



72' PASSENGER CATAMARAN

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Notice and Scope of Applicability

This document represents the sum total of formal product definition to date of issue. Only items defined in this document are considered part of the proposed product.

Proprietary Notice

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100 GENERAL INFORMATION

The proposed vessel is an all welded aluminum symmetrical round-chine passenger catamaran, designed by Crowther Design of Newport, Australia.

110 PRINCIPAL CHARACTERISTICS

Table 110.1 Principal Characteristics	
Length, Overall	72'-9"
Length, On Deck	72'-9"
Beam, Overall	29'-4" Approx.
Beam, Hull	28'-4" Approx.
Freeboard	5'-9"
Length of Design Waterline	62'-0"
Light Weight	~92 LT
Weight at Full Load Draft	~110 LT
Passengers	150

112 DOCUMENTATION

This specification should be read in conjunction with the following documents and together they shall define the vessel. In the event of inconsistencies among the documents, the following order of precedence shall be observed:

Table 112.1 Documents		
#	Item	Description
1	Contract	--
2	Specification	This document
3	General Arrangement Drawing	7241-110-001 Rev B dated 04/27/06

113 SIZES AND SPECIFIED EQUIPMENT

Throughout this document, equipment is called by manufacturer and in certain instances by model number. These references communicate the intent in level of quality of the final product. As design resolution increases during the design/build process, certain equipment may require change. Therefore, all equipment, with the exception of the main engines, specified within this document by make, or make and model, is implied to be that piece of equipment or another of "or equal" quality and performance.

Likewise, some equipment sizes may change accordingly as the design evolves. Therefore, all equipment specified by size within this document is implied to be approximate and subject to change to meet its required function.

131 STABILITY

The vessel will meet the intact, damaged and subdivision requirements for a vessel of its intended use, size and service (See Table 160.1).

141 PERFORMANCE

It is anticipated, *but not guaranteed*, that the vessel will perform as follows:

Table 141.1 Performance Expectations at Full Load		
Power	Speed	Range
Full Power (100% MCR) 2x800 bhp	Approx. 27.25 knots	Approx. 400 nm
Cruise Power (85% MCR) 2x680 bhp	Approx. 25.1 knots	Approx. 420 nm

Table 141.2 Operating Profile			
Trip Profile	Minutes	% Load	Factor
Idle	8	10	80
Maneuver	3	25	75
Max	8	100	800
Maneuver	3	25	75
Idle	8	10	80
	30		37%
Annual Operations:			
Hours/day	10	Hours	
Days/year	360	Days	
Hours/year	3600	Hours	
Trips/day	20		
Max hours/day	2.67	Hours	
Max % Total	27%		
Maneuvering hours/day	2.0	Hours	
Maneuvering % Total	20%		
Idle hours/day	5.33	Hours	
Idle % Total	53%		

The above figures represent the boat at a full load and do not include a sea margin. Changes to the vessel that increase the weight or shift the longitudinal center of weight may negatively influence performance.

150 TANKAGE

The vessel will have the capacity to store the following liquids in permanent onboard tanks:

Fluid	Tank Description	Total Volume
Fuel Oil	(2) aluminum, 600 gal ea	1200 gal
Lube Oil	None	
Dirty Oil	None	
Fresh Water	(1) Polyethylene	300 gal
Gray Water	None	
Black Water	(1) Polyethylene	300 gal

160 STANDARDS, CLASSIFICATION AND CERTIFICATION

The vessel will be designed and constructed as an USCG inspected Subchapter-T small passenger vessel. The USCG Puget Sound Marine Safety Office (MSO) will inspect the vessel during construction and issue a temporary Certificate of Inspection (COI) at delivery. The Owner will be responsible for obtaining a permanent COI from the MSO in the vessel's region of operation. KMI will address design and construction issues with the regional MSO but the Owner will be responsible for training, fire and safety, and documentation issues. KMI will be responsible for obtaining FCC certification for radio equipment and installation. The Owner will be responsible for acquiring any radio station licenses from the FCC.

USCG Subchapter	Subchapter-T small passenger vessel
Tons	Less than 100 gross tons
Passengers	150
Service	Exposed waters
Route	Coastwise – not more than 20 nautical miles from shore

200 STRUCTURAL

The hull and superstructure will be constructed of marine grade aluminum plate and extrusions. Construction shall be in accordance with standard KMI practice. Aluminum welding performed will be in accordance with procedures approved by the United States Coast Guard. Weld spatter, soot, and construction scars will be removed or faired. Sharp edges and corners will be dressed to prevent hazards to personnel and equipment.

The vessel's hull and superstructure will be fabricated of the following materials:

Table 200.1 Material Schedule	
Structural Plating Material	5083 H116 or H321 All plate will meet ASTM 928
Extrusion Material	6000 series aluminum
Filler Material	Weld filler will meet the aluminum manufacturer's recommendations pertaining to the joining of like and unlike alloys.

Construction details will be based on existing KMI products, proven in heavy-duty commercial service over many years. The hull structural scantlings will be at a minimum based on the following rules and minimum plate thicknesses:

Table 200.2 Scantlings	
Rules	Det Norske Veritas, Rules for Classification of High Speed Craft
Vessel Type	Passenger Catamaran
Service Area	20 nm Offshore

Table 200.3 Minimum Plate Thicknesses	
Bottom Shell Plating	6mm
Outer Side Shell Plating	0.190"
Inner Side Shell Plating	0.190"
Wet Deck Plating	0.190"
Watertight Bulkhead Plating	0.190"
Superstructure Front Plating	0.190"
Fore Deck Plating	0.190"
Main Deck Plating	0.250" and extruded plank
Superstructure Deck Plating	0.190" and extruded plank
Superstructure Side Plating	0.160"
Superstructure House Top Plating	0.125" and extruded plank

Painted exterior main deck welded joints will be continuously welded or otherwise sealed to prevent penetration of water.

