ATTACHMENT B

TECHNICAL REQUIREMENTS

APPENDIX A

ADDITIONAL REQUIREMENTS FOR LABORATORY AND RELATED SPACES

Revision 3, 15 November 2002

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APPENDIX A

ADDITIONAL REQUIREMENTS FOR LABORATORY AND RELATED SPACES

A1.0 OVERVIEW

A significant component of the Vessel's mission includes basic research in all branches of oceanography in support of the United States Antarctic Program ("USAP"). The Vessel's equipment and the investigations it undertakes will change frequently. The Vessel shall be configured to facilitate attaching temporary equipment easily and quickly. Thus, any specific mission of the Vessel can be rapidly changed between successive cruises. Equipment mounted in the laboratories and on the working decks shall be installed such that it can be easily removed, rearranged, or reinstalled. Laboratories shall be contiguously located and none shall serve as a general passageway. There shall be convenient access between all laboratory spaces, working deck areas and scientific storage spaces.

Approximately 7,600 total square feet of dedicated Laboratory and related support spaces shall be provided. The following is a list of the required spaces. Requirements for each individual space are described within following sections of this Appendix.

- Aquarium Room
- Wet Lab
- Main Lab
- Bio Lab
- Staging Hangar
- Autosal Room
- Microscopy Room
- Science Storage Room
- Dark Room
- HAZMAT Storage
- Conference Room and Library
- Hydro Lab
- Controlled Temperature Rooms
- Computer Lab
- LAN Office
- Electronics Shop
- Electronics Storage
- Dry Lab

These spaces shall be arranged for maximum efficiency of flow of work and accessibility of any individual designated space without accessing one space through another. Emergency egress must be considered. Unless otherwise specified the above Laboratory and related spaces shall have a minimum clear height without obstructions of 6' 10" between decks and corresponding overheads.

In addition, approximately 80 square feet of dedicated scientific space shall be provided on the vessel’s navigating bridge. Charterer’s personnel shall have unfettered access to the vessel’s navigating bridge except during critical vessel maneuvering as determined by the master or the deck officer on watch.

A2.0 ADDITIONAL SHIP'S SERVICES REQUIREMENTS FOR LABORATORIES

In addition to all Technical Requirements pertaining to ship's service systems for the Vessel in general, all of the Laboratory and related spaces identified in above Section A1.0 shall also comply with the following supplemental requirements.

A2.1 Heating, Ventilating and Air Conditioning ("HVAC") Systems

The Bio Lab, Hydro Lab, and Main Lab snorkel hood system shall include positive supply air and positive exhaust air. Air supplied to these spaces shall not be recirculated in any manner, i.e., once supplied to a space, air shall be exhausted to atmosphere. HVAC system components shall not infringe upon the required minimum clear overhead height in these spaces.

The HVAC system shall provide minimum outside air change rates within these spaces per the following schedule:

- Laboratories and Dark Room - 8 to 10 changes per hour
- Science Work Rooms, Conference Room and Library - 5 to 8 changes per hour
- Storage-Only Rooms - 2 to 3 changes per hour

The scientific equipment which will be operated in the Autosal Room is extremely sensitive to changes in temperature. Therefore this space shall be equipped with its own HVAC system branches and its own thermostatic control such that temperature in this space can be maintained to +/- 1° of the thermostat setting. It is estimated that Charterer-furnished equipment and personnel operating in this space will generate a heat load of approximately 1,800 BTU/hour.

The Controlled Temperature Rooms shall be served by two independent, redundant heating/cooling systems, each of which is capable of simultaneously maintaining both rooms within a temperature range of 15°F to 50°F with a variance of +/-2°F to thermostatic control settings. Each such independent system shall utilize its own dedicated heating/cooling machinery which shall not be connected with any other ship's systems. Each such independent system shall be capable of serving both controlled temperature rooms simultaneously, so that only one system need be running at any one time. System air-handling units must consist of several fans which disperse air over a large area in order to minimize drafts and must provide uniformity of temperature throughout the space (one large fan is NOT acceptable). Each room shall have its own thermostatic control in order to permit the rooms to be set at different temperatures.

Contractor shall ensure that HVAC installations in way of the Computer Lab and the Dry Lab are sufficient to maintain the interior temperature ranges set forth in the Technical requirements, with all Charterer-furnished electronics in operation. It is estimated that Charterer-furnished equipment and personnel operating in the Computer Lab will generate a heat load of approximately 60,000 BTU/hour. It is estimated that Charterer-furnished equipment and personnel operating in the Dry Lab will generate a heat load of approximately 165,000 BTU/hour.

A2.2 Fresh Water and Sea Water Systems

A2.2.1 Laboratory Sink Connections

Unless otherwise specified, each Laboratory and related space sink faucet shall be connected to the Vessel's potable water distribution piping for both hot and cold water. Unless otherwise specified, each Laboratory and related space sink drain shall be connected to the Vessel's "gray water" drain piping system. Where expressly specified, certain Laboratory and related space sink drains shall connect directly to overboard discharge piping.

A2.2.2 Reserved

A2.2.3 Uncontaminated Sea Water

Uncontaminated Sea Water ("USW") shall be distributed to the locations identified by the individual space descriptions in Section A3.0 of this Appendix by a dual pump, parallel piped system. One of these USW supply pumps shall be referred to as the "Aquarium Pump" and the other shall be referred to as the "Hydro Lab Pump." Each pump shall take suction from 6 inch diameter, stainless steel piping which is connected, in accordance with regulatory requirements and with isolation valves at each intake source, to both the Moon Pool described in the Technical Requirements as well as a separate and dedicated science sea chest. The science sea chest should be located aft, near the centerline of the Vessel. All piping in this USW distribution system other than the 6 inch stainless steel supply header and overboard discharge piping shall be "Red Thread II" fiberglass piping manufactured by Smith Fiberglass, Little Rock, AR. Overboard discharge piping shall be stainless steel from the valve closest to the point of discharge to the discharge itself, as per regulatory body requirements. Per the Technical Requirements section of this Contract, all such overboard discharges shall be located on the port side of the Vessel.

No bend in the installed distribution piping shall have a radius of less than 3 times the pipe diameter. All valves in the USW system including, but not limited to laboratory manifold valves, shall be lined with Teflon or inert enamel. All distribution piping between the Moon Pool and all USW system supply outlets shall be insulated so as to maintain the temperature of the delivered sea water within +/-2 F of the Moon Pool water temperature under all sea and weather conditions (winter and summer). All USW system drain, discharge, etc. piping shall be heated by electrical trace tape, or other suitable means, to prevent build up or clogging by ice.

