Project 1: Design of Eight-Bedroom Houseboat for Varanasi.

IDC School of Design

Submitted by:
Roshan kumar sahu
176390003
Mobility & Vehicle Design

DECLARATION

I declare that this written report represents my own idea in my own words, and where others, ideas or words have been included, I have mentioned the original source. I also declare that I have adhered to all principles of academic honesty and integrity and have not falsified, misinterpreted or fabricated any idea, data, facts or source in my submission. I understood that any violation of the above will be cause for disciplinary action by the institute and can also penal action from the source from which proper permission has not been taken, or improperly cited.

Roshan kumar Sahu
176390003
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ACKNOWLEDGEMENT

I would like to sincerely thank Mr. Unni Mohan , Designer at Samudra Shipyard Ltd. for his valuable guidance and creative input throughout the project.
I would like to thank Dr. S. Jeevan, CEO, Samudra Shipyard (P) Ltd. for giving me this opportunity to work for his firm and gain a better understanding about water transportation.

Roshan kumar Sahu

CERTIFICATE

Samudra®

Ref: SSPL/GN / 2018/188
Date: 05th July 2018

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Mr. **Roshan Kumar Sahu** (176390003), student from Industrial Design centre (IIT Bombay) has completed his internship with us from 7th May 2018 to 12th June 2018 on design of Eight **Bedroom Catamaran Houseboat for Varanasi.**

For **Samudra Shipyard Pvt.Ltd.**

Dr.S.Jeevan
Chairman & Managing Director

the art & science of BOATBUILDING
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MEMBER ABYC

SAMUDRA SHIPYARD (P) LTD.

Established in 1991, Samudra Shipyard (P) Ltd. is India's No.1 fibre glass boat building company. It is known for its lasting boat building technology. Unlike others, Samudra Shipyard designs and manufactures their composite boats up to 34m in length for travel, tourism, defence and fishing. It also manufactures water sport equipments, marker buoys and other marine related products.

About the Industry

As Samudra is known for its composite boat building techniques in manufacturing, we got an opportunity to take a closer look at how things are made. There are many ongoing projects like 'Kopra Vallam' a day cruiser, fire fighting boat for Sri Lank Govt. and many such other projects. FRP(Fibre Reinforced Plastic) is widely used in manufacturing the boats. They design the boat then make a mould out of wood which is later used for making the parts. FRP is sandwiched with resin combined with hardener and the let to dry. A gel coat is applied as a last layer which gives the part a glossy look. Generally to save time and manufacturing costs, it is applied

Manufacturing bay

Manufacturing bay

Applying Resin

Drying out

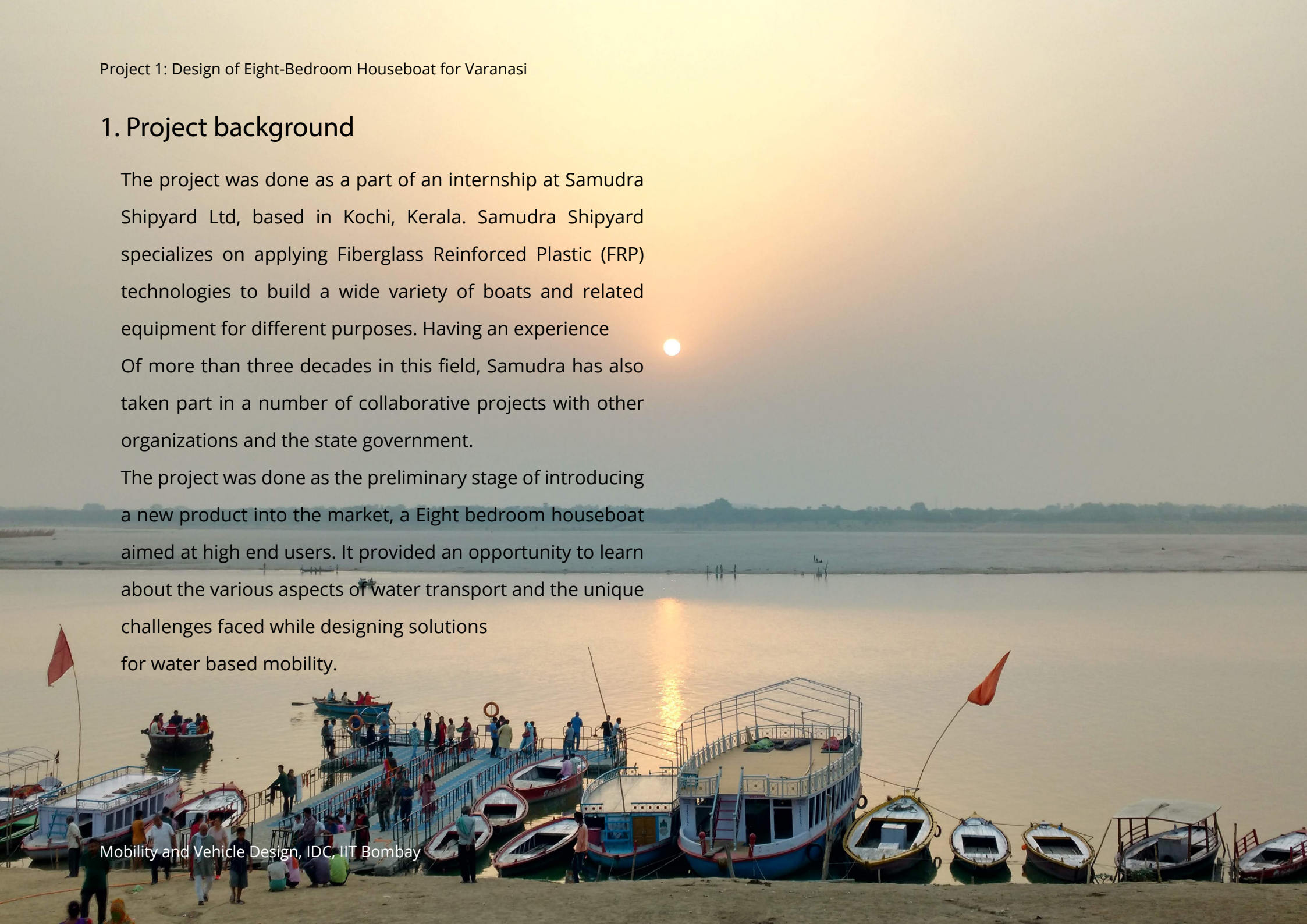
Manufacturing bay

CONTENT:

1. Project background

The project was done as a part of an internship at Samudra Shipyard Ltd, based in Kochi, Kerala. Samudra Shipyard specializes on applying Fiberglass Reinforced Plastic (FRP) technologies to build a wide variety of boats and related equipment for different purposes. Having an experience
Of more than three decades in this field, Samudra has also taken part in a number of collaborative projects with other organizations and the state government.

The project was done as the preliminary stage of introducing a new product into the market, a Eight bedroom houseboat aimed at high end users. It provided an opportunity to learn about the various aspects of water transport and the unique challenges faced while designing solutions
for water based mobility.



2. Preliminary Research

As a part of getting familiar with the different types of water transport and experience of Water transport, we spent a few days travelling around places such as Kochi, Alappuzha and Kollam. The observations done as a part of this provided a highly beneficial groundwork for the completion of the project.

Backwater at KERELA:

The Kerala backwaters are a chain of lagoons and lakes lying parallel to the Arabian Sea coast. The network includes five large lakes linked by canals, both man-made and natural, fed by 38 rivers, and extending virtually half the length of Kerala state. The backwaters were formed by the action of waves and shore currents creating low barrier islands across the mouths of many rivers flowing down from the Western Ghats range. In the midst of this landscape there are a number of towns and cities, which serve as the starting and end points of backwater cruises. The backwaters have a unique ecosystem: freshwater from the rivers meets the seawater from the Arabian Sea. A barrage has been built near Neendakara, Kollam, so salt water from the sea is prevented from entering deep inside, keeping the fresh water intact. Such fresh wateris extensively used for irrigation purposes. They also nurture a thriving ecosystem of diverse flora and fauna. Lined with paddy fields and endless coconut trees, the backwaters are an iconic feature of Kerala.

Back water

Shikara – Alappuzha:

The Shikara is a concept borrowed from the famous day-cruising boats used in Dal Lake, Kashmir. These are typically small boats which can seat up to 10 people. The superstructure is open from sides to allow maximum visibility around while the roof provides shade and basic rain protection. The driver sits up front which gives him good command of maneuvering. The passengers have plush chairs, divans and cushions lined along the sides of the hull for seating. The superstructure uses a combination of materials for construction. GI pipes and bamboo are used for framework, along with wooden pillars and covered with woven bamboo sheets. Coir, a traditional rope made using coconut fibres, is used to tie the structure together as well as wrapping some rods or beams. The open structure and the sedate pace make the Shikara a relaxing

Shikara

Driver cab

Rear deck

State Transport Boat – Alappuzha to Kollam

The backwaters of Kerala houses the National Waterway – 3, stretching from Kollam to Kottappuram. The state government employs a number of passenger boats along the waterway. The boat has two levels: a closed lower deck and an open upper deck with roof. The lower deck is appointed in a similar way to the government buses, with cushioned seats and rexin seat covers, while the upper deck uses bare steel chairs. Devices like life jackets and life buoys are easily visible and accessible, but kept unsystematic-ally, often piled up on one of the empty seats. There are typically 4 crew members: a driver who controls the steering, another driver who controls the throttle and reverse, and 2 crew members who guard the doors as well as secure the boat to the jetty while docking. The short distance routes in Kochi, Alappuzha and Kollam are often crowded, but a long inter-city route as the one we took is rarely considered in favour of buses. The main reason for this is time consumption. The trip from Alappuzha to Kollam took 8 hours by boat while it is just 2.5 hours by road.

State transport Boat


Front deck Driver's Cab


Top deck

Kopra Vallam – Kochi

Kopra Vallam is Samudra Shipyard's take on a day-cruising vessel. It can accommodate up to 10 passengers, and is styled to emulate the traditional Kerala houseboats, as opposed to the Shikaras. Unlike Shikaras, Kopra Vallam has amenities such as a toilet and wash area. The driver sits above the passenger area, which gives them privacy and isolation. It also gives them a better all-round view. The chairs are also freely movable, maximising potential for social interaction among passengers.

Kopra Vallam

Front deck

Front deck

House Boat

The current crop of tourist houseboats were derived from the traditional 'Kettuvallam's used in the Kuttanad region of Alappuzha. These were traditionally cargo vessels, used to transport rice and coir over the waterways. The woven bamboo superstructure held together by coir has been adapted by modern houseboats to emulate the same look and feel. I travelled to Alappuzha in order to observe houseboats in closer detail. Modern houseboats are enormous, reaching up to 30 meters in length, and containing several rooms, often in more than one level. A typical houseboat has a living room, dining room, kitchen and at least 3 bedrooms, each with attached bathrooms. Larger boats have more rooms on the upper level, which may include party halls or conference rooms. Open balconies are also common. Houseboats can accommodate anywhere between 35 to 80 people. The exterior design of houseboats largely stick to the traditional look which has been followed for ages. The bamboo woven superstructure has a layer of plastic sheet within to insulate the interiors. Wooden doors, windows and sometimes pillars complete the traditional look. However, certain modern designs go for larger glass panels and sliding doors which improve passenger visibility. While the exteriors remain traditional, the interiors are rapidly getting modernized in order to evoke the feel of a high end hotel suite. Designs experiment with a variety of materials and textures to get the feel of high end luxury. Textured tiles and paint are used in certain wall areas to bring highlight to it. Houseboats are usually hired by large groups of people. During peak holiday seasons, rent can go up to Rs. 10000 per room. It is therefore preferred mostly by companies on corporate getaways, large family gatherings etc.

Alappuzha Houseboat

Alappuzha Houseboat

Front deck

Dinning hall

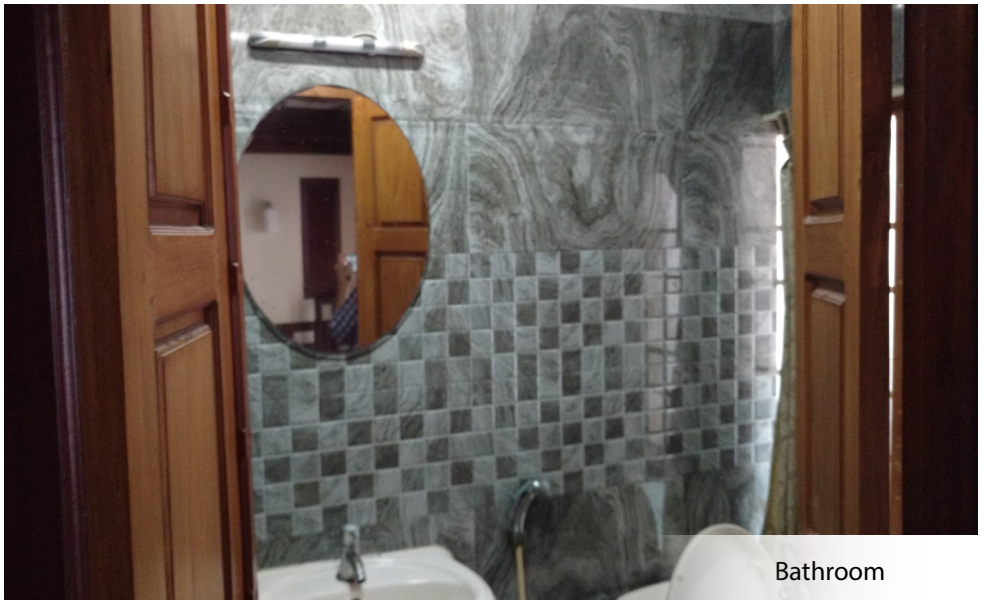
Hall way

Wash basin

Lights

Sofa at front of deck

Tea table at front of deck



Bathroom

Houseboat bedroom

Boat steering wheel

3.Secondary Research

After completing all necessary research at Kochi, we headed towards Varanasi, UP. As a part of getting familiar with the different types of water transport available and to do user study. At Varanasi we got opportunity to talk with client and gets his input for the project. The observations done as a part of this provided a highly beneficial groundwork for the completion of the project.