When installed directly through aluminum exposed to weather, fasteners shall be isolated with Teflon washers and sleeves, “TEF-GEL” or other means to prevent galvanic corrosion.

231 FENDERING

Fabricated aluminum guards will be fitted port and starboard as shown on the arrangement drawings.

232 SCUPPERS AND FREEING PORT

Freeing ports in the bulwarks will be of sufficient open area to provide drainage in accordance with regulatory requirements (See Section 160).

240 MAST

A fabricated mast will support various electronics and navigation lights.

250 MOORING FITTINGS

The vessel will be equipped with mooring cleats as shown on the General Arrangement Drawing. All cleats will be located above watertight bulkheads, major frames or locally reinforced foundations.

Table 250.1 Mooring Fitting Schedule		
Qty	Item	Description
1	Bow Bitt	Pipe bitt
2	Bow Cleats	15” cast aluminum cleats
4	Side Cleats	15” cast aluminum cleats
2	Stern Cleats	15” cast aluminum cleats

251 ANCHOR HANDLING GEAR

A centerline bow eye and bow cleat will allow securing of the anchor. The anchor will be stored on deck in fabricated brackets.

Table 251.1 Anchor Gear Schedule	
Item	Description
Anchor	Fortress Aluminum
Rode	chain rode

253 LIFTING FITTINGS

Lifting eyes will not be fitted.

254 HANDRAILS

Aluminum railings of sufficient size, separation, height, and strength to meet the applicable regulatory requirements (See Section 160) will surround the exposed perimeter of all passenger decks. The passenger stair well will be fitted with ADA compliant handrails.

A single aluminum grab rail will be fitted on the house sides above the cabin side windows and louvers.

255 LADDERS & STAIRS

Vertical ladders or inclined ladders will be fitted to access hull compartments from the main deck if the walking surface exceeds 36” below the deck surface. Where required, ladders will be removable to allow access to equipment.

Table 255.1 Ladder Schedule	
Location	Description
Lazarettes (p/s)	Ladder
Engine Compartments (p/s)	Ladder (aft) Ladder (fwd)
Tank Compartments (p/s)	None
Forward Void (p/s)	Ladder
Collision Voids (p/s)	Ladder

Table 255.2 Stair Schedule	
Location	Description
Aft Deck to Upper Deck	48” minimum clear width 45° incline
Upper Deck to Fore Deck	36” clear width 45° incline
Cabin to Fore Deck	36” clear width 45° incline

263 INTERCEPTOR PLATES

The lower edge of each transom will be fitted with fabricated fixed interceptors. The position of the interceptors will be manually set during sea trials to set vessel trim.

270 STRUCTURAL OPENINGS

Cast aluminum, quick acting deck hatches will allow access from the main deck into watertight compartments as indicated on the General Arrangement Drawing.

Bolted, watertight hatches will be provided above each engine room on the main and upper decks to allow for main engine removal. Piping and electrical runs within these areas will be arranged for convenient take down.

Table 270.1 Structural Opening Schedule

Qty	Item	Description
2	Lazarette Access	Quick Acting Flush Watertight 15"x24" oval, lift-out
4	Engine Compartments Access	Quick Acting Flush Watertight 15"x24" oval, hinged
2	Tank Compartments Access	20" Tiona Hatch in fwd bulkhead
2	Forward Voids Access	Quick Acting Flush Watertight 15"x24" oval, lift-out
2	Collision Voids Access	Quick Acting Flush Watertight 15"x24" oval, lift-out
4	Fuel Tank	20" Tiona Hatch

271 BOARDING RAMPS

A 76" wide, hinged, boarding ramp will be provided amidships on both sides of main deck to allow for passenger embarking and disembarking.

For cargo loading and unloading, a 48" wide, hinged boarding ramp will be provided on both sides of main deck towards the aft end of the vessel.

All boarding ramps will be raised, lowered and secured manually. Each ramp will be provided with a pair of swiveling casters on the dock end.

300 MAIN MACHINERY

Twin marine diesel engines coupled to reversing transmissions turning conventional propellers will propel the vessel. A single marine diesel generator will provide electrical power.

310 PROPULSION ENGINES AND TRANSMISSIONS

The main engines and directly coupled transmissions will be installed on vibration isolation mounts. The engine's local start stop panels will be located and/or protected to preclude the accidental actuation of either switch. The engine manufacturer's standard instrument panels will be located on the pilothouse console.

The hull structure perimeter beneath the engines and transmission will be welded tight to provide containment of spilled liquids. Structural members within this boundary will be limbered. The containment area shall drain via a plug fitted to the lowest corner of the containment structure.

Table 310.1 Propulsion Schedule

Engine Make	Cummins
Engine Model	QSK-19M
Engine Rating	800 bhp @ 2100 rpm
Emissions	EPA Tier I
Engine Options	Local start stop panels mounted inboard
Transmission Make	ZF
Transmission Model	665
Ratio	2.593

320 PROPELLERS AND SHAFTING

The transmission will drive fixed propellers via solid propeller shafts. Raw water discharge from the transmission coolers will provide water lubrication for the shaft seal (See Section 330). The shafts and bearings will be housed in cast Nibral struts.

