B-/C+

Maritime Museum

BY

MANZANA MUZAMMIL

ID

08208006

SEMINAR II

Submitted in partial fulfillment of the requirements for the degree of bachelor of architect

Department of Architecture

BRAC University

Acknowledgement:

Many people have helped me during the process of this project and i would like to show my gratitude through this acknolegement.

I am very grateful to my course teachers Abul Fazal Mahmudun Nobi, Imon Chowdhooree, Nandidni Awal, Shakil Ahmad Shimul and Dr. Fuad H Mallik head of the department, Department of Architecture, Brac University for guiding me with their respective feedbacks. I am also thankful to seminar 2 course teachers Sheikh Rubaiya Sultana and Nesfun Nahar who helped me prepare this dissertation.

I am also thankful to the students of Architecture Department of Brac University specially, Tahmidur Rahman, Samiur Rahman, Enjamul, Sakib, Adnan, Sabrina for their help in the presentation of the project and Sibat Ahnaf for helping me in the site survey.

Finally i thank my parents, siblings and friends for their help and support to complete the project.

CONTENT

CHAPTER 01: INTRODUCTION

1.1 BACKGROUND OF PROJECT:

The deep seafloor itself, well beyond the range of diving mammals, is inhabited by an incredible diversity of animals. Although at the surface the ocean can appear calm and quiet, in fact there is an enormous amount of life activity taking place, particularly at certain times of the year. To overcome and explore this vast water body ships and various kind of transportation has been invented by mankind.

The marine history of Bangladesh is very rich. AnMaritime museum would enhance this even more. Not only will it help to spread the knowlege of the history of ships of bangladesh it will also enlighten people of what is going on, on the outside world, how far advance tenchology has developed.

PROJECT BRIEF:

Name of the project: Maritime Museum

Location: Mouza: Inani,Thana: Ukhia,Union: JaliaPalong

Client: Ministry of science and information and communication technology

1.2 PROJECT INTRODUCTION:

The Maritime history of Bangladesh is not very old but it is a sector full of possibilities. Addition of amaritme museum would help advance the marine and maritime knowledge of our society. The major objective of the Centre is to display thediversity of the marine ships of the region and out of the region and impart its values to the common people and to carry out the research activities. The concept and theme is geared towards Knowledge, Education and Entertainment

A maritime museum is a museum specializing in the display of objects relating to ships and travel on large bodies of water. A subcategory of maritime museums is naval museums, which focus on navies and the military use of the sea.

The Ministry of science and information & communication technology works for the betterment of the knowledge of science and improves technology.

1.3 OBJECTIVES OF THE PROJECT:

The main objective of the project:

- Establish a National Maritime Museum
- Utilization of this knowledge for inventory and exploration of marine resources and technology
- Provide a public space to convey the Maritime information with a more interactive way.

1.4 GIVEN PROGRAM:

Programs are chosen according to the requirement of the organizations. Suggested programs are chosen according to the activity of the organization. Programs are as following as:

- Library
- Lecture theater
- Cafeteria
- Administration
- Gallery Space
- Souvenir shop
- car parking

CHAPTER 02: SITE APPRAISAL

2.1 SITE HISTORY

This is a typical Buddhist village, about 16 km. from Cox's Bazar, on the main road to Chittagong. There are monasteries, khyangs and pagodas containing images of Buddha in gold, bronze and other metals inilaid with precious stones. One of the most interesting of these temples is on the bank of the Baghkhaliriver.The village is famous for its handicrafts and homemade cigars.The village has a charm of its own. Weavers ply there trade in open workshops and craftsmen makehandmade cigars in their pagoda like houses

Archaeological heritage of this upazila are Ramkot Hindu Temple, Ramkot Buddhist Keyang, Lamarpara Buddhist Keyang. Tradition goes that Ramu was named after the royal Ramu dynasty of Arakan. At the time of the conquest of Chittagong by the Mughals (1666) a thirteen feet high bronze image of Buddha was found at Ramu. This is the biggest of the Buddha images hitherto discovered in Bangladesh. It is said that Ramachandra met Sita at Ramkot after her abduction by Ravana and that the stone-grinder used by Sita had once been preserved at Ramkot.

Population of this area is 167480; male 51.41%, female 48.59%; Muslim 91.26%, Hindu 4.44%, Buddhist 4.29%, Christian 0.01%; ethnic nationals: Rakhain 188 families and Marma 142 families (1.2% of the total population). Density of population per sq km is 428.

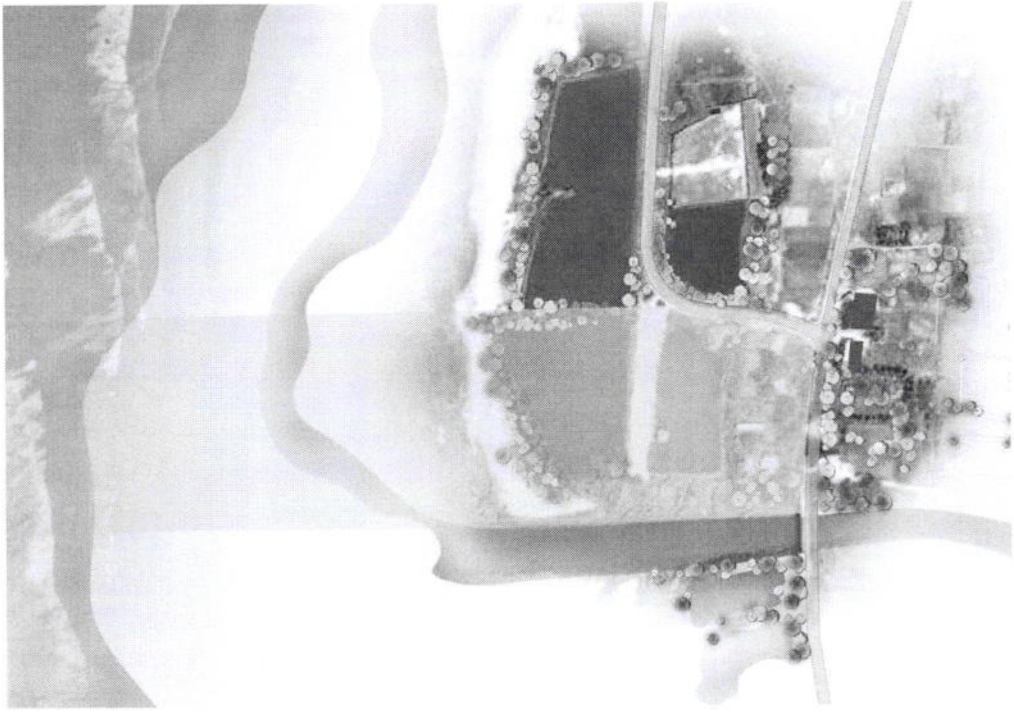
The Average literacy 21.3%; male 28.3%, female 14.3%. Educational institutions: college 1, high school 11, madrasa 5, government primary school 55, non-government primary school 22.

Cultivable land is 11129 hectares, fallow land 3072 hectares; single crop 35%, double crop 45% and triple crop land 20%. The largest rubber garden of the country comprising an area of 844.19 hectares belongs to this upazila. Cultivable land under irrigation 80%.

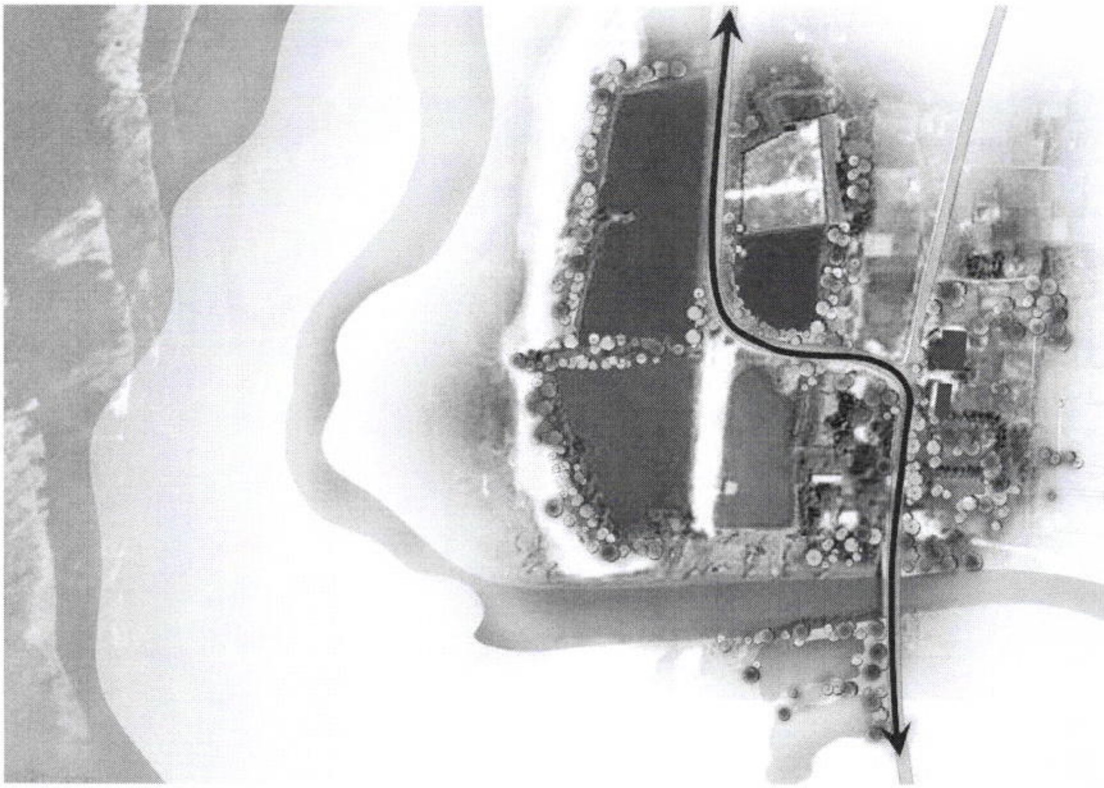
2.2SITE LOCATION 01:

