



MML Ocean 1 Wind Farm Jack UP

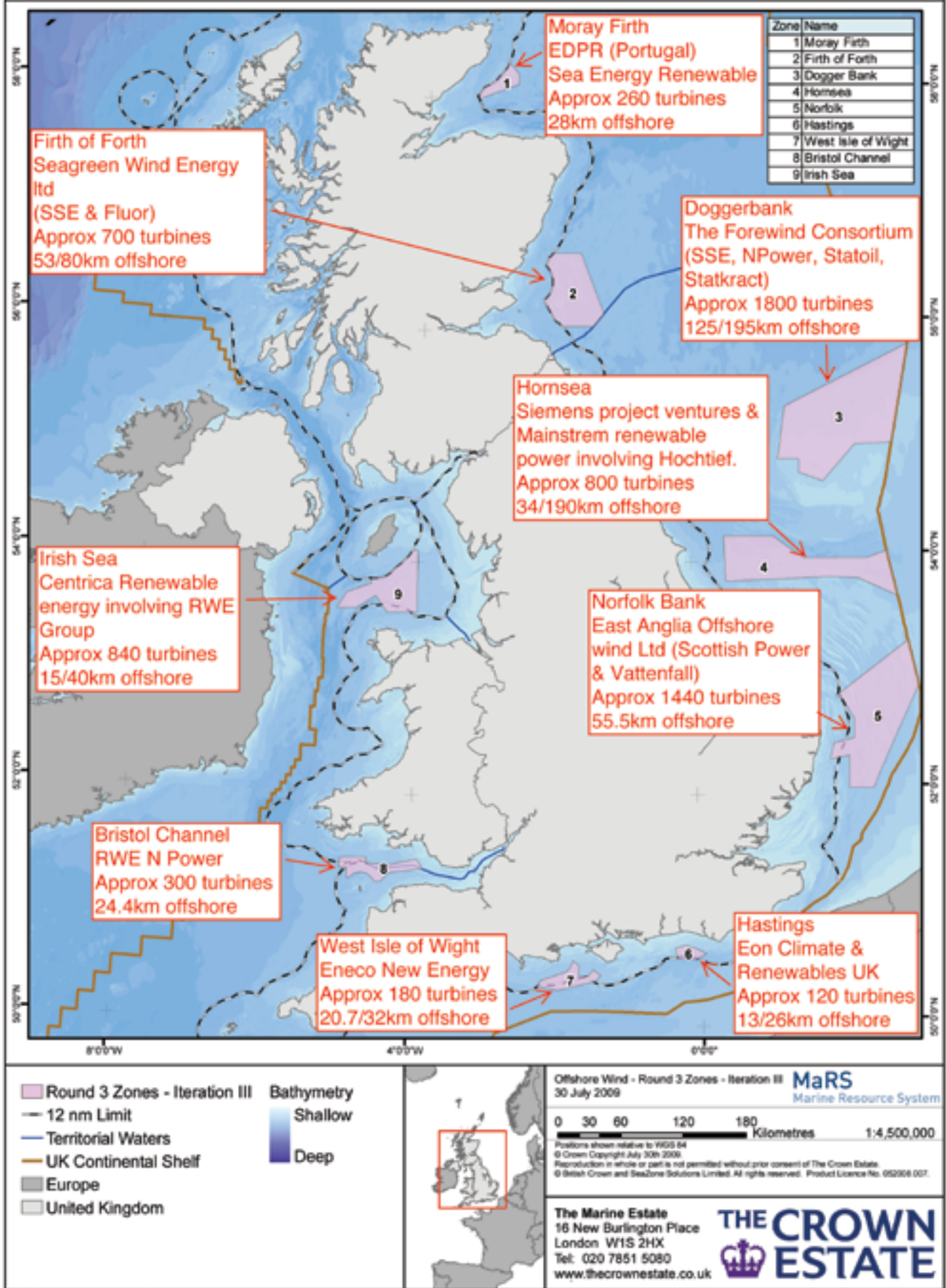
Due for completion October 2012

NG Series Self Propelled Jack UP Units

Type NG-2750-WTM



Offshore Wind - Round 3 Zones - Iteration III



OCEAN 1 is a self-propelled DP2 jack up vessel being built for operations in the Offshore Wind Industry in the North Sea. With 450t capacity crane and 1000m² deck space, work including installations and maintenance can be facilitated. GustoMSC have been responsible for the design from their NG2750 series. Det Norske Veritas will class the vessel. Components of Offshore Wind turbines of up to 5MW will be able to be transported and installed. On board areas of the vessel will provide comfort class standard of accommodation, a helideck and workshop repair facilities.

European Wind Energy Association recent study* shows a target of 2.8MW of new offshore wind power sites to be installed during the delivery year of OCEAN 1. In 2017 the figure is 4.1GW to be installed. This compares with a total of presently installed power from Offshore Wind in Europe at under 4GW since 1990. Each future GW equates to between 180 and 300 turbines being constructed.



Turbines installed by 2014 will total about 2900 units on 60 European wind farms. OCEAN 1 will have a significant role in maintaining and servicing future wind sites where a large crane, good accommodation and working area on a mobile stable vessel is required.

On-going and new installation projects in 2013/14 will include over 20 projects split 50/50 between UK and remainder of Europe. Jack up vessels will be used for all installations of turbines. Major term vessel commitments have already been made by 10 vessel owners and developers.

UK 3rd round developments and Scottish sites commencing installations in 2014/15 in deeper and further offshore areas will require state-of the-art jack up vessels offering flexible services with the highest standards available: - OCEAN 1 with DNV class.

OCEAN 1, A UNIQUE UNIT TO FACILITATE REPAIR AND MAINTENANCE OF WIND FARMS



Left: Gijs Peters,
Project Engineer (TOP)



Right: Jack Binns,
Project Engineer (TOP)

Market research conducted by MML into offshore renewable energy, made clear that there is a shortage in supply of suitable vessels to facilitate the construction of offshore wind farms. By building the Ocean 1, MML provides in a unit that facilitates repair and maintenance of wind farms. TOP was asked to support and advise MML in the design process of this unique new unit. Gijs Peters is involved as project engineer together with colleague Jack Binns. They work closely together with MML's Gordon Gray.

