

HANDS-ON

The Newsletter of JMS Naval Architects

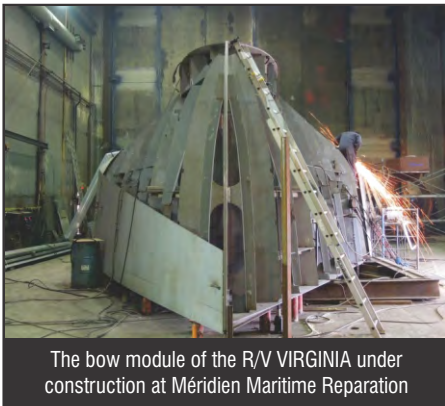
Naval Architecture · Salvage Engineering · Marine Engineering · Marine Surveying

2017 Volume 22

ENGINEERING & DESIGN

Research Vessel Designed by JMS is Under Construction at Méridien Maritime Reparat

Virginia Institute of Marine Science (VIMS) of Gloucester Point, VA awarded a contract to Méridien Maritime Reparat of Matane, Quebec to construct a 93-foot research vessel designed by JMS. The R/V VIRGINIA will replace VIMS's current vessel, the R/V BAY EAGLE.



The bow module of the R/V VIRGINIA under construction at Méridien Maritime Reparat

The primary mission of the Institute's fleet is to provide inshore and offshore work platforms for the support of fisheries related oceanographic research projects. The new vessel VIRGINIA will be capable of conducting fisheries assessments of greater capacity, in deeper waters and with a larger science complement than the BAY EAGLE ever could. In addition, the new vessel will greatly expand VIMS's capability to perform general oceanographic research in the Chesapeake Bay and the

VIMS continued on page 2...

Stevedoring Barge Designed by JMS is Delivered to Port of Providence Rhode Island

JMS engineered and designed a crane barge for the State of Rhode Island that is being used for stevedoring operations at ProvPort Inc. ProvPort is a nonprofit public-private partnership, formed in 1994, which owns and operates the municipal port of the City of Providence, RI. ProvPort is New England's premier deep water multimodal facility for international trade and domestic distribution and one of the busiest ports in America's northeast.

JMS designed the barge PROVPORT I to carry and operate the facility's 440 ton Liebherr LHM 550 mobile harbor cranes. The 300-foot long x 72-foot wide rake/box barge has a deck rating of over 6,000 pounds per square foot. The crane barge design allows for the easy loading and unloading of cargo from ships to the dock or from ship to ship. The barge is ABS classed A1 with notation "Deck Barge", uninspected and unmanned. JMS also created the technical specification documents to utilize for the solicitation of shipyard bids and provided owner's representative services during the construction of the barge at Conrad Industries in Amelia, LA.

The contract was funded by the State of Rhode Island's Transportation Investments Generating Economic Recovery (TIGER) II grant program award managed by the Rhode Island Commerce Corporation. The grant was created by Congress in the 2010 Transportation Appropriations Act and allowed the purchase

ProvPort continued on page 2...



Stevedoring barge PROVPORT I arrives at the Port of Providence, Rhode Island

Letter from the President



Dear Readers,

"Under design, under construction and underway" sums up the recent activity at JMS. We have been busy with a large variety of projects for vessel owners and operators. JMS recently completed the contract design of the R/V VIRGINIA for the Virginia Institute of Marine Science. The R/V VIRGINIA is another example of the JMS Coastal Research Vessel Series – Fisheries Class design and is currently under construction at Meridian Marine where JMS is providing on-site technical oversight support. The JMS Coastal Research Vessel Series concept-model provides a multi-purpose, efficient and cost-effective platform for scientists and educators. The design offers flexibility in science outfitting allowing for high utilization and affordable operating day rates.

At the same time, our engineers have been on the deck plates and underway on vessels all over the world from the southern tip of Strait of Magellan to Hawaii assisting ship owners with our unique combination of high-end analytical engineering expertise and practical deck plate experience.

Although we are proud of our past accomplishments, we realize that our continued success depends on a commitment to continuous improvement and we strive to insure that JMS continually evolves with the changing needs of the maritime community. Whether it is engineering, marine surveying, or marine casualty response our goal is to provide pragmatic solutions that bring real value to our customers every day. This year's newsletter describes many of our naval architecture, marine engineering, and marine surveying projects. I hope you enjoy reading about them and I welcome you to send me your comments at blake@jmsnet.com or, better yet, visit us in our waterfront office located on the Mystic River.

Best regards,

T. Blake Powell

VIMS continued from the cover...

mid-Atlantic near coastal waters.

JMS designed the *VIRGINIA* as an uninspected research vessel with an ABS Loadline. The state-of-the-art research vessel offers capabilities more commonly found on larger and more costly vessels. The vessel is easily adaptable to evolving scientific research areas such as offshore biological and environmental surveys related to oil & gas exploration, wind energy development surveys, environmental impact studies, and the servicing of ocean observing systems. The design offers flexibility in science outfitting allowing for high utilization and affordable operating day rates.

JMS is currently providing technical oversight of the construction which is well underway with the hull being fabricated using modular construction methods. The hull is being built in two blocks joined at the engine room bulkhead, each block is primarily built upside down, righted, completed and then preliminary outfitting commences prior to joining. At which time completion of the main deck structure and superstructure will be undertaken. The vessel will be launched in early 2018, with trials scheduled for the summer of 2018.

Main propulsion is provided by a pair of 660 BHP tier III diesel engines coupled to a two-in/one-out marine gear driving a 5 blade controllable pitch propeller within a Rice nozzle. This unique arrangement will provide the capability to operate the vessel efficiently on a single propulsion engine when on station or during slow speed transits. This will reduce overall engine hours and thus reduce the cost of

operation and improve fuel efficiency, while reducing emissions. The marine gearbox also powers a very robust fishing hydraulic system through independently clutched PTO's. The fishing hydraulic system supports the suite of deep water trawl winches, net reels, anchor windlass and bow thruster. The electrical system is comprised of a pair of 99 kW generators which provide redundant capability and can be run in parallel during peak power demands. LED lighting will reduce both power consumption and heat emitted into the accommodation spaces.

The Rice nozzle is fitted with high aspect ratio triple rudders and a 185 kW Veth compact grid omnidirectional bow thruster provide excellent maneuverability. The vessel's capabilities are further enhanced by a state-of-the-art dynamic positioning system for station keeping.

Oceanographic outfitting includes very large Wet and Dry Labs which have been designed for maximum flexibility to accommodate the many types of science that the vessel is expected to conduct. The 1,000 square foot main working deck allows for a large science payload and provides a significant working platform for conducting fishing operations, over-the-side sampling and coring activities. There is room and services to load a 20 foot science van for specialized science missions. The new research vessel will take advantage of the latest technology through an extensive array of acoustic instrumentation for the gathering and processing of data in support of fisheries research, oceanography and geophysical sciences.