Mouza: inani, Thana: Ukhia, Union: JaliaPalong

Site Location



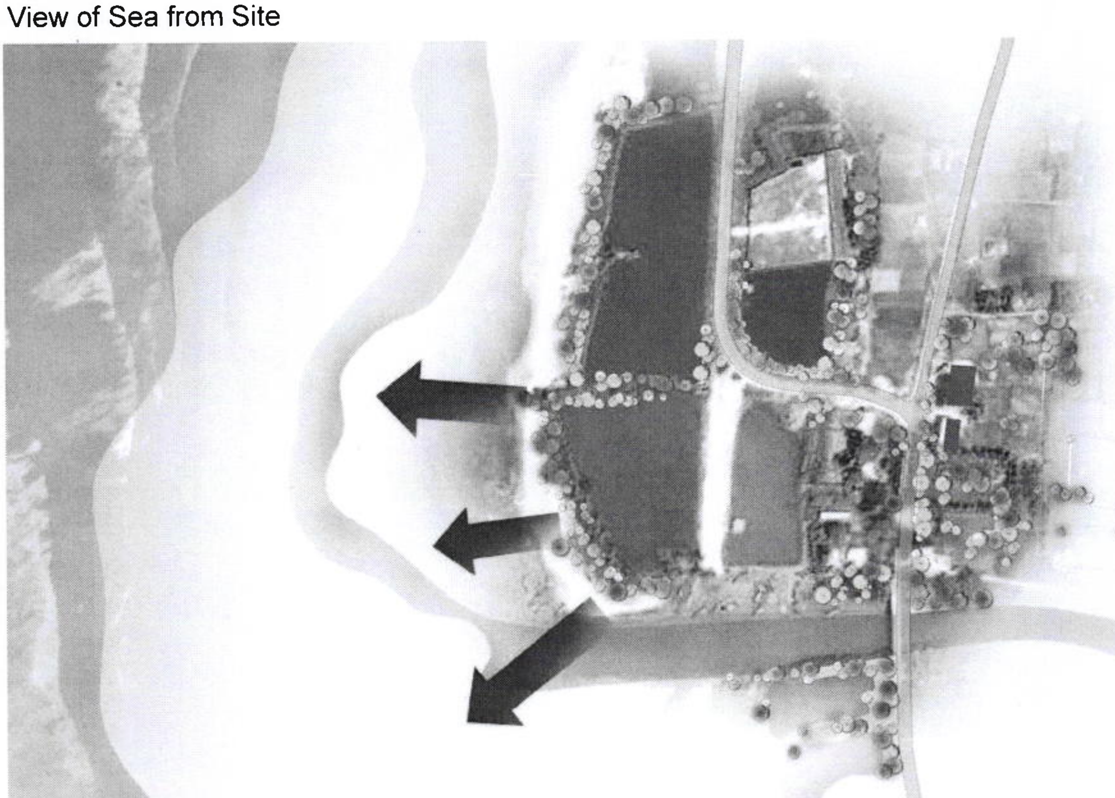
Main Road: Marine Drive Road



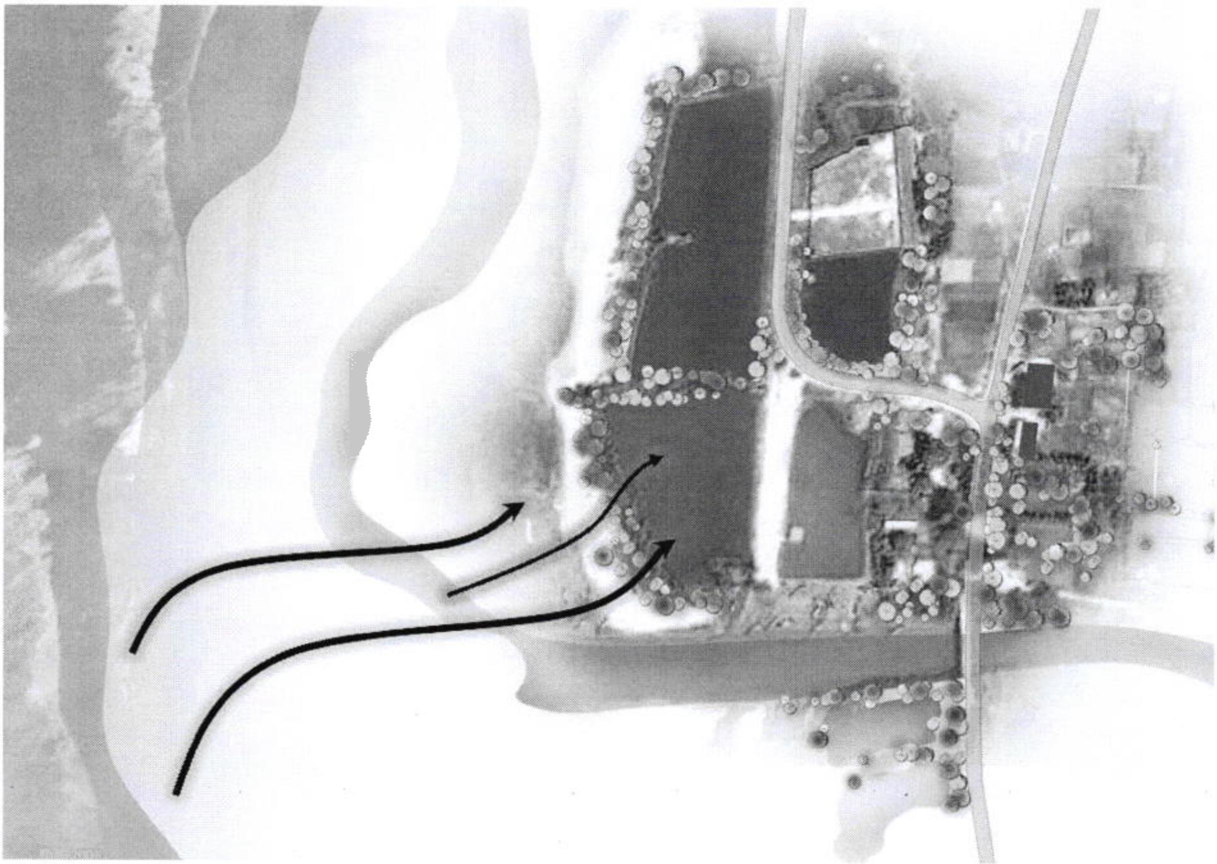
Site surrounding: Cyclone Shelter

Site Access

View of Sea from Site



Wind Flow



CHAPTER 03: LITERATURE REVIEW

A maritime museum (sometimes nautical museum) is a museum specializing in the display of objects relating to ships and travel on large bodies of water. A subcategory of maritime museums are naval museums, which focus on navies and the military use of the sea.

The great prize of a maritime museum is a historic ship (or a replica) made accessible as a museum ship, but these are large and require a considerable budget to maintain, many museums preserve smaller or more fragile ships or partial ships within the museum buildings and most museum's exhibit interesting pieces of ships (such as a figurehead or cannon), ship models, and miscellaneous small items like cutlery, uniforms, and so forth.

Ship modellers often have a close association with maritime museums; not only does the museum have items that help the modeller achieve better accuracy, but the museum provides a display space for models larger than will comfortably fit in a modeller's home; and of course the museum is happy to take a ship model as a donation. Museums will also commission models.

Preservation of ships

The preservation of ships in museums ensures that ancient and historic vessels are preserved for posterity in optimum conditions and are available for academic study and for public education and interest.

Remains of ancient and historic ships and boats can be seen in museums around the world. Where a ship is in a good state of preservation it can sometimes act as a museum in its own right. Many museum ships, such as HMS Victory are popular tourist attractions. Some ships are too fragile to be exposed outdoors or are incomplete and must be preserved indoors. The remains of the Mary Rose for example are kept in a purpose designed building so that conservation treatment can be applied.

In some cases, archaeologists have discovered traces of ships and boats where there are no extant physical remains to be preserved, such as Sutton Hoo, where museum displays can show what the vessel would have looked like, although the vessel itself no longer exists.

Maritime archaeology a discipline within archaeology as a whole that specifically studies human interaction with the sea, lakes and rivers through the study of associated physical remains, be they vessels, shore side facilities, port-related structures, cargoes, human remains and submerged landscapes. A specialty within maritime archaeology is nautical archaeology, which studies vessel construction and use. As with archaeology as a whole, maritime archaeology can be practiced within the historical, industrial, or pre-historical periods.An associated discipline, and again one that lies within archaeology itself, is underwater archaeology, which studies the past through any submerged remains be they of maritime interest or not. An example from the pre-historic era would be the examination of remains submerged in ancient wells or cenotes, or of Indigenous sites now lying underwater yet well away from the sea or inland waters. The study of submerged aircraft lost in lakes, rivers or in the sea is an example from the historical or industrial era. Many specialist sub-disciplines within the broader maritime and underwater archaeological categories have emerged in recent years.

Maritime archaeological sites often result from shipwrecks or sometimes seismic catastrophes, and thus represent a moment in time rather than a slow deposition of material accumulated over a period of years, as is the case with port-related structures (such as piers, wharves and jetties) where objects are lost or thrown off structures over extended periods of time. This fact has led to shipwrecks often being described in the media and in popular accounts as 'time capsules'.

Archaeological material in the sea or in other underwater environments is typically subject to different factors than artifacts on land. However, as with land archaeology what survives to be investigated by modern archaeologists can often be a tiny fraction of the material originally deposited. A feature of maritime archaeology is that despite all the material that is lost, there are occasional rare examples of substantial survival, from which a great deal can be learned, due to the difficulties often experienced in accessing the sites.

There are those in the archaeology community who see maritime archaeology as a separate discipline with its own concerns (such as shipwrecks) and requiring the specialized skills of the underwater archaeologist. Others value an integrated approach, stressing that nautical activity has economic and social links to communities on land and that archaeology is archaeology no matter where the study is conducted. All that is required is the mastering of skills specific to the environment in which the work occurs.

What is marine biology?

Marine biology is the study of life in the oceans and other saltwater environments such as estuaries and wetlands. All plant and animal life forms are included from the microscopic picoplankton all the way to the majestic blue whale, the largest creature in the sea—and for that matter in the world.

Marine conservation is the study of conserving physical and biological marine resources and ecosystem functions. This is a relatively new discipline. Marine conservationists rely on a combination of scientific principles derived from marine biology, oceanography, and fisheries science, as well as on human factors such as demand for marine resources and marine law, economics and policy in order to determine how to best protect and conserve marine species and ecosystems. Marine conservation can be seen as subdiscipline of conservation biology.

Strategies and techniques for marine conservation tend to combine theoretical disciplines, such as population biology, with practical conservation strategies, such as setting up protected areas, as with marine protected areas (MPAs) or Voluntary Marine Conservation Areas. Other techniques include developing sustainable fisheries and restoring the populations of endangered species through artificial means.

Another focus of conservationists is on curtailing human activities that are detrimental to either marine ecosystems or species through policy, techniques such as fishing quotas, like those set up by the Northwest Atlantic Fisheries Organization, or laws such as those listed below. Recognizing the economics involved in human use of marine ecosystems is key, as is education of the public about conservation issues. This includes educating tourists that come to an area that might not be familiar of certain rules and regulations regarding the marine habitat. One example of this is a project called Green Fins that uses the SCUBA diving industry to educate the public based in SE Asia. This project, implemented by UNEP, encourages scuba diving operators to educate the public they teach to dive about the importance of marine conservation and encourage them to dive in an environmentally friendly manner that does not damage coral reefs or associated marineecosystems.

