Disputes. This contract is subject to 41 U.S.C. chapter 71, Contract Disputes. Failure of the parties to this contract to reach agreement on any request for equitable adjustment, claim, appeal or action arising under or relating to this contract shall be a dispute to be resolved in accordance with the clause at Federal Acquisition Regulation (FAR) 52.233-1, Disputes, which is incorporated herein by reference. The Contractor shall proceed diligently with performance of this contract, pending final resolution of any dispute arising under the contract.
(e) Definitions. The clause at FAR 52.202-1, Definitions, is incorporated herein by reference.

(f) Excusable delays. The Contractor shall be liable for default unless nonperformance is caused by an occurrence beyond the reasonable control of the Contractor and without its fault or negligence such as, acts of God or the public enemy, acts of the Government in either its sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, strikes, unusually severe weather, and delays of common carriers. The Contractor shall notify the Contracting Officer in writing as soon as it is reasonably possible after the commencement of any excusable delay,

setting forth the full particulars in connection therewith, shall remedy such occurrence with all reasonable dispatch, and shall promptly give written notice to the Contracting Officer of the cessation of such occurrence.

(g) Invoice.

(1) The Contractor shall submit an original invoice and three copies (or electronic invoice, if authorized) to the address designated in the contract to receive invoices. An invoice must include--

(i) Name and address of the Contractor;

(ii) Invoice date and number;

(iii) Contract number, line item number and, if applicable, the order number;

(iv) Description, quantity, unit of measure, unit price and extended price of the items delivered;

(v) Shipping number and date of shipment, including the bill of lading number and weight of shipment if shipped on Government bill of lading;

(vi) Terms of any discount for prompt payment offered;

(vii) Name and address of official to whom payment is to be sent;

(viii) Name, title, and phone number of person to notify in event of defective invoice; and

(ix) Taxpayer Identification Number (TIN). The Contractor shall include its TIN on the invoice only if required elsewhere in this contract.

(x) Electronic funds transfer (EFT) banking information.

(A) The Contractor shall include EFT banking information on the invoice only if required elsewhere in this contract.

(B) If EFT banking information is not required to be on the invoice, in order for the invoice to be a proper invoice, the Contractor shall have submitted correct EFT banking information in accordance with the applicable solicitation provision, contract clause (e.g., 52.232-33, Payment by Electronic Funds Transfer—System for Award Management, or 52.232-34, Payment by Electronic
Funds Transfer--Other Than System for Award Management), or applicable agency procedures.

(C) EFT banking information is not required if the Government waived the requirement to pay by EFT.

(2) Invoices will be handled in accordance with the Prompt Payment Act (31 U.S.C. 3903) and Office of Management and Budget (OMB) prompt payment regulations at 5 CFR part 1315.

(h) Patent indemnity. The Contractor shall indemnify the Government and its officers, employees and agents against liability, including costs, for actual or alleged direct or contributory infringement of, or inducement to infringe, any United States or foreign patent, trademark or copyright, arising out of the performance of this contract, provided the Contractor is reasonably notified of such claims and proceedings.

(i) Payment.--

(1) Items accepted. Payment shall be made for items accepted by the Government that have been delivered to the delivery destinations set forth in this contract.

(2) Prompt payment. The Government will make payment in accordance with the Prompt Payment Act (31 U.S.C. 3903) and prompt payment regulations at 5 CFR part 1315.

(3) Electronic Funds Transfer (EFT). If the Government makes payment by EFT, see 52.212-5(b) for the appropriate EFT clause.

(4) Discount. In connection with any discount offered for early payment, time shall be computed from the date of the invoice. For the purpose of computing the discount earned, payment shall be considered to have been made on the date which appears on the payment check or the specified payment date if an electronic funds transfer payment is made.

(5) Overpayments. If the Contractor becomes aware of a duplicate contract financing or invoice payment or that the Government has otherwise overpaid on a contract financing or invoice payment, the Contractor shall--

(i) Remit the overpayment amount to the payment office cited in the contract along with a description of the overpayment including the--

(A) Circumstances of the overpayment (e.g., duplicate payment, erroneous payment, liquidation errors, date(s) of overpayment);

(B) Affected contract number and delivery order number, if applicable;

(C) Affected line item or subline item, if applicable; and

(D) Contractor point of contact.

