MED MARINE

SINCE 1995
TURKEY

PRESENTATION OVERVIEW

SEA THE FUTURE...

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VoltRA Battery Electric Tug

Philosophy
Design & General Overview

PHILOSOPHY

Fossil fuels, mainly heavy fuel oil and marine gas oil are mainly used in marine transportation. Due to the related emissions of GHG (greenhouse gases), NO_x (nitrogen oxides), So_x (sulphur oxides) and CO_2, the shipbuilding industry is trying to find alternatives to reduce the environmetal and climate impact of shipping.

Safe, reliable and cost efficient operations are crucial for tugs, as is the need to comply with global and local environmental regulations. Med Marine's hybrid and fully electric solutions can easily integrate alternative energy sources that allow you to comply with current and future environmental regulations and hybrid or fully electrical operations reduces fuel consumption and maintenance costs.

Since producing concrete solutions to achieve climate goals has always been one of Med Marine's sole priorities, Med Marine started to work on zero-emmission battery electric tugs with Robert Allan Ltd. as a power source for green shipping and aimed to set high standards for its customers. The creation of our VoltRA series is also based on this philosophy.

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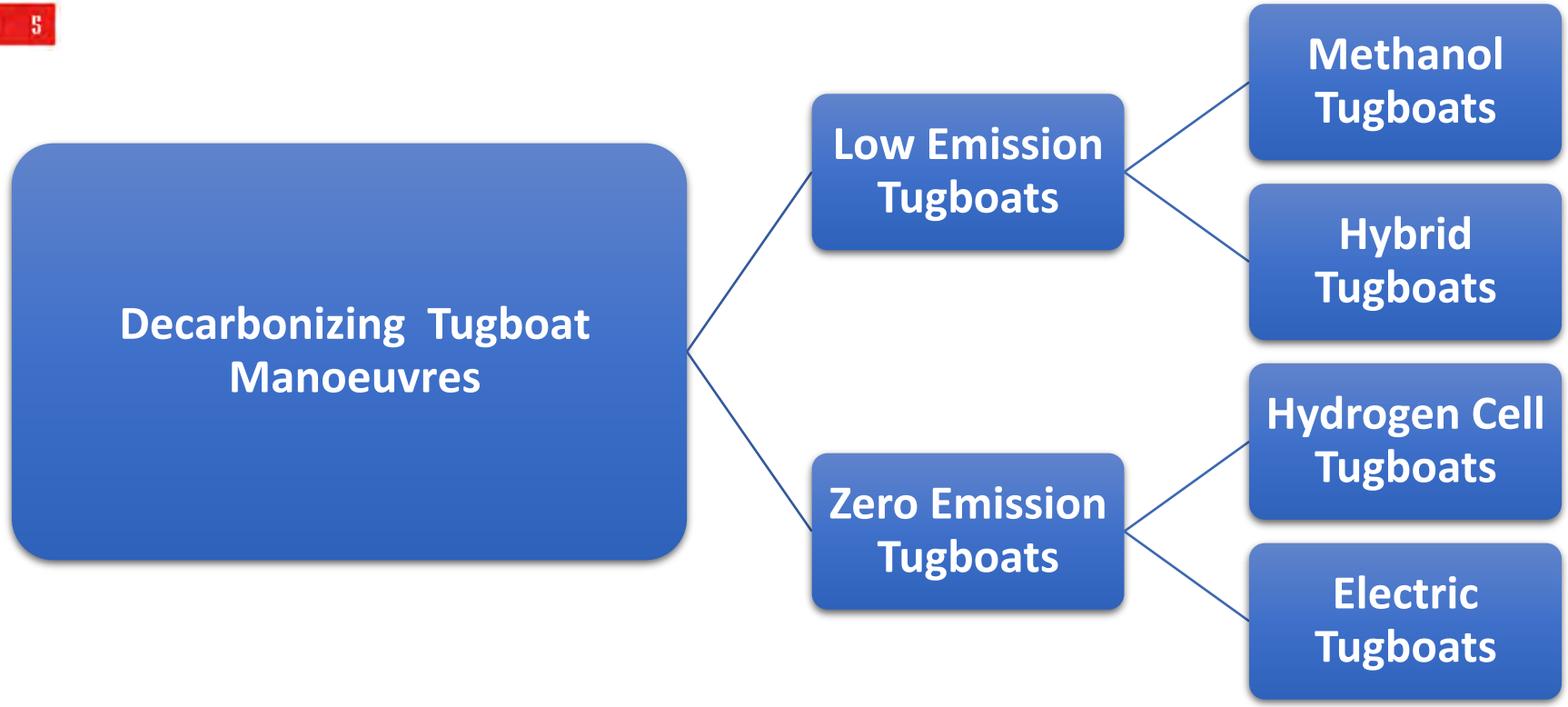


Low Emission Tugboats

Methanol Tugboats

- Methanol is used as a cleaner alternative to conventional marine fuels.
- The tugboats are powered by engines that can run on methanol, which produces fewer emissions compared to diesel.
- Methanol-powered engines reduce emissions of sulfur oxides (SOx), nitrogen oxides (NOx), and particulate matter.

Hybrid Tugboats

- Hybrid tugboats combine traditional internal combustion engines with electric motors and battery storage.
- The electric motor can be used for low-power operations, reducing fuel consumption and emissions.
- The batteries can be recharged by the diesel engine or through shore power, providing flexibility and efficiency.

Zero Emission Tugboats

Fuel Cell Tugboats

- Fuel cell tugboats use hydrogen fuel cells to generate electricity for propulsion.
- The hydrogen can be produced from renewable sources, leading to a completely zero-emission operation.
- Fuel cells provide a quiet and efficient power source, with water vapor being the only byproduct.

Electric Tugboats

- Electric tugboats are powered entirely by batteries, producing zero emissions during operation.
- The batteries are charged using renewable energy sources or shore power, ensuring a clean energy supply.
- Electric propulsion systems offer high efficiency and instant torque, making them suitable for the demanding tasks of tugboats.

PHILOSOPHY

Med Marine builds tailor made tugboats according to its clients' requirements and provides best solutions for the performance of the tugboats.

For VoltRA series, the most considered data is clients' operational profiles to decide the design and battery calculation.

