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Designing a Self-Propelled Floating Cafe as a Sunset Tourist Attraction on the Kenjeran Coast of Surabaya

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Abstract

The Suramadu View Point in North Kenjeran, Surabaya, has considerable coastal tourism potential; however, existing facilities remain limited. This study proposes a self-propelled floating café as an alternative to enhance tourism activities. The methodology includes site surveys, hull design, resistance analysis, power prediction, general arrangement, and stability analysis. Considering shallow water constraints and operational simplicity, a monohull configuration was selected due to its ease of construction. The vessel has principal dimensions of 21.50 m length overall, 6.00 m breadth, 3.50 m depth, and 2.00 m draft, operating at 6 knots. The calculated total resistance is 43.70 kN, corresponding to a required propulsion power of 242 kW. A 277 kW engine is selected to ensure sufficient safety margin. The vessel is designed to support 48 hours of operation for 55 occupants with adequate tank capacities. Stability analysis under four loading conditions confirms compliance with IMO A.749 criteria. The results indicate that the proposed design is technically feasible, safe, and suitable for shallow coastal applications, offering a practical solution to support maritime tourism development.

Keywords: ship design; ship resistance; general arrangement; stability analysis.

1. Introduction

As a metropolitan city with a coastal area, Surabaya needs to develop its marine tourism. Marine tourism can be an important role in the economic growth [1], and also used as an icon or characteristic of Surabaya to make it more well-known. Currently, Surabaya has several marine tourism sites, to be exact Surabaya North Quay [2], Kenjeran Beach [3], Kali Mas boat tours [4], the maritime tourism Koarmada 2 Submarine Monument, and the Indonesian Navy Central Museum [5], [6]. One of the tourist spots that can be developed is the north coast of Surabaya, specifically on the coast of Kenjeran Beach.

There are several tourist facilities along the Kenjeran Coast, namely Kenjeran Beach Amusement Park, Kenjeran Ria Beach (Kenjeran Park), Sanggar Agung Temple, and Dancing Fountain Park (Suroboyo Bridge) [7], [8]. Besides that, there is a destination where young people enjoy viewing sunset around the north coast of Kenjeran. This destination is located on the coast near the access to the Suramadu Bridge on the Surabaya side, namely Suramadu View Point. It remains a popular destination for people to visit, but it will gradually lose interest due to monotonous activities and lack of development. Therefore, to improve the tourist attractions on the north coast of Kenjeran, the design of a new attraction, such as a self-propelled floating café is necessary.

Self-propelled floating café is a concept of a floating café that can move. The floating café is planned to be moored near Suramadu View Point, and at certain times can move to other tourist destinations, for example the Suroboyo Bridge which is famous for its dancing fountain. This self-propelled floating café offers the experience of hanging out on a boat while enjoying coffee or other snacks and the experience of traveling around the north coast of Kenjeran. It is hoped that the presence of the self-propelled floating café can increase the tourist

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attractions on the north coast of Kenjeran and give a positive impact on the regional economy and local community.

This research discusses the main dimensions of a floating cafe, hull shape, general arrangement, engine selection, and stability analysis as determinants of safety.

2. Experimental Methods

This study aims to design a self-propelled floating cafe as a reference for marine tourism development on the Kenjeran coast, Surabaya. The research design used is developmental research with a case study approach on the north coast of Kenjeran, as seen in Figure 1.

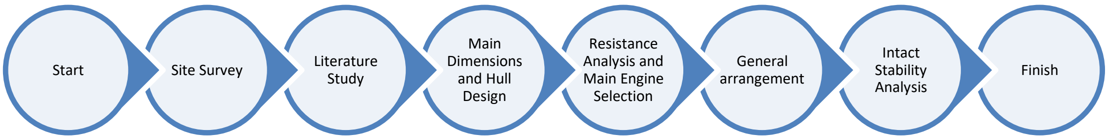

Figure 1. Research methodology

This research began with a site survey (location). The survey intended to identify the characteristics of the Kenjeran coastal location suitable for the placement of the floating café, including water conditions, depth, and potential interaction with existing tourism facilities. The second step was to plan the main dimensions and hull form, so that the floating café has sufficient hull. The third step was a resistance analysis to determine the power requirements to determine the capacity of the floating café's main engine. The fourth step was to plan the layout of the floating café. The last step was intact stability analysis which ensures that the floating café can operate safely.

2.1. Site Survey

A site survey was conducted in the afternoon to determine the condition of the Kenjeran coastline (Figure 2) and to assess the actual conditions along the Kenjeran coastline. In the afternoon, the Suramadu View Point is quite hectic, especially on weekends. Furthermore, the water depth was assessed and determined using visual observations and data from bathymetric maps. The shoreline of the Suramadu View Point has a shallow depth of approximately 0–2 m. This is consistent with the data on the bathymetric map in Figure 3, which is approximately 2 m. This water depth data will be used as a reference for determining ship draft and the infrastructure needed to access the floating cafe.