(ii) Provide a copy of the remittance and supporting documentation to the Contracting Officer.

(6) Interest.

(i) All amounts that become payable by the Contractor to the Government under this contract shall bear simple interest from the date due until paid unless paid within 30 days of becoming due. The interest rate shall be the interest rate established by the Secretary of the Treasury as provided in 41 U.S.C.
7109, which is applicable to the period in which the amount becomes due, as provided in (i)(6)(v) of this clause, and then at the rate applicable for each six-month period as fixed by the Secretary until the amount is paid.

(ii) The Government may issue a demand for payment to the Contractor upon finding a debt is due under the contract.

(iii) Final decisions. The Contracting Officer will issue a final decision as required by 33.211 if--

(A) The Contracting Officer and the Contractor are unable to reach agreement on the existence or amount of a debt within 30 days;

(B) The Contractor fails to liquidate a debt previously demanded by the Contracting Officer within the timeline specified in the demand for payment unless the amounts were not repaid because the Contractor has requested an installment payment agreement; or

(C) The Contractor requests a deferment of collection on a debt previously demanded by the Contracting Officer (see 32.607-2).

(iv) If a demand for payment was previously issued for the debt, the demand for payment included in the final decision shall identify the same due date as the original demand for payment.

(v) Amounts shall be due at the earliest of the following dates:

(A) The date fixed under this contract.

(B) The date of the first written demand for payment, including any demand for payment resulting from a default termination.

(vi) The interest charge shall be computed for the actual number of calendar days involved beginning on the due date and ending on--

(A) The date on which the designated office receives payment from the Contractor;

(B) The date of issuance of a Government check to the Contractor from which an amount otherwise payable has been withheld as a credit against the contract debt; or

(C) The date on which an amount withheld and applied to the contract debt would otherwise have become payable to the Contractor.

(vii) The interest charge made under this clause may be reduced under the procedures prescribed in FAR 32.608-2 in effect on the date of this contract.

(j) Risk of loss. Unless the contract specifically provides otherwise, risk of loss or damage to the supplies provided under this contract shall remain with the Contractor until, and shall pass to the Government upon:

(1) Delivery of the supplies to a carrier, if transportation is f.o.b. origin; or

(2) Delivery of the supplies to the Government at the destination specified in the contract, if transportation is f.o.b. destination.

(k) Taxes. The contract price includes all applicable Federal, State, and local taxes and duties.

(l) Termination for the Government's convenience. The Government reserves the right to terminate this contract, or any part hereof, for its sole convenience. In the event of such termination, the Contractor shall immediately stop all work hereunder and shall immediately cause any and all of its suppliers and subcontractors to cease work. Subject to the terms of this contract, the Contractor shall be paid a percentage of the contract price reflecting the percentage of the work performed prior to the notice of termination, plus reasonable charges the Contractor can demonstrate to the satisfaction of the Government using its standard record keeping system, have resulted from the termination. The Contractor shall not be required to comply with the cost accounting standards or contract cost principles for this purpose. This paragraph does not give the Government any right to audit the Contractor's records. The Contractor shall not be paid for any work performed or costs incurred which reasonably could have been avoided.

(m) Termination for cause. The Government may terminate this contract, or any part hereof, for cause in the event of any default by the Contractor, or if the Contractor fails to comply with any contract terms and conditions, or fails to provide the Government, upon request, with adequate assurances of future performance. In the event of termination for cause, the Government shall not be liable to the Contractor for any amount for supplies or services not accepted, and the Contractor shall be liable to the Government for any and all rights and remedies provided by law. If it is determined that the Government improperly terminated this contract for default, such termination shall be deemed a termination for convenience.

(n) Title. Unless specified elsewhere in this contract, title to items furnished under this contract shall pass to the Government upon acceptance, regardless of when or where the Government takes physical possession.

(o) Warranty. The Contractor warrants and implies that the items delivered hereunder are merchantable and fit for use for the particular purpose described in this contract.