The two supply pumps shall be cross-connected downstream of their backflow preventer valves via 3 inch diameter piping which shall be fitted with valves which permit either pump to simultaneously supply both distribution piping branches (Aquarium Pump Branch and Hydro Lab Pump Branch). Each supply pump shall be a variable speed, 200 gpm model SB101*X1R5\V, manufactured by Mono Pumps, Ltd., Manchester, England. Each distribution piping branch shall be fitted with an automatic pressure control valve upstream of its overboard discharge, which shall maintain pressures in the discharge piping between 20 psi and 60 psi, as well as a back-flow preventer valve immediately downstream of the pump discharge.

The Aquarium Pump shall take suction from the supply header via 4 inch diameter pipe into which Charterer shall install and connect a remote temperature sensor. The Aquarium Pump shall discharge into 4 inch diameter piping which is routed in way of the spaces and branch connections which it is to serve, then led aft to a valved, stainless steel connection to an overboard discharge fitting located beneath the Vessel's normal waterline. The overboard discharge piping shall be fitted with a back-flow

preventer valve downstream of this valved connection. Off of this 4 inch supply piping, the following branch connections shall be fitted:

- Aquarium Room connections described in Section A3.0 of this Appendix
- Wet Lab connections described in Section A3.0 of this Appendix
- Staging Hangar connection described in Section A3.0 of this Appendix
- two separate 4 inch diameter branches, each terminating in two 2 inch diameter sub-branches and each sub-branch fitted with a valved connection at the Helo Deck (for connection of up to 4 scientific containers) - such connections shall be located so as not to interfere with helicopter operations on the Helo Deck
- 2 inch branch connections to Scientific Vans identified at Technical Requirement 4.11
- a 3/4 inch diameter branch to a valved hose connection at the aft main deck area
- a 3/4 inch diameter branch to a valved hose connection in the Helo Hangar.

The Hydro Lab Pump shall take suction from the supply header via 3 inch diameter pipe into which Charterer shall install and connect a remote temperature sensor. The Hydro Lab Pump shall discharge into 3 inch diameter piping which is routed in way of the spaces and branch connections which it is to serve, then led aft to a valved, stainless steel connection to an overboard discharge fitting located beneath the Vessel's normal waterline. The overboard discharge piping shall be fitted with a back-flow preventer valve downstream of this valved connection. At a suitable location downstream of the backflow preventer valve at the pump discharge and downstream of the pump cross-connection piping, this 3 inch piping shall contain a flanged, removable section which is 3 feet in length to facilitate Charterer's installation and connection of a deck-mounted, centrifugal debubbling strainer. The location shall provide sufficient area for the strainer, which is approximately 24 inches in diameter and 30 inches in height. From the location for this strainer, 2 inch diameter piping, temporarily blind-flanged at a valve at the inboard end, shall lead to a stainless steel overboard discharge fitting located beneath the Vessel's normal waterline. The overboard discharge line shall have its own shut-off valve and, farther downstream, a back-flow preventer valve. If practicable, this discharge line may be common with the Hydro Lab Pump branch overboard discharge line. Off of the 3 inch supply piping, the following branch connections shall be fitted:

- Hydro Lab connections described in Section A3.0 of this Appendix
- Main Lab connections described in Section A3.0 of this Appendix
- Wet Lab connections described in Section A3.0 of this Appendix

A2.2.4 Emergency Fresh Water

A readily available supply of fresh water is required for emergency flushing of chemicals off of personnel working in the laboratory facilities. Emergency showers and eye wash stations shall be installed where indicated in Section A3.0 of this Appendix. In addition to any and all regulatory body requirements, these installations shall also comply with the following. Emergency shower heads shall be located 76 inches to 82 inches above the deck, with a spray pattern centered at least 16 inches from any obstruction and 20 inches in diameter at a height of 60 inches above the deck. Each emergency shower shall be capable of delivering a minimum water flow of 20 gallons per minute. The water supply valve actuator shall be readily accessible from its emergency shower station at a height of not more than 60 inches above the deck. The supply valve shall permit the water flow to continue without requiring the use of the operator's hands.

Eye wash stations shall provide a controlled flow of potable water to both eyes at a low enough velocity so as not to be injurious to the user. Each eye wash station shall be capable of delivering a minimum water flow of 0.4 gallons per minute. The water supply valve actuator shall be readily

accessible from its eye wash station and shall permit the water flow to continue without requiring the use of the operator's hands.

A2.3 Compressed Air Systems

Outlets for ship's service compressed air in Laboratory and related spaces shall be provided where identified in the individual space descriptions at Section A3.0 of this Appendix. Each such outlet shall be fitted with a moisture separator and a hose valve. If necessary, pressure-reducing fittings shall be installed upstream of such outlets such that Laboratory and related space outlet pressure is 30 to 40 psi.

A2.4 Electrical Power and Lighting Systems

Laboratories and related spaces shall be furnished with 115 VAC, 208VAC and 440VAC electrical power supplied from electrical distribution panels connected to the Vessel's electrical switchboards. These spaces shall also be supplied with 115 VAC electrical power from distribution panels connected to the Uninterruptible Power Supply ("UPS") sources identified in the Technical Requirements. All of the foregoing electrical power shall be provided in accordance with the individual space configurations described in Section A3.0 of this Appendix.

Receptacles in all "wet" areas shall be of the Ground Fault Interrupting ("GFI") type, or shall be connected to GFI type circuit breakers in the electrical distribution panels from which they are supplied. Fume Hood installations shall not be connected to electrical supplies via receptacles, but shall be wired directly to circuit breakers within electrical distribution panels.

A2.5 Lighting

In general, fluorescent fixtures shall be high efficiency type with energy saving ballasts. Each of the above referenced Laboratory and related spaces shall be fitted with local switches in each space, so as to permit the lights to be extinguished in the spaces not in use. Switches at each entranceway to each space shall be capable of controlling all of the lighting in that space. Additionally, in Laboratory and related spaces which exceed 400 square ft., lighting must be sectioned into equal areas not exceeding 400 square ft. each, with each section having its own separate switch, in order to permit reduced lighting levels in the space.

Laboratory and related space lighting shall be designed to achieve the following lighting levels:

- Laboratories - 100 foot candles (+/- 20%)
- Other Science Work Rooms, Conference Room and Library - 50 foot candles (+/- 20%)
- Storage Rooms and Passageways - 15 foot candles (+/- 20%)

A2.6 Deck Drains

All Laboratory and related space deck drains shall lead to suitably-sized stainless steel overboard discharge lines fitted beneath the Vessel's normal waterline. All such discharge lines shall be fitted with back-flow preventer valves closest to the actual discharge, and shut-off valves upstream of these preventers. One such shut-off valve shall be fitted for each branch leading to the discharge if more than one line leads to any such underwater discharge.

All Laboratory and related space deck drain and associated piping installations shall be heated by electrical trace tape, or other suitable means, to prevent build up or clogging by ice.