Marine conservation technologies are devices used to protect endangered and threatened marine organisms and/or habitat. Marine conservation technologies are innovative and revolutionary because they reduce bycatch, increase the survivorship and health of marine life and habitat, and benefit fishermen who depend on the resources for profit. Examples of technologies include marine protected areas (MPAs), turtle excluder devices (TEDs), and radio-frequency identification (RFID). Commercial practicality plays in important role in the success of marine conservation because it is necessary to cater to the needs of fishermen while also protecting marine life.

Turtle excluder devices for example (TEDs) remove a major threat to turtles in their marine environment. Many sea turtles are accidentally captured, injured or killed by fishing. In response to this threat the National Oceanic and Atmospheric Administration (NOAA)worked with the shrimp trawling industry to create the TEDs devices. By working with the industry they insured the commercial viability of the devices. Basically, a TED is a series of bars that is placed at the top or bottom of a trawl net, fitting the bars into the "neck" of the shrimp trawl and acting as a filter to ensure that only small animals may pass through. The shrimp will be caught but larger animals such as marine turtles that become caught by the trawler will be rejected by the filter function of the bars.

Similarly, halfway technologies work to increase the population of marine organisms, however, it does so without behavioral changes and "addresses the symptoms but not the cause of the declines". Examples of halfway technologies would include hatcheries and fish ladders

How are underwater tunnels built?

Some underwater tunnels are made from giant tubes that are built on land, then such in a deep trench dug in the river bottom. It is sometimes better to tunnel under a river than a bridge across it.

Building an underwater tunnel is more difficult than boring a tunnel through a mountain. In solid rock, a tunnel holds its shape. In the mud and sand of a river bottom the problem is to keep water out and the sides from caving in.

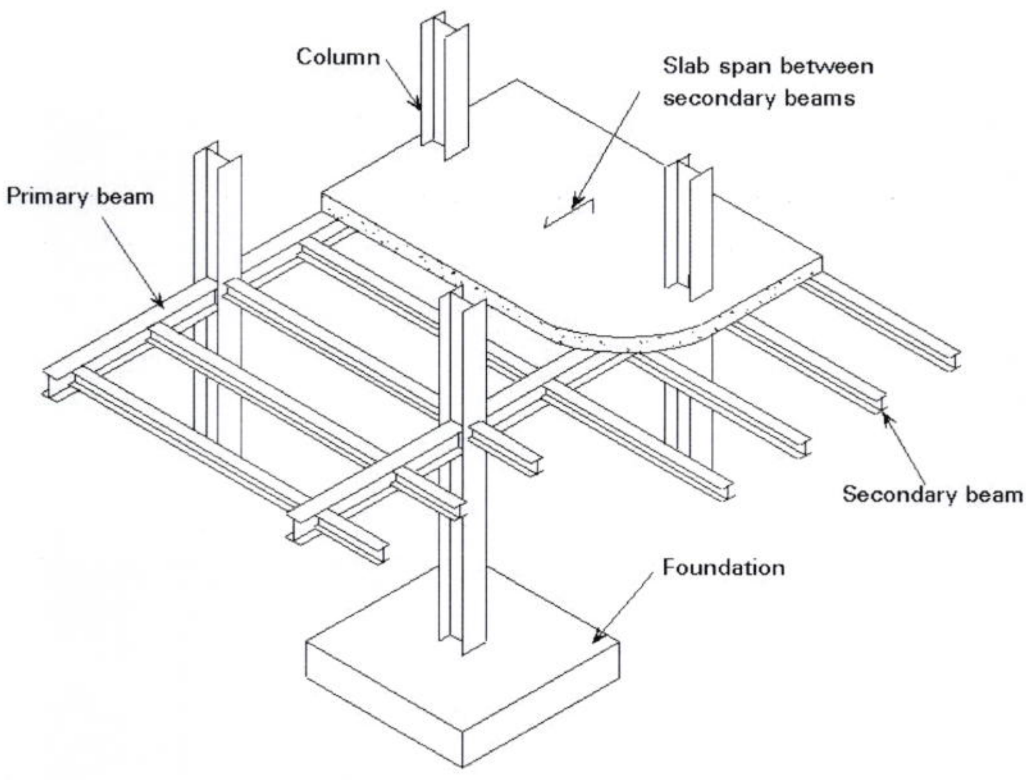
In building an underwater tunnel, men work in a large, water tight chamber that holds back the mud and water while the tunnel is being built.

A barrel shaped shields, as big as the tunnel, is pushed forward through the mud by powerful jacks, as workmen inside the shield dig away the sand and mud and build up the lining of the tunnel. To hold the water out, compressed air is pumped into the working room. Sometimes, underwater tunnels are made by sinking giant steel tubes the size of the tunnel into a trench that has been dug across the river bottom.

Floor systems

The principal structural elements of a typical multi-storey building are the floors, beams, columns and foundations.

The principal structural elements of a typical multi-storey building comprise floors, beams and columns. A wide variety of alternative forms and arrangements can be used in multi-storey steel framed structures.



The principal structural elements of a typical multi-storey building

Floor slabs: Several different types of slab can be used, in either composite or non composite form.

A number of different floor slab types can be used in association with a steel frame. The floor slab usually spans one way; it is either simply supported or continuous. Most slab types can be designed to act compositely with the supporting beams if adequate shear connection is provided

Composite floors consist of a concrete topping cast onto metal decking.

Composite floor slabs use metal decking, which spans between secondary steel beams usually spaced at between 2.5 and 3m centres. Concrete, which may be either lightweight or normal weight, is then poured onto the decking, usually by pumping, to make up the composite system. Metal decking acts both as permanent formwork for the concrete, eliminating the need to provide props, and as tensile reinforcement for the slab. Steel bars are included in the slab to prevent cracking and to provide reinforcement in the event of degradation of the decking in a fire.

Alternative arrangements of primary and secondary beams can be adopted for an optimum deck span of 3m. and a typical system is illustrated.

There are many types of steel decking available, but perhaps the most commonly used is the re-entrant profile type which provides a flat soffit and facilitates fixings for services and ceilings.

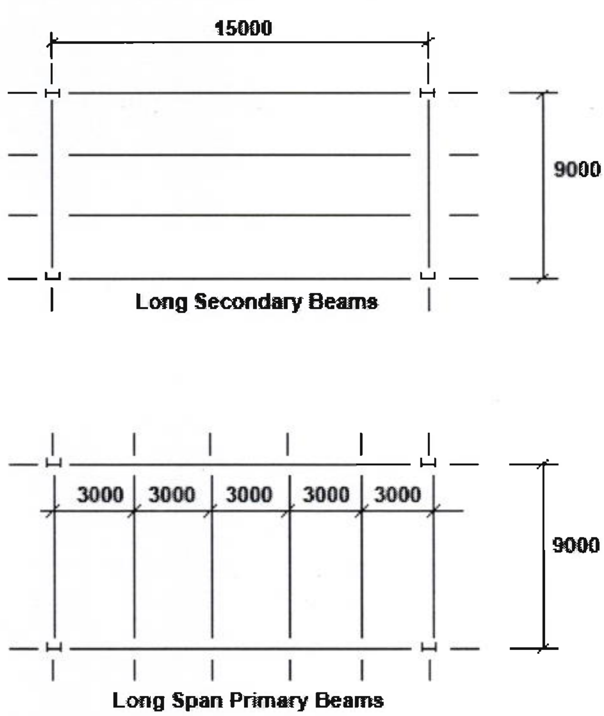


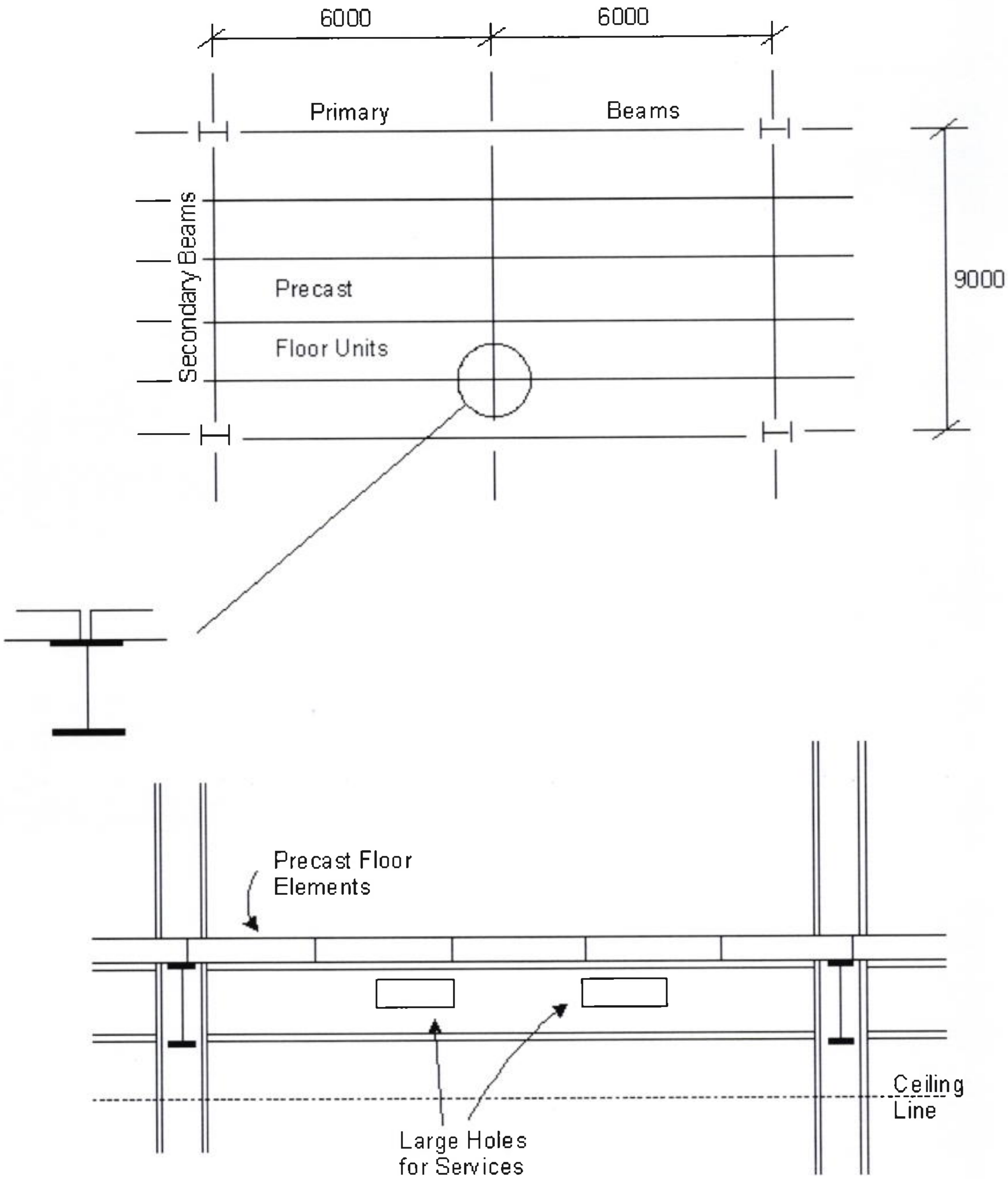
Fig.1: Primary and secondary steel beams

Composite floor slabs have become popular for multi-storey buildings when rapid construction is required.

