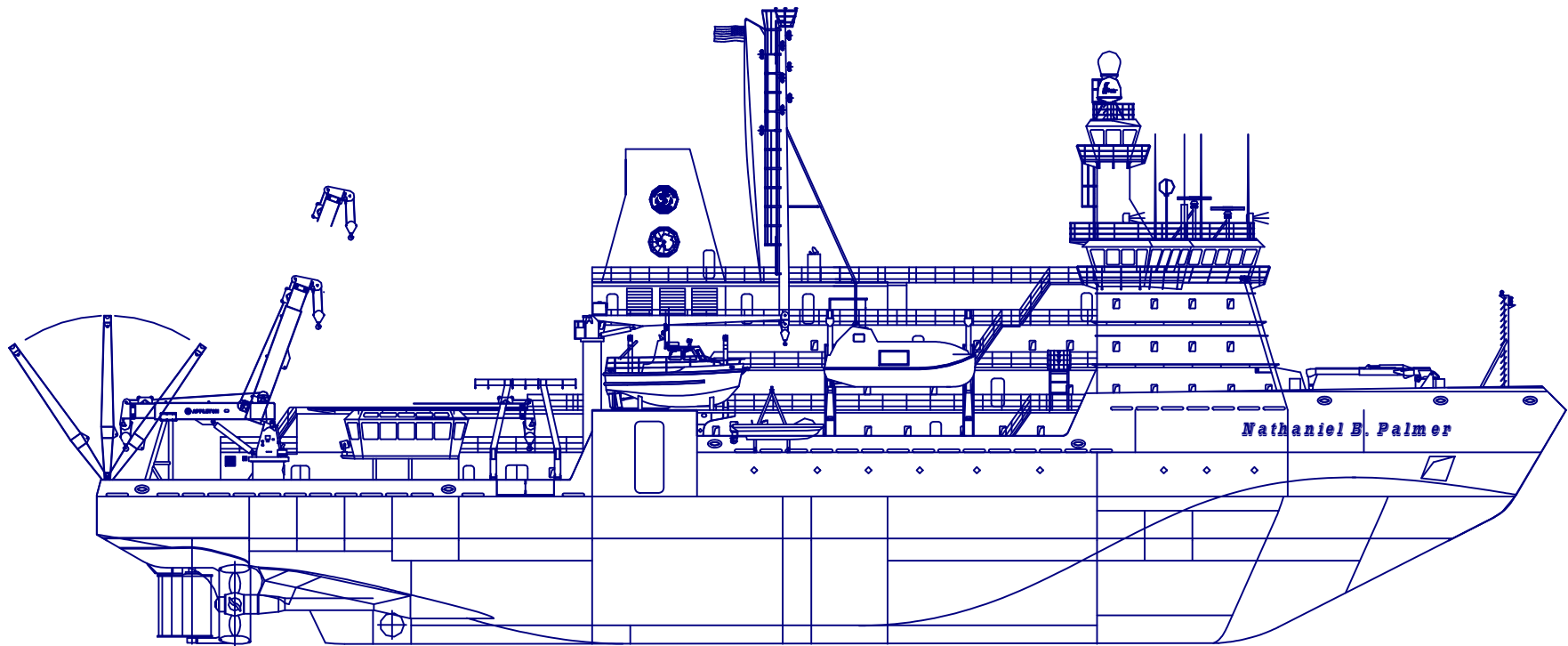

Nathaniel B. Palmer

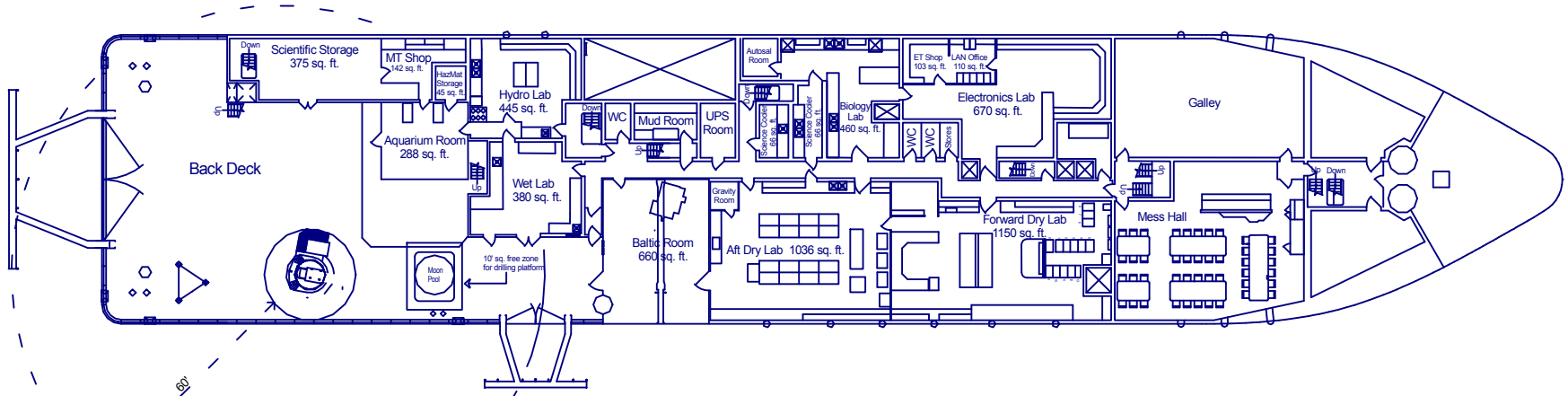
Research Vessel / Icebreaker



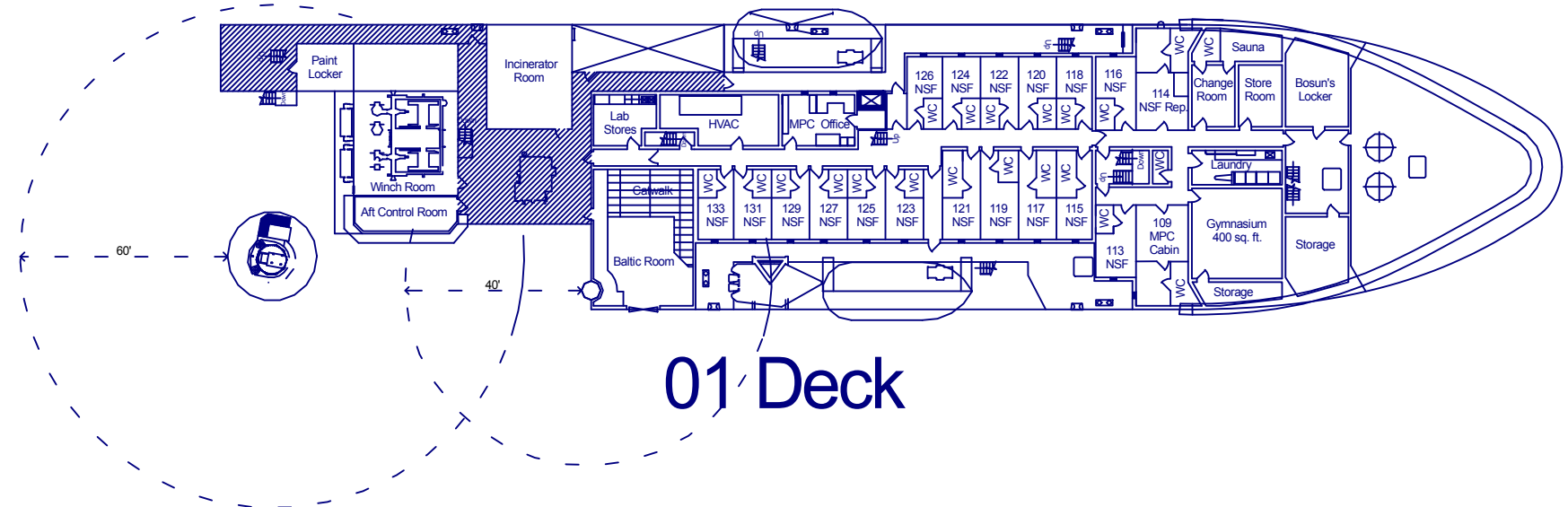
Operated for the
National Science Foundation, Office of Polar Programs
by

Raytheon Polar Services

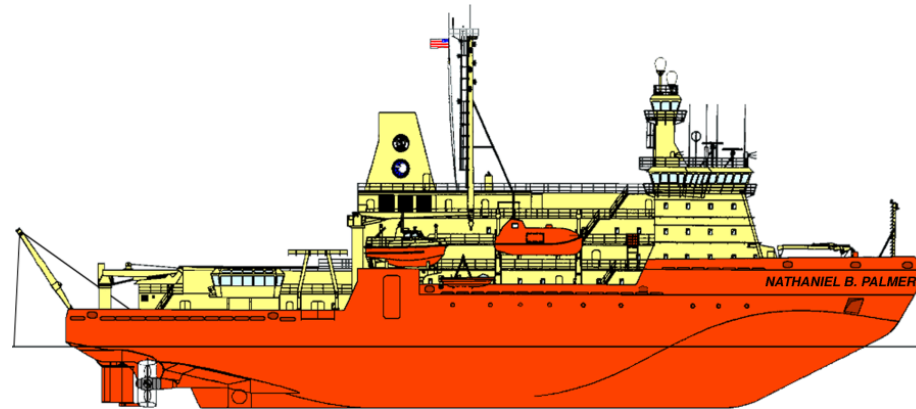
Under a charter with
Edison Chouest Offshore



Main Deck



01 Deck



The R/V Nathaniel B. Palmer is operated by Raytheon Polar Services on a long-term charter from Edison Chouest Offshore (ECO), Galliano, Louisiana. Raytheon staffs the vessel with a charter representative to coordinate cruise planning and scheduling, and with a technical staff to support science operations. ECO provides the vessel master, ice pilot and crew.