(p) Limitation of liability. Except as otherwise provided by an express warranty, the Contractor will not be liable to the Government for consequential damages resulting from any defect or deficiencies in accepted items.

(q) Other compliances. The Contractor shall comply with all applicable Federal, State and local laws, executive orders, rules and regulations applicable to its performance under this contract.

(r) Compliance with laws unique to Government contracts. The Contractor agrees to comply with 31 U.S.C. 1352 relating to limitations on the use of appropriated funds to influence certain Federal contracts; 18 U.S.C. 431 relating to officials not to benefit; 40 U.S.C. chapter 37, Contract Work Hours and Safety Standards; 41 U.S.C. chapter 87, Kickbacks; 41 U.S.C. 4712 and 10 U.S.C. 2409 relating to whistleblower protections; 49 U.S.C. 40118, Fly American; and 41 U.S.C. chapter 21 relating to procurement integrity.

(s) Order of precedence. Any inconsistencies in this solicitation or contract shall be resolved by giving precedence in the following order:

(1) The schedule of supplies/services.

(2) The Assignments, Disputes, Payments, Invoice, Other Compliances, Compliance with Laws Unique to Government Contracts, and Unauthorized Obligations paragraphs of this clause.

(3) The clause at 52.212-5.

(4) Addenda to this solicitation or contract, including any license agreements for computer software.

(5) Solicitation provisions if this is a solicitation.

(6) Other paragraphs of this clause.

(7) The Standard Form 1449.

(8) Other documents, exhibits, and attachments.

(9) The specification.

(t) Reserved.

(u) Unauthorized Obligations.

(1) Except as stated in paragraph (u)(2) of this clause, when any supply or service acquired under this contract is subject to any End User License Agreement (EULA), Terms of Service (TOS), or similar legal instrument or agreement, that includes any clause requiring the Government to indemnify the Contractor or any person or entity for damages, costs, fees, or any other loss or liability that would create an Anti-Deficiency Act violation (31 U.S.C. 1341), the following shall govern:

(i) Any such clause is unenforceable against the Government.

(ii) Neither the Government nor any Government authorized end user shall be deemed to have agreed to such clause by virtue of it appearing in the EULA, TOS, or similar legal instrument or agreement. If the EULA, TOS, or similar legal instrument or agreement is invoked through an "I agree" click box or other comparable mechanism (e.g., "click-wrap" or "browse-wrap" agreements), execution does not bind the Government or any Government authorized end user to such clause.

(iii) Any such clause is deemed to be stricken from the EULA, TOS, or similar legal instrument or agreement.

(2) Paragraph (u)(1) of this clause does not apply to indemnification by the Government that is expressly authorized by statute and specifically authorized under applicable agency regulations and procedures.

(v) Incorporation by reference. The Contractor's representations and certifications, including those completed electronically via the System for Award Management (SAM), are incorporated by reference into the contract.

(End of clause)

ADDENDUM TO 52.212-4 CONTRACT TERMS AND CONDITIONS-- COMMERCIAL ITEMS (OCT 2018)

Paragraph (a) Inspection/Acceptance is revised to add the following:
Additional Inspection/Acceptance requirements can be found in Section E.

Paragraph (o) Warranty is revised to incorporate clause FAR 52.246-18 Warranty of Supplies of a complex Nature.

(End of Clause Addendum)

52.212-5 CONTRACT TERMS AND CONDITIONS REQUIRED TO IMPLEMENT STATUTES OR EXECUTIVE ORDERS—COMMERCIAL PRODUCTS AND COMMERCIAL SERVICES (DEVIATION 2018-O0021) (JAN 2022)

(a) Comptroller General Examination of Record. The Contractor shall comply with the provisions of this paragraph (a) if this contract was awarded using other than sealed bid, is in excess of the simplified acquisition threshold, and does not contain the clause at 52.215-2, Audit and Records—Negotiation.

(1) The Comptroller General of the United States, or an authorized representative of the Comptroller General, shall have access to and right to examine any of the Contractor’s directly pertinent records involving transactions related to this contract.

