

WHALE FALL

Metamorphosing Architecture to Changing Landscapes

Biomimetic Design Centered around Rising Sea Levels

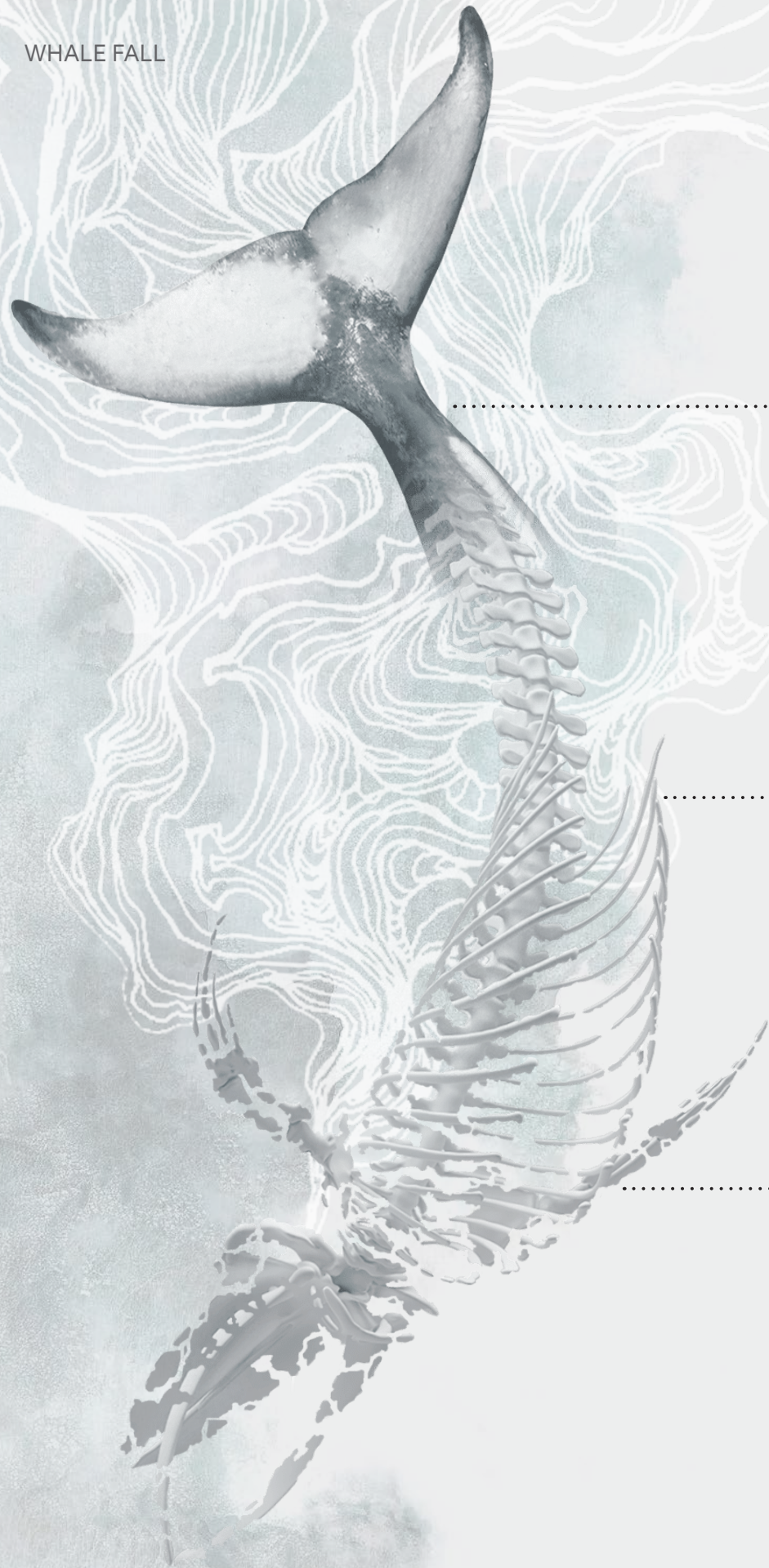
Globally, sea levels are rising as climate change continues to be a significant issue impacting both humans and wildlife. With the current emissions trajectory, **the reality of inevitability sets in**. Landscapes are changing, and architecture should be built with that awareness.