Project	23m 70 TBP
Total Power (kW)	3800

Description		Percentage	Duration (min)	kW	kW (w/ Hotel Load)
Port	Warm up / Idle	1%	5	38	118
In Harbour	Departure from Port	31%	5	1178	1258
Harbour	Approaching and Handling the Ship	32%	3	1216	1296
Operation (towing job	Bollard Pull Start (Assisting Low Load	45%	5	1710	1790
Operation (towing job	Bollard Pull (Assisting Medium Load)	75%	5	2850	2930
Operation (towing job	Max Bollard Pull (Assisting Peak Load	94%	10	3572	3652
Operation (towing job	Bollard Pull (Assisting Medium Load)	75%	5	2850	2930
Operation (towing job	Bollard Pull Finish (Assisting Low Loa	45%	5	1710	1790
Harbour	Leaving the Ship	32%	4	1216	1296
In Harbour	Approaching the Port	22%	15	836	916
Wharf	Idle / Cool down	1%	5	38	118
Total Operation Duration			67		
Hotel Load		100 kW	67	80	

Project	25m 70 TBP
Total Power (kW)	3800

Description		Percentage	Duration (min)	kW	kW (w/ Hotel Load)
Port	Warm up / Idle	1%	5	38	138
In Harbour	Departure from Port	31%	5	1178	1278
Harbour	Approaching and Handling the Ship	32%	3	1216	1316
Operation (towing job	Bollard Pull Start (Assisting Low Load	45%	5	1710	1810
Operation (towing job	Bollard Pull (Assisting Medium Load)	75%	5	2850	2950
Operation (towing job	Max Bollard Pull (Assisting Peak Load	94%	10	3572	3672
Operation (towing job	Bollard Pull (Assisting Medium Load)	75%	5	2850	2950
Operation (towing job	Bollard Pull Finish (Assisting Low Loa	45%	5	1710	1810
Harbour	Leaving the Ship	32%	4	1216	1316
In Harbour	Approaching the Port	22%	15	836	936
Wharf	Idle / Cool down	1%	5	38	138
Total Operation Duration			67		
Hotel Load		100 kW	67	100	

VOLTRA
BATTERY ELECTRIC TUG

MED MARINE

SINCE 1995

DESIGN & GENERAL OVERVIEW

VOLTRA

BATTERY ELECTRIC TUG SERIES

DESIGN & GENERAL OVERVIEW

Med Marine VoltRA Battery Electric Tug series consist of 5 different designs.

- VoltRA 2100; 21m 45 TBP max
- VoltRA 2300; 23m 70 TBP max
- VoltRA 2500; 25m 80 TBP max
- VoltRA 2800; 28m 80/85 TBP max
- VoltRA 3000; 30m 90 TBP max

VOLTRA
BATTERY ELECTRIC TUG

VoltRA 2100 - 21m 50 TBP

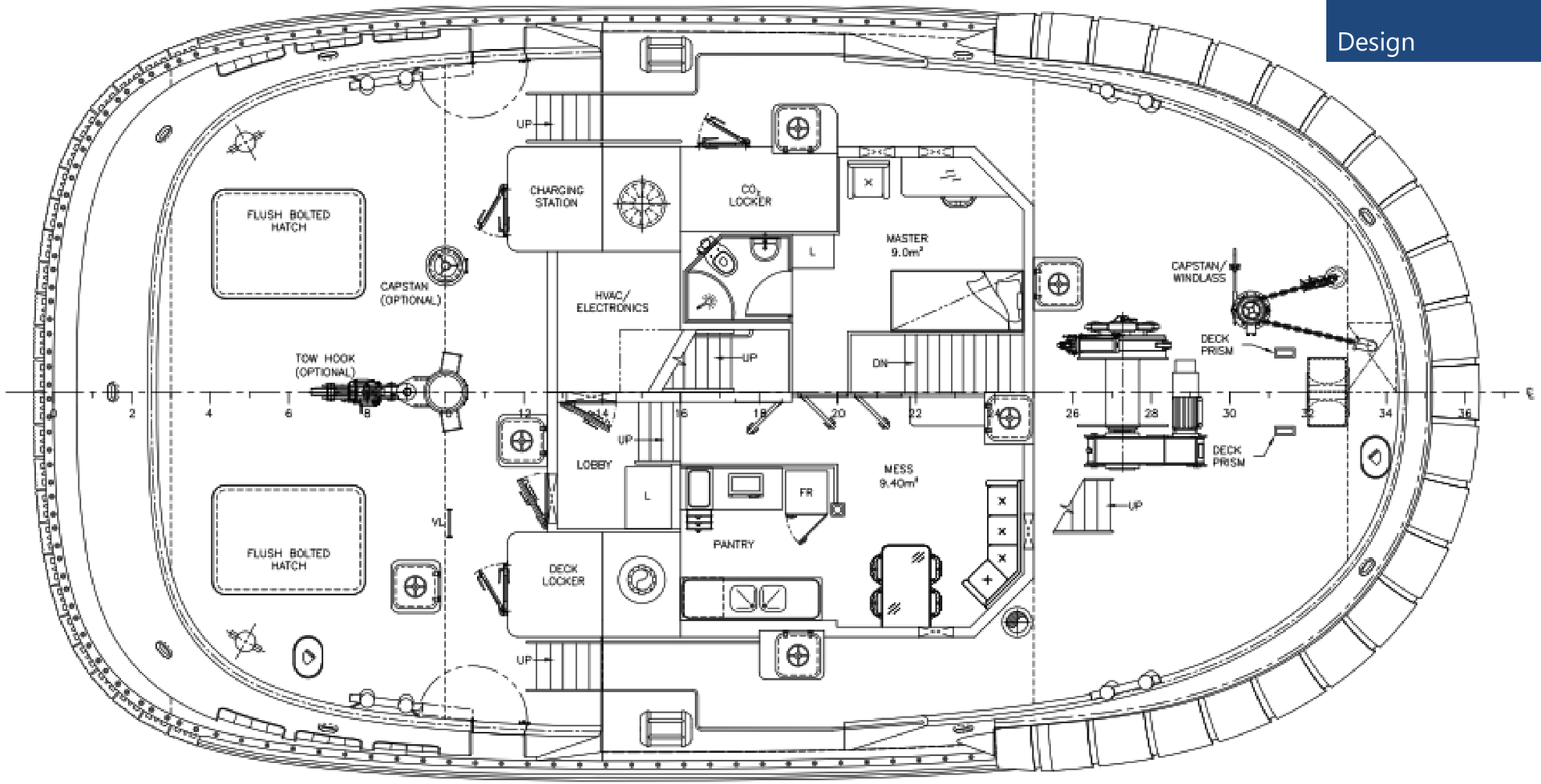
Length Overall	21.40 m
Beam	11.3 m
Max Draft	4.60 m
Bollard Pull$_{max}$	50 TBP
Free Running Speed	10 knots
Notations	✠HULL, ✠ MACH, TUG, AUT-UMS, FIREFIGHTING E, BATTERY SYSTEM, SUSTAINABLE SHIP 1, UNRESTRICTED NAVIGATION, INWATER SURVEY
Design	Robert Allan Ltd.

VoltRA 2100 Battery Electric Tug series are designed by Robert Allan, driven by 2 x 1400 kW propulsive power and 2900 kWh battery pack capacity max. The vessel is equipped with a forward towing winch, an aft towing hook and internal and external firefighting system. Two (2) gensets will be installed in case of emergency and firefighting.