(a) (b)

Figure 2. Site survey point in the Suramadu View Point (a) Map and (b) Original view

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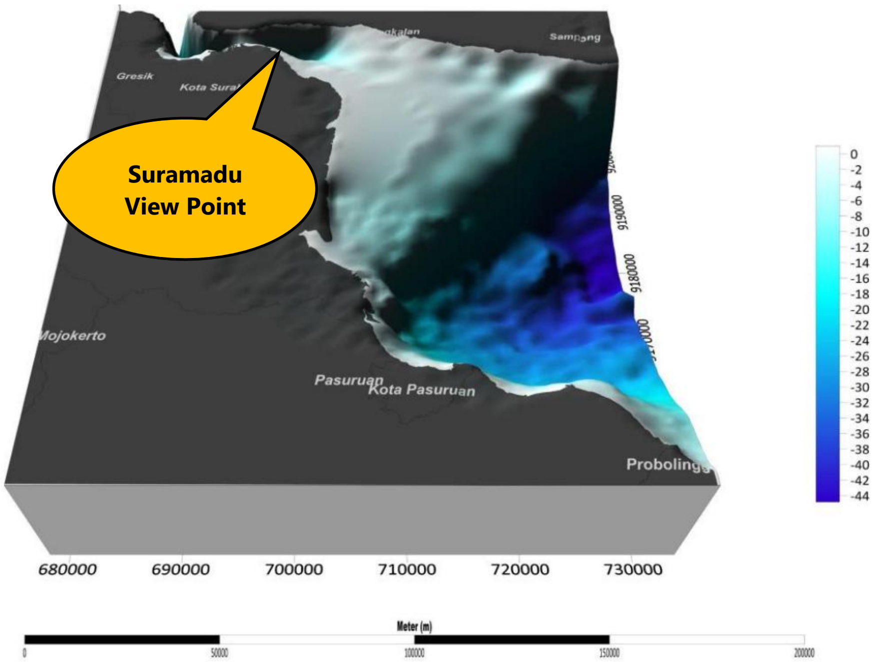

Figure 3. 3D Bathymetric map of the Kenjeran sedimentation study area, East Java [9]

2.2. Determination of Main Dimensions

Determining the main dimensions of the ship is a very important initial stage in the design process of the self-propelled floating café that will operate in the coastal waters of Kenjeran, because the main dimensions will affect the stability, buoyancy, cargo capacity, and overall operational performance of the ship. Since this ship has a special concept as a floating café that can move with a diesel propulsion system, a flexible design approach is required. Therefore, in determining the main dimensions of the ship, this study uses the parametric method.

There are not many large floating cafes with a single hull has been designed for the waters off Surabaya. One floating restaurant with a single hull designed for the waters off Surabaya has a length overall (LOA) of 7 m [10]. Due to the limited number of comparison vessels, the main dimensions were determined using the parametric method. The parametric method is a design approach used when a parent ship with similar characteristics is unavailable. This method allows for the independent determination of the ship's primary dimensions through an optimization process based on mathematical relationships between design parameters and certain criteria constraints. The primary parameters determined include the ship's length (LOA), ship's breadth (B), ship's depth (H), and draft (T). The LOA determines the ship's capacity and potential speed. The ship's breadth (B) affects transverse stability and the area of space above deck. The ship's depth (H) is related to the strength of the structure and the volume of space below deck. The draft (T) determines the ship's buoyancy and vertical stability. The basic principle of this method is to determine the primary dimensions through the proportional ratio between the ship's length, breadth, and draft (Table 1).

Table 1. Ratios of dimensions [11]

Ratio Dimension	Value Ratio
L/B	3.5 – 10
L/T	10 – 30
B/T	1.8 – 5

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2.3. Hull Form

The hull of this self-propelled floating café is designed with a barge hull model. The barge hull model is used because it has several advantages compared to other hull models. One of them is very suitable for shallow water conditions, where barges are known for their large capacity but with a low draft [12]. This advantage is certainly appropriate for waters in the Kenjeran area which has low water depth.

2.4. Resistance Analysis and Main Engine Selection

The resistance analysis was carried out using the Korean Register of Shipping (KR) Barge prediction method. The KR Barge prediction method is suitable for analysing box-type hulls such as barges [13] and landing craft [14]. The resistance analysis was used to determine the main engine power.

2.5. General Arrangement

The general arrangement is the arrangement of the ship's space for room requirements, placement of equipment, and designing the exit/entrance routes for a room. In planning the ship's space, it is adjusted to its function and equipment according to needs [15]. Other information contained in the general arrangement includes the number of rooms, room area, cargo space volume, engine room and tanks. The stages of making the general arrangement include calculating resistance, engine power, construction, number of crew and their equipment, calculating the volume of tanks and cargo space, and finally determining the specifications and completeness of safety equipment according to applicable regulations (BKI/SOLAS).

The general arrangement design must be developed in accordance with the existing lines plan. Adjusting several things, including DWT, capacity, load and speed that have been planned [16]. In this stage, spiral design method is used as a design preparation method. Each design cycle involves an evaluation of the main dimensions, load capacity, weight distribution and component placement. Through the spiral design method, the optimal and efficient ship layout configuration is produced and meets applicable technical standards and regulations.

2.6. Intact Stability Analysis

One of the important components in ship safety is its stability [17]. The ship design must not only be able to float, but also must be able to stand upright when the load is added or reduced [11]. Therefore, it is crucial to understand the stability of the floating cafe being designed. If the vessel meets the required stability criteria, the risk of capsizing is lower [18]. The criteria used are the criteria from IMO A.749, where these criteria are the stability criteria used on all types of ships [19]. There are four standard load cases simulated in the stability analysis, as follows [20]:

1. Ship in the fully loaded departure condition with cargo, full stores and fuel and with the full number of passengers with their luggage.
2. Ship in the fully loaded arrival condition, with cargo, the full number of passengers and their luggage but with only 10% stores and fuel remaining.
3. Ship without cargo, but with full stores and fuel and the full number of passengers and their luggage.
4. Ship in the same condition as at .3 above with only 10% stores and fuel remaining.

3. Results and Discussion

3.1. Mooring Locations and Routes

The self-propelled floating cafe is planned to be moored 100 m from the shoreline, as seen in Figure 4. This is done because if it is too close to the shoreline, the cafe is feared to run aground. However, it is important to note that a jetty is needed to support the self-propelled floating cafe.