Varanasi:

Varanasi, the holy city of India, is also known by the name of Kashi and Benaras. Kashi, the city of Moksha for Hindus since centuries, is known for its fine-quality silks, 'paan' and Benares Hindu University and Avimukta of the ancient days, Varanasi is the most popular pilgrimage point for the Hindus. One of the seven holiest cities, Varanasi city is also one the Shakti Peethas and one of the twelve Jyotir Linga sites in India. In Hinduism it is believed that those who die and are cremated here get an instant gateway to liberation from the cycle of births and re-births.

Considered as the abode of Lord Shiva, Varanasi is situated on the banks of River Ganges, which is believed to have the power of washing away all of one's sins. As pundits here will tell you, whatever is sacrificed and chanted here or given in charity reaps its fruits thousand times more than those good deeds performed at other places because of the power of that place. It is believed that three nights of fasting in Varanasi city can reap you rewards of many thousands of lifetimes of asceticism!

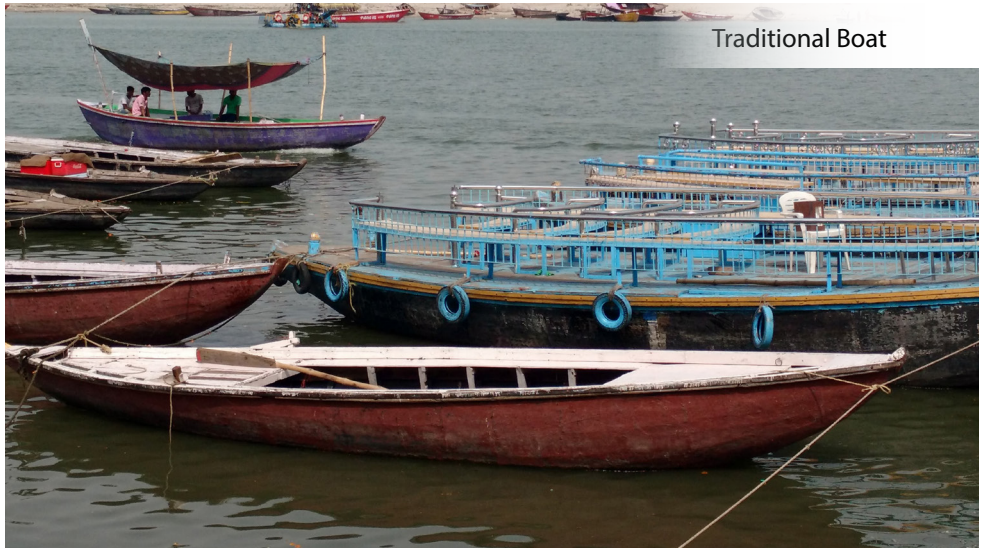
Varanasi Ghats

Varanasi Sunrise

Boats at Varanasi:

We did study of types of boats available at Varanasi Ghats and attractions. Boats at Varanasi are mostly made of wood. They are run and controlled by strong community known as MALHAR. Mostly they have row boats.

There are following type of boats available at Varanasi Ghats:



Traditional Boat

Traditional Sailor

2. 10-15 seater motorised single hull wooden boat.

Traditional Boat

Traditional Boat

Traditional Boat

2. 10-25 seater motorized single hull rooftop wooden boat.

Bajra (Budgerows)

Bajra (Budgerows)

4. Project Outline

The aim of the project was to design a eight bedroom houseboat which is based on Catamaran, and should offer five star facilities.
The hull can be 33 long and 13m wide, thus getting maximum space for all luxury. Being a Eight bedroom houseboat and expected to run between Patna-Varanasi, it is expected to stay on cruise for at-least 6 days. This would mean that the passengers and crew should have all the required amenities needed for such extended use. The need for such a product was also taken into consideration.
Manufacturing budget was also a consideration. Typical houseboats can cost anywhere from 50 lakhs to 1 crore to build. Since chosen boat is catamaran type, it will be costly but

Cruise ship

6 days

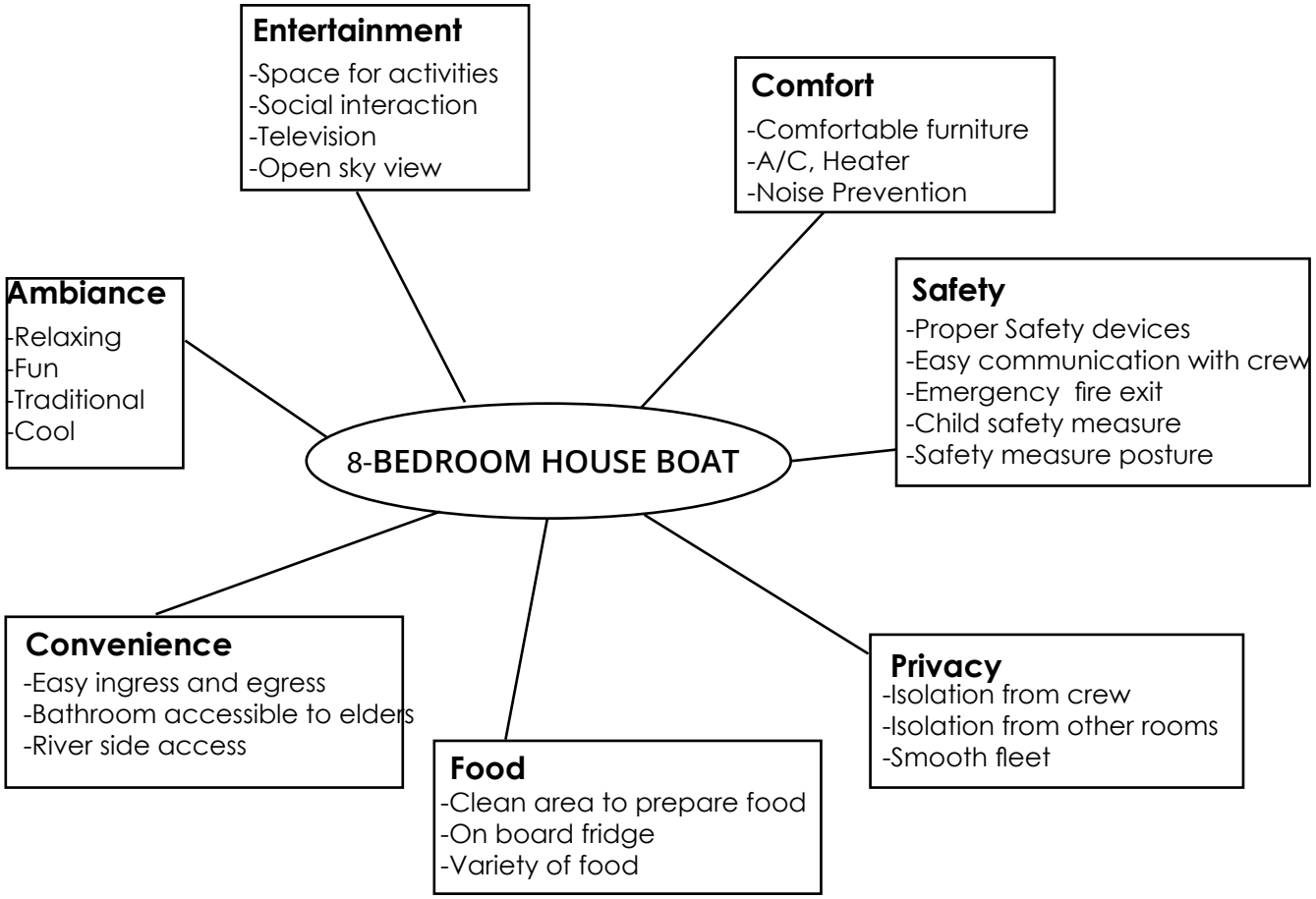
Diesel Engine

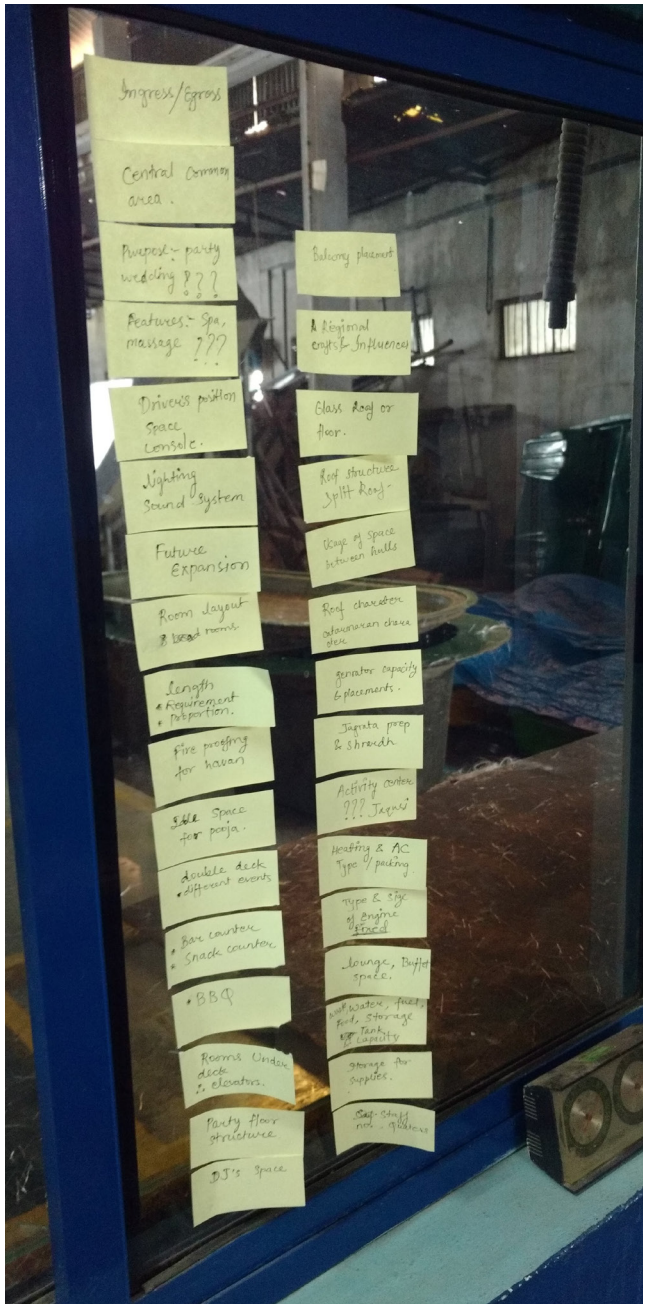
Max. 30

5 including driver

5. Initial Brainstorming

A brainstorming session was carried out in order to extract a number of keywords which would be beneficial for later stages. The keywords were initially accepted without question, and later grouped and eliminated based on relevance. The keywords were broadly classified into two: experience and safety, both being the primary concerns for passengers in a houseboat.





6. Users Profile

After the focus areas have been decided, the variations in user Requirements were considered. In order to better understand the requirements, four broad user persona were developed.

1. Family with small children
2. Family with infant
3. Young couple
4. Elderly couple

Common User Scenarios:
Having studied the user persona, certain common user scenarios were extracted from them.

-Easy ingress and egress
-Properly guarded railings
-Easy access to safety equipment
-Communication with driver and crew

1. Tall railing with glass covering or mesh.
2. Soft edges in Bedroom.
3. Comfortable ambiance.

1. Wheel chair access.
2. Comfortable and cool ambiance.
3. Proper lite room.
4. Easy communication with driver and crew.

1.Wider bed.
2. Easily unlockable bathroom door.
3. Proper attention by crew.

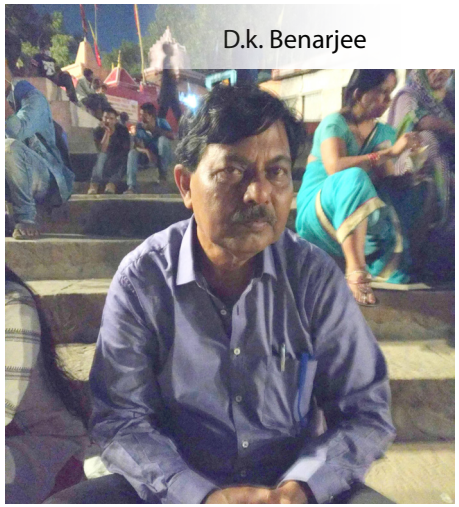
1. Romantic ambiance.
2. Privacy- less interference of crew.
3. Bath tub facility.