VOLTRA
BATTERY ELECTRIC TUG

VoltRA 2100 - 21m 50 TBP

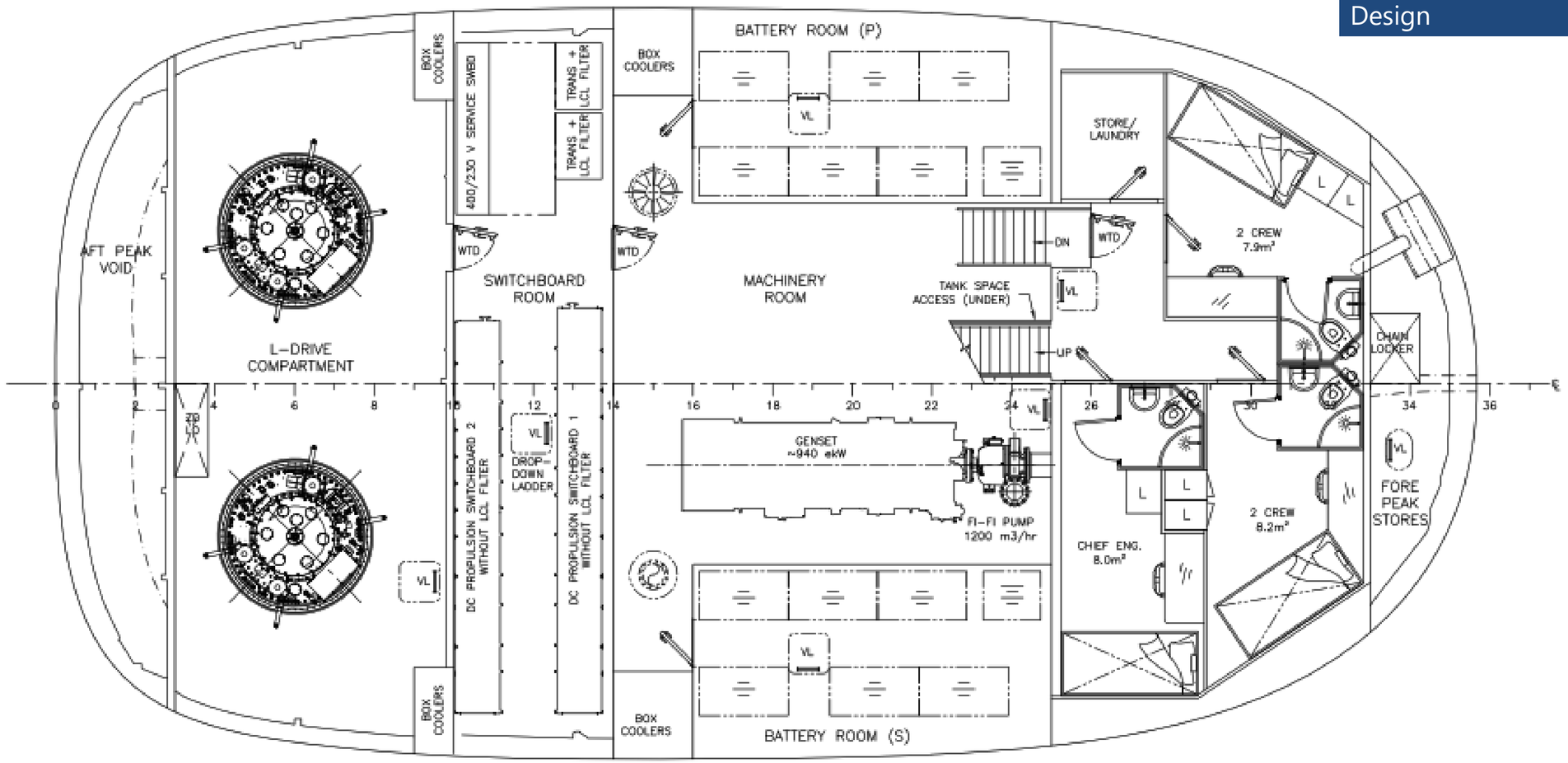
Length Overall	21.40 m
Beam	11.3 m
Max Draft	4.60 m
Bollard Pull$_{max}$	50 TBP
Free Running Speed	10 knots
Notations	✠HULL, ✠ MACH, TUG, AUT-UMS, FIREFIGHTING E, UNRESTRICTED NAVIGATION, INWATER SURVEY
Design	Robert Allan Ltd.



VOLTRA
BATTERY ELECTRIC TUG

VoltRA 2100 - 21m 50 TBP

Length Overall	21.40 m
Beam	11.3 m
Max Draft	4.60 m
Bollard Pull$_{max}$	50 TBP
Free Running Speed	10 knots
Notations	✠HULL, ✠ MACH, TUG, AUT-UMS, FIREFIGHTING E, UNRESTRICTED NAVIGATION, INWATER SURVEY
Design	Robert Allan Ltd.



VOLTRA
BATTERY ELECTRIC TUG

VoltRA 2300 - 23m 70 TBP

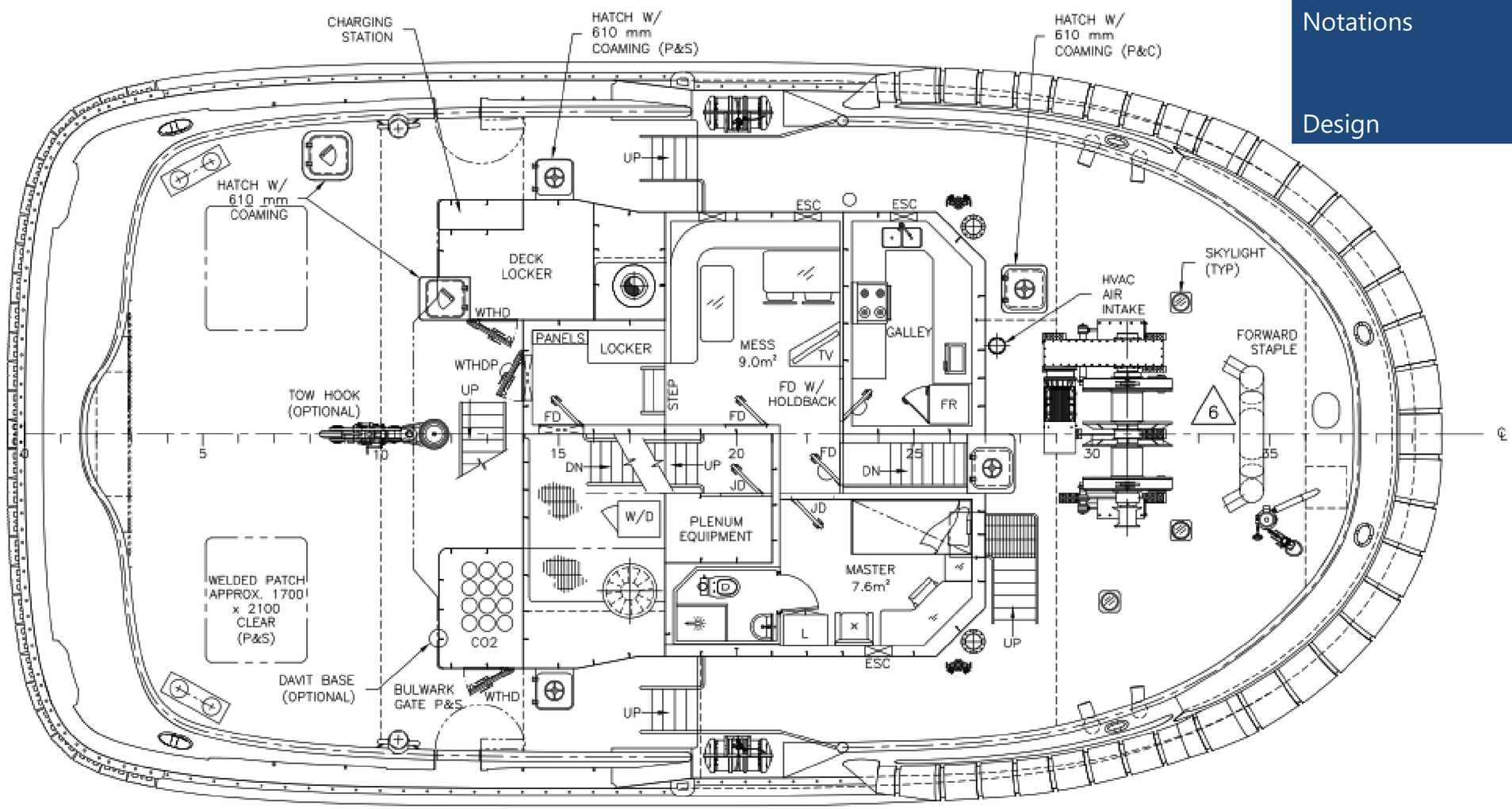
Length Overall	23.45 m
Beam	11.95 m
Max Draft	5.42 m
Bollard Pull$_{max}$	70 TBP
Free Running Speed	11,5 knots
Notations	✠HULL, ✠ MACH, TUG, AUT-UMS, FIREFIGHTING 1 WITH WATER SPRAYING, BATTERY SYSTEM, SUSTAINABLE SHIP-1/2, UNRESTRICTED NAVIGATION, INWATER SURVEY
Design	Robert Allan Ltd.

