UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NOAA Marine and Aviation Operations
Marine Operations Center
439 W. York Street
Norfolk, VA 23510-1114

August 8, 2017

MEMORANDUM FOR: Captain Donn Pratt, NOAA
Master, NOAA Ship *Nancy Foster*

FROM: Captain Scott M. Sirois, NOAA
Commanding Officer, NOAA Marine Operations Center-Atlantic

SUBJECT: Project Instruction for NF-17-08
Southeast Deep Coral Initiative (SEDCI)

Attached is the final Project Instruction for NF-17-08, Southeast Deep Coral Initiative (SEDCI), which is scheduled aboard NOAA Ship *Nancy Foster* during the period of August 10 to August 31, 2017. Of the 18 DAS scheduled for this project, 18 days are funded by a Line Office Allocation. This project is estimated to exhibit a Medium Operational Tempo. Acknowledge receipt of these instructions via e-mail to **OpsMgr.MOA@noaa.gov** at Marine Operations Center-Atlantic.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE

National Centers for Coastal Ocean Science
219 Fort Johnson Road Charleston
South Carolina 29412

Project Instructions

Date Submitted: August 7, 2017

Platform: NOAA Ship *Nancy Foster*

Project Number: NF-17-08 (OMAO)

Project Title: Southeast Deep Coral Initiative (SEDCI)

Project Dates: August 10, 2017 to August 31, 2017

Prepared by: Peter J Etnoyer, PhD Dated: August 1, 2017
Peter Etnoyer, Ph.D.
Chief Scientist (Leg 1)
NOAA Center for Coastal Monitoring and Assessment

Prepared by: Dated: August 1, 2017
Daniel Wagner, Ph.D.
Chief Scientist (Leg 2)
JHT, Inc. at NOAA Center for Coastal Monitoring and Assessment

Approved by: MONACO.MARK.EUGENE.DR.1365855150 Dated:
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Date: 2017.08.05 06:37:11 -04'00'
Mark Monaco, Ph.D.
Chief
NCCOS Marine Spatial Ecology Division

Approved by: Dated:
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Date: 2017.08.07 07:19:02 -04'00'
Steven Thur, Ph.D.
Acting Director
NOAA National Centers of Coastal Ocean Science

Approved by: Dated: 8/8/17
Captain Scott M. Sirois, NOAA
Commanding Officer
Marine Operations Center – Atlantic

I. Overview

A. Brief Summary and Project Period

On August 12-31, 2017 the National Centers for Coastal Ocean Science (NCCOS) will lead a research expedition aboard NOAA Ship *Nancy Foster* supported by NOAA's Deep Sea Coral Research and Technology Program (DSCRTP) through the Southeast Deep Coral Initiative (SEDCI). The purpose of the NF-17-08 expedition will be to survey, map and sample deep-sea coral ecosystems in federal waters of the eastern Gulf of Mexico and South Atlantic Bight, focusing on priority areas identified by the Gulf of Mexico Fishery Management Council (GMFMC) and the South Atlantic Fishery Management Council (SAFMC). For this purpose, the expedition will conduct (1) benthic surveys using a deep-water remotely operated vehicle (ROV), (2) mapping operations using the ship's fisheries acoustics and multibeam echosounders, and (3) CTD-casts and water sampling using the ship's CTD carousel and sensors.

B. Days at Sea (DAS)

Of the _18_ DAS scheduled for this project, _0_ DAS are funded by an OMAO allocation, _18_ DAS are funded by a Line Office Allocation, _0_ DAS are Program Funded, and _0_ DAS are Other Agency funded. This project is estimated to exhibit a Medium Operational Tempo.

C. Operating Area (include optional map/figure showing op area)

The NF-17-08 expedition will consist of two legs. NF-17-08 Leg 1 will start in St. Petersburg, FL on August 12, and end in St. Petersburg, FL on August 24. This first leg will focus on surveying deep-water coral ecosystems on the West Florida Shelf using a deep-water ROV in conjunction with mapping operations using the ship's multibeam and fisheries acoustics instruments (Figure 1). NF-17-08 Leg 2 will start in St. Petersburg, FL on August 27, and end in Charleston, SC on August 31. The second leg will focus on seafloor mapping off Eastern Florida and South Carolina (Figure 1). CTD casts and/or XBTs will be conducted on both legs of the expedition in order to collect sound velocity profiles needed to calibrate the ship's multibeam echosounders, as well as to collect water samples using the Niskin-bottle rosette.

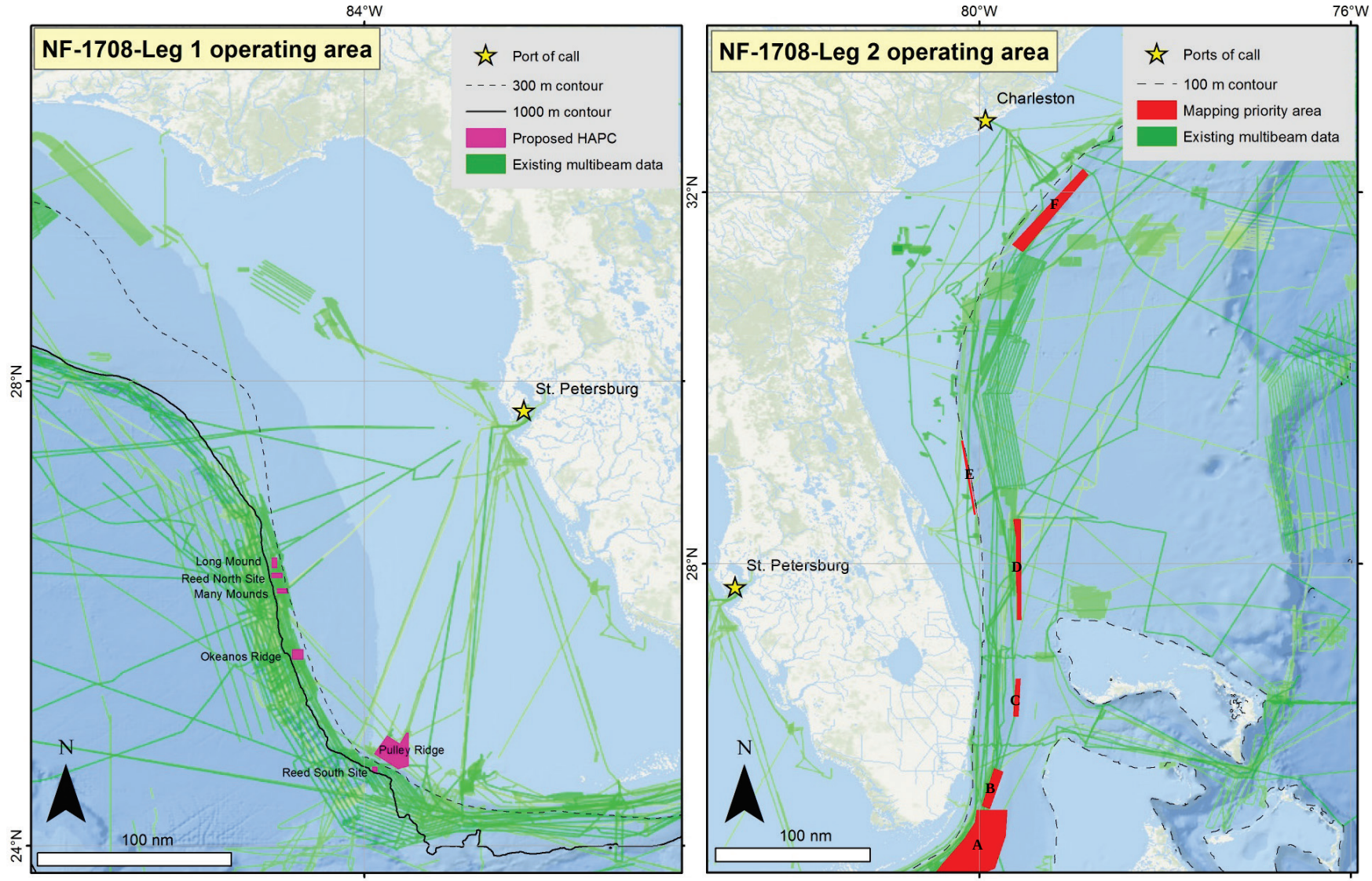


Figure 1. Map showing the operating area of the two legs of NF-17-08. Leg 1 will start and end in St. Petersburg, FL, and focus on surveying proposed habitat areas of particular concern off West Florida using a ROV. Leg 2 will start in St. Petersburg, FL and end in Charleston, SC, and focus on mapping priority areas off Eastern Florida and South Carolina (labeled A-F). CTD casts will be conducted on both legs of the expedition.

D. Summary of Objectives

The objectives of the expedition will be different for the two legs of the expedition. The primary objectives of NF-17-08 Leg 1 will be to conduct daytime ROV surveys of deep-water coral ecosystems on the West Florida Shelf at depths between 300-1,000 m (Figure 1), and nighttime mapping operations using the ship's multibeam and fisheries acoustic instruments. Additionally, NF-17-08 Leg 1 will include daily CTD-casts and/or XBTs deployments in order to collect sound velocity profiles needed to calibrate the ship's multibeam echosounders, as well as to collect water samples for carbon chemistry studies. ROV surveys will be conducted using the ROV *Odysseus* operated by the Pelagic Research Services. ROV dives will be conducted on seafloor areas that have previously been mapped at a high resolution (Figure 1), focusing on hard-bottom substrates with moderate relief that are predicted to contain high densities of deep-sea corals and sponges. During ROV surveys, the ROV will descend to the seafloor and then transit at an altitude of <1 m off the bottom with a speed of ~0.5 knots, documenting the benthic fauna using high-definition video and photo cameras. ROV pilots and scientists will watch the ROV video in real-time from the ship. Additionally, a limited number of biological samples (6-10/per dive) will be collected using the manipulator arm of the ROV. Specimen collections will focus on deep-water corals and sponges, as well as invertebrates that are directly associated with these organisms.

ROV dives are expected to cover linear distances of ~0.5-2.0 km each, and two or three ROV dives are expected to be conducted on most days of the expedition. All ROV operations will be conducted during daytime, and will not exceed 12 hours per day. Seafloor multibeam operations and CTD deployments will be conducted during nighttime mapping operations, or whenever the ROV is on board. Mapping operations will collect seafloor topography and backscatter data using the ship's Kongsberg EM 710 and Reson Seabat 7125 multibeam echosounders, as well as fisheries acoustics data using the ship's Simrad EK60 fisheries acoustic suite. The expedition will focus on mapping areas at depths between 200-300 m on the West Florida Shelf that have not been previously mapped at a high resolution. CTD operations will consist of deploying the CTD-carousel with the SBE-9/11 plus sensors in order to collect CTD profile-data throughout the water column. Additionally, water samples will be collected at 10-12 predetermined depths during each cast using the Niskin bottles attached to the CTD-carousel. Samples will be processed for carbonate chemistry studies following the expedition.