The vessel was named after merchant marine and ship builder, Nathaniel B. Palmer (8 August 1799 - 21 June 1877). The son of a Connecticut ship builder, Palmer had a prosperous and adventurous life as a sealer and whaler, a sea captain, and a ship designer and builder. He was a pioneer in the clipper era and some historians credit Palmer with the discovery of Antarctica, although others challenge this view. The Palmer, completed in 1992, is 308 ft long and is ice-classed ABS-A2, capable of breaking three feet of level ice at three knots. The Palmer can accommodate 39 scientists and staff in one and two-person staterooms. Each stateroom has a television and computer Ethernet connection. The ship has a galley and a common dining area, conference room/library, lounge with audio and visual systems, a sauna and an exercise room.

RVIB Nathaniel B. Palmer

Principal Features and Technical Information

General		
Vessel Owner	Edison Chouest Offshore	
Builder	North American Shipbuilding, U.S.A.	
Year Commissioned	1992	
Chartered to	Raytheon Polar Services	
Classification	ABS A1, AMS, E, ACC, Ice Class A2	
Flag	U.S.A.	
Principal Dimensions		
Length Overall	308.50 ft	94.0 m
Length on Waterline	279.85 ft	85.3 m
Breadth Moulded	60 ft	18.3 m
Draft, Design	22.5 ft	6.8 m
Depth	30.0 ft	9.1 m
Displacement	6800 LT	6909 t
Light Ship Weight	4800 LT	4877 t
Main Propulsion Machinery		
Shafts		
Number of Shafts	2	
Total Shaft HorsePower	12,700 SHP	9500 kW
Transmission and shafting efficiency	0.96	
Shaftline Bearing Loss	2%	
Gearing Loss	2%	
Total Brake Horsepower (BHP)	13,200 BHP	9,900 kW
Main Engines		
Number of Engines	4	
Manufacturer Model	Caterpillar	3608
Prime Mover	Diesel	
Rating of Engine	3300 BHP @ 900 rpm	
Transmission System	Reduction Gear	
Gear Box		
Manufacturer Model	Lohmann & Stoltefort	GVL 1250B
Gear Ratio	6.4 to 1	
Propellers		
Number of Propellers	2	
Propeller Diameter	13.12 ft	4 m
Number of Blades	4	
Material	NiAlBr	
Direction of Rotation	Inboard turning	
Hub Diameter	4.36 ft	1.33 m
Hub to Prop Diameter Ratio	0.33	
Manufacturer	Ullstein, Norway	
Nozzles		
Inside Diameter	13.28 ft	4.05 m
Outside Diameter	16.14 ft	4.92 m
Material	Stainless Steel	
Stern Tub Bearing		
Manufacturer	Thordon	
Generators		
Number	4	
Rating of each	1400 BHP	1050 kW
Total Auxiliary Power	5600 BHP	4200 kW
Manufacturer Model	Caterpillar	3512
Electric Power	AC=480/240/120V, 60Hz, DC=24V	
Thrusters		
Bow Thruster		
Number	1	
Type	Water Jet Azimuthing	Flush Mounted
Thrust	10.0 LT	
Rating	1400 BHP	1050 kW

RVIB Nathaniel B. Palmer Principal Features and Technical Information

Stern Thruster			Emergency Diesel Generator		
Type	Tunnel		Number	1	
Thrust	6.0 LT		Rating	300 kW	
Prime Mover	Electric Motor		Manufacturer	Caterpillar	
Rudders			Glycol Heating System		
Number	2		Number	2	
Type	Schilling High-Lift		Rating of each	6,600,000 BTU/hr	
Evaporator/Fresh Water Maker			Manufacturer	Vapor Corporation	
Number	3		Exterior Lighting		
Manufacturer Type	Alfa Laval	JWP-26-C80	Searchlights		
Rating of each (daily)	15 LT		Number	4 single	1 double
Heeling System			Rating	2.5 kW zenon with heather circuit	
Number of Tanks	1 Pair		Manufacturer	Carlisle and Finch	
Number of Pumps	1		Tank Capacities		
Total Heeling System Horsepower	1400 BHP	1050 kW	Fuel	425,000	
Manufacturer Model	Caterpillar	3512	At 22.5 ft draft	1,550 LT	1,574 t
Induced Roll & Time Period	5° roll side to side in 2 minutes		At 95% maximum capacity	1,740 LT	1,768 t
Anti-roll tanks			Fresh Water at 95%	215 LT	218 t
Number	2 pair		Ballast Water at 95%	1,000 LT	1016 t
Dimensions	10 ft. (W) x 60 ft (L)		Aviation Fuel at 95%	34 LT	
Percent Roll Reduction, Sea State 6	40-50%		Heeling Tanks (16 ft level)	227 LT	
Waste Disposal System			Antiroll Tanks (4.5 ft level)	173 LT	
Incinerator	1		Endurance	15,000 NM @ 12 knots	
Manufacturer	Golar 500		Accommodations		
Holding Tanks	2-hour duration		Crew Owner	22	5
			Scientists and Staff	39	
			Spare	2	
			Total Accommodations	68	

RVIB Nathaniel B. Palmer **Principal Features and Technical Information**

Special Features		
Helicopter hangar and ability to carry two small helicopters and 7,200 gallons of fuel		
Low friction hull coating (Inerta 160)		
No fuel oil in double bottom		
One compartment damage stability standard		
Overboard discharge on port side only		
Uninterruptible and conditioned power in main work area and computer lab		
Two boilers to circulate water/antifreeze mixture under exterior deck on main level		
Design Air Temperature	100° to -50° F	37.8° to 45.6° C
Design Water Temperature	85° to 28° F	29.4° to -2.2° C
Drinking water made from seawater	12,000 gal/day maximum production	
Other Features and Space Allocations		
Aloft Observation Station (deck height)	80 ft above water surface	
Pilot House (deck height)	54 ft above water surface	
Main Science Deck aft (deck height)	9 ft above water surface	
Pilot House (interior width)	74 ft	
Overhang at vessel side	12 ft	
Helicopter Hangar	40 ft x 32 ft	1300 sq ft
Flight Deck	54 ft x 44 ft	2500 sq ft
Boats		
Survey Boat "Cajun Cruncher"		
Length	28.8 ft	8.8 m
Breadth	10.75 ft	3.3 m
Depth	7.25 ft	2.2 m
Draft (keel)	4 ft	1.2 m
Displacement	11.3 LT	11.5 t
A-frame	800 lbs	
Winch	300 m 5/16" cable	
Personnel Capacity	4 scientists	2 crew
Boats (continued)		
Diesel Manufacturer	GM	8V-71
Diesel Engine Horsepower	230	
Propeller Diameter	36", fixed pitch, in a nozzle	
Cooling System	Keel cooler	
Lifeboats with Davits		
Number	2 (1 port, 1 starboard)	
Capacity of each	76	
Features	Enclosed, powered (55 HP)	
Material	Fiberglass	
Manufacturer	Schat Watercraft	
Inflatable Rafts		
Number	1	
Capacity of each	20	
Manufacturer	Suitlik	
Rescue Boat with Davits		
Number	1	
Length	19.7 ft	
Features	100 HP outboard, 25 knots	
Manufacturer	J&V, Grimstad, Norway	
Miscellaneous Vessel Facts		
Over 3,000 10x40-ft steel plates & 810,000 linear feet of welding were used on the ship		
The steel plate in the bow is 1 9/16" thick and is twice the strength of regular steel		
The steel on the hull is made with a low-temperature alloy rated to -60° C		
75,000 ft (14 miles) of pipe were used to outfit the ship		
There are 2,700,000 feet, (511 miles) of wire inside the vessel		
Total electrical generating capacity is 4.63 million watts (nearly 4,000 hair dryers)		
The vessel is capable of carrying twenty, 20 ft cargo containers		