MML is planning to build a unit for the maintenance and repair of new wind turbine installations. MML has approached GustoMSC for a jack-up based on one of their standard designs. TOP was asked to assist MML in the design process. The unique feature of the Ocean 1 in comparison to other units is that it is primarily engineered for repair and maintenance of wind farms. The unit also allows for major overhaul projects such as the replacement of a complete top section, using the large onboard crane. The crew can be on the spot quickly, because the Ocean 1 is equipped with living accommodation and will remain in the centre of the wind turbine park. They can easily be transported to the wind turbine installations using smaller vessels. This offers greater logistical flexibility.

"We just finalized the concept design

with our client MML, consolidating the design parameters for the Ocean 1. We have discussed the project strategy and discussed the approach for the next engineering phases. So now we are starting up for the basic engineering phase with GustoMSC. A short list of shipyards will be made who will be approached for the construction of the unit.

After the basic engineering phase MML will sign a contract with a yard for the construction of the hull. So detail engineering will from then on mainly focus on the hull construction. After successfully booking a contract for offshore jobs, the MML Ocean 1 will enter the next stage in detail design and construction. The rest of the hull will be outfitted and equipment will be integrated exactly as per project requirement. That way it is ensured that the unit will be designed and constructed

exactly to the needs of the end user.", according to Gijs Peters

The construction of the Ocean 1 is a great chance in the market and good investment for MML. TOP advises MML on all contractual aspects, is responsible for the project management and will assist during the entire process from design to construction. During the construction phase TOP will assist MML with superintendents and other support on site. GustoMSC will deliver the design of the jack-up system, which is based on a standard design with minor adjustments to fit market needs. GustoMSC will also supply the hardware of the jacking system. The intention is to start with the construction of the hull in the beginning of 2012, the delivery is planned in 2013. ■



The Jack UP vessel
Ocean 1

"We at MML have chosen Josso Van Boxtel and his team at TOP to be project managers on the new build of our Jack UP vessel "Ocean 1" 66 mtr x 36 mtr and 80 mtr legs which is specifically being built for the European Offshore Wind Farm installation and Service market. Since TOP are based in Rotterdam along with the designers of NG2750 MSCGusto this is a perfect location for the project team to be based from. Our plan is to select a shipyard in either Europe or the Far East over the next 4-5 months and enter into firm contracts with all suppliers in 2011 and construction to be complete by 1st Quarter 2013."

Gordon Gray, Managing Director MML





Current project status



- Unit type has been selected (GustoMSC NG-2750 C)
- Basic design engineering contract has been signed and engineering is progressing
- Project management contract has been signed
- Classification contract has been signed with DNV
- ITT is due for shipyards
- ITT for main equipment has been sent



Project milestones



- Project management (project start-finish)
- Basic design (Q2 2011-Q3 2011)
- Detail design (Q3 2011 – Q2 2012)
- Signing of shipbuilding contract (Q4 2011)
- Start building (Q1 2012)
- Delivery (Q2 2013)

NG-SERIES SELF PROPELLED JACK-UP UNITS

Type NG-2750-WTM

Description

The NG-series is a series of multi-purpose self propelled jack-up units. The self-propelled unit undertakes field moves and positions for jacking operations without tug assistance. The four legs and the diagonal pre-loading allow for easy and fast installation. The NG-2750 is intended for use in water depths up to 45 m in a North Sea type rough environment.

This product sheet describes the unit for wind turbine maintenance. Modifications to suit the client's requirements can be considered.



Main Dimensions

Hull length	66.0m
Hull width	36.0m
Hull depth	6m
Hull draft	3.7m
Leg length	90.0m

Machinery / Equipment / Fittings

Jacking system:

- Design GustoMSC
- Type hydraulic, pin in hole
- Active preload 2,750 tf per leg

Propulsion	4 x 1,500 kW
Transit Speed	8 knots
Accommodation	50 persons
Facilities	50 persons
Main Crane	450t at 35m at 75m above deck
Auxiliary Crane	5 t at 30 m
Helicopter	Super Puma AS 332L2
Free Deck Area	over 800 m ²

Rules and Regulations

American Bureau of Shipping
SNAMET&R 5-5AMetric

Metric System

Weights [t] and forces [tf] are in the metric system.

Design Survival Criteria

• Water depth max	45.0m
• Wave height max	14.0m
• Wave period	13.0s
• Surface current	1.0m/s
• Wind speed (1 min)	38.0m/s
• Leg penetration	2.0m
• Air gap (maximum waterdepth)	11.0m

Payload

• Survival	1,150 t (excl crane)
• Operational	1,550 t (excl crane)
• Location move	1,400 t (excl crane)