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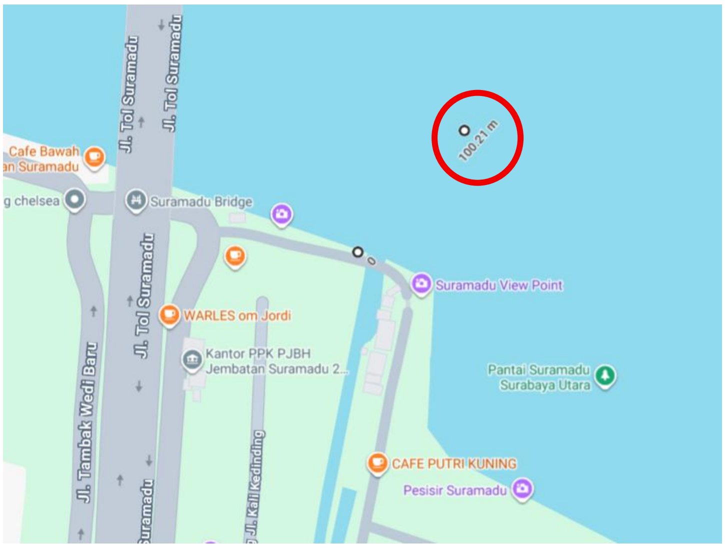

Figure 4. Planned mooring point for self-propelled floating cafe at Suramadu View Point

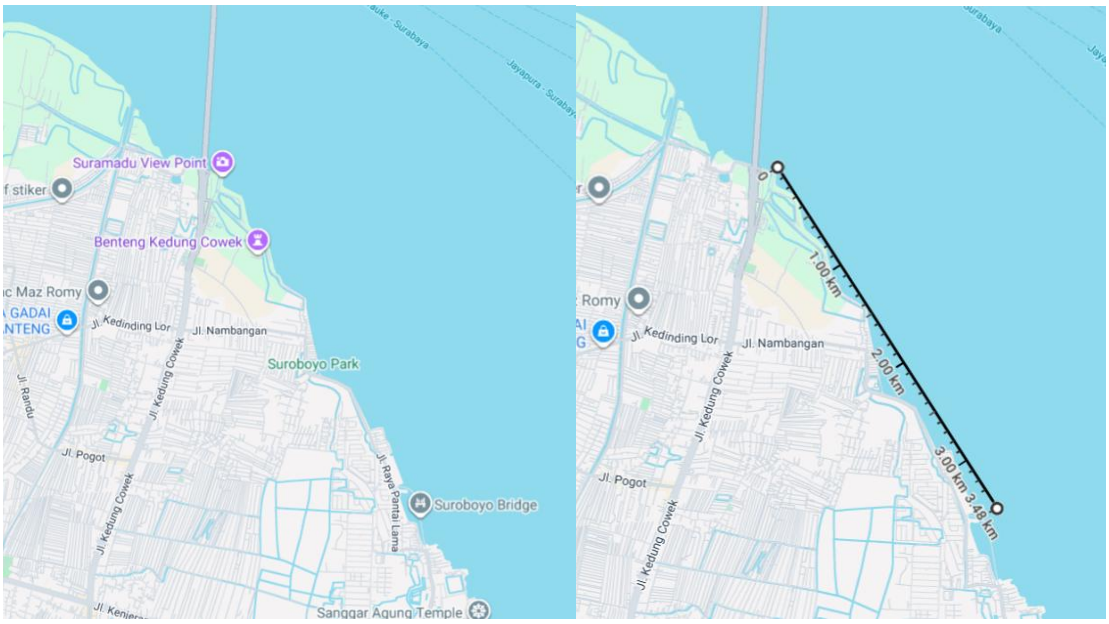

Figure 5. Self-propelled floating café route plan

To enhance its tourist appeal, the self-propelled floating café will not only operate and be moored near Suramadu View Point. It will also offer customers a sailing experience. The planned route is from Suramadu View Point to Suroboyo Bridge, and back to Suramadu View Point. The distance covered is 6.96 km, as seen in Figure 5.

3.2. Main Dimensions

In the context of the self-propelled floating café, there are several additional factors considered in determining the main dimensions, specifically: accommodation and service space, such as seating areas and mini kitchens. The low speed limit (≤ 6 knots), so the design emphasizes stability rather than speed. From the results of the parametric method application, the main dimensions obtained meet the technical and operational requirements, which then become the basis for the design of the hull form (hull form design), propulsion system design, and floating café layout. The water depth of 2 m is a limitation in determining the draft size of the floating café. In addition, the self-propelled floating café is planned to carry 48 passengers and 7 crews.

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Based on this passenger capacity, the main dimensions of the ship are planned: LOA = 21.50 m, B = 6.00 m, H = 3.50 m, T = 2.00 m, Vs = 6.00 knots, and Hull type = Monohull.

After the ship's main dimensions are obtained, the next step is to validate the ship's main dimensions. Validating the ship's main dimensions ratio is very important because this ratio has a significant influence on the ship's hydrodynamic aspects. In this study, ratios such as L/B (Length to Breadth ratio), L/T (Length to Draft ratio), and B/T (Breadth to Draft ratio) are used as the main reference. The ship's main dimensions ratio used refers to the standards and provisions contained in Principles of Naval Architecture Volume 1, which is the main reference in designing monohull ships and contains empirical guidelines regarding the dimensions and characteristics of ship design to ensure optimal ship operation.