RVIB Nathaniel B. Palmer **Principal Features and Technical Information**

Uncontaminated Seawater System (continued)			Bottom Sampling Equipment (continued)		
Three Seawater Intakes					
Main	At Stern Thruster	6 in. diameter			
Secondary	At Moon Pool	6 in. diameter			
Tertiary	At Center of Hull	2.5 in. diameter			
Surface Seawater Sampling Equipment			Seismic Instrumentation		
Fluorometer	Turner	10-AU-005	Seismic Data Logger	Triton Elics Delph	Records data in SEG-Y format by converting SEG-2 32 to SEG-Y
Thermosalinograph	Sea-Bird	SBE-45	Research Vessel Data Acquisition System (RVDAS)	Lamont Doherty Earth Observatory / Raytheon Polar Services	Linux-Based Data Acquisition System
Transmissometer	WET Labs	C-Star	Magnetometer	Marine Magnetics	Seaspy
Digital Remote Temperature Sensor	Sea-Bird	SBE-38	Digital Benthic Camera, with Strobe	Ocean Imaging Systems	DSC 10000 Strobe Model: 3831
pCO ₂ Equilibration System	Lamont-Doherty Earth Observatory		GCS-90 Seismic Gun Controller	Syntron	Consists of two components: the SPS-90 Solenoid Power Supply and the GCS-90 Gun Controller
Aquaria			Cable-Leveling System (RCL-5 Birds)	Input/Output Inc.	Digibird 50-10
Two permanent fiberglass tanks, space for four additional Xactic tanks (4' x 4' x4')			48-Channel Seismic Data Logger	OYO	DAS-1
Deck Incubators			Gravity Meter	LaCoste & Romberg	Air-Sea Gravity Meter
Number	3		Streamers		
Material Type	Plexiglas	UV Transparent	Multi-Channel Seismic Streamer Cable, Oil-Filled, 48 Channels	Teledyne	Length: 1,200 m, with a 300 m lead-in
Water Purification Systems			Single Channel Streamers		
E-pure four-holder system	Barnstead	Type I water (ultra-pure), 2 L per minute	Geometrics	Innovative Transducers Inc. (ITI)	
Diamond UV	Barnstead	TOC-free water	Seismic Sound Sources		
Bottom Sampling Equipment			Generator Injector (GI) Seismic Air Guns (6)	Seismic Systems Inc.	210 cu in. configurable in volume and mode by using volume and port reducers
Dredges					
Small Chain Dredge, Rock Dredge	Kahl Scientific				
Large Chain Dredge, Rock Dredge	Kahl Scientific				
Coring Equipment					
The vessel can be equipped with several different coring devices designed to take vertical samples of sediment from below the sea floor.					
Jumbo Piston Corer	Woods Hole Oceanographic Institute				
Standard Piston Corer	Woods Hole Oceanographic Institute				
Gravity Corer					

RVIB Nathaniel B. Palmer

Principal Features and Technical Information

Seismic Sound Sources (continued)		
Bolt Gun 1500 Long Life Airgun	Bolt Technology Corp.	Sizes in cu. in.: 1000, 800, 500, 450, 400, 350, 300, 200, 145, 80
GI Water Gun (1)	Seismic Systems Inc.	15 cu in.
Seismic Air Compressors	Borsig-LMF	1200 scfm, 2000 psi
Sonar Systems		
Acoustic Doppler Current Profiler	RD Instruments	VM-150 Narrow Band
Depth Indicator	DataMarine	VM-150 Narrow Band
3.5 kHz sub-bottom profiler	O.D.E.C.	Bathy 2000W, 8.3 KW
12 kHz bottom tracker	O.D.E.C.	Bathy 2000W
3.5 kHz sub-bottom profiler	Knudsen	320 B/R, 2 KW
12 kHz bottom tracker	Knudsen	320 B/R
EM 120 Multibeam System	Simrad	12 kHz full ocean depth swath mapping
The EM 120 uses a fan of narrow acoustic beams to create a map of the sea floor. Preliminary maps can be produced and plotted almost immediately after a survey is finished.		
Acoustic Doppler Current Profiler	RD instruments	
38, 120 and 200 kHz Fish Finder	Simrad	EK-500
12 kHz PDR (for pinger tracking)	O.D.E.C. / Raytheon	
Towed Bio-Acoustic Sonar	HTI	38 & 120 kHz
Chirp Sidescan Sonar / Sub-Bottom Profiler, towed	Datasonics	SIS-1000, max. depth 1000 m
Diving Equipment		
Dive Compressors (1 on board)	Bauer	Fills to 3000 psi
Dive Van (for storage/setup of dive equipment)	20' x 8' x 8.5'	
DAN (Divers Alert Network) Oxygen Kit		
Meteorological Sensor Suite		
Humidity/Wet Temp	RM Young	41372LC
Barometer	RM Young	61201

Meteorological Sensor Suite (continued)		
Anemometer	RM Young	5106
Precision Infrared Radiometer	Eppley	PIR
Pyranometer	Eppley	PSP
PAR Radiometer	Biospherical	QSR-240
PRR (mast)	Biospherical	PRR-610
GUV (mast)	Biospherical	GUV-2511
PUV (underwater)	Biospherical	PUV-2500
Time Systems		
Rubidium Time Standard Clock	TRAK	8812-11
Time & Frequency Receiver and Clock	Symmetricom	XL-GPS
Navigation Systems		
Gyrocompass (2)	Yokogawa	KM008-E
GPS	Trimble	
GPS	Furuno	
GPS, with heading and attitude (2)	Seatex	SeaPath 200
HF WEFAX	Furuno	DFAX
10 cm Radar (S-band)	Furuno	FAR 2837S
3 cm Radar (X-band)	Furuno	FAR 2822X
HF Radio Direction Finder (RDF)	Simrad	
VHF Radio Direction Finder	Taiyo	TDC338H2 MKI
TeraScan	TeraScan	DL500
The TeraScan is a dual-processing ground station providing high-resolution images of ice, chlorophyll, weather, and navigation. Data are supplied to grantees and NASA.		
Communication Equipment		
The NBP is Global Maritime Distress Safety System (GMDSS) compliant. This means there is automatic, complete redundancy for ship to ship & ship to shore communication.		
Fleet 77	Sailor	Fleet 77+
Inmarsat-C	Sailor	
Iridium Phones	Motorola	9500

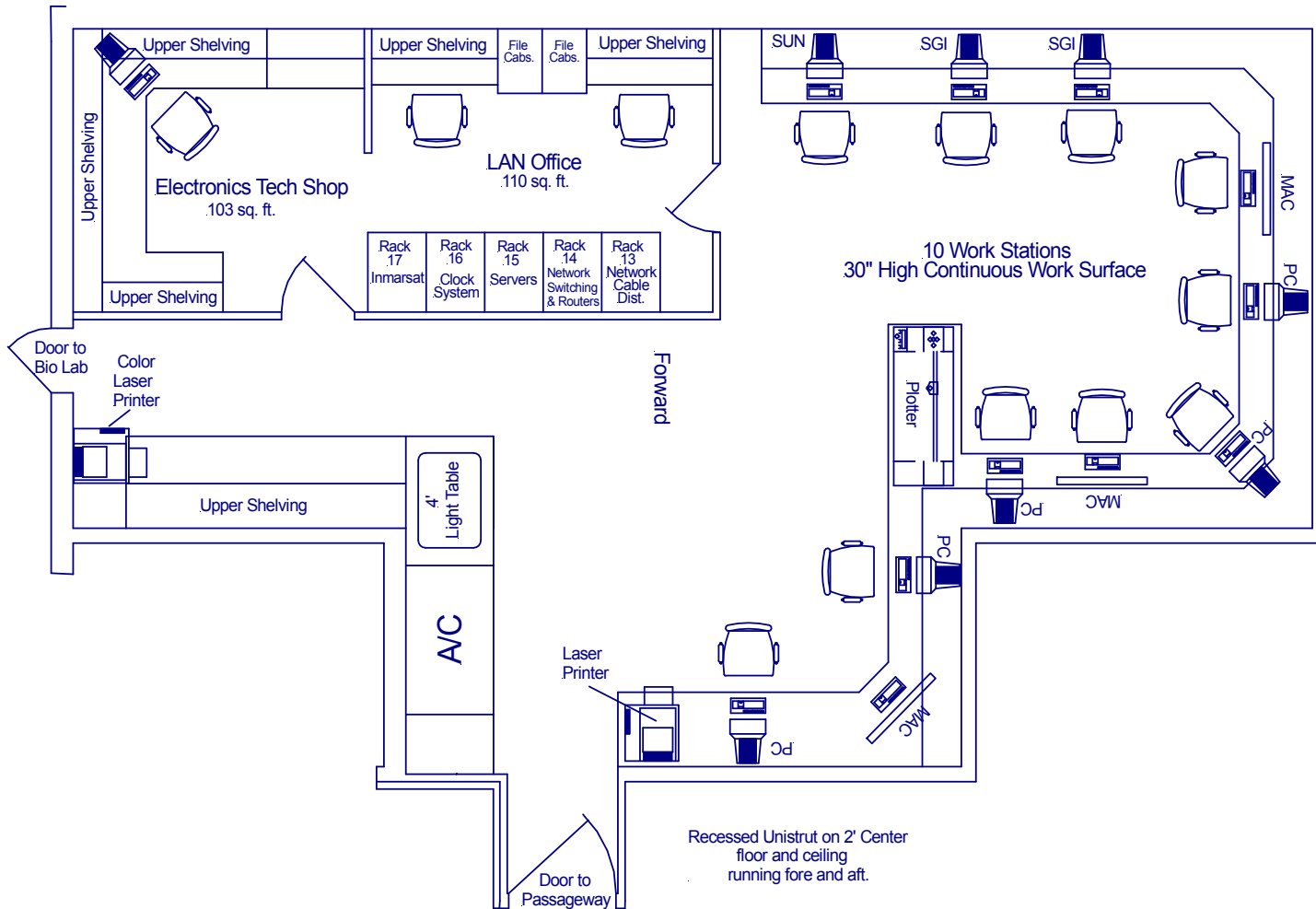
RVIB Nathaniel B. Palmer **Principal Features and Technical Information**

Communications Equipment (continued)		
VHF Radios		
Sailor	RT146	Bridge to Bridge
Sailor	RT2048	Main
Sailor	RM2042	Watch Receiver
HF SSB Radios		
Sailor	SP300	
Sailor	T2130	
Computers and Networking		
Windows, Macintosh, Solaris, and Linux operating systems are available. There are usually 8 to 10 computers available for general use in the E-Lab and 03 Conference Room.		
Network	400 LAN drops throughout ship, including cabins	
E-mail	Transmitted three times daily via satellite. User allotment of 25 KB/day may be used any time during a cruise.	
Individual email size restrictions	100 KB outgoing	75 KB incoming
Space Allocation		
Lab spaces feature recessed unistrut on 2' centers, floor and ceiling, running fore and aft		
Main Deck		
Electronics/Computer Lab	670 sq. ft	
Forward Dry Lab	1150 sq. ft	
Aft Dry Lab	1036 sq. ft	
Hydro Lab	445 sq. ft	
Wet Lab	416 sq. ft	
Bio Lab	460 sq. ft	
Science Coolers	2 @ 86 and 68 sq. ft	
Baltic Room / Staging Area	680 sq. ft	
Aquarium Room	298 sq. ft	
Marine Tech Workshop	142 sq. ft	
Scientific Storage	375 sq. ft	