How can architecture adapt to changing physical landscapes? Many buildings have rigid structures, serve only one function, and are demolished after their useful life. This project presents the idea of **metamorphosing architecture inspired by the concept of a whale fall**. A whale fall occurs when it dies and continues supporting a succession of biological communities in its decomposition. Similarly, the structure would support a complex system of users at each stage of its deterioration.

The architecture **deconstructs itself according to the rising water levels**, serving a new purpose and program at each interval. In this way, the structure becomes a manifestation of the changing landscape. While the focus is different in each phase, the core concept is to attract visitors to stimulate the economy and prompt a reflection on the results of climate change.



WHALE FALL



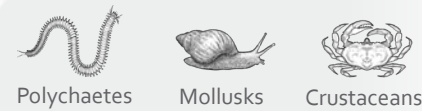
STAGE 1: MOBILE-SCAVENGER

Free-moving scavengers consume the soft tissues.



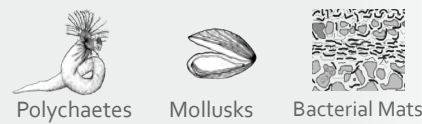
STAGE 2: ENRICHMENT- OPPORTUNIST

Organisms feed on and colonize the bones and enriched sediments surrounding the whale fall.



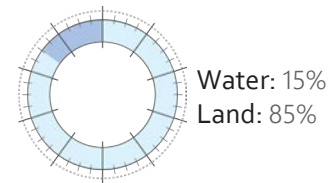
STAGE 3: SULPHOPHILIC

Lipids within the bones are broken down and produce sulfides, which other organisms then consume.



STAGE 4: REEF STAGE

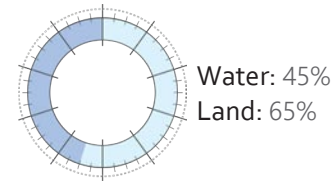
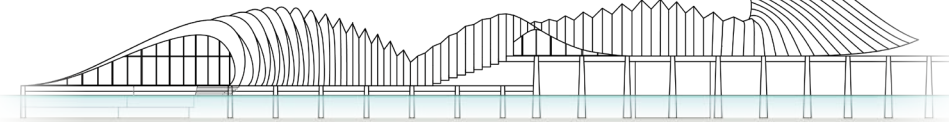
Mineral skeleton left behind provides hard substrate for deep sea suspension and filter feeders.



STAGE 1: NON-SUBMERGED

Building is above water level and intact with no deterioration.

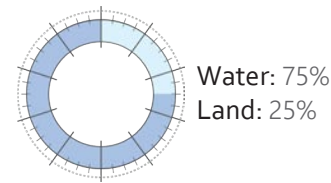
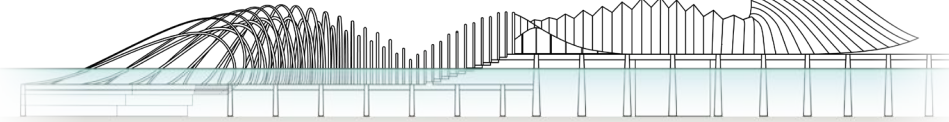
ELEVATION 1 (WATER LEVEL DIAGRAM)



STAGE 2: 1/2 SUBMERGED

The first level of the structure is underwater and stripped of the skin/interior and internal elements, leaving only the bones/frame behind.

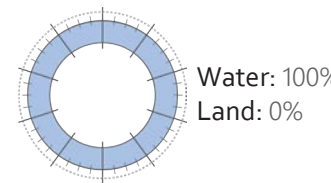
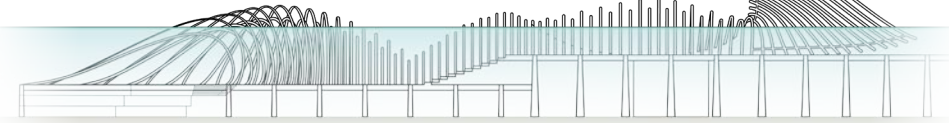
ELEVATION 2 (WATER LEVEL DIAGRAM)



STAGE 3: 3/4 SUBMERGED

Water reaches the upper level and the structure is stripped. The established marine ecosystem in the lower level spreads throughout the frame.