The primary objectives of NF-17-08 Leg 2 will be to conduct multibeam mapping on priority locations off Eastern Florida, and South Carolina (Figure 1). Given the large distance between St. Petersburg and Charleston, most of the expedition will be spent in transit, during which multibeam data will be collected continuously. Additionally, dedicated multibeam mapping surveys will be conducted on a small priority area (priority E in Figure 1) located offshore of Cape Canaveral, FL, where water depths are 100 m on

average. Similar to the first leg, NF-17-08 Leg 2 will include daily CTD-casts and/or XBTs in order to collect sound velocity profiles needed to calibrate the ship's multibeam echosounders, as well as collect water samples for carbon chemistry studies (see above). In addition to scientific objectives, NF-17-08 Leg 2 will have a large focus on education and outreach. Several graduate students will participate in this second leg, during which they will obtain at-sea classroom instructions on various topics relating to deep-sea research. Furthermore, a videographer will participate in both legs of the expedition in order to produce short videos for outreach purposes. Finally, NF-17-08 will be featured on an expedition website, which will include background stories on the objectives of the expedition, as well as regular updates on the accomplishments of the mission.

E. Participating Institutions

NOAA including representatives from NCCOS, Deep Sea Research and Technology Program (DSCRTP) and Southeast Fisheries Science Center (SEFSC); Gulf of Mexico Fishery Management Council (GMFMC); South Atlantic Fishery Management Council (SAFMC); U.S. Geological Survey (USGS); Pelagic Research Services (PRS); Florida State University (FSU); University of South Florida (USF); College of Charleston (COC); Bethune-Cookman University (BCU); Texas A&M University (TAMU); Florida A&M University (FAMU), Greenfire Productions (GP); Nelson Mandela University (NMU) and U.S. State Department Office of Marine Conservation (OMC).

F. Personnel/Science Party: name, title, gender, affiliation, and nationality

NF-17-08-Leg 1 (8/12-8/24, St. Petersburg, FL – St. Petersburg, FL)						
Name (Last, First)	**Title**	**Date Aboard**	**Date Disembark**	**Gender**	**Affiliation**	**Nationality**
Etnoyer, Peter	Chief scientist	8/10/2017	8/24/2017	M	NOAA	USA
Wagner, Daniel	Coordinator	8/10/2017	8/31/2017	M	NOAA	Germany (green card)
Poti, Matthew	Habitat modeler	8/11/2017	8/24/2017	M	NOAA	USA
Gray, John	Mapper	8/11/2017	8/24/2017	M	USF	USA
Harter, Stacey	Fish biologist	8/11/2017	8/24/2017	F	NOAA	USA
Brooke, Sandra	Coral biologist	8/11/2017	8/24/2017	F	FSU	USA
Kilgour, Morgan	Biologist	8/11/2017	8/24/2017	F	GMFMC	USA
Coleman, Heather	Media	8/11/2017	8/24/2017	F	NOAA	USA
Doren, Jesse	ROV manager	8/10/2017	8/25/2017	M	PRS	USA
Ingram, Kris	ROV pilot	8/10/2017	8/25/2017	M	PRS	USA
Sanacore, Paul	ROV pilot/ET	8/10/2017	8/25/2017	M	PRS	USA
Hodges, Erik	ROV pilot/ET	8/10/2017	8/25/2017	M	PRS	USA
Gallant, Jon	ROV navigation	8/10/2017	8/25/2017	M	PRS	USA
Meyer, Ralf	Videographer	8/11/2017	8/31/2017	M	GP	Germany (green card)
Katharine Coykendall	Biologist	8/11/2017	8/24/2017	F	USGS	USA

NF-17-08-Leg 2 (8/27-8/31, St. Petersburg, FL – Charleston, SC)						
Name (Last, First)	**Title**	**Date Aboard**	**Date Disembark**	**Gender**	**Affiliation**	**Nationality**
Wagner, Daniel	Chief scientist	8/11/2017	8/31/2017	M	NOAA	Germany (green card)
Cross, Scott	Mapper	8/26/2017	8/31/2017	M	NOAA	USA
Collier, Chip	Mapper	8/26/2017	8/31/2017	M	SAFMC	USA
Proux, Zach	Student/mapper	8/26/2017	8/31/2017	M	COC	USA
Hansberry, Tyler	Student/mapper	8/26/2017	8/31/2017	M	FAMU	USA
Meyer, Ralf	Videographer	8/11/2017	8/31/2017	M	GP	Germany (green card)
Bassett, Rachel	Media	8/26/2017	8/31/2017	F	NOAA	USA
Rydman, Claire	Student/mapper	8/26/2017	8/31/2017	F	TAMU	USA
Brooks, Mallory	Student/media	8/26/2017	8/31/2017	F	BCU	USA
Barbare, Evalynn	Student/mapper	8/26/2017	8/31/2017	F	COC	USA
Fein, Rachel	Student/mapper	8/26/2017	8/31/2017	F	COC	USA
Zoleka Filander	Student/mapper	8/26/2017	8/31/2017	F	NMU	South Africa
Geddes, Katie	Student/mapper	8/26/2017	8/31/2017	F	NOAA	USA
Fine, Leah	Student/mapper	8/26/2017	8/31/2017	F	OMC	USA

G. Administrative

1. Points of Contacts:

Chief Scientist (leg 1), Dr. Peter Etnoyer, 219 Fort Johnson, Charleston, SC 29412, 843-762-8645 (office), 843-789-9061 (cel), peter.etnoyer@noaa.gov.

Chief Scientist (leg 2), Dr. Daniel Wagner, 219 Fort Johnson, Charleston, SC 29412, 843-762-8565 (office), 808-256-5014 (cel), daniel.wagner@noaa.gov.

Nancy Foster Operations Officer, ENS Keith Hanson, 1050 Register St., North Charleston, SC 29405, 843-991-6326, ops.nancy.foster@noaa.gov.

ROV Team Lead, Ed Cassano, PO Box 309, South Wellfleet, MA 02663, 831-594-6637 (cel), ecassano@pelagic-services.com.

2. Diplomatic Clearances:

None Required.

3. Licenses and Permits:

Prior to the expedition, the Chief Scientists completed an informal consultation with Paula Whitfield, environmental officer at NCCOS, under section 7 of the Endangered Species Act (ESA) in order to address any potential impacts of

cruise activities on ESA-listed species and critical habitat. A letter of concurrence stating that the activities of the expedition will not adversely affect ESA-listed species and have insignificant effects on critical habitat, was issued on June 15, 2017. Additionally, the Chief Scientists contacted the NOAA Southeast Regional Office (SERO) prior to the expedition in order to obtain a permit to collect biological specimens during the expedition. A letter of acknowledgement allowing collection of biological specimens during the expedition was issued by SERO on July 13, 2017.

II. Operations

The Chief Scientist and alternate are responsible for ensuring the scientific staff are trained in planned operations and are knowledgeable of project objectives and priorities. The Commanding Officer is responsible for ensuring all operations conform to the ship's accepted practices and procedures.

A. Project Itinerary:

Actual locations for ROV, multibeam and CTD casts will be made available to the Operations Officer during the daily operating meeting. ROV surveys will be conducted on leg 1 only, and will occur during daytime hours between 0800-1800. At least two, but up to three ROV deployments and recoveries are planned for each day, with ROV dives typically being 2-4 hours in duration each. Mapping operations will occur on both legs. On leg 1, multibeam operations will be restricted to nighttime hours, or whenever the ROV is not deployed. On leg 2, multibeam operations will occur continuously during both daytime and nighttime hours (0000-2400). CTD operations will also occur on both legs of the expedition, and will typically consist of a single deployment in both the morning (0600-0700) and the evening (1800-1900). XBT deployments might also occur intermittently throughout mapping operations of both expedition legs, in order to calibrate the ship's multibeam echosounders as needed.

B. Staging and Destaging:

All ROV gear will be loaded onto the ship in St. Petersburg, FL on August 10-11 and offloaded in St Petersburg on August 24-26. The ROV team will arrange for crane support to load and unload all necessary ROV gear. All other scientific equipment (e.g. computers, chemicals, chemical skill kits, etc.) will be loaded in St. Petersburg on August 10-11 and offloaded in Charleston, SC on August 31-September 1.

C. Operations to be Conducted:

August 10-11: St. Petersburg

Staging days in St. Petersburg. Load ROV and all scientific gear. All leg 1 scientists onboard by the evening of August 11.

August 12: Transit

0900 transit to Long Mound Site (~20 h, 140 nm at 9 knots plus 4 h harbor transit) with underway multibeam survey over Geodetic instrument target (see Appendix for waypoints).

~1600-1800 ROV test dive to 100 m (no specific site, just need ~100 m depth)

1800 Continue transit to Long Mound Site

August 13-15: Long Mound – North Reed Site

~0700 arrive at Long Mound Site

0800-1800 ROV dive

1900-0000 Multibeam survey

August 16-17: Many Mounds

0000-0600 Multibeam survey

0600-0700 CTD cast

0800-1800 ROV dive

1800-1900 CTD cast

1900 transit to Okeanos Ridge (~4.5 h, 40 nm at 9 knots)

August 18: Okeanos Ridge

~0000 arrive at Okeanos Ridge

0000-0600 Multibeam survey

0600-0700 CTD cast

0800-1800 ROV dive

1800-1900 CTD cast

1900-0000 Multibeam survey

August 19: Okeanos Ridge

0000-0600 Multibeam survey

0600-0700 CTD cast

0800-1800 ROV dive

1800-1900 CTD cast

1900-0000 Multibeam survey

August 20: Okeanos Ridge

0000-0600 Multibeam survey

0600-0700 CTD cast

0800-1800 ROV dive

1800-1900 CTD cast

1900 transit to Reed South Site (~8 h; 70 nm at 9 knots)

August 21: Reed South Site

~0300 arrive at Reed South Site

0300-0600 Multibeam survey

0600-0700 CTD cast

0800-1800 ROV dive

1800-1900 CTD cast

1900-0000 Multibeam survey

August 22: Reed South Site

0000-0600 Multibeam survey

0600-0700 CTD cast

0800-1800 ROV dive

1800-1900 CTD cast

1900-0000 Multibeam survey

August 23: Reed South Site

0000-0600 Multibeam survey

0600-0700 CTD cast

0800-1100 ROV dive

1100 transit to St. Petersburg (~26 h, 200 nm at 9 knots, plus 4 h harbor transit)

August 24: St. Petersburg

~1300 Arrive St. Petersburg and start destaging. Leg 1 scientists depart ship (all scientists except Wagner and Meyer)

August 25-26: St. Petersburg

De-staging days in St. Petersburg. Unload ROV and all associated gear. All leg 2 scientists onboard by the evening of August 26.

August 27: Transit

0900 transit to Mapping Priority A (~40 h, 330 nm at 9 knots, plus 4 h harbor transit)

August 28: Mapping Priority A-B

~2200 Arrive at Mapping Priority A site

2200-0000 Multibeam survey over priorities A-B (~17 h, 100 nm at 6 knots)

August 29: Mapping Priority C-D

0000-1500 Multibeam survey over priorities C-D (100 nm at 6 knots)

1500 Transit to priority E (~17 h, 160 nm at 9 knots)

August 30: Mapping Priority E

0800 Arrive at Mapping Priority E

0800-1300 Multibeam survey over priority E (~5 h, 50 nm at 8 knots, depths< 150 m)

1300 Transit to Charleston (~26 h, 210 nm at 9 knots plus 2 h harbor transit)

August 31: Charleston

~1500 Arrive Charleston and start destaging. All leg 2 scientists depart the ship.