This form of slab construction is particularly popular for multi-storey buildings when rapid construction is required. Some of the advantages of the composite system are:

Steel decking acts as a permanent shuttering which can eliminate the need for slab reinforcement and propping of the construction while the concrete develops strength. This leads to simple, rapid construction.

- Composite action reduces the overall depth of structure. It provides up to 2 hours fire resistance without additional fire protection and 4 hours with added thickness or extra surface protection.
- It is a light, adaptable system that can be cut to awkward shapes and can easily be drilled or cut out for additional service requirements.
- The overall weight of this system is low, particularly if lightweight concrete topping is used, reducing frame loadings and foundation costs.
- The demands on cranage are low as many sheets of steel decking may be lifted at a time, and then laid out by hand; the concrete topping may be placed by pump.
- Precast concrete units are also often used with a steel frame, offering long spans and quick installation.
- Precast concrete floors area heavier form of construction than comparable composite metal deck floors, but offer the following advantages:
- Fewer floor beams since precast floor units typically span 6 to 8m.
- Shallow floor construction can be obtained by supporting precast floor units on shelf angles.
- Fast construction because there is no propping and no time is needed for curing and the development of concrete strength.

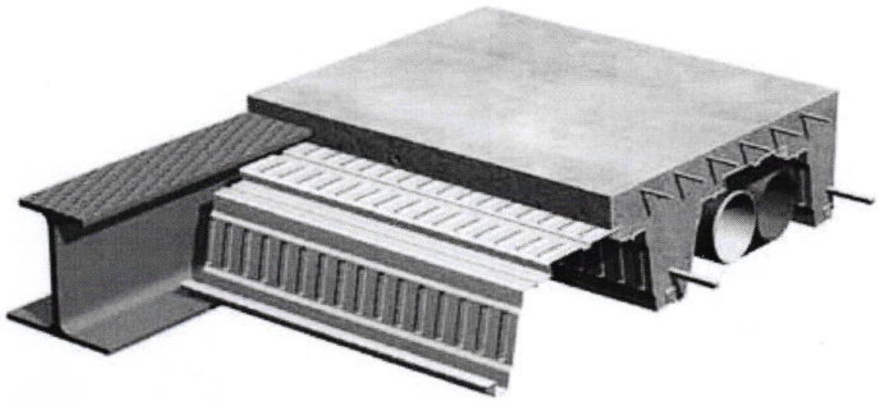


Precast concrete floor systems

Composite action may be difficult with precast floors, and construction requires a crane.

The disadvantages of precast concrete floors are:

- Composite action not readily achieved without a structural floor screed.
- Heavy floor units are difficult to erect, requiring the use of a crane which may have implications on the construction programme.



Slimdek® is an engineered floor solution developed to offer a cost-effective, service-integrated, minimal depth floor for use in multi-storey steel framed buildings with grids up to 9 metres x 9 metres.
Slimdek extends the range of cost-effective steel options for modern buildings. Ease of planning and servicing, combined with a reduction in building height, gives significant cost and speed of construction benefits.

Slimdek solutions can be designed to incorporate the latest technology in energy efficient services principles.

Alternative floor framing systems

Composite beams mobilise the strength of the floor slab to improve the strength of the steel beam.

Composite action is achieved by welding studs to the beam flange to form a continuous shear connection. The slab then acts as the compression flange for the beam. When used with composite deck flooring, the studs are welded through the decking onto the flange of the beams below to form a connection between steel beam and concrete slab.

Maximum beam span is about 15m and beam depth can be estimated as span/25 (see figure 1)

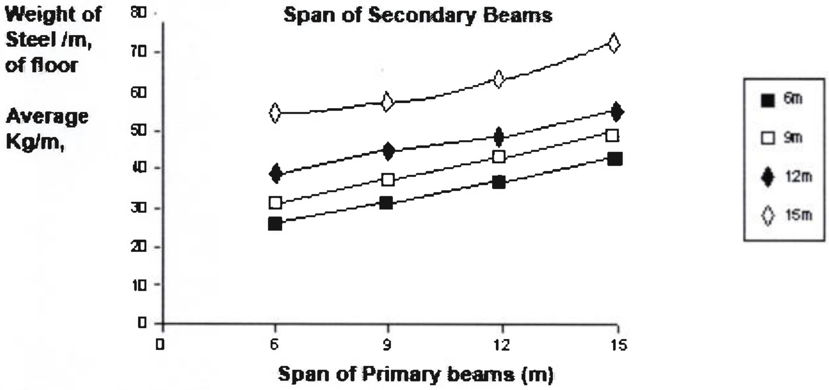
Weight comparisons for different beam layouts indicate the use of long span main beams.

Figure 1 shows the effect of varying the arrangements of primary and secondary beams. The weight of steelwork per square metre for each arrangement is plotted against span of primary beam. This comparison has been based on a limiting criterion of span/360 for superimposed load deflection required by BS 5950 and incorporates an allowance for trimmers and connections.

The comparison highlights a number of interesting features relating to this type of floor system and floor grids in general:

- Long spanning secondary systems result in heavier floor steel than using long span primary beams. For example, a 9m by 15m structural bay with 15m secondary beams uses 20 percent more steel than a 15m by 9m bay with 15m primary beams.
- For the longer spans the effect of setting more stringent deflection criteria (say a flat limit of 25mm instead of span/360) is to increase the weight of steel required significantly (between 5 and 10 percent).

In practice long span secondary beams are often used.



Weight of structural steel for composite floors

The above graph should be used with caution because:

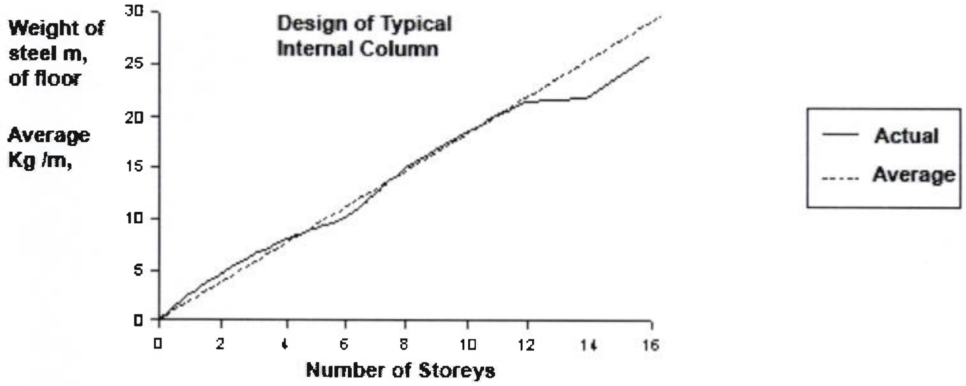
- They are based on idealised grids
- Although the long span primary system is some 20 percent lighter than the equivalent long span secondary system, it contains as much as 40 percent more labour content in fabrication and erection.
- Although an allowance is made for items such as connections and trimming round openings these are difficult to define. In practice, the irregularities encountered in a real building may have an overriding influence.

Section sizes of main and secondary beams is more consistent if the more lightly loaded secondary beams have longer spans

The weight of columns is largely independent of beam span.

The graphs also exclude the influence of the columns on the weight of the floor steel. Studies on composite floors have shown that the average weight of column on a particular floor is largely independent of the span of the floor provided. Of course, the columns must not be so closely spaced that the column size is not related to the load it carries. This being the case, to find the combined weight of both floors and vertical steel in a building, the effect of the columns can be added to the floors.

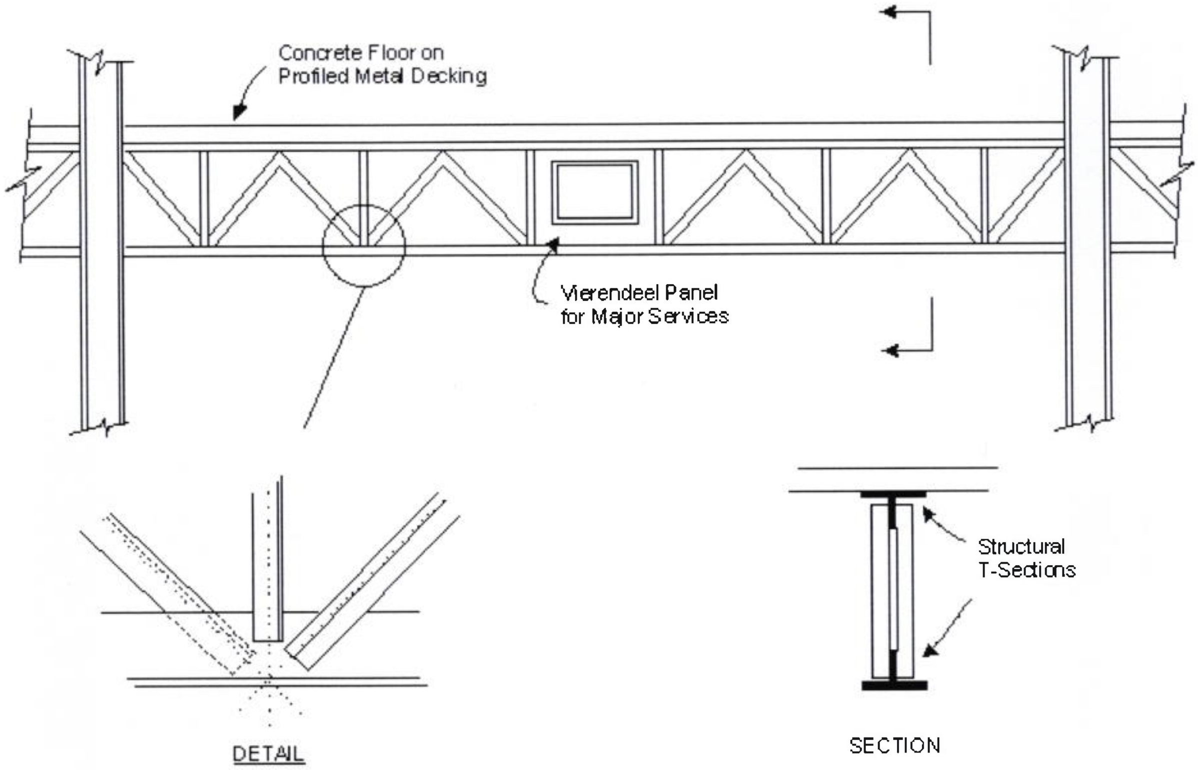
The figure below shows the weight per metre of typical column (forming part of a 9m by 6m grid) for a building with increasing height. To obtain an estimate of the overall tonnage of structural steel in a building, the weight per square metre for the floors can be added and multiplied by the gross floor area.