Table 2. Validation of ship's main dimensions ratio

Standard ratio of main dimensions		Main dimensions ratio of floating café	Result
L/B	3.5 – 10	3.57	Accepted
L/T	10 – 30	10.00	Accepted
B/T	1.8 – 5	2.8	Accepted

From Table 2 it can be concluded that the main dimensions ratio that was previously obtained meets the main dimensions ratio standards for monohull ships as stated in Principles of Naval Architecture Volume 1 [11].

3.3. Lines Plan

Lines plan is a two-dimensional representation of a ship's shape/form. The purpose of lines plan is to visualize the form of the ship's hull, especially the submerged parts below the waterline [21]. In lines plan, the hull form is projected into three two-dimensional views: a sheer plan (longitudinal section), a half-breadth plan (horizontal section), and a body plan (transverse section) [22].

The lines plan is essential because it will serve as a reference for all other derivative design drawings. The lines plan will influence the design of the general arrangement, hydrostatics curves, bonjean curves, midship section, steel plan, ship stability (stability calculation), and other drawings. In addition, the shape of the ship's hull, especially the bow section, resulting from the lines plan will directly impact the ship's resistance. Figures 6, 7, and 8 show the results of the lines plan design for the self-propelled floating café by adjusting the ship's main dimensions obtained in the previous stage.

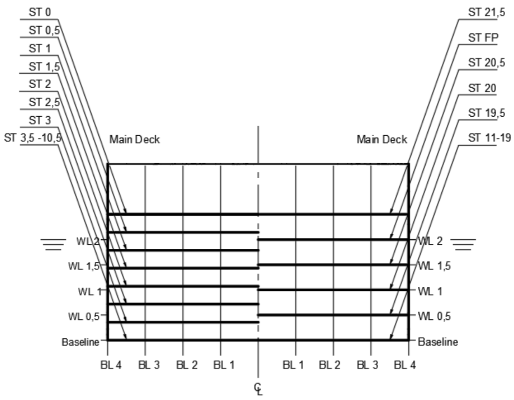

Figure 6. Body plan

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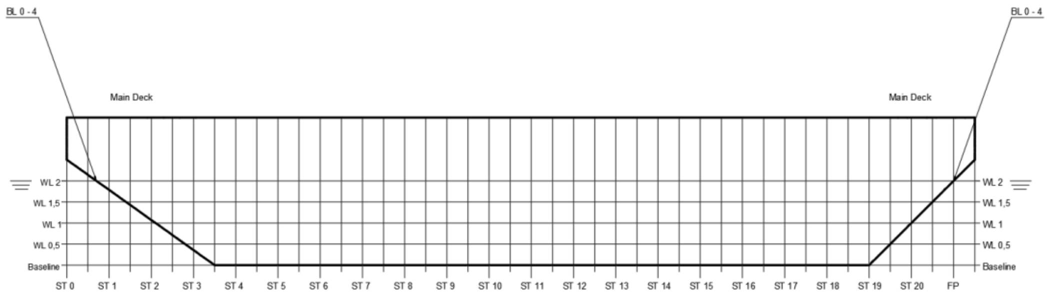

Figure 7. Sheer plan

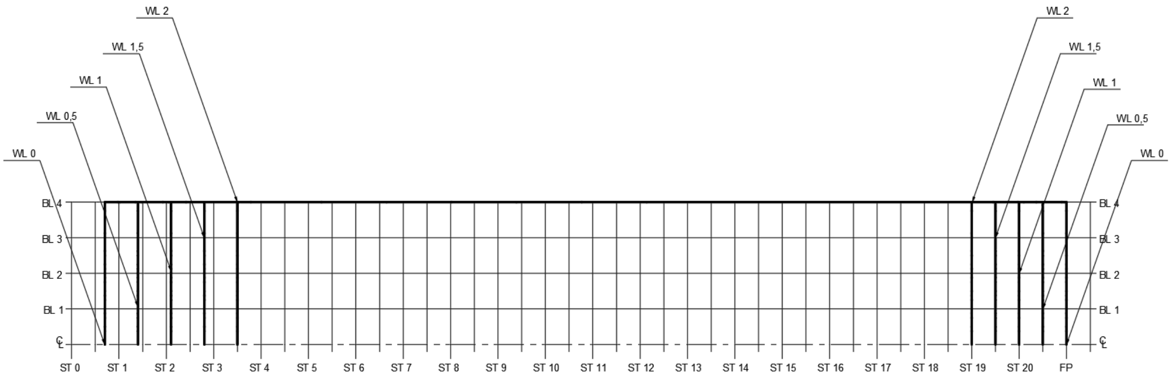

Figure 8. Half breadth plan

3.4. Resistance Analysis and Main Engine Selection

The lines plan in Figures 6, 7, and 8 are used as the basis for analyzing the resistance (R_T) of the self-propelled floating café. Based on the resistance analysis using the KR Barge prediction method, it is known that the resistance acting on the floating café when moving at a service speed (V) of 6 knots is 43.70 kN, as seen in Figure 9.