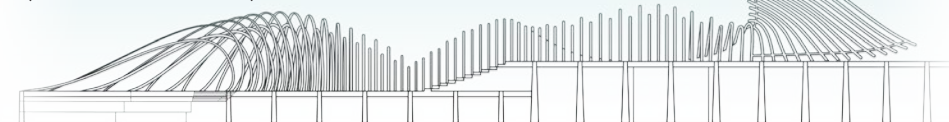
ELEVATION 3 (WATER LEVEL DIAGRAM)



STAGE 4: SUBMERGED

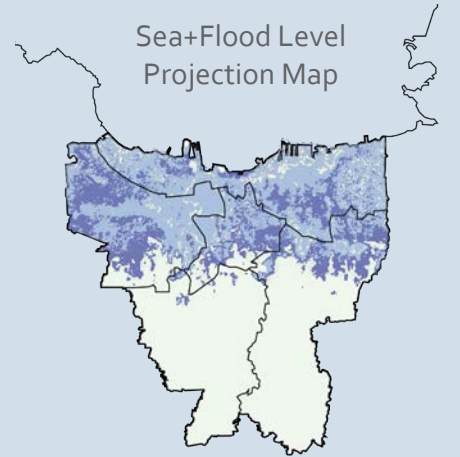
Full submersion, program of the architecture completely changes from human centric to wildlife as the building becomes a marine refuge.

ELEVATION 4 (WATER LEVEL DIAGRAM)



Jakarta, Indonesia

Sea+Flood Level Projection Map



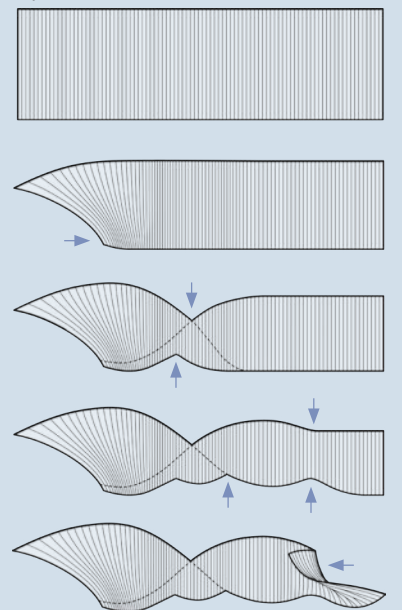
- Nearly half of the city sits below the current sea level
- Epicenter of biodiversity that is located in the Coral Triangle and a top priority for marine conservation
- Large population that is heavily impacted by rising sea levels due to climate change
- Fastest-sinking city in the world due to excessive groundwater drainage

Year: 2100
 Temperature Rise: 2-4 °C
 Pollution Pathway: Current
 Source: IPCC 2021

Form Development

The form is twisted from a single pleated surface. The geometric folds adhere to the program, and the pleated design contributes to structural integrity and flexibility of the form.

Top View



STAGE 1: NON-SUBMERGED

In the first stage, the new structure remains **above the water line**. As a **climate and marine research sanctuary**, researchers, students, and tourists visit it, raising awareness to increase conservation efforts. The building is primarily made of stainless steel-supported marine-grade concrete (pH-neutral concrete) with waterproof ETFE film as the primary facade.

LOWER LEVEL: The lower level is a public space for visitors to **view aquatic life and learn about conservation**. The open water spaces are connected to the ocean and separated through detachable gates. Direct connection allows researchers to utilize the local climate for testing water levels and offer a transitional space for wildlife reintroduction after rehabilitation.

TRANSITION LEVEL: The space between the levels is a sheltered open-air area with stepped seating. It provides a casual gathering hub for people to **talk, rest, and enjoy the view**.