Space Allocation (continued)		
Electronic Equipment Room	96 sq. ft	
Changing / Mud Room / Darkroom	100 sq. ft	
Lower Deck		
Scientific Storage	170 sq. ft	
Scientific Storage	four 20' containers	
Exterior Main Deck		
Deck tie down points are located at 2 ft centers on the main deck and helo deck		
Science Vans		
Radioisotope Vans	2 vans	20' x 8' x 8'
Freezer Lab Vans	2 vans	20' x 8' x 8'
Garage/Trace Metal Clean Van	1 van	20' x 8' x 8'
Recreation / Leisure Spaces		
Library / Conference Room (03 Deck)	700 sq. ft	
TV Lounge (02 Deck)	510 sq. ft	
Gymnasium (01 Deck)	400 sq. ft	

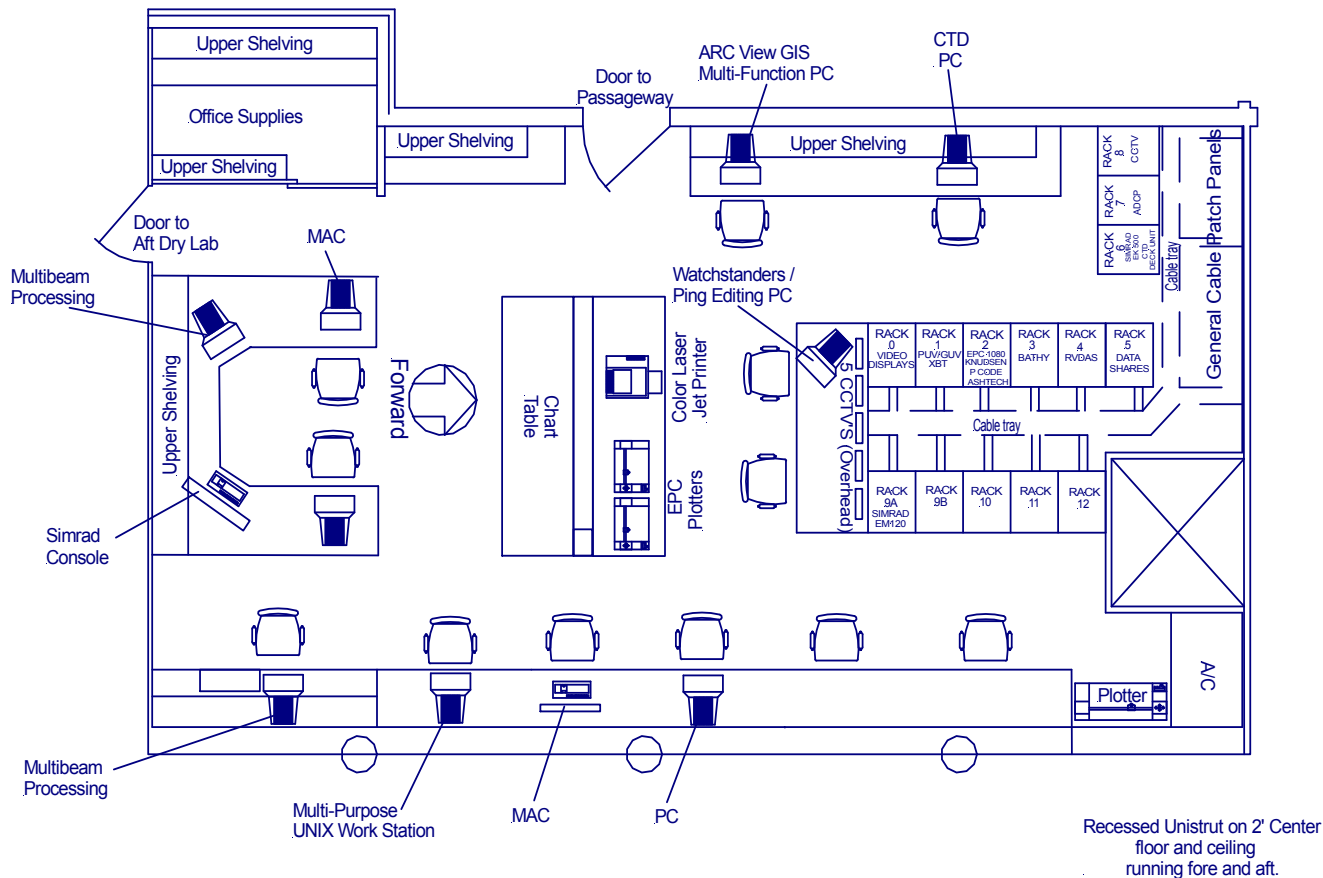
Electronics Lab

670 sq. ft.

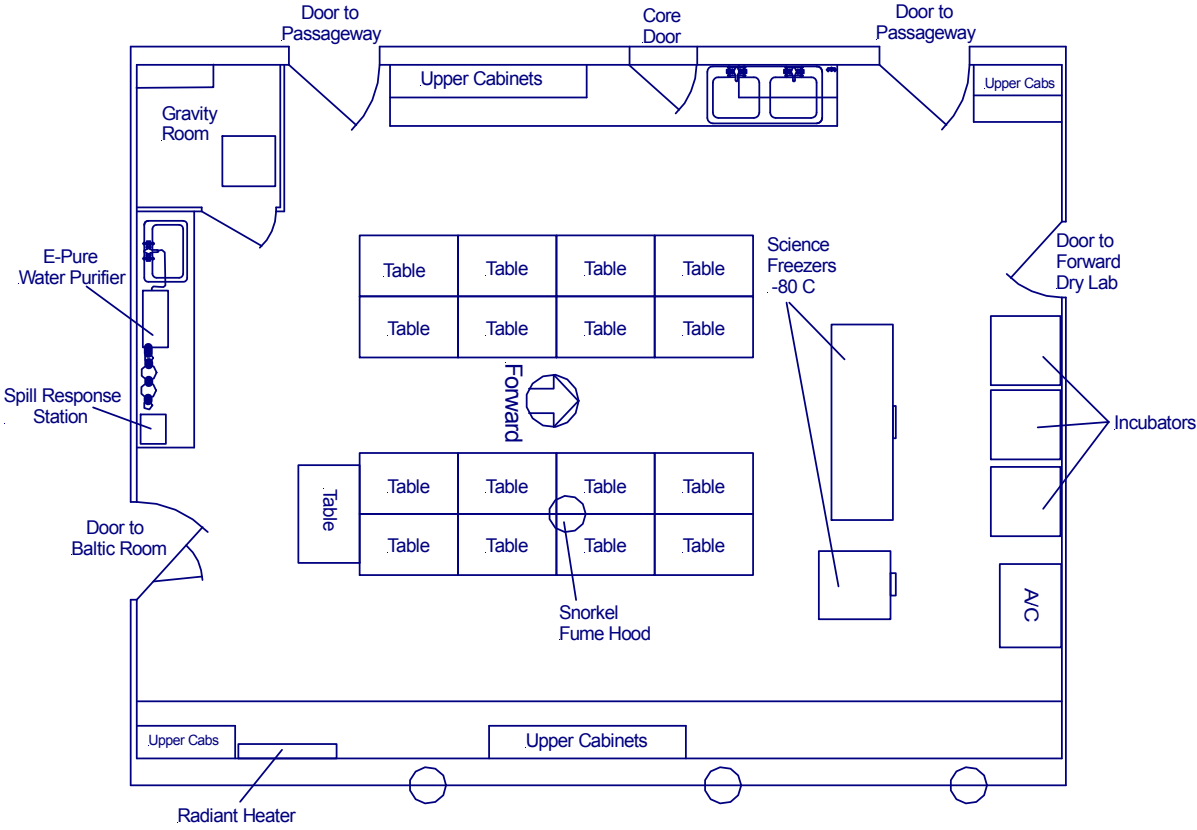


Forward Dry Lab

1150 sq. ft.

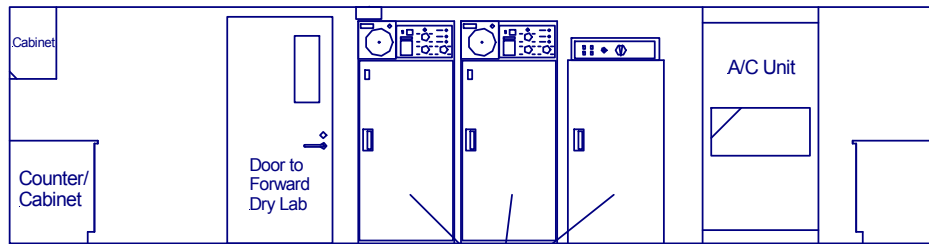


Aft Dry Lab 1036 sq. ft.