The aft deck is fitted with a stern mounted A-Frame with an 8,000 lb safe working load for over the stern lifting operations and a side mounted J-Frame with an 4,000 lb safe working load for conducting CTD operations. The principal fishing arrangement consists of a pair of trawl net reels and a pair of trawl winches with 4,000 lb linear pull with 355 fathoms of 3/8" wire to support small mesh (200 mm net) bottom trawl surveys in inshore and nearshore waters. An electric CTD (Conductivity, Temperature, and Depth) winch with 2,000 m of 0.322" wire will also be fitted for operation from the side mounted J-Frame. There is also a knuckle boom deck crane with a 2,240 lbs capacity at a 33 foot reach to support load handling operations. The winches and crane are being supplied by Hawbolt Industries of Nova Scotia.



PROVPORT

ProvPort continued from the cover...

and installation of the barge and two high performance harbor cranes.

The new stevedoring equipment modernizes and enhances the port's ability to continue its existing bulk material operations while expanding its capabilities to accommodate container operations; thus alleviating demand on the Port of Boston – the only existing container port in New England. The new crane barge is critical for the port which previously relied on 30-year-old rented crane barges that were prone to breakdowns and were out of service for prolonged periods. The crane barges are estimated to remove on average 1,000 trucks per week off the northeast corridor highway system – one of the most congested in the country.



Tests and Trials of JMS-Designed Semi-submersible Purpose-Built Barge

Final tests and trials were conducted last November of the horizontal submergence platform *JG BURKE* designed by JMS for **McNally Construction** of Hamilton, Ontario, Canada. The operational tests and trials took place at the facilities of McNally's parent company, *Weeks Marine* of Cranford, NJ.

JMS developed a complete engineering and design package for McNally to modify an existing deck barge and allow it to be used as a submersible platform for constructing concrete caissons. JMS also providing engineered support throughout the modification of the platform.

Construction of an \$80-million jetty in Halifax Harbour ramped-up into high gear in early 2017 with the arrival of the large, specialized barge. The *BURKE* was in Halifax from March to August to assist with the construction of the new jetty for the **Department of National Defense**.

McNally is using the submergence platform to construct concrete caissons used for the construction of piers and jetties. The caissons are formed on the platform by slipform method,



The stern module of the R/V VIRGINIA



External buoyancy tank installed on to the JG BURKE

at the installation site, one layer at a time, floated free, and then stacked onto a prepared rock mattress by filling them with rock ballast.

The *BURKE* replaces McNally's submersible barge with a larger, more capable platform that is easier to operate. JMS engineered the platform to be mobile and highly flexible in order to accommodate a wider range of use including operating as a dry dock to refloat vessels for repair work. When used as a caisson construction platform, a key design requirement was that the platform submerge with no trim or list for more controlled and stable operations. The *BURKE* was based on an existing 250' x 75' x 16' deck barge. Large external buoyancy tanks were installed at each corner of the barge with supports engineered and designed by JMS to allow the tanks and supports to be removed when the vessel is not being operated as a submersible platform. The ability to remove the buoyancy tanks and

supports and carry them on the platform deck allows the platform to be transported through the 78' wide locks of the St. Lawrence Seaway. Once the platform is at the construction site, the buoyancy tanks are reattached and a clear working deck of 150' x 65' is made available with clear access from three sides. The vessel also benefits from increased stability provided by the attached buoyancy tanks expanding the overall beam to 101'.

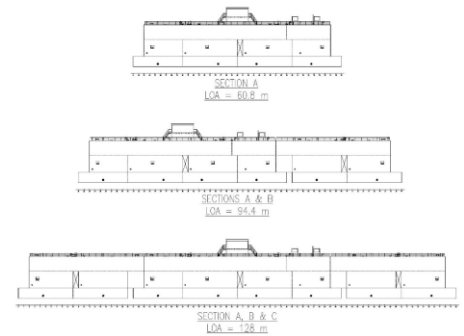
JMS also engineered and designed a ballast control air system supplied by two 750 cfm air compressors used to deballast the barge. The deballasting and submergence operations are controlled from a raised control platform installed at the bow of the barge. A manually operated air manifold is located on the control station platform and the ballast system is controlled remotely by air actuated valves. JMS engineered and designed the high-capacity ballast system to be capable of supporting the construction of concrete caissons weighing up to 5,000 tons and with a footprint of up to 150' x 65'. The ballast system is capable of submerging and reballasting from a 12" freeboard to an 18' depth over the deck in approximately 90 minutes each direction.

The *BURKE* includes spudwells, and a spud lifting system, located on each side of the bow and fitted with 80' spuds to allow the barge to maintain position during caisson construction operations. When used as a floating dry dock, the platform can accommodate vessels up to 2,000 tons and 180' long.

The *BURKE* retains the original barge's loadline so it can be towed offshore to construction projects. All modification work was performed by Weeks Marine.



Semi-submersible purpose-built barge JG BURKE "under-going" tests and trials at Weeks Marine



Modular Floating Dry Dock

JMS designed a 128.0 m (420 ft) by 37.5 m (123 ft) modular floating dry dock for an undisclosed client. The dry dock was designed to be built in three phases. One 60.8 m long section is currently under construction, and two additional 36.8 m long end sections will be constructed separately and joined to the dry dock at a later date to create a 128 m long dry dock. The first 60.8 m section of the dry dock was designed to be fully operational as a stand-alone dry dock with a lifting capacity of 3,800 tons. The additional end sections increases the lifting capacity to 5,700 tons and ultimately 7,500 tons. JMS also designed the dry dock structure and systems to be capable of operation in ice conditions.

The wing walls are 3.5 m wide by 9.2 m high and run continuous through the midbody of the dry dock and stop two frames short of the end of the 3 m deep pontoon to create an apron. Each modular section of the dry dock has an access through the wing walls on both the port and starboard side. A safety deck is located in the wing walls at 7.88 m above the baseline. Ballast tank vents extend below the safety deck to form an air cushion. The deballasting and submergence operations are controlled from a raised control platform installed on top of the starboard wing wall of the center module. The ballast system is capable of submerging and reballasting from a 0.3 m freeboard to an 8.1 m depth over the deck in approximately 70 minutes each direction.

JMS developed the complete engineering and design package, including all detail structural design, tankage, and outfitting design. Systems design included the ballast system, seachest arrangement, equipment specification, pump and discharge piping systems. JMS also designed the power system including generator arrangement, fuel tank arrangement, and electrical and piping systems one-lines. The dry dock will be built and operated as a classed dry dock through **Bureau Veritas** (BV). The structure and systems were designed to BV Rule Note 475, and is being built under survey by BV.



JMS-Designed Dry Dock for Senesco Marine

JMS designed a 2,500 LT floating dry dock for, and built by, **Senesco Marine**. The new ATB tug *GRACIE M. REINAUER*, also built by Senesco, was transferred to the new dry dock in preparation for the new tug's launch in July 2016. The new ATB tug was built at Senesco Marine in North Kingstown, RI for **Reinauer Transportation Companies (RTC)**. The dry dock was built by Senesco in 2016 and the ATB was the first new-build vessel to be launched from the dry dock. The dry dock is 200 feet x 80 feet and is capable of docking vessels up to 2,500 LT. The dry dock is being utilized by Senesco's new vessel construction facilities and also by their repair yard facilities.