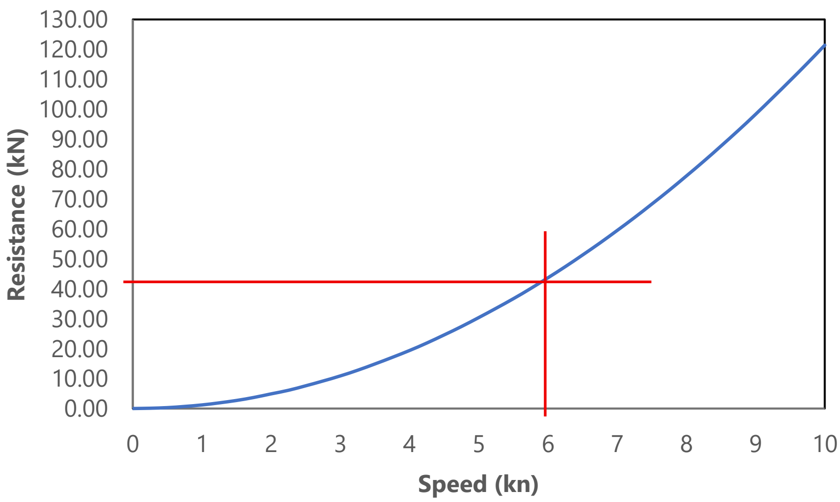

Figure 9. The relationship between speed and resistance of the floating café

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To determine the power requirements of the main engine (brake horse power/P_I), it is necessary to determine the effective power (P_E), delivered power (P_D), and service power (P_S) first [23].

$$P_E = R_T \times V = 43.70\ \text{kN} \times 3.09\ \text{m/s} = 134.9\ \text{kW} \quad (1)$$

$$\eta O = \text{Open water efficiency} = 40\% \sim 70\% = 50\% \quad (2)$$

$$w = \text{Wake friction} = 0.48 \quad (3)$$

$$k = \text{Thrust deduction factor} = 0.8 \quad (4)$$

$$t = k \times w = 0.8 \times 0.48 = 0.36 \quad (5)$$

$$\eta H = \text{Hull efficiency} = \frac{(1-t)}{(1-w)} = \frac{(1-0.36)}{(1-0.48)} = 1.16 \quad (6)$$

$$\eta R = \text{Relative rotative efficiency} = 1 \quad (7)$$

$$\eta D = \text{Quasi-propulsive coefficient} = \eta O \times \eta H \times \eta R = 0.5 \times 1.16 \times 1 = 0.58 \quad (8)$$

$$P_D = \frac{PE}{\eta D} = \frac{134.9\ kW}{0.58} = 232.1\ \text{kW} \quad (9)$$

$$\eta S = 98\% \quad (10)$$

$$\eta G = 98\% \quad (11)$$

$$P_S = \frac{PD}{\eta S} = \frac{232.1\ kW}{0.98} = 237\ \text{kW} \quad (12)$$

$$P_I = \frac{PS}{\eta G} = \frac{237\ kW}{0.98} = 242\ \text{kW} = 324\ \text{HP} \quad (13)$$

Based on the brake horsepower (P_I) calculation, the main engine power requirement is 242 kW. Therefore, a Yanmar 6LY2M-WST engine with a power rating of 277 kW was selected, as shown in Figure 10.

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Figure 10. Main engine Yanmar 6LY2M-WST

3.5. General Arrangement

In the general arrangement stage, the rooms are arranged according to needs. There are eight mandatory rooms in the self-propelled floating cafe, namely the café consumer area, kitchen, toilet, navigation room, crew room, office, prayer room, and engine room. Figures 11, 12, and 13 show the results of the general arrangement design of the self-propelled floating cafe. The layout planning of each deck is shown in this general arrangement drawing. The ship's main deck is used as a café area, a bar café, passenger toilets, and a navigation/steering area. The lower deck is used as an engine room, kitchen, and accommodation for the crew. This general arrangement design also shows the layout of the tank compartments used to support the operation of the self-propelled floating cafe, including the fuel tank (FO tank), fresh water tank (FW tank), and waste/disposal tank (Sewage tank). The fuel tank (FO tank) is planned at 4.5 m^3 by referring to the SFOC engine data which is 65 liters/hour and the estimated fuel tank that can hold fuel for 48 hours (2 days) of operation. The fresh water tank (FW tank) is planned at 13.5 m^3 by assuming the use of fresh water as drinking and washing water needs for 55 people (48 passengers + 7 crews) for 48 hours (2 days). Then, the waste/disposal tank (Sewage tank) is planned at 9 m^3 for 55 people (48 passengers + 7 crews) for 48 hours (2 days).