(2) The Contractor shall make available at its offices at all reasonable times the records, materials, and other evidence for examination, audit, or reproduction, until 3 years after final payment under this contract or for any shorter period specified in FAR Subpart 4.7, Contractor Records Retention, of the other clauses of this contract. If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for 3 years after any resulting final termination settlement. Records relating to appeals under the disputes clause or to litigation or the settlement of claims arising under or relating to this contract shall be made available until such appeals, litigation, or claims are finally resolved.

(3) As used in this clause, records include books, documents, accounting procedures and practices, and other data, regardless of type and regardless of form. This does not require the Contractor to create or maintain any record that the Contractor does not maintain in the ordinary course of business or pursuant to a provision of law.

(b)(1) Notwithstanding the requirements of any other clauses of this contract, the Contractor is not required to flow down any FAR clause, other than those in this paragraph (b) (1) in a subcontract for commercial products or commercial services. Unless otherwise indicated below, the extent of the flow down shall be as required by the clause—

(i) 52.203-13, Contractor Code of Business Ethics and Conduct (NOV 2021) (41 U.S.C. 3509).

(ii) 52.203-19, Prohibition on Requiring Certain Internal Confidentiality Agreements or Statements (JAN 2017) (section 743 of Division E, Title VII, of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235) and its successor provisions in subsequent appropriations acts (and as extended in continuing resolutions)).

(iii) 52.204-23, Prohibition on Contracting for Hardware, Software, and Services Developed or Provided by Kaspersky Lab and Other Covered Entities (NOV 2021) (Section 1634 of Pub. L. 115-91).

(iv) 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment. (NOV 2021) (Section 889(a)(1)(A) of Pub. L. 115-232).

(v) 52.219-8, Utilization of Small Business Concerns (OCT 2018) (15 U.S.C. 637(d)(2) and (3)), in all subcontracts that offer further subcontracting opportunities. If the subcontract (except subcontracts to small business concerns) exceeds $700,000 ($1.5 million for construction of any public facility), the subcontractor must include 52.219-8 in lower tier subcontracts that offer subcontracting opportunities.

(vi) 52.222-21, Prohibition of Segregated Facilities (APR 2015).

(vii) 52.222-26, Equal Opportunity (SEP 2016) (E.O. 11246).

(viii) 52.222-35, Equal Opportunity for Veterans (OCT 2015) (38 U.S.C. 4212).

(ix) 52.222-36, Equal Opportunity for Workers with Disabilities (JUL 2014) (29 U.S.C. 793).

(x) 52.222-37, Employment Reports on Veterans (FEB 2016) (38 U.S.C. 4212).

(xi) 52.222-40, Notification of Employee Rights Under the National Labor Relations Act (DEC 2010) (E.O. 13496). Flow down required in accordance with paragraph (f) of FAR clause 52.222-40.

(xii) 52.222-41, Service Contract Labor Standards (AUG 2018) (41 U.S.C. chapter 67).

(xiii)(A) 52.222-50, Combating Trafficking in Persons (NOV 2021) (22 U.S.C. chapter 78 and E.O. 13627).

(B) Alternate I (Mar 2015) of 52.222-50 (22 U.S.C. chapter 78 and E.O. 13627).

(xiv) 52.222-51, Exemption from Application of the Service Contract Act to Contracts for Maintenance, Calibration, or Repair of Certain Equipment-Requirements (MAY 2014) (41 U.S.C. chapter 67).

(xv) 52.222-53, Exemption from Application of the Service Contract Act to Contracts for Certain Services-Requirements (MAY 2014) (41 U.S.C. chapter 67).

(xvi) 52.222-54, Employment Eligibility Verification (NOV 2021) (E.O. 12989).

(xvii) 52.222-55, Minimum Wages Under Executive Order 13658 (JAN 2022).

(xix)(A) 52.224-3, Privacy Training (JAN 2017) (5 U.S.C. 552a).

(B) Alternate I (JAN 2017) of 52.224-3.

(xx) 52.225-26, Contractors Performing Private Security Functions Outside the United States (OCT 2016) (Section 862, as amended, of the National Defense Authorization Act for Fiscal Year 2008; 10 U.S.C. 2302 Note).