Bridge



Conference Room



Kongsberg DP2 control



DP2 Thruster x 4

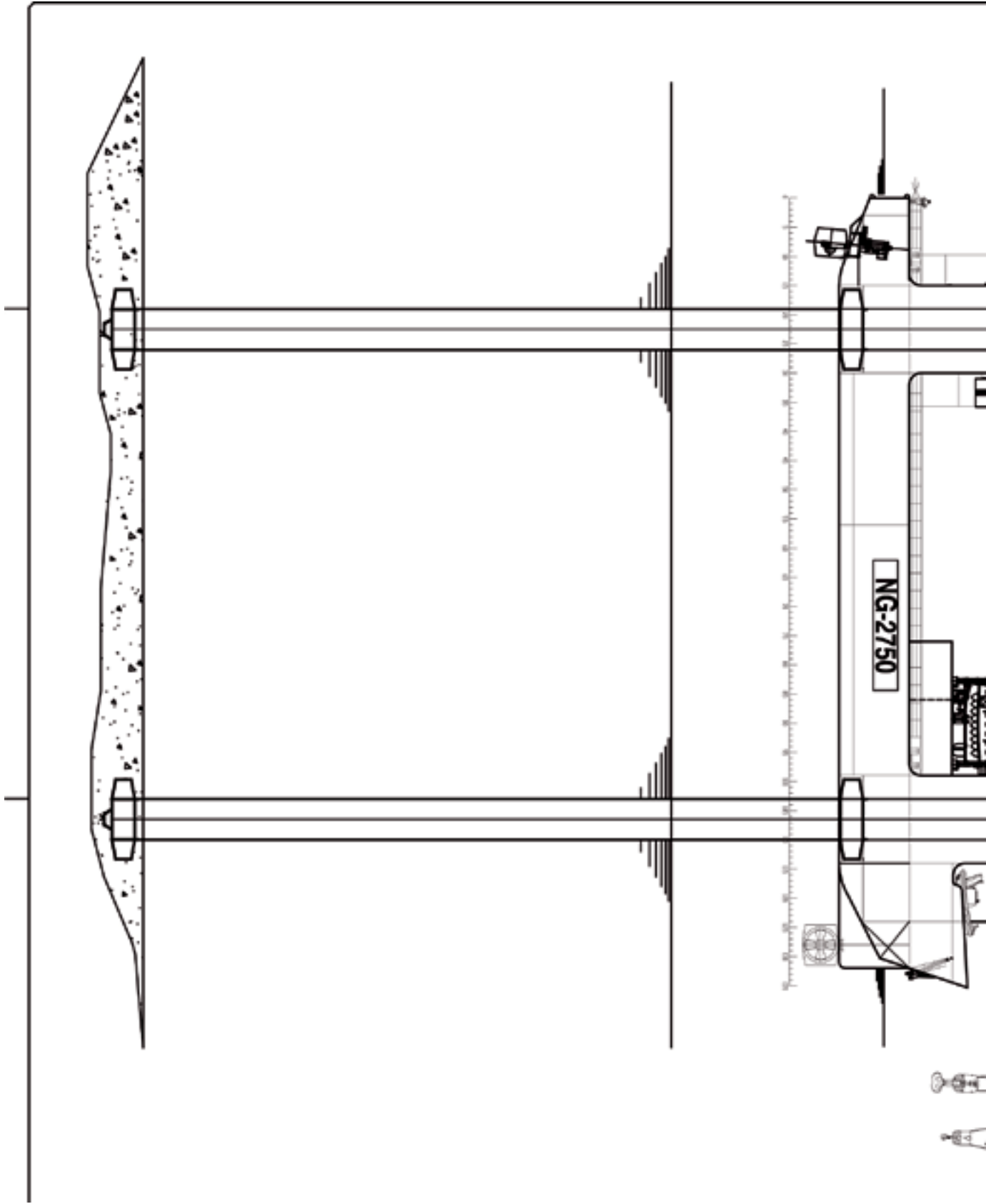


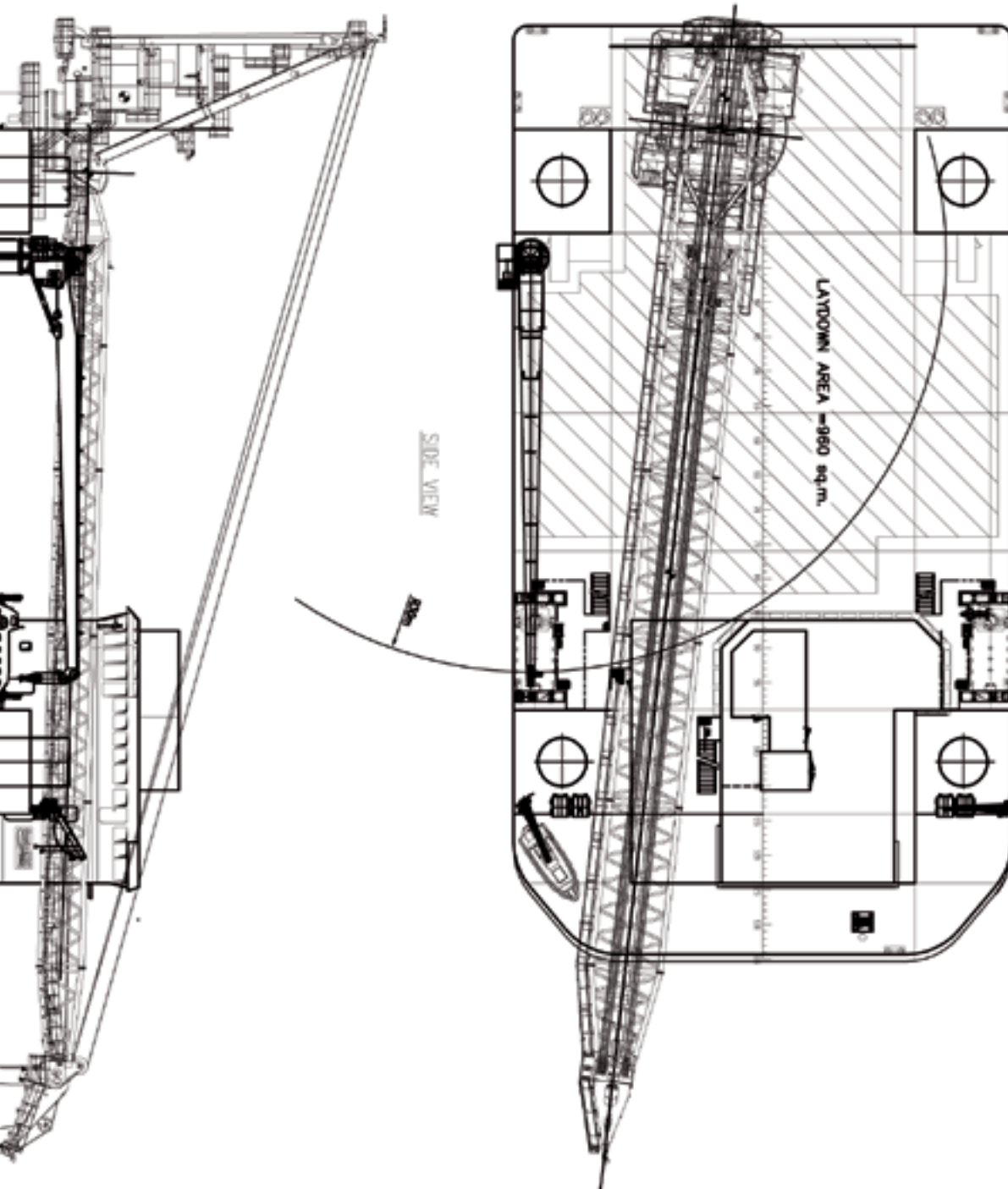
Heli Deck



450 ton Pedestal Crane

DECK SPACE 1000 SQ MTR.