Table 320.1 Shafting Schedule

Qty	Item	Description
2	Shafting	Size: 3.50" Aquamet 22-HS (or equivalent) Propeller end: keyed standard taper Drive end: keyed taper
2	Stern Tube Seals	PYI dripless mechanical seal
2	Strut Bearings	Johnson-Duramax, Non-metallic sleeve cutlass or equal

Table 320.2 Propeller Schedule		
Qty	Item	Description
2	Propellers	Material: Nibral Blades: 5 Diameter: TBD Pitch: TBD DAR: TBD Handed: outboard

330 MAIN ENGINE COOLING

Each main engine will be provided with an independent heat exchanger cooling circuit. Engine driven jacket water pumps will circulate an engine manufacturer approved coolant solution through the engine's cooling circuit and engine mounted heat exchanger.

The engine driven raw water pumps will draw suction through sea valves from within the machinery space (See Section 332). A strainer will protect each raw water pump from debris according to the engine manufactures requirements. To prevent damage to the raw water piping from engine vibration, a flex bellow or length of raw water hosing will connect the engine's raw water inlet to the piping system.

Raw water discharge from the engines will be routed to the wet-exhaust injection rings (See Section 340). Raw water discharge from the transmission will be routed to the water lubricated shaft seal (See Section 320) or by-pass overboard as required.

Raw water piping will be fitted with pencil anodes. Dissimilar metals will be isolated to prevent galvanic corrosion.

The size of the seawater system will meet the engine manufacturer's published requirements.

Table 330.1 Main Engine Cooling Schedule		
Qty	Item	Description
2	Raw Water Intakes	See Section 332
2	Sea Valves	Aluminum lugged butterfly 2½" or larger 316L stainless steel full port ball valve, 2" and smaller
--	Raw Water Piping	Aluminum 5086
--	Raw Water Hose	Wire reinforced raw water hose stainless steel hose clamps
2	Strainers	Simplex, aluminum or bronze, as appropriate

331 GENERATOR COOLING

The generator engine will be provided with an independent heat exchanger cooling circuit. An engine-driven jacket water pump will circulate an engine-manufacturer approved coolant solution through the engine's cooling circuit. This coolant will also circulate through the engine-mounted heat exchanger.

The engine- driven raw water pump will draw suction through a sea valve from within the machinery space (See Section 332). A strainer will protect the raw water pump from debris according to the engine manufacturer's requirements. To prevent damage to the raw water piping from engine vibration, a flex bellow or length of raw water hosing will connect the engine's raw water inlet to the piping system.

Raw water discharge from the engines will be routed to the wet-exhaust injection rings (See Section 341).

Raw water piping will be fitted with pencil anodes. Dissimilar metals will be isolated to prevent galvanic corrosion.

The size of the seawater system will meet the engine manufacturer's published requirements.

340 MAIN ENGINE EXHAUST

Each main engine will be fitted with a wet exhaust system sized to meet the flow and backpressure requirements of the engine. Raw water discharge from the engine (see Section 330) will be routed to an injection ring to cool the exhaust. The water-exhaust mixture will pass through wet mufflers to attenuate exhaust noise and prevent ingestion of seawater back through the system into the engine. The water-exhaust gas mixture will then discharge above the design waterline.

Removable sections of thermal insulation will cover all dry exhaust piping to limit insulation surface temperature to below 150°F. Isolation hangers will support dry piping to meet the requirements of the maximum permissible load on the engine turbocharger outlets and expansion joints. A rubber gasket material will isolate the muffler from the structural foundation and strapping. The hose section connecting the exhaust piping to the aluminum exhaust outlet will be sealed with a high temperature sealant on assembly to inhibit corrosion between the exhaust hose and thru-hull pipe.

Table 340.1 Main Engine Exhaust Schedule

Item	Description
Expansion Joints: Dry Wet	Stainless steel bellow With stainless steel flanges, Hump hose type
Dry Exhaust Piping	316L stainless steel sch 10 pipe With stainless steel flanges Insulation wrap
Wet Exhaust Piping	FRP exhaust tubing or Aluminum 5083 or 5086
Wet Exhaust Elbows & Connections	High temperature silicon-rubber stainless steel t-bolt clamps
Muffler	Wet FRP, Centek or equal
Exhaust Outlet	5083 or 5086 aluminum tube

341 GENERATOR EXHAUST

The generator will be fitted with a wet exhaust system sized to meet the flow and backpressure requirements of the engine. Raw water discharge from the engine (see Section 331) will be routed to an injection ring to cool the exhaust. The water-exhaust mixture will pass through a water-lift muffler to attenuate exhaust noise and prevent ingestion of seawater back through the system into the engine. The water-exhaust gas mixture will then enter a water-gas separator. The gaseous portion of the exhaust will exit above the waterline. The water portion of the exhaust will discharge below the waterline.

Table 341.1 Generator Exhaust Schedule

Item	Description
Expansion Joints	TBD
Dry Exhaust Piping	none
Wet Exhaust Piping	Exhaust hose
Wet Exhaust Elbows & Connections	High temperature silicon-rubber stainless steel t-bolt clamps
Muffler	Water lift
Exhaust Outlet	5083 or 5086 aluminum tube

350 FUEL SYSTEM

The vessel will be fitted with a diesel fuel system serving the main engines and generator. The starboard fuel system and port fuel systems will be independent of each other. Transfer of fuel between the port fuel system and starboard fuel systems will not be provided.