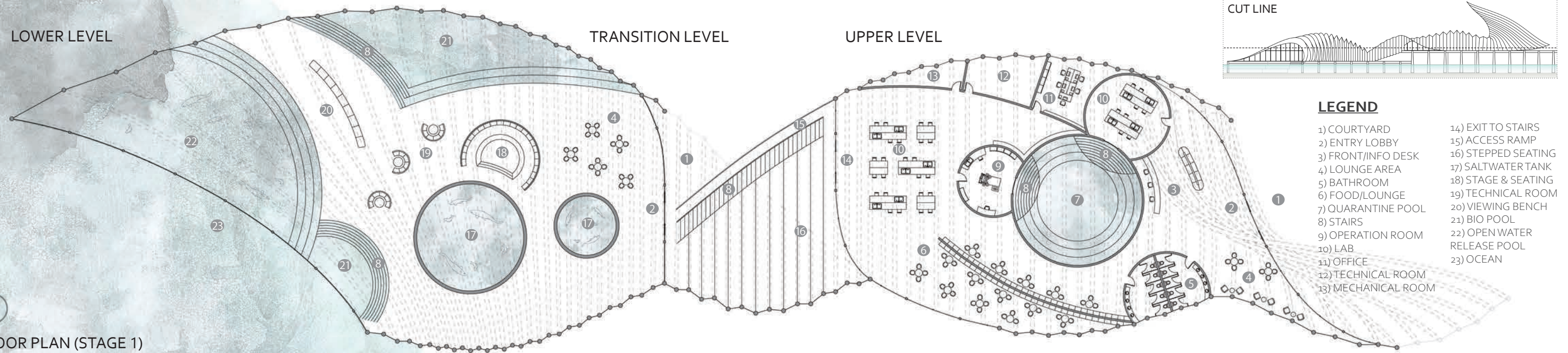
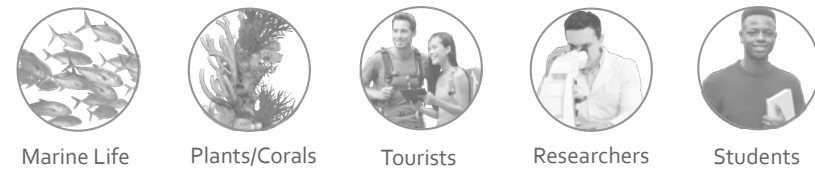
UPPER LEVEL: The upper level is a semi-public space mainly used for **research and education**. Private labs and offices are present for specimen research with clinical facilities for the rescue and eventual reintroduction of marine species. Visitors can access the public labs where classes are given on climate change and its impacts on humans and wildlife.



TRANSITION LEVEL

PUBLIC LAB

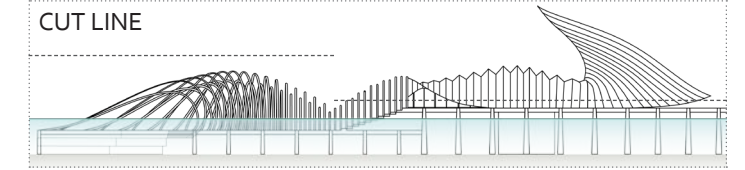
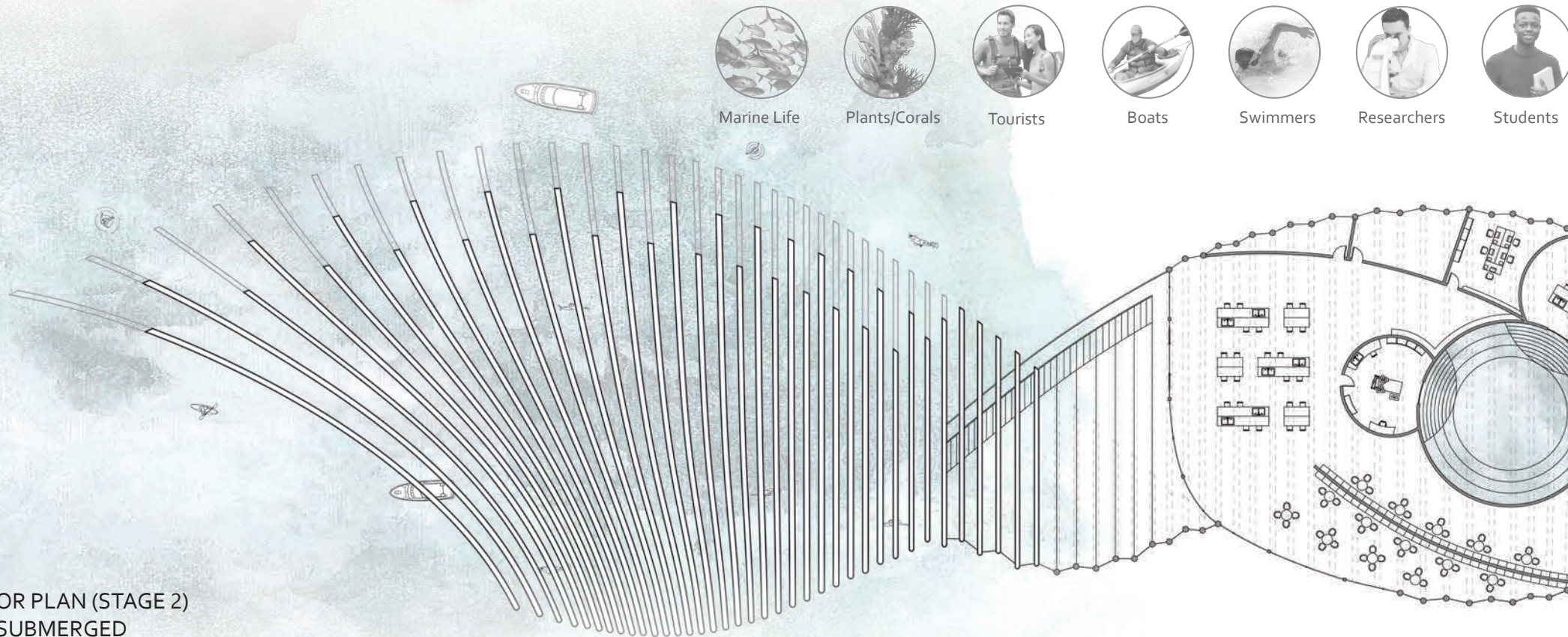
QUARANTINE POOL