TOP VIEW

SIDE VIEW



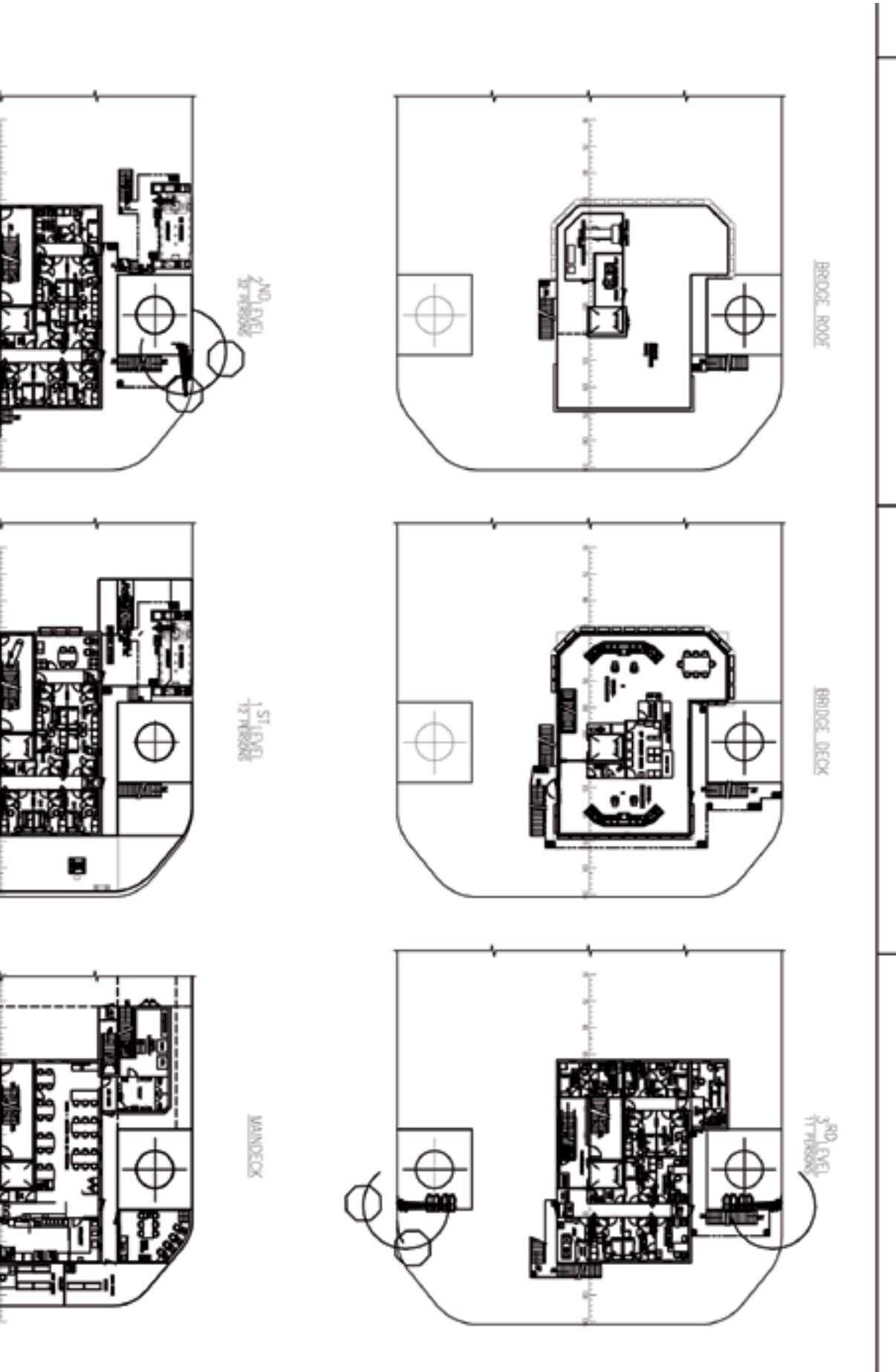


DECK LAYOUTS

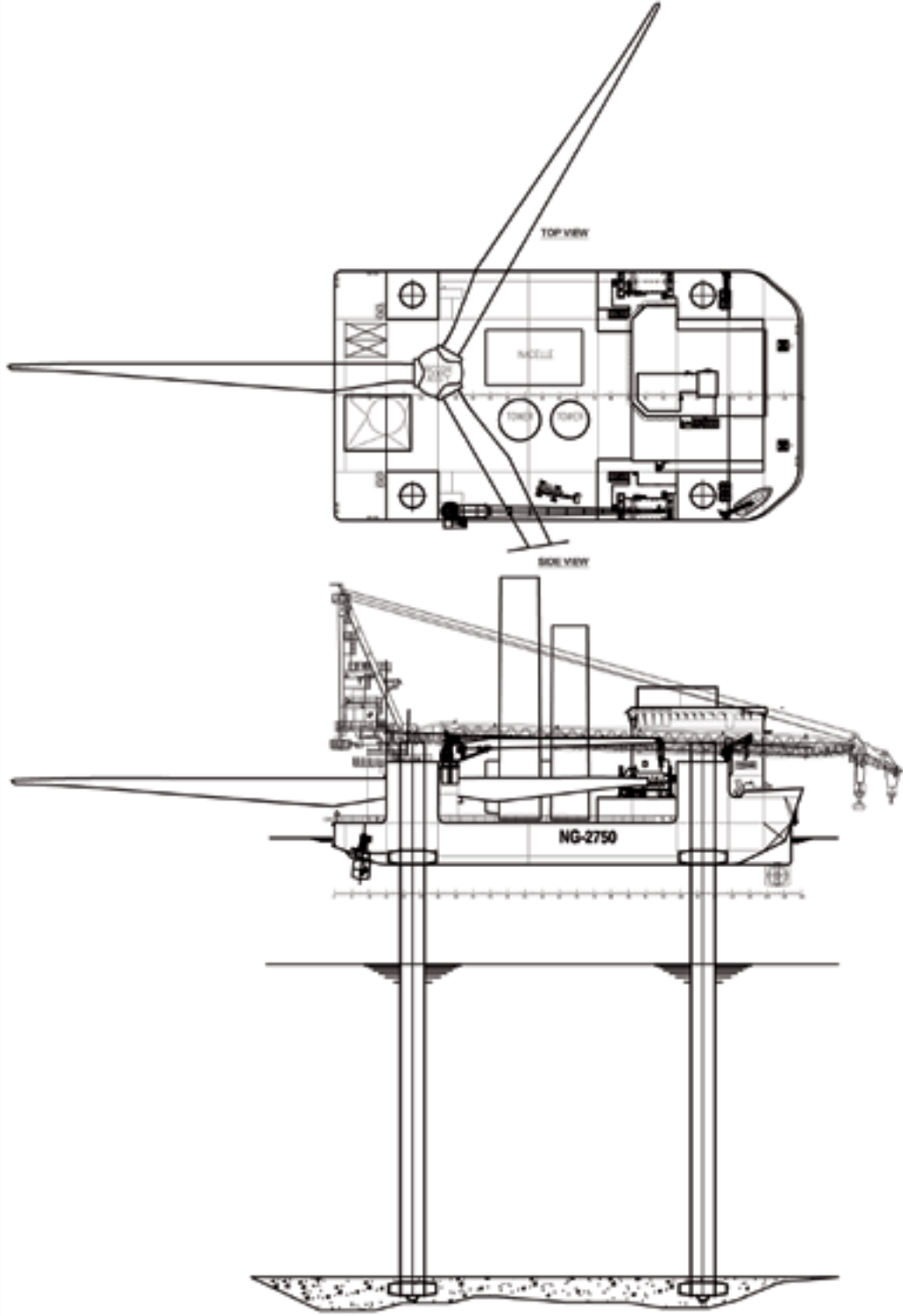


TANK TOP

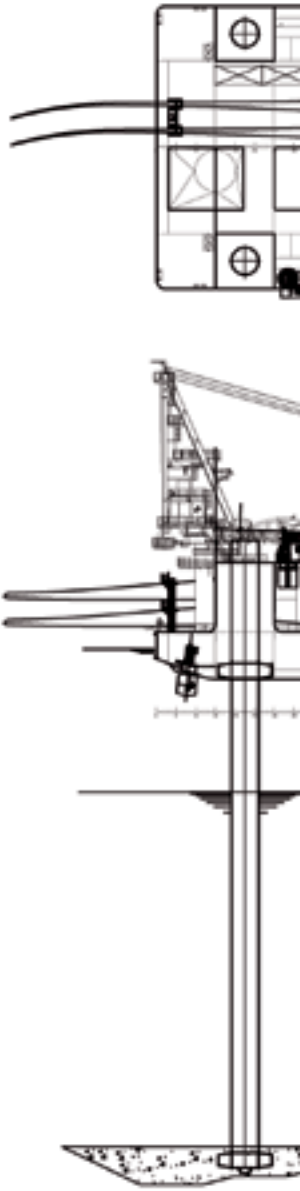
<p>GENERAL DIMENSIONS</p> <p>LENGTH (OVERALL) 66.00 FT</p> <p>BREADTH (OVERALL) 30.00 FT</p> <p>DEPTH 4.00 FT</p> <p>SERVICE DECK 3.00 FT</p> <p>WATER DEPTH 46.00 FT</p> <p>WIND LENSURE 52.00 FT</p> <p>CRANE CAPACITY 200.00 FT</p>	
<p>GENERAL NOTATION</p> <p>ALL DIMENSIONS ARE UNLESS OTHERWISE SPECIFIED IN METERS (IN PARENTHESES)</p> <p>ALL DIMENSIONS ARE UNLESS OTHERWISE SPECIFIED IN METERS (IN PARENTHESES)</p> <p>ALL DIMENSIONS ARE UNLESS OTHERWISE SPECIFIED IN METERS (IN PARENTHESES)</p>	
<p>GENERAL</p> <p>1. MAIN CRANE POSITION</p> <p>2. MAIN CRANE CAPACITY</p> <p>3. ACCOMMODATION EXTENSIVE (LIFEBOATS AND SLIPS)</p> <p>4. RECREATION BRIDGE LAYOUTS</p>	
<p>PROJECT INFORMATION</p> <p>PROJECT NO. 10145</p> <p>DATE 10/14/15</p> <p>SCALE TBD</p> <p>PROJECT NO. 10145</p>	
<p>General Arrangement</p> <p>NO. 10145-101-0-01</p>	