(xxi) 52.226-6, Promoting Excess Food Donation to Nonprofit Organizations (MAY 2014) (42 U.S.C. 1792). Flow down required in accordance with paragraph (e) of FAR clause 52.226-6.

(xxii) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (NOV 2021) (46 U.S.C. 55305 and 10 U.S.C. 2631). Flow down required in accordance with paragraph (d) of FAR clause 52.247-64.

(2) While not required, the contractor may include in its subcontracts for commercial products and commercial services a minimal number of additional clauses necessary to satisfy its contractual obligations.

(End of clause)

52.219-28 POST-AWARD SMALL BUSINESS PROGRAM REREPRESENTATION (SEP 2021)

(a) Definitions. As used in this clause--

Long-term contract means a contract of more than five years in duration, including options. However, the term does not include contracts that exceed five years in duration because the period of performance has been extended for a cumulative period not to exceed six months under the clause at 52.217-8, Option to Extend Services, or other appropriate authority.

Small business concern--

(1) Means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria in 13 CFR part 121 and the size standard in paragraph (d) of this clause. Such a concern is "not dominant in its field of operation" when it does not exercise a controlling or major influence on a national basis in a kind of business activity in which a number of business concerns are primarily engaged. In determining whether dominance exists, consideration shall be given to all appropriate factors, including
volume of business, number of employees, financial resources, competitive status or position, ownership or control of materials, processes, patents, license agreements, facilities, sales territory, and nature of business activity.

(2) Affiliates, as used in this definition, means business concerns, one of whom directly or indirectly controls or has the power to control the others, or a third party or parties control or have the power to control the others. In determining whether affiliation exists, consideration is given to all appropriate factors including common ownership, common management, and contractual relationships. SBA determines affiliation based on the factors set forth at 13 CFR 121.103.

(b) If the Contractor represented that it was any of the small business concerns identified in 19.000(a)(3) prior to award of this contract, the Contractor shall rerepresent its size and socioeconomic status according to paragraph (f) of this clause or, if applicable, paragraph (h) of this clause, upon occurrence of any of the following:

(1) Within 30 days after execution of a novation agreement or within 30 days after modification of the contract to include this clause, if the novation agreement was executed prior to inclusion of this clause in the contract.

(2) Within 30 days after a merger or acquisition that does not require a novation or within 30 days after modification of the contract to include this clause, if the merger or acquisition occurred prior to inclusion of this clause in the contract.

(3) For long-term contracts--

(i) Within 60 to 120 days prior to the end of the fifth year of the contract; and

(ii) Within 60 to 120 days prior to the date specified in the contract for exercising any option thereafter.

(c) If the Contractor represented that it was any of the small business concerns identified in 19.000(a)(3) prior to award of this contract, the Contractor shall rerepresent its size and socioeconomic status according to paragraph (f) of this clause or, if applicable, paragraph (h) of this clause, when the Contracting Officer explicitly requires it for an order issued under a multiple-award contract.

(d) The Contractor shall rerepresent its size status in accordance with the size standard in effect at the time of this rerepresentation that corresponds to the North American Industry Classification System (NAICS) code(s) assigned to this contract. The small business size standard corresponding to this NAICS code(s) can be found at https://www.sba.gov/document/support--table-size-standards.

(e) The small business size standard for a Contractor providing an end item that it does not manufacture, process, or produce itself, for a contract other than a construction or service contract, is 500 employees if the acquisition--

(1) Was set aside for small business and has a value above the simplified acquisition threshold;

(2) Used the HUBZone price evaluation preference regardless of dollar value, unless the Contractor waived the price evaluation preference; or

(3) Was an 8(a), HUBZone, service-disabled veteran-owned, economically disadvantaged women-owned, or women-owned small business set-aside or sole-source award regardless of dollar value.