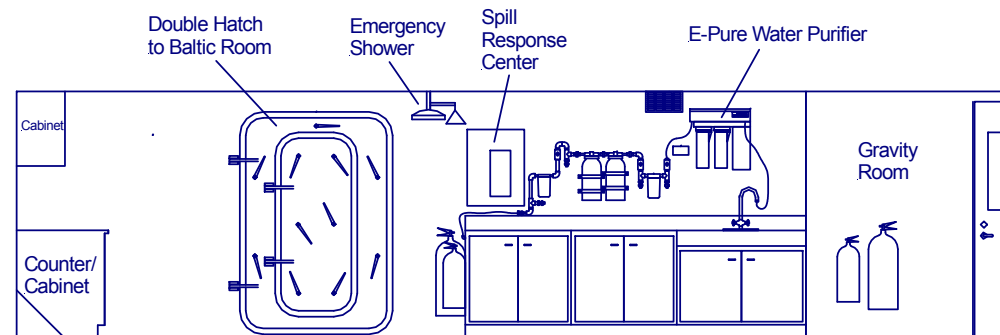
Recessed Unistrut on 2' Center
Floor and Ceiling
Running Fore and Aft

Aft Dry Lab Elevations



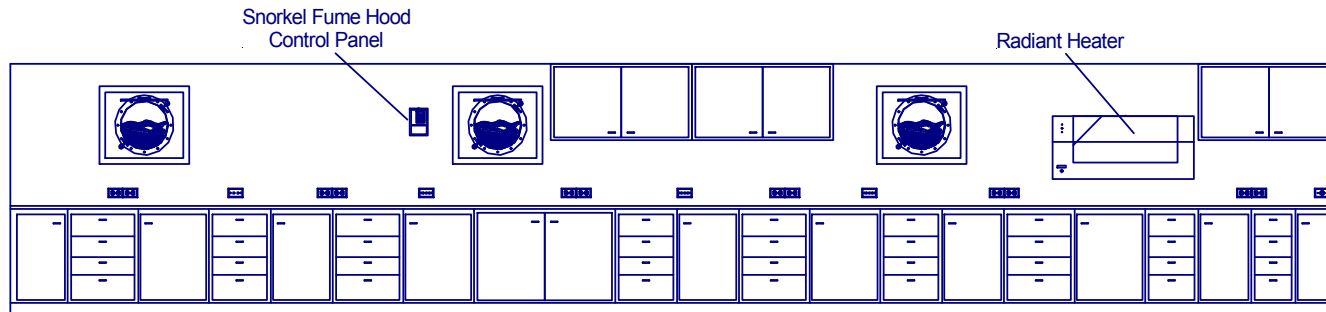
Forward

Science Incubators

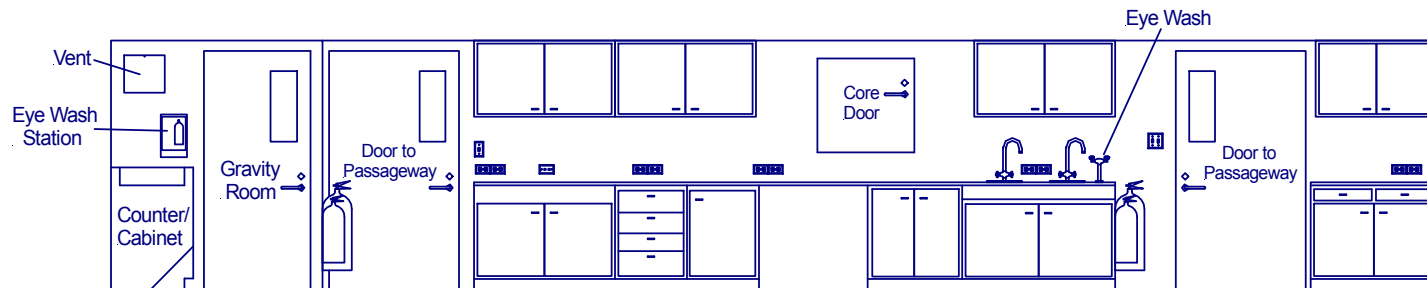


Aft

Aft Dry Lab Elevations



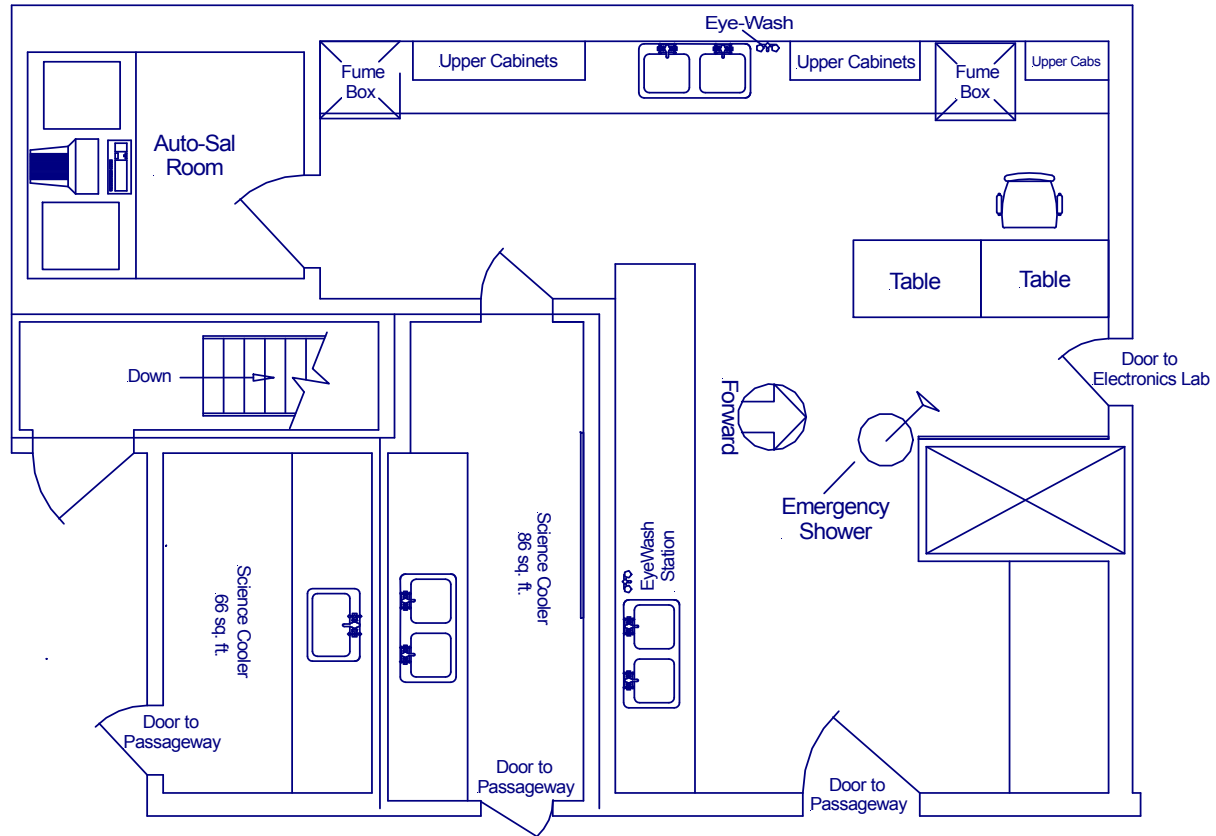
Starboard



Port

Bio Lab

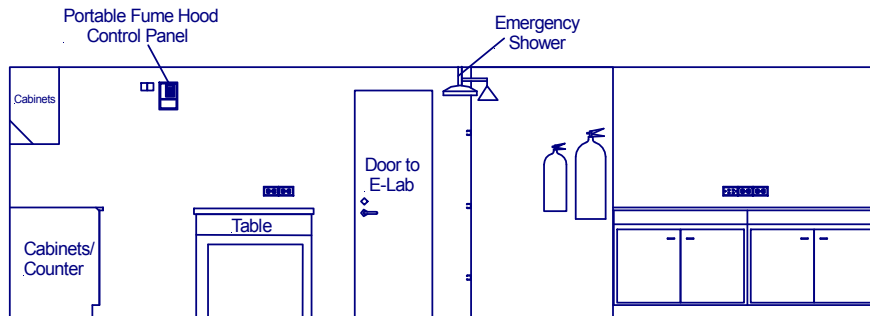
460 sq. ft.



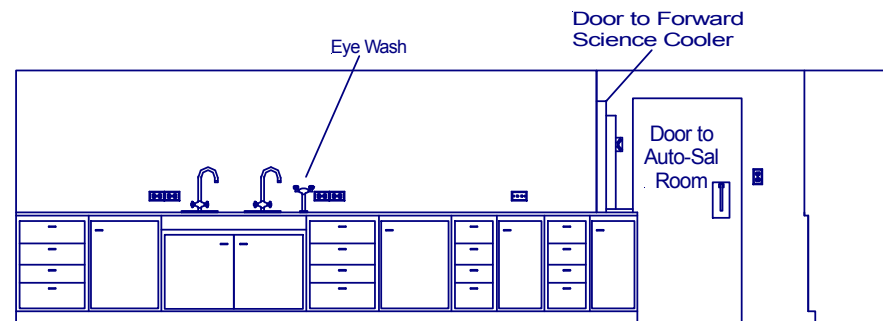
Floor and Ceiling Unistrut
on 2' center
running fore and aft.