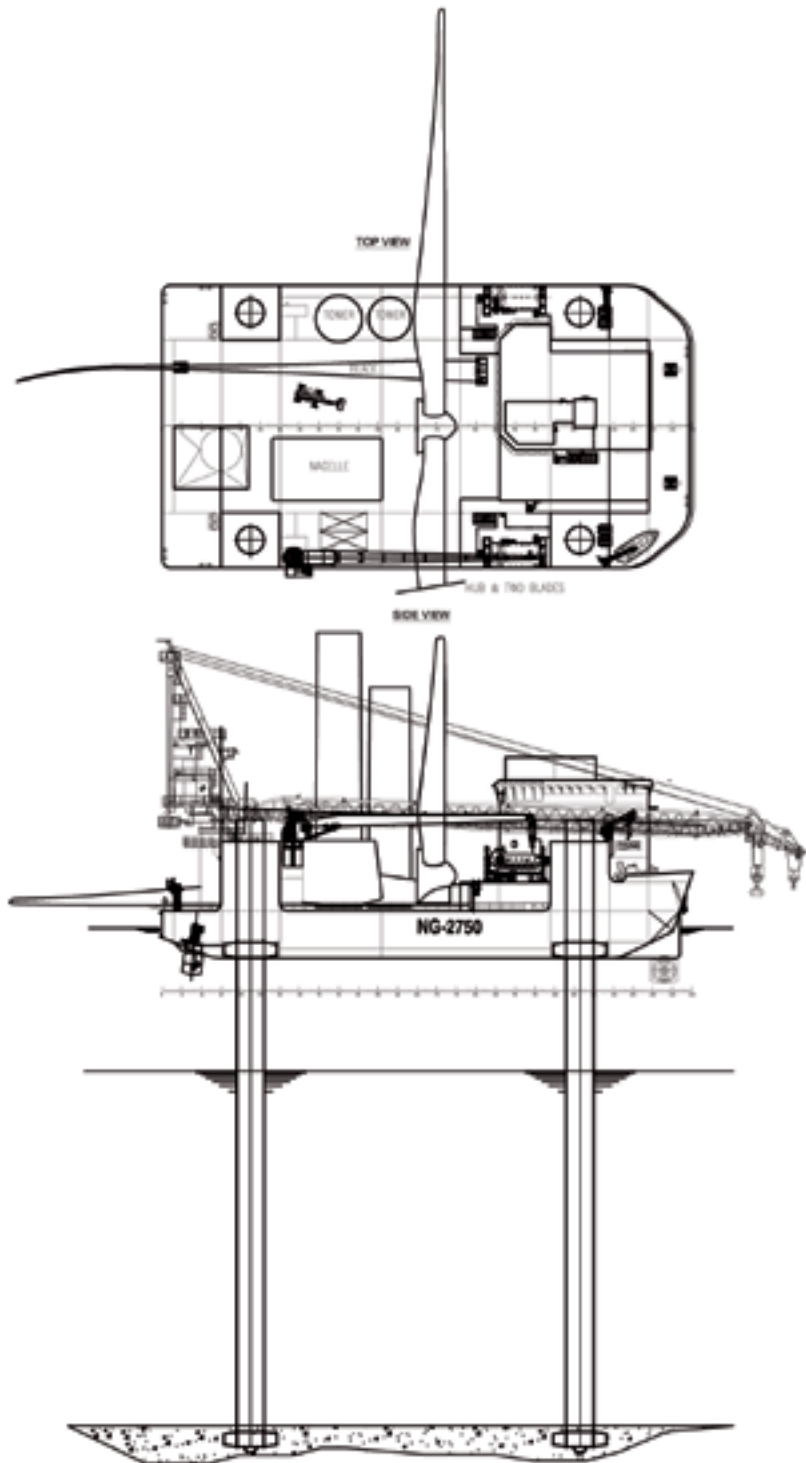
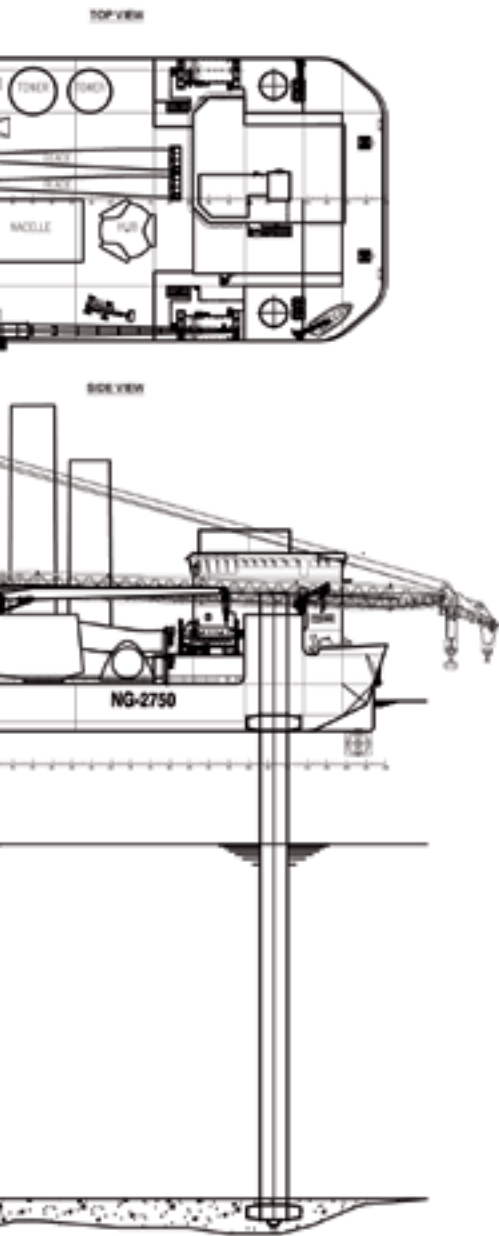
TRANSPORTATION OPTIONS FOR 5MW TURBINES



LOADING OPTION 1
 BASED ON A FICTIVE 5 MW WIND TURBINE GENERATOR LOADED ON DECK WITH A COMPLETELY PRE-ASSEMBLED ROTOR, IT IS ASSUMED THAT WIND TURBINE MANUFACTURER ALLOWS HANDLING OF COMPLETELY PRE-ASSEMBLED BLADE AND HUB CONSTRUCTIONS.