The fuel system will be for open nozzle filling. The fuel filling system will consist of independent pipe runs from each tank to a common fueling station located on the aft deck. Each fill line will have a cam lock type connection. A cofferdam will be built around the fueling station.

Each fuel tank vent will run independently to the fueling station. It will be contained within the same cofferdam to minimize the chance of over-filling.

Independent suctions for each engine will be taken directly from the tank. A manual fuel shut-off valve with remote pulls mounted outside of the space will be fitted to all fuel suctions at the tank connection. Fuel supply piping will pass through a primary fuel filter fitted with a drip pan before connection to the engine. Fuel returns will be independent for each engine and direct to the fuel tank.

All connections to engines will be by a section of hose less than 30 inches in length to protect the piping from engine vibration.

Each fuel tank will be fitted with an electronic fuel sender.

Table 350.1 Fuel System Schedule	
Item	Description
Piping - fill	6061-T6, sch 80 aluminum pipe
Piping - vents	T-vent with flame screen or inverted vent check
Piping – supply/returns	Copper tubing or fuel hose
Primary Fuel Filters	Racor With drip pans Size per engine manufacturer
Secondary Fuel Filters	Supplied with engine Mounted on engine
Sounding	Electronic fuel sender

360 MACHINERY COMPARTMENT VENTILATION

A forced air ventilation system will supply each engine compartment with fresh air for combustion and cooling. The size of the ventilation system will limit the engine compartment temperature to the maximum allowable by the main engines or generators based upon a design ambient air condition of 95°F dry bulb/ 82°F wet bulb. This design condition represents the upper average of the 1% summer time design condition for Caribbean countries.

Moisture eliminating de-misting louvers will limit the ingestion of sea spay into the machinery space. Extracted moisture will drain out the house sides. Intake ducting will direct air away from the exhaust uptakes and into the bilges.

The intake ducts and exhaust outlets will be fitted with manually operated fire dampers. The ventilation fans will be shutdown in event of fire suppression discharge (See Section 761).

Table 360.1 Engine Compartment Ventilation Schedule

Qty	Item	Description
2	Intake Demisters	Aluminum or PVC, WIDE or equal
2	Intake Dampers	KMI fabricated
2	Intake Fans	Delta-T 11" Power: 24VDC Single speed
2	Exhaust Dampers	KMI fabricated
2	Exhaust Louvers	KMI fabricated

361 NON-MACHINERY COMPARTMENT VENTILATION

Aluminum vents positioned above the main deck will ventilate all hull compartments without forced ventilation systems.

370 PROPULSION CONTROLS

The vessel will be fitted with an electronic control system. This system will consist of a primary station in the pilothouse and a wired remote. The wire remote will have a single exterior plug on the forward portion of the pilothouse, for operation either port or starboard on the upper deck.

Table 370.1 Propulsion Control Schedule

Qty	Item	Description
1	Primary Station Throttle and Transmission Controls	Electronic Control Dual function levers Engine synchronization Clutch / throttle actuator
1	Wired Remote	Electronic Control Waterproof Clutch / throttle actuator

380 LUBE OIL

All engine lube oil connections will be fitted with quick-disconnect hose fittings and ball valve. A lube oil storage and transfer system will not be fitted. A lube oil waste storage system will not be fitted.

The boat (first boat only of multiple boat orders) will be provided with an Aeroquip Fast Lube Oil Change System (FLOCS). This system will be comprised of 120VAC electric pump and 30' of transfer hose with quick connection ends matching those on the vessel.

Each engine compartment will be fitted with lube oil transfer piping that will allow connection of the FLOCS on the aft deck. Each engine compartment will contain a flexible hose of sufficient length to connect all engine and gear lube oil connections.

390 GENERATOR SET

A single diesel driven generator will be installed in one of the engine compartments to power high-voltage loads.

Table 390.1 Generator Schedule	
Quantity	1
Make	Northern Lights
Model	M844W2
Rating	20 kw, 120/240v 0.8pf, 60Hz , 1 phase
Emissions	EPA Tier II

400 MECHANICAL SYSTEMS

410 FRESH WATER SYSTEM

A fresh water system will provide domestic water use for the lavatory sinks. A single pressure pump will supply pressurized water. A strainer will protect the pump.

Table 410.1 Fresh Water System Schedule

Qty	Item	Description
1	Pressure Pump	FloJet 4325-343 24VDC 4.5pgm open flow
1	strainer	Yes
2	Head Lavatory	Kohler Commercial Vitreous China (1) ADA compliant
2	Head Faucet	Kohler Commercial (1) ADA compliant
--	Piping	1½" deck fill Hose with plastic fittings
--	Storage Tanks	See Section 150

430 HEAT & WINDOW DEFROSTING SYSTEM

None

431 ACCOMMODATIONS VENTILATION SYSTEM

Each head will be fitted with an exhaust fan. The head bulkheads will be fitted with natural supply vents to allow air entry.

Table 431.1 Accommodations Ventilation Schedule

Qty	Item	Description
2	Head Exhaust fans	Air exchanges: min 6 per hour 24VDC

432 AIR CONDITIONING SYSTEM

None

440 WASTE SYSTEM

The vessel will be fitted with a waste water system to collect toilet and drain water. Discharge of the tank contents will be by a manually activated pump through a selectable, lockable, Y-valve to either an overboard discharge or deck discharge. Tank vents will be located on the starboard side deck. The vent will

be fitted with an inline replaceable charcoal filter to decrease noticeable odor. The head compartments will be fitted with floor drains.