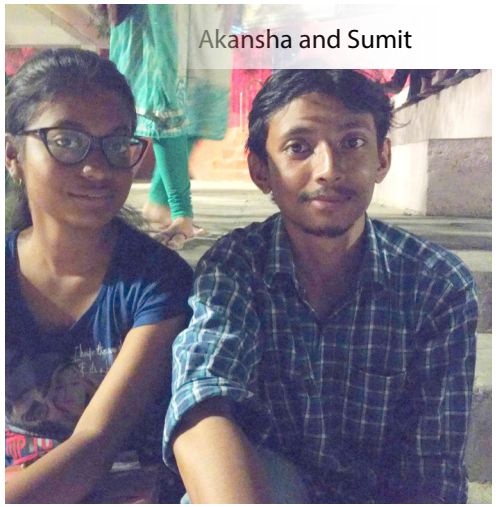
User study at VARANASI

User study was conducted at Varanasi. Though the boat was aimed for high end tourists, still questaires were asked from tourists to visualise their requirements. They were asked about type of facilities they want. This user stuy was followed by meeting with actual client who wants to run the service.


Rahul Shah


Suresh Dubey


D.k. Benarjee


Akansha and Sumit

Requirements by Users:

1.Users says 70% of tourists come from south India.

2. Seating should be comfortable.

3. Less noisy ride is preferable.

4. No scenery, so not so excited about the travel.

5. Good inclosed rooms with all luxury.

6. Users also needed water sport, pool.

7. No scenery is available but Varanasi is spiritual place. Boat should reflect Varanasi.

8. Open space should be more for night.

9. Comfortable and smooth ride is needed.

10. Five star facilities should be available.

11. Privacy is required.

12. AC is must.

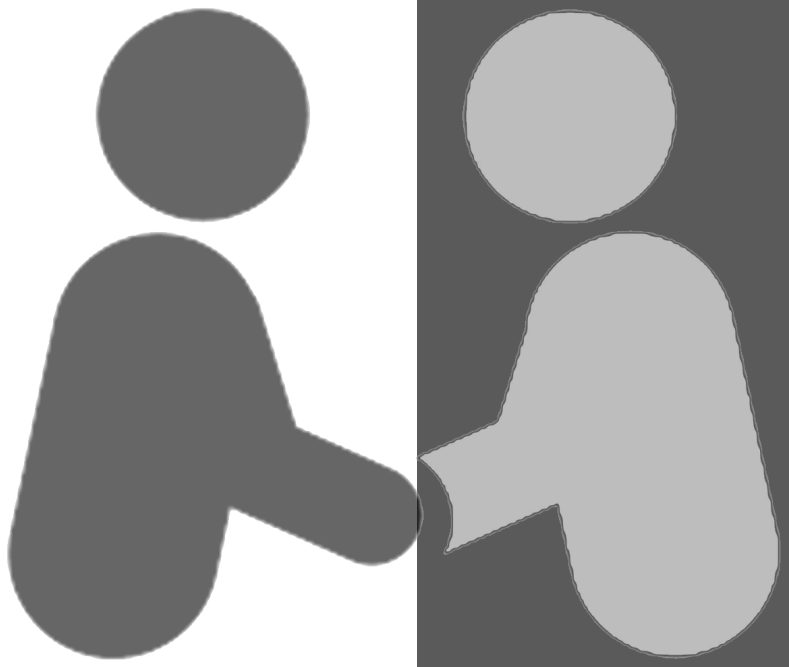
13. Large party hall is welcome.

14. Ramnagar fort can be benchmarked.

User study at VARANASI

Client's requirement:

1. Service is aimed for high end Indian/foreign tourists.
2. It should have 5 star luxury facilities.
3. Desired routes: Allahabad-Varanasi-Patna.
4. Currently in Varanasi boats are run by Malhar community.
5. To gain profit Cruise boat should have atleast 8 bedrooms.
6. Client expecting 7-8 staffs on-board.
7. Ship should depict uniqueness about Varanasi and its cuture.
8. Spacious dining space is required.
9. Expected tariff for the round trip journey: 15k-25k



7. Technical Aspect

The engine is a water cooled, inboard 4 cyclinder ALM4CTILLGB Power- 50kVA. Since it is a leisure vessel, top speed is just around 7-8 knots. Draft is the portion of the hull that is below the water level. Inlet pipes below the draft level suck cooling water into the engine. The hull also holds a water tank and bio-digester sewage tank for the bathroom and wash area.

Specifications:

Catamaran: Double hull

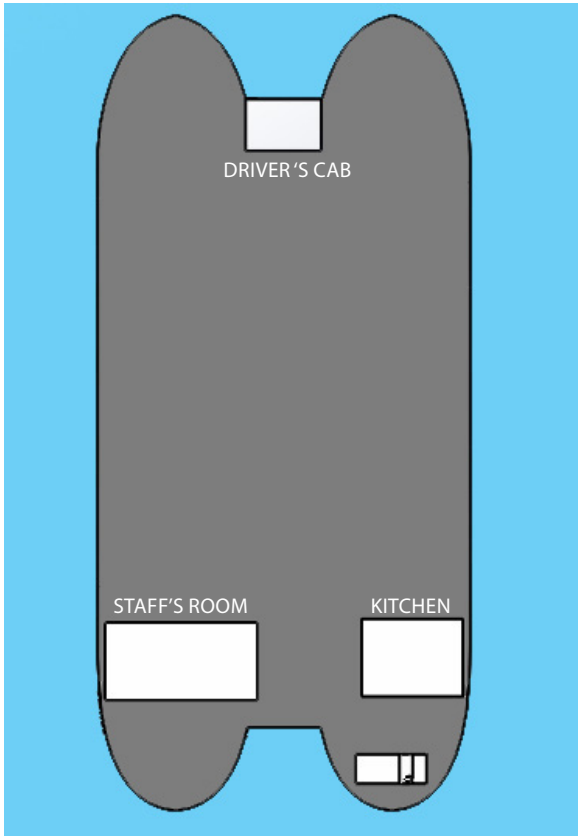
Overall Length: 33 meters, Breadth: 13 meters