VoltRA 2300 Battery Electric Tug series are designed by Robert Allan, driven by 2 x 1850 kW propulsive power and 3390 kWh battery pack capacity max. The vessel is equipped with a forward towing winch, an aft towing hook and internal and external firefighting system. Two (2) gensets will be installed in case of emergency and firefighting.

VOLTRA
BATTERY ELECTRIC TUG

VoltRA 2300 - 23m 70 TBP

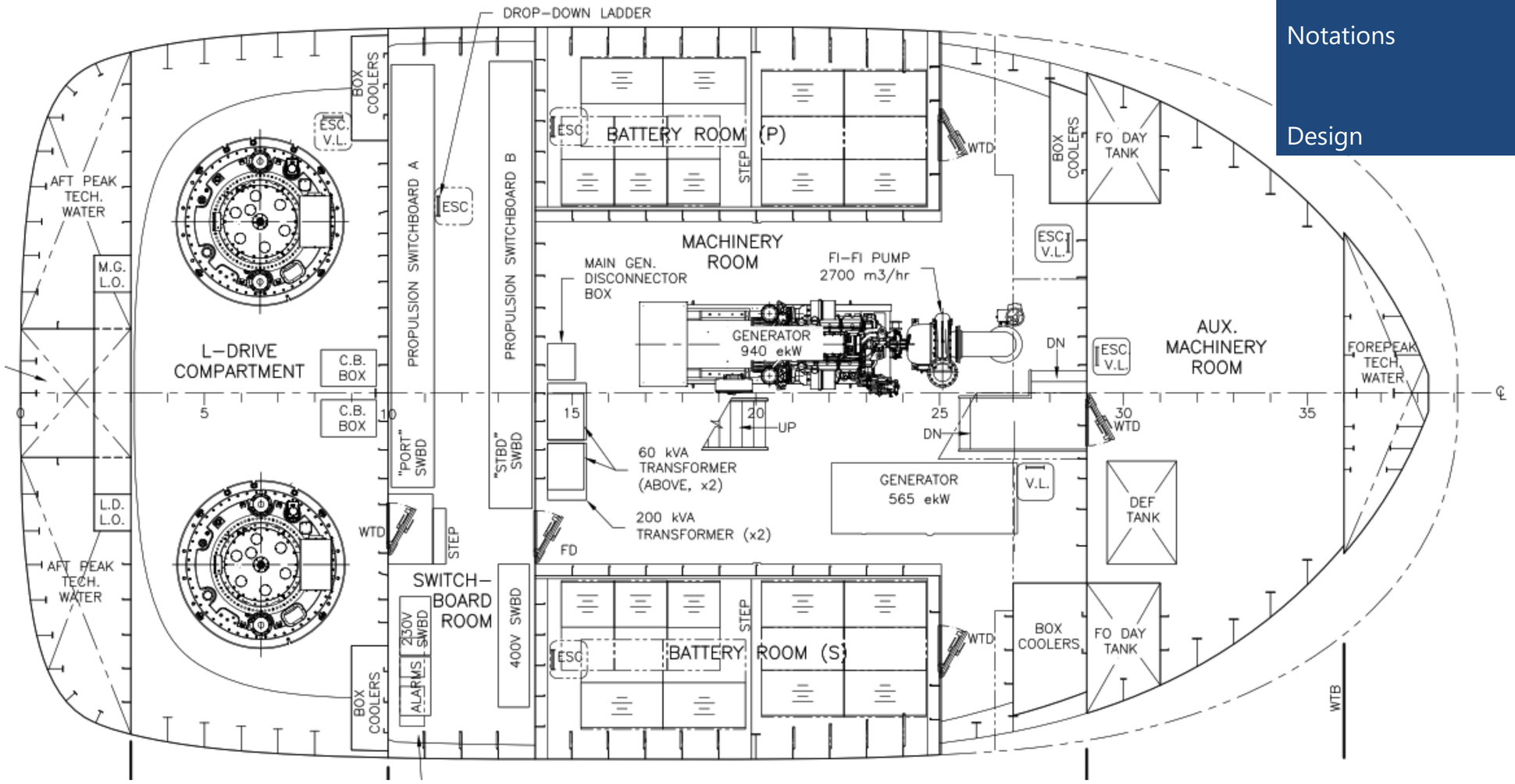
Length Overall	23.45 m
Beam	11.95 m
Max Draft	5.42 m
Bollard Pull$_{max}$	70 TBP
Free Running Speed	11,5 knots
Notations	✠HULL, ✠ MACH, TUG, AUT-UMS, FIREFIGHTING 1 WITH WATER SPRAYING, BATTERY SYSTEM, SUSTAINABLE SHIP-1/2, UNRESTRICTED NAVIGATION, INWATER SURVEY
Design	Robert Allan Ltd.



VOLTRA
BATTERY ELECTRIC TUG

VoltRA 2300 - 23m 70 TBP

Length Overall	23.45 m
Beam	11.95 m
Max Draft	5.42 m
Bollard Pull$_{max}$	70 TBP
Free Running Speed	11,5 knots
Notations	✠HULL, ✠ MACH, TUG, AUT-UMS, FIREFIGHTING 1 WITH WATER SPRAYING, BATTERY SYSTEM, SUSTAINABLE SHIP-1/2, UNRESTRICTED NAVIGATION, INWATER SURVEY
Design	Robert Allan Ltd.