JMS designed the dry dock with an opening in each wing wall at midships to allow easier access to the dock and to reduce steel used in its construction. Five ballast tanks are provided on



Senesco's new dry dock prepares to launch the new ATB tug GRACIE M. REINAUER

each side as well as centerline tanks that are used for ballast and wash water containment. JMS also designed a set of modular, removable aprons to increase the working deck space while still allowing the dock to be used for land transfer and ship launching. The new ATB tug was mated to the 100,000 bbl tank barge *RTC 109*, also built by Senesco, and launched the previous week using their other dry dock *LESLIE G.*

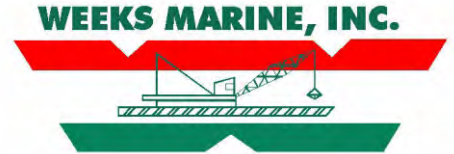
Gantry Crane Barge Designed for Weeks Marine

JMS completed the design of a 250' by 64' by 16' gantry crane barge for **Weeks Marine** of Cranford, NJ. JMS provided complete engineering and design services for the concept through detail design of the new crane barge to support a Clyde Model 28 gantry crane. JMS provided engineering calculations and design drawings meeting the requirements of the ABS Rules for Building and Classing Steel Barges. The barge has a deck rating of 1,000 PSF and a crane rail rating of 65 LT/ft.

JMS also developed a structural and systems design package including, generator and machinery arrangement, fuel, electrical, and hydraulic system one-lines, towing arrangements, crane rail and tie-down installation, dry docking and anode plan, and a construction details package.

Engineering Support for Weeks Marine Crane Barge

JMS provided engineering support for **Weeks Marine** as they upgraded the crane capacity of their 140 foot crane barge, the *WEEKS 575*, and



obtained a load line for the vessel to allow operation in offshore waters. The *WEEKS 575* was originally built for the United States Army in the 1950's. Weeks Marine began work to upgrade the crane lift capacity and make modifications needed to obtain a load line for the *WEEKS 575* in September 2016. JMS provided engineering review of the existing vessel drawings to verify scantlings prior to submitting drawings to Lloyd's for review and approval. JMS also performed stability calculations to verify that the new crane capacity would be supported by the barge, and conducted a deadweight survey and final stability analysis once the project was completed in November 2017. The resulting capacity of the ringer crane is 200 tons at a 65 foot radius when lifting over the stern and 150 tons at a 65 foot radius when lifting over the side.

Engineering for Heavy-Lift Transport of New Barges and Tug

Weeks Marine contracted the construction of 8 new sand scow barges to be built at a Gulf of Mexico shipyard and was exploring the most economical ways to transport them to Weeks Marine's New Jersey facilities. Each of the scows measure 150'x40'x12'.

In engineering consultation with JMS, Weeks decided to use an existing Weeks Marine Load Line deck barge *WEEKS 99* and carry 4 barges at-a-time (double-stacked) on her deck, secure them for ocean tow, and transport them from the Gulf of Mexico to New Jersey. The *WEEKS 99* is a converted oil tank barge measuring 300'x72'x19' that had undergone modifications to increase its width to 72'.

JMS provided design and engineering services to Weeks Marine for transporting the scow barges onboard the *WEEKS 99* deck barge. JMS performed calculations and developed drawings for a shipping, blocking, and sea fastening plan and to support the required modifications to the *WEEKS 99* to support and secure the 4 new sand scow barges to the *WEEKS 99*. Modifications included an analysis of using her new bin walls to support the sand scows during shipping.

JMS performed similar calculations and drawings to carry, as additional cargo, the Weeks Marine tug *GEORGE W* on top of the second-tier of sand scow barges.



Weeks Marine tug GEORGE W and 4 new sand scows hitchin' a ride on the WEEKS 99

JMS updated the stability documents for the WEEKS 99 following modifications to also allow it to be used as a scow barge after the transportation of the smaller scows and tug was completed.

JMS performed a deadweight survey, stability analysis, and submitted the results to ABS for review and issuance of a new stability letter for the WEEKS 99.

JMS also performed calculations to support modifying and converting the WEEKS 99 from a deck barge to a hopper barge.

be able to seat up to 32 guests in an intimate setting while taking in the beautiful scenery of the upper Charles River. Guests onboard will also enjoy Brelundi's authentic Sicilian food, wine, and atmosphere. The boat is also designed to pass under the Prospect Street Bridge and proceed upriver to the historic Newton Public Boathouse and historic Watch Factory.

ROSE ARIA is in the preliminary design phase, but the intent is to have the vessel open to the environment during temperate weather with a transparent canopy above the passengers. The canopy is capable of being encapsulated to incorporate heating and air conditioning for passenger comfort in an extended river tour season or rainy weather. Atop the canopy are wheels that can be used as a guide to safely navigate the Prospect Street Bridge. Propulsion will be provided by dual outboard motors or by electric motors run off of a bank of batteries. The pilot station is located at the bow with added

maneuverability provided by an electric bow thruster. The passenger area consists of 8 booths capable of seating 4 people per booth. There is a passenger restroom and an entertainment stage. Allowances have been made for an elevator integrated into the entertainment stage for handicapped individuals.

Meals will be prepared by Brelundi's restaurants prior to the cruises and served hot onboard. A small prep galley is located aft of the passenger accommodations capable of keeping the food warm and also for allowing cold food preparations.



Bridge Inspection Vessel Design

JMS designed a compact, self-propelled, **bridge inspection vessel** for Northeast Work & Safety Boats, LLC. The unique vessel is a 28' aluminum catamaran with inflatable outriggers. JMS developed the concept design as well as the detail and system design and provided technical support to the owner throughout the construction, outfitting, and testing of the vessel. The patent-pending vessel design utilizes an outrigger system with detachable inflatable sponsons. The outrigger system is deployed to provide additional stability for aerial lift operations, and retracted to allow the vessel to be trailered over the road between job sites. The vessel provides an alternative to the typical truck-mounted bridge inspection platforms and allows for minimal disruption to bridge traffic and provides a faster, more cost effective and safer solution to highway bridge inspection.