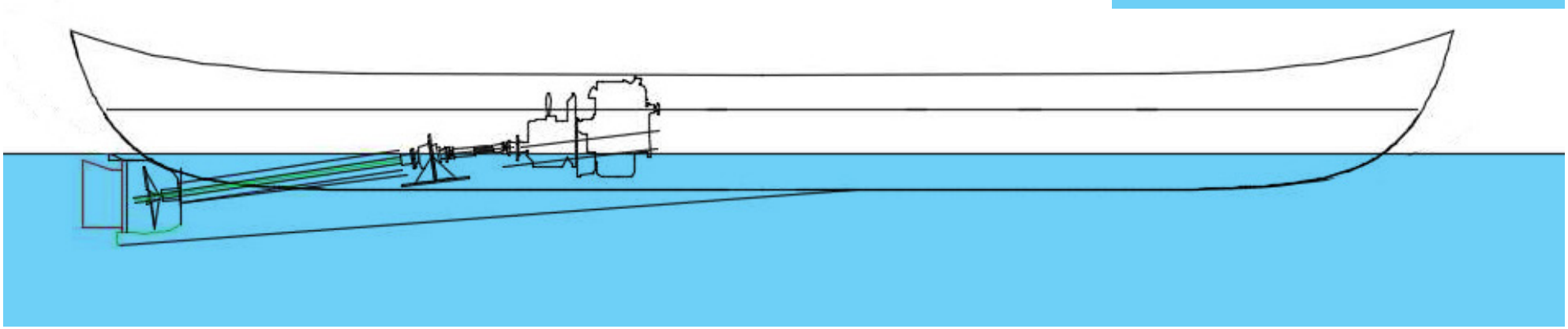
Speed: 7-8 knots

Engine: Ashok Leyand ALM4CTILLGB

Fuel Tank: 100 lt

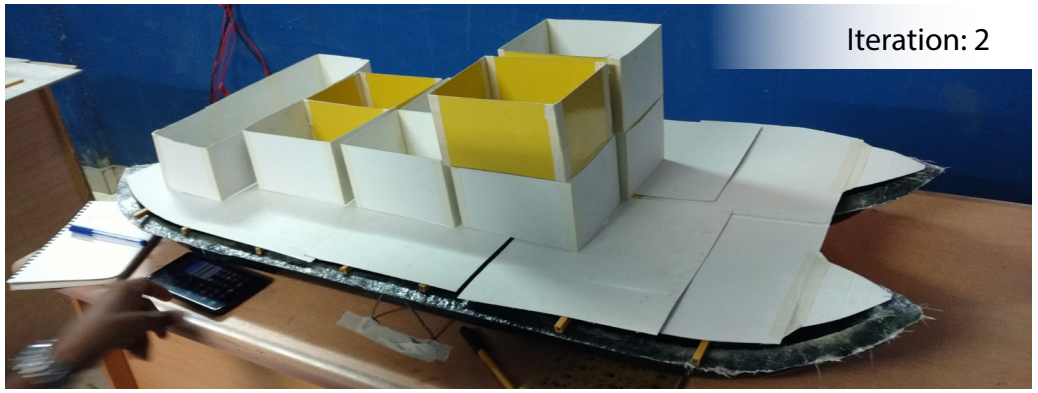
Fresh Water Capacity: 300 lt

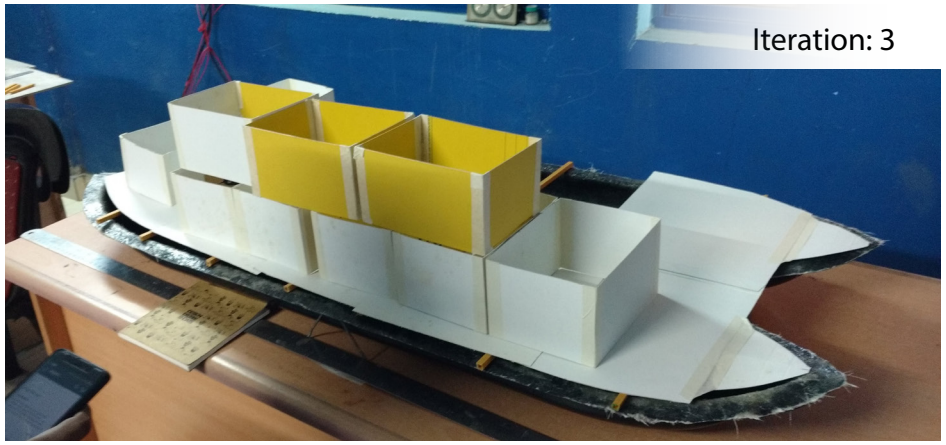




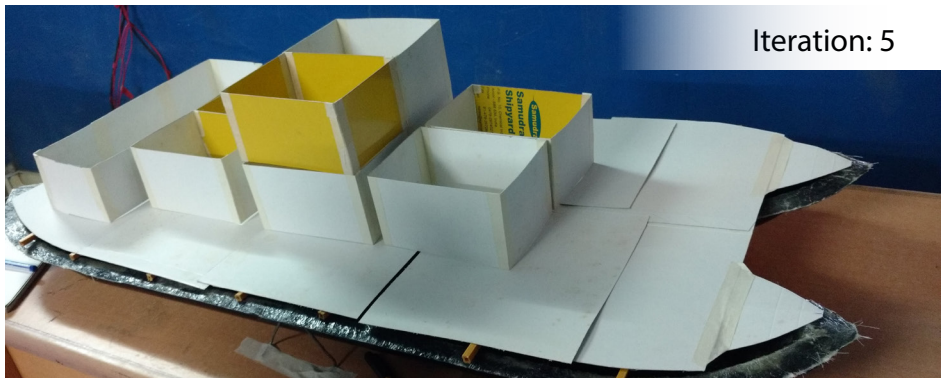
8. Layouts

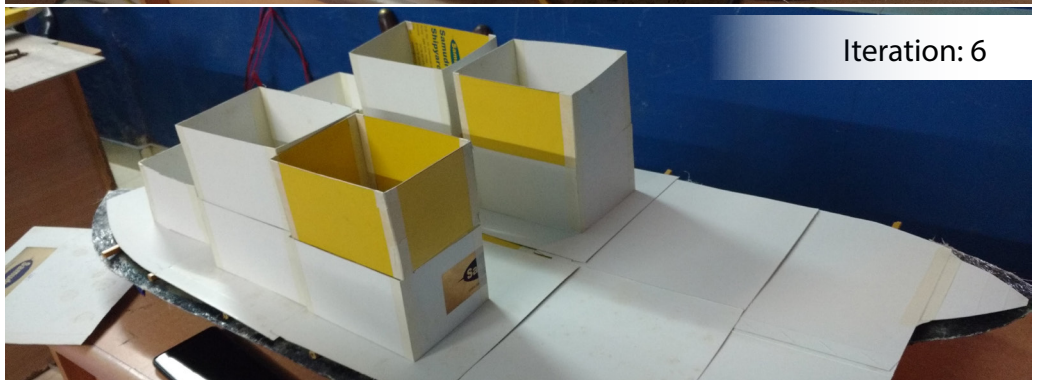

Iteration: 1


Iteration: 2

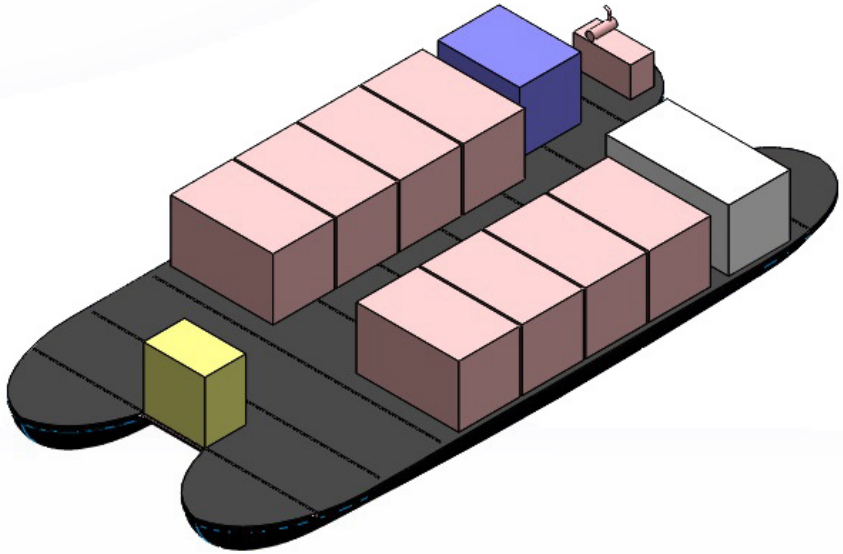

Iteration: 3

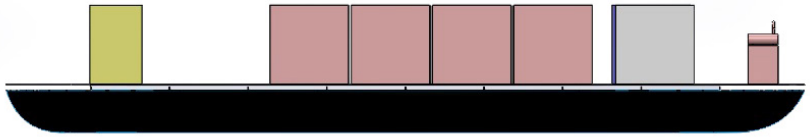

Iteration: 4

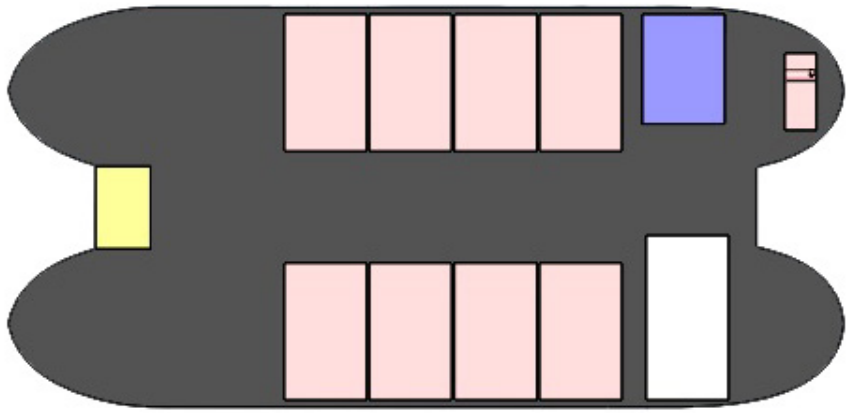

Iteration: 5


Iteration: 6

Layout iteration-1 has 8-bedrooms on the deck distributed symmetrically. Kitchen and staff rooms were placed at back. There is no rooftop area for activities. Roof equipped with solar panels. It has dinning area on front side of deck.







PROS

- Equally distirbution of weight.
-Individual bedroom with balcony.
-Increased privacy.
-More surface area for solar pannels.
- More efficiency due to solar pannels and less drag.

CONS

- Less area for dinning room
- Less area for lesiure activities.
- Less area for jacuzzi.

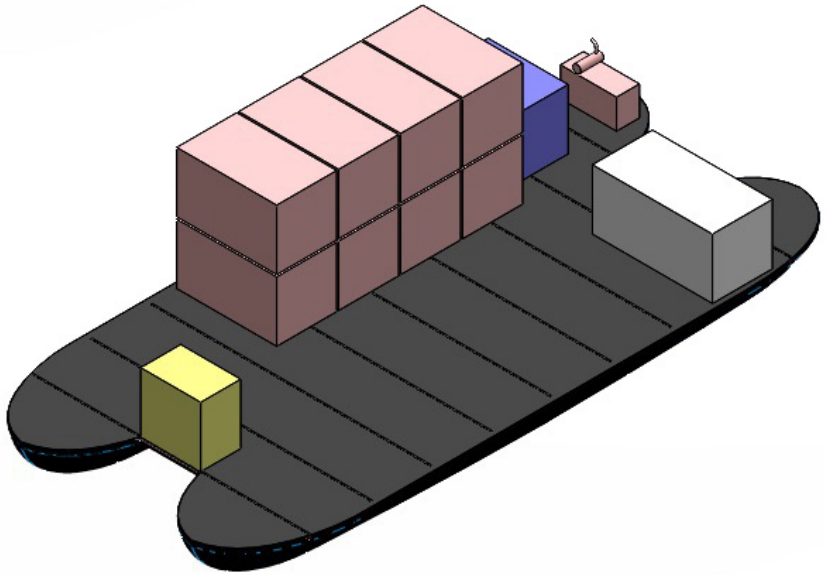
KITCHEN

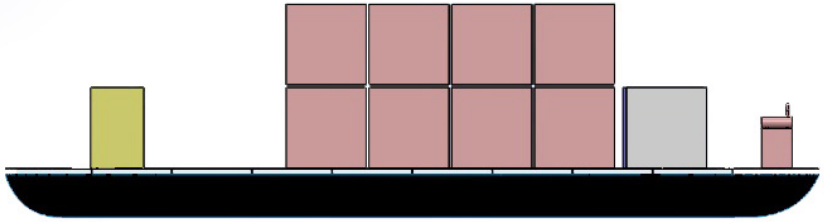
STAFFROOM

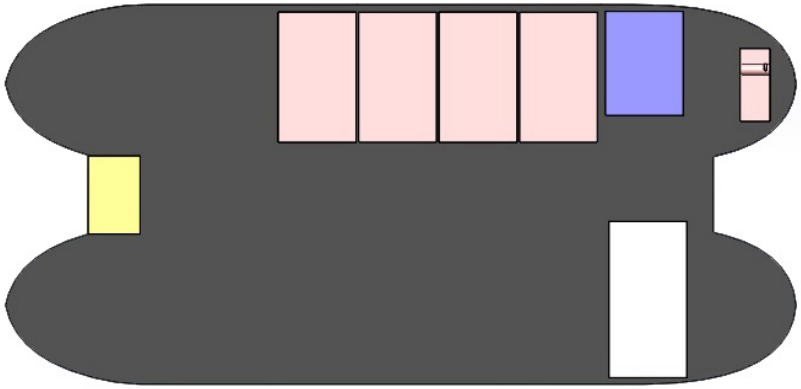
BEDROOMS

DRIVER

Layout iteration-2 has 8-bedrooms on the deck distributed on one side. 4 bedrooms on one level and other four one above level. Kitchen and staff rooms were placed at back. There is no rooftop area for activities. Roof equipped with solar panels. It has dinning area on open side.







PROS

- Individual bedroom with balcony.
- Large area is availble for activities.
-Increased privacy.
-More surface area for solar pannels.

CONS

- Weight distribution on one side will make vessel unsable.
- Asymmetric design will make asthetically unplaesant.
- One sided view of bedrooms will reduce options.

KITCHEN

STAFFROOM

BEDROOMS

DRIVER

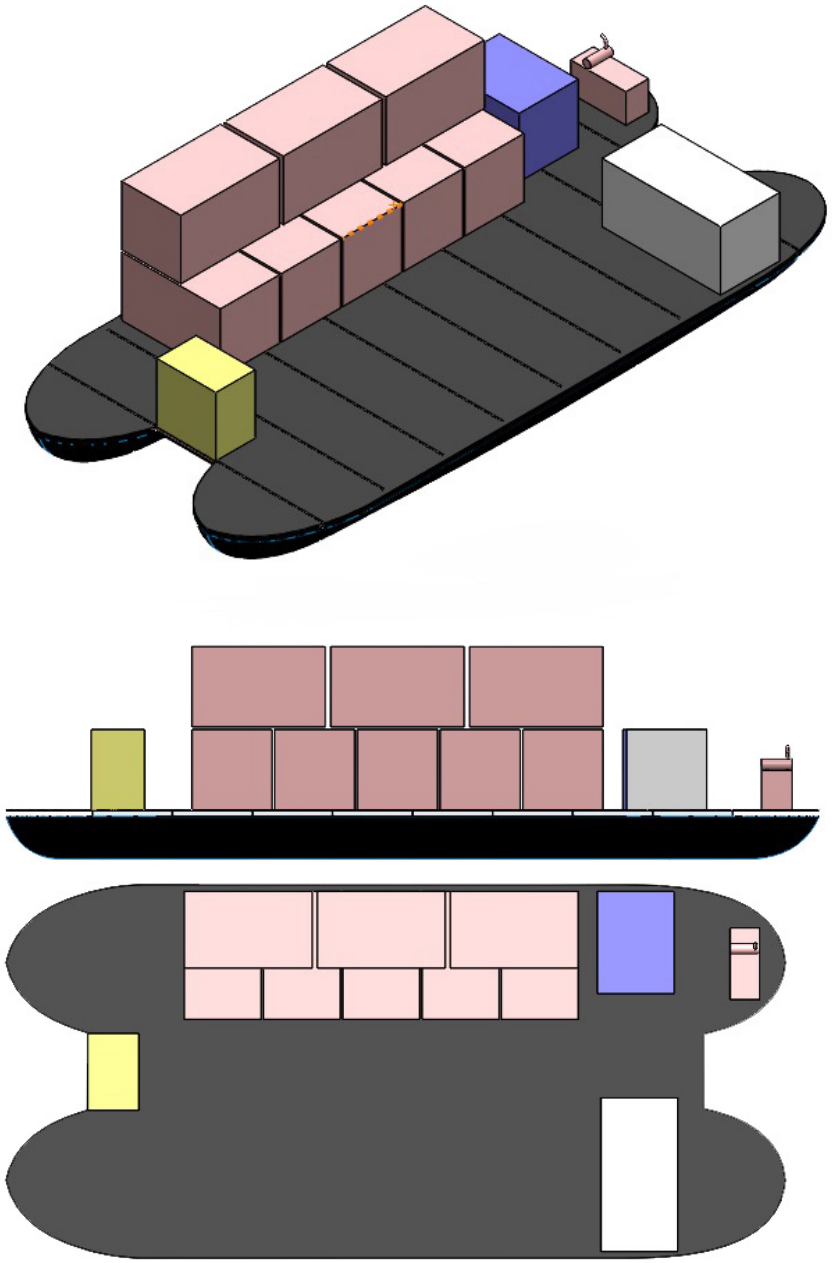
Layout iteration-3 has 8-bedrooms on the deck distributed on one side. Five bedrooms on one level and other three one above level. Kitchen and staff rooms were placed at back. There is no rooftop area for activities. Roof equipped with solar panels. It has dinning area on open side.

PROS

- Individual bedroom with balcony.
- Large area is availble for activities.
-Increased privacy.

CONS

- Weight distribution on one side will make vessel unsable.
- Asymmetric design will make asthetically unplaesant.
- One sided view of bedrooms will reduce options.



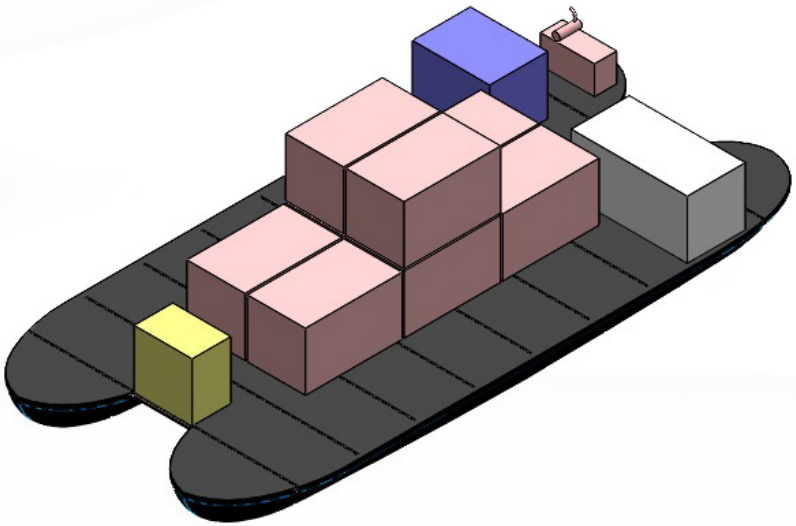
KITCHEN

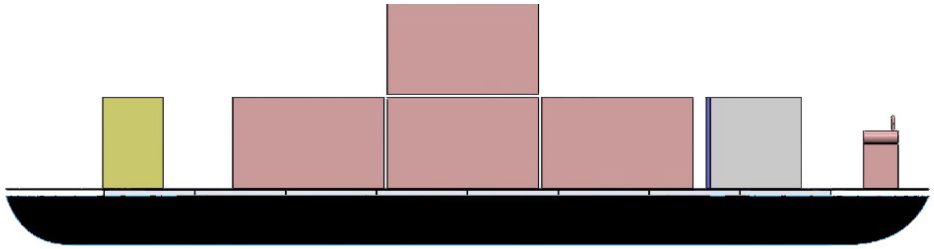
STAFFROOM

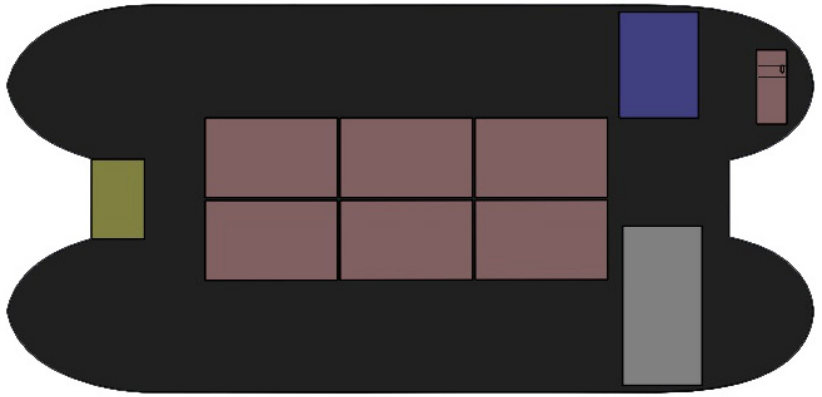
BEDROOMS

DRIVER

Layout iteration-4 has 8-bedrooms on the deck distributed on center. Six Bedrooms are symmterically distriibuted on one level and other two on above level. Kitchen and staff rooms were placed at back. There is no rooftop area for activities. Largebalcony forRoof equipped with solar panels. It has dinning area on two open sides.