Table 440.1 Waste Water System Schedule		
Qty	Item	Description
2	Toilets	Kohler Commercial Vitreous China (1) ADA compliant Ultra-low flush valves, 1.6 gallons per flush
2	Flushing Valves	Sloan Motion sensing (1) -ADA compliant
--	Piping	Hose
1	Discharge Pump	Bosworth 2824-B, 24VDC
2	Storage Tank	See Table 150.1
2	Tank Monitor	Head Hunter Tank Sentry

450 HYDRAULICS SYSTEM

None

460 STEERING SYSTEM

The vessel will be fitted with a full power follow-up electronic steering system. This system will consist of a primary wheel station in the pilothouse.

Table 460.1 Steering System Schedule		
Qty	Item	Description
1	Primary Station	Electronic helm
2	HPU	Size TBD Engine mounted
2	Tiller Arms	Size TBD
2	Cylinders	Size TBD
--	Piping	Copper tubing or hydraulic hose
1	Rudder angle indicator	Single unit for both rudders located in pilothouse

462 RUDDERS

Vessel steering will be by balanced rudders positioned aft of the propellers. The rudders will be offset from the shaft centerlines to allow shaft removal without unshipping the rudder blades. The rudderpost seals will be located above the design waterline.

Table 462.1 Rudder Schedule

Qty	Item	Description
2	Rudders	Cast Urethane
2	Rudder Shafts	Aquamet 22
2	Rudder Seal / Bottom Bearing	Tides Marine or equal
2	Rudder Top Bearing	Tides Marine or equal

470 BILGE/FIRE SYSTEM

The bilge system will consist of independent submersible bilge pumps in all compartments except the collision voids. (See Table 470.1) A portable, hand operated, manual bilge pump will be provided and located in the pilothouse.

The high-level alarms will not connect to the other alarm system (See section 540).

Table 470.1 Bilge System Schedule

Qty	Item	Description
2	Steering Gear Compartments (P/S) Bilge Pumps	Submersible pump w/float switch 24VDC
4	Engine Compartment (P/S) Bilge Pumps	Submersible pump w/float switch 24VDC See Table 470.2
2	Tank Compartment (P/S) Bilge Pumps	Submersible pump w/float switch 24VDC
2	Forward Compartment (P/S) Bilge Pumps	Submersible pump w/float switch 24VDC
10	High Level Alarms	TBD
--	Piping	Aluminum pipe and reinforced hose with stainless steel hose clamps plastic fittings
10	Bilge Switches / Indicators	3-way panel switch (auto/off/manual) with indicator light and fuse

An engine driven pump will serve as the fire pump (see Table 470.2). The fire main will be connected to a single fire station on the main deck.

Table 470.2 Fire System Schedule

Qty	Item	Description
1	Fire Pump	Rotary Gear Pump bronze Size TBD Engine driven
	Fire Station	1 ½" fire hose, 50 ft USCG approved nozzle
--	Sea Valve	Aluminum lugged butterfly 2½" or larger stainless steel full port ball valve, 2" and smaller
--	Piping (normally wet)	Aluminum 6061, sch 80 pipe suction side, sch 40 on discharge
	Piping (normally dry)	6061-T6 Aluminum
--	Strainer	Simplex Aluminum

472 COMPRESSED AIR SYSTEM

None

473 WASH DOWN SYSTEM

None

500 ELECTRICAL SYSTEMS

Wire will be marine grade, thermoplastic insulated, stranded copper wire. All low voltage circuits shall be two-wire negative ground. All high voltage circuits will be three-wire neutral ground. In no case shall the hull or superstructure be used for a return or grounding circuits. Wire will be secured in bundles to fabricated wire runs (round-bar or similar) with cable ties. Deck penetration and watertight bulkhead penetrations will be collared and sealed tight with Fire Stop.

Electrical panels containing voltmeter, amp meter and space for spare breakers (for future installation) will be provided. These panels will have a hinged, front access. They will be non-illuminated.

510 LOW VOLTAGE (DC) SYSTEM

Each main engine will be provided with a 24VDC starting battery bank sized to meet the CCA requirements per the engine manufacturer. The batteries will be located in the same compartments as the engines and provided with a cover to protect the terminals from accidental short and straps to secure them to a fixed frame. The engine-mounted alternators will maintain starting battery's charge when the engines are running. The port engine and starboard engine will be tied together with a negative crossover.

A 24VDC house battery bank will provide power for the low voltage distribution panel(s). Either port side or starboard side main engine alternator will maintain the house battery charge through a battery isolator.

Battery switches will allow emergency paralleling the 24VDC battery banks.

A multi-bank 120VAC/24VDC battery charger will maintain charge of all the 24VDC batteries when connected to shore power.

The generator starter will receive power from local main engine start battery or from any other available battery bank.

A 24VDC distribution panel will be flush mounted in the pilothouse console and receive power from the 24VDC house battery bank. In an emergency, power can be provided by either or both of the 24VDC main engine starting battery banks. A 12VDC distribution panel will be mounted in the pilothouse adjacent to the 24VDC distribution panel or be integral to the 24VDC panel and receive power from a 24VDC to 12VDC converter.