(f) Except as provided in paragraph (h) of this clause, the Contractor shall make the representation(s) required by paragraph (b) and (c) of this clause by validating or updating all its representations in the Representations and Certifications section of the System for Award Management (SAM) and its other data in SAM, as necessary, to ensure that they reflect the Contractor's current status. The Contractor shall notify the contracting office in writing within the timeframes specified in paragraph (b) of this clause, or with its offer for an order (see paragraph (c) of this clause), that the data have been validated or updated, and provide the date of the validation or update.

(g) If the Contractor represented that it was other than a small business concern prior to award of this contract, the Contractor may, but is not required to, take the actions required by paragraphs (f) or (h) of this clause.

(h) If the Contractor does not have representations and certifications in SAM, or does not have a representation in SAM for the NAICS code applicable to this contract, the Contractor is required to complete the following rerepresentation and submit it to the contracting office, along with the contract number and the date on which the rerepresentation was completed:

(1) The Contractor represents that it [ ] is, [ ] is not a small business concern under NAICS Code assigned to contract number .

(2) [Complete only if the Contractor represented itself as a small business concern in paragraph (h)(1) of this clause.] The Contractor represents that it [ ] is, [ ] is not, a small disadvantaged business concern as defined in 13 CFR 124.1002.

(3) [Complete only if the Contractor represented itself as a small business concern in paragraph (h)(1) of this clause.] The Contractor represents that it [ ] is, [ ] is not a women-owned small business concern.

(4) Women-owned small business (WOSB) concern eligible under the WOSB Program. [Complete only if the Contractor represented itself as a women-owned small business concern in paragraph (h)(3) of this clause.] The Contractor represents that--

(i) It [ ] is, [ ] is not a WOSB concern eligible under the WOSB Program, has provided all the required documents to the WOSB Repository, and no change in circumstances or adverse decisions have been issued that affects its eligibility; and

(ii) It [ ] is, [ ] is not a joint venture that complies with the requirements of 13 CFR part 127, and the representation in paragraph (h)(4)(i) of this clause is accurate for each WOSB concern eligible under the WOSB Program participating in the joint venture.

[The Contractor shall enter the name or names of the WOSB concern eligible under the WOSB Program and other small businesses that are participating in the joint venture: .] Each WOSB concern eligible under the WOSB Program participating in the joint venture shall submit a separate signed copy of the WOSB representation.

(5) Economically disadvantaged women-owned small business (EDWOSB) concern. [Complete only if the Contractor represented itself as a women-owned small business concern eligible under the WOSB Program in (h)(4) of this clause.] The Contractor represents that--

(i) It [ ] is, [ ] is not an EDWOSB concern eligible under the WOSB Program, has provided all the required documents to the WOSB Repository, and no change in circumstances or adverse decisions have been issued that affects its eligibility; and

(ii) It [ ] is, [ ] is not a joint venture that complies with the requirements of 13 CFR part 127, and the representation in paragraph (h)(5)(i) of this clause is accurate for each EDWOSB concern participating in the joint venture. [The Contractor shall enter the name or names of the EDWOSB concern and other small businesses that are participating in the joint venture: .] Each EDWOSB concern participating in the joint venture shall submit a separate signed copy of the EDWOSB representation.

(6) [Complete only if the Contractor represented itself as a small business concern in paragraph (h)(1) of this clause.] The Contractor represents that it [ ] is, [ ] is not a veteran-owned small business concern.

(7) [Complete only if the Contractor represented itself as a veteran-owned small business concern in paragraph (h)(6) of this clause.] The Contractor represents that it [ ] is, [ ] is not a service-disabled veteran-owned small business concern.

(8) [Complete only if the Contractor represented itself as a small business concern in paragraph (h)(1) of this clause.] The Contractor represents that--

(i) It [ ] is, [ ] is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material changes in ownership and control, principal office, or HUBZone employee percentage have occurred since it was certified in accordance with 13 CFR part 126; and

(ii) It [ ] is, [ ] is not a HUBZone joint venture that complies with the requirements of 13 CFR part 126, and the representation in paragraph (h)(8)(i) of this clause is accurate for each HUBZone small business concern participating in the HUBZone joint venture. [The Contractor shall enter the names of each of the HUBZone small business concerns participating in the HUBZone joint venture: .] Each HUBZone small business concern participating in the HUBZone joint venture shall submit a separate signed copy of the HUBZone representation.