D. Dive Plan

SCUBA dives are not planned for this project.

E. Applicable Restrictions

Conditions which preclude normal operations:

- ROV equipment failure. Mitigation: ROV recovery, at sea repair, switch to multibeam mapping or CTD operations.
- Poor weather. Mitigation: switch to more protected areas or suspend operations.
- Safety concerns. Mitigation: discuss at daily safety briefing or with ship command.

III. Equipment

A. Equipment and Capabilities provided by the ship (itemized):
- Hand held radios for communication between bridge and deck
- Hard hats and life vests for all scientists
- Access to the ship's network for all scientists
- GPS and DGPS
- Kongsberg EM 710 and Reson Seabat 7125 multibeam echosounders (all calibrated)
- Simrad EK60 fisheries acoustics suite (calibrated)
- SBE-9/11 plus CTD sensors (temperature, conductivity, pressure and dissolved oxygen; all calibrated)
- SBE-32 CTD carousel with 12 x 5 L internal Teflon-coated spring closure Niskin bottles (to be placed on main deck)
- Scientific freezer (-20ºC)
- Moon pool pole and flange
- Generator

B. Equipment and Capabilities provided by the scientists (itemized):
- ROV (to be placed on fantail of main deck)
- ROV control van (20 ft. container to be placed on main deck)
- ROV workshop van (20 ft. container to be placed on 01 deck)
- Steel-toed shoes for all scientists involved in ROV deployments
- USBL underwater tracking system
- Laptops or desktop computers
- CARIS, ArcGIS and Hypack software
- Chemical spill kits and chemicals (ethanol, formalin, mercuric chloride, liquid nitrogen)
- Vials and bags to store biological specimens
- Video and photo cameras
- XBT probes, XBT launcher and software

IV. Hazardous Materials

A. Policy and Compliance

The Chief Scientists are responsible for complying with FEC 07 Hazardous Materials and Hazardous Waste Management Requirements for Visiting Scientific Parties (or the OMAO procedure that supersedes it). By Federal regulations and NOAA Marine and Aviation Operations policy, the ship may not sail without a complete inventory of all hazardous materials by name and quantity, MSDS, appropriate spill cleanup materials (neutralizing agents, buffers, or absorbents) in amounts adequate to address spills of a size equal to the amount of chemical brought aboard, and chemical safety and spill response procedures. Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

Per OMAO procedure, the scientific party will include with their project instructions and provide to the CO of the respective ship 30 days before departure:

- List of chemicals by name with anticipated quantity
- List of spill response materials, including neutralizing agents, buffers, and absorbents
- Chemical safety and spill response procedures, such as excerpts of the program's Chemical Hygiene Plan or SOPs relevant for shipboard laboratories
- For bulk quantities of chemicals in excess of 50 gallons total or in containers larger than 10 gallons each, notify ship's Operations Officer regarding quantity, packaging and chemical to verify safe stowage is available as soon as chemical quantities are known.

Upon embarkation and prior to loading hazardous materials aboard the vessel, the scientific party will provide to the CO or their designee:

- An inventory list showing actual amount of hazardous material brought aboard
- An MSDS for each material
- Confirmation that neutralizing agents and spill equipment were brought aboard sufficient to contain and cleanup all of the hazardous material brought aboard by the program
- Confirmation that chemical safety and spill response procedures were brought aboard

Upon departure from the ship, scientific parties will provide the CO or their designee an inventory showing that all chemicals were removed from the vessel. The CO's designee will maintain a log to track scientific party hazardous materials. MSDS will be made available to the ship's complement, in compliance with Hazard Communication Laws.

Scientific parties are expected to manage and respond to spills of scientific hazardous materials. Overboard discharge of hazardous materials is not permitted aboard NOAA ships.

B. Inventory

Common Name of Material	Qty	Notes	Trained Individual	Spill control
Formaldehyde solution (36.5%) (MSDS)	1 x 1 gallon	Alkalinity, Stored in ship chemical locker	Sandra Brooke, Daniel Wagner	F
Alcohol, denatured (190 proof) (MSDS)	5 x 1 gallon	Alkalinity, Stored in ship chemical locker	Daniel Wagner	A
Saturated Mercuric Chloride ($HgCl_2$) solution (MSDS)	2 x 10 mL	Stored in ship chemical locker	Daniel Wagner	M
Liquid Nitrogen (MSDS)	6.7 L	Stored in science freezer	Katharine Coykendall	N

C. Chemical safety and spill response procedures

F/A: Formaldehyde solution/Alcohol

- Ventilate area of leak or spill. Remove all sources of ignition.
- Wear appropriate personal protective equipment.
- Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible.
- Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container.
- Do not use combustible materials, such as saw dust.

M: Mercury

- Spills: Pick up and place in a suitable container for reclamation or disposal in a method that does not generate dust. Sprinkle area with sulfur or calcium polysulfide to suppress mercury. Use Mercury Spill Kit if need be.

N: Liquid nitrogen

- Wear gloves and appropriate personal protective equipment. Never allow any unprotected part of the body to touch uninsulated pipes or vessels which contain cryogenic fluids like liquid nitrogen.
- Spills: Evacuate all personnel from affected area. Increase ventilation to release area and monitor oxygen level.

Product Name	Amount	Chemicals it is useful against	Amount it can clean up
ENPAC Fast Pack Spill Kit Aggressive	1 kit	Universal	5 gallons
Mercasorb	500 g	Mercury	75 g
Sodium carbonate	300 g	Formaldehyde	450 ml

D. Radioactive Materials

No Radioactive Isotopes are planned for this project.

V. Additional Projects

A. Supplementary ("Piggyback") Projects

No Supplementary Projects are planned.

B. NOAA Fleet Ancillary Projects

No NOAA Fleet Ancillary Projects are planned.

VI. Disposition of Data and Reports

Disposition of data gathered aboard NOAA ships will conform to NAO 216-101 *Ocean Data Acquisitions* and NAO 212-15 *Management of Environmental Data and Information*. To guide the implementation of these NAOs, NOAA's Environmental Data Management Committee (EDMC) provides the *NOAA Data Documentation Procedural Directive* (data documentation) and *NOAA Data Management Planning Procedural Directive* (preparation of Data Management Plans). OMAO is developing procedures and allocating resources to manage OMAO data and Programs are encouraged to do the same for their Project data.

A. Data Classifications: *Under Development*

a. OMAO Data

b. Program Data

B. Responsibilities: *Under Development*

We request that the ship's data storage be made available during the cruise to store all data including ROV video, multibeam data, and project planning files (~6 TB). The

science party will transfer that data from the Ship storage to scientist drives during the mid-cruise in-port and at the end of the cruise. The scientists will be responsible for providing data archives to NCEI as part of R2R within 12 months of the completion of the cruise. In order for this to be accomplished, twelve scientist Government computers will need network access to the ship's data storage device, so that the data can be moved from the acquisition computer to storage, and subsequently accessed by other Government computers tasked with data post-processing. The Chief Scientists will be provided a Full Local Administrative account for each of these computers to assist the Ship's ET in adding them to the Ship's network.

VII. Meetings, Vessel Familiarization, and Project Evaluations

A. Pre-Project Meeting: The Chief Scientists and Commanding Officer will conduct a meeting of pertinent members of the scientific party and ship's crew to discuss required equipment, planned operations, concerns, and establish mitigation strategies for all concerns. This meeting shall be conducted before the beginning of the project with sufficient time to allow for preparation of the ship and project personnel. The ship's Operations Officer usually is delegated to assist the Chief Scientists in arranging this meeting.

B. Vessel Familiarization Meeting: The Commanding Officer is responsible for ensuring scientific personnel are familiarized with applicable sections of the standing orders and vessel protocols, e.g., meals, watches, etiquette, drills, etc. A vessel familiarization meeting shall be conducted in the first 24 hours of the project's start and is normally presented by the ship's Operations Officer.

C. Post-Project Meeting: The Commanding Officer is responsible for conducted a meeting no earlier than 24 hrs before or 7 days after the completion of a project to discuss the overall success and shortcomings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting shall be attended by the ship's officers, applicable crew, the Chief Scientist, and members of the scientific party and is normally arranged by the Operations Officer and Chief Scientist.

D. Project Evaluation Report

Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Chief Scientist. The form is available at https://sites.google.com/a/noaa.gov/omao-intranet-dev/operations/marine/customer-satisfaction-survey and provides a "Submit" button at the end of the form. It is also located at https://docs.google.com/a/noaa.gov/forms/d/1a5hCCkgIwaSII4DmrHPudAehQ9HqhRqY3J_FXqbJp9g/viewform. Submitted form data is deposited into a spreadsheet used by OMAO management to analyze the information. Though the complete form is not shared with the ship, specific concerns and praises are followed up on while not divulging the identity of the evaluator.

VIII. Miscellaneous

A. Meals and Berthing

The ship will provide meals for the scientists listed above. Meals will be served 3 times daily (at 0700-0800, 1100-1200 and 1630-1730) beginning one hour before scheduled departure, extending throughout the project, and ending two hours after the termination of the project. Since the watch schedule is split between day and night, the night watch may often miss daytime meals and will require adequate food and beverages (for example a variety of sandwich items, cheeses, fruit, milk, juices) during what are not typically meal hours. Special dietary requirements for scientific participants will be made available to the ship's command at least seven days prior to the project.

Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the Chief Scientist. The Chief Scientist and Commanding Officer will work together on a detailed berthing plan to accommodate the gender mix of the scientific party taking into consideration the current makeup of the ship's complement. The Chief Scientist is responsible for ensuring the scientific berthing spaces are left in the condition in which they were received; for stripping bedding and linen return; and for the return of any room keys which were issued. The Chief Scientist is also responsible for the cleanliness of the laboratory spaces and the storage areas utilized by the scientific party, both during the project and at its conclusion prior to departing the ship.

All NOAA scientists will have proper travel orders when assigned to any NOAA ship. The Chief Scientists will ensure that all non NOAA or non Federal scientists aboard also have proper orders. It is the responsibility of the Chief Scientist to ensure that the entire scientific party has a mechanism in place to provide lodging and food and to be reimbursed for these costs in the event that the ship becomes uninhabitable and/or the galley is closed during any part of the scheduled project.

All persons boarding NOAA vessels give implied consent to comply with all safety and security policies and regulations which are administered by the Commanding Officer. All spaces and equipment on the vessel are subject to inspection or search at any time. All personnel must comply with OMAO's Drug and Alcohol Policy dated May 17, 2000 which forbids the possession and/or use of illegal drugs and alcohol aboard NOAA Vessels.

B. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ, NF 57-10-01 (3-14)) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Chief Scientist or the NOAA website http://www.corporateservices.noaa.gov/noaaforms/eforms/nf57-10-01.pdf.

All NHSQs submitted after March 1, 2014 must be accompanied by NOAA Form (NF) 57-10-02 - Tuberculosis Screening Document in compliance with OMAO Policy 1008 (Tuberculosis Protection Program).

The completed forms should be sent to the Regional Director of Health Services at the applicable Marine Operations Center. The NHSQ and Tuberculosis Screening Document should reach the Health Services Office no later than 4 weeks prior to the start of the project to allow time for the participant to obtain and submit additional information should health services require it, before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of either form. Ensure to fully complete each form and indicate the ship or ships the participant will be sailing on. The participant will receive an email notice when medically cleared to sail if a legible email address is provided on the NHSQ.