Weight of structural steel for columns

Longer spans are possible using composite steel floor trusses, but fabrication costs are higher.

Use of composite steel floor trusses as primary beams in the structural floor system permits much longer spans than would be possible with conventional universal beams. The use of steel trusses for flooring systems is common for multi-storey buildings in North America, but seldom used in Britain. Although they are considerably lighter than the equivalent universal beam section, the cost of fabrication is very much greater, as is the cost of fire proofing the truss members. For maximum economy, trusses should be fabricated using simple welded lap joints. Maximum span for floor trusses is about 30m and truss depth can be estimated as span/15.



Typical composite truss details

Truss forms allow integration of services.

The openings between the diagonal members should be designed to accept service ducts, and if a larger opening is required, a Vierendeel panel can be incorporated, typically at the centre of the span.

CHAPTER 4: CONTEXTUAL ANALYSIS

4.1 HISTORICAL BACKGROUND

It is also one of the fishing ports of Bangladesh. A number of people are also involved in fishing and collecting seafood and sea products for their livelihood. Various kinds of Oyster, Snail, Pearl and their ornaments are very popular with tourists in seaside and city stores.
the first surfing initiative in Bangladesh's history is in 2002 in Cox's Bazar.It has now extended to hold an annual competition including locals and foreign tourists.
Submarine Cable Landing Station is here.
The sand at Cox's Bazar beach and surrounding areas is rich in heavy-metal mineral content. The heavy minerals of Cox's Bazar beach sands are dominated by hornblende, garnet, epidote, ilmenites (both unaltered and altered) with magnetite, rutile, pyrite and some hydroxides. Inani beach has also a lot of diposite like Cox's Bazar. Surrounding islands of Maheshkhali, Kutubdia and Nijhum Deep as well as mainland beach in Teknaf area are also believed to have similar large deposits. The total deposit in these locations is about 20.5 million tons of raw sand, which contains 4.4 million tons of heavy minerals.

4.2 CLIMATIC CONDITION

The annual average temperature in Cox's Bazar is 34.8 °C and a minimum of 16.1 °C. The climate remains hot and humid with some seasons of temperate weather. The average amount of rainfall is 4285 nm. The climate is typically tropical; mild winter (October to March); hot, humid summer (March to June); humid, warm rainy monsoon (June to October). The terrain: mostly flat alluvial plain; hilly in southeast. For Dhaka in January the daily average maximum temperatures is 25°C with the average minimum 10°C, while in June the average maximum is 32°C with a minimum of 25°C. The wettest month for Dhaka is July with an average of 367.9mm of precipitation falling while the driest month is December with 8.9mm falling.

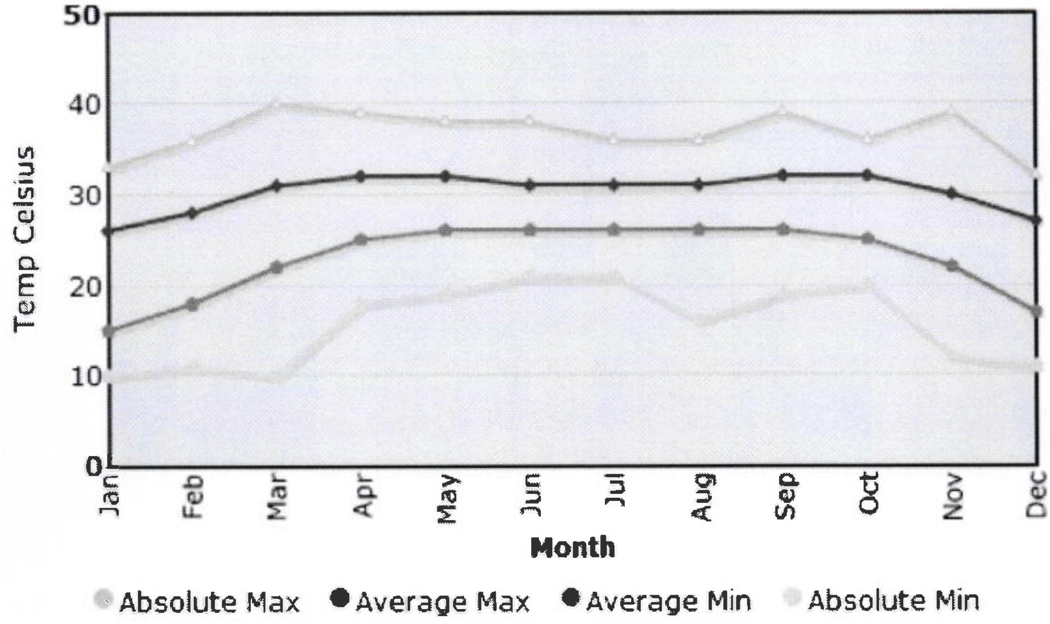


Figure: Average and extreme temperature variation with month

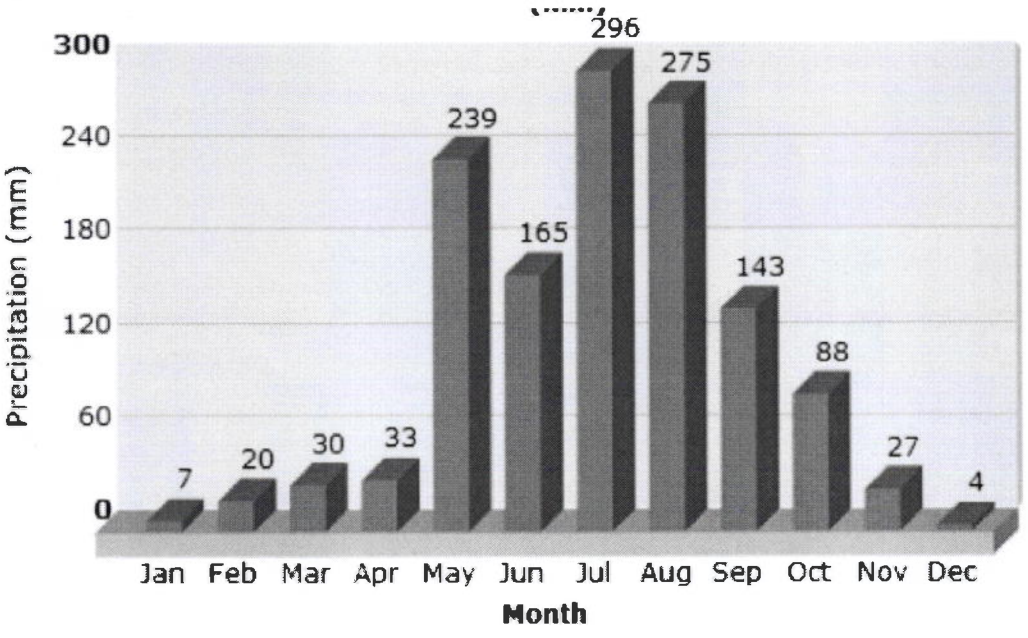


Figure: Precipitation amount

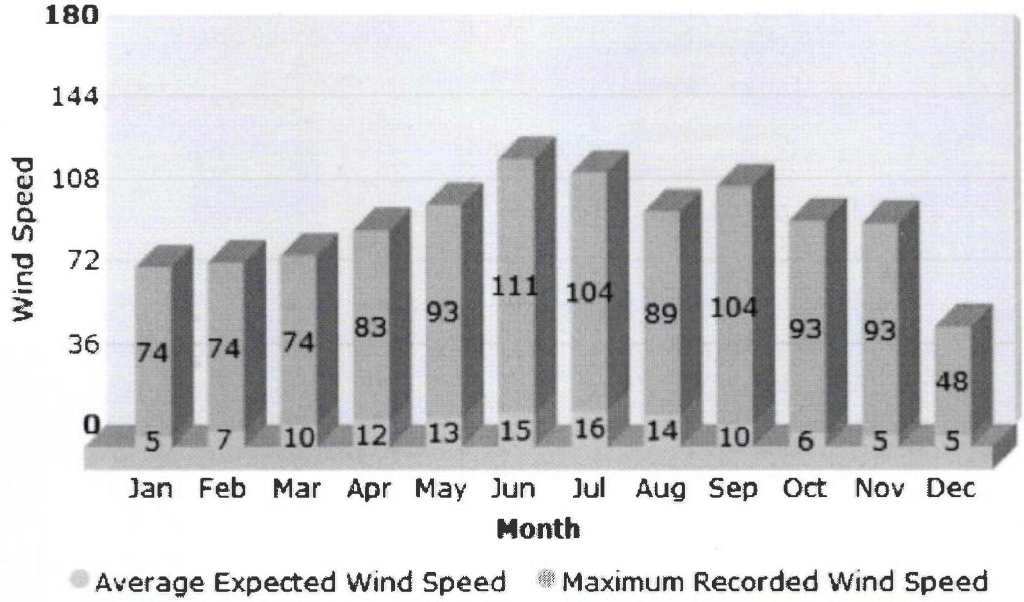


Figure: Wind speed

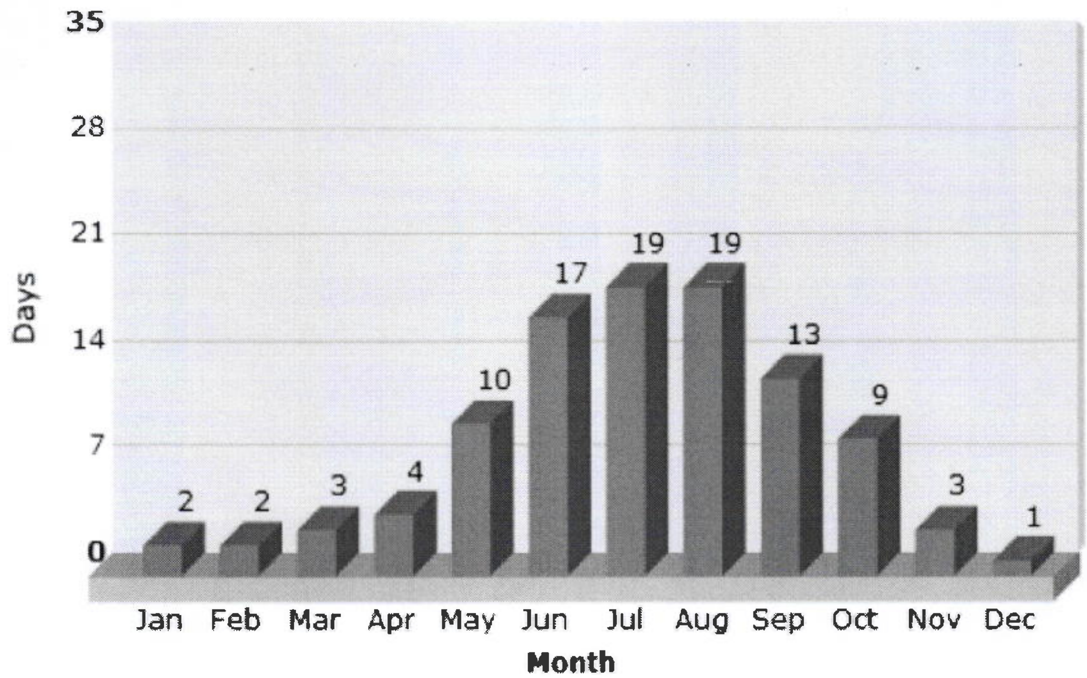


Figure: Number of rain days

CHAPTER 05: CASE STUDY

5.1 OCEANOGRAPHIC CENTER, VALENCIA, SPAIN.

The building was completed in 2004. Designed by Santiago Calatrava and Félix Candela, the project underwent the first stages of construction in July 1996 and the finished "city" was inaugurated April 16, 1998 with the opening of L'Hemisfèric.Constructed with glass, concrete and steel the building is shaped like a shell that consists of a 23 million liter dolphinarium and a 70 meter long tunnel. Underground tanks are flushed out six times a day and replenished by 150 million liters of water pumped from malvarrosa beach. The filtration system can produce its own salt water if regular supply is threatened said to be one of Europe's largest marine parks it is home to 45000 species.