PROS

- Individual bedrooms with large balcony can be an expensive room.
- Weight balanced at center making it very stable.
- Increased privacy.
- Large area is available to create indivdual balcony.

CONS

- No common dining area.
- No activity room for interaction.

KITCHEN

STAFFROOM

BEDROOMS

DRIVER

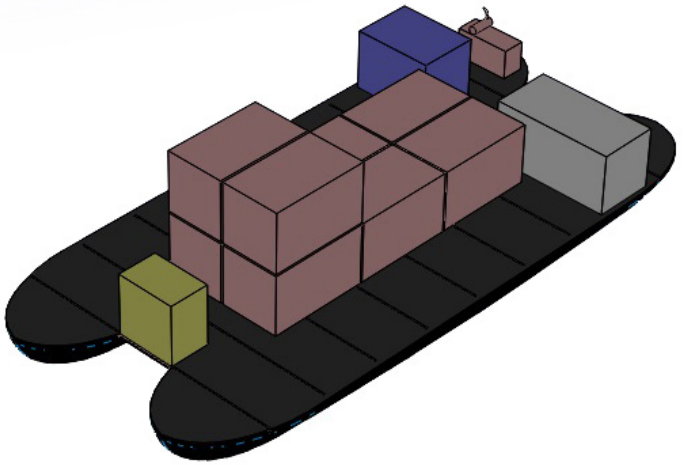
Layout iteration-5 has 8-bedrooms on the deck distributed on center. Six Bedrooms are symmterically distriibuted on one level and other two on above level. Kitchen and staff rooms were placed at back. There is no rooftop area for activities. Roof equipped with solar panels. It has dinning area on two open sides.

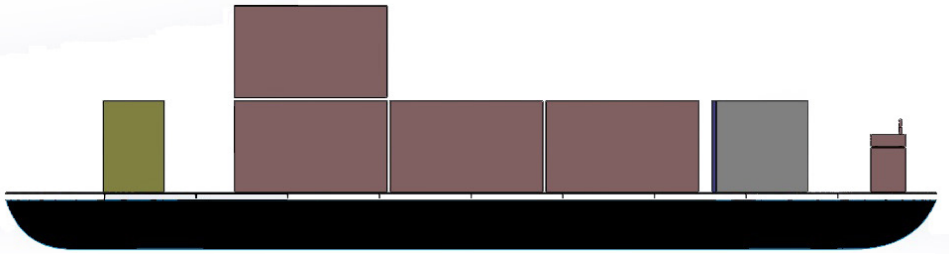
PROS

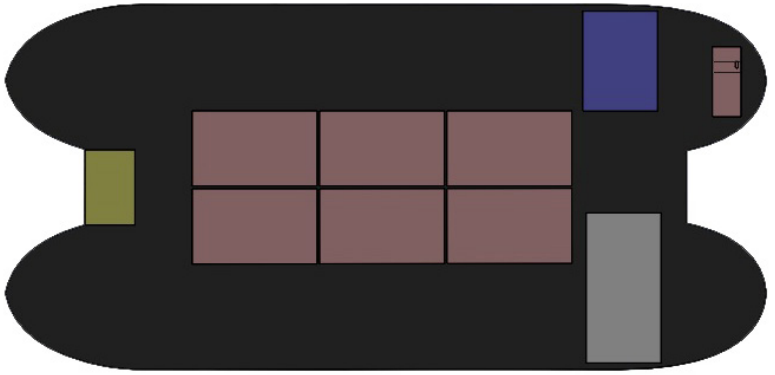
- Individual bedrooms with large balcony can be an expensive room.
- Weight balanced at center making it very stable.
- Increased privacy.
- Large area is available to create indivdual balcony.

CONS

- No common dining area.
- No activity room for interaction.







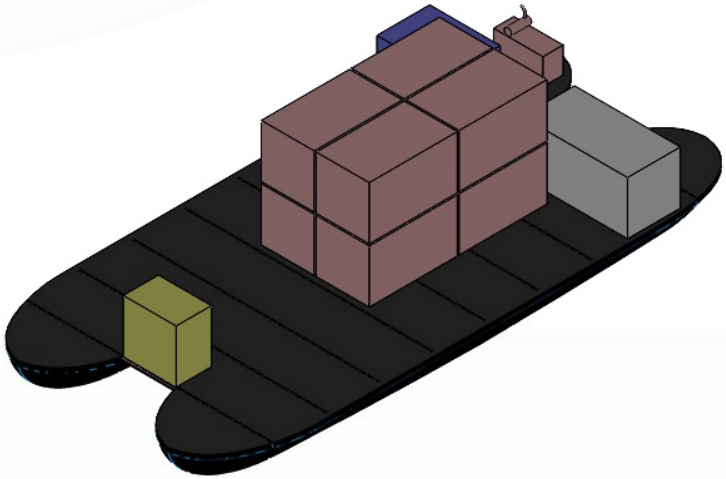
KITCHEN

STAFFROOM

BEDROOMS

DRIVER

Layout iteration-6 has 8-bedrooms on the deck distributed on center. Four Bedrooms are symmterically distributed on one level and other four are on above level. Kitchen and staff rooms were placed at back. There is rooftop area for activities. It has dinning area on two open sides and also on front.

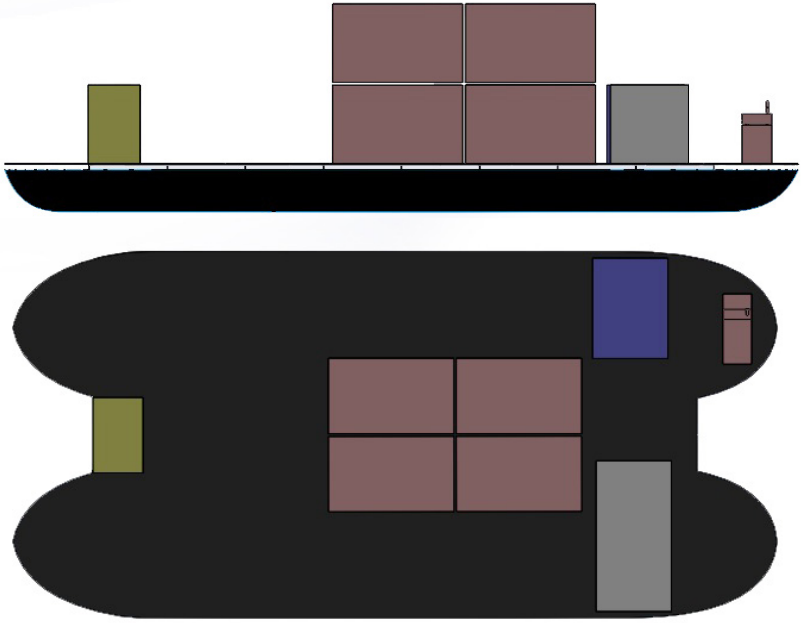


PROS

- Individual bedrooms with large balcony can be an expensive room.
- Weight balanced at center making it very stable.
- Increased privacy.
- Large area is available to create indivdual balcony.

CONS

- Weight is distributed at center, which is not recommended.
- No activity room for interaction.



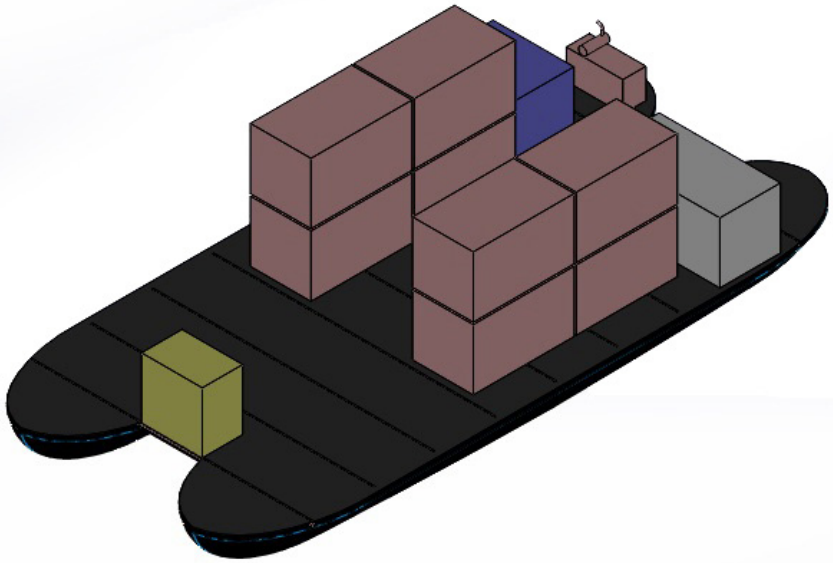
KITCHEN

STAFFROOM

BEDROOMS

DRIVER

Layout iteration-7 has 8-bedrooms on the deck distributed on center. Four Bedrooms are symmterically distributed on one level and other four on above level. Kitchen and staff rooms were placed at back. There is rooftop area for activities with jacuzzi. Roof equipped with solar panels. It has dinning area on front.

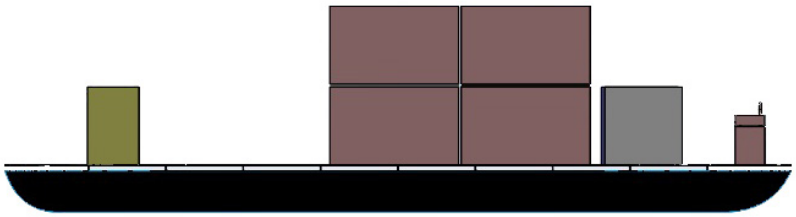


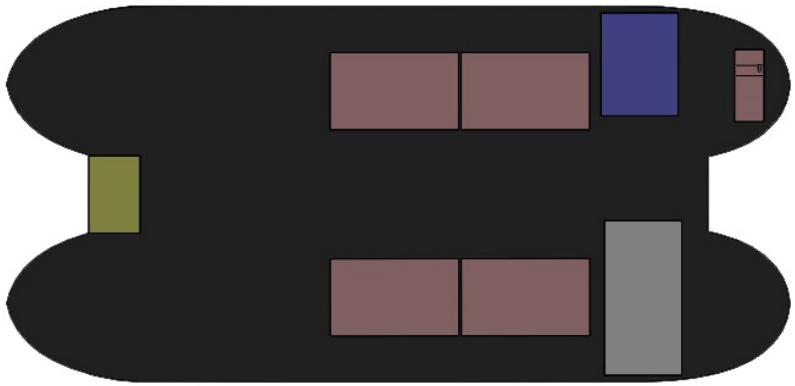
PROS

- Individual bedrooms with small balcony.
- Weight balanced at center making it very stable.
- Increased privacy.
- Large area is available to create indivdual balcony.
- Good open area is avialable.

CONS

- More cost of manufacturing.