A3.0 INDIVIDUAL LABORATORY AND RELATED SPACES DESCRIPTIONS

Laboratory and related spaces are to be configured as described below. More detailed information with regard to certain outfit and furnishing components identified below is contained in Section A4.0 of this Appendix.

A3.1 Aquarium Room

- This space shall consist of at least 260 sq. ft. located in the aft portion of the Vessel and having direct access to the aft main working deck area.
- It shall be designed so that 4 ft. X 4 ft. X 4 ft. Charterer-furnished Aquarium tanks full of water/fish can be moved between the space and the aft main working deck via pallet jack.
- It shall have 1 inch threaded (UNC) hold-down fittings secured to and positioned flush with the deck. These hold downs shall be uniformly located throughout the space on 2 ft. centers. Flush plugs shall be furnished and installed for each hold-down fitting.
- It shall be fitted with sufficient deck drains which lead to a port side overboard discharge fitting such that the deck will remain free of water accumulation when water is introduced into the space at the rate of 120 gallons per minute. At minimum, the space shall contain at least five such deck drain installations, one in way of each space corner and one at the approximate center of the space.
- Raised Grating which conforms to the parameters set forth in Section A4.0 of this Appendix shall be furnished and installed atop the deck steel throughout this space.
- It shall be furnished with: two Work Tables; Chem-Res, which conform to the parameters set forth in Section A4.0 of this Appendix.
- It shall be fitted with two connections to the Uncontaminated Sea Water ("USW") system consisting of one valved, 3 inch pipe outlet and one 6-port Laboratory Manifold which conform to the parameters set forth in Section A4.0 of this Appendix. The pipe outlet shall be connected by 3 inch diameter piping and the manifold shall be connected by 2 inch diameter piping to the "Aquarium Pump" distribution branch of the USW system.
- It shall be fitted with one ship's service compressed air connection which conforms to the parameters set forth in Section A2.0 of this Appendix.
- The deck beneath this space should not be heated as part of the main deck heating system.
-
- All electrical receptacles in this space shall be marine-grade waterproof fixtures located at least 48 inches above the deck.
- A minimum of 8 duplex, bulkhead-mounted, ship's service 115 VAC receptacles shall be evenly distributed throughout the space; associated electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.
- A minimum of 2 bulkhead-mounted, ship's service 208 VAC receptacles shall be installed, with one at each end of the space; associated electrical feeder circuits shall be 30 amp minimum, with no more than two receptacles on any one electrical feeder circuit.

A3.2 Wet Lab

- This space shall consist of at least 400 sq. ft. located near the side A-Frame installation and having direct access to the main working deck area in way of the side A-Frame.
- It shall be fitted with a wide entry door arrangement which will provide a minimum of 72 inches of clear entry width and a minimum of 80 inches of clear entry height.
- It shall be equipped with an overhead-mounted crane or davit installation (no monorail) which will facilitate the handling of heavy equipment and/or instrumentation packages between the space and the main working deck area in way of the side A-Frame.

- It shall be furnished with an emergency shower installation and an emergency eye wash station which conform to the parameters set forth in Section A2.0 of this Appendix.
- It shall have 1 inch threaded (UNC) hold-down fittings secured to and positioned flush with the deck. These hold downs shall be uniformly located throughout the space on 2 ft. centers. Flush plugs shall be furnished and installed for each hold-down fitting.
- It shall be fitted with sufficient deck drains which lead to an port side overboard discharge fitting such that the deck will remain free of water accumulation when water is introduced into the space at the rate of 60 gallons per minute.
- It shall be furnished with:
  - 1 Slop Sink,
  - 8 linear ft. of Chem-Res Countertop with 5 inch top enclosure,
  - 8 linear ft. of Chem-Res Countertop,
  - 1 Standard Faucet,
  - 3 Base Cabinets; Standing Height; Steel,
  - 6 Work Tables; Chem-Res,

  all of which conform to the parameters set forth in Section A4.0 of this Appendix.
- The Slop Sink installation in this space shall be installed into the countertop containing the 5 inch top enclosure and shall be equipped with a drain fitting and drain piping which connect directly to overboard discharge piping and shall be sized to drain water at a minimum rate of 20 gallons per minute.
- It shall be fitted with two connections to the Uncontaminated Sea Water ("USW") system consisting of one valved, 3 inch pipe outlet and two 6-port Laboratory Manifolds which conform to the parameters set forth in Section A4.0 of this Appendix. The pipe outlet shall be connected by 3 inch diameter piping and one manifold shall be connected by 2 inch diameter piping to the "Aquarium Pump" distribution branch of the USW system. The other manifold shall be connected by 2 inch diameter piping to the "Hydro Lab Pump" distribution branch of the USW system and labeled accordingly.
- A minimum of 8 duplex, bulkhead-mounted, ship's service 115 VAC receptacles shall be evenly distributed throughout the space; associated electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.
- Immediately next to each of the above described ship's service 115 VAC receptacle installations shall be a matching, duplex, bulkhead-mounted, 115 VAC receptacle fed from a UPS installation and labeled accordingly. Associated UPS electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.
- A minimum of 2 bulkhead-mounted, ship's service 208 VAC receptacles shall be installed, with one at each end of the space; associated electrical feeder circuits shall be 30 amp minimum, with no more than two receptacles on any one electrical feeder circuit.
- A multi-cable transit (MCT) approximately 12 inches high and 18 inches wide shall be installed between the Wet Lab and the Aquarium.

A3.3 Main Lab

- This space shall consist of at least 1,500 sq. ft. having direct access to the main working deck area.
- It shall be furnished with an emergency shower installation and an emergency eye wash station which conform to the parameters set forth in Section A2.0 of this Appendix.
- It shall be fitted with a powered exhaust piping header for Snorkel Hoods which conforms to the parameters set forth in Section A4.0 of this Appendix.
- Its deck shall be finished with slip-resistant tile over suitable underlayment.
- It shall be fitted with Unistrut installations on 2 ft. centers mounted flush in both the deck and the overhead. Deck runs shall be directly beneath overhead runs, such that both lie in the same

vertical plane. Overhead Unistruts shall be secured to Vessel structural members, not simply attached to ceiling surfaces.