The Architects: Santiago Calatrava and Felix Candela

Santiago Calatrava was born in Valencia Spain on the July 28, 1951. He is a qualified architect and engineer and also known for his artist skills in painting and sculpting. He attended the Art Academy in Valencia in the mid-1960s, then he earned a degree in architecture and a post graduate course in city planning at the EscuelaTecnica Superior de Arquitecturea, studied civil engineering at the Federal Polytechnic University of Zurich, and participated in academic research investigating The Foldability of Space Frames. Calatrava's architecture is aimed to unite structure and movement. Early in his career, Calatrava was the winner to design The Stadelhofen Station in Zurich. He was recognized for his achievement in creating poetics of movement and integrating public transportation in a natural setting and urban context. Another theme in his work was moving contraptions in his buildings. The dome for the Reichstag Conversion Competition in Berlin that open and closes like a flower. The Planetarium in the City of Arts and Sciences in Valencia opens and closes like eyelids.

Felix Candela was born on January 27, 1910 in Madrid Spain and died December 7, 1997. His architectural designs composed of reinforced-concrete structures distinguished by thin, curved shells. His popularity sprung from his design, in collaboration with Jorge Gonzales Reyna, of the Cosmic Ray Pavilion in Mexico. He used his signature design of the reinforced concrete roof that varies in thickness from only 5/8 inch to 2 inches. He also built the church of La Virgin Milagrosa in Mexico City and the church of San Vicente de Paul. His designs consisted of warped-shell industrial buildings, thin-shell centenary, and barrel-vaulted factories and warehouses. Candela was also a teacher at Harvard University and University of Illinois. Felix Candela designed the underwater city, L'Oceanografic, located in the City of Arts and Sciences in Valencia and is reminiscent of Antoni Gaudi work in Barcelona.

The complex is made up of the following buildings, in order of their inauguration:

- L'Hemisfèric — an Imax Cinema, Planetarium and Laserium. The building is meant to resemble a giant eye, and has an approximate surface of 13,000 m². The Hemesferic also known as the planetarium or the "eye of knowledge," is the centerpiece of the City of Arts and Sciences. It was the first building completed in 1998. Its design resembles an eyelid that opens to access the surrounding water pool. The bottom of the pool is glass, creating the illusion of the eye as a whole. This planetarium is a half-sphere composed of concrete 110 meters long and 55.5 meters wide. The shutter is built of elongated aluminum awnings that fold upward collectively to form a brisesoleil roof that opens along the curved axis of the eye. It opens to reveal the dome, the pupil of the eye, which is the Ominaxtheater. The City of Arts and Sciences is divided in half by a set of stairs that descend into the vaulted concrete lobby. The underground spaces are illuminated with the use of translucent glass panels within the walking path. The transparent roof is supported by concrete arches that connect to the sunken gallery. There is a miraculous echo inside of the building and if two people stay on the two opposite pillars inside of the eye they can seamlessly speak with each other.

- El Museu de les Ciències Príncipe Felipe — Is an interactive museum of science that resembles the skeleton of a whale. It occupies around 40,000 m^2 on three floors. The hotch-potch of exhibits is designed more for 'entertainment value' than for science education. The building is much more impressive outside than inside and its meagre contents show how little thought was put into the whole project. Much of the ground floor is taken up by a basketball court sponsored by a local team and various companies. The building is made up of three floors of which 26,000 square meters is used for exhibitions. The first floor has a beautiful view of the Turia Garden that surrounds it; which is over 13,500 square meters of water. The second floor hosts "The Legacy of Science" exhibition by the researchers; Santiago Ramón y Cajal, Severo Ochoa y Jean Dausset. The third floor is known as the "Chromosome Forest" which shows the sequencing of human DNA. Also on this floor is the "Zero Gravity," the "Space Academy," and "Marvel Superheroes" exhibitions. The building's architecture is known for its geometry, structure, use of materials, and its design around nature. The building is about 42,000 square meter and 26,000 square meters of is exhibition space, which is currently the largest in Spain. It has 20,000 square meters of glass, 4,000 panes, 58,000 m^3 of concrete, and 14.000 tons of steel. This magnificent building stands 220 meters long, 80 meters wide and 55 meters high.

- L'Umbracle — a landscaped walk with plant species indigenous to Valencia (such as rockrose, lentisca, romero, lavender, honeysuckle, bougainvillea, palm tree). It harbors in its interior The Walk of the Sculptures, an outdoor art gallery with sculptures from contemporary artists. (Miquel from Navarre, Francesc Abbot, Yoko Ono and others). The Umbracle is a space that is a home to numerous sculptures surrounded by nature. It was designed as a entrance to the City of Arts and Sciences. It is 320 meters long and 60 meters wide, located on the southern side of the complex. It 55 fixed arches and 54 floating arches that stand 18 meters high. The plants in the garden were carefully picked to change color with the seasons. The garden consists of 99 palm trees, 78 small palm trees, 62 bitter orange trees. There are 42 varieties of shrubs from the Region of Valencia including Cistuses, Mastics, Buddleia, Pampas grass, and Plumbagos. In the garden there are 16 plants of Beauty of the Night. Honeysuckle and hanging Bougainvilea are two of the 450 climbing plants in the umbracle. It also has 5,500 carpet plants such as Lotus, Agateas, Spanish Flags, and Fig Marigolds. There are over a hundred aromatic plants including Rosemary and Lavender.

- L'Oceanogràfic — an open-air oceanographic park. It is the largest oceanographic aquarium in Europe with 110,000 square meters and 42 million liters of water. It was built in the shape of a water lily and is the work of architect Félix Candela. Each building represents different aquatic environments including the Mediterranean, Wetlands, Temperate and Tropical Seas, Oceans, the Antarctic, the Artctic, Islands and the Ted Sea. This aquarium is a home to over 500 different species including dolphins, belugas, sawfish, jellyfish, starfish, sea urchins, walruses, sea lions, seals, penguins, turtles, sharks,and rays. It also inhabits wetland bird species.

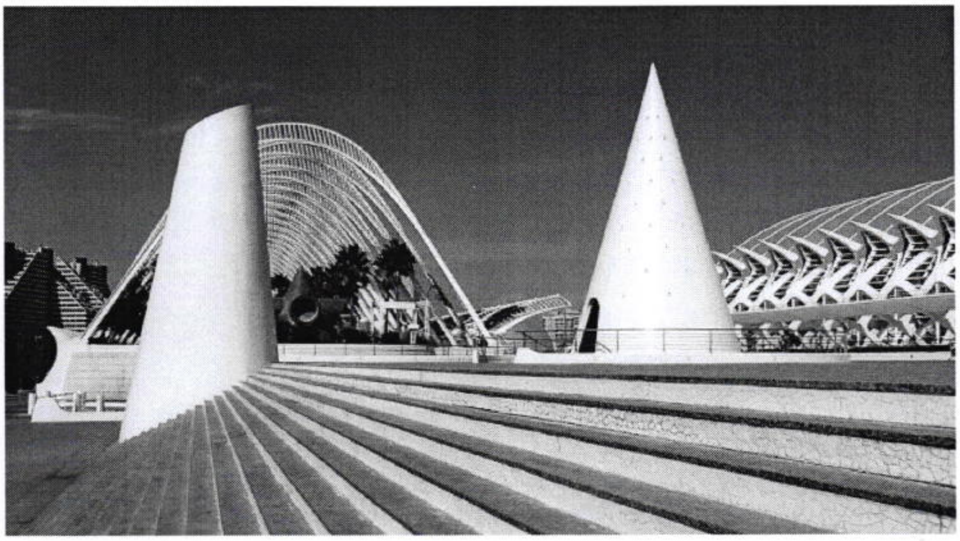
- El Palau de les Arts Reina Sofia — an opera house and performing arts center. It contains four large rooms: a Main Room, Magisterial Classroom, Amphitheater and Theater of Camera. It is dedicated to music and the scenic arts. It is surrounded by 87,000 square meters of landscape and water, as well as 10,000 square meters of walking area. The Palau de Les Arts has four sections; the main hall, the master hall, the auditorium, and the Martin y Soler theatre. It holds many events such as opera, theatre and music in its auditoriums. Panoramic lifts and stairways connect platforms at different heights on the inside of the metallic frames of the building. The building has an metallic feather outer roof that rests on two supports and is 230 meters long and 70 meters high. One of the supports allows for part of the building to overhang. The building is supported by white concrete. Two laminated steel shells cover the building weighing over 3,000 tons. These shells are 163 meters wide and 163 meters long.

- El Pont de l'Assut de l'Or — a suspension bridge that connects the south side with Minorca Street, whose 125 meters high pillar is the highest point in the city.

- L'Àgora — a covered plaza in which concerts and sporting events (such as the Valencia Open 500) are held.[1] The Agora is a space designed to hold a variety of events such as concerts, performances, exhibitions, conventions, staging of congresses, and international sports meetings. Many important events have been held in this building including the Freestyle Burn Spanish Cup in 2010 and the Christmas Special Program.