KITCHEN

STAFFROOM

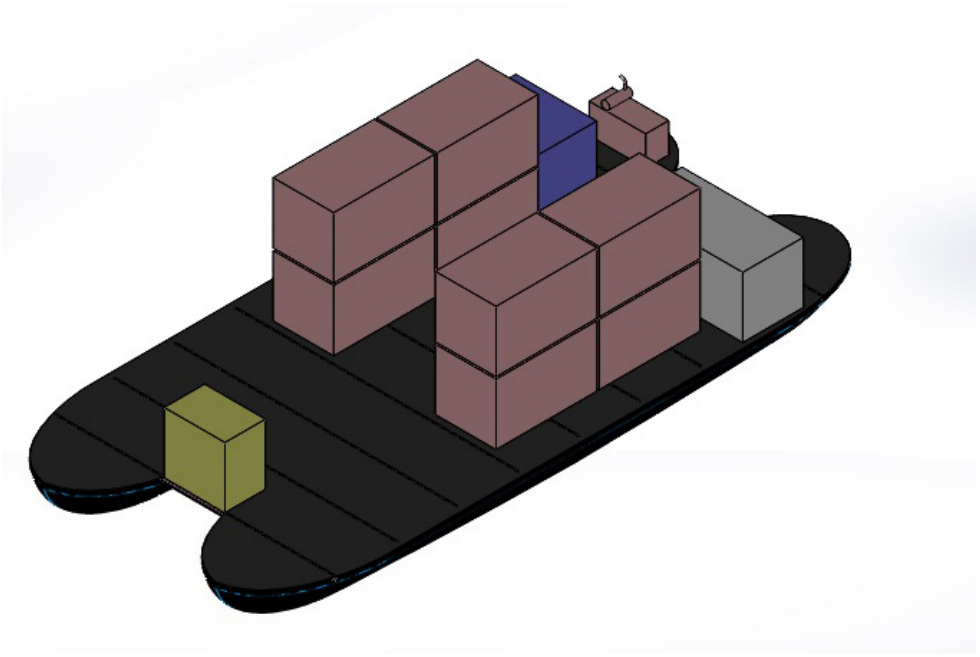
BEDROOMS

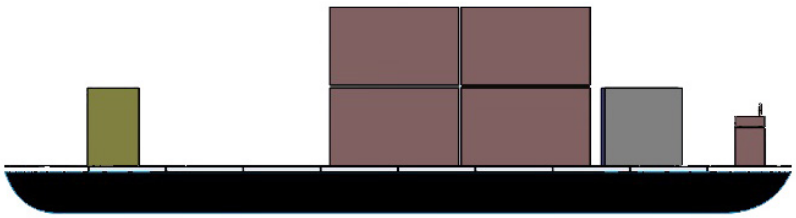
DRIVER

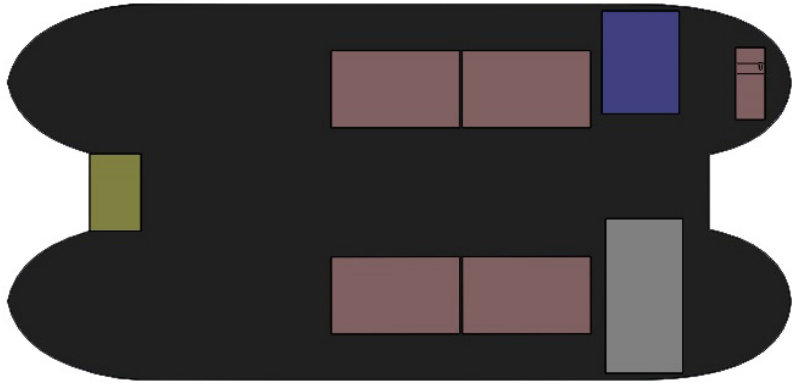
9. Exterior

Super structure consideration, Final layout selected was Layout 7 for safe balanced design. Exterior should refllect some features of Varanasi and it should look luxurious. So as to accommodate 8 bed rooms, boat is divided into two decks each deck had 4 bedrooms placed symmetrically. Rear is saved for kitchen and crew room. Rear also has area to do pooja in Ganga river.Front has refreshing twin open deck with driver in middle. Middle section has large dinning area to accommodate on board passengers. Every room has there own balcony with sitting area.

SELECTED LAYOUT FOR EXTERIOR



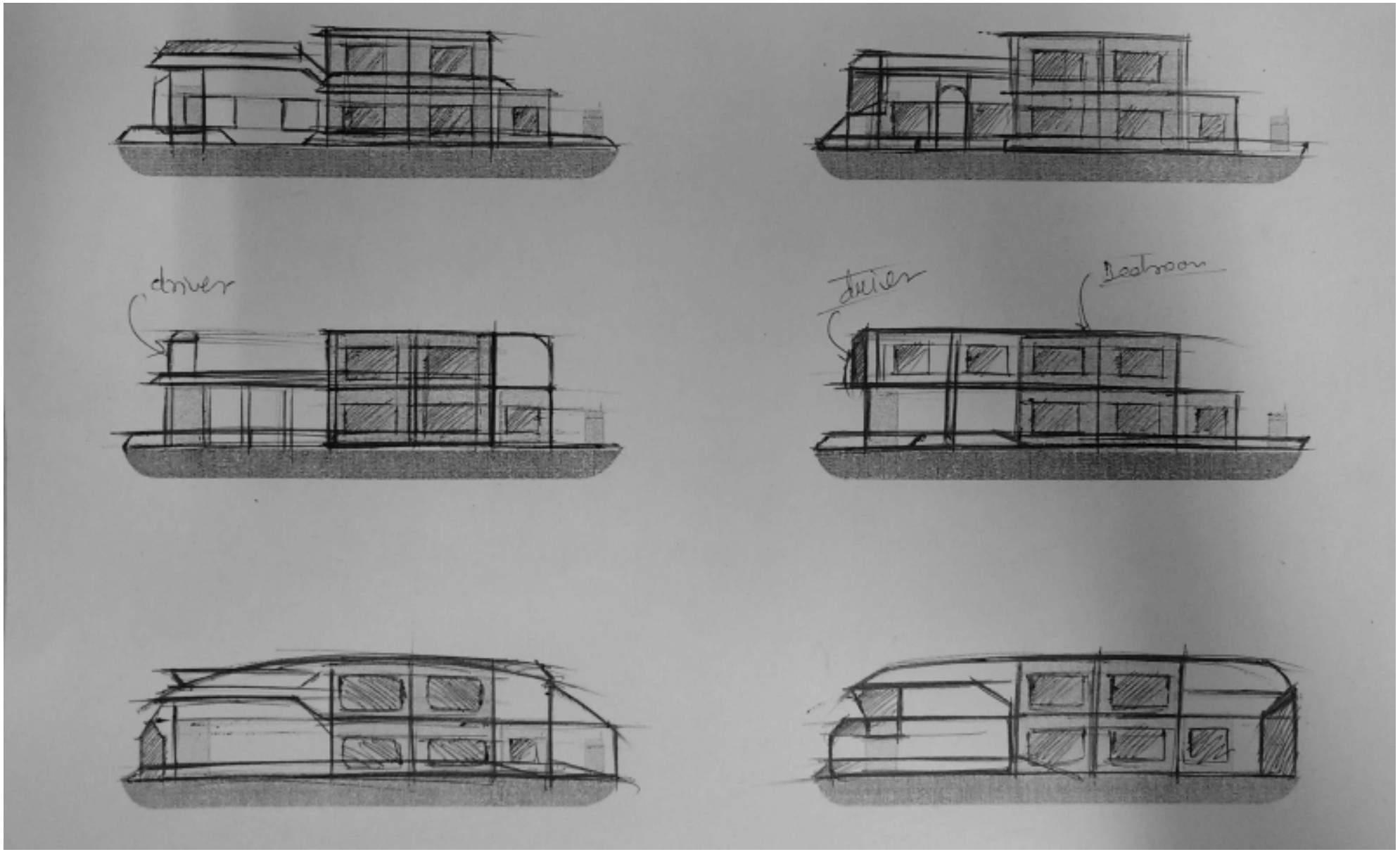




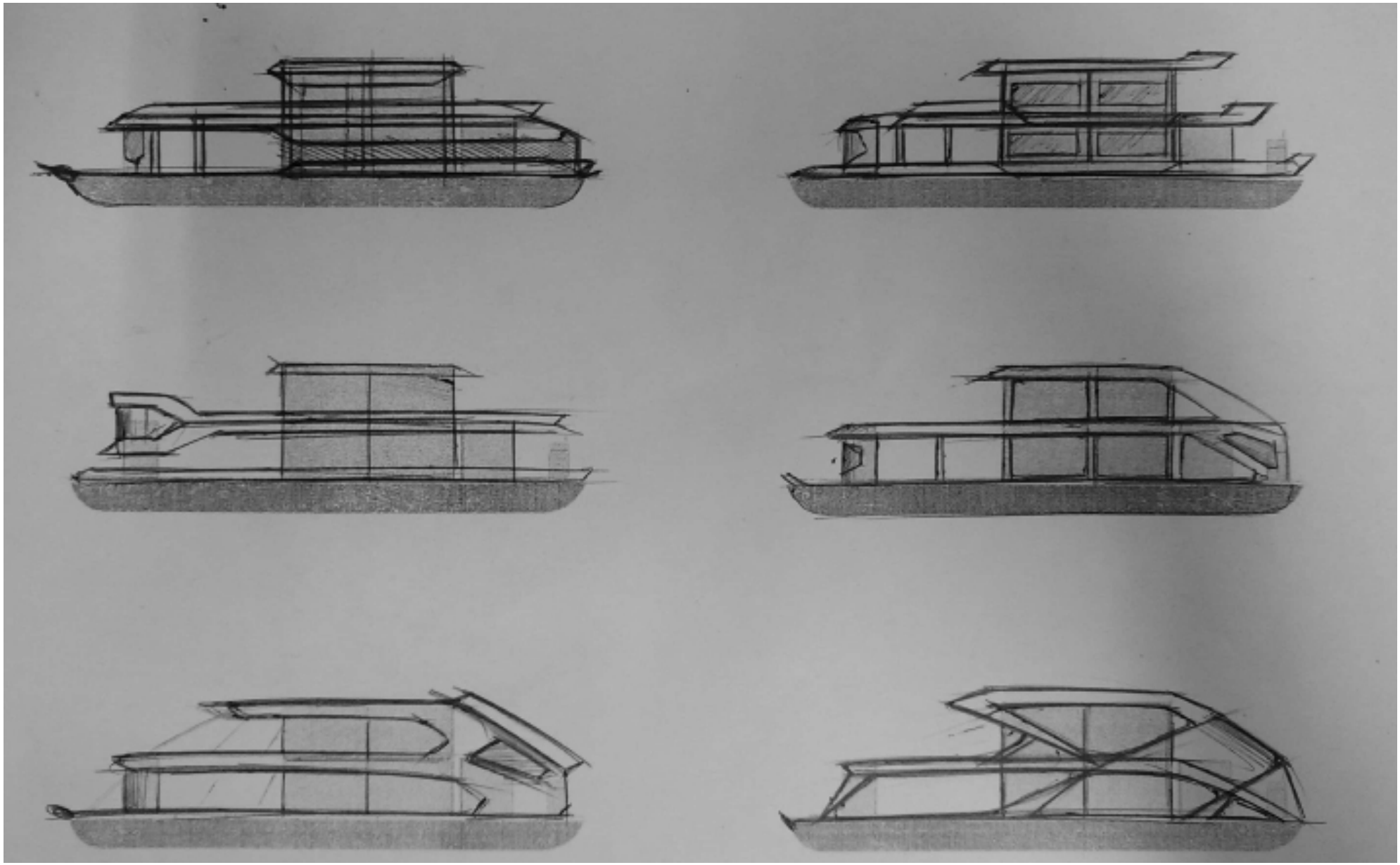
Moodboard

The exterior represents curvaceous nd with architectural infulence. It also represents few elements of Varnasi Architecture. A melting pot of cultures from India and beyond, the architecture of Kashi reflects diversity in construction, pattern and detailing. Ancient buildings falling to ruins, strong - proud pillars, traditional balconies, redbrickwork,connected congested lanes, intrusive modern buildings, soot covered temples and carpets of ash is what welcomes you to the Land of Spirituality; Kashi.