The participant can mail, fax, or email the forms to the contact information below. Participants should take precautions to protect their Personally Identifiable Information (PII) and medical information and ensure all correspondence adheres to DOC guidance (http://ocio.os.doc.gov/ITPolicyandPrograms/IT_Privacy/PROD01_008240).

The only secure email process approved by NOAA is Accellion Secure File Transfer which requires the sender to setup an account. Accellion's Web Users Guide is a valuable aid in using this service, however to reduce cost the DOC contract doesn't provide for automatically issuing full functioning accounts. To receive access to a "Send Tab", after your Accellion account has been established send an email from the associated email account to accellionAlerts@doc.gov requesting access to the "Send Tab" function. They will notify you via email usually within 1 business day of your approval. The 'Send Tab" function will be accessible for 30 days.

Contact information:

Regional Director of Health Services
Marine Operations Center – Atlantic
439 W. York Street, Norfolk, VA 23510
Telephone 757-441-6320; Fax 757-441-3760
Email: MOA.Health.Services@noaa.gov

Prior to departure, the Chief Scientist must provide an electronic listing of emergency contacts to the Executive Officer for all members of the scientific party, with the following information: contact name, address, relationship to member, and telephone number.

C. Shipboard Safety

Hard hats are required when working with suspended loads. Work vests are required when working near open railings and during small boat launch and recovery operations. Hard hats and work vests will be provided by the ship when required.

Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. At the discretion of the ship CO, safety shoes (i.e. steel or composite toe protection) may be required to participate in any work dealing with suspended loads, including ROV and CTD deployment and recovery. The ship does not

provide safety-toed shoes/boots. The ship's Operations Officer should be consulted by the Chief Scientists to ensure members of the scientific party report aboard with the proper attire.

D. Communications

A progress report on operations prepared by the Chief Scientists may be relayed to the program office. Sometimes it is necessary for the Chief Scientists to communicate with another vessel, aircraft, or shore facility. Through various means of communications, the ship can usually accommodate the Chief Scientist. Special radio voice communications requirements should be listed in the project instructions. The ship's primary means of communication with the Marine Operations Center is via email and the Very Small Aperture Terminal (VSAT) link. Standard VSAT bandwidth at 128kbs is shared by all vessels staff and the science team at no charge. Increased bandwidth in 30 day increments is available on the VSAT systems at increased cost to the scientific party. If increased bandwidth is being considered, program accounting is required and it must be arranged through the ship's Commanding Officer at least 30 days in advance.

E. IT Security

Any computer that will be hooked into the ship's network must comply with the *OMAO Fleet IT Security Policy* 1.1 (November 4, 2005) prior to establishing a direct connection to the NOAA WAN. Requirements include, but are not limited to:

(1) Installation of the latest virus definition (.DAT) file on all systems and performance of a virus scan on each system.
(2) Installation of the latest critical operating system security patches.
(3) No external public Internet Service Provider (ISP) connections.

Completion of the above requirements prior to boarding the ship is required.

Non-NOAA personnel using the ship's computers or connecting their own computers to the ship's network must complete NOAA's IT Security Awareness Course within 3 days of embarking.

F. Foreign National Guests Access to OMAO Facilities and Platforms

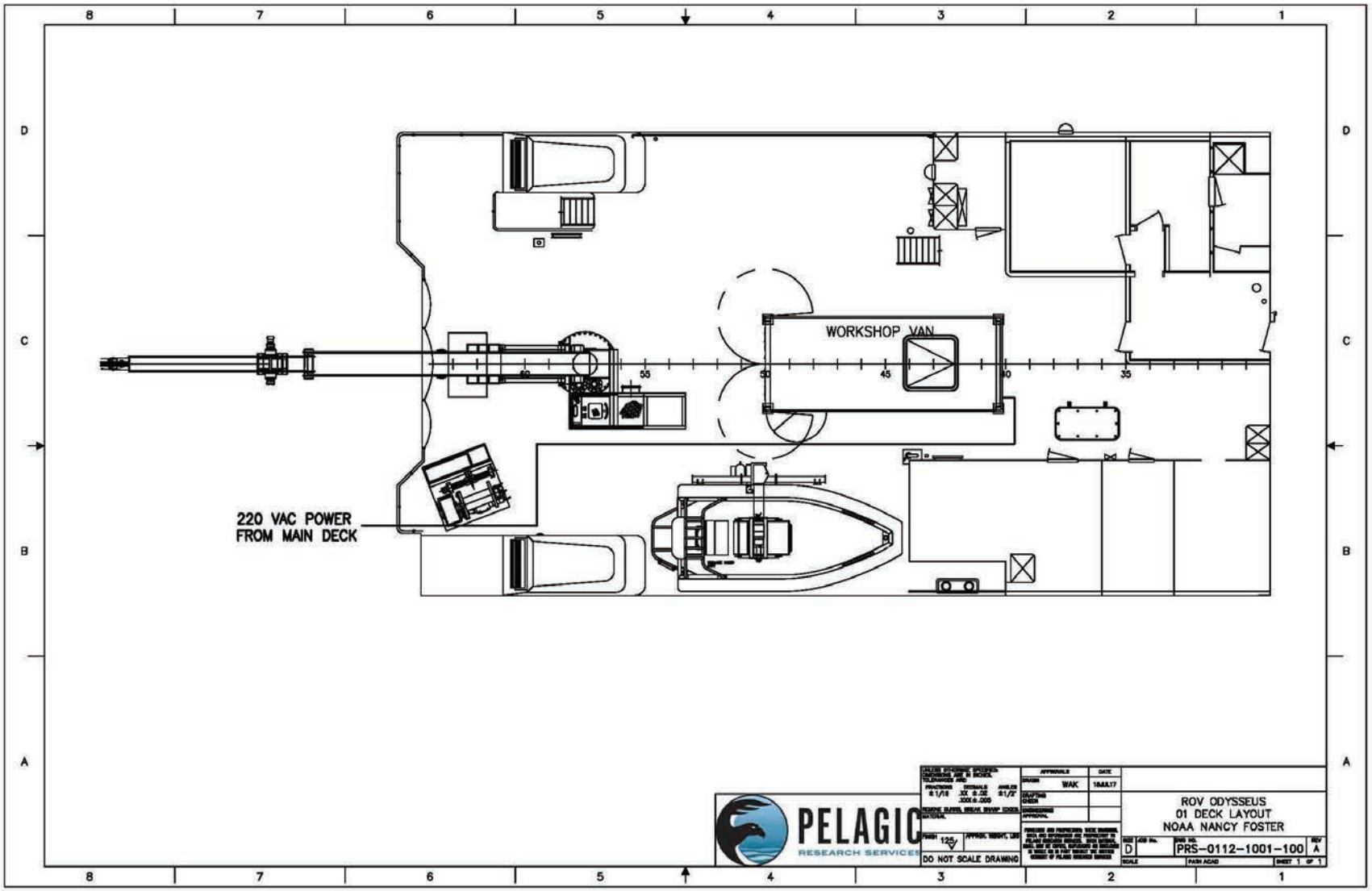
Foreign national access will only be required for Zoleka Filander (South Africa) on Leg 2. Scott Cross will serve as her the NOAA sponsor for this foreign national, and all paperwork to request foreign national clearance for Zoleka Filander was submitted on 7/12/2017.

VIII. Appendix

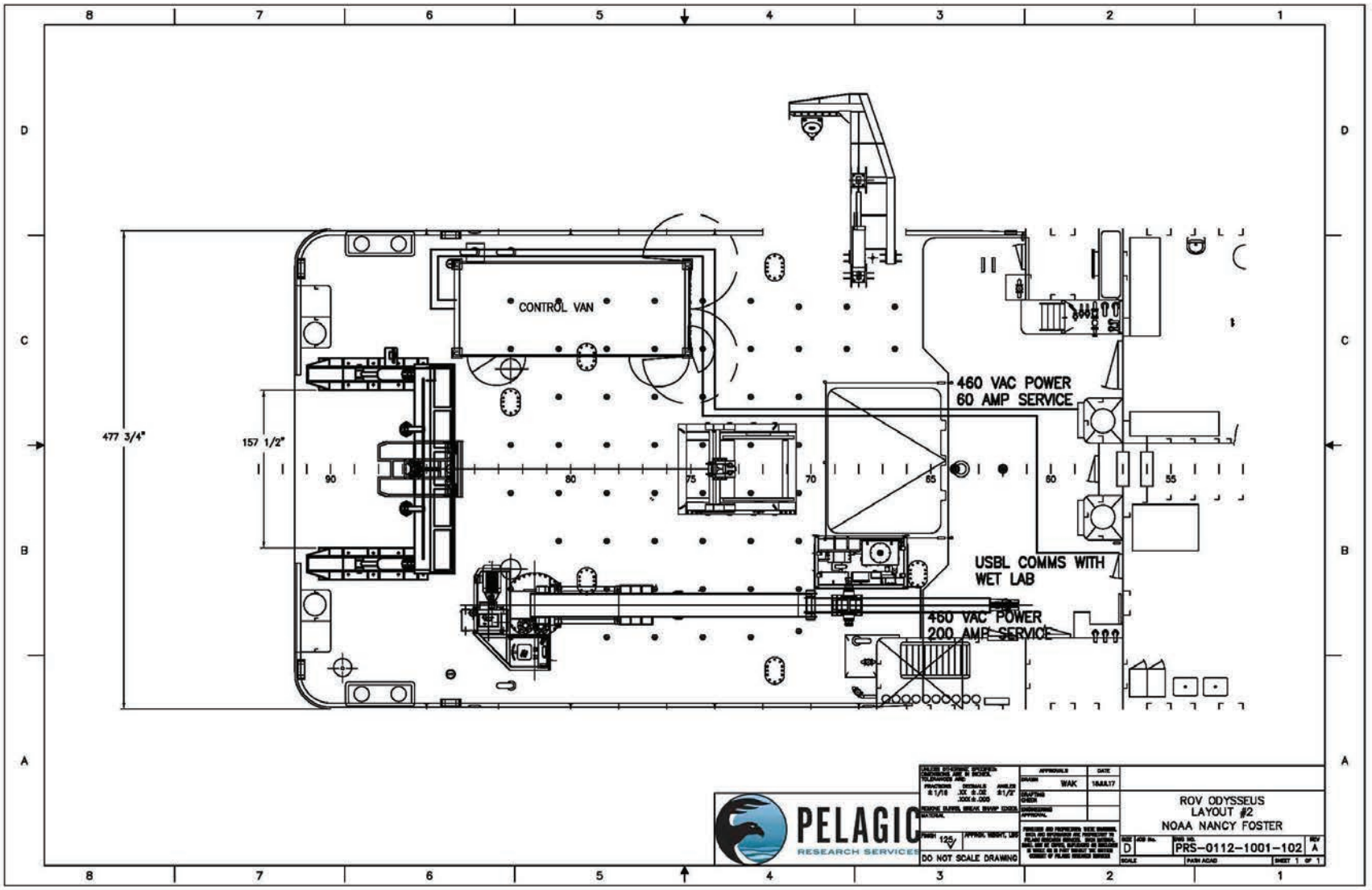
1. Station/Waypoint List

Site Name	Latitude	Longitude	Depth (m)	Planned Operations
St. Petersburg Sea Buoy	27.58833	-83.01167	20	None
Geodetic instrument target	27.450000	-83.050000	23	Multibeam
Long Mound (midpoint)	26.435216	-84.777388	514	ROV
North Reed Site (midpoint)	26.326972	-84.750327	586	ROV
Many Mounds (midpoint)	26.200688	-84.705226	384	ROV
Okeanos Ridge (midpoint)	25.650449	-84.578942	547	ROV
Reed South Site (midpoint)	24.667236	-83.929480	783	ROV
Mapping priority A (SW corner)	24.378586	-80.700211	399	Multibeam
Mapping priority A (NW corner)	25.343759	-80.014668	387	Multibeam
Mapping priority B (SW corner)	25.397881	-79.969566	378	Multibeam
Mapping priority B (NW corner)	25.794774	-79.843282	379	Multibeam
Mapping priority C (SW corner)	26.363053	-79.626794	710	Multibeam
Mapping priority C (NW corner)	26.759947	-79.617774	685	Multibeam
Mapping priority D (SW corner)	27.400388	-79.590713	739	Multibeam
Mapping priority D (NW corner)	28.464784	-79.644835	740	Multibeam
Mapping priority E (SW corner)	28.509886	-80.014668	81	Multibeam
Mapping priority E (NW corner)	29.285632	-80.168013	94	Multibeam
Mapping priority F (SW corner)	31.432464	-79.635815	180	Multibeam
Mapping priority F (NW corner)	32.226251	-78.896150	279	Multibeam