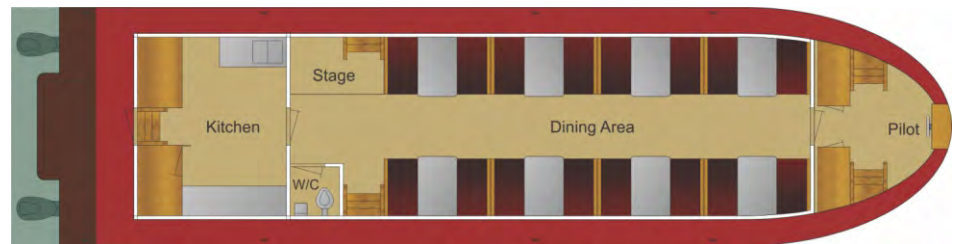
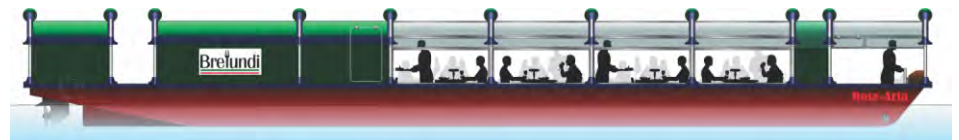


Brelundi Restaurants & Hotels

River Dinner Cruise Boat Design for the Charles River

JMS is designing a 60' river dinner cruise boat for tours and dining on the Charles River in Waltham, MA. JMS is designing the boat for Michael Colomba, the founder of **Brelundi Restaurants**, and his soon-to-be-built hotel, also on the Charles River. The boat is intended to expand on his company's amenities by offering the first river dinner cruise experience in the area.

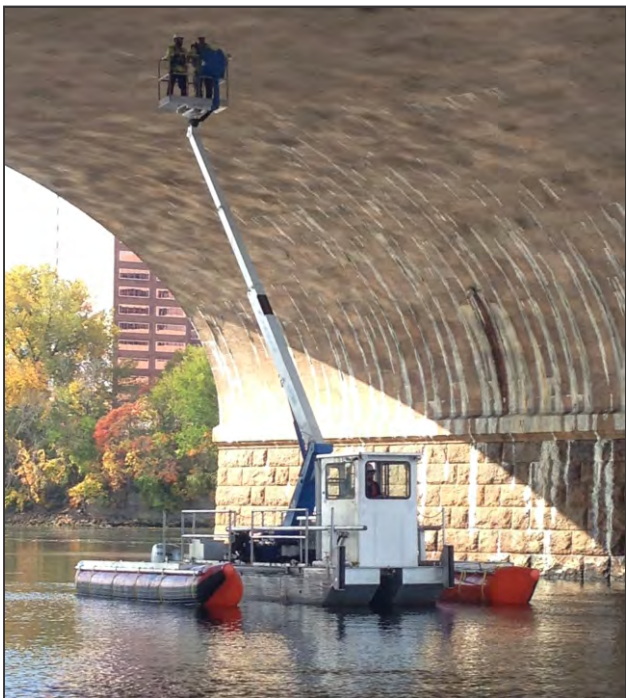
The *ROSE ARIA*, named after Colomba's mother, will be at the new hotel location that Colomba is currently building on Moody Street in downtown Waltham. *ROSE ARIA* will



32 Passenger Charles River Dinner Cruise Boat for Brelundi Restaurants & Hotels

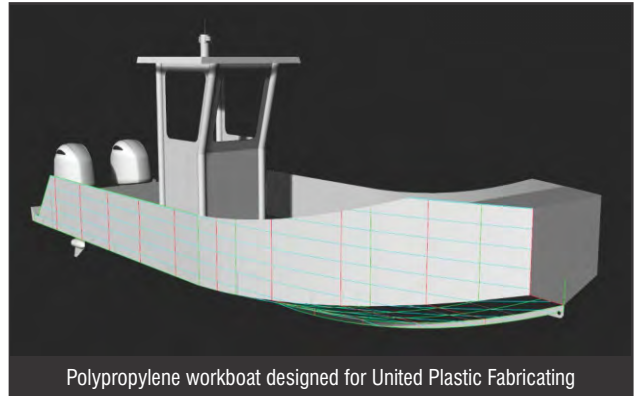
The unique outrigger system employs two 25' long, 3' diameter inflatable sponsons which are hydraulically deployed and retracted. When deployed, the overall beam of the vessel increases to 22', providing a stable platform for aerial lift operations. When retracted, the inflatable sponsons are detached from the outrigger structure and stored in the transport truck. This allows the outrigger structure to retract into a complementary opening formed in the hull and reduce the vessel beam to 9'-2 1/4", allowing the vessel to be transported over the road. Aluma Marine & Fabrication in Harvey, LA was selected to build the vessel. CPI Marine in Kyle, TX fabricated the sponsons. The 40oz urethane inflatable sponsons have 8" rub strakes to provide puncture and wear protection when operating in close proximity to structures and environmental obstacles. Each sponson has three removable air bladders for ease of maintenance and repair as well as added protection against puncture. Each sponson can be deflated and packed into a 6' x 3' x 3' box for easy storage in a truck bed during road transport. The vessel is powered by twin Honda BF115 four stroke outboard engines with counter rotating propellers. The controls for the engines and hydraulic spuds are located inside an enclosed, heated wheelhouse, providing shelter for the operator.

The vessel is outfitted with a Socage T 360 aerial lift which was installed by Cues Equipment in North Franklin, CT. With a fully extended reach of 60' above the water, the aerial lift can be collapsed to a stowed height of only 7'-2" above



Bridge inspection vessel designed for Northeast Work & Safety Boats

the deck, permitting the vessel to have a low transport height for transit on public highways. The lightweight aluminum basket has a rated load capacity of 550 lbs and can rotate up to 90 degrees in either direction. Both compressed air and AC power are available in the basket to support the use of inspection and repair tools on site. In addition to the aerial lift, Cues Equipment procured and installed a custom hydraulic power unit built by Foster Manufacturing Corp, and a Fabco Power 8kW hydraulic generator. The hydraulic power unit is fit with a Kubota diesel engine and supplies two independent hydraulic circuits which together power the aerial lift, hydraulic generator, outriggers, and hydraulicspuds.



Polypropylene workboat designed for United Plastic Fabricating



Polypropylene Workboat Design for United Plastic Fabricating

JMS designed a 25-foot polypropylene workboat for **United Plastic Fabricating (UPF)** of North Andover, MA. The **polypropylene Workboat** is an open cockpit planing hull with an unobstructed forward working deck. It has easy access on and off the working deck, provides good protection from wave action at the bow, has a self-bailing cockpit, and a partially-enclosed operator station on the aft deck that folds forward for low bridge clearance when on the water or for over the road transport. The boat is designed to be transported on trailer with no special permits required. The first offering will be a barebones design with propulsion provided by two (2) 150 HP outboard engines. Due to its construction method and material (constructed by plate welding), the base design is easily adaptable to many uses and types of customers. UPF intends to market the polypropylene Workboat to commercial and government vessel operators in fields such as fish farming, oil spill response, fire department/police response and coastal patrol/ security. The

25-foot polypropylene Workboat will be available in any color, as long as it's black.