[Contractor to sign and date and insert authorized signer's name and title.]

(End of clause)

52.228-1 BID GUARANTEE (SEP 1996)

(a) Failure to furnish a bid guarantee in the proper form and amount, by the time set for opening of bids, may be cause for rejection of the bid.

(b) The bidder shall furnish a bid guarantee in the form of a firm commitment, e.g., bid bond supported by good and sufficient surety or sureties acceptable to the Government, postal money order, certified check, cashier's check, irrevocable letter of credit, or, under Treasury Department regulations, certain bonds or notes of the United States. The Contracting Officer will return bid guarantees, other than bid bonds, (1) to unsuccessful bidders as soon as practicable after the opening of bids, and (2) to the successful bidder upon execution of contractual documents and bonds (including any necessary coinsurance or reinsurance agreements), as required by the bid as accepted.-

(c) The amount of the bid guarantee shall be 20 percent of the bid price or $3M, whichever is less.-

(d) If the successful bidder, upon acceptance of its bid by the Government within the period specified for acceptance, fails to execute all contractual documents or furnish executed bond(s) within 10 days after receipt of the forms by the bidder, the Contracting Officer may terminate the contract for default.-

(e) In the event the contract is terminated for default, the bidder is liable for any cost of acquiring the work that exceeds the amount of its bid, and the bid guarantee is available to offset the difference.

(End of provision)

52.228-16 PERFORMANCE AND PAYMENT BONDS--OTHER THAN CONSTRUCTION (NOV 2006)

(a) Definitions. As used in this clause--

Original contract price means the award price of the contract or, for requirements contracts, the price payable for the estimated quantity; or, for indefinite-quantity contracts, the price payable for the specified minimum quantity. Original contract price does not include the price of any options, except those options exercised at the time of contract award.

(b) The Contractor shall furnish a performance bond (Standard Form 1418) for the protection of the Government in an amount equal to 20 percent of the original contract price and a payment bond (Standard Form 1416) in an amount equal to 20 percent of the original contract price.

(c) The Contractor shall furnish all executed bonds, including any necessary reinsurance agreements, to the Contracting Officer, within 10 days, but in any event, before starting work.

(d) The Government may require additional performance and payment bond protection if the contract price is increased. The Government may secure the additional protection by directing the Contractor to increase the penal amount of the existing bonds or to obtain additional bonds.

(e) The bonds shall be in the form of firm commitment, supported by corporate sureties whose names appear on the list contained in Treasury Department Circular 570, individual sureties, or by other acceptable security such as postal money order, certified check, cashier's check, irrevocable letter of credit, or, in accordance with Treasury Department regulations, certain bonds or notes of the United States. Treasury Circular 570 is published in the Federal Register, or may be obtained from the U.S. Department of the Treasury, Financial Management Service, Surety Bond Branch, 3700 East West Highway, Room 6F01, Hyattsville, MD 20782. Or via the internet at http://www.fms.treas.gov/c570/.

(End of clause)

52.246-18 WARRANTY OF SUPPLIES OF A COMPLEX NATURE (MAY 2001)

(a) Definitions.

"Acceptance," as used in this clause, means the act of an authorized representative of the Government by which the Government assumes for itself, or as an agent of another, ownership of existing and identified supplies, or approves specific services rendered, as partial or complete performance of the contract.

"Correction," as used in this clause, means the elimination of a defect.

"Supplies," as used in this clause, means the end items furnished by the Contractor and related services required under this contract. The word does not include "data."

(b) Contractor's obligations. (1) The Contractor warrants that for 365 calendar days from final acceptance of the vessel all supplies furnished under this contract will be free from defects in design, material and workmanship and will conform with all requirements of this contract; provided, however, that with respect to Government-furnished property, the Contractor's warranty shall extend only to its proper installation, unless the Contractor performs some modification or other work on the property, in which case the Contractor's warranty shall extend to the modification or other work.