VOLTRA
BATTERY ELECTRIC TUG

VoltRA 2500 - 25m 80 TBP

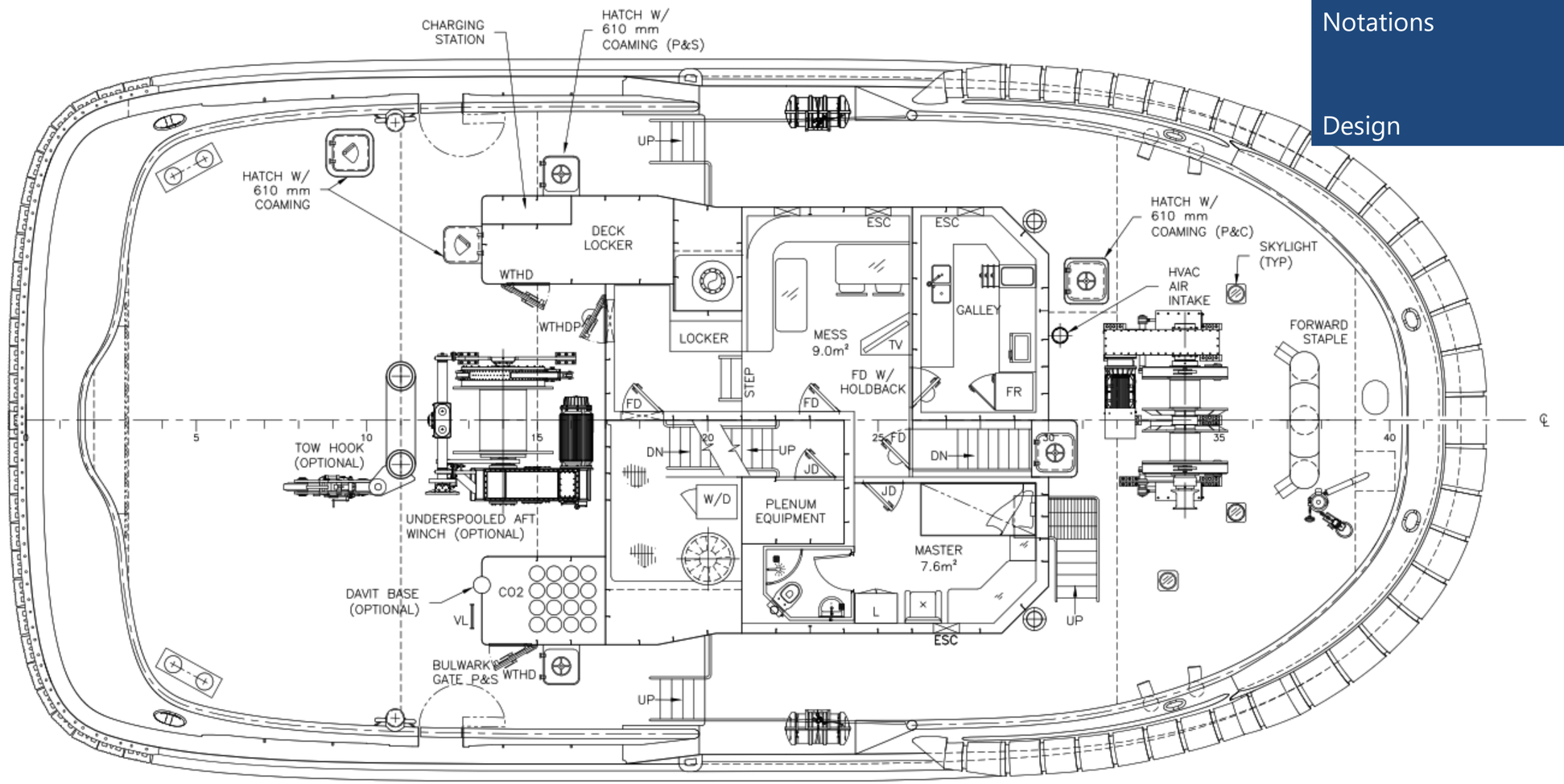
Length Overall	25.25 m
Beam	12.10 m
Max Draft	6.00 m
Bollard Pull$_{max}$	80 TBP
Free Running Speed	12 knots
Notations	✠HULL, ✠ MACH, TUG, AUT-UMS, FIREFIGHTING 1 WITH WATER SPRAYING, BATTERY SYSTEM, SUSTAINABLE SHIP-1/2, UNRESTRICTED NAVIGATION, INWATER SURVEY
Design	Robert Allan Ltd.

VoltRA 2500 Battery Electric Tug series are designed by Robert Allan, driven by 2 x 2350 kW propulsive power and 4295 kWh battery pack capacity max. The vessel is equipped with a forward towing winch, an aft towing winch, an aft towing hook and internal and external firefighting system. Two (2) gensets will be installed in case of emergency and firefighting.