FLOOR PLAN (STAGE 1)
NON-SUBMERGED



FLOOR PLAN (STAGE 2)
1/2 SUBMERGED

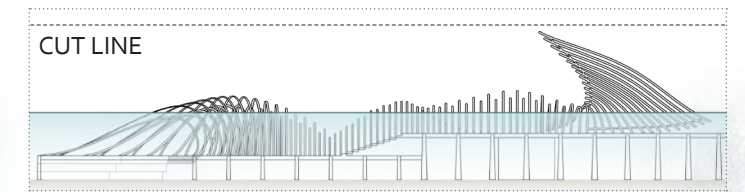
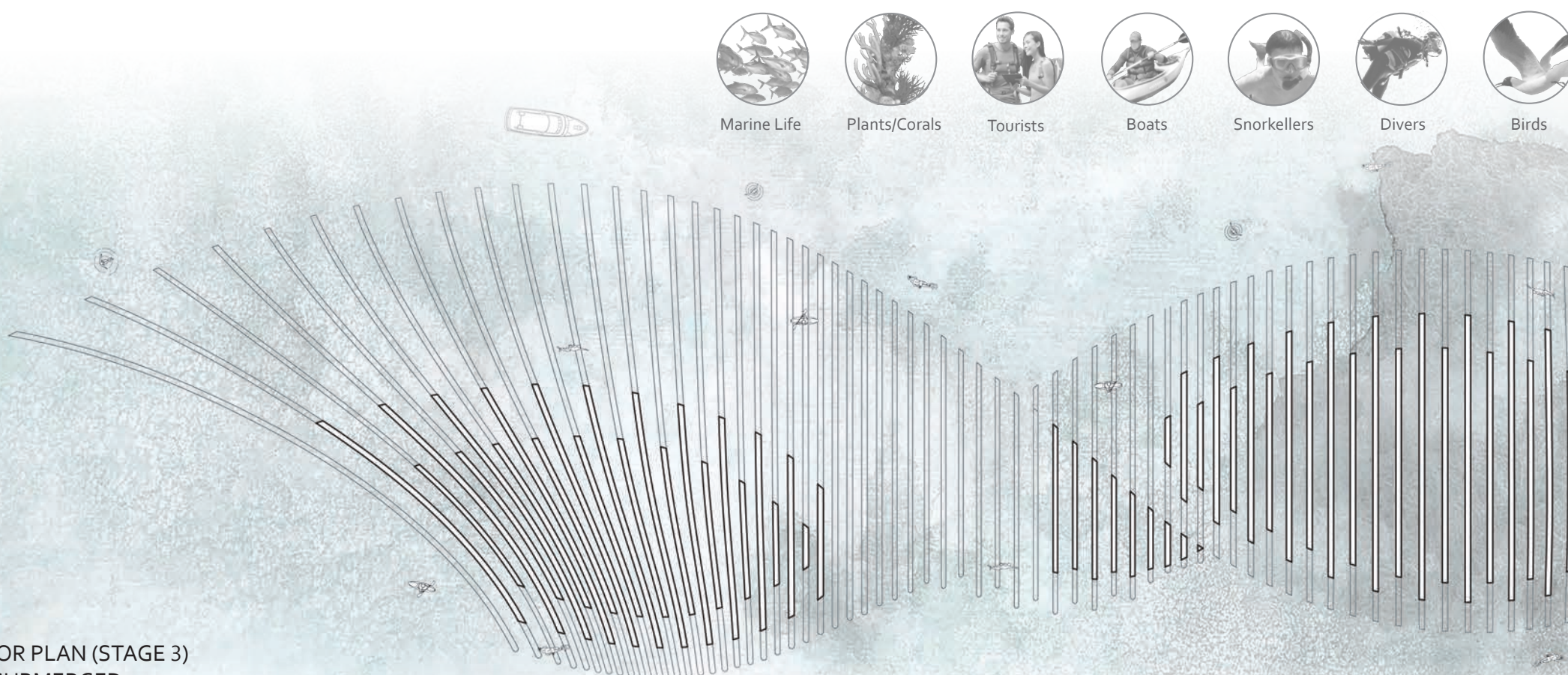