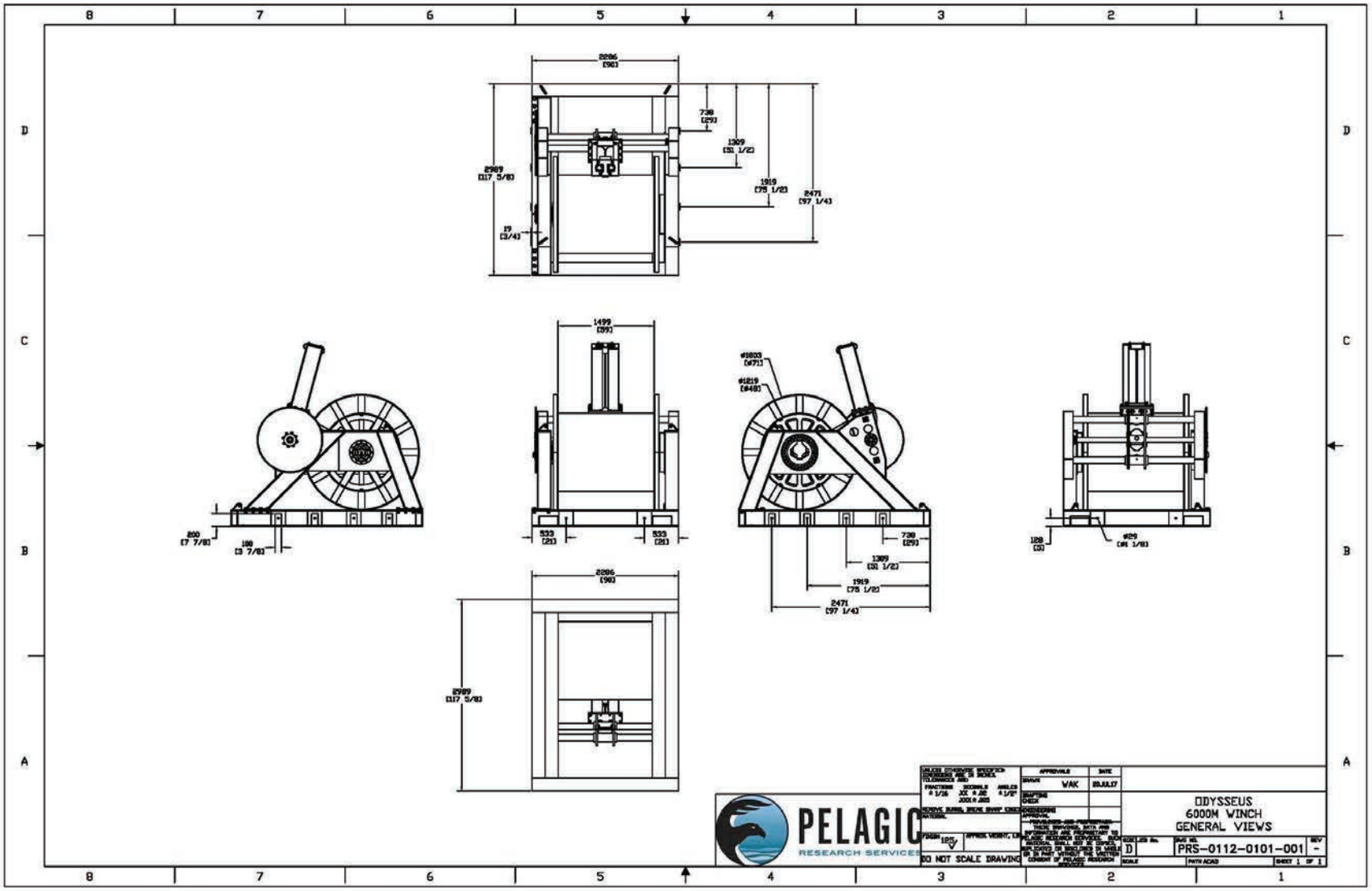
2. ROV layout drawings (O1 deck)



3. ROV layout drawings (main deck)



4. ROV winch schematic



5. ROV mobilization plan

Section One – Winch System

Winch System Description

The Odysseus ROV winch can deploy and recovery 19,686 feet (6,000m) of .681 inch (17.3mm) diameter umbilical. It is powered using a separate Electro-Hydraulic Power Unit that utilizes a closed loop hydrostatic drive to control the winch drum rotation.

The winch drum drive consists of a Rexroth A6VE series 160cc variable displacement motor with HZ-1 control directly driving an O&K Planetary Gearbox with a 206:1 ratio. An integral spring apply, failsafe release brake is part of the gearbox assembly and will stop rotation upon loss of release pressure. The opposite side of the drum is supported by a steel shaft and a bearing assembly.

The winch includes a diamond screw levelwind assembly for proper spooling of the winch. The levelwind is chain driven in the correct ratio to properly spool the umbilical on the winch drum.

ROV Winch Parameters:

Line Pull Performance

Line Pull at bare drum: 16,000 lbs.

Line pull at full drum (4500m stored)): 12,880 lbs.

Line Pull at full drum (6000m stored): 12,400 lbs.

Line Speed Performance

Line Speed at bare drum: 122 ft./min

Line speed at full drum (4500m stored): 152 ft./min

Line Speed at full drum (6000m stored): 158 ft./min

Average line speed: 140 ft./min

Winch Weight and Dimensions:

Length: 117.75 inches

Width: 90 inches

Operational Height: 113 inches

Shipping Height: 81 inches (With Levelwind roller box removed)

Shipping Weight: 20,000 lbs.

Lifting Arrangement:

1. Two each, 7/8" Wire rope legs x 4' long, thimble eyes each end. Secured to the forward lifting points.
2. One each 4 legged bridle sling with 7/8" wire rope legs, 1-1/2" master link and thimble eyes at each end.

Winch Installation Details

To align the winch on deck, align the center of the winch drum to the center of the A-Frame (block mounting point). Square the winch to the A-Frame and use one of the following 2 methods to secure the winch to the vessel:

Option 1: Weld the eight sacrificial plates directly to the deck of the ship (or doubler pads if desired) using E71T wire or 7018 Low Hydrogen welding rods. Perform a 3 pass weld, wrapping the short ends of each plate. The approximate weld size should be ½" at the root. Ensure the 1"-8 fasteners that connect the sacrificial plates to the winch frame are torqued to 480 ft-lbs lubricated.

Option 2: Secure 6" x 3" x 3/8" angle iron x 108" long to each side of the winch frame, tightening the 1"-8 bolts to 480 ft-lbs lubricated. Align to the Baxter pattern on the vessel and secure with the appropriate fasteners according to the vessels recommendations.

The Levelwind Fleet Angle should not exceed 7* to ensure the levelwind has sufficient drive force to properly spool the cable.

Five hydraulic connections are made to the winch system as follows.

Motor A (#16)
Motor B (#16)
Motor Case (#8)
Motor X-Port (#4)
Brake Release (#4)
No electrical connections are required.

It is recommended to perform a load test after the Winch, Block and A-Frame have been installed. Either a hydraulic cylinder or water bags should be utilized to generate the load.

Load test recommendations

SWL Bare Drum: 12,400 lbs.

Test Load = 1.25 x SWL = 15,500 lbs.

Upon completion of the load test, perform NDE on the eight sacrificial plates.

Once the system is load tested, make the five hydraulic connections to the winch motor and gearbox.

To check the winch gear oil level, find the fill and drain ports on the rear gearbox cover, opposite the winch motor (located inside the winch drum). Rotate one port until it is located at the 6 o'clock position. The second port should be just above the 3 o'clock position (or 9 o'clock position). Open the top port and oil should weep out. If not, fill the gearbox with oil to this level using the following:

Recommended Gearbox Gear Oil: Royal Purple Max-Gear 75W140

Total Oil Volume: 13-16 Liters

If unavailable, a Recommended Lubricants document is available in this section

Levelwind Preparation

The levelwind is self-timing and should not need adjustment once properly aligned. It is recommended to coat the levelwind drive chain with a Lubriplate Gear Shield spray grease upon installation and weekly as needed. The guide bars and diamond screw should be manually greased using a Mystik JT-6 or equivalent grease. The same grease should be pumped into the levelwind pawl box and roller assemblies.

Reference Files

1. Winch Layout Drawing
2. Lubriplate GearShield Data Sheet
3. Gearbox Recommended Oils

Section Two – Odysseus ROV

The Odysseus ROV System is a highly capable free-flying ROV with a 6000 meter depth capability. Its flexible design allows it to be configured for a variety of operations.

Odysseus is equipped a fiber optic SubC 1Cam Alpha MK5 HD camera that provides real time, broadcast quality HD video. This camera is mounted on a hydraulic pan and tilt with scaling lasers that can be toggled on and off as required. The camera also features a 10x optical zoom. A data overlay system providing germane ship and ROV navigational information will be provided on the main HD video stream. Raw and processed HD video is available in the Odysseus control room where 4 separate video streams may be recorded on both solid state drives and other digital media. The digital video viewing and recording suite in the control room utilizes a Master Time Clock to synchronize all of the image streams and navigational data collected. The HD camera also comes equipped with 512 gigabytes of internal storage which serves as a functional back-up to the primary video data recorders. The ROV main HD camera also takes 6 to 24 native megapixel digital stills. An SD camera is also mounted on the pan and tilt to serve as a backup to the main HD camera. The Odysseus comes equipped with 5 additional DeepSea Power and Light SD cameras that can be placed anywhere on the ROV. The client may select which SD camera best meets the needs of a downward looking camera view. The video feed from this downward selected camera will also be viewable in real time and include a 2nd pair of scaling lasers in the camera view. This camera will be recorded per project requirements. Lighting for the ROV is provided by 6 to 9 DeepSea Power and Light 5000 lumen individually dimmable LED lights. These lights can be placed anywhere on the ROV to provide illumination to complement the full suite of cameras. This includes adequate illumination both obliquely to the ROV track for the HD camera and directly underneath the ROV for the downward facing camera.