12VDC receptacles (cigarette / accessory) will be location in accordance with Table 510.3.

Table 510.1 Battery Bank Schedule

Qty	Item	Description
2	Main Engine Starting Battery Banks	24VDC 8D AGM
1	Ship Service Battery Bank	24VDC 8D AGM Total bank Amp Hours: TBD

Table 510.2 24VDC Load Schedule

Qty	Item	Description
4	ER fans	See Section 360
1	Fresh water pump	See Section 410
2	Head Exhaust Fans	See Section 431
1	Waste discharge pump	See Section 440
--	Steering	See Section 460
10	Bilge Pumps	See Section 470
--	Electronics	See Section 530
1	Fire Alarm	See Section 540
--	Lights	See Section 550
2	Windshield Wipers	See Section 631
1	Windshield Washers	See Section 632

Table 510.3 12VDC Load Schedule

Qty	Item	Description
2	Pilothouse accessory outlets	12VDC outlet
--	Electronics	See Section 530

514 CATHODIC PROTECTION

Bolt-on sacrificial anodes will protect for hull and equipment from cathodic damage. Seawater piping will have pencil anodes (See Sections 340, 341 and 470). An active cathodic protection system is not provided. Cathodic monitoring is provided by an Electroguard meter.

520 HIGH VOLTAGE (AC) SYSTEM

The vessel will have 120/240 VAC 1ph, 60 Hz. The vessel will receive high voltage power from one diesel driven generators (See Section 390) or from a shore power tie.

The shore power system will allow connection to a 120/240VAC, 60Hz, single phase, 50A shore power connection. A shore connection breaker will protect the isolation transformer and the shore side bus breaker. A single shore power receptacle will be provided.

An AC distribution panel will be mounted in the electrical equipment locker beneath the aft stairwell. A linkage will prohibit the simultaneous closure of both the generator bus breaker and the shore power connection breakers.

Table 520.1 AC Schedule		
Qty	Item	Description
1	Shore Power Connection	Female plug matching ship side shore connection
1	Shore Power Connection	Located on aft deck
1	Isolation Transformer	12kVA With voltage boost

Table 520.2 120VAC Load Schedule		
Qty	Item	Description
1	Multi-Bank 24VDC Battery Charger	See Section 510
--	Lighting Cabin	See Section 550
3	Receptacles Main Cabin Counter (Kiosk)	20A GFI, Duplex
2	Receptacles Entertainment System components	20A GFI, Duplex
2	Receptacles (1) for TV at main deck (1) for TV at upper deck	20A GFI, Duplex
2	Receptacles Main Cabin Displays	20A GFI, Duplex
1	Receptacle Pilot house	20A GFI, Duplex
1	Receptacle Engine Compartment (p)	20A GFI, Duplex
1	Receptacle Engine Compartment (s)	20A GFI, Duplex
--	Entertainment System	See Section 531

530 NAVIGATION AND COMMUNICATION ELECTRONICS

The following electronics and navigation equipment will be installed. Electronics controls / displays will be arranged within reach and sight of the operator's station in the pilothouse.

Table 530.1 Electronics Schedule		
Qty	Item	Description
1	Compass	Ritchie, flush mount
1	Radar/	Furuno, 18" Radome 24nm
1	Display	Furuno, 7" color LCD
1	GPS	TBD
1	Fathometer	Standard
2	VHF Radio	Standard
1	Bell	cast, polished, w/removable bracket
1	Whistle/Horn	Single trumpet horn
1	Loud Hailer	Standard

531 ENTERTAINMENT SYSTEM

A cabinet will house the central entertainment system. The system will consist of the following items as indicated by Table 531.1. Video displays are not provided but two (2) junction boxes with power and AV connections will be positioned to allow for Owner Furnished flat panel displays.

Table 531.1 Entertainment System Schedule		
Qty	Item	Description
2	Main Stereo Amp	Owner Furnished
3	Pre Amp	Owner Furnished
4	Interior Speakers	8" 2-way, overhead mount
8	Exterior Speakers	5.25" 2-way marine grade
2	Volume Control Boxes	Wall mount
1	AM/FM radio Tuner	Owner Furnished
1	CD/DVD changer	Owner Furnished
--	Video Display	Owner Furnished
--	VCR/DVD Combo	Owner Furnished
--	Microphones	None
--	Microphone Jacks	None

534 LIGHTNING PROTECTION

None

540 ALARM SYSTEM

Independent alarms for bilge high level and fixed fire extinguishing system activation will be provided. Alarms will announce at the pilothouse operator's station. Engine and generator alarms will be per the manufacturer's display panels.

The bilge alarms will be set approximately 6" above the bilge float switches (see Section 470). This alarm system is independent and not connected to the bilge system indication / operation panel.

Table 540.1 Bilge Alarm Circuit Schedule	
Circuit	Description
1 (p/s)	Collision Compartment Bilge High Level Alarm
2 (p/s)	Forward Void Bilge High Level Alarm
3 (p/s)	Tank Compartment Bilge High Level Alarm
4 (p/s)	Engine Compartment Bilge High Level Alarm
5 (p/s)	Steering Gear Compartment Bilge High Level Alarm

Discharge of either fixed fire extinguishing system will activate an audible and visible alarm. A audible enunciator mounted below the upper deck overhang will provide audible indication

Table 540.2 Fire Extinguishing System Alarm Schedule		
Qty	Item	Description
1	Audible Enunciator	6" Fire Bell, 24VDC, 85db@10ft
1	Visual Indicator	TBD

550 LIGHTING ARRANGEMENT

The vessel will have navigation lights in accordance with the COLREGS for a power driven vessel less than 50m in length overall but greater than 20m in length overall, underway (Rule 23) and at anchor (Rule 30) engaged in International service.

