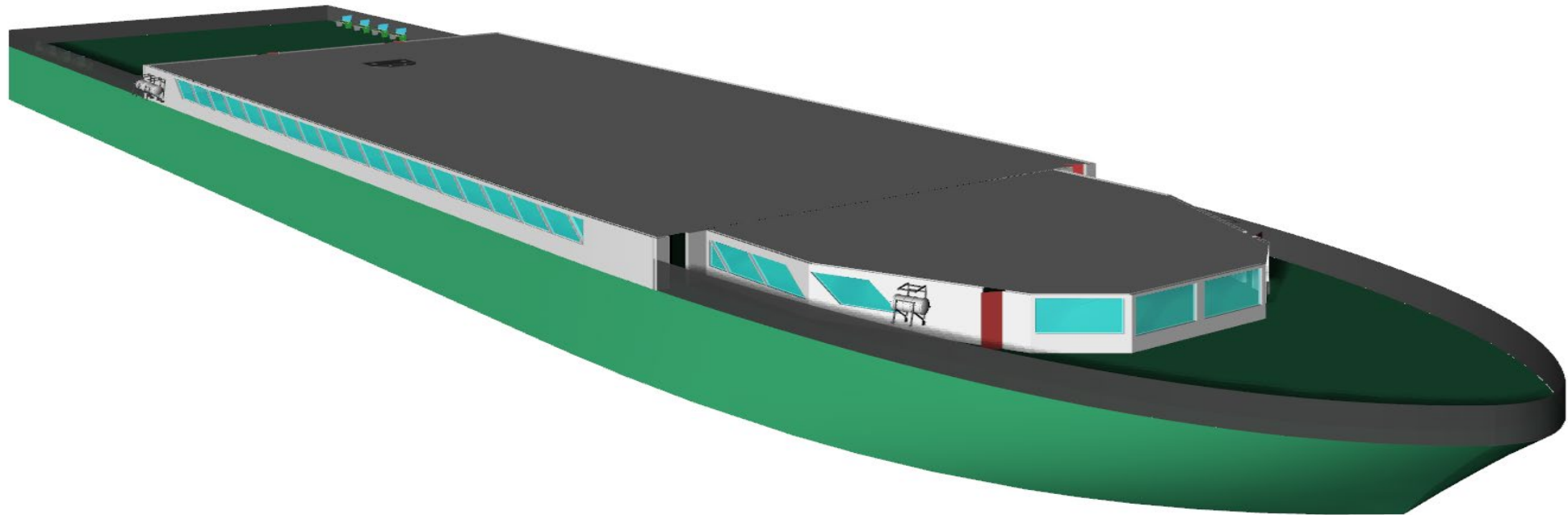


Worldwide Ferry Safety Association's virtual Ferry Safety and Technology Conference 2020

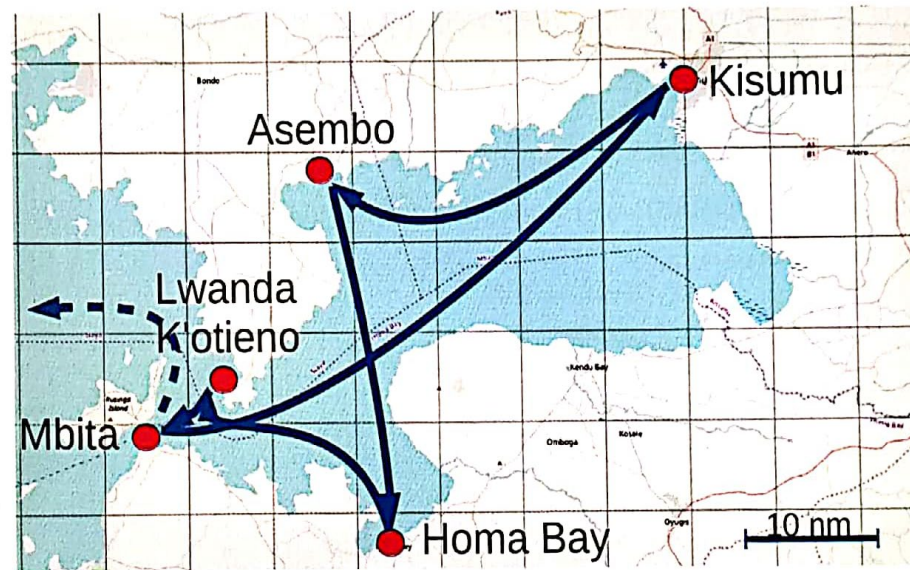


André Paiva, Midhun Kanadan, Asad Khan, Laura Lungu, Jonas Musil



Main Requirements

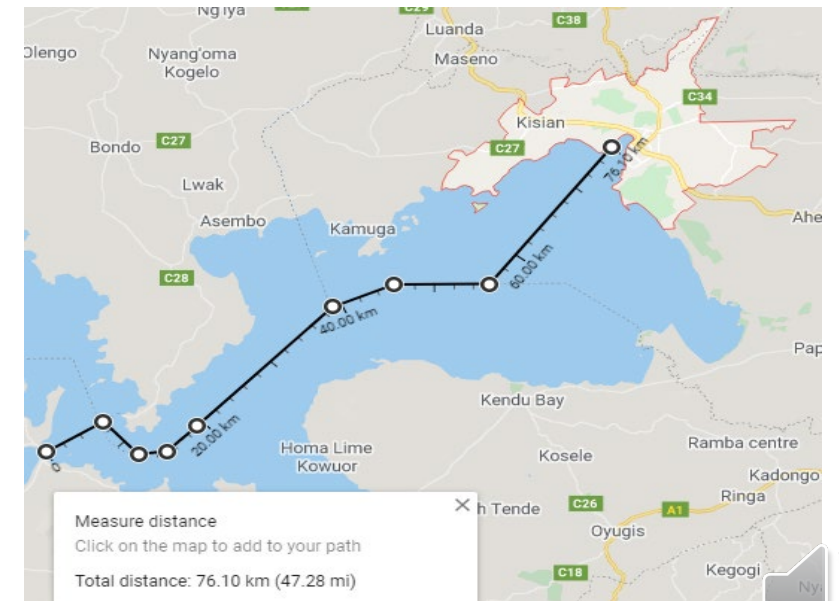
- Design a safe and affordable ferry for the Lake Victoria, Kenya;
- Route: Kisumu and Mbita point with stops in Asembo and Homa Bay;



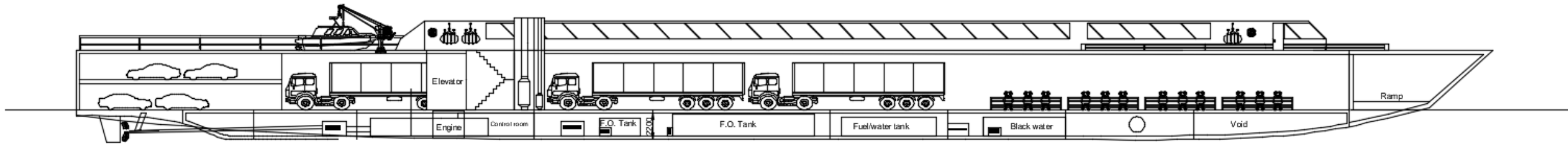
- Intended to transport 200 passengers and 30 salon size vehicles (639 m lane capacity);
- The ferry should be able to carry cars, motorcycles, bicycles, carts, livestock, fuel/LPG tanker lorries, building materials and others.

Design Constraints

- Maximum dimensions:
 - ▶ Draft: 2.5 m;
 - ▶ Air draft: 8 m (Rusinga Mbita Bridge);
 - ▶ Breadth: 40m (Rusinga Mbita Bridge).
- Speed:
 - ▶ Sufficient speed to cross the channel within 30 minutes;
 - ▶ The trip time from Kisumu to Mbita:
 - Max. 3 hours to compare with time taken by road
 - ▶ The design speed considered is of 15 knots.



Design Main Dimensions

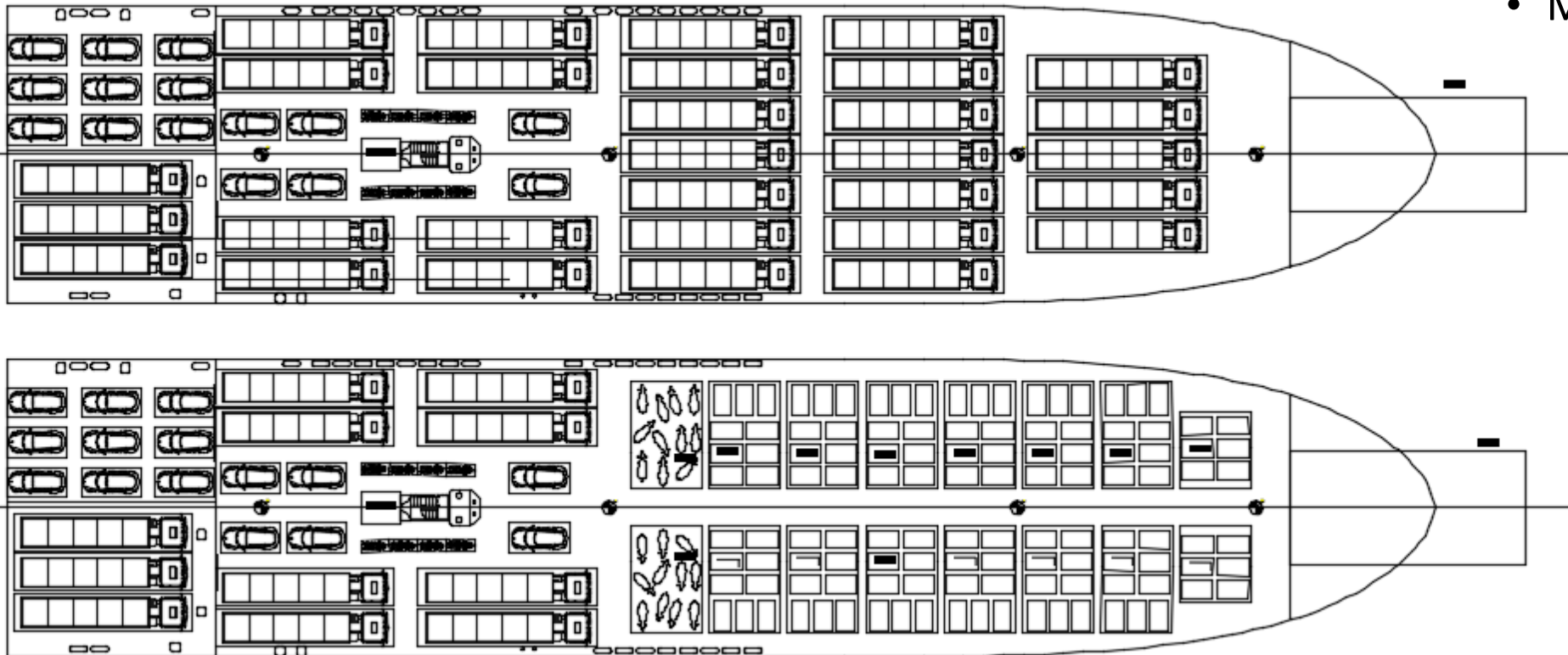


Length	120 m
Breadth	25 m
Draft	2.5 m
Air Draft	7.5 m

Main Dimensions



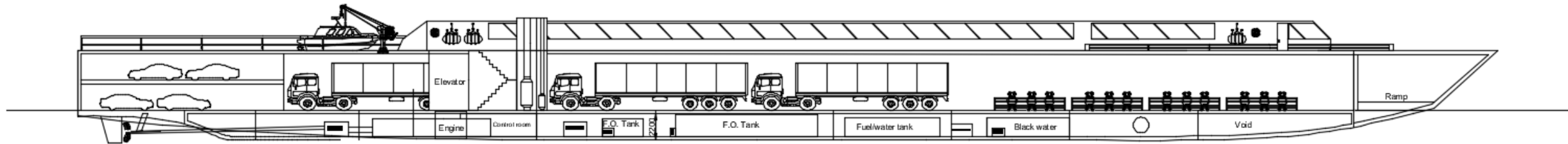
Cargo Deck Arrangement



- Maximum capacities:
 - ▶ 490 meters lane of 3.1 meters width;
 - ▶ 210 meters lane of 2.5 meters width;
 - ▶ 43 meters lane of 1.0 metres width;
 - ▶ Livestock (cattle) – 227

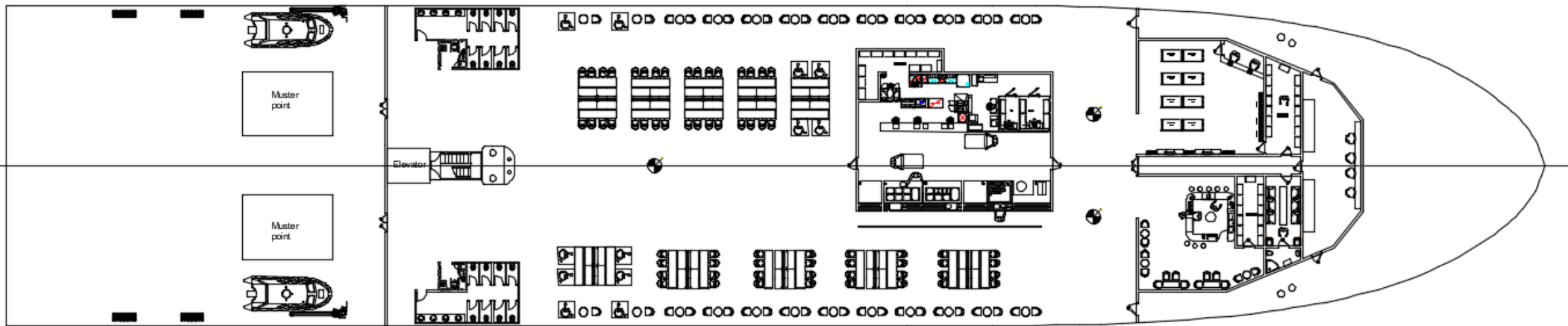


Plan Arrangement



Intermediary Deck- Cars only

Main Deck Arrangement



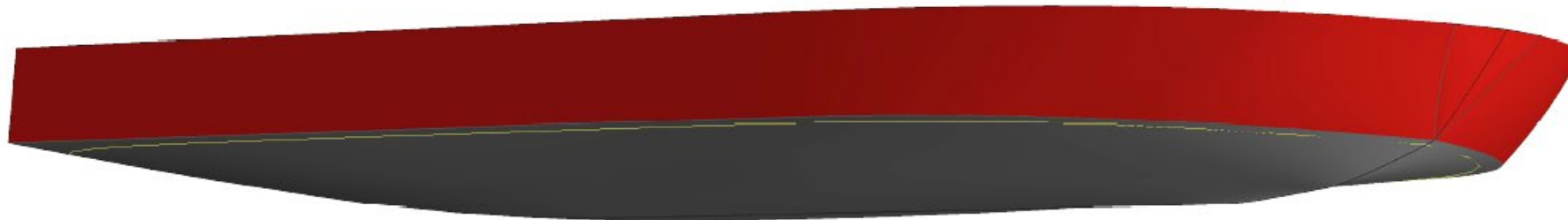
Main Deck



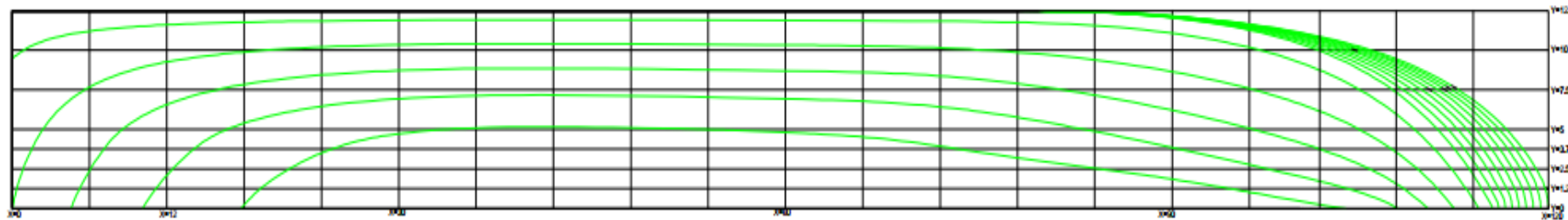
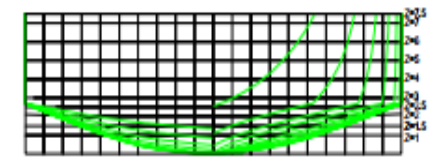
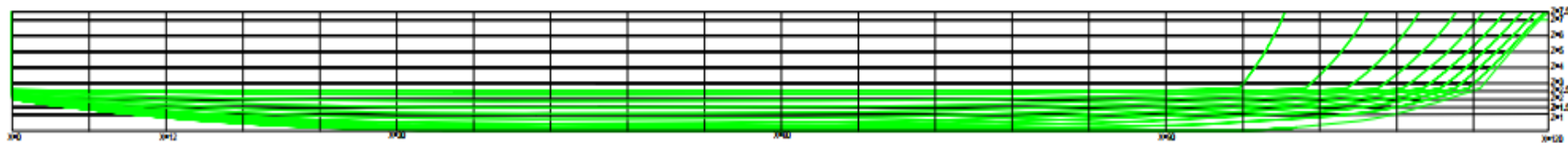
Hull Form – 3D Design and Lines Plan

For the maximum loaded condition:

- 3000 tons at the maximum draft;
- Estimated KG: 53.631 m
- LCB: 54.597 m
- Trim angle: 0.0839°
- Maximum inclination: 16.7 cm



Hull Form – 3D Design and Lines Plan



NO.	DATE	BY	CHECKED	REVISION
1	2023-10-10	J. Doe	M. Smith	1
DRAWING TITLE				
LINES PLAN DRAWING				
DRAWING NUMBER			REV	SHEET
1000-001			1	1

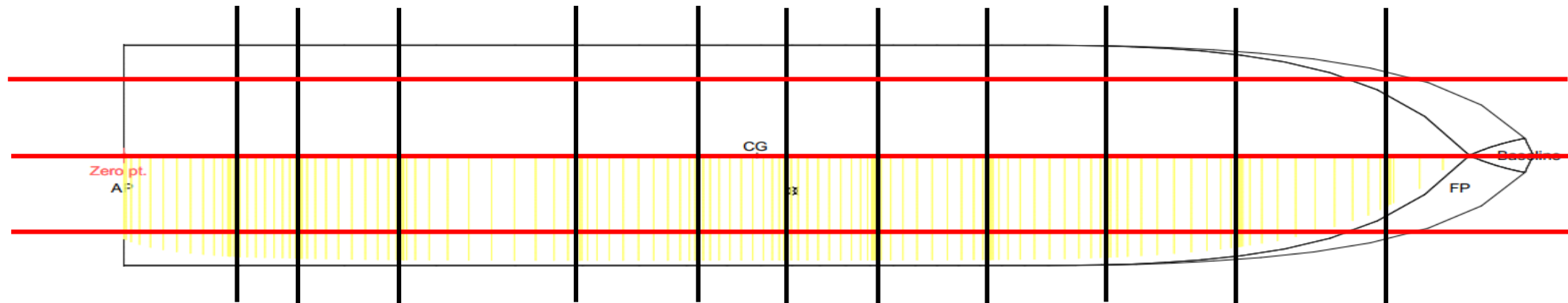


Intact Stability – IS Code MSC.267(85)

- ✓ All Intact Stability criterion are met

Probabilistic Damage Stability – SOLAS MSC.281(85)

- Considering the following compartmentation:



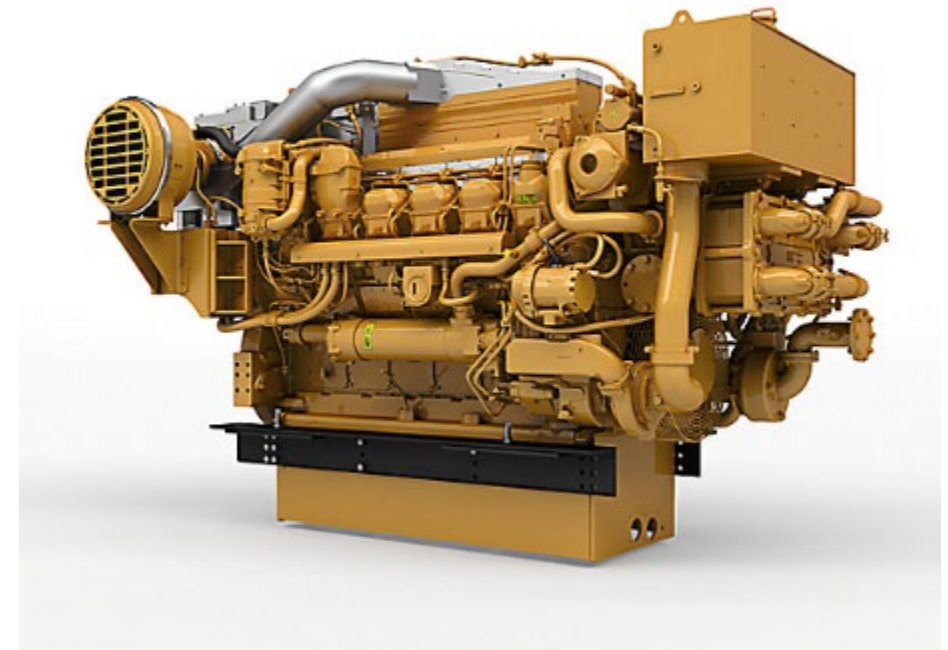
- ✓ The attendance index is higher than the required:
- $A = 0.862661$
 $R = 0.695586$



Engine Selection – MARPOL Tier 3 Compliant

- Required power per engine: ~1800 kW
- 2 x CAT 3512E-C Tier 4 / IMO III

Power Range	1650-1901 bkW
Speed Range	1600-1800 rpm
Fuel Consumption	199.0- 199.9 g/bkW-hr
Emissions	U.S. EPA Tier 4 Final, IMO III
Minimum Dry Weight	8176.0 kg
Maximum Length	2624.0 mm
Maximum Height	2222.6 mm
Maximum Width	2037.0 mm



Cost Estimation

SWBS	Description	Weight [t]	Labor Manhours [\$]	Material Dollars [\$]
100	Structure	1428.8	187,789	1,143,016
200	Propulsion	24.1	6,940	496,992
300	Electrical	1.3	920	33,469
400	Command and Control	1.0	1,605	40,000
500	Auxiliary	7.1	796	80,720
600	Outfit and Furnishing	101.6	24,883	102,1000
	Direct costs [\$]		869,439	2,815,196
	Overhead costs [\$]	10%	86,944	281,520
	Profit [\$]	10%	86,944	281,520
		Total	1,043,327	3,378,236
			Total Price	4,421,562



Key Points

- ✓ More than a mean of transportation, leisure activities are offered to the passengers, encouraging the growth of tourism and local economy;
- ✓ Complying with the height constraint and the multiple cargo configurations, increase the economical viability of the project;
- ✓ The design easily attends the criterion of the relevant security rules and the simple geometry of the vessel reduces its manufacturing costs.



Thank you!