- It shall be furnished with:
  - 1 Single Sink,
  - 1 Double Sink
  - 2 Swing Gooseneck faucets,
  - 60 linear ft. of Chem-Res Countertop,
  - 8 linear ft. of Chem-Res Countertop with 5 inch top enclosure,
  - 15 Base Cabinets; Steel; Standing Height,
  - 10 Wall-Mounted Storage Cabinets; Steel,
  - 25 Work Tables; Wood,

  all of which conform to the parameters set forth in Section A4.0 of this Appendix.
- The Single Sink installation in this space shall be installed into the countertop containing the 5 inch top enclosure and adjacent to one of the steel base cabinets. Additionally, it shall be equipped with a drain fitting and drain piping which connect directly to overboard discharge piping and shall be sized to drain water at a minimum rate of 20 gallons per minute.
- It shall be fitted with one cold fresh water system outlet piped directly from the Vessel's fresh water-making equipment, which installation shall conform to the parameters set forth in Section A2.0 of this Appendix.
- It shall be fitted with one connection to the Uncontaminated Sea Water ("USW") system consisting of one 3-port Laboratory Manifolds which conform to the parameters set forth in Section A4.0 of this Appendix. The manifold shall be connected by 2 inch diameter piping to the "Hydro Lab Pump" distribution branch of the USW system.
- A multi-cable transit (MCT) approximately 12 inches high and 18 inches wide shall be installed in each bulkhead between this lab and each adjacent lab in watertight bulkheads. Non-watertight bulkheads can use the 4-in through bulkhead fitting..
- A minimum of 12 duplex, bulkhead-recessed, ship's service 115 VAC receptacles shall be evenly distributed throughout the space; associated electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.
- Immediately next to each of the above described ship's service 115 VAC receptacle installations shall be a matching, duplex, bulkhead-recessed, 115 VAC receptacle fed from a UPS installation and labeled accordingly. Associated UPS electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.
- A minimum of four ceiling mounted and one bulkhead mounted 208 VAC receptacles 30 amp minimum, with no more than two receptacles per circuit.

A3.4 Bio Lab

- This space shall consist of at least 530 sq. ft.
- It shall be equipped with the two Fume Hood installations described in Section A4.0 of this Appendix.
- It shall be furnished with an emergency shower installation and an emergency eye wash station which conform to the parameters set forth in Section A2.0 of this Appendix.
- It shall be fitted with a powered exhaust piping header for Snorkel Hoods which conforms to the parameters set forth in Section A4.0 of this Appendix.
- Its deck shall be finished with slip-resistant tile over suitable underlayment.
- It shall be fitted with Unistrut installations on 2 ft. centers mounted flush in both the deck and the overhead. Deck runs shall be directly beneath overhead runs, such that both lie in the same vertical plane. Overhead Unistruts shall be secured to Vessel structural members, not simply attached to ceiling surfaces.
- It shall be furnished with:
  - 3 Double Sinks,

- 3 Swing Gooseneck Faucets,
- 64 linear ft. of Chem-Res Countertop,
- 13 Base Cabinets; Standing Height; Steel,
- 11 Wall-Mounted Storage Cabinets; Steel,
- 2 Work Tables; Wood,

all of which conform to the parameters set forth in Section A4.0 of this Appendix.

- A multi-cable transit (MCT) approximately 12 inches high and 18 inches wide shall be installed between this lab and the computer lab. An MCT is not required for the Autosal room..
- A minimum of 12 duplex, bulkhead-recessed, ship's service 115 VAC receptacles shall be evenly distributed throughout the space; associated electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.
- Immediately next to each of the above described ship's service 115 VAC receptacle installations shall be a matching, duplex, bulkhead-recessed, 115 VAC receptacle fed from a UPS installation and labeled accordingly. Associated UPS electrical feeder circuits shall be 20 amp minimum, with no more than three receptacles on any one electrical feeder circuit.
- One ceiling-mounted 208 VAC receptacle, 30 amp minimum.

A3.5 Staging Hangar

- This space shall consist of at least 900 sq. ft., with a minimum clear overhead height of 15’ 6” and shall have direct access to the main working deck area.
- Raised Grating which conforms to the parameters set forth in Section A4.0 of this Appendix shall be furnished and installed atop the deck steel throughout this space.
- It shall be fitted with sufficient deck drains which lead to an port side overboard discharge fitting such that the deck will remain free of water accumulation when water is introduced into the space at the rate of 100 gallons per minute.
- It shall be fitted with an overhead, telescoping boom as per requirements under the "Cranes" section of the Technical Requirements.
- It shall be fitted with the DUSH 5 single drum winch as per requirements under the "Winches" section of the Technical Requirements.
- It shall be fitted with one connection to the Uncontaminated Sea Water ("USW") system consisting of one valved, 1 inch pipe outlet. The pipe outlet shall be connected by 1 inch diameter piping to the "Aquarium Pump" distribution branch of the USW system.
- It shall be fitted with one valved 3/4 inch hose connection which is connected via a 1 inch piping to the Vessel’s cold potable water system piping.
- It shall be fitted with one ship's service compressed air connection which conforms to the parameters set forth in Section A2.0 of this Appendix.
- A multi-cable transit (MCT) approximately 12 inches high and 18 inches wide shall be installed in each bulkhead between this lab and each adjacent lab.
- All electrical receptacles in this space shall be marine-grade waterproof fixtures located at least 48 inches above the deck.
- A minimum of 8 duplex, bulkhead-mounted, ship's service 115 VAC receptacles shall be evenly distributed throughout the space; associated electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.
- One bulkhead-mounted 208 VAC receptacle, 30 amps.
- A single bulkhead-mounted, ship's service 440 VAC receptacle shall be installed in this space, connected to a feeder circuit capable of supporting a 60 amp load.
- The Staging Hangar shall also be fitted with a minimum of 200 square ft. of easily accessible catwalk storage in the overhead of this space. The catwalk installation shall include a davit to facilitate movement of equipment to and from the storage area.

A3.6 Autosal Room

- This space shall consist of 56 sq. ft.
- Additional HVAC requirements for this space are described in Section A2.0 of this Appendix.
- Its deck shall be finished with slip-resistant tile over suitable underlayment.
- It shall be furnished with:
  - 8 linear ft. of Chem-Res Countertop,
  - 2 Base Cabinets; Standing Height; Steel,
  all of which conform to the parameters set forth in Section A4.0 of this Appendix.
- Two (3) duplex, bulkhead-recessed, 115 VAC receptacles shall be evenly distributed throughout the space. The three receptacles shall be fed from on 20 amp circuit.
- Two (3) duplex, bulkhead-recessed, 115 VAC UPS receptacles adjacent to the non-UPS (normal power) receptacles. The UPS receptacle face plates shall be premarked with the UPS symbol.

A3.7 Microscope Room

- This space shall consist of at least 120 sq. ft. and should be located near the centerline of the Vessel in a minimum-vibration area not on the main deck.
- Its deck shall be finished with slip-resistant tile over suitable underlayment.
- It shall be furnished with:
  - 2 Storage Cabinets, Full Height,
  which conform to the parameters set forth in Section A4.0 of this Appendix.
- Three (3) duplex, bulkhead-recessed, 115 VAC receptacles shall be evenly distributed throughout the space. The three receptacles shall be fed from one 20 amp circuit.
- Three (3) duplex, bulkhead-recessed, 115 VAC UPS receptacles adjacent to the non-UPS (normal power) receptacles. The UPS receptacle face plates shall be premarked with the UPS symbol.