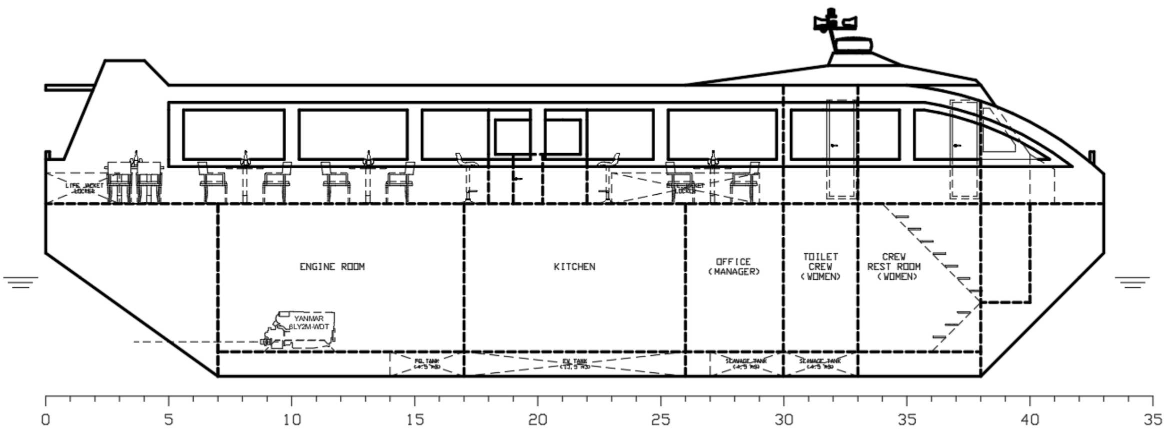

Figure 11. Side view

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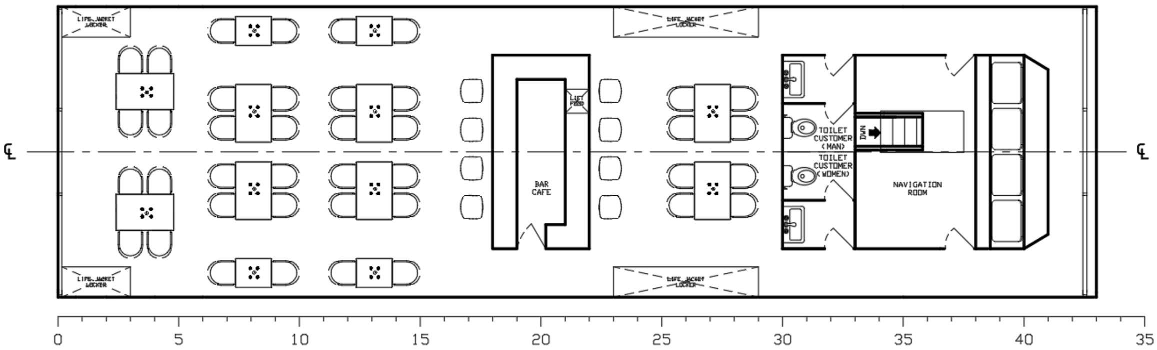

Figure 12. Main deck plan

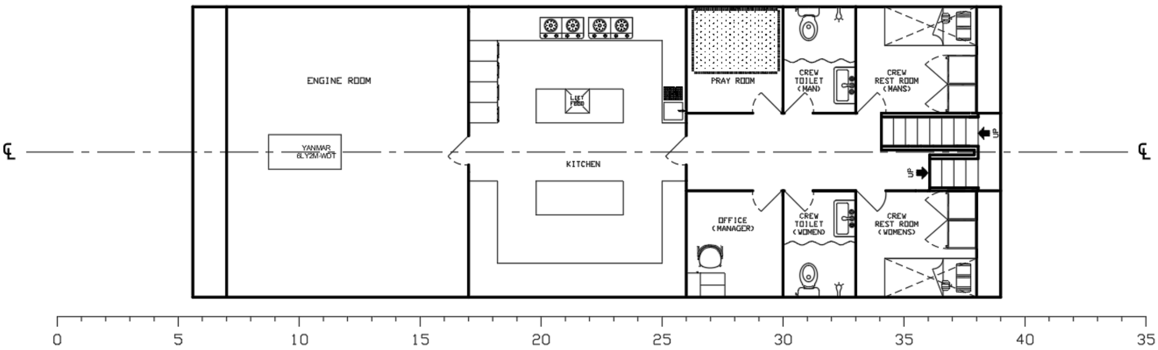

Figure 13. Lower deck plan

3.6. Stability Analysis

Stability analysis is carried out to determine the stability of the ship by referring to rules A 749 (18) E IMO Criteria, including the area of the curve under the GZ uprighting arm at an angle of 0 to 30 must not be less than 0.055 m.rad. The area of the curve under the GZ uprighting arm at an angle of 0 to 40 must not be less than 0.09 m.rad. The area of the curve under the GZ uprighting arm at an angle of 30 to 40 must not be less than 0.03 m.rad. The GZ arm must not be less than 0.2 m at an angle of inclination of 30, the angle at the maximum GZ uprighting arm must not be less than 25, and the height of the initial metacenter value or initial GMt must not be less than 0.15 m. Table 3 lists the coordinates of each tank and compartment on the ship in accordance with the general arrangement design.

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Table 3. Room definition window

No.	Item	Type	Specific Gravity	Fluid Type	Aft (m)	Fore (m)	Port (m)	Stbd (m)	Top (m)	Bottom (m)
1	FO Tank - P	Tank	0.9443	Fuel Oil	7.0	8.5	-3.0	0.0	0.5	0.0
2	FO Tank - S	Tank	0.9443	Fuel Oil	7.0	8.5	0.0	3.0	0.5	0.0
3	FW Tank - P	Tank	1	Fresh Water	8.5	13.0	-3.0	0.0	0.5	0.0
4	FO Tank - S	Tank	1	Fresh Water	8.5	13.0	0.0	3.0	0.5	0.0
5	Sewage Tank-1P	Tank	1		13.5	15.0	-3.0	0.0	0.5	0.0
6	Sewage Tank-1S	Tank	1		13.5	15.0	0.0	3.0	0.5	0.0
7	Sewage Tank-2P	Tank	1		15.0	16.5	-3.0	0.0	0.5	0.0
8	Sewage Tank-2S	Tank	1		15.0	16.5	0.0	3.0	0.5	0.0
9	Ballast Tank-1P	Tank	1.025	Sea Water	13.0	13.5	-3.0	0.0	0.5	0.0
10	Ballast Tank-1S	Tank	1.025	Sea Water	13.0	13.5	0.0	3.0	0.5	0.0
11	Ballast Tank-2P	Tank	1.025	Sea Water	16.5	19.0	-3.0	0.0	0.5	0.0
12	Ballast Tank-2S	Tank	1.025	Sea Water	16.5	19.0	0.0	3.0	0.5	0.0
13	Chain Locker	Compart-ment			19.0	20.0	-1.0	1.0	3.5	0.0
14	Aft Peak Tank	Tank	1.025	Sea Water	0.0	3.5	-3.0	3.0	3.5	0.0
15	Fore Peak Tank	Tank	1.025	Sea Water	19.0	21.5	-3.0	3.0	3.5	0.0