The Odysseus has 7 hydraulic thrusters, 4 horizontal and 3 vertical. The thrusters are individual controlled by RPM providing outstanding maneuverability, station keeping and operations in high current. The ROV control system has a complete auto pilot system featuring auto hover, auto depth, auto altitude, and waypoint navigation. As a science class ROV system Odysseus is pre-populated with sensor bulkheads, spare power and hydraulic functions to easily integrate wired USBL beacons, multi-beam SONARS, multi-beam survey systems and additional cameras including HD, 3D and 4K cameras if requested.

The Odysseus ROV uses a Greensea Inertial Navigation System coupled with the following aiding sensors, Tritech Altimeter, TRD Workhorse DVL and Paroscientific depth sensor. Coupled with a USBL system of matching accuracy we achieve close to 1 meter precision. This positional information is provided in real time every 1 second. Odysseus also utilizes the Greensea Balefire Workspace mission interface system. This system allows for discrete monitoring of all ROV navigational sensors, ship navigational data and USBL data. Navigation solutions for the ROV as determined by the INS are presented along with critical ROV and ship data. This system serves as an additional tracking and navigation interface as well as serial data management system.

Unique to the Balefire Workspace, the Odysseus's SeaKing SONAR is also presented and recorded on the mission interface. SONAR data is seamlessly overlain on the tracking data providing a critical visualization of the subsea environment. The Balefire Workspace along with all of the navigation and SONAR data used to populate the interface is records every dive as unique event. These logs, coupled with video from each dive can be replayed at a later date by the science team providing an excellent tool for post expedition analysis.

To ensure every dive is efficient and successful as possible, PRS will provide a Schilling Titan 7 function manipulator for the project. A seven function manipulator allows for fast and precise operations. The ROV will also come equipped with second manipulator, a 5 function, extended reach Mantis.

General Information

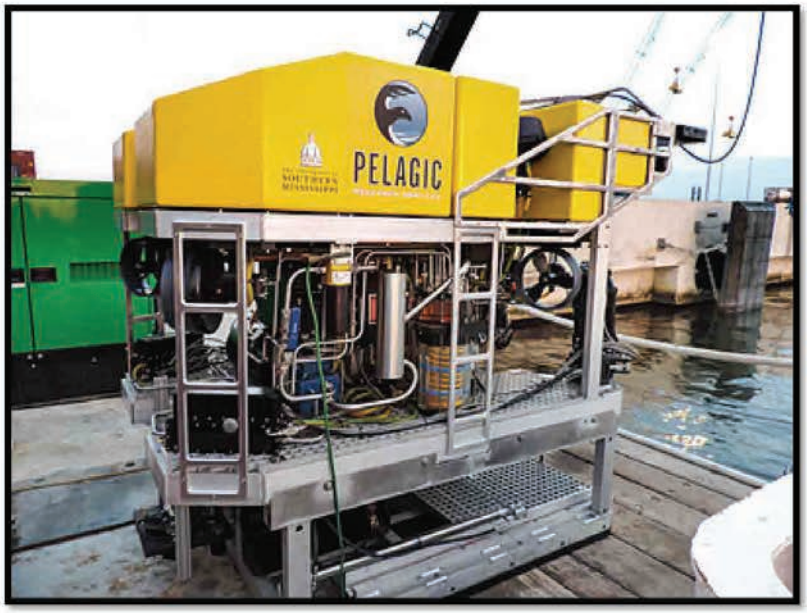
Dimensions: 93" Long x 55.5" Wide x 83.25" Tall

Weight in Air: 3,128 Lbs.

Thru Frame lift capability: 6,000 Lbs.

Power: 25 Horsepower

Hydraulic Power: 3000 PSI @ 10 GPM



ODYSSEUS ROV System

Reference Files

1. ROV Electrical Schematics
2. Odysseus ROV Specification
3. Rochester Umbilical Specification
4. Evergrip Documentation

Section Three – Hydraulic Power Unit

The Hydraulic Power Unit that drives the ROV winch is comprised of a 100 Horsepower electric motor driving a closed loop hydraulic pump and an open loop hydraulic pump. The closed loop pump connects to the winch motor and provides direction control and load control. The open loop pump provides brake release pressure, various constant pressure signals for hydraulic controls, and if needed, hydraulic power for a third-party A-Frame.

The 125 gallon reservoir is elevated above the pump string to ensure positive pressure on the suction ports of each pump. It includes a sight gauge, level gauge, cleanout cover and suction strainers for each pump.

Filtration for the closed loop circuit is provided by the charge pump filter located on the side of the closed loop pump. Filtration for the open loop pump is provided by a Donaldson in-line filter assembly.

Filter elements are as follows:

Description	Filter Type	MFG	Part Number	Quantity
Closed Loop Pump Suction	Suction Strainer	Flow-Ezy	50-1 ½-200	1
Closed Loop Charge Pump Circuit	Low Pressure Filter	Donaldson	P16-5332	1
Open Loop Pump Suction	Suction Strainer	Zinga	SS3000-0-100	1
Open Loop Circuit	High Pressure Filter	Donaldson	P16-4174	1
Return Filter	Low Pressure Filter	Zinga	LE-10	1

Recommended Hydraulic Oil is Shell Tellus ISO 46 oil or Chevron Rando ISO 46 oil.

HPU Installation and Startup

HPU Installation Dimensions are as follows:

Length: 96 inches

Width: 53.5 inches

Height: 72 inches

Weight: 4,350 lbs with oil

Locate the HPU within approximately 25 feet of the ROV Winch (to be confirmed by the actual hose lengths installed). Set the HPU down onto the steel deck or doubler pads as needed. Ensure the main electrical enclosures readily accessible during operations.

Weld the 4 each sacrificial plates located near each corner of the HPU frame with a one pass 3/8" weld, wrapping the short ends of each plate. Use E71T wire or 7018 welding rods.

As an alternative to welding, the HPU can be secured to the deck using chains and chain binders. Use 4 chains and secure each upper corner to the deck.

HPU secured to deck using chains

Once the system is welded down, perform the following:

1. Connect the following hydraulic hoses to the winch:

   Motor A (#16)
   Motor B (#16)
   Motor Case (#8)
   Motor X-Port (#4)
   Brake Release (#4)

2. Connect a ground strap of at least 1/0 size between the HPU frame and the deck.
3. The system includes a 40-foot-long 1/0 Four conductor Gexol Marine Grade power cable already wired at the HPU disconnect. Wire the supply end to a 480 VAC +/- 10%, 3 phase, 60 Hz, 200 amp Disconnect capable of starting a 100HP electric motor with soft start. For reference the FLA of the motor is 113 Amps. Ensure the ground wire is properly connected at both ends.
4. Turn on power at the breaker.
5. Turn on the HPU Disconnect switch. You should see the RED "FAULT" light illuminate for about 5 seconds, then the GREEN "POWER OK" light illuminate and stay on. If not, swap any 2 of the power supply leads at the breaker and try again. If this does not fix the problem, verify the light bulbs are working properly behind each lens.
6. A RED "FAULT" light will not allow the HPU to start. This condition would cause the pumps to rotate the wrong direction and cause catastrophic damage to both pumps.
7. Once the GREEN "POWER OK" light is illuminated, bump start the electric motor several times until the Charge Pressure gauge begins to register pressure. Then start the HPU and let it idle for several minutes.

8. At idle, you should see the following pressures:
   A-Port – 350 PSI (May read near 0 due to gauge scale)
   B-Port – 350 PSI (May read near 0 due to gauge scale)
   Charge Pressure – 350 PSI
   Auxiliary Pressure – 2500 PSI
   Levelwind Pressure – 2000 PSI
9. Once the pressures are verified, use the local control joystick to operate the winch in Haul in and Pay Out directions. Verify the direction is correct. If not, stop the HPU, swap the A and B hoses at the winch motor and try again.
10. The HPU and Winch are now ready to operate.

HPU Cooling

The HPU includes an Air-over-oil cooler with a thermostat that comes on automatically when the return header temperature reaches 86* F. No external cooling connections are required for this to operate correctly.

The HPU includes a Seawater-over-oil cooler in series with the Air-over-oil cooler. It requires a flow of 20 GPM (75 LPM) with ¾" hose barb connections in the inlet and outlet. It is recommended to verify the integrity of the Zinc Anodes installed in the heat exchanger at the installation of every job and every 30 days of work.

Winch Control

Winch Control Joystick – Bi directional, Spring return to center. Haul In rotates the drum in the haul in direction, Pay Out rotates the drum in the payout direction. A micro switch is installed to release the brake when the joystick is moved out of neutral in either direction.

HPU Stop button – stops HPU pump string. Electrical power is still active.

Remote Enable – Enables Control van remote control. Note moving the local control joystick out of neutral will retake command.

Remote Enabled Light – Illuminates when the Remote Control has command.

Brake Released Light – Illuminates when the winch brake is released.

Levelwind Corrector – Not used with this winch

Tension Switch – Not used with this winch

Local Control dimensions:

Height: 10 inches

Width: 8 inches

Depth: 6 inches

Interconnect cable length: 50 feet Bostrig Type P, 16 Gauge, 16 conductor wire

Mount on the deck within view of the A-Frame and the levelwind/winch assembly.

Remote Control

The 19" Rack Mounted Remote Control allows the winch to be driven in either direction from the Control Cabin.

Remote Control dimensions:

Height: 4U

Width: 19 inches

Depth: 4 inches

Interconnect cable length: 100 feet Bostrig Type P, 16 Gauge, 10 conductor wire

Controls

Winch Stop – Stops the winch HPU pump string.

Remote Enabled Light – Indicates when the remote is enabled from the Local Control

Winch Control Joystick - Bi directional, Spring return to center. Haul In rotates the drum in the haul in direction, Pay Out rotates the drum in the payout direction. A micro switch is installed to release the brake when the joystick is moved out of neutral in either direction.

ROV Stop – Stops ROV electric motor and pump string

ROV Start – Starts ROV electric motor and pump string

Cable Out – Displays length of umbilical deployed

ROV E-Stop – Maintained switch, stops ROV electric motor and pump string.

Reference Files

1. HPU Electrical Schematic
2. HPU Electrical Parts
3. HPU Hydraulic Schematic
4. HPU Hydraulic Parts
5. HPU General Assembly Drawing

Section Four – Block Dimensions

The over boarding sheave block is a 48" diameter sheave rated at 25,000 lbs. It has a groove diameter of .715 inches with a 30* taper. The sheave is Cast Polyamide while the remaining construction is Aluminum and Stainless Steel.

Sheave dimensions:

Length: 64 inches

Width: 9 inches

Height: 64.25 inches

Weight: 700 lbs.

Mounting Ring: McMaster-Carr Hoist Ring P/N: 3145T89

Cable counter sensors are installed in the block. This provides the payout distance readout and transmits this information to the ROV control room on a Red Lion display. If required, the signal can be transmitted using RS-232 serial data string to a client device.