UPF has been an innovator of plastic products for the fire, trucking, and industrial markets since 1986. They have developed several products for the trucking industry, including the PolyBody®, which is the world's first polypropylene service body. Some of their other products include the Poly-Tank® for fire apparatus, poly water tanks, poly storage tanks, tow truck bodies and custom industrial poly tanks. Polypropylene vessels have many unique advantages over steel, aluminum and fiberglass. Polypropylene is not susceptible to electrolysis or osmosis, is easy to clean, UV stable, and requires little or no maintenance. The material is naturally buoyant and has several times the impact resistance of traditional boat building materials such as fiberglass and aluminum.

JMS is providing concept through detail design, engineering support during prototype development and construction, and engineering support during tests and trials. Construction of the prototype workboat is currently underway. JMS and UPF plan to develop other size polypropylene vessels including tow boats and barges.



Barge Conversion Design for Port of Coeymans Marine Terminal

JMS completed the conversion design of a 260-foot manned tank barge into a manned deck cargo barge for **Coeymans Marine Towing** of the **Port of Coeymans Marine Terminal** on the Hudson River in Coeymans, New York. The tank barge was formally known as the **MSRC 350** and has been renamed the **CMTYNOT1**.

JMS provided complete engineering and design services for the concept through detail design of



Barge conversion design project for Coeymans Marine Towing

the conversion and provided owner's representative services and engineering support to **Metal Trades Inc.** of Hollywood, SC where the conversion work was performed.

All existing on-deck piping and chemical & oil product-based equipment was removed from the deck. All other equipment that needed to remain on deck was relocated. The cargo bin walls were designed to be removable and have been constructed and installed on the vessel.

JMS developed engineering calculations and design drawings ensuring the conversion design meets the requirements of ABS Rules for Building and Classing Steel Barges and for the barge to retain is Ocean service Load Line.



The design package developed by JMS also included a "Key Plan", General Arrangement drawing, Structural Analysis, Hydraulic System One-Line, Electrical One-Line, Existing Scantling drawings, Bin Wall Detail Drawing, and Stability Analysis for Load Line. The conversion work was completed in June 2017.

Engineering Support to Add Upper Pilothers to 3 Tugboats

Harley Marine acquired three tugboats for their New York and **Olympic Tug & Barge** operations and wanted to increase their visibility when operating in harbors by adding upper pilothouses. Harley asked JMS to provide their naval architecture and engineering support services to examine the stability of the three tugboats with upper pilothouses added before the modifications were actually undertaken. The three tugboats are the *DR. MILTON WANER*, *ANDREA*, and *CE*.

JMS conducted a preliminary inclining test of the *WANER* and performed preliminary stability analyses on all three tugboats. The analyses confirmed that various modifications would need to be made to each of the tugboats in order for them to meet the required stability regulations and allow them to continue operation as load line tugboats.

Both the *CE* and *WANER* required changes in their tankage arrangements, including reductions in fuel and water capacities, addition of permanent ballast, and enclosing their sterns to create additional buoyancy space. JMS prepared drawings for the new permanent ballast tanks and the stern enclosures for submittal to ABS for approval. PermaBallast



New raised pilot houses for three Harley Marine tugs

by Ballast Technologies Inc. (BTI) was chosen as the ballast material and JMS worked closely with BTI's engineering department to ensure the permanent ballast tanks had appropriate features for efficient installation of the ballast material.

Following completion of the modifications, JMS performed deadweight surveys on the *CE* and *WANER* to update their lightship characteristics, and prepared final stability analyses and loading instructions for review and approval by ABS.

The tugboat *ANDREA* required changes to her tank arrangement following installation of the upper pilothouse. JMS performed an incline test at the completion of the work, prepared a final stability analysis, and developed loading instructions for review and approval by ABS.



Engineering Support for Superyacht Launching

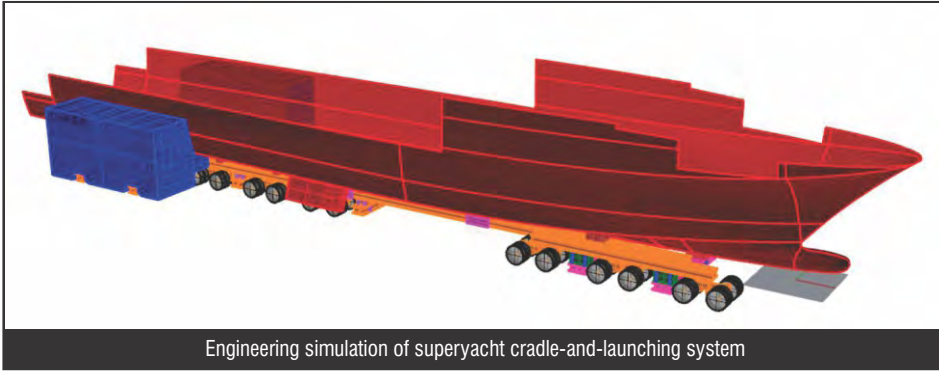
JMS performed a technical review of a superyacht launching system composed of a custom steel trailer and buoyancy modules designed and fabricated by **Christensen Shipyard**. The superyacht launching system was used to successfully launch two 164-foot yacht hulls at Christensen's Vancouver, WA facilities.

The launches were accomplished using a unique cradle-and-launcher system designed to give the shipyard a safer and more flexible way of getting its yachts into the Columbia River. Christensen manufactured a 140,000-pound steel cradle to which two large FRP flotation boxes are attached. The boxes provide additional lift in low-water conditions and keep the yacht perfectly stable throughout the launch process.

Once the yacht and cradle are floating, the air in the launchers is replaced by water, as in a dry dock, and the yacht is able to safely float free on its own.

The custom trailer and buoyancy floats are designed to be assembled and disassembled via bolted connections for ease of storage in the shipyard and used for future hulls with only minor alterations.

JMS performed a technical review of launch load reactions on the dollies used to transport and launch the 164-foot yachts atop the custom steel cradle. JMS developed a hydrostatic and structural analyses model using HECSALV to



Engineering simulation of superyacht cradle-and-launching system

simulate the launch sequences of the yachts on an inclined ramp. Reaction forces were calculated at the 14 intersections of the hydraulic dolly extension rods with the longitudinal spars.

"I just want to thank JMS for their part in making these launches successful. It was reassuring to know that what we had designed was confirmed through their simulation."

~ KC Harrison, Engineering Manager at Christensen Shipyard, Ltd



Engineering Support for Airbag Launch of 150,000 bbl Tank Barge

JMS performed an analysis for using airbags to launch a 150,000 barrel tank barge at **Senesco Marine** to determine the feasibility and verify stability and vessel stresses during the launch. Based on the results of the analysis, JMS provided recommendations on changes to the launch procedure that Senesco had previously developed to accommodate the larger barge.

Using the existing vessel plans, JMS developed a stability model using HECSALV to allow the launch evolution to be modeled as a multi-point grounding. JMS developed a launch sequence in HECSALV to accurately show bag locations in relation to the vessel and the launch way as the barge was rolled towards the water. Bag reactions and hull forces were tabulated and verified for compliance with the allowable bag loads, and vessel hull bending restrictions.