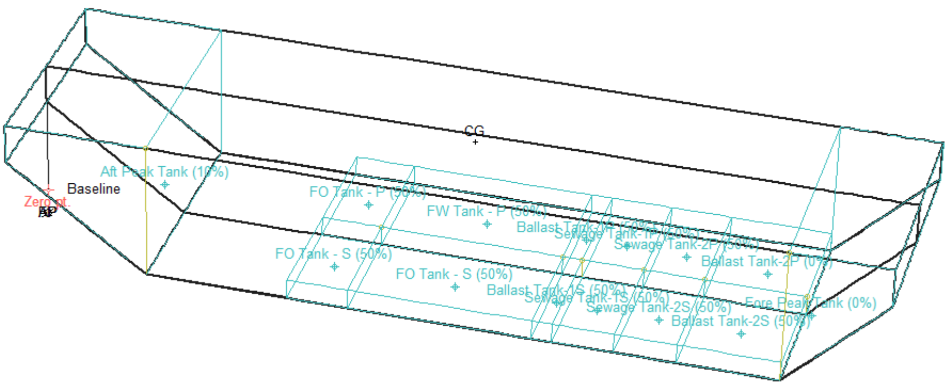

Figure 14. Room definition (isometric view)

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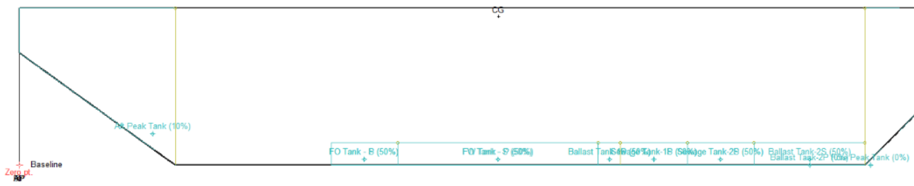

Figure 15. Room definition (side view)

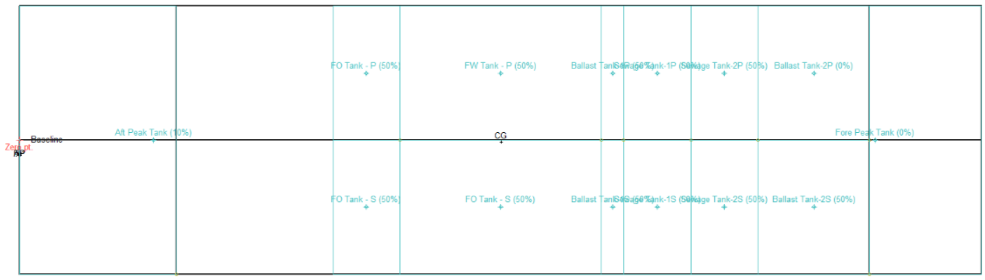

Figure 16. Room definition (top view)

Figures 14, 15, and 16 shows the tank definition display in the stability analysis software from the front, side, and top views. The results of the stability analysis on 4 load cases show that all IMO A.749 criteria in the form of area, angle at maximum GZ, and initial GMt have been met, as shown in Table 4.

Table 4. Stability analysis results for 4 load case conditions

Code	Criteria	Value	Load case				Status
			1	2	3	4	
			Actual	**Actual**	**Actual**	**Actual**	
A.749(18) Ch3 - Design criteria applicable to all ships	3.1.2.1: Area 0 to 30	3.16	19.85	16.76	21.57	18.95	Pass
A.749(18) Ch3 - Design criteria applicable to all ships	3.1.2.1: Area 0 to 40	5.16	30.25	24.48	32.75	27.33	Pass
A.749(18) Ch3 - Design criteria applicable to all ships	3.1.2.1: Area 30 to 40	1.72	10.40	7.71	11.18	8.38	Pass
A.749(18) Ch3 - Design criteria applicable to all ships	3.1.2.2: Max GZ at 30 or greater	0.20	1.05	0.82	1.12	0.89	Pass
A.749(18) Ch3 - Design criteria applicable to all ships	3.1.2.3: Angle of maximum GZ	25.00	32.70	26.20	33.00	25.10	Pass
A.749(18) Ch3 - Design criteria applicable to all ships	3.1.2.4: Initial GMt	0.15	2.86	2.38	3.16	2.92	Pass

4. Conclusion

The design of a self-propelled floating café has been successfully developed as a supporting facility for maritime tourism in Surabaya. The vessel's principal dimensions and monohull configuration are found to be suitable for stable and efficient operation at a service speed of 6 knots. The resistance and powering analysis indicate that the selected propulsion system is capable of meeting operational demands with an adequate safety margin, ensuring reliable performance. Furthermore, the general arrangement demonstrates that the vessel can effectively accommodate both operational systems and occupant needs.

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The design of fuel, freshwater, and sewage tanks has been appropriately determined to support continuous operation for 48 hours, ensuring self-sufficiency and compliance with basic service requirements for passengers and crews. In addition, the vessel fulfills the required stability criteria under all evaluated loading conditions, confirming its safety and reliability during operation. Overall, this design provides a feasible and practical solution for enhancing maritime tourism infrastructure, particularly in urban coastal areas such as Surabaya, by integrating functionality, safety, and operational efficiency.

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6. References

[1] R. Santoso, "Tourism-led economic growth in coastal areas: a qualitative study of marine economies," *Jurnal Ilmu Ekonomi Terapan,* vol. 10, no. 2, pp. 238–251, 2025, doi: 10.20473/jiet.v10i2.76620.

[2] R. B. Miazaki and D. I. Setyadi, "Perancangan desain grafis lingkungan museum maritim surabaya north quay di pelabuhan tanjung perak surabaya," *Jurnal Sains dan Seni ITS*, vol. 8, no. 2, pp. F294–F299, 2019, doi: 10.12962/j23373520.v8i2.48183.