Wall Mounted Unistrut
at 16", 32", and 48" from
deck for gas bottle storage

Bio Lab Elevations

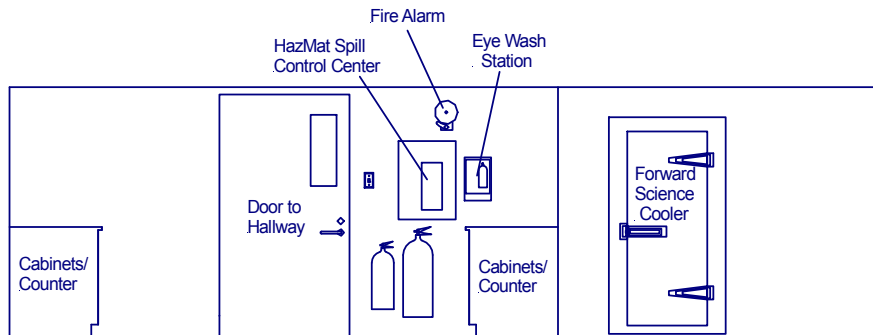


Forward

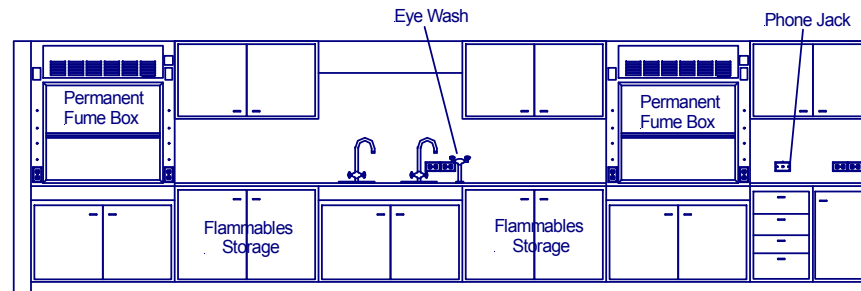


Aft

Bio Lab Elevations



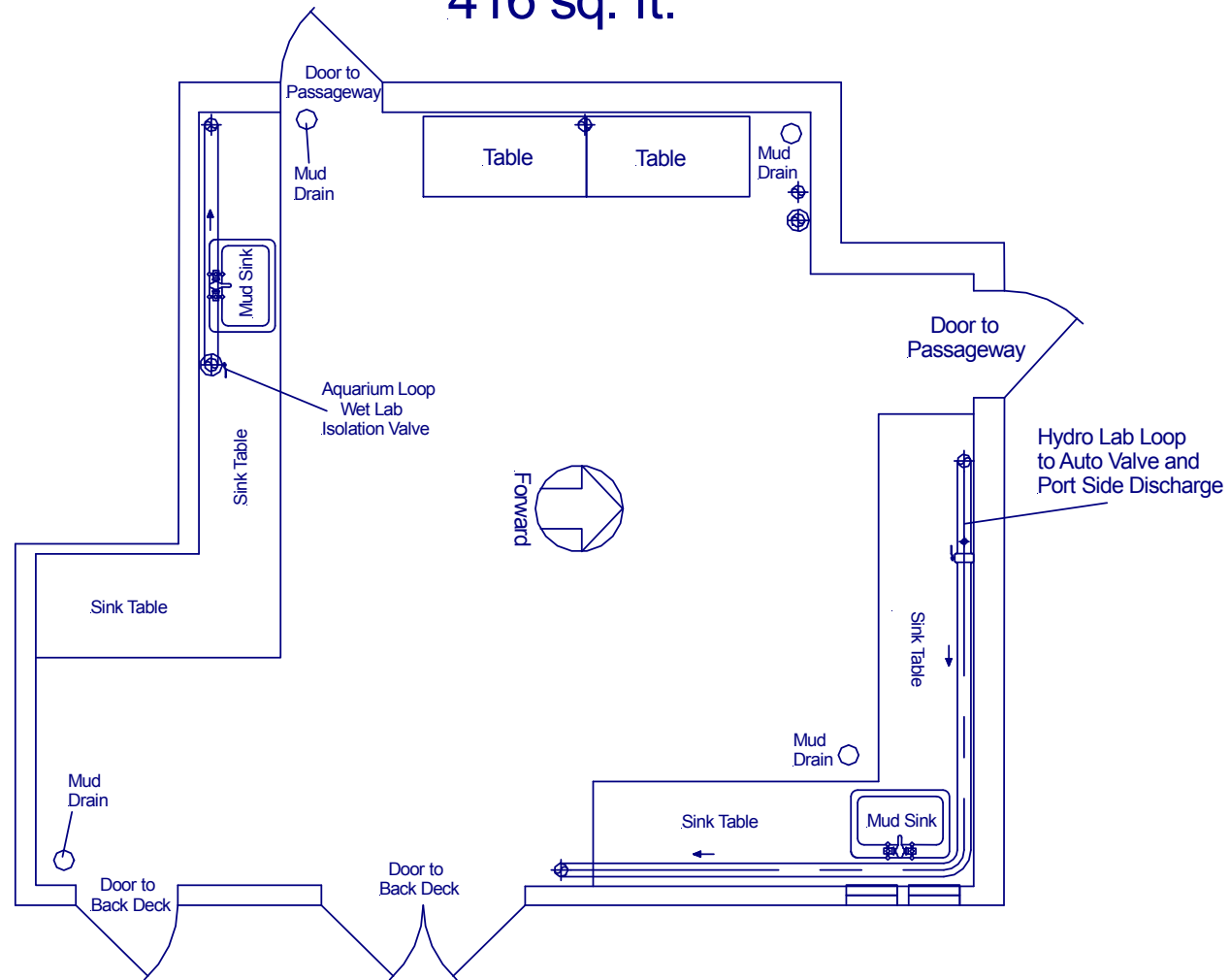
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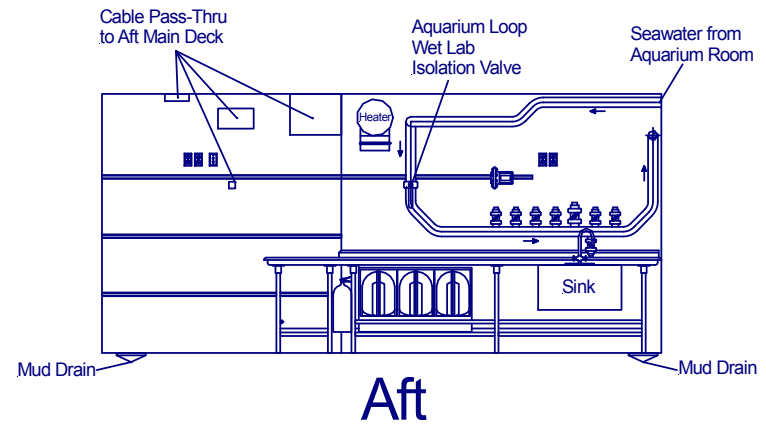
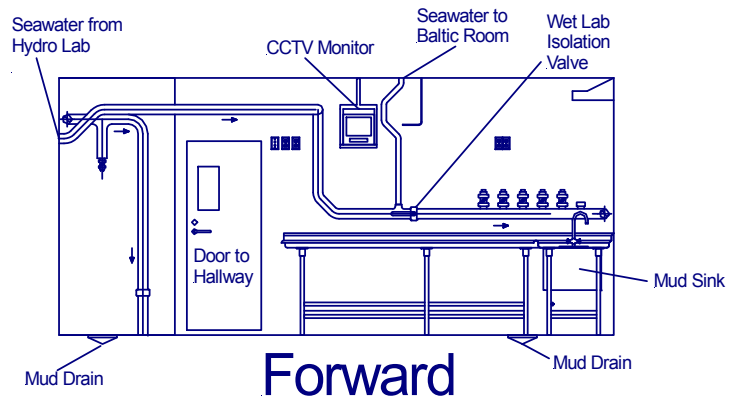
Port

Wet Lab

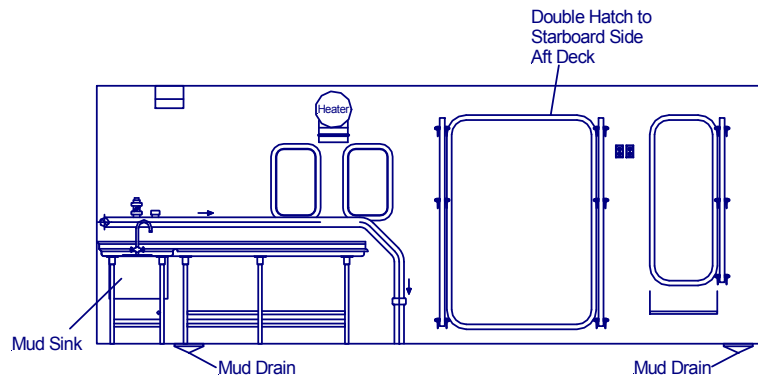
416 sq. ft.