The analysis showed that additional length was required to fit sufficient bags to

fully support the hull during the initial phases of the launch. JMS designed a staging piece to fit in the stern tunnel area of the barge so that the flat of bottom could be continued further aft. The staging piece was designed to float neutrally buoyant and in trim to minimize damage to the hull when being removed following the launch. Also noted is that the knuckle loads at the bow require higher strength air bags to be used at the end of the launch sequence. The launch of the first barge is scheduled for January 2018.



Engineering Support for Restoration of MAYFLOWER II

JMS is providing engineering support to **Mystic Seaport** of Mystic, CT and **Plimoth Plantation** of Plymouth, MA for the restoration of the **MAYFLOWER II**. The 30-month restoration effort is taking place at the Mystic Seaport's **H.B. duPont Preservation Shipyard**. The organizations, with the help of JMS serving as naval



MAYFLOWER II at Mystic Seaport's restoration shipyard

architecture consultant on the project, are working toward restoring the historic vessel's Certificate Of Inspection (COI) by the summer of 2019 in time for the 2020, 400th Anniversary of the arrival of the pilgrims at Plimoth. The mission of the restoration team is to honor the vessel's historic structure as much as possible; make replacements in-kind, and only modify where necessary in order to improve the vessel's strength, longevity, and maintain regulatory compliance. JMS' work began in January 2017 with verifying some of the engineering previously done regarding a steel support structure designed to maintain the vessel's shape as the work proceeds.



New Research Vessel for Duke University Marine Lab

JMS is providing naval architecture and consulting services to **Duke University Marine Lab (DUML)** to assist them in acquiring a new research vessel. The marine lab has been without a large research vessel since two of its boats were retired; the 135-foot **CAPE HATTERAS**, owned by the National Science Foundation, and the 50-foot **SUSAN HUDSON**. These vessels were important resources that allowed faculty members to take students offshore and participate in oceanographic work.

Duke University recently received substantial donor funding for the construction and operation of a new state-of-the-art research vessel that will allow marine scientists from DUML and other institutions to conduct research along the Atlantic seaboard in a wide range of vital fields, including marine ecology and conservation, biological oceanography, and renewable ocean energy development. The vessel will also serve as a classroom for undergraduate and graduate students.

JMS assisted DUML in the development of their science mission requirements and matching those requirements to the capabilities and attributes a new vessel needs to have. Additionally, JMS assisted with defining the specific oceanographic outfitting requirements that will enable the vessel to perform these science mission requirements. The aluminum-hulled catamaran will be capable of high-speed daytrips to stations in the Gulf Stream as well as shallow draft operations in and out of Oregon Inlet and Pamlico Sound. It is envisioned that the vessel will conduct

research, educational outreach, and semester-at-sea programs from environs in the Chesapeake Bay to the Florida Keys. Principal outfitting includes an observation platform, rigid hull inflatable for marine mammal viewing, CTD and hydrographic winches with an A-Frame for water quality missions and a full suite of acoustic and bottom mapping sensors.

JMS will provide technical oversight during the construction of the vessel and will oversee the progress of the vessel construction, monitor construction quality, verify adherence to the approved specifications and design, and witness all tests and trials.



JMS Awarded Engineering Support Contract from USGS

JMS was competitively awarded an engineering services contract to provide naval architecture and marine engineering support to the U.S. Geological Survey (USGS) Great Lakes Science Center (GLSC). The Great Lakes Science Center operates five large fisheries research vessels, ranging in length from 70 to 107 feet, with one vessel stationed on each of the Great Lakes. The vessels conduct long-term data collections including population studies of prey fish and stocked lake trout, environmental sampling for contaminants monitoring, and invasive species. JMS has been providing naval architecture and marine engineering services to The Great Lakes Science Center for over 20 years. JMS provided



USGS research vessel R/V ARCTICUS

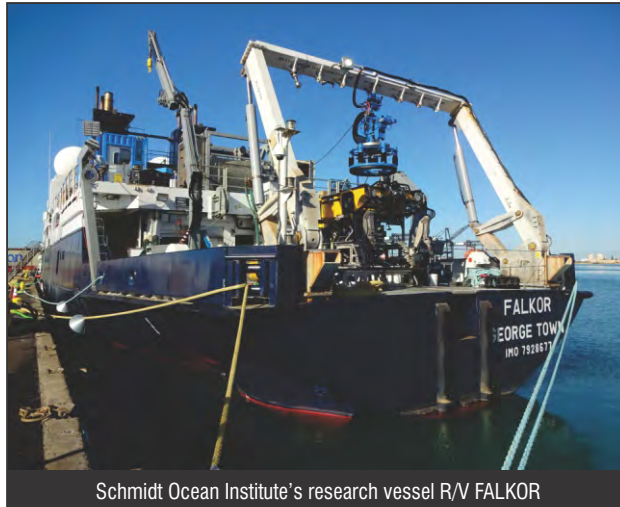
Other Engineering Projects

JMS Naval Architects has unique expertise in naval architecture, marine engineering, shipboard operations, salvage engineering, towing, and shipyard construction. JMS maintains a full time staff of naval architects and engineers with sea-going and vessel operations experience. This combination of high-end analytical engineering expertise and practical seafaring experience allows JMS to deliver rapid and innovative solutions to complex problems, only a few of which are described in this year's newsletter. Other recent projects include:

| Customer | Project |
|---------------------------------|--|
| Bath Iron Works | • Support for shipyard diving program |
| Maryland Dept Of Natural Res. | • Engineering and design for buoy tender crane replacement |
| Reinauer Transportation | • Engineering support for tank barge loading program |
| Robinson Stafford Rude | • Value engineering support for USACE barge |
| Just Ducky Tours | • Engineering support for amphibious passenger vessel plan review |
| ASMAR Shipyard | • Coastal fisheries research vessel design |
| Coeymans Marine | • Hopper barge engineering support |
| Maritime Attorney | • Vessel condition expert witness |
| Maritime Attorney | • Tug allision expert witness |
| Sandy Hook Pilots | • Marine survey for pilot vessel fleet |
| Ocean New Brunswick | • Dry dock lengthening feasibility study |
| Christensen Yachts | • Launch cradle engineering and design support |
| Ducci Electrical | • Engineering and design support for heavy lift |
| Coeymans Marine | • Engineering and design for tank barge conversion |
| Coeymans Marine | • Engineering support for crane barge loadout |
| McAsphalt Industries | • Engineering support for tank barge loading |
| Ocean Exploration Trust | • Marine survey services for E/V NAUTILUS |
| Poling and Cutler | • Engineering support for tank barge cathodic protection system |
| Woods Hole Oceanographic Inst | • Eng. support for research vessel ALUCIA hyperbaric chamber pressure test |
| Waco Products | • Engineering review for high speed transport vessel |
| Cetacean Marine | • RV LAKE GUARDIAN engineering and design for davit modifications |
| Coastline Consulting | • Crane barge feasibility study |
| United Plastic Fabricating | • Engineering and design for polypropelene workboat |
| Weeks Marine | • Engineering and design of gantry crane barge |
| Plimoth Plantation | • Marine survey, eng. and design support for MAYFLOWER II refit |
| US Navy | • Salvage manual update and revision |
| Reinauer Transportation | • Engineering support for tug docking plan |
| Weeks Marine | • Stability analysis for crane barge |
| Coeymans Marine | • Engineering and design for cargo loading and lashing plan |
| Feeney Enterprises | • Engineering support for heavy lift |
| Reinauer Transportation | • Stability analysis for SOLAS tugs |
| Friends of Falls of Clyde | • Engineering support for heavy lift loadout |
| Galveston Duck | • Engineering support for amphibious vessel stability analysis |
| Senesco Marine | • Eng. and design support for passenger vessel modifications |
| Coastline Consulting | • Engineering support for crane barge heavy lift |
| Recreation Unlimited | • Engineering and design for aluminum recreational pontoon boat |
| Marine Technologies, Inc. | • Engineering support for crane barge stability analysis |
| U.S. Army Corps of Engineers | • Marine survey of dredge and quarters barge |
| Maritime Attorney | • Shipyard construction expert witness |
| Weeks Marine | • Engineering support for loadout and sea fastening design of heavy lift |
| Harley Marine | • Stability analysis for tug |
| Harley Marine | • Engineering and design for tug modifications |
| Reinauer Transportation | • Engineering support for tug shafting modifications |
| Department of Homeland Security | • Passenger vessel shipyard support |
| EMR | • Feasibility study for barge conversion |
| National Crane Inspection | • Crane barge stability analysis |
| Schmidt Ocean Institute | • Marine survey of research vessel FALKOR |
| Mystic River Cruises | • Engineering support for passenger vessel tonnage measurement |
| U.S. Geological Survey | • Engineering and design support for research vessel fleet |
| U.S. Geological Survey | • Engineering support for research vessel acoustic modifications |
| Ocean Surveys Inc | • Engineering support for sediment research vessel |
| Caldwell Marine | • Engineering and design for cable laying gantry barge |
| H&L Contracting | • Engineering support for deck barge heavy lift |
| Feeney Enterprises | • Engineering and design for ferry landing barge |
| Feeney Enterprises | • Engineering support for tug repower |
| Feeney Enterprises | • Deadweight survey |
| Maritime Attorney | • Vessel allision expert witness |

complete vessel design (from concept design through contract design and engineering package development) and construction oversight for the 78-foot fisheries research vessel *R/V ARCTICUS* which was recently recognized as one of the “10 Significant Ships of 2015” by *Workboat Magazine*.

Under the engineering contract, JMS will provide engineering consultation, perform design services, conduct marine surveys and develop engineering specifications and drawings for the maintenance and modernization of the fleet. Two of the vessels, *R/V KAHO* and *R/V MUSKIE* are due to be hauled out in 2017 for a 5-year maintenance period. JMS developed technical procurement specifications and associated drawings for the repair and alterations of the vessels and support systems. The work packages included significant modifications to the fishing gear arrangement and hydraulic system on both vessels. JMS will also be providing Owner's Representation services on USGS's behalf during the shipyard periods. Additionally, JMS is designing modifications for noise attenuation based on the results of a detailed noise and vibration survey conducted while the vessels are underway and under a variety of operating conditions. JMS will provide drawings, material recommendations, specifications and cost



Schmidt Ocean Institute's research vessel *R/V FALKOR*

estimates for options to reduce noise and vibration for the purpose of minimizing the impact on crew and the science being conducted.

MARINE SURVEY & INSPECTION

JMS conducts safety, material condition, on/off hire, trip-in-tow, and lash-in-stow surveys of tugs, tank barges, crane barges, research vessels and commercial workboats. JMS personnel are

members of the **Society of Marine Surveyors (SAMS)** and are qualified to perform towing vessel surveys to verify compliance with the applicable provisions of **Subchapter M**.

The map below illustrates the variety of vessel types, scope of surveys and geographic range of our recent marine survey projects. Examples include research vessel inspections of the 272-foot oceanographic research vessel *R/V FALKOR*, the flagship vessel of the **Schmidt Ocean Institute**, and the *R/V KA'IMIKAI-O-KANALOA (KOK)*, a 223-foot research vessel and manned submersible support vessel owned and operated by the **University of Hawaii**. JMS was also contracted by the **U.S. Army Corps of Engineers (USACE)** to perform safety inspections and condition surveys of the 160-foot USACE quarters barge **TAGGATZ** and the 200-foot dredge **GOETZ**. The surveys were conducted in accordance with U.S. Army Corps of Engineers Safety and Health Requirement's manual in Memphis, TN at the Ensley USACE Engineer Repair Yard. In addition to a safety and material condition survey, a hull gauging survey was also conducted of each vessel.

JMS conducted Ship Structure & Machinery Evaluation Surveys (SS&ME) of the Pilot Boats



NEW YORK and *NEW JERSEY* for the **Sandy Hook Pilots Association**. The surveys evaluated the condition of each vessel for the purpose of determining the potential remaining service life with respect to hull structure, main propulsion machinery, deck machinery, electrical systems, and auxiliary systems. The pilot boat *NEW YORK* was built in 1971 and the *NEW JERSEY* was built in 1986. Both vessels have accommodations for 14 crew and 16 pilots and operate as Uninspected Pilot Vessels (Subchapter C). The Sandy Hook Pilot Associations provide pilotage services to vessels entering or departing the Port of New York/New Jersey, the Hudson River, the East River, Atlantic City, Jamaica Bay, and Long Island Sound. The Sandy Hook Pilots maintain a pilot vessel on station year round. At 182 feet, the Pilot Boat *NEW YORK* is generally used as the winter boat while the 146 foot Pilot Boat *NEW JERSEY* is on station during the summer.



Research vessel inspection aboard ARSV LAURENCE M GOULD in Punta Arenas, Chile

operational, regulatory, and budget constraints. The surveys ensure that the fleet serves the science community safely and that the research vessels in the academic fleet are capable of effectively conducting NSF-sponsored research cruises.

The **U.S. Academic Research Fleet (ARF)** is comprised of 18 vessels including *R/V NEIL ARMSTRONG* and *R/V SALLY RIDE*, the two newest vessels delivered by the **Office of Naval Research (ONR)**. The vessels in the Academic Research Fleet range in size, endurance, and capabilities, enabling NSF and other federally and state-funded scientists to conduct marine science and education with a diverse fleet capable of operating in coastal and deep ocean waters. Some of the vessels also have specialized capabilities for Polar operations and manned submersible support. The missions supported by these vessels range from water-quality monitoring in the Great Lakes to deep-ocean drilling for geophysical research to ice capable research vessels operating in the Southern Ocean.