Reference Files

1. Sheave General Views Drawing
2. Sheave Groove Drawing
3. Sheave Calculations

Section Five – Tote Information

Four totes are included with the Odysseus ROV System. Each tote has the following capacities:

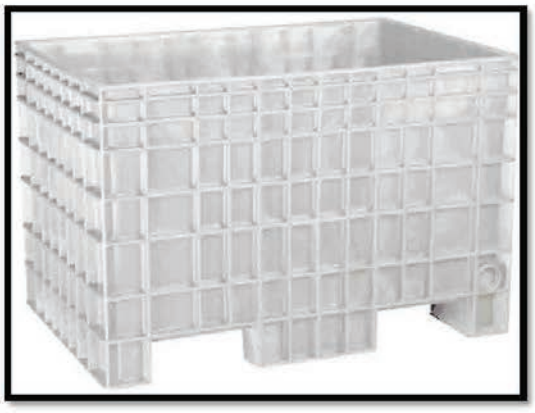
Length: 41.6 inches

Width: 28.8 inches

Height: 27.8 inches

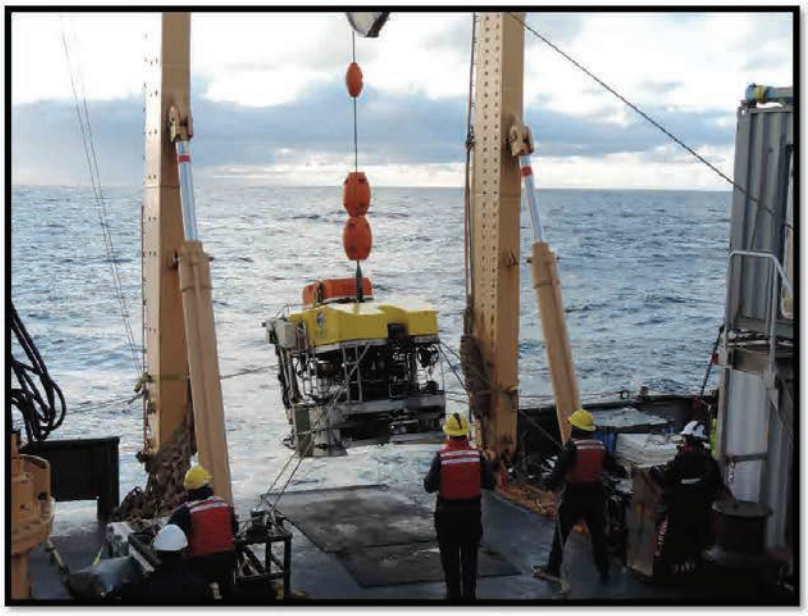
Empty weight: 70 lbs.

Max Weight: 900 lbs.



Section Six – Tag Line Stations

The Vessel needs to provide a minimum of four cleats near the A-Frame to support tag lines connected to the ROV. Two of these should be inboard of the A-Frame, and 1 each located forward and aft of the A-Frame.



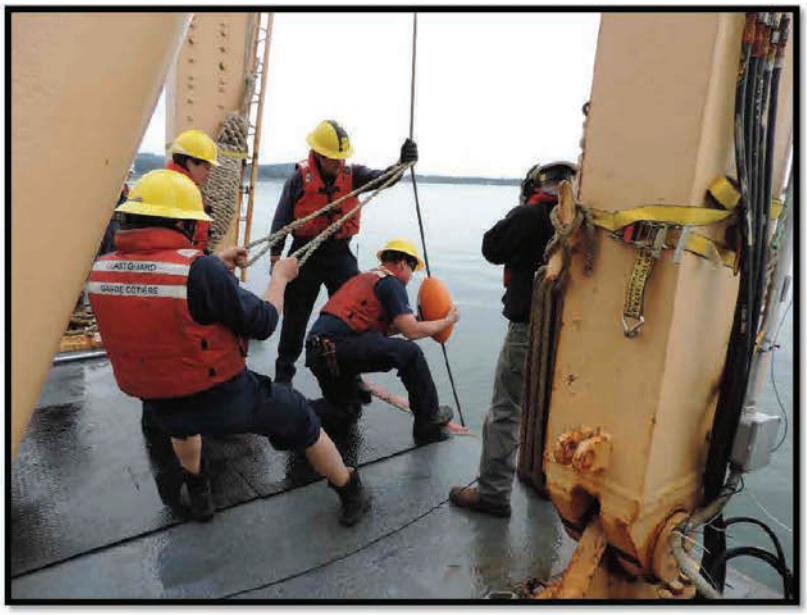
Example of Tag Lines used during launch and recovery

Reference Files

1. Sample Tag Line using Tailing Station

Section Seven – Umbilical Floats

Umbilical floats are attached to the ROV umbilical during deployment of the ROV. The floats are required to allow the Odysseus ROV a larger working radius and to separate the ROV from any vessel motion. The Odysseus ROV utilizes Deepwater Buoyance CF-09-HL-6000 meter rated floats every 2-3 meters as required to provide sufficient floatation for the ROV umbilical.



Installation of ROV Umbilical Float

Typical operations require the installation of 10-12 each of the 6000m rated floats and 1-2 of the 3000m rated floats.

Reference Files

1. Float General Assembly Drawing

Section Eight – Control Van

ROV control and video and data management is housed in the PRS control van. The van is a standard 20 foot long ISO container modified with air conditioning, lighting, power and is laid out to optimize the ROV operations. As the main hub of all activities for the ROV, it provides adequate and comfortable seating for the entire ROV team and the client representatives. PRS can also remote the live video streams from the ROV to an interior laboratory space for the management of dive operations by the client. PRS utilizes a state of the art, broadcast quality ClearCom intercom system to provide seamless communication between ROV pilots and science team dive management.

ROV Control Van Interior

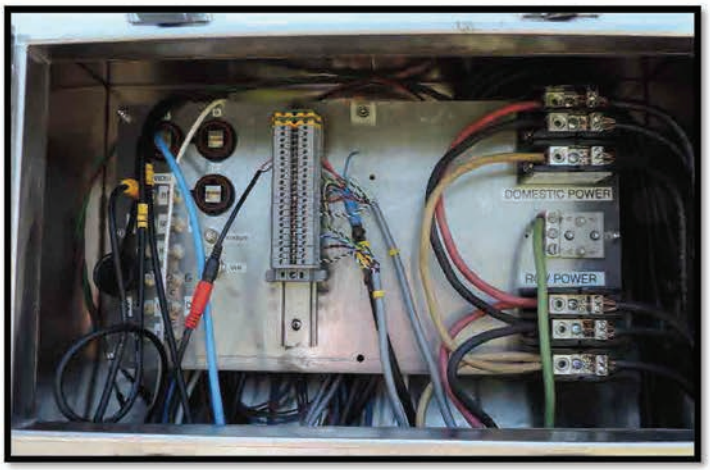
Installation

The Control Van is supported on each bottom corner by a Twist Lock pedestal assembly. The pedestals are 8.375" long x 8.375" wide x 8.375" tall. It is recommended that these are secured to the Control Van container before lowering on the deck. Once aligned on deck, weld the perimeter of each plate with a 3/8" single pass weld using E71T wire or 7018 welding rods.

Control Van ISO Corner Pedestal

Power Connection

The Control Van requires 480 VAC, 3 phase, 60 Hz power from a minimum of 60 amp supply. This can be provided by the vessel if needed or a minimum of 75 KVA generator. The power cable is brought to the outside of the Control Van and connected at the junction block. The Domestic Power can operate from a separate power source than the ROV if needed.



Control Van Incoming Power Connection

High Voltage Distribution

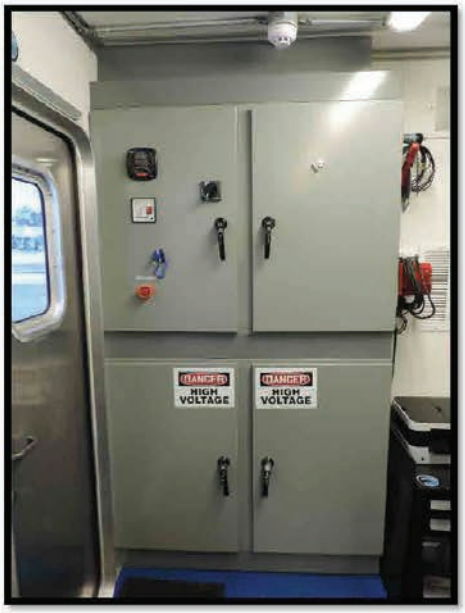
The ROV system Odysseus Power Distribution System (PDU) for the ROV takes in 440 / 480 VAC three-phase power and boosts it to 2800 VAC. This is then sent to the ROV. The PDU is housed in cabinets located in the control van and comes complete with gauges, main breaker, overloads, interlocks and ground fault monitoring in the upper cabinet. The lower cabinet incorporates the step up transformers for house power and ROV power.

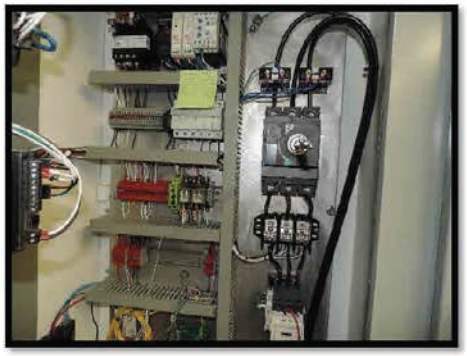
Power, once boosted via the ROV PDU is sent to the winch via the ROV Deck Cable. Power and fiber are connected via a stationary J-BOX on the left side of winch. Fiber pathways and power are connected to .681 cable through a slip ring and rotating j-box on the right side of winch.

When energized **high voltage** is present in the following locations on the Odysseus ROV System (high voltage warning signs are present at all of these locations) -

- At power generating source – Generator, ships power panel etc.
- Terminal strips on aft end of Control Van
- PDU units in Control Van (ROV PDU, Control Van Power)
- HPU for Winch
- Winch J-boxes – rotating and fixed
- ROV Transformer
- High Voltage Arrestor Can on ROV
- ROV Termination J-Box
- ROV HPU
- .681 umbilical

It is REQUIRED that all PRS ROV Personnel review and initial the document titled **High Voltage Safety Procedures for Pelagic Research Services ROV System Odysseus** before starting up, operating or maintaining the ROV.





Section Nine – Workshop Van

The Odysseus ROV System includes a fully outfitted 20 foot ISO Container as a Workshop Van. This houses a complete compliment of spare parts including board, lights, cameras, thrusters, manipulator, and compensators among others. This allows the ROV crew to address any issue that may arise with the ROV while on-site.

High Voltage Distribution

The Workshop Van connects to the Control Van for its power. The connection is made using a Leviton connector assembly, with the bulkhead located on the Control Van. The Power Distribution panel is located inside the workshop van.

Workshop Van power connection (located at Control Van)

Workshop Van power distribution panel

Section Ten – Clear Com System

The Odysseus ROV system utilizes a state of the art, broadcast quality ClearCom intercom system to provide seamless communication between ROV pilots and the client dive management.

