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**TO:**Captain Peter Kahl
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SUBJ: Owner’s Requirements

REF: Owner’s Requirements: 20AUG, 2018

ENCL: Owner’s Requirements and References.

* The Owner’s Requirements outlines our team’s proposed requirements for a wind turbine installation vessel, The Gilded Lady. This includes broad requirements, mission capability, constraints, a quote on feasibility studies, and references.
* Team Prestige Coastwide is working on and researching the design for an offshore wind turbine installation vessel.
* This document represents all of our own work in accordance with the regulations in place at the United States Merchant Marine Academy.

Very respectfully,



Midshipman Monica Keeley 1/C

Team Leader

Prestige Coastwide

**REQUIREMENTS:**

 **Speed:** 12 knots

 The required speed of twelve knots is determined using the capabilities of ships with similar routes and means of propulsion (thrusters). The Gilded Lady is not expected to travel more than 50nm off the United States Coast therefore speed is not a great concern for the ship. A slower speed is also more fuel efficient and the extra time it may take to travel to the site is not significant because once on site, the ship could spend days or weeks at the same location.

**Size:** 90 meters in length

The required length is based off the size of the turbine being installed. A similarly constructed ship, the Brave Tern, is 132m long; however, the Brace Tern was tasked with installing much larger turbines than The Gilded Lady is constructing. Therefore, the smaller ship could manage the installation of these smaller turbines.

 **Stability:** DP2 Capabilities

 The stability of The Gilded Lady is primarily important for its ability to remain stationary during turbine installation. For this reason, Dynamic Positioning Class 2 has been chosen. Equipment Class 2 has redundancy so that no single fault in an active system will cause the system to fail. Loss of position will not occur from a single fault of an active component or system but may occur after failure of a static component. The DP Capabilities will be installed on each leg of the ship (3,700ton jacking capacity and 6,500ton holding capacity each) to keep them stationary during turbine installation. The legs of the ship will be able to support the weight of the ship with the weight of the turbine, discussed in the capacity section below. This class is ideal for The Gilded Lady due to her proximity to shore and need to stay in one position to install turbines.

 **Capacity:** 10,000 tons with a Crane

 A single *Obvia* Turbine weighs roughly 18 tons and the turbine’s necessary foundation weighs 36 tons. Therefore, the ship must have the capacity to carry this required weight in addition to the weight of the equipment. A rail crane will be installed with a maximum hoisting capacity of 500tons and a 56ft outreach. The ship must also have a crane capable of lifting the weight of the individual turbine components, specifically the blades expected to weigh 2-4 tons each depending on the composite of the blades for the chosen location. The main crane will have a 38ton lifting capacity and two deck cranes will have 14ton capacities at a 63ft radius. The Gilded lady will have the ability to easily upgrade cranes should the *Obvia* turbine grow in size, although unexpected from the company’s current forecasts.

 **Seaworthiness:** Moonpool Hull

 The Gilded Lady must be able to withstand a 3m wave height in the areas it is working in. The ship cannot escape wave energy by expanding in the horizontal direction. Therefore, the ship will move in the vertical direction. The vertical expansion is what creates the moonpool shape, popular in the drilling industry. The center of the ship will not be in contact with the water creating two keels instead of one. The name comes from the crescent shape created on the underside of the hull by the two pontoons.

 **Accommodations:** 45 Personnel

 The installation of a conventional offshore wind turbine farm houses 80 personnel. However, The Gilded Lady is installing smaller turbines that are located closer to shore. The demand of accommodation space for special persons, such as inspectors, is less than other TIVs. In addition, the installation crew is smaller due to the sheer difference in size between the *Obvia* turbine and a conventional one.

**MISSION CAPABILITY:**

 Prestige Coastwide is designing a Turbine Installation Vessel to meet the needs of *Obvia LLC.* *Obvia* is looking to install a number of smaller shallow water turbines off the coast of New England. The requirements above for The Gilded Lady will make it capable of installing not only the turbines *Obvia* is designing now, but allow for growth in the future should *Obvia* decide to increase the turbine size; however, unexpected by their current engineers and forecasting. This new build ship will have state of the art equipment for dynamic positioning and jacking systems to keep itself competitive. There is no doubt that The Gilded Lady will be capable of this mission.

**CONSTRAINTS:**

 The Gilded Lady will be the first of its kind subject to the Jones Act. A bottom founded wind turbine foundation is considered a United States port. The Jones Act prevents a foreign flagged vessel from carrying cargo between United States ports without first visiting a foreign port. This requires one of two things. If the ship is foreign built and flagged, it can still be used as a platform. However, the personnel and equipment must be brought to it by barge. The second option is to build the ship in the United States to allow the ship to travel freely from one turbine to the next. With the up and coming off shore wind industry, Prestige Coastwide has chosen to adapt to these constraints by building The Gilded Lady in the United States with the expectation that being Jones Act compliant will make it more competitive in the future.

**FEASABILITY:**

 The feasibility of this project is already known as similar projects have proven successful. The Block Island Wind Turbines were the first turbines installed off the coast of the United States and had to be installed using multiple feeder barges. With the ship’s requirements fulfilled, the feasibility of the installation is not in question; however, the competitive budget and schedule are. The Brave Tern was a converted ship whereas The Gilded Lady will be a new build. New build ships are often more costly and time consuming; however, they have longer life spans and can be molded seamlessly with state of the art technology during the design process. The technology on The Gilded Lady and the longer lifespan, upwards of an additional 30 years compared to a converted vessel, it gains by being a new build will keep it competitive as the off shore wind energy industry grows. Prestige Coastwide will be building turbines off the New England coast where the states set high off shore wind energy goals in 2016. By May of 2018, numerous states set high goals, illustrated below.

|  |  |  |
| --- | --- | --- |
| State | Megawatts | By Year |
| Massachusetts | 1,600 | 2027 |
| New York | 2,400 | 2030 |
| New Jersey | 3,500 | 2030 |

 The demand and support for offshore wind energy is there and The Gilded Lady will be there to meet it.

**REFERENCES:**

Primary to this document

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