A3.8 Science workshop/storage room

- This space shall consist of at least 130 sq. ft..
- Its deck shall be finished with slip-resistant tile over suitable underlayment.
- It shall be furnished with:
  - 16 linear ft. of Laminate Countertop,
  - 4 Base Cabinets; Standing Height; Wood,
  - 3 Wall-Mounted Storage Cabinets; Wood,
  all of which conform to the parameters set forth in Section A4.0 of this Appendix.
- This space shall also be furnished with two bulkhead-mounted bookshelf units. Each unit shall be 60 inches wide X 14 inches deep. The shelves shall be mounted one above the other at readily accessible heights and spaced not less that 18 inches apart. Each bookshelf unit shall be fitted with a retainer bar arrangement to prevent books from falling from shelf in a seaway.
- Three (3) duplex, bulkhead-recessed, 115 VAC receptacles shall be evenly distributed throughout the space. The three receptacles shall be fed from one 20 amp circuit.
- Three (3) duplex, bulkhead-recessed, 115 VAC UPS receptacles adjacent to the non-UPS (normal power) receptacles. The UPS receptacle face plates shall be premarked with the UPS symbol.

A3.9 Dark Room

- This space shall consist of at least 100 sq. ft. and shall be capable of achieving total darkness suitable for photographic development operations.
- A lighted red/white sign box which reads 'DO NOT ENTER" shall be affixed to an exterior bulkhead of the space, near the entry door, and shall be controlled by a switch located on an interior bulkhead of the space, near the entry door.
- Its deck shall be finished with slip-resistant tile over suitable underlayment.

- It shall be furnished with:
  - 1 Photo Sink,
  - 1 Swing Gooseneck Faucet,
  - 1 Dark Room Water Panel,

  all of which conform to the parameters set forth in Section A4.0 of this Appendix.
- One (1) duplex, bulkhead-recessed, 115 VAC receptacle shall be placed in this space. The receptacle shall be fed from one 20 amp circuit.
- Two (2) duplex, bulkhead-recessed, 115 VAC UPS receptacles adjacent to the non-UPS (normal power) receptacles. The UPS receptacle face plates shall be premarked with the UPS symbol.

A3.10 HAZMAT Storage

- This shall be a dedicated science storage area of at least 8 ft. x 10 ft. dimensions, suitable for storage of hazardous materials including, but not limited to, sulfuric acid, hydrochloric acid, sodium hydroxide, formaldehyde and acetone.
- The space shall be equipped with all safety features required for hazardous materials storage, such as explosion-proof lighting, fire suppression apparatus, etc., to be in compliance with US Coast Guard regulations.
- Its deck shall be finished with slip-resistant tile over suitable underlayment.

A3.11 Conference Room and Library

- This space shall consist of at least 560 sq. ft.
- It shall be furnished with:
  - 1 sturdy conference table capable of comfortably seating 20 persons;
  - 20 fixed-back, conference table chairs without roller fittings on legs;
  - 6 study carrels; each consisting of a 48 inch long X 24 inch deep desktop, a 48 inch long overhead storage unit/bookshelf (with retaining bar), one 16 inch wide two-drawer under-desktop filing cabinet, a fixed-back desk chair without roller fittings on legs and a desktop lighting fixture mounted on the underside of the overhead unit;
  - 18 continuous linear feet of lockable base storage cabinets with lockable bookcases above, in a deck-to-overhead configuration - base storage cabinets to be 2-door units, 36 inches wide X 30 inches high with 2 interior adjustable shelves - bookcases shall be 14 inches deep;
  - 1 Television monitor, minimum 36 inch screen,
  - 1 Video Cassette Recorder ("VCR") unit and 1 Digital Video Disc (DVD) unit which are compatible with the above television monitor.
- Additionally, it shall be furnished with:
  - 1 Conference Cabinet

  which conforms to the parameters set forth in Section A4.0 of this Appendix.
- A minimum of 8 duplex, bulkhead-recessed, ship's service 115 VAC receptacles shall be evenly distributed throughout the space, with one installation adjacent to each study station; associated electrical feeder circuits shall be 15 amp minimum, with no more than four receptacles on any one electrical feeder circuit.

A3.12 Hydro Lab

- This space shall consist of at least 500 sq. ft.
- It shall be furnished with an emergency shower installation and an emergency eye wash station which conform to the parameters set forth in Section A2.0 of this Appendix.

- It shall be fitted with a powered exhaust piping header for Snorkel Hoods which conforms to the parameters set forth in Section A4.0 of this Appendix.
- • It shall be fitted with Unistrut installations on 2 ft. centers mounted flush in both the deck and the overhead. Deck runs shall be directly beneath overhead runs, such that both lie in the same vertical plane. Overhead Unistruts shall be secured to Vessel structural members, not simply attached to ceiling surfaces.
- It shall be furnished with:
  - 1 Single Sink,
  - 1 Double Sink
  - 2 Swing Gooseneck faucets,
  - 36 linear ft. of Chem-Res Countertop,
  - 8 linear ft. of Chem-Res Countertop with 5 inch top enclosure,
  - 9 Base Cabinets; Steel; Standing Height,
  - 7 Wall-Mounted Storage Cabinets; Steel,
  - 4 Work Tables; Wood,
  - 1Refrigerator,
  -1 Icemaker,

  all of which conform to the parameters set forth in Section A4.0 of this Appendix.
- The Single Sink installation in this space shall be installed into the countertop containing the 5 inch top enclosure and adjacent to one of the steel base cabinets. Additionally, it shall be equipped with a drain fitting and drain piping which connect directly to overboard discharge piping and shall be sized to drain water at a minimum rate of 20 gallons per minute.
- It shall be fitted with one cold fresh water system outlet piped directly from the Vessel's fresh water-making equipment, which installation shall conform to the parameters set forth in Section A2.0 of this Appendix.
- It shall be fitted with two connections to the Uncontaminated Sea Water ("USW") system consisting of two 6-port Laboratory Manifolds which conform to the parameters set forth in Section A4.0 of this Appendix. The manifolds shall be connected by 2 inch diameter piping to the "Hydro Lab Pump" distribution branch of the USW system.
- A multi-cable transit (MCT) approximately 12 inches high and 18 inches wide shall be installed between the Hydro Lab and the Wet Lab and an MCT approximately 6 inches high by 6 inches wide shall be installed between the Hydro Lab and the Aquarium Room.
- A minimum of 12 duplex, bulkhead-mounted, ship's service 115 VAC receptacles shall be evenly distributed throughout the space, with two such installations being centrally located in the overhead of the space; associated electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.
- Immediately next to each of the above described ship's service 115 VAC receptacle installations shall be a matching, duplex, bulkhead-mounted, 115 VAC receptacle fed from a UPS installation and labeled accordingly. Associated UPS electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.
- A minimum of 2 bulkhead-mounted, ship's service 208 VAC receptacles shall be installed in a central location within the overhead of the space; associated electrical feeder circuits shall be 30 amp minimum, with no more than two receptacles on any one electrical feeder circuit.