Floodlights will illuminate the exterior decks and surrounding area. A remote operated spotlight on the pilothouse top will be provided. Controls will be located in the pilothouse, in reach of the person at the helm station, but to the side allowing operation by second crewmember.

Table 550.1 Exterior Lighting Schedule		
Qty	Item	Description
As Req'd	Navigation Lighting	24VDC
2	Foredeck Floodlights	24VDC, 200W
2	Upper Deck Floodlight	24VDC, 200W
2	Aft Deck Floodlight	24VDC, 200W
1	Spot Light	24VDC, 200,000cp (min) remote control
As Req'd	Exterior Stair lighting	24VDC run LEDs 2 per stair run

All interior compartments will be fitted with low voltage lights. The main cabin will be fitted with high voltage lights for normal service and low voltage lights as backup. All lighting will be set up either for zone dimmer controls or staged, bright for cleaning and dim for night cruising.

Table 550.2 Interior Lighting Schedule		
Qty	Location	Description
2	Pilothouse	red/white dome light, 24VDC
1	Under Stairs Storage	White dome light, 24VDC
1	Steering compartment (p)	White dome light, 24VDC
1	Steering compartment (s)	White dome light, 24VDC
3	Engine compartment (p)	White dome light, 24VDC
3	Engine compartment (s)	White dome light, 24VDC
1	Tank compartment (p)	White dome light, 24VDC
1	Tank compartment (s)	White dome light, 24VDC
-	Forward Void (p)	None
	Forward Void (s)	None
-	Collision Void (p)	None
-	Collision Void (s)	None
18	Main Cabin	White, ceiling mount, 24VDC
12	Main Cabin	White, ceiling mount, 110VAC
2	Main Cabin Exit	Red LED "EXIT", 120VAC with battery backup

24 non-dimmable LED button-style lights will be distributed around the peripheral of the exterior decks.

600 OUTFIT

630 WINDOWS AND DOORS

Windows will be located as per the General Arrangement Drawing. All glass will be tempered safety glass.

Table 630.1 Window Schedule		
Qty	Location	Description
2	Pilothouse Windshield	Fixed, clear, clamp-in
2	Pilothouse Sides (p/s)	Fixed, clear, clamp-in
2	Pilothouse Sides Aft (p/s)	Horizontal sliding, clear, clamp-in
12	Cabin Side Windows (p/s)	Vertical half-drop, gray tint, clamp-in With screens

The exterior doors will be located as per the General Arrangement Drawing. Exterior doors will be equipped with stainless steel hardware. Exterior door locksets will be keyed alike.

Table 630.2 Exterior Door Schedule		
Qty	Location	Description
2	Head Door (s)	(1) 34" x 78" (1) 34"x78" ADA Aluminum, interior joiner door
2	House Aft Door	34" x 78" Aluminum clamp-in Weather tight with upper fixed light
1	House Front Door	32" x 72" Aluminum clamp-in Weather tight with upper fixed light, gray tint

Interior doors will be equipped with stainless steel hardware. Interior door locksets will be keyed alike.

631 WINDSHIELD WIPERS

The pilothouse windshields will be fitted with pantograph wipers. Wiper control will be a switch on the console and allow intermittent, continuous, and self-parking operation of both wipers together.

Table 631.1 Windshield Wiper Schedule		
Qty	Item	Description
2	Windshield Wiper	Imtra Pantograph arm 24VDC

632 WINDSHIELD WASHERS

A window washer system, dependent of the domestic fresh water system will be supplied. Washing activation will be by pushing the wiper selector switch (see Section 631).

Table 631.1 Windshield Wiper Schedule		
Qty	Item	Description
2	Washers	Arm mounted
--	Washer pump	None, uses 24VDC solenoid valves to access pressurized domestic water
--	Washer reservoir	None (uses domestic water)

640 INTERIOR OUTFIT

Pilothouse:

Bulkheads will be vinyl covered and/or painted aluminum. Mullions will be painted. The overhead will be vinyl covered and/or painted aluminum. Sole covering will be non-skid.

Main Cabin:

Bulkheads will be vinyl covered and/or painted aluminum. Mullions will be painted. The overhead will be vinyl covered and/or painted aluminum. Sole covering will be non-skid.

Heads:

Bulkheads will be either painted aluminum for bulkheads without visible stiffeners or vinyl-covered aluminum for bulkheads with stiffeners. The overhead will be vinyl-covered aluminum. Sole covering will be removable rubber matting.

Kiosk Food/Beverage Area:

A Kiosk consisting of a small counter height serving bar area and a lower counter with a small sink will be provided. Space for owner-furnished food and beverage equipment such as under-counter refrigerator, icemaker and a drink dispenser

will be provided for. Electrical power supply, cold water supply and a sink drain will be built in. The kiosk will be finished with painted or vinyl aluminum panels.

The kiosk counter tops will be Corian®. The lower counter will include a molded in sink.

641 SEATING

Seating will be installed in accordance with Table 641.1 and Table 641.2.

Table 641.1 Crew Seating Schedule		
Qty	Item	Description
1	Helm Seat	Bentley fore/aft and height adjustment
1	Crew Seat	Bentley

Passenger seating will be installed on tracks, as per the General Arrangement Drawing.