VOLTRA
BATTERY ELECTRIC TUG

VoltRA 2500 - 25m 80 TBP

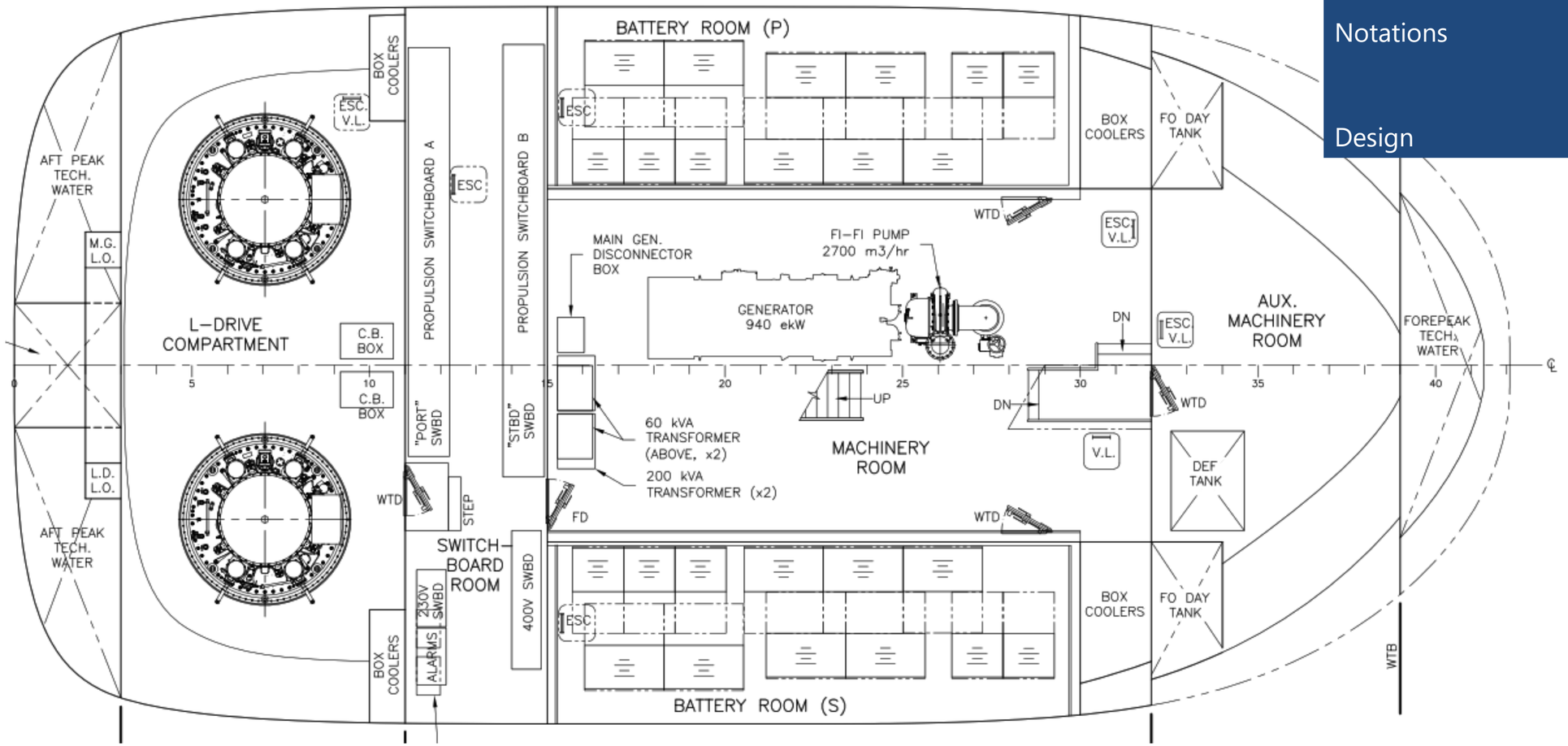
Length Overall	25.25 m
Beam	12.10 m
Max Draft	6.00 m
Bollard Pull$_{max}$	80 TBP
Free Running Speed	12 knots
Notations	✠HULL, ✠ MACH, TUG, AUT-UMS, FIREFIGHTING 1 WITH WATER SPRAYING, BATTERY SYSTEM, SUSTAINABLE SHIP-1/2, UNRESTRICTED NAVIGATION, INWATER SURVEY
Design	Robert Allan Ltd.



VOLTRA
BATTERY ELECTRIC TUG

VoltRA 2500 - 25m 80 TBP

Length Overall	25.25 m
Beam	12.10 m
Max Draft	6.00 m
Bollard Pull$_{max}$	80 TBP
Free Running Speed	12 knots
Notations	✠HULL, ✠ MACH, TUG, AUT-UMS, FIREFIGHTING 1 WITH WATER SPRAYING, BATTERY SYSTEM, SUSTAINABLE SHIP-1/2, UNRESTRICTED NAVIGATION, INWATER SURVEY
Design	Robert Allan Ltd.



VOLTRA
BATTERY ELECTRIC TUG

VoltRA 2800 - 28m 85 TBP

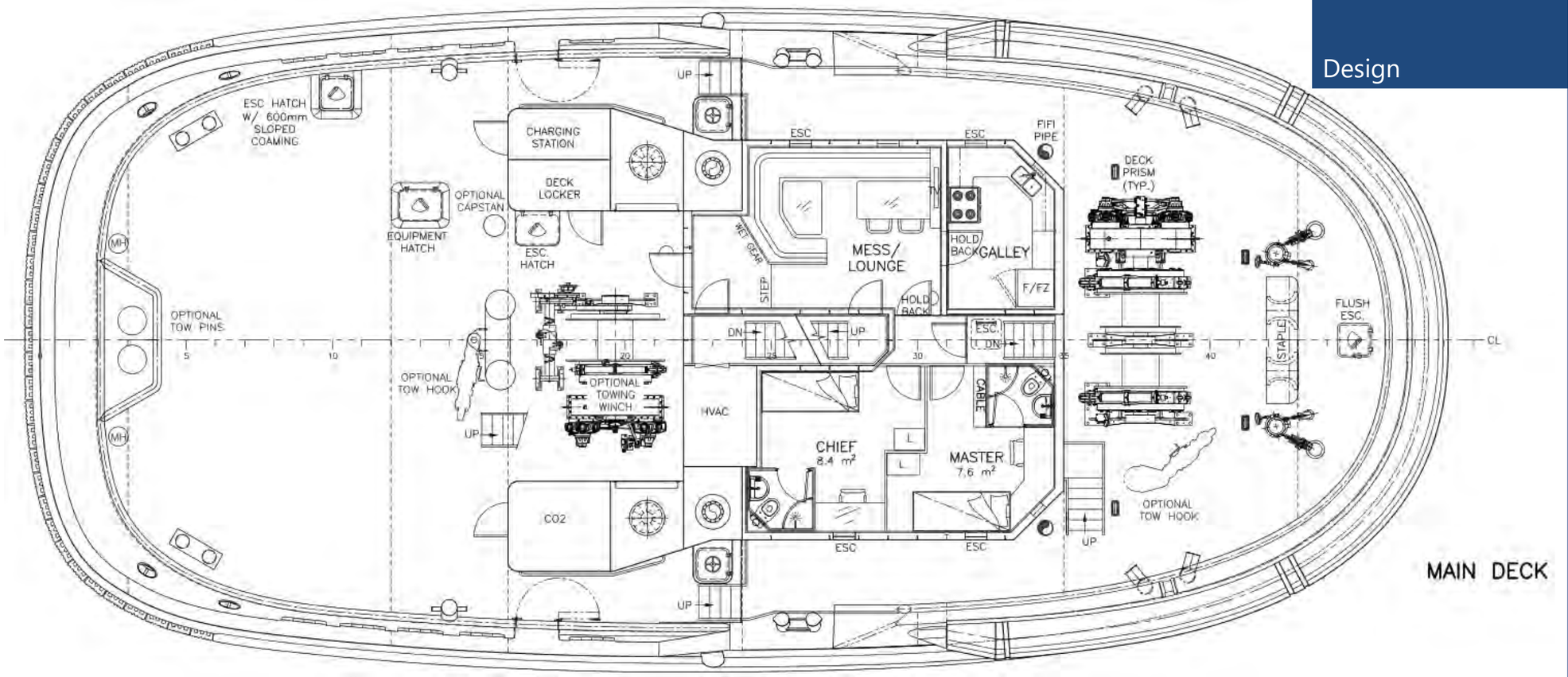
Length Overall	28.45 m
Beam	12.95 m
Max Draft	6.20 m
Bollard Pull$_{max}$	85 TBP
Free Running Speed	12 knots
Notations	✠HULL, ✠ MACH, TUG, AUT-UMS, FIREFIGHTING 1 WITH WATER SPRAYING, BATTERY SYSTEM, SUSTAINABLE SHIP-1/2, UNRESTRICTED NAVIGATION, INWATER SURVEY
Design	Robert Allan Ltd.