The JMS inspection team surveys each vessel on a biennial basis pier-side and underway during a multi-day inspection. In addition to the ship itself, JMS reviews ship operations and shipboard scientific support equipment and provides NSF with reports that assist in the evaluation of vessel condition and in developing funding objectives for maintaining the vessels and the scientific equipment in a high degree of operational readiness to meet oceanographic research objectives.

National Science Foundation Ship Inspection Program

JMS has a long history of supporting the **National Science Foundation (NSF)** in the management of the academic research vessel fleet. JMS has conducted hundreds of research vessels inspections since 1997 specifically for NSF to ensure that vessels in the Academic Research Vessel Fleet are maintained in a high degree of operational readiness and able to meet current and emerging oceanographic research objectives. The multidisciplinary team of JMS engineers understands the importance of identifying the science mission requirements of the vessel and balancing them within their



JMS recently conducted research vessel inspections aboard:

| Vessel | Length (ft) | Location | Operating Institution | Owner |
|-----------------------|-------------|---------------------|--|--|
| RV BARNES | 66 | Seattle, WA | University of Washington | National Science Foundation |
| RV BLUE HERON | 86 | Duluth, MN | University of Delaware | University of Delaware |
| RV PELICAN | 116 | Cocodrie, LA | Louisiana University Marine Consortium | Louisiana University Marine Consortium |
| RV SPROUL | 125 | San Diego, CA | Scripps Institution of Oceanography | University of California |
| RV SHARP | 146 | Lewes, DE | University of Delaware | University of Delaware |
| RV ATLANTIC EXPLORER | 168 | Bermuda | Bermuda Institute of Ocean Sciences | Bermuda Institute of Ocean Sciences |
| RV OCEANUS | 177 | Newport, OR | Oregon State University | National Science Foundation |
| RV ENDEAVOR | 185 | Narragansett, RI | University of Rhode Island | National Science Foundation |
| RV KILO MOANA | 186 | Honolulu, HI | University of Hawaii | Office of Naval Research |
| ARSV GOULD | 230 | Punta Arenas, Chile | Edison Chouest Offshore | Edison Chouest Offshore |
| RV LANGSETH | 235 | New York, NY | Lamont-Doherty Earth Observatory | National Science Foundation |
| RV SIKULIAQ | 261 | San Juan, PR | University of Alaska | National Science Foundation |
| RV THOMPSON | 274 | Seattle, WA | University of Washington | Office of Naval Research |
| RV REVELLE | 274 | San Diego, CA | Scripps Institution of Oceanography | Office of Naval Research |
| RV ATLANTIS | 274 | Woods Hole, MA | Woods Hole Oceanographic Institute | Office of Naval Research |
| RVIB NATHANIEL PALMER | 308 | Punta Arenas, Chile | Edison Chouest Offshore | Edison Chouest Offshore |
| USCGC HEALY | 420 | Seattle, WA | US Coast Guard | US Coast Guard |
| RV SALLY RIDE | 238 | San Diego, CA | Scripps Institution of Oceanography | Office of Naval Research |
| RV NEIL ARMSTRONG | 238 | Woods Hole, MA | Woods Hole Oceanographic Institute | Office of Naval Research |
| RV SAVANNAH | 91 | Savannah, GA | Skidaway Inst of Oceanography | University of Georgia |
| RV WALTON SMITH | 96 | Miami, FL | University of Miami | University of Miami |



Owner's Rep Services for New-build Catamarans

City University of New York – CUNY 1

Construction and delivery were completed in October 2017 for a new hybrid research vessel built at **Derecktor Shipyard** in Mamaroneck, NY. JMS served as Owner's Representative during the construction, outfitting, system tests, and sea trials of the 65-foot, aluminum, hybrid, catamaran, research vessel *CUNY 1* built for **City University of New York (CUNY)**.

The Subchapter T vessel can carry up to 35 students and researchers on day trips primarily within Jamaica Bay and the surrounding waters. The vessel will be used for multi-disciplinary research and education. It is outfitted with an A-Frame, oceanographic winch, davit, sonar pole, dive platform and large lab. The vessel's diesel-electric hybrid propulsion is provided by a pair of BAE HybriDriveSystems with ISG Variable Speed AC Gensets, a 680 VDC Lithium-Ion Energy Storage System and AC Traction/Propulsion motors.

National Park Service – TURTLE RUNNER and PELICANPERCH

Construction and delivery were completed in April 2017 for two new catamaran ferry vessels built at **All American Marine** in Bellingham,



National Park Service ferry ready to launch at All American Marine



WA. JMS served as Owner's Representative during the construction, outfitting, system tests, and sea trials of two 72-foot aluminum catamaran ferry vessels for the **National Park Service (NPS)**. The two, 150-passenger vessels, designed by **Teknicraft** of Auckland, NZ, will be used for the Pensacola Bay passenger ferry service beginning in 2018. Propulsion is provided by a pair of **Scania 444 BHP** engines for a 15 knot service speed.

As the National Park Service's Owner's Representative, JMS reviewed the vessel design and specification for compliance with the National Park Service's operating requirements. JMS conducted monthly site visits to the shipyard to oversee construction progress,

quality, and conformance with contract requirements. JMS also attended all dock and sea trials conducted at the shipyard in Bellingham, WA as well as post-delivery in Pensacola, FL.

The new passenger ferry service will operate in Pensacola Bay between the City of Pensacola, Pensacola Beach, and Fort Pickens in Gulf Islands National Seashore. The NPS estimates that over 65,000 passengers annually will take advantage of the ferry system. The NPS funded the purchase of the two vessels partly with money the agency received in restitution from the 2010 BP oil spill.

Engineering and Marine Survey Support for Barge Transport of Power Plant

JMS conducted an engineering review of the sea-fastening structural calculations for the transport of a Heat Recovery Steam Generator (HRSG) module built by **Durr-Megrant J.V.** The 130-foot tall, 3,800 long ton Heat Recovery Steam Generator (HRSG) prefabricated module is the largest ever built in the U.S. and set a record for the heaviest and tallest object moved on the Hudson River. The combined height of the barge and HRSG module above the water was 130 feet, requiring careful timing to clear the various bridges at the correct tide. The HRSG module was tall enough that it had to be lit in accordance with FAA regulations.

The \$195 million HRSG module was successfully loaded onto the 400'X100' barge in early August for its 1 ½ day journey down the Hudson River. **Mammoet Global Engineering** performed the loadout operation of the machinery onto and off of the barge using their hydraulically-powered heavy-lift transporters. **Coeymans Marine Towing** performed the tow using their tug **MISTER JIM** along with 2 assist tugs and **McDonough Marine's** 400-foot barge **MARMAC 400**.

Transportation of the HRSG module was the seventh of nine trips between the **Port of Coeymans** and Sewaren, NJ to carry various modules to the new power plant. In addition to performing an engineering review of the roll-on/roll-off calculations and sea fastenings, JMS conducted the pre-tow surveys of the barges and tugs for all nine of the load-outs and tows.



130-foot tall, 3,800 long ton Heat Recovery Steam Generator travels down the Hudson River



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