(2) Any supplies or parts thereof corrected or furnished in replacement shall be subject to the conditions of this clause to the same extent as supplies initially delivered. This warranty shall be equal in duration to that set forth in paragraph (b)(1) of this clause and shall run from the date of delivery of the corrected or replaced supplies.

(3) The Contractor shall not be obligated to correct or replace supplies if the facilities, tooling, drawings, or other equipment or supplies necessary to accomplish the correction or replacement have been made unavailable to the Contractor by action of the Government. In the event that correction or replacement has been directed, the Contractor shall promptly notify the Contracting Officer, in writing, of the nonavailability.

(4) The Contractor shall also prepare and furnish to the Government data and reports applicable to any correction required (including revision and updating of all affected data called for under this contract) at no increase in the contract price.

(5) When supplies are returned to the Contractor, the Contractor shall bear the transportation costs from the place of delivery specified in the contract (irrespective of the f.o.b. point or the point of acceptance) to the Contractor's plant and return.

(6) All implied warranties of merchantability and "fitness for a particular purpose" are excluded from any obligation contained in this contract.

(c) Remedies available to the Government. (1) In the event of a breach of the Contractor's warranty in paragraph (b)(1) of this clause, the Government may, at no increase in contract price--

(i) Require the Contractor, at the place of delivery specified in the contract (irrespective of the f.o.b. point or the point of acceptance) or at the Contractor's plant, to repair or replace, at the Contractor's election, defective or nonconforming supplies; or

(ii) Require the Contractor to furnish at the Contractor's plant the materials or parts and installation instructions required to successfully accomplish the correction.

(2) If the Contracting Officer does not require correction or replacement of defective or nonconforming supplies or the Contractor is not obligated to correct or replace under paragraph (b)(3) of this clause, the Government shall be entitled to an equitable reduction in the contract price.

(3) The Contracting Officer shall notify the Contractor in writing of any breach of the warranty in paragraph (b) of this clause within 45 days after discovery of the defect. The Contractor shall submit to the Contracting Officer a written recommendation within 10 days as to the corrective action required to remedy the breach. After the notice of breach, but not later than 30 days after receipt of the Contractor's recommendation for corrective action, the Contracting Officer may, in writing, direct correction or replacement as in paragraph (c)(1) of this clause, and the Contractor shall, notwithstanding any disagreement regarding the existence of a breach of warranty, comply with this direction. If it is later determined that the Contractor did not breach the warranty in paragraph (b)(1) of this clause, the contract price will be equitably adjusted.

(4) If supplies are corrected or replaced, the period for notification of a breach of the Contractor's warranty in paragraph (c)(3) of this clause shall be 45 days from the furnishing or return by the Contractor to the Government of the corrected or replaced supplies or parts thereof, or, if correction or replacement is effected by the Contractor at a Government or other activity, for 45 days thereafter.

(5) The rights and remedies of the Government provided in this clause are in addition to and do not limit any rights afforded to the Government by any other clause of the contract.

(End of clause)

52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at this/these address(es):

www.acquisition.gov

(End of provision)

52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

www.acquisition.gov

(End of clause)

52.252-3 ALTERATIONS IN SOLICITATION (APR 1984)

Portions of this solicitation are altered as follows:

FAR 52.212-1 Instructions to Offerors-Commercial Items.

FAR 52.212-4 Contract Terms and Conditions-Commercial Items.

52.252-5 AUTHORIZED DEVIATIONS IN PROVISIONS (NOV 2020)

(a) The use in this solicitation of any Federal Acquisition Regulation (48 CFR Chapter 1) provision with an authorized deviation is indicated by the addition of "(DEVIATION)" after the date of the provision.

(b) The use in this solicitation of any DFARS (48 CFR Chapter 2) provision with an authorized deviation is indicated by the addition of "(DEVIATION)" after the name of the regulation.

(End of provision)

52.252-6 AUTHORIZED DEVIATIONS IN CLAUSES (NOV 2020)

(a) The use in this solicitation or contract of any Federal Acquisition Regulation (48 CFR Chapter 1) clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the date of the clause.

(b) The use in this solicitation or contract of any DFARS (48 CFR chapter 2) clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the name of the regulation.

(End of clause)