A3.13 Controlled Temperature Rooms

- There shall be two controlled temperature rooms; each such space shall consist of at least 90 sq. ft.
- Additional HVAC requirements for these spaces are described in Section A2.0 of this Appendix.
- Each deck shall be finished with slip-resistant tile over suitable underlayment.
- Each shall be furnished with:
  - 1 Single Sink,

- 1 Swing Gooseneck faucet,
- 12 linear ft. of Chem-Res Countertop,
- 2 Base Cabinets; Steel; Standing Height,

all of which conform to the parameters set forth in Section A4.0 of this Appendix.

- All water supply and drain piping shall be heated in accordance with best commercial marine standard practices.
- A minimum of 4 duplex, bulkhead-mounted, ship's service 115 VAC receptacles shall be evenly distributed throughout each space; associated electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.
- Immediately next to each of the above described ship's service 115 VAC receptacle installations shall be a matching, duplex, bulkhead-mounted, 115 VAC receptacle fed from a UPS installation and labeled accordingly. Associated UPS electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.

A3.14 Computer Lab

- This space shall consist of at least 950 sq. ft. (which includes the 80 sq. ft. LAN Office described at A3.15)
- Additional HVAC requirements for this space are described in Section A2.0 of this Appendix.
- Its deck shall be finished with slip-resistant tile over suitable underlayment.
- It shall be furnished with:
  - 78 linear feet of Laminated Countertop,
  - 16 Storage Drawer Base Cabinets,
  - 1 Chart Drawer Base Cabinet ,
  - 2 Base Cabinets; Wood; Standing Height,
  - 10 Wall-Mounted Storage Cabinets; Wood,

  all of which conform to the parameters set forth in Section A4.0 of this Appendix.
- Approximately 70 linear feet of the above countertop installations shall be securely fastened to bulkheads by appropriate brackets and shall not attach to the Chart Drawer Base Cabinet and Storage Drawer Base Cabinets which shall be positioned beneath these countertops. Additionally, 12 pull-out computer keyboard drawers shall be furnished and mounted beneath these countertops.
- A multi-cable transit (MCT) approximately 12 inches high and 18 inches wide shall be installed between this lab and the Bio Lab. Three (3) 4” diameter pass through shall be provided between this lab and the Dry Lab.
- A minimum of 20 duplex, bulkhead-recessed, ship's service 115 VAC receptacles shall be evenly distributed throughout the space; associated electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.
- Immediately next to each of the above described ship's service 115 VAC receptacle installations shall be a matching, duplex, bulkhead-recessed, 115 VAC receptacle fed from a UPS installation and labeled accordingly. Associated UPS electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.
- One bulkhead recessed 208 VAC, 15 amp receptacle at the aft end of the space.

A3.15 LAN Office

- This space shall consist of at least 80 sq. ft., located within, and petitioned off from, the Computer Lab described at A3.14.
- Its deck shall be finished with slip-resistant tile over suitable underlayment.
- Sufficient clear space shall be reserved for 6 Charterer-furnished computer racks, each of which is 19 inches wide X 30 inches deep X 82 inches high.
- It shall be furnished with:
  - 8 linear feet of Laminated Countertop,

- 2 Storage Drawer Base Cabinets,
all of which conform to the parameters set forth in Section A4.0 of this Appendix.

- The 8 linear feet of above countertop installations shall be securely fastened to bulkheads by appropriate brackets and shall not attach to the Storage Drawer Base Cabinets which shall be positioned beneath these countertops. Additionally, 2 pull-out computer keyboard drawers shall be furnished and mounted beneath these countertops.
- This space shall also be furnished with two bulkhead-mounted bookshelf units. Each unit shall be 60 inches wide X 14 inches deep. The shelves shall be mounted one above the other at readily accessible heights and spaced not less that 18 inches apart. Each bookshelf unit shall be fitted with a retainer bar arrangement to prevent books from falling from shelf in a seaway.
- A minimum of 8 duplex, bulkhead-mounted, ship's service 115 VAC receptacles shall be evenly distributed throughout the space; associated electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.
- Immediately next to each of the above described ship's service 115 VAC receptacle installations shall be a matching, duplex, bulkhead-mounted, 115 VAC receptacle fed from a UPS installation and labeled accordingly. Associated UPS electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.

A3.16 Electronics Shop

- This space shall consist of at least 80 sq. ft.
- Its deck shall be finished with slip-resistant tile over suitable underlayment.
- Sufficient clear space shall be reserved for 3 Charterer-furnished cabinets which are 36 inches wide X 30 inches deep X 35 inches high and 1 Charterer-furnished cabinet which is 36 inches wide X 30 inches deep X 66 inches high.
- It shall be furnished with:
  - 12 linear feet of Laminated Countertop,
  - 3 Wall-Mounted Storage Cabinets; Wood,
  all of which conform to the parameters set forth in Section A4.0 of this Appendix.
- The 12 linear feet of above countertop installations shall be securely fastened to bulkheads by appropriate brackets and shall not attach to Charterer-furnished cabinets which shall be positioned beneath these countertops.
- This space shall also be furnished with two bulkhead-mounted bookshelf units. Each unit shall be 60 inches wide X 14 inches deep. The shelves shall be mounted one above the other at readily accessible heights and spaced not less that 18 inches apart. Each bookshelf unit shall be fitted with a retainer bar arrangement to prevent books from falling from shelf in a seaway.
- A minimum of 11 duplex, bulkhead-recessed, ship's service 115 VAC receptacles shall be evenly distributed throughout the space; associated electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.
- Immediately next to each of the above described ship's service 115 VAC receptacle installations shall be a matching, duplex, bulkhead-recessed, 115 VAC receptacle fed from a UPS installation and labeled accordingly. Associated UPS electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.

A3.17 Electronics Storage

- This shall be an interior storage space (no access to deck necessary) consisting of at least 100 sq. ft.
- Its deck shall be finished with slip-resistant tile over suitable underlayment.
- Charterer shall install cabinets in this space for storage of computers and other electronic equipment.