VoltRA 2800 Battery Electric Tug series are designed by Robert Allan, driven by 2 x 2525 kW propulsive power and 4500 kWh battery pack capacity max. The vessel is equipped with a forward towing winch, an aft towing winch, an aft towing hook and internal and external firefighting system. Two (2) gensets will be installed in case of emergency and firefighting.

VOLTRA
BATTERY ELECTRIC TUG

VoltRA 2800 - 28m 85 TBP

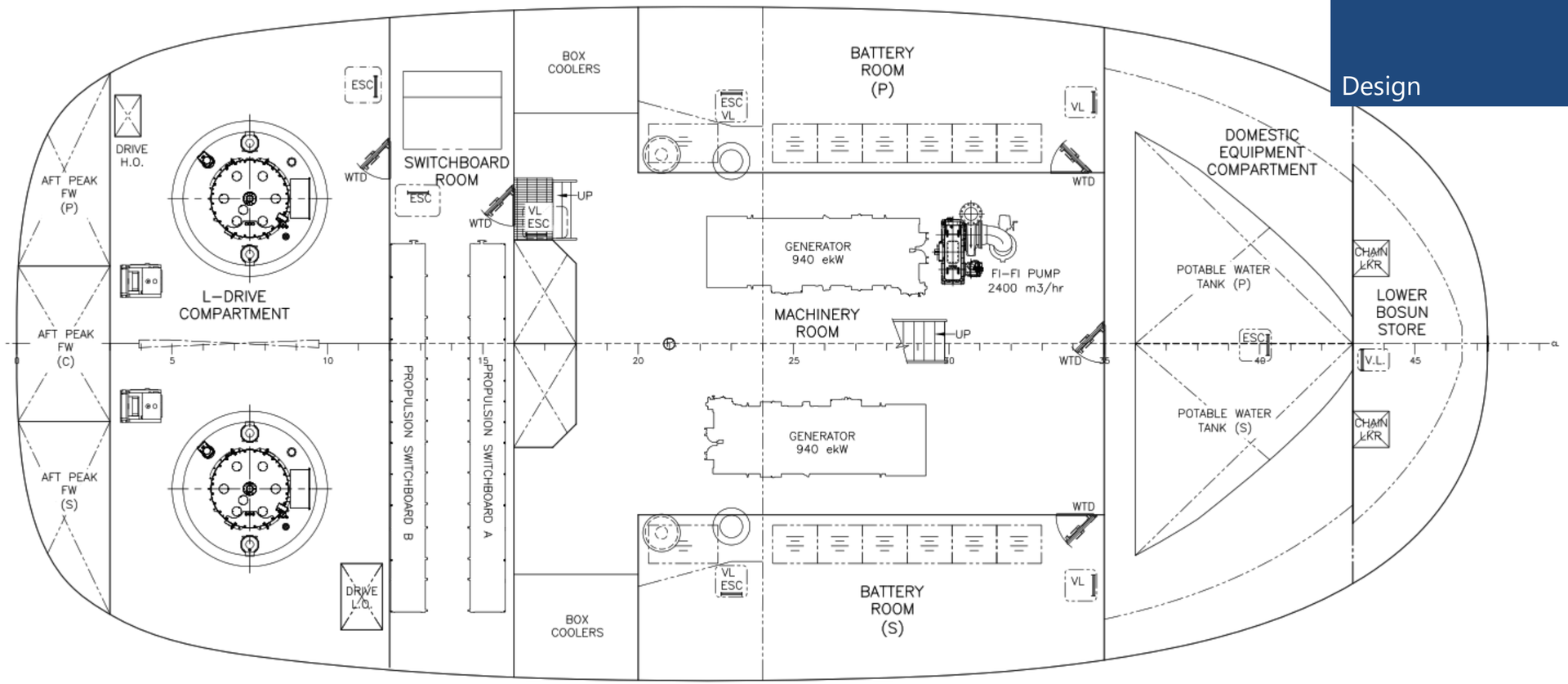
Length Overall	28.45 m
Beam	12.95 m
Max Draft	6.20 m
Bollard Pull$_{max}$	85 TBP
Free Running Speed	12 knots
Notations	✠HULL, ✠ MACH, TUG, AUT-UMS, FIREFIGHTING 1 WITH WATER SPRAYING, BATTERY SYSTEM, SUSTAINABLE SHIP-1/2, UNRESTRICTED NAVIGATION, INWATER SURVEY
Design	Robert Allan Ltd.



VOLTRA
BATTERY ELECTRIC TUG

VoltRA 2800 - 28m 85 TBP

Length Overall	28.45 m
Beam	12.95 m
Max Draft	6.20 m
Bollard Pull$_{max}$	85 TBP
Free Running Speed	12 knots
Notations	✠HULL, ✠ MACH, TUG, AUT-UMS, FIREFIGHTING 1 WITH WATER SPRAYING, BATTERY SYSTEM, SUSTAINABLE SHIP-1/2, UNRESTRICTED NAVIGATION, INWATER SURVEY
Design	Robert Allan Ltd.



VOLTRA
BATTERY ELECTRIC TUG

VoltRA 3000 - 30m 90 TBP

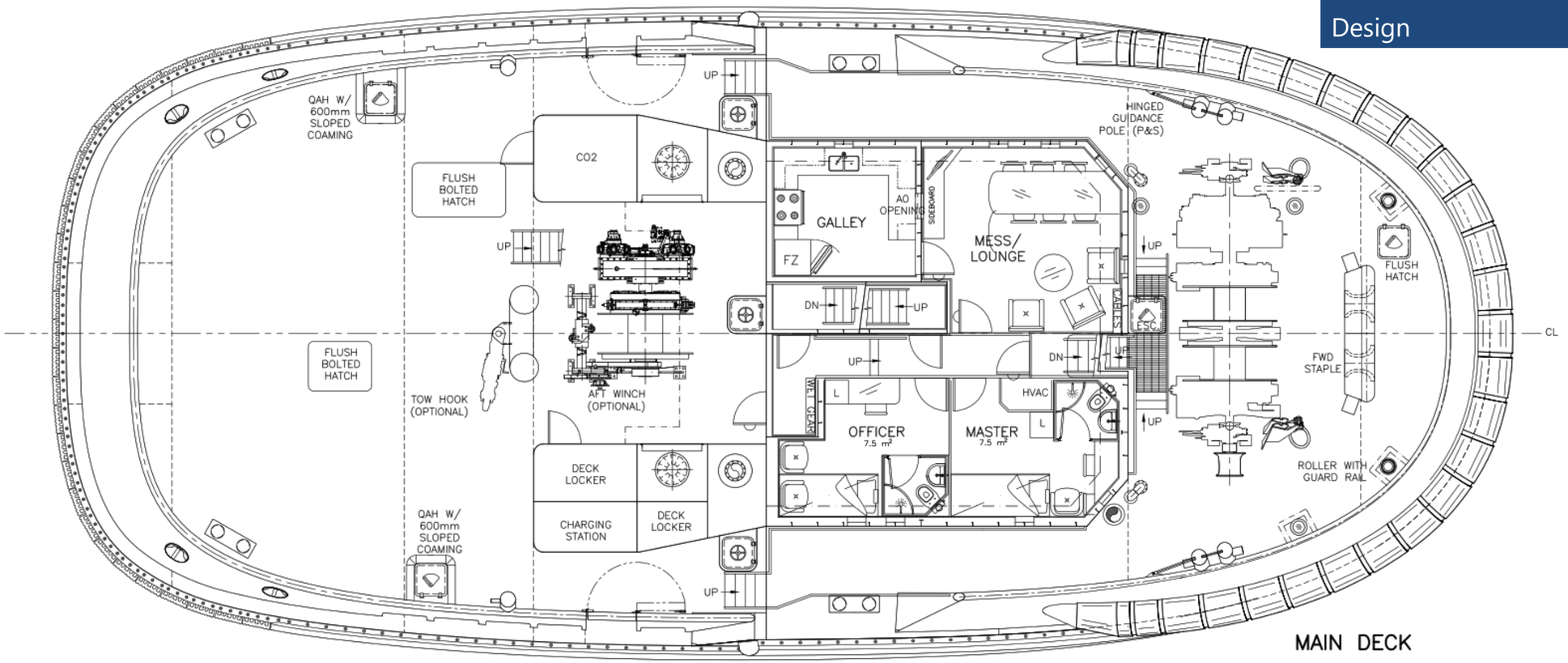
Length Overall	30.30 m
Beam	13.30 m
Max Draft	6.20 m
Bollard Pull$_{max}$	90 TBP
Free Running Speed	12.5 knots
Notations	✠HULL, ✠ MACH, TUG, AUT-UMS, FIREFIGHTING 1 WITH WATER SPRAYING, BATTERY SYSTEM, SUSTAINABLE SHIP-1/2, UNRESTRICTED NAVIGATION, INWATER SURVEY
Design	Robert Allan Ltd.