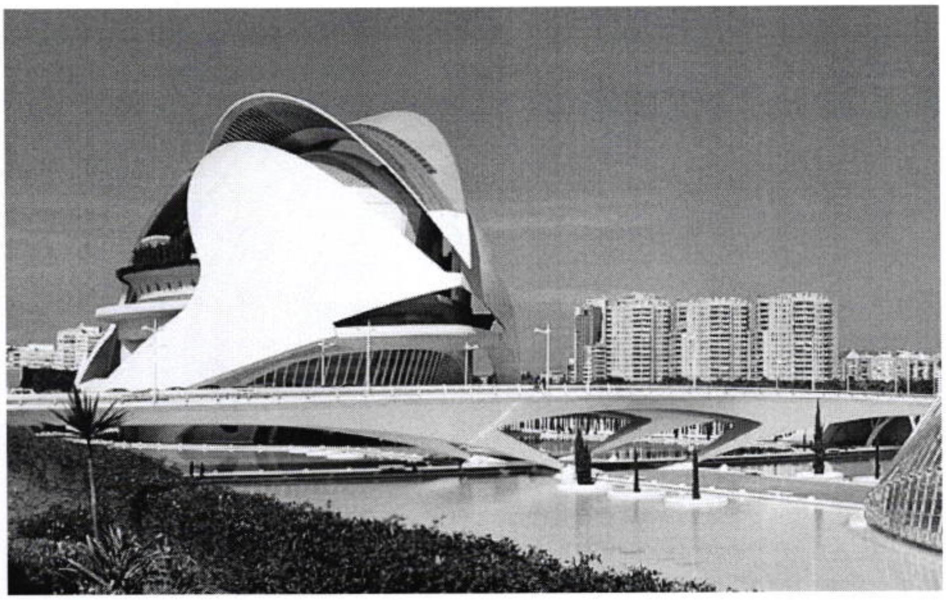
- Torres de València — forming part of a project of the construction of three skyscrapers of 308, 266 and 220 m. The project has been put on hold and the possibilities that it will be finished are seen by many as doubtful.

The main structures

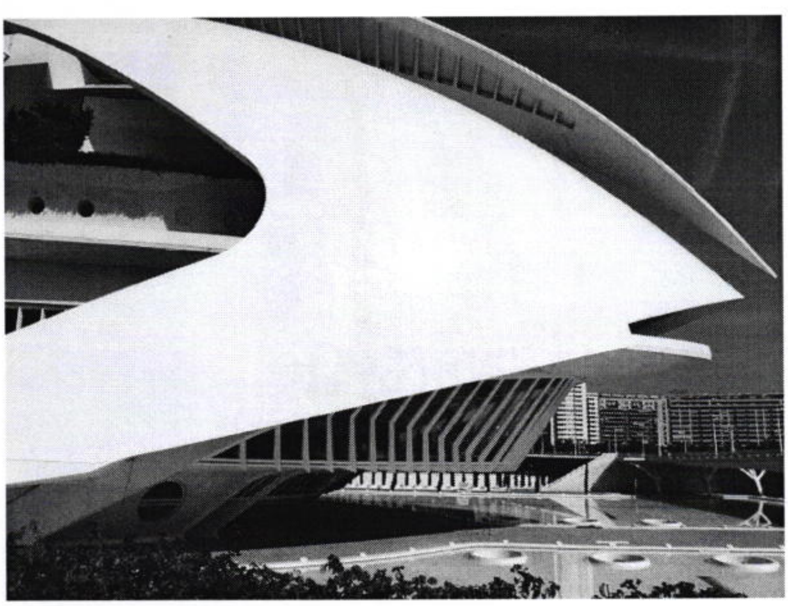


The Umbracle is the huge promenade entrance to the City of Arts and Sciences. Numerous lofty arches are covered in verdant vines that protect a garden and several species of tropical plants and trees. Along the colorful walk you will also find the 'Stroll of the Sculptures' an outdoor gallery of nine unusual figures by contemporary artists.

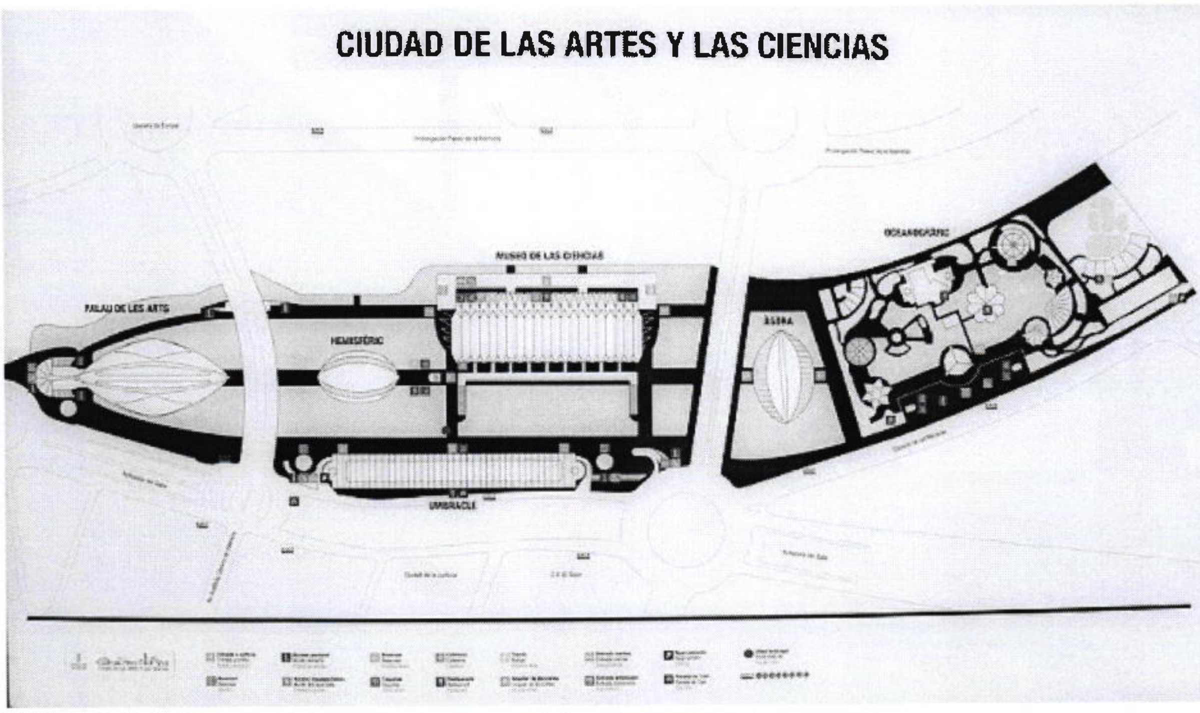
The Prince Phillip Museum of Sciences opened in 2000 and its design is often said to resemble a whale's skeleton, or a dinosaur's spine. Whatever your muse, this magnificent exhibit is actually an interactive museum that will prove fascinating to anyone interested in the scientific disciplines that study everything from questions about The origin of the universe to contemporary issues like the enigma of climate change.



The Queen Sophia Palace of Arts sits amidst a setting of Mediterranean blue reflecting pools. When it opened in 2005, it became the signature performing arts center in Spain for opera, theatre, and dance. At 248 feet, it is the tallest opera house in the world. The site encompasses four multi-purpose auditoriums and the smallest hall seats 400, the largest 1,700 people.

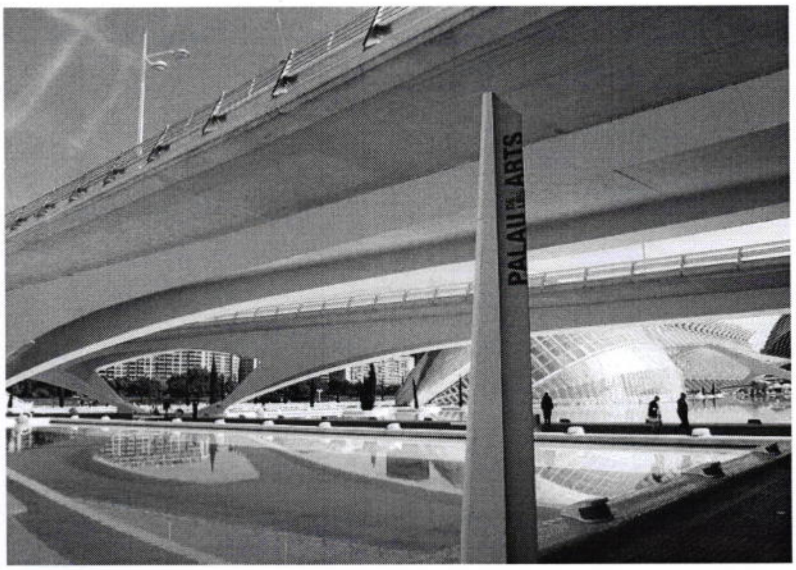


Proudly, the Queen Sophia Company hosts the Centre of PerfeccionamentPlacido Domingo, which is a celebrated program for young talented opera artists. As the name indicates, the program honors Spain's most famous tenor, Placido Domingo.



The Oceanographic is like an underwater city and is the largest aquarium in Europe. It features over 500 species of fish and mammal inhabitants collected from the world's oceans. The oceanographic compound covers some 20-acres and includes an unusual aquarium restaurant with floor to ceiling glass walls where curious fish can watch you savor the catch of the day along with your paella.

The Hemispheric is a visually striking eye-shaped Planetarium in the midst of a stunning turquoise pool. This popular attraction has a computerized astro-projector that shows the night sky with all the planets and stars on a screen so large you feel like an astronaut.



There is also a laser show displayed on a 900 square foot screen, and visitors can watch IMAX and 3-D journeys through space. It is no wonder that the Hemispheric Planetarium is now one of the top five buildings visited in Spain.

The Agora is the latest structure created by Calatrava's architectural genius. This surrealistic multi-use sports arena is 262 feet high and seats over 5,500 spectators. The Agora is the venue for the Valencia Open 500 and is expected to take its place among the greatest sports facilities in the world

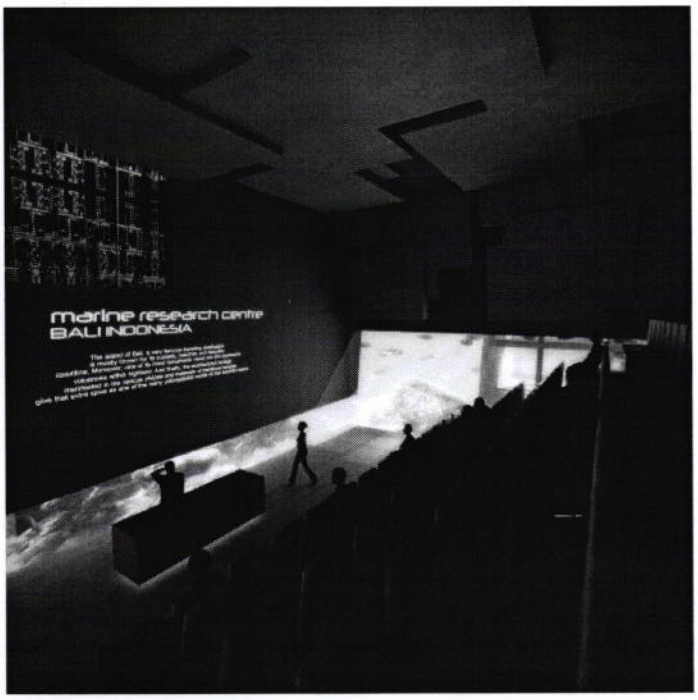
5.2MARINE RESEARCH CENTER BALI

Croatian design team, **AVP_arhitekti**, has submitted to ArchDaily their latest project, Marine Research Center Bali. Their proposal seeks to align the center with the elemental characteristics of Bali itself

MARINE RESEARCH CENTER

The island of Bali, a very famous traveling destination, is mostly known for its sunsets, beaches and beautiful coastline. Moreover, one of its most remarkable views are the impressive volcanoes within highland. And finally, the architectural heritage manifested in the various shapes and materials of traditional temples give that extra spice as one of the many unforgettable motifs of this beautiful island.