Table 641.2 Passenger Seating Schedule		
Qty	Item	Description
21	Fore Deck Seating	Beurteaux Ocean Outdoor
50	Main Cabin Seating	Beurteaux Ocean Outdoor With life preserver stowage
66	Upper Deck Seating	Beurteaux Ocean Outdoor

Two 4-person benches with storage under will be provided in the pilothouse.

650 PAINT

The hull and house will be painted in accordance with the following schedule. All preparation and application will be performed by licensed individuals and will follow all requirements stipulated by the coating system manufacturer. Dry film thickness will be per the coating system manufacturer’s recommendation for the application.

Table 650.1 Paint Schedule	
Location	Description
Hull Bottom & Sides below waterline (exterior)	Primer: Amercoat 235 Barrier Coat: Amercoat 235 Anti-Foulant: Sea Hawk, Biocop AF
Hull Sides (exterior)	Primer: Amerlock #2 Paint: Amershield Polyurethane Color: White
Main Deck, weather deck (exterior)	Primer: Rhinolite Etch Paint: Amershield Non-skid
Main Deck, interior deck	As per Main Deck, weather deck Color: TBD
House Sides , Pilothouse Sides, Pilothouse Top, Hand Rails	Primer: Amerlock #2 Paint: Amershield Polyurethane Color: White
House Interior (window mullions and un-covered bulkheads only)	As per House Sides
Upper Deck, weather deck (exterior)	As per Main Deck, weather deck
Fore Deck, weather deck (exterior)	As per Main Deck, weather deck

651 SIGNAGE

Vinyl lettering will be applied to the exterior of the vessel according to the schedule below:

Table 651.1 Signage Schedule	
Location	Description
Hull Sides (p/s)	Vessel name Company Logo
Transom	Vessel home port and vessel name

660 ACOUSTIC INSULATION

A layer of vinyl/foam acoustic insulation will be applied to the hull sides down to the waterline, the forward bulkhead down to the tank top and under the deck plating, in each engine compartment. The under deck insulation will extend inboard to above the haunch and close off the between deck volume inboard of the haunch. The access/exhaust trunks and intake air trunks will also be treated.

The acoustic insulation material will have a laminated Mylar covering to prevent moisture absorption.

Table 660.1 Acoustic Insulation Schedule	
Item	Description
Vinyl foam insulation	1.25-1.5" Polymer Tech

661 THERMAL INSULATION

Exterior surfaces of the main cabin and pilothouse will be treated with thermal insulation.

Table 661.1 Thermal Insulation Schedule	
Item	Description
Thermal insulation	Mylar bubble wrap

662 STRUCTURAL FIRE PROTECTION

None

670 LABELS & MARKINGS

The vessel's wiring, piping, instrument and equipment will be labeled if the item is not readily identifiable or if labels are required by regulation (See Section 160).

Table 670.1 Label & Marking Schedule	
Item	Description
Safety & Pollution	As required by regulatory agency
Wiring	Color code or tag
Piping	Color code, tag, or permanent marking
Instruments	Label only if not readily identifiable
Switches	Label
Valves	Label only if not readily identifiable
Builder's Plaque	Polished brass in main cabin
Builder's Name Plate	Aluminum, (p/s)

700 AUXILIARY SYSTEMS

760 LIFE SAVING

The safety equipment indication in Table 760.1 will be provided and installed. Life preservers will stow beneath seats in main cabin seating (See Section 641) and in deck boxes for exterior seating.

Table 760.1 Life Saving Equipment Schedule		
Qty	Item	Description
156	Adult Life Preserver	USCG Type I w/lights
15	Children Life Preserver	USCG Type I w/lights
1	Ring Buoy w/ throw line	24" ring, 60ft line
2	Ring Buoy w/MOB signal	24" ring
1	Pyrotechnic Package	In watertight container 6 hand red flares 6 orange smoke distress signals
1	EPIRB	Per regulatory requirements
3	Med Kit	Orion Life Boat Kit or equal (for 50 pax ea.)
1	Boat Hook	Glass reinforced nylon telescoping hook with pole extending from 4 ft to 8 ft
8	Life float	Jim Buoy, Series 1200 22-person
1	MOB device	Jason's Cradle

A rescue boat is not provided.

761 FIXED FIRE EXTINGUISHING SYSTEM

A pre-engineered FM-200 or equal fire-extinguishing system will be installed in each machinery space. The port machinery space system will be completely independent of the starboard machinery space system. Each fixed fire extinguishing system will consist of a fire-suppression bottle and discharge head. The system will allow for automatic discharge and manual discharge from the helm station. Upon activation, the system will automatically shutdown the respective ventilation fan, shutdown the engine and generator within the protected space, activate the alarm and release the agent within the effected space, (See Section 540).

Table 761.1 Fixed Fire Extinguishing System Schedule		
Qty	Item	Description
2	Fixed Fire Fighting System	Sea-Fire Marine FD-Model Series Engine Room Size: TBD
2	Manual Release Cable	TBD
1	Discharge Alarm	24VDC
2	System Interrupt	Multi-circuit

800 MANUALS & DOCUMENTATION

Three copies of all documents, instructions, etc., provided by the manufacturers of equipment and machinery will be collated and placed on board. One copy of USCG approved drawings will be delivered with the vessel.

850 DELIVERY

The vessel will be delivered to owner's resort in Puerto Rico.