ClearCom Part #	Description	Quantity
MS-702	Clear-Com MS-702 Intercom 2-Channel Rackmount Main Station	1
CC-KB702GM	ClearCom KB-702GM 2-Channel Select Flush Mount Speaker Station	2
CC-GM18	Clear-Com GM-18 18 Inch Plug-In Gooseneck Microphone	2
CLCM-RS-701	ClearCom RS-701 Single-Channel Standard Belt pack	3
CLCM-CC-300-X4	Clear-Com CC-300-X4 Single-Ear Headset with 4-pin Female XLR	3

Section Eleven – Deck Cameras

The Odysseus ROV system utilizes two Day/Night cameras to monitor deck operations. These are Vitek Infrared Bullet Cameras with the ability to see up to 150ft in total darkness. Each camera is rated to IP68. One camera is pointed at the ROV Winch, while the other watches the ROV deployment into the water. Each camera image is display in the Control Van.

Section Twelve– Navigation Survey

This section is intentionally left blank.

Section Thirteen – Generator

If vessel power is unavailable, a generator will be required to operate the Odysseus ROV System. The Power Requirements are as follows:

ROV System Power

Power: 480 VAC, 3 phase, 60 Hz

ROV System service: 60 Amp Service

ROV Electric Motor: 25 HP (No soft start)

Recommended Generator Size: 75 kVA or larger.

Winch Hydraulic Power Unit

Power: 480 VAC, 3 phase, 60 Hz

HPU Service: 150 Amp service

HPU Electric motor size: 100 HP with soft start motor controller.

Recommended Generator Size: 200 kVA or larger.

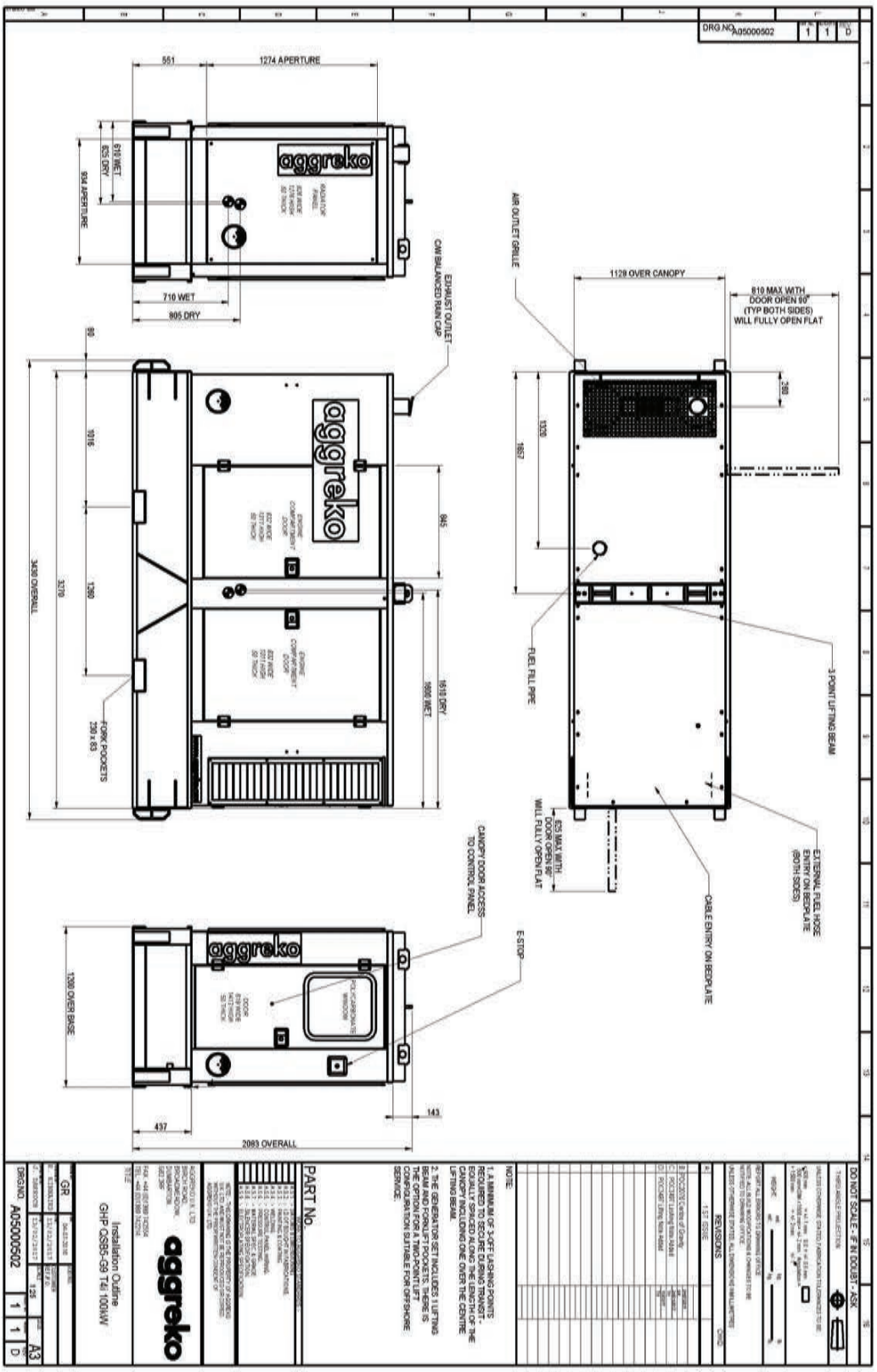
Section Fourteen – IMCA R018

A copy of IMCA R018, "ROV Systems", is provided as a reference in the following pages.

Reference Files

1. IMCA R018, "ROV Systems"

6. Generator diagrams (only one of these two will be brought onboard, model TBD)



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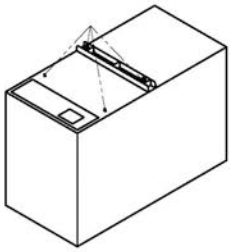
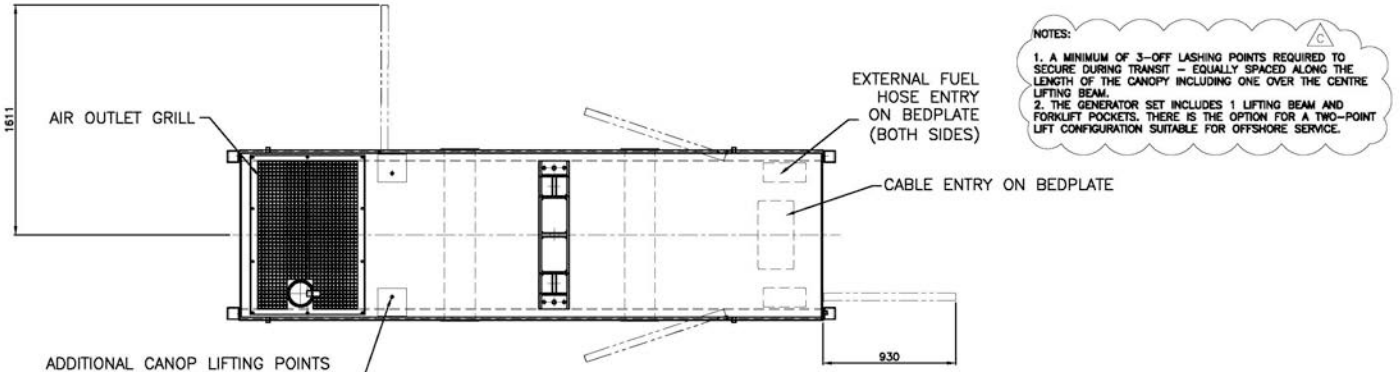
THIRD ANGLE PROJECTION

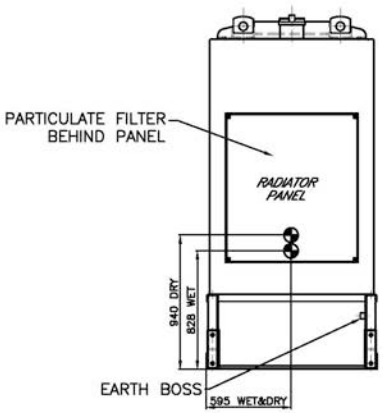


SCHEMATIC CANOPY REMOVAL

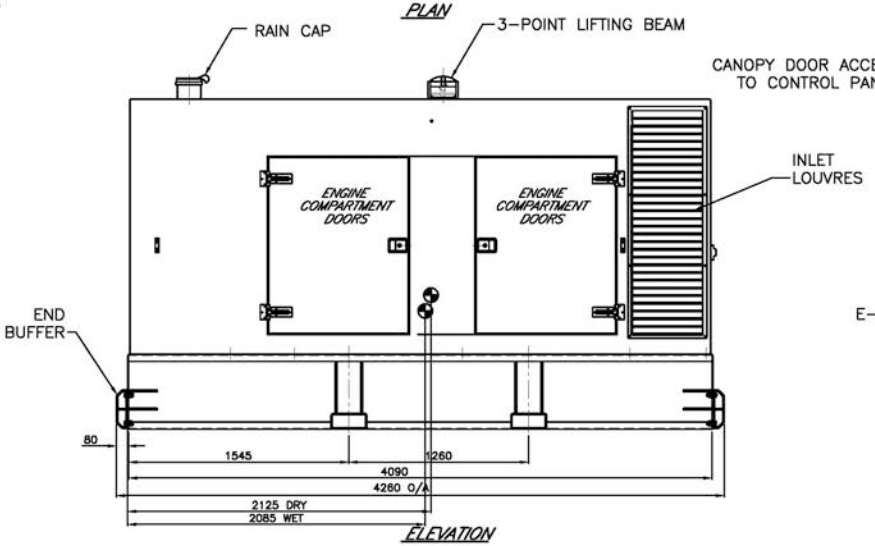


PLAN

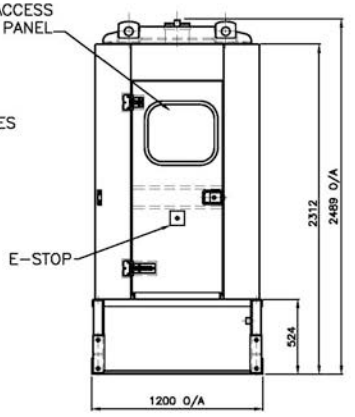
NOTES:
1. A MINIMUM OF 3-OFF LASHING POINTS REQUIRED TO SECURE DURING TRANSIT - EQUALLY SPACED ALONG THE LENGTH OF THE CANOPY INCLUDING ONE OVER THE CENTRE LIFTING BEAM.
2. THE GENERATOR SET INCLUDES 1 LIFTING BEAM AND FORKLIFT POCKETS. THERE IS THE OPTION FOR A TWO-POINT LIFT CONFIGURATION SUITABLE FOR OFFSHORE SERVICE.



END ELEVATION



ELEVATION



END ELEVATION

SCALE : 1:30

REVISIONS							TITLE.			DRG.No.	SHEET No.	No OF SHEETS	REV.
A: 1 ST. ISSUE							INSTALLATION OUTLINE & CofG GHP/QSB7G6 TIER 4i		aggreko	A050249	1	1	C
B: POC 2057 CENTRE OF GRAVITY ADDED	D.TAYLOR	26/11/14					DRAWN: A. Hellyer	APPROVED: J. Darroch					
C: POC003497 - NOTE ADDED	T.HELLYER	13/02/17					DATE: 07/02/2017	DATE: 13/02/2017					

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