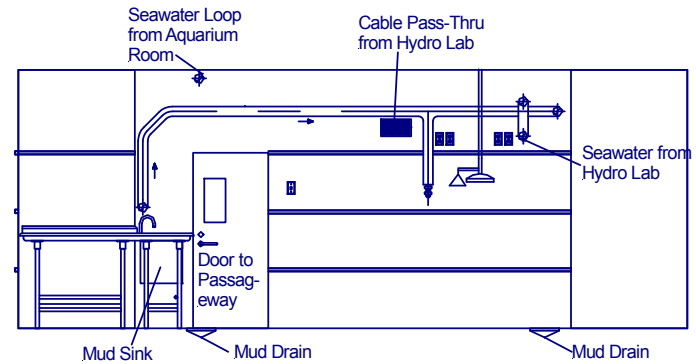
Wet Lab Elevations



Wet Lab Elevations



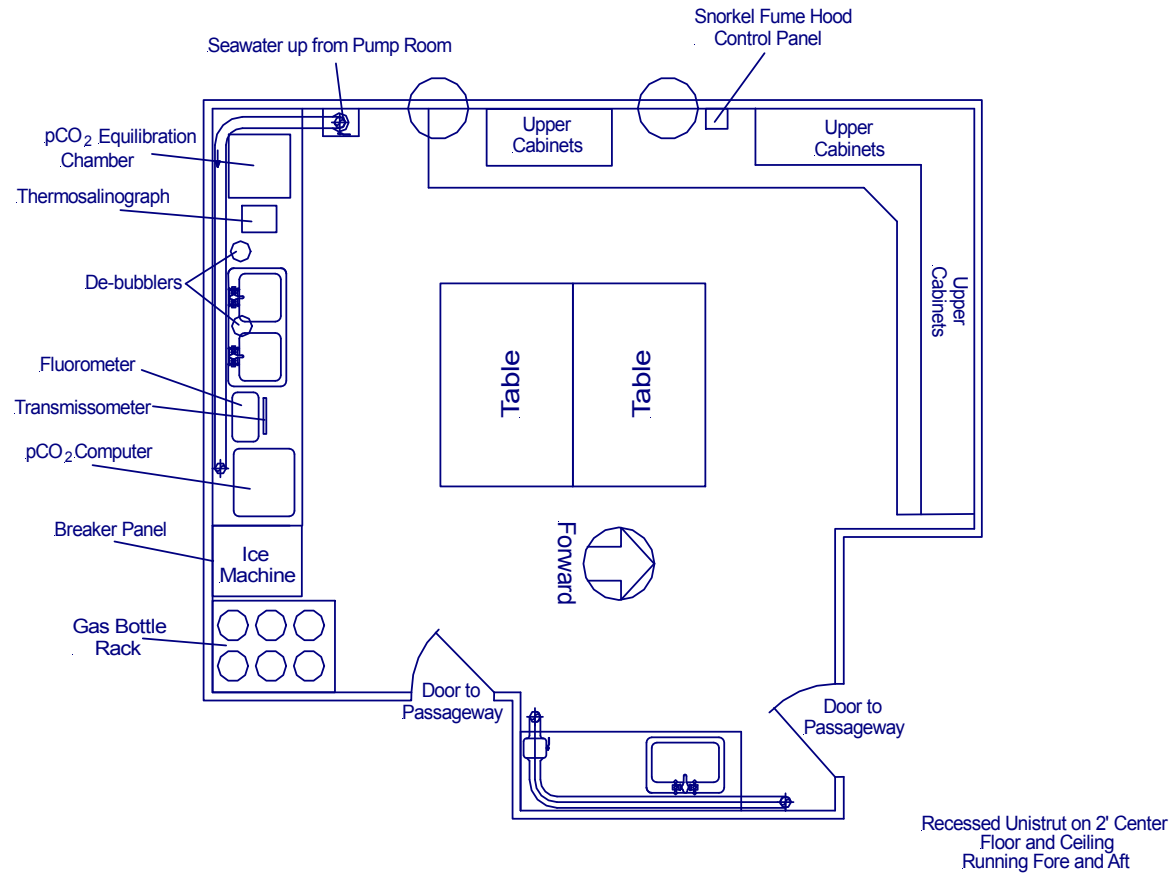
Starboard



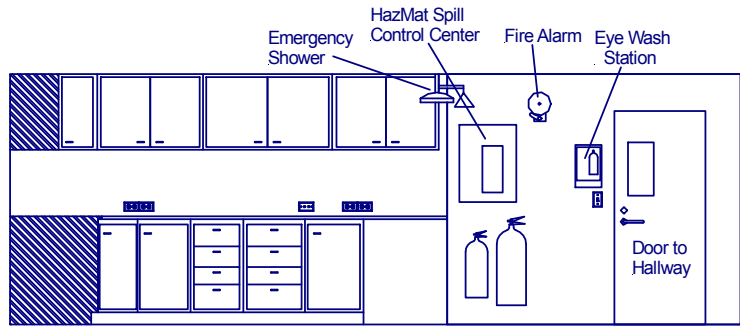
Port

Hydro Lab

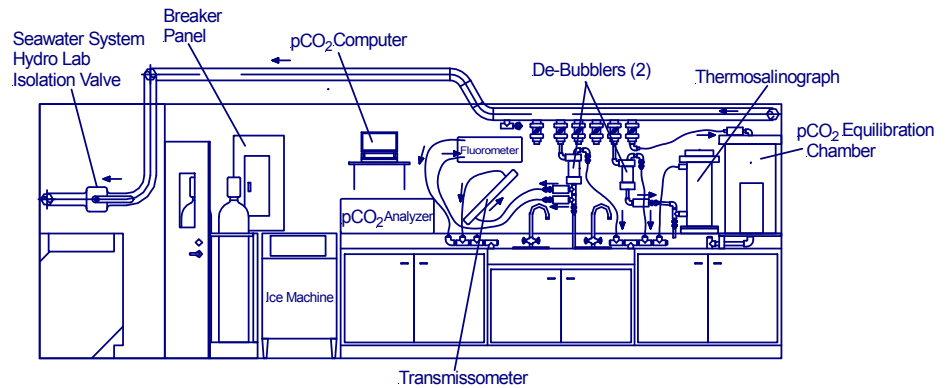
445 sq. ft.