A3.18 Dry Lab

- This space shall consist of at least 1,100 sq. ft..
- Additional HVAC requirements for this space are described in Section A2.0 of this Appendix.
- Its deck shall be finished with slip-resistant tile over suitable underlayment.
- Sufficient clear space shall be reserved for 15 Charterer-furnished and installed computer racks, each of which is 19 inches wide X 30 inches deep X 82 inches high.
- It shall be fitted with Unistrut installations on 2 ft. centers mounted flush in both the deck and the overhead. Deck runs shall be directly beneath overhead runs, such that both lie in the same vertical plane. Overhead Unistruts shall be secured to Vessel structural members, not simply attached to ceiling surfaces.
- It shall be furnished with:
  - 114 linear feet of Laminated Countertop,
  - 2 Chart Drawer Base Cabinets ,
  - 16 Storage Drawer Base Cabinets,
  - 6 Base Cabinets; Wood; Standing Height,
  - 8 Wall-Mounted Storage Cabinets; Wood,

  all of which conform to the parameters set forth in Section A4.0 of this Appendix.
- Approximately 90 linear feet of the above countertop installations shall be securely fastened to bulkheads by appropriate brackets and shall not attach to the Storage Drawer Base Cabinets and Chart Drawer Base Cabinets which shall be positioned beneath these countertops. Additionally, 16 pull-out computer keyboard drawers shall be furnished and mounted beneath these countertops.
- This space shall also be furnished with four bulkhead-mounted bookshelf units. Each unit shall be 60 inches wide X 14 inches deep. Two shelves each shall be mounted side-by-side to form 120 inch wide installations. Each 120 inch wide installation shall be mounted one above the other at readily accessible heights and spaced not less that 18 inches apart. Each bookshelf unit shall be fitted with a retainer bar arrangement to prevent books from falling from shelf in a seaway.
- This space shall also be fitted with 6 inch diameter steel conduits for installation of Charterer's science-related cables. Conduits shall be installed between the Dry Lab and the base of the Science Mast, the Dry Lab and the foredeck area, as well as the Dry Lab and the aft main deck area including the port aft corner of the Air Gun Shack (above ladder to steering flat).
- A minimum of 40 duplex, bulkhead-mounted, ship's service 115 VAC receptacles shall be evenly distributed throughout the space; associated electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.
- Immediately next to each of the above described ship's service 115 VAC receptacle installations shall be a matching, duplex, bulkhead-mounted, 115 VAC receptacle fed from a UPS installation and labeled accordingly. Associated UPS electrical feeder circuits shall be 20 amp minimum, with no more than four receptacles on any one electrical feeder circuit.

A4.0 LABORATORY AND RELATED SPACE OUTFIT AND FURNISHINGS

The following section sets forth specific requirements for certain outfit and furnishing components to be furnished and installed by the Contractor in connection with the Laboratory and related space descriptions presented in Section A3.0 of this Appendix.

A4.1 Fume Hoods

The two fume hood units shall be Bypass Superstructure with remote baffle adjustment and polyresin lining, manufactured by Fisher Hamilton, Inc., Two Rivers, WI, model number 54L591, or

equal. Each fume hood shall have a vertical sash and shall be fitted with an exhaust blower which is mounted outside of the space in which the fume hood is installed. Blower controls shall be located near the fume hood installations. The discharge from the exhaust blowers shall be connected to an exhaust piping system which complies with all recommendations of the fume hood manufacturer, as well as all regulatory body requirements. The exhaust blower for each fume hood shall be sized to maintain a minimum face velocity at the front of the fume hood opening of 125 feet per minute.

One of these fume hoods shall be mounted atop a 48 inch long acid storage base cabinet, Fisher Hamilton model number 144S8320, or equal. The other fume hood shall be mounted atop a 48 inch long solvent storage base cabinet, Fisher Hamilton model 950S7550, or equivalent as approved by Charterer.

A4.2 Snorkel Hood Powered Exhaust Piping Header

Each required Powered Exhaust Piping Header for use with Charterer-furnished Snorkel Hoods shall consist of a 10 ft. length of schedule 80 PVC pipe, 6 inches in diameter. Each header shall be fitted with a threaded, 6 inch 90 ° elbow at one end, a threaded, 6 inch tee connection in the center and a threaded, 6 inch tee connection at the other end, so that Charterer may connect up to 3 portable Snorkel Hoods. The open ends of the elbow and two tee connection stems shall be fitted with threaded caps which securely close off the openings when not in use. The other side of the header end tee shall connect to a variable-speed exhaust blower which is mounted outside of the space in which the header is installed. Blower controls shall be located near the header installations. The discharge from the exhaust blowers shall be connected to an exhaust piping system which complies with all regulatory body requirements. The variable-speed exhaust blower for each header shall be capable of maintaining an exhaust rate of 460 cfm at each header connection point, in conditions where one, two, or all three connection points are in use.

A4.3 Raised Grating

Required Raised Grating installations shall be fiberglass molded grating, 1-1/2 inches thick with a 1-1/2 inch X 1-1/2 inch mesh and of IFR resin system construction, manufactured by FiberGrate Corporation, Dallas, TX, or equal.

A4.4 Unistrut Installations

Required Unistrut installations shall utilize 1-1/4 inch material, 1-1/4 inches high, manufactured by the Unistrut Corp., Itasca, IL, model A1000, or equal.

A4.5 Base Cabinets; Standing Height

Required Base Cabinets; Standing Height; Wood shall be 35 inches high X 21 1/2 inches deep X 36 inches long, manufactured by Fisher Hamilton Inc., Two Rivers, WI, model 106C632 or equal. Each cabinet shall be fitted with a keyless, push-to-close latch on each door and drawer, manufactured by SOUTHCO Inc., Concordville, PA, model M1, or equal.

Required Base Cabinets; Standing Height; Steel, 35 1/4 inches high X 21 5/8 inches deep X 48 inches long, manufactured by Fisher Hamilton Inc., model 380S8320 or equal. Each cabinet shall be fitted with a keyless, push-to-close latch on each door and drawer, manufactured by SOUTHCO Inc., Concordville, PA, model M1, or equal.

A4.6 Chart Drawer Cabinet

Required Chart Drawer Cabinets shall be 35 inches high X 21 1/2 inches deep X 48 inches long, with 8 drawers, manufactured by Fisher Hamilton Inc., Two Rivers, WI, model 305C832 or equal. Each cabinet shall be fitted with a keyless, push-to-close latch on each door and drawer, manufactured by SOUTHCO Inc., Concordville, PA, model M1, or equal.

A4.7 Wall-Mounted Storage Cabinets

Required Wall-Mounted Storage Cabinets; Wood shall be 30 5/8 inches high X 16 inches deep X 36 inches long, manufactured by Fisher Hamilton Inc., Two Rivers, WI, model 706C636 or equal. Each cabinet shall be fitted with a keyless, push-to-close latch on each door and drawer, manufactured by SOUTHCO Inc., Concordville, PA, model M1, or equal.

Required Wall-Mounted Storage Cabinets; Steel shall be 25 3/16 inches high X 16 inches deep X 48 inches long, manufactured by Fisher Hamilton Inc., model 706S8260 or equal. Each cabinet shall be fitted with a keyless, push-to-close latch on each door and drawer, manufactured by SOUTHCO Inc., model M1, or equal.