LOADING OPTION 2
 COMPLETELY DISASSEMBLED 5 MW WIND TURBINE GENERATOR INCLUDING TOWER SECTIONS.

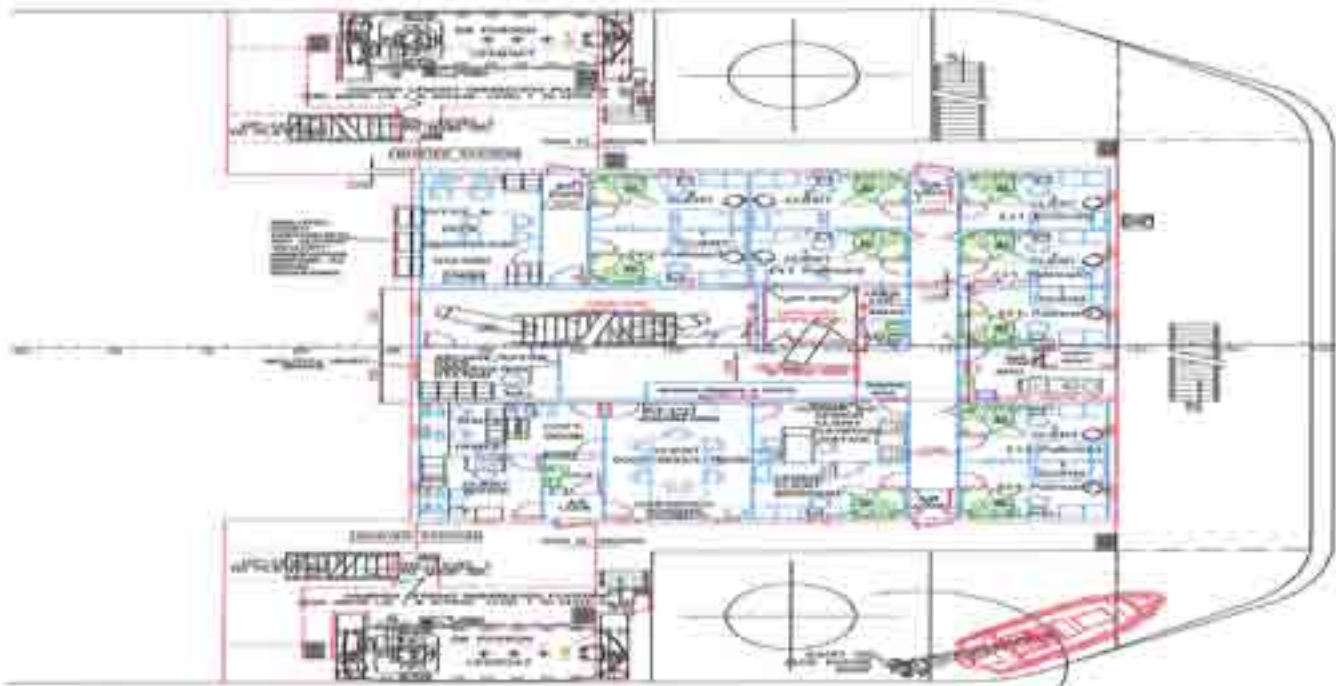
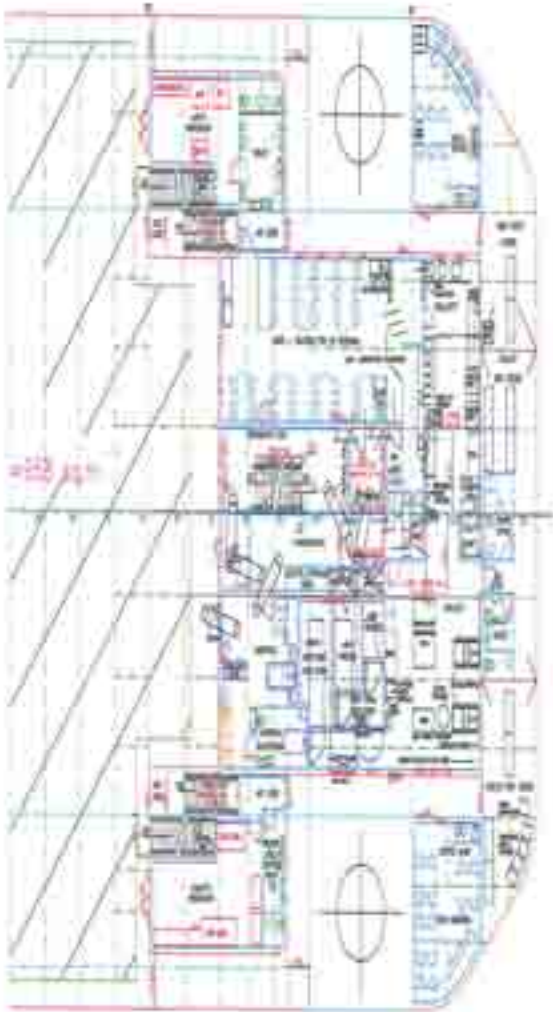


LOADING OPTION 3

USING A PARTIALLY ASSEMBLED ROTOR WITH 2 BLADES PRE-INSTALLED ON THE HUB AND THEN STORED AND SEAFASTENED WITH THE ROTATION AXIS HORIZONTALLY. THE 3RD BLADE WILL BE STORED ON DECK IN A TRANSPORT RACK.