Hydro Lab Elevations

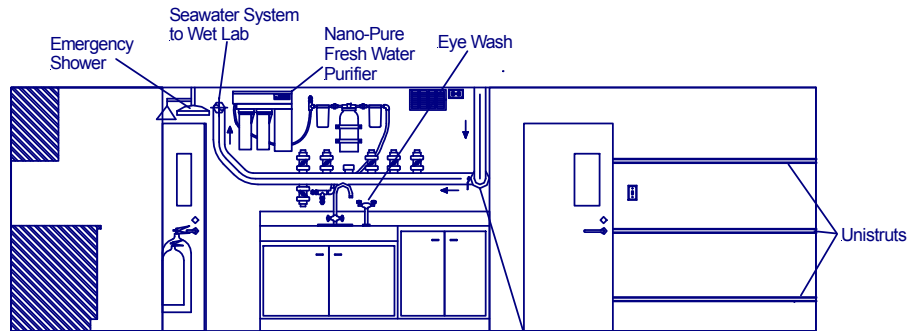


Forward



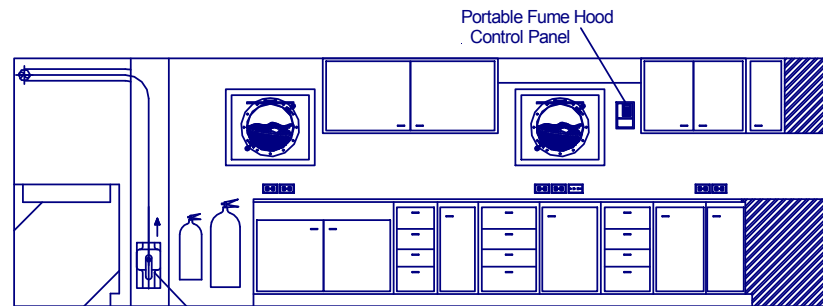
Aft

Hydro Lab Elevations



Starboard

Seawater System Isolation Valve

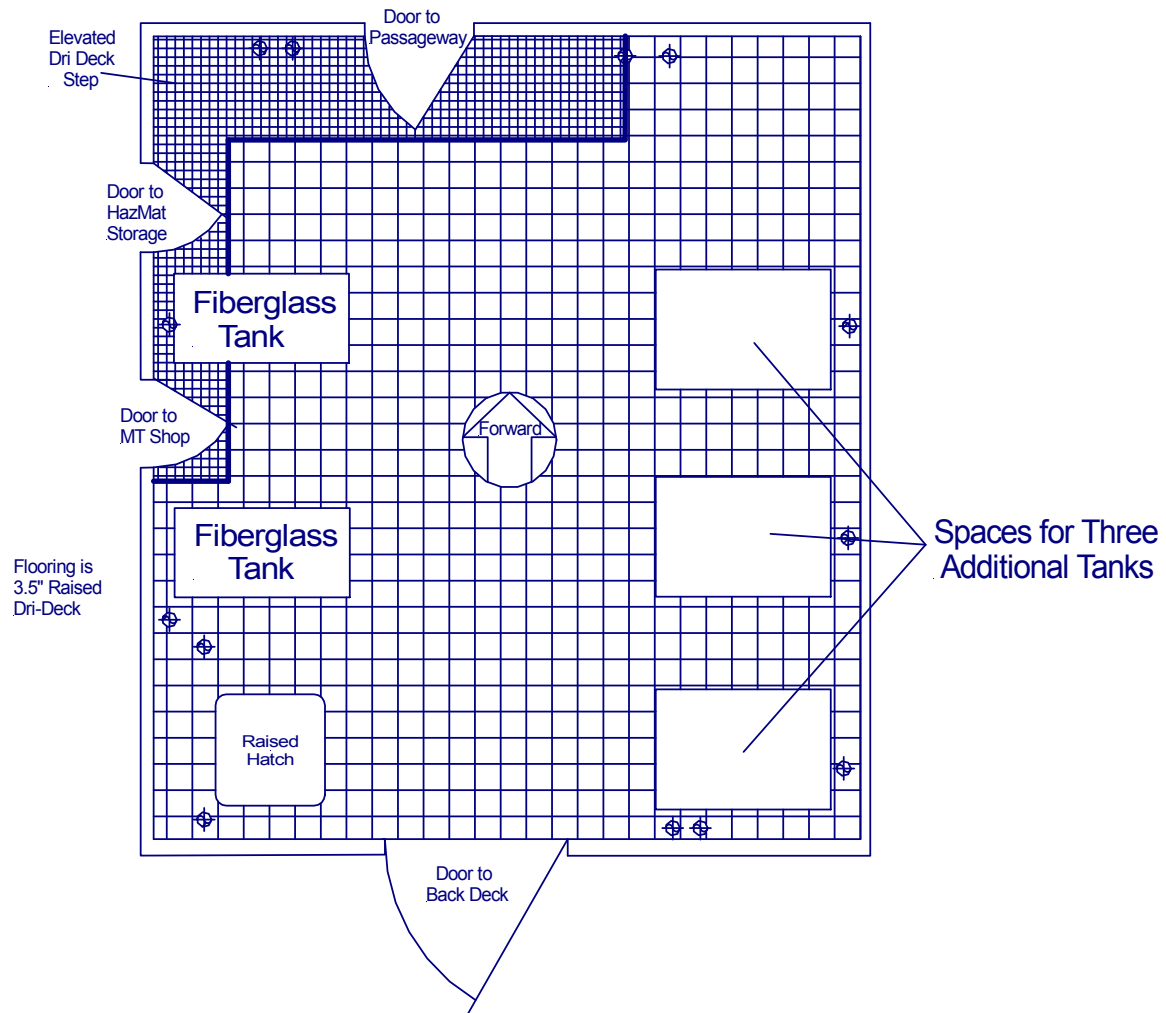


Port

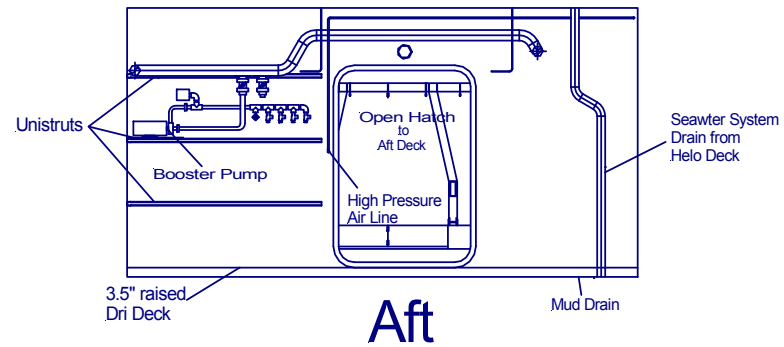
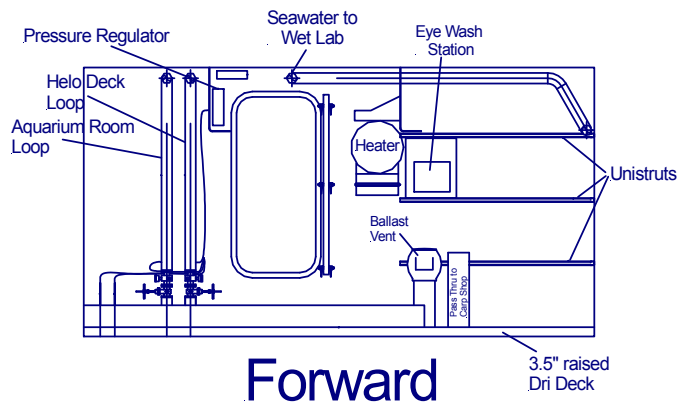
Seawater System Hydro Lab Isolation Valve

Aquarium Room

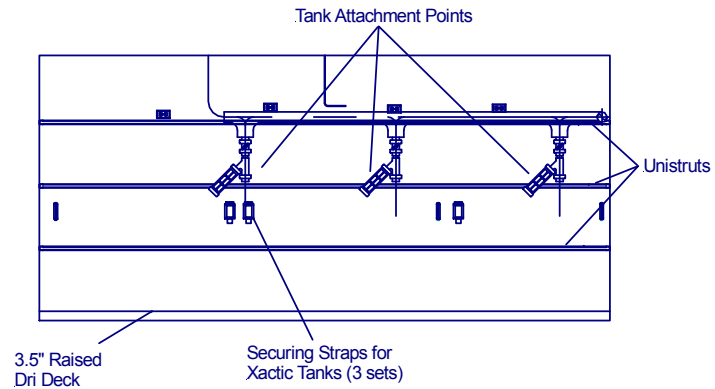
298 sq. ft.



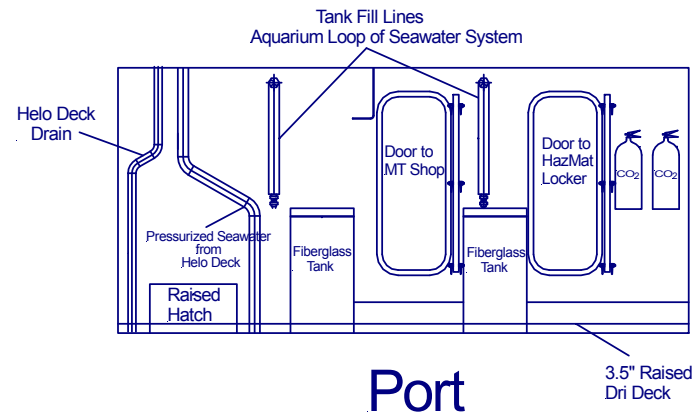
Aquarium Room Elevations

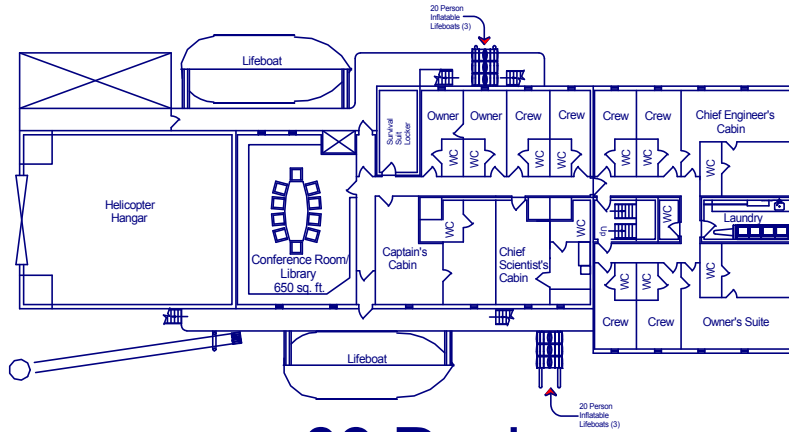


Aquarium Room Elevations

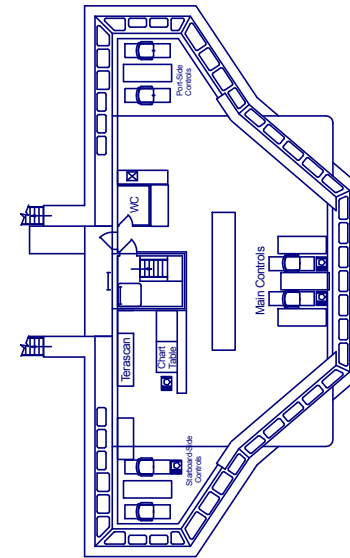


Starboard

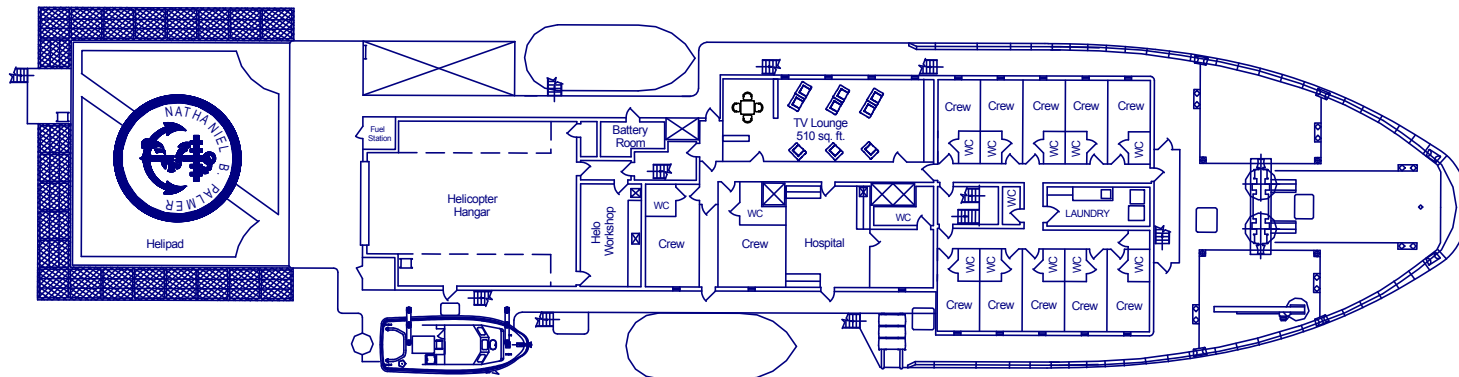




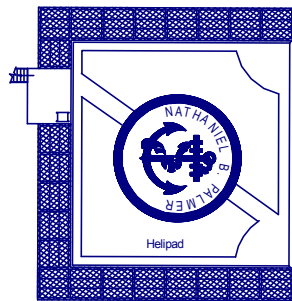
03 Deck



Bridge



02 Deck





RPSC-08-200