All wall-mounted storage cabinets shall be installed so as to leave 4 clear inches of space between the top of the cabinet and the overhead of the space in which it is installed.

A4.8 Storage Drawer Base Cabinet

Required Storage Drawer Base Cabinets shall be 28 1/2 inches high X 21 1/2 inches deep X 18 inches long, with 3 drawers and 1 pull-out shelf, manufactured by Fisher Hamilton Inc., Two Rivers, WI, model 133C222 or equal. Each cabinet shall be fitted with a keyless, push-to-close latch on each door and drawer, manufactured by SOUTHCO Inc., Concordville, PA, model M1, or equal.

A4.9 Storage Cabinets; Full Height

Required Storage Cabinets; Full Height shall be 72 inches high X 30 inches deep X 48 inches long, with 5 adjustable shelves, manufactured by TRU-BILT Casework, Calmar, IA, Tru-Bilt Classic model 502-48-72-30,or equal. Each cabinet shall be fitted with a keyless, push-to-close latch on each door and drawer, manufactured by SOUTHCO Inc., Concordville, PA, model M1, or equal.

A4.10 Countertops

Required Chem-Res Countertop shall be 1 inch high x 30 inches deep with 5 inch backsplash, manufactured by Fisher Hamilton Inc., Two Rivers, WI, "EPOXY RESIN" style B, or equal. Where expressly indicated, certain installations shall be fitted with a 5 inch top enclosure consisting of lengths of backsplash material secured in a watertight installation along each outer edge of the countertop.

Required Laminated Countertop shall be 30 inches deep with no backsplash, manufactured by Fisher Hamilton, "HIGH PRESSURE LAMINATES" style F, or equal.

All countertop installations shall include two rows of brass 1/4 inch UNC hold-down fittings of 3/8 inch depth, positioned along the length of the countertop. One row shall be located 10 inches in from the front edge of the countertop and the second row shall be located 10 inches in from the rear edge (second row to be 8 inches in from rear edge on Computer and Dry Lab countertops). In each row, the hold-down fittings shall be mounted flush with the top surface of the counter on 2 ft. centers.

A4.11 Work Tables

Each required Work Table; Chem-Res shall consist of a 2-drawer table assembly, 36 inches high X 30 inches deep X 48 inches wide, manufactured by Fisher Hamilton Inc., Two Rivers, WI, model 950S3850-L and a 1 inch high X 30 inches deep X 48 inches long top manufactured by Fisher Hamilton, "EPOXY RESIN" style F , or equal.

Each required Work Table; Wood shall consist of a 2-drawer table assembly, 36 inches high X 30 inches deep X 48 inches wide, manufactured by Fisher Hamilton Inc., Two Rivers, WI, model 950S3850-L and a 1-1/2 inches high X 30 inches deep X 48 inches long top manufactured by the KEWAUNEE Scientific Corp., "HARDWOOD MAPLE" style B , or equal.

All work table top installations shall include two rows of brass 1/4 inch UNC hold-down fittings of 3/8 inch depth, positioned along the length of the work table top. One row shall be located 10 inches in from the front edge of the work table top and the second row shall be located 10 inches in from the rear edge. In each row, the hold-down fittings shall be mounted flush with the top surface on 2 ft. centers.

A4.12 Conference Cabinet

The required Conference Cabinet shall be a 2-door wood veneer cabinet, 5 inches deep X 48 inches wide with doors closed, 96 inches wide with doors open X 48 inches high. It shall contain a 48 inch X 48 inch dry-erase writing surface and a retractable 48 inch X 48 inch projection screen, such as model 838 manufactured by QUARTET, Skokie, IL, or equal.

A4.13 Sinks

Each required Single Sink shall be 37 inches long X 15 inches wide X 11 inches high, manufactured by the KEWAUNEE Scientific Corp., Statesville, NC, model 1003-00, or equal. It shall be installed flush with the countertop specified for the space, over a sink base cabinet manufactured by the KEWAUNEE Scientific Corp., model G00M3124-02, or equal.

Each required Double Sink shall be 18 inches long X 15 inches wide X 11 inches high, manufactured by the KEWAUNEE Scientific Corp., model 1003-0DT or equal. It shall be installed flush with the countertop specified for the space, over a sink base cabinet manufactured by the KEWAUNEE Scientific Corp., model G00M3148-02, or equal.

Each required Slop Sink shall be 30 inches long X 18 inches wide X 18 inches high, manufactured by the KEWAUNEE Scientific Corp., model SM-9 or equal. It shall be installed flush with the countertop specified for the space, over a sink base cabinet manufactured by the KEWAUNEE Scientific Corp., model G00M3142-02, or equal.

The required Photo Sink shall be 96 inches long X 30 inches wide X 5 inches high, manufactured by KREOLAB LABORATORY SYSTEMS, Wichita, KS, 5 inch deep Tray Processing Sink, or equal.

All sink installations shall include acid-resistant drain fittings.

A4.14 Sink Faucets

Each required Standard Faucet shall be a model 32L407 manufactured by Fisher Hamilton, Inc., Two Rivers, WI, or equal.

Each required Swing Gooseneck Faucet shall be a model CO.412-VB manufactured by the WATER SAVER FAUCET Co., Chicago, IL, or equal.

A4.15 Refrigerator

The required Refrigerator shall be an under-counter unit, 6.1 cubic ft., 23-7/8 inches X 24 inches X 34 inches, such as model MV4-6UCR manufactured by SO-LOW, Cincinnati, OH, or equal.

A4.16 Icemaker

The required Icemaker shall be an under-counter unit, such as model AF200PSC manufactured by IMI Cornelius, Anoka, MN, or equal.

A4.17 Dark Room Water Panel

The required Dark Room Water Panel is a device for maintaining constant water temperature. It shall have a thermostatic mixing, flow-control valve, adjustable spring check valves and a replaceable 20 micron filter cartridge, such as Delta model 25 Water Control Panel manufactured by OMEGA, Hampstead, MD, or equal.

A4.18 (X)-Port Laboratory Manifold

Three- and six-port Laboratory Manifolds in the Uncontaminated Sea Water system shall be constructed of schedule 80 PVC material and fittings which are threaded, not glued. Each manifold shall be configured with one 2 inch globe valve at the manifold inlet, one 2 inch globe valve at the manifold outlet and a series of "ports" between these two valves. Each "port" shall consist of a 2 inch tee fitting and all ports shall be connected in series via 2 inch threaded PVC nipples. The remaining "stem" of the tee fitting for each port shall be reduced to 3/4 inch diameter and terminated in a 3/4 inch globe valve. The inlet side of each manifold shall be supplied from the system distribution branch identified in the Section A3.0 individual space descriptions. In order to permit constant circulation of water through each manifold even when all ports are closed, the outlet side of each manifold shall be connected to piping leading to and connecting with the overboard discharge fitting for the identified system distribution branch.