STAGE 2: 1/2 SUBMERGED

In the lower level, interior elements are removed and re-purposed after being flooded with water. The ETFE film facade is easily detached and is fully recycled, leaving the concrete and stainless steel framing. Various plants and corals are grown within the area and on the frame to help with conservation efforts and research. The program for the upper level remains the same.



FLOOR PLAN (STAGE 3)
3/4 SUBMERGED



STAGE 3: 3/4 SUBMERGED

The structure is now stripped of interior and exterior elements, leaving only the bones(frame) of the architecture. The portion of the building remaining above water serves as a resting ground for birds and a tourist attraction. The ecosystem and plants that scientists have established on the lower section of the design will now slowly begin to spread to the rest of the structure.

STAGE 4: SUBMERGED

After complete submersion, the floor space is slowly covered by sand, becoming a habitat for marine life. All that remains of the building is the frame made with marine-grade concrete (PH-neutral concrete) and supported by stainless steel framing.

The structure is made to be porous and encourages the growth of coral, algae, seaweed, etc., as a means of **artificial sea bed restoration**, speeding up a process that would take years naturally. The plant growth attracts fish and other organisms to feed and congregate, forming a **refuge for different species**. Visitors can dive down and explore while observing wildlife and the process and effects of rising sea levels.



Marine Life



Plants/Corals



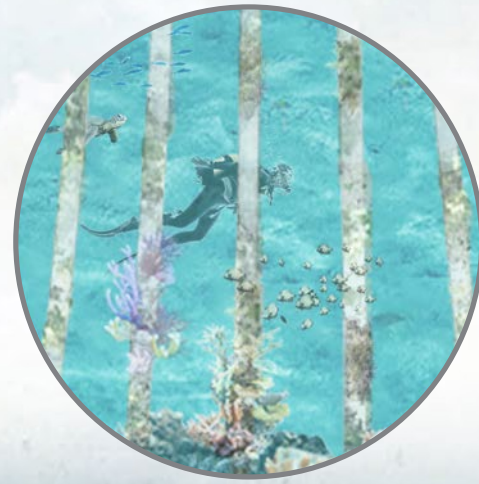
Tourists



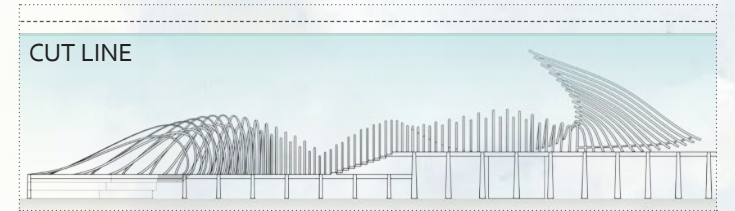
Boats



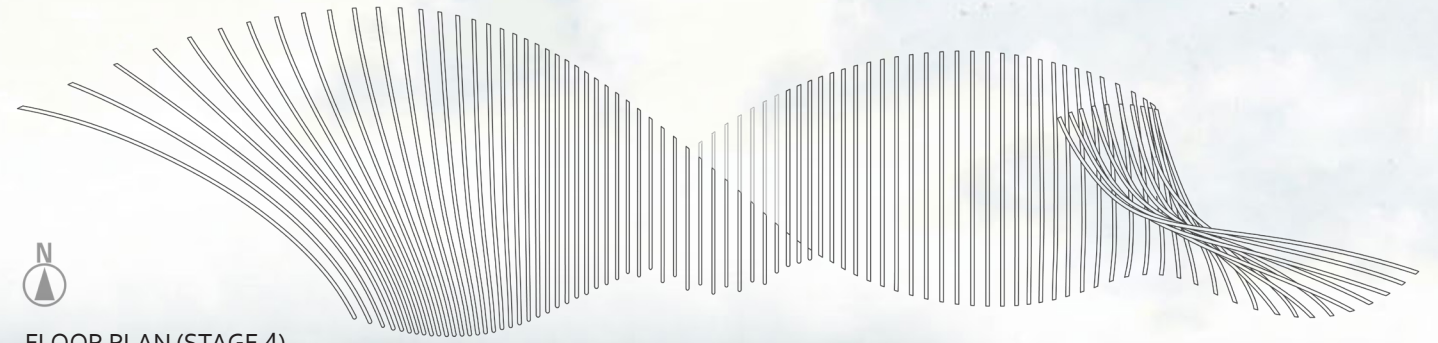
Divers



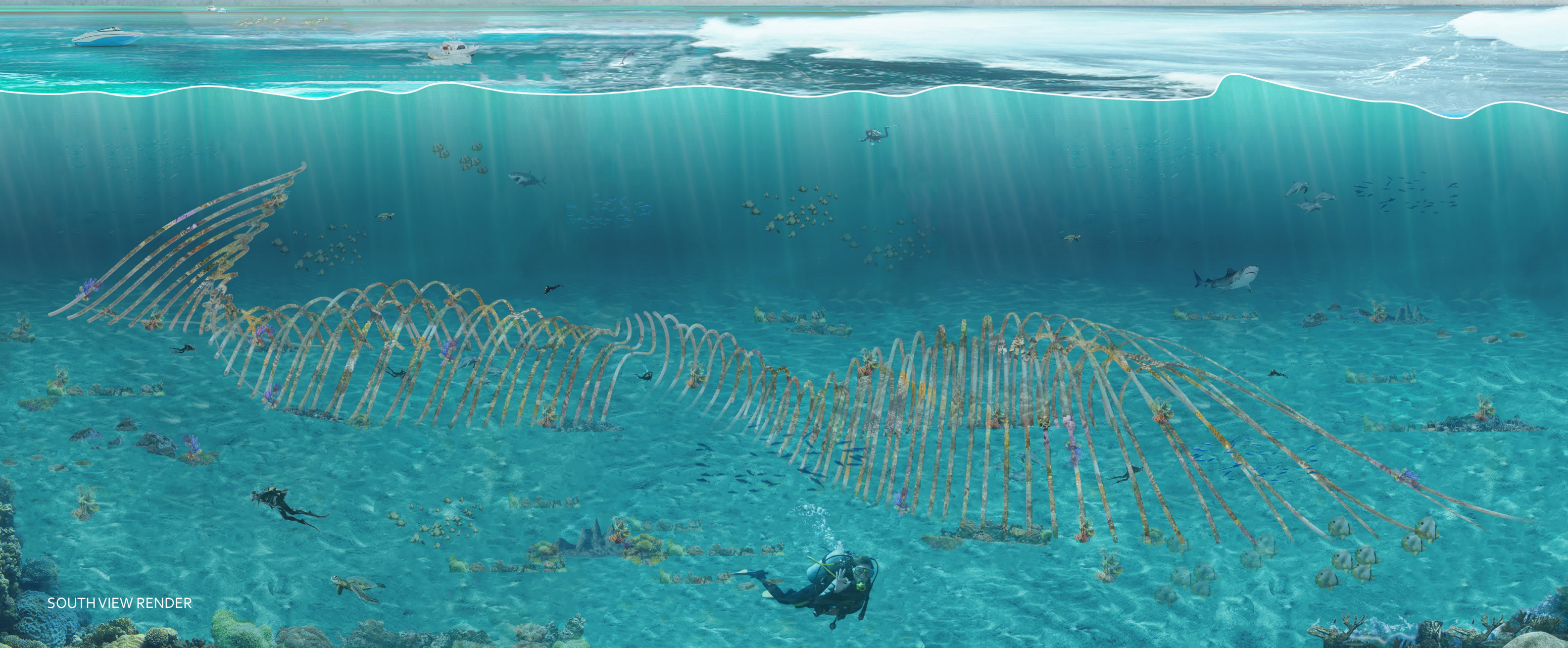
RENDER DETAIL



CUT LINE



FLOOR PLAN (STAGE 4)
SUBMERGED



SOUTH VIEW RENDER

SOURCES AND REFERENCES

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