The main challenge was to combine tradition and geographic characteristics of this island with the requested architectural assignment – a Marine research center for tsunamis.



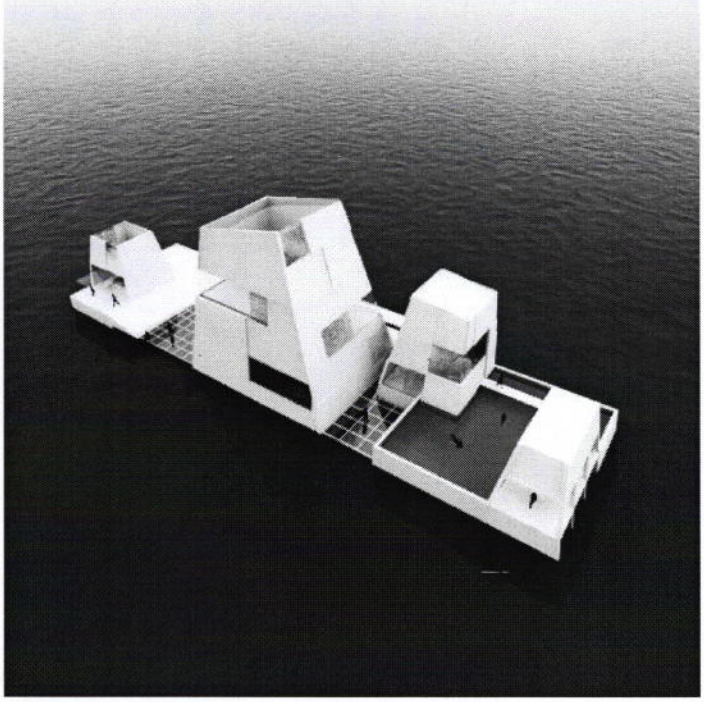
IDEA

The main idea came from the intention of making the above-sea level as less dominant on the Kuta beach horizon, famous for it's surreal sunset, but symbolic enough to incorporate the very essence of island Bali and to become a new landmark.

SHAPE

The concept: merge the sea and inland; an interaction of both elements, a symbiosis of these opposite essentials. Thus, the design is basically an interaction of solid and liquid, land and sea.

By cutting voids on the original building mass, creating several spaces which are filled naturally with water to accomplish the different functions requirements of the MRC (marine research center), and on the other hand, solid volumes were manifested in the above-sea level as tops of volcanoes, connected on the under-sea level. The very same personification of everlasting relationship of land and sea, earth and water. The building also responds naturally to its environment , for example: When the ocean is at its "high-tide phase", the building submerges into the sea, being covered by water just letting see its four pyramidal volumes or "volcanoes", but when at "low-tide phase", the MRC emerges again from within the sea to welcome the air, sun and guests, thus becoming a building that interacts with this natural process.

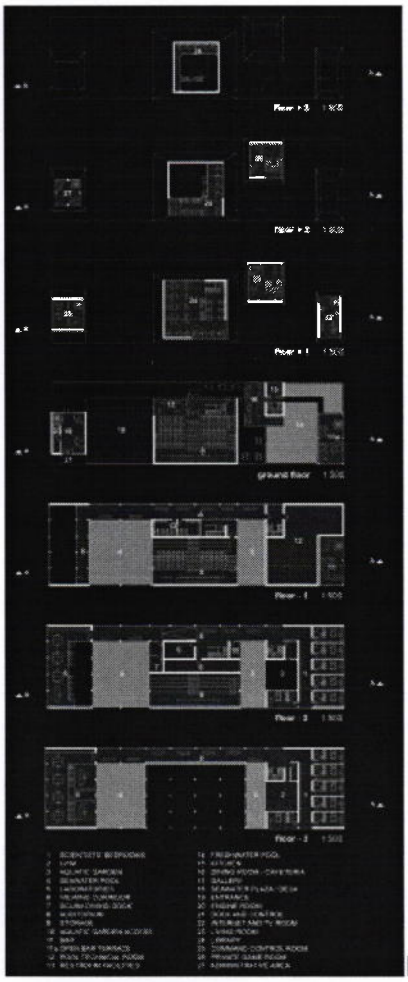


PROGRAM

The program consisted basically in grouping all the functions within the MRC – semipublic, public, and private – and sort them horizontally throughout the building. The result is a basic division of 3 equal areas which at the same time define the structural grid. Sometimes the various programs interconnect but parts in whole still preserve its given predominant function.

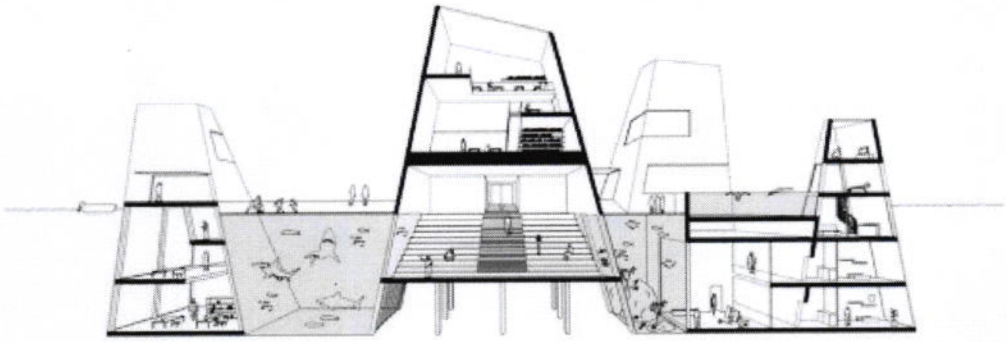
SPACES

The main access is at the 0,00 (above-sea level) platform where we generated an open square (just on top of the seawater pool) with a glass floor for the public to enjoy, gather and observe the building and its surroundings. Then, visitors continue towards the auditorium at the -3,00 level. Inside they experience a wonderful and unique atmosphere thanks to the 2 different pools (seawater pool and aquatic garden) which surround the auditorium while receiving a welcoming lecture that introduces them to the work within the MRC. Visitors are then directed towards an enclosed corridor with overhead view to observe the scientists within their laboratories. Eventually, they are free to visit the cafe and restroom facilities which are easily reached from this level through a vertical communication. Scientist's circulation is accomplished through corridors on level -6, 0 and -10, 0. Thus, the scientist have direct access to all areas of the MRC without interfering with the public communication.


Plans

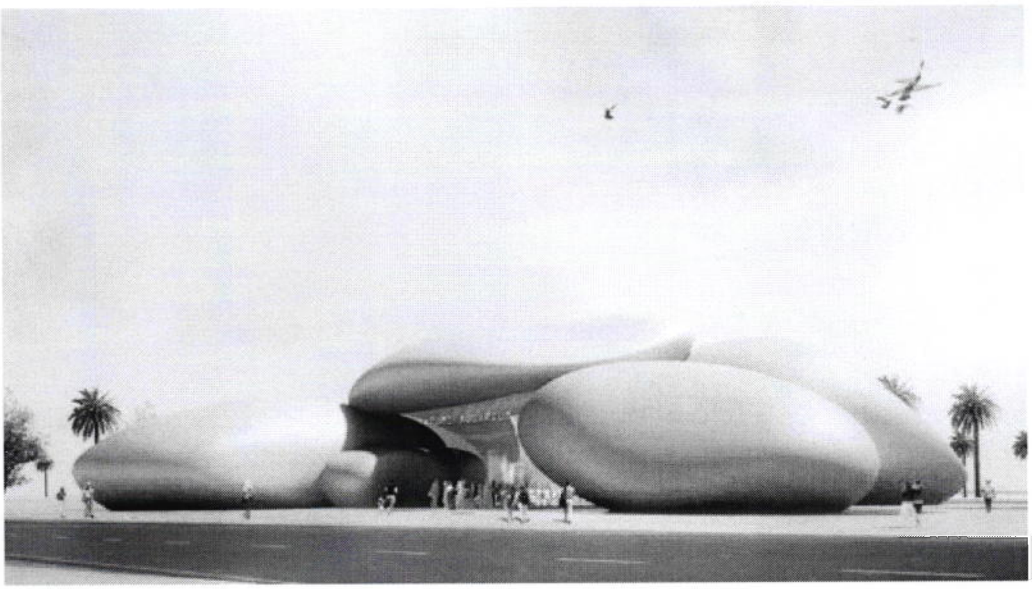
MATERIALS

The use of the adequate materials plays an essential role within the idea of creating a symbolic landmark, which in this particular case is achieved by using regional craft motifs, colors and textures characteristic for island of Bali. The concept of sustainability is present with the possibility of reducing energy consumption thanks to the use of latest technology in solar facades, natural ventilation and lightning (above water), management of waste and water recycling systems.



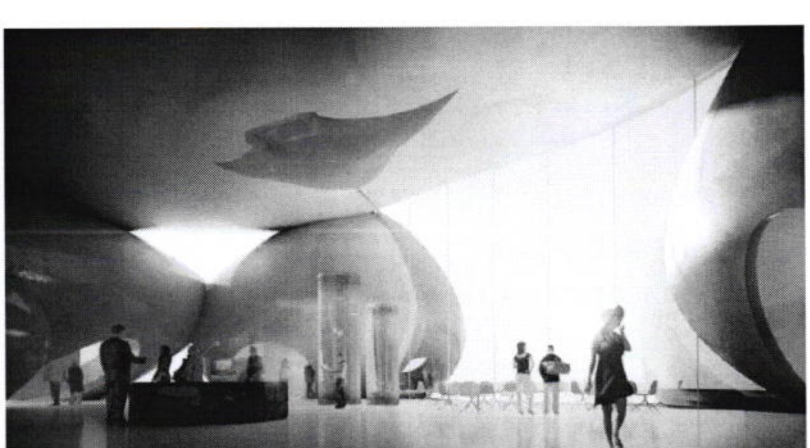
Section

5.3BATUMI AQUARIUM IN GEORGIA