VoltRA 3000 Battery Electric Tug series are designed by Robert Allan, driven by 2 x 2525 kW propulsive power and 5000 kWh battery pack capacity max. The vessel is equipped with a forward towing winch, an aft towing winch, an aft towing hook and internal and external firefighting system. Two (2) gensets will be installed in case of emergency and firefighting.

VOLTRA
BATTERY ELECTRIC TUG

VoltRA 3000 - 30m 90 TBP

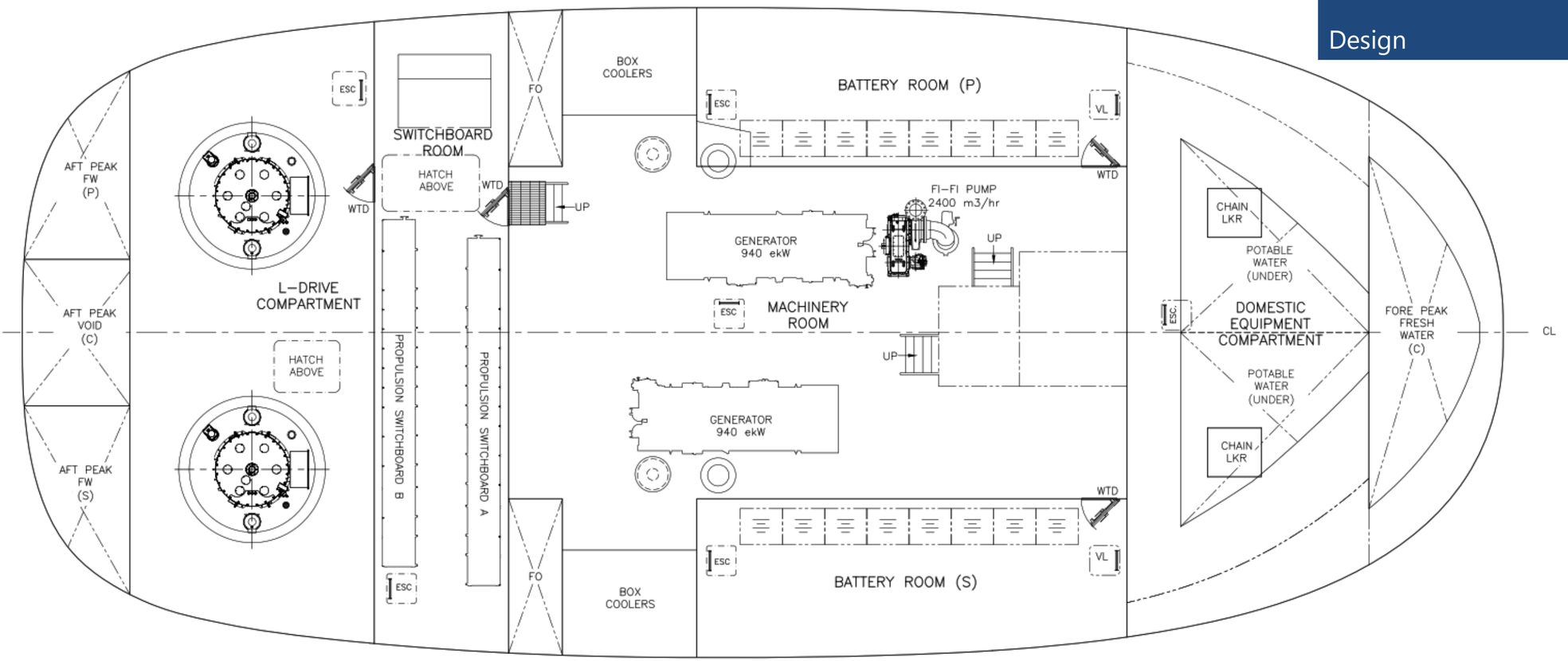
Length Overall	30.30 m
Beam	13.30 m
Max Draft	6.20 m
Bollard Pull$_{max}$	90 TBP
Free Running Speed	12.5 knots
Notations	✠HULL, ✠ MACH, TUG, AUT-UMS, FIREFIGHTING 1 WITH WATER SPRAYING, BATTERY SYSTEM, SUSTAINABLE SHIP-1/2, UNRESTRICTED NAVIGATION, INWATER SURVEY
Design	Robert Allan Ltd.



VOLTRA
BATTERY ELECTRIC TUG

VoltRA 3000 - 30m 90 TBP

Length Overall	30.30 m
Beam	13.30 m
Max Draft	6.20 m
Bollard Pull$_{max}$	90 TBP
Free Running Speed	12.5 knots
Notations	✠HULL, ✠ MACH, TUG, AUT-UMS, FIREFIGHTING 1 WITH WATER SPRAYING, BATTERY SYSTEM, SUSTAINABLE SHIP-1/2, UNRESTRICTED NAVIGATION, INWATER SURVEY
Design	Robert Allan Ltd.



VOLTRA
BATTERY ELECTRIC TUG

MED MARINE

SINCE 1995

DELIVERIES

WORLDWIDE DELIVERIES

Med Marine has delivered more than 150 vessels to 40+ countries all around the world.

Med Marine continues to expand its delivery range day by day by expanding to different markets.

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SINCE 1995

SEA THE FUTURE...