[3] M. A. Prasetyo, M. Musta'in, and H. Ikhwani, "Pemberdayaan potensi wisata pantai kenjeran surabaya," *Jurnal Teknik ITS*, vol. 9, no. 2, pp. G137–G142, 2020, doi: 10.12962/j23373539.v9i2.57116.

[4] D. P. Yoly and G. W. Pradana, "Peran pemerintah daerah dalam pengembangan wisata perahu kalimas di kota surabaya (studi pada dinas kebudayaan, kepemudaan, dan olahraga serta pariwisata kota surabaya)," *Socius: Jurnal Penelitian Ilmu-Ilmu Sosial*, vol. 2, no. 12, pp. 904–915, 2025, doi: 10.5281/zenodo.16421988.

[5] A. Solihin, N. L. Choirunnisa, and M. Mintohari, "Eksplorasi etnosains monumen kapal selam surabaya sebagai sumber belajar IPAS sekolah dasar," *Jurnal Review Pendidikan Dasar: Jurnal Kajian Pendidikan dan Hasil Penelitian*, vol. 10, no. 2, pp. 137–148, 2024, doi: 10.26740/jrpd.v10n2.p137-148.

[6] R. Oktaviani, A. Rahmatulloh, and A. A. Haerulloh, "Pemanfaatan peninggalan arkeologis bangkai kapal onrust untuk mendukung pengembangan pariwisata sejarah di barito utara, kalimantan tengah," *AMERTA*, vol. 42, no. 2, pp. 153–170, 2024, doi: 10.55981/amt.2024.3860.

[7] F. R. Yunita, B. Suharto, and S. Isnaini, "Developing kenjeran as a tourism destination based on fisher community approach," *Indonesian Journal of Tourism and Leisure*, vol. 5, no. 2, pp. 123–136, 2024, doi: 10.36256/ijtl.v5i2.440.

[8] S. Marsudi, "Based on coastal management policy sustainable development in kenjeran beach," *Maritime Park: Journal of Maritime Technology and Society*, vol. 1, no. 1, pp. 34–39, 2022, doi: 10.62012/mp.v1i1.19934.

[9] Menteri Kelautan dan Perikanan, "Keputusan menteri kelautan dan perikanan nomor 16 tahun 2024 tentang dokumen perencanaan pengelolaan hasil sedimentasi di laut," 2024.

[10] E. S. Koenhardono, S. Sarwito, R. S. Gurning, M. B. Zaman, A. Baheramsyah, I. R. Kusuma, B. Cahyono, J. Prananda, T. Yulianto, and Hasannudin, "Development of ecotourism floating restaurant in surabaya city," *MATEC Web of Conferences*, vol. 177, p. 01010, 2018, doi: 10.1051/matecconf/201817701010.

[11] E. V. Lewis, "Principles of naval architecture volume I stability and strength", Jersey City: The Society of Naval Architects and Marine Engineers, 1988.

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[12] C. Sasmito, M. Sano, and A. Kadir, "Improvement on resistance performance of self-propelled barge in indonesia," *Proceeding of Ocean, Mechanical and Aerospace - Science and Engineering*, vol. 5, no. 1, pp. 57–62, 2018.

[13] Sarwoko and B. Santoso, "Computational tahanan kapal untuk menentukan daya mesin utama kapal ikan 5 GT," *Jurnal Rekayasa Mesin*, vol. 14, no. 1, pp. 23–26, 2019, doi: 10.32497/rm.v14i1.1450.

[14] C. V. Muñoz, G. T. Brockhaus, M. S. Inzunza, and C. C. Salazar, "Statistic model for the estimation of the resistance of landing craft hulls," *Ship science & technology*, vol. 13, no. 26, pp. 45–50, 2020, doi: 10.25043/19098642.197.

[15] S. W. Satoto, F. N. Tampubolon, Juliarni, M. Y. Aksyaputra, H. I. Raihan, D. L. R. Sitompul, A. S. Purba, N. A. Prasetyo, and G. Rindo, "Studi desain rencana umum kapal pengangkut sampah sebagai inisiasi pembuatan desain kapal sejenis di batam, kepulauan riau," *Jurnal Teknologi dan Riset Terapan (JATRA)*, vol. 7, no. 1, pp. 7–15, 2025, doi: 10.30871/jatra.v7i1.9282.

[16] G. Suhardjito, "General arrangement: rencana umum kapal," Archimedia, 2006.

[17] Pemerintah Republik Indonesia, "Peraturan pemerintah nomor 31 tahun 2021 tentang penyelenggaraan bidang pelayaran," 2021.

[18] A. B. Biran and R. L-. Pulido, "Ship hydrostatics and stability," Oxford: Butterworth-Heinemann, 2014.

[19] International Maritime Organization, "Resolution A.749(18) code on intact stability for all types of ships," 1993.

[20] International Maritime Organization, "Resolution MSC.267(85) adoption of the international code on intact stability," 2008.

[21] Z. Hilmy, Z. Dzirrusydi, and T. Susilo, "Perancangan lines plan kapal menggunakan computer aided design engineer (CAD-CAE)," Cipta Media Nusantara (CMN), 2025.

[22] K. Anam, E. S. Hadi, and P. Manik, "Pembuatan aplikasi perancang lines plan dengan metode diagram NSP (nederlandsch scheepbouwkundig proefstation) berbasis macro VBA MS. office excel dan pendekatan b-spline untuk mempermudah proses perancangan kapal," *Jurnal Teknik Perkapalan*, vol. 4 no. 4, pp. 811–820, 2016.

[23] A. F. Molland, S. R. Turnock, and D. A. Hudson, "Ship resistance and propulsion," United States of America: Cambridge University Press, 2011.