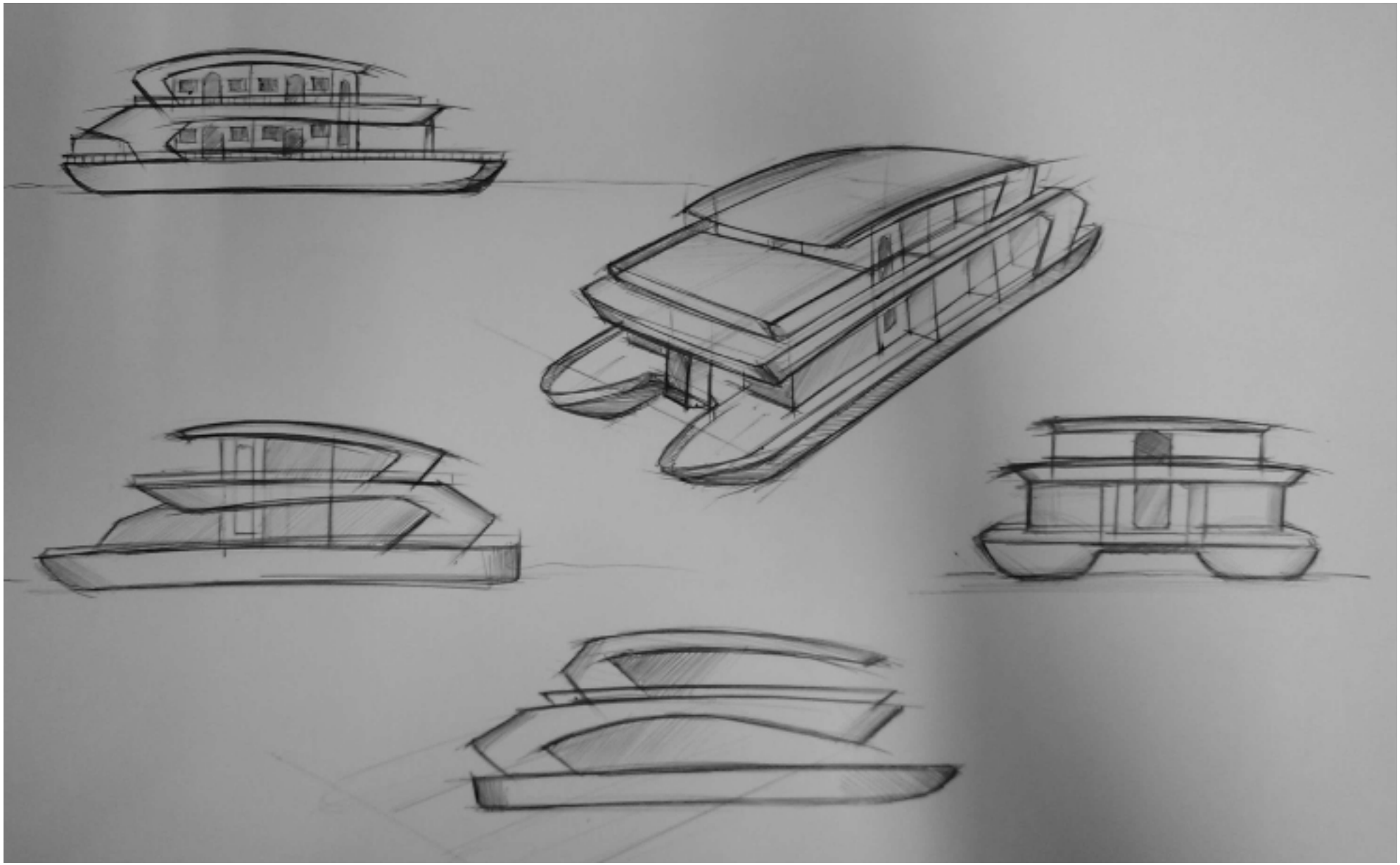
Sketches:



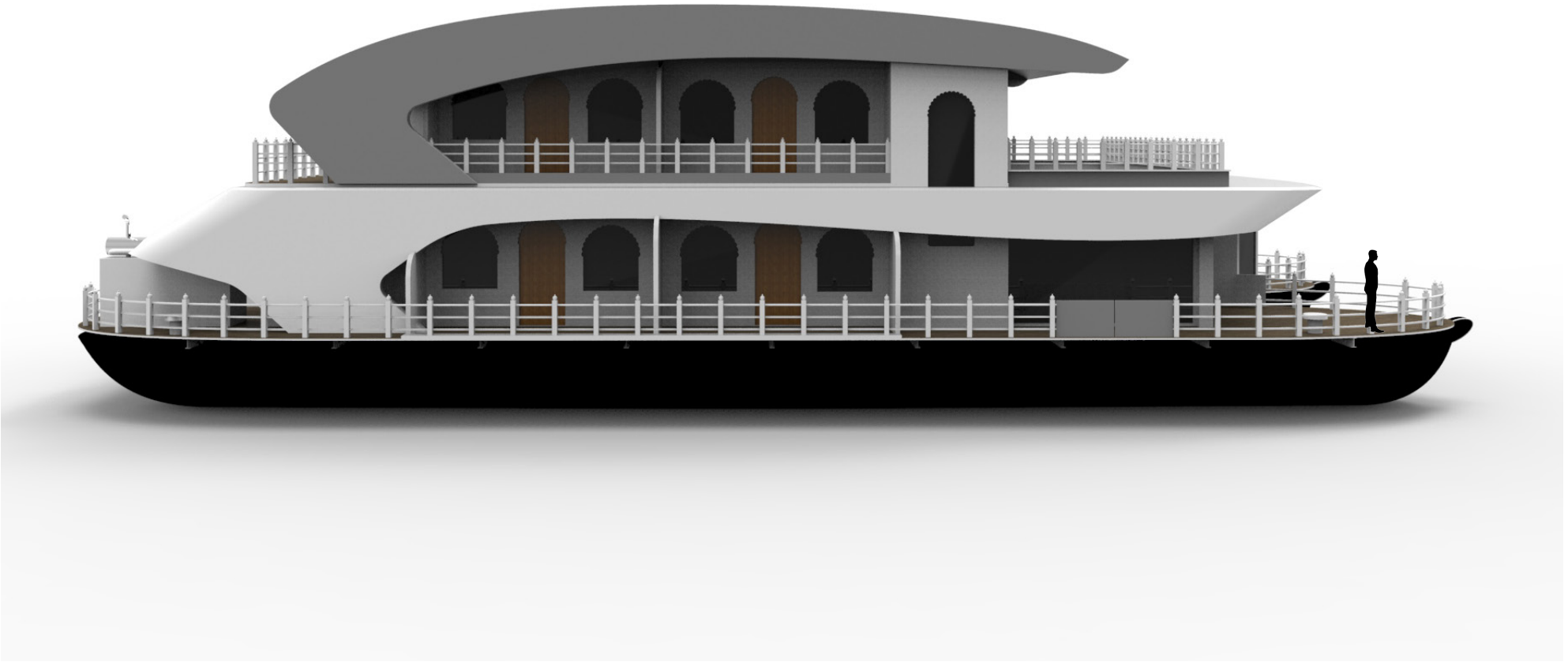
Sketches:



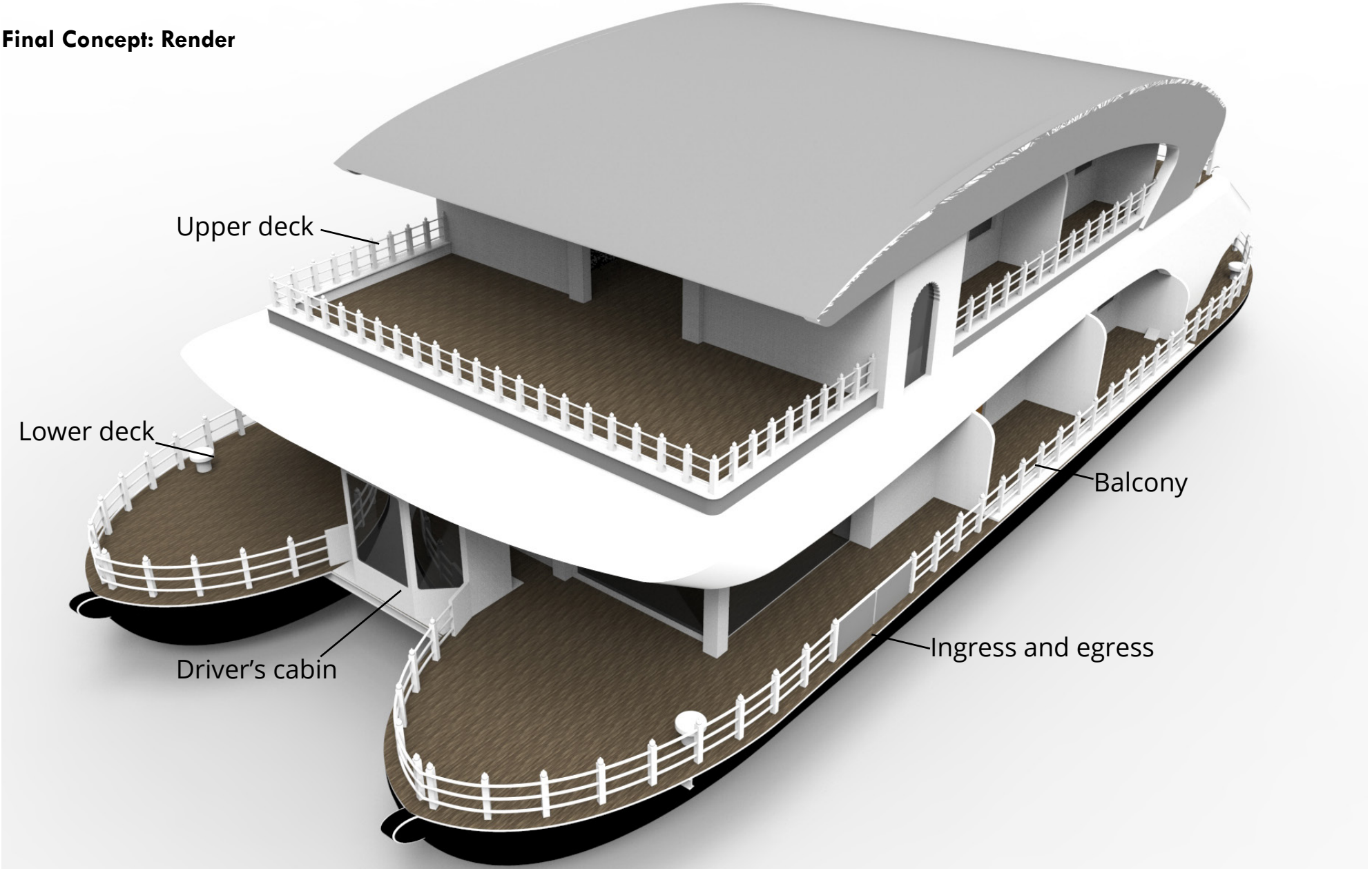
Sketches:



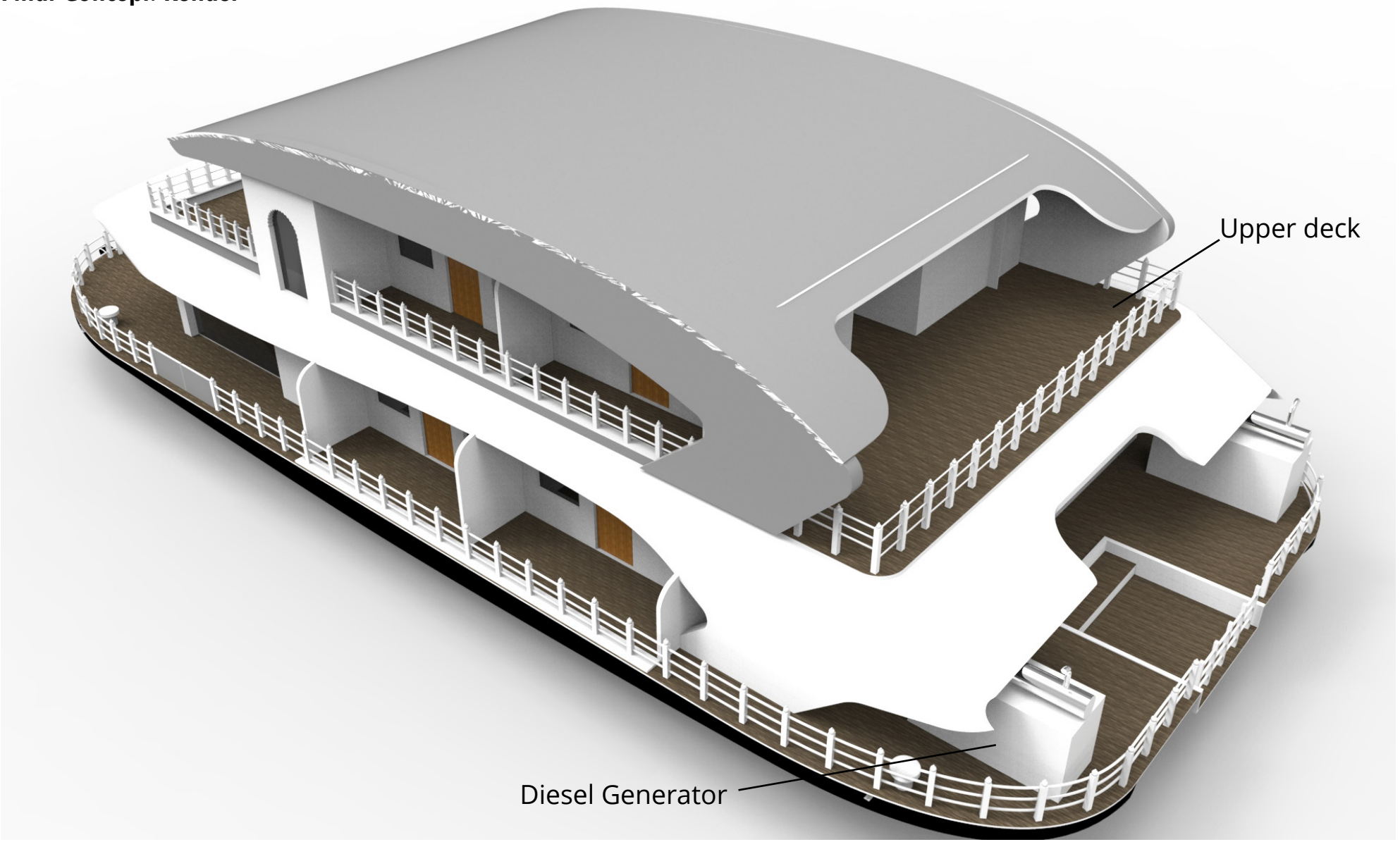
Final Concept: Render



Final Concept: Render



Final Concept: Render



Final Concept: Render

Boat at Varanasi Ghat (Ganges)

Final Concept: Render

Boat at Varanasi Ghat (Ganges)

Final Concept: Render

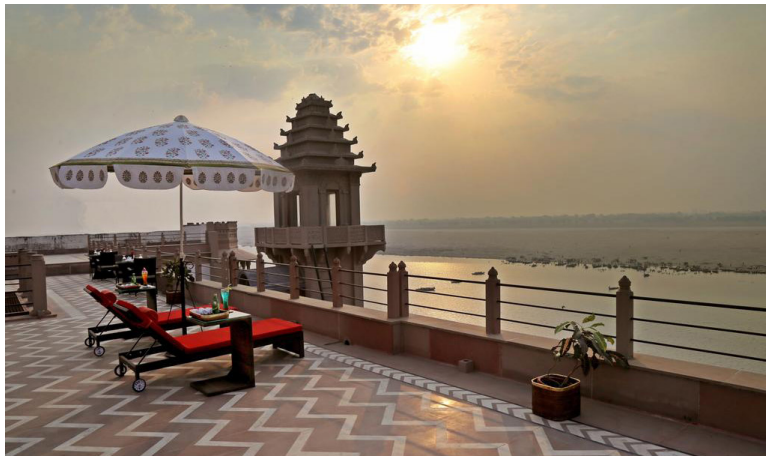
Boat at Varanasi Ghat (Ganges)

10. Interior

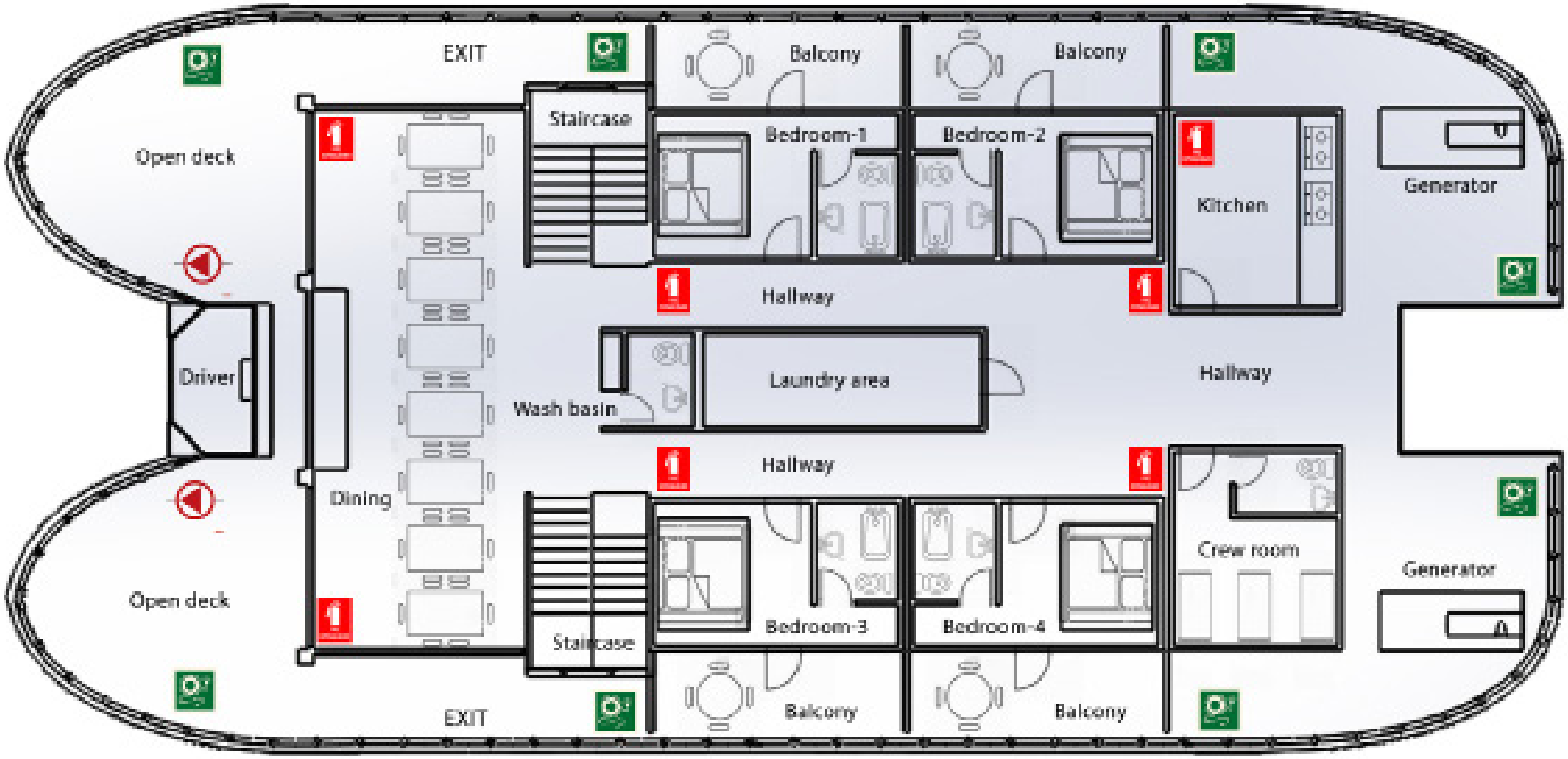
Inspiration: A number of inspirations for the functional and aesthetic design for the interiors were used. Management of available space was a key issue. Since there was lare area available, each room has individual balcony with living area. As the service is for 6 days long, there are laundry room and crew room. Every room has airconditioning and bathroom.

Ideations: Three possible directions were proposed for interior styling: Modern, Traditional and Fusion. Modern styling would emulate the look of hotel rooms and take direct inspiration from 5 star hotel. Traditional styling would involve a lot of cues from Varanasi architecture and arts. Fusion styling would be a blend of the two. In the discussions held, fusion was decided to be the way to go, with the interiors having modern structure and components, with some traditional

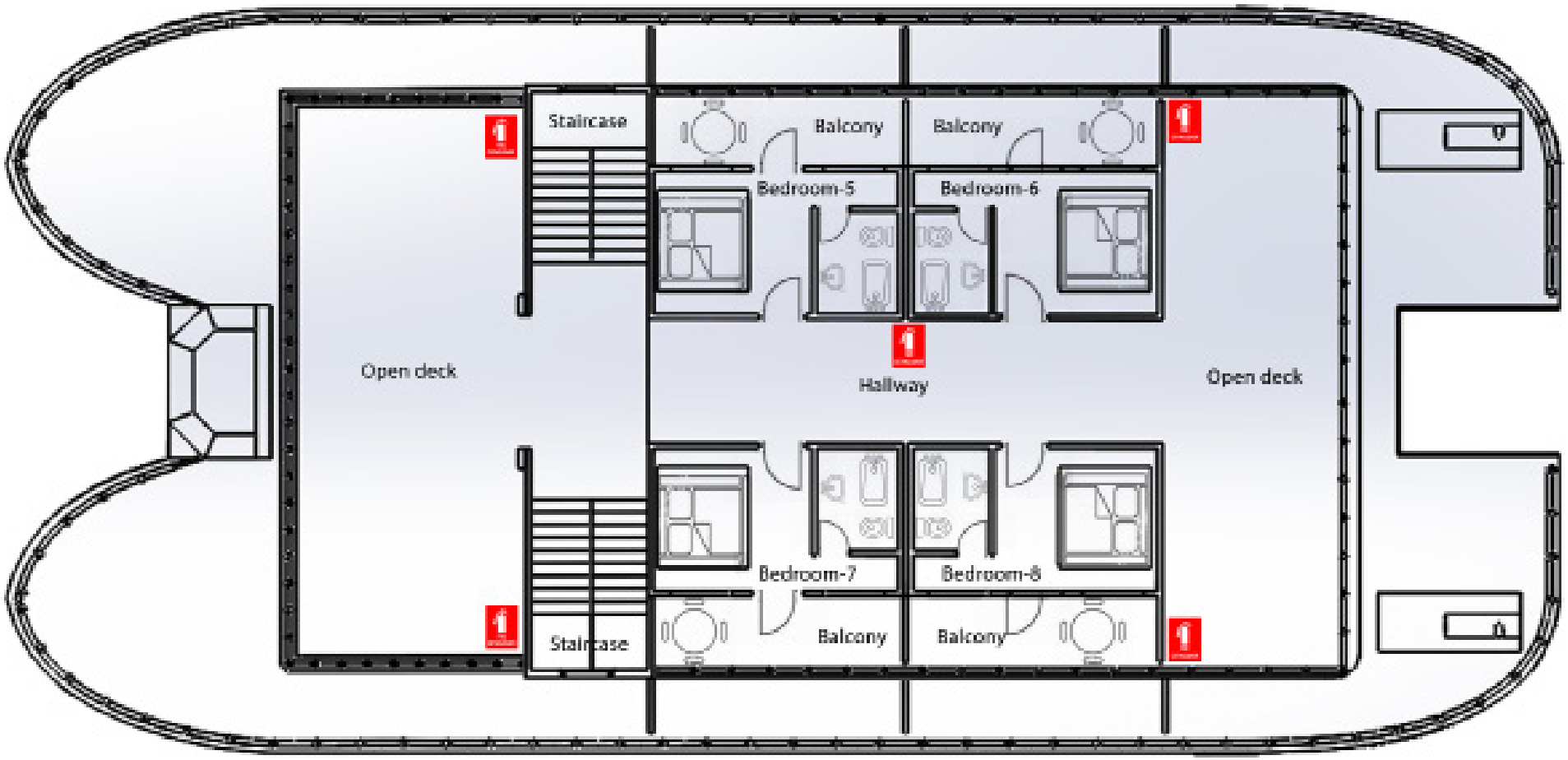
Moodboard



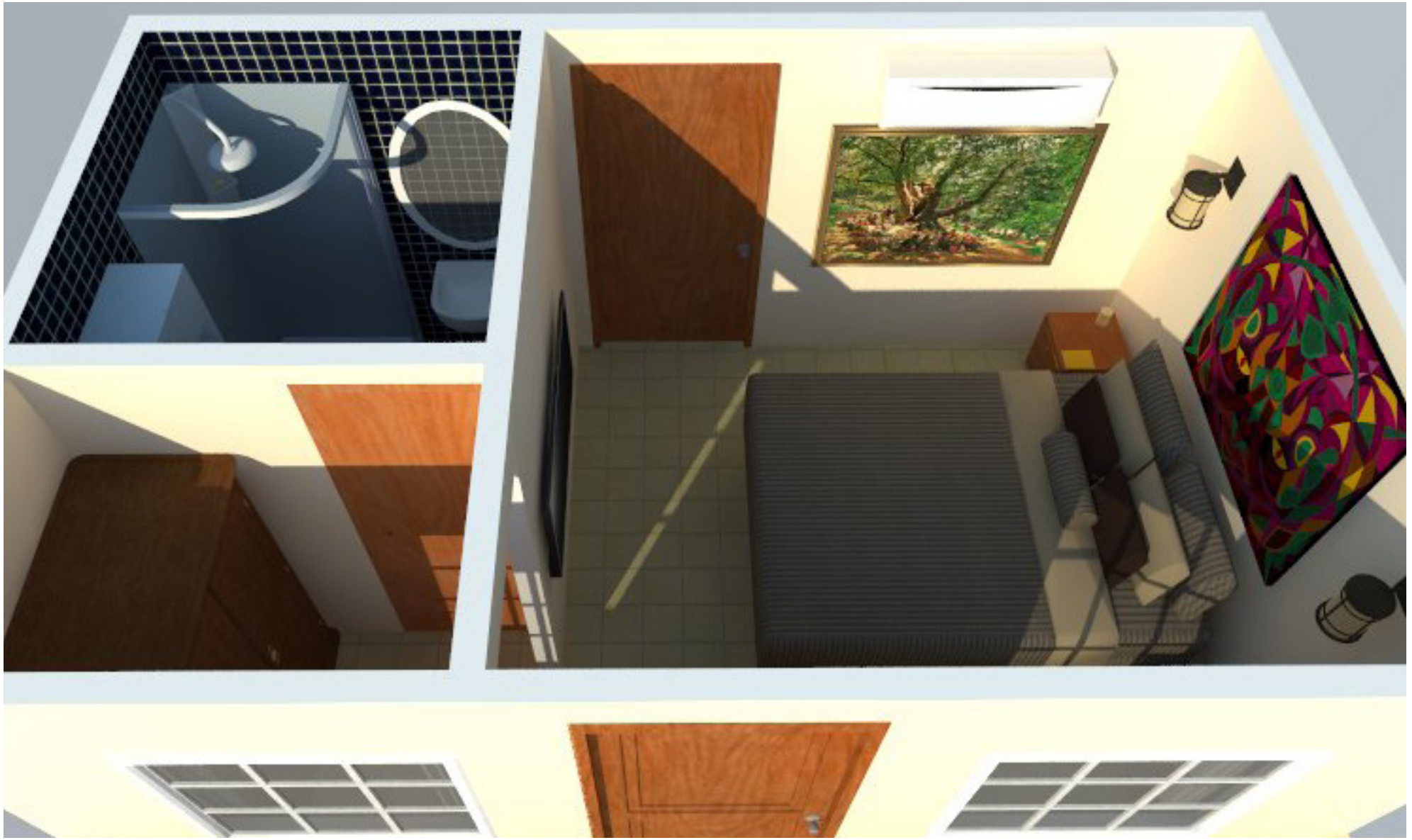
LOWER DECK Layout



UPPER DECK Layout



Final Concept: Render



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