<small>THE OFFSHORE RENEWABLE ENERGY SUPPLY CHAIN (TOSC) IS A JOINT VENTURE OF THE FOLLOWING COMPANIES: BENTLEY SYSTEMS INC., BENTLEY SYSTEMS (UK) LTD, BENTLEY SYSTEMS (AUSTRALIA) PTY LTD, BENTLEY SYSTEMS (CANADA) LTD, BENTLEY SYSTEMS (INDIA) PRIVATE LTD, BENTLEY SYSTEMS (JAPAN) LTD, BENTLEY SYSTEMS (KOREA) LTD, BENTLEY SYSTEMS (MEXICO) SA DE CV, BENTLEY SYSTEMS (RUSSIA) LLC, BENTLEY SYSTEMS (USA) LLC, BENTLEY SYSTEMS (CHINA) LTD, BENTLEY SYSTEMS (BRAZIL) LTDA, BENTLEY SYSTEMS (MIDDLE EAST) LLC, BENTLEY SYSTEMS (AFRICA) LTD, BENTLEY SYSTEMS (ASIA) LTD, BENTLEY SYSTEMS (EUROPE) LTD, BENTLEY SYSTEMS (AMERICA) LTD, BENTLEY SYSTEMS (OCEANIA) LTD, BENTLEY SYSTEMS (ANTARCTICA) LTD, BENTLEY SYSTEMS (ARCTIC) LTD, BENTLEY SYSTEMS (POLAR) LTD, BENTLEY SYSTEMS (SUBTROPICAL) LTD, BENTLEY SYSTEMS (TROPICAL) LTD, BENTLEY SYSTEMS (TEMPERATE) LTD, BENTLEY SYSTEMS (COLD) LTD, BENTLEY SYSTEMS (HOT) LTD, BENTLEY SYSTEMS (WET) LTD, BENTLEY SYSTEMS (DRY) LTD, BENTLEY SYSTEMS (WINDY) LTD, BENTLEY SYSTEMS (CALM) LTD, BENTLEY SYSTEMS (SUNNY) LTD, BENTLEY SYSTEMS (CLOUDY) LTD, BENTLEY SYSTEMS (RAINY) LTD, BENTLEY SYSTEMS (SNOWY) LTD, BENTLEY SYSTEMS (ICY) LTD, BENTLEY SYSTEMS (FOGGY) LTD, BENTLEY SYSTEMS (Hazy) LTD, BENTLEY SYSTEMS (CLEAR) LTD, BENTLEY SYSTEMS (MISTY) LTD, BENTLEY SYSTEMS (DRIZZLY) LTD, BENTLEY SYSTEMS (SHOWERY) LTD, BENTLEY SYSTEMS (STORMY) LTD, BENTLEY SYSTEMS (CALM) LTD, BENTLEY SYSTEMS (WINDY) LTD, BENTLEY SYSTEMS (SUNNY) LTD, BENTLEY SYSTEMS (CLOUDY) LTD, BENTLEY SYSTEMS (RAINY) LTD, BENTLEY SYSTEMS (SNOWY) LTD, BENTLEY SYSTEMS (ICY) LTD, BENTLEY SYSTEMS (FOGGY) LTD, BENTLEY SYSTEMS (Hazy) LTD, BENTLEY SYSTEMS (CLEAR) LTD, BENTLEY SYSTEMS (MISTY) LTD, BENTLEY SYSTEMS (DRIZZLY) LTD, BENTLEY SYSTEMS (SHOWERY) LTD, BENTLEY SYSTEMS (STORMY) LTD</small>		
OCEAN-1 WIND TURBINE INSTALLATION UNIT		
NO.:	MVA:	TBD
		10145
SMW Turbine - Transport Layouts		

ACCOMMODATION



ACCOMMODATION





Installing Wind Turbines



Offshore Wind Farm



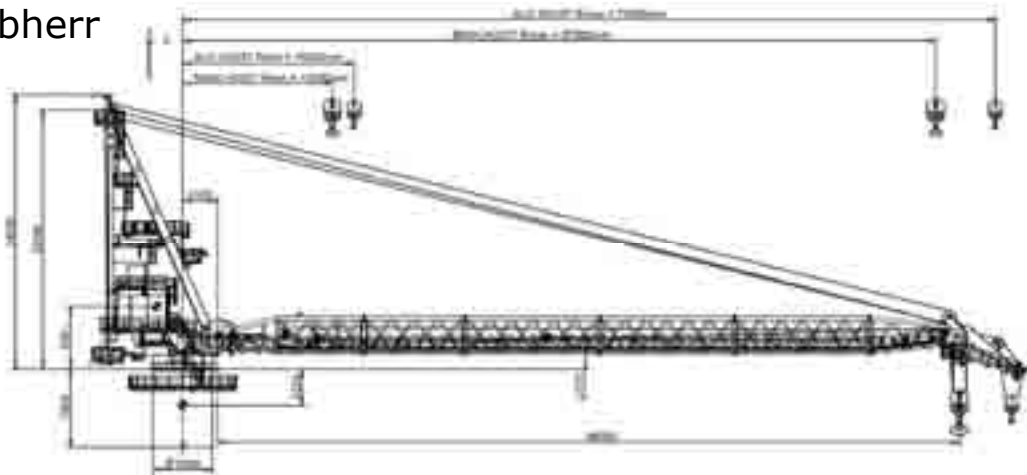
450 ton Crane



Crane



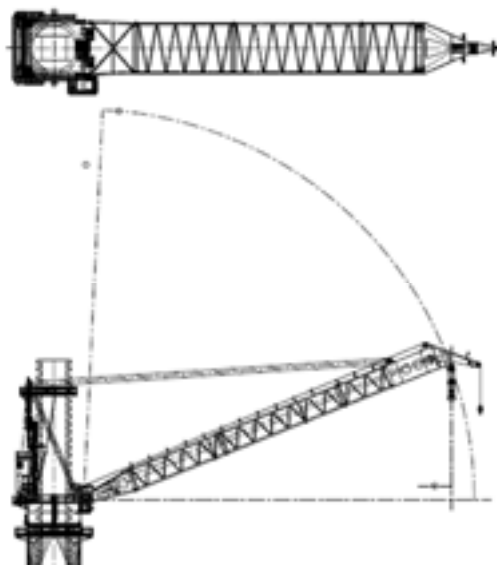
Liebherr



Crane



KENZ-FIGEE
wrap-around-the-
leg mounting





Committed to Offshore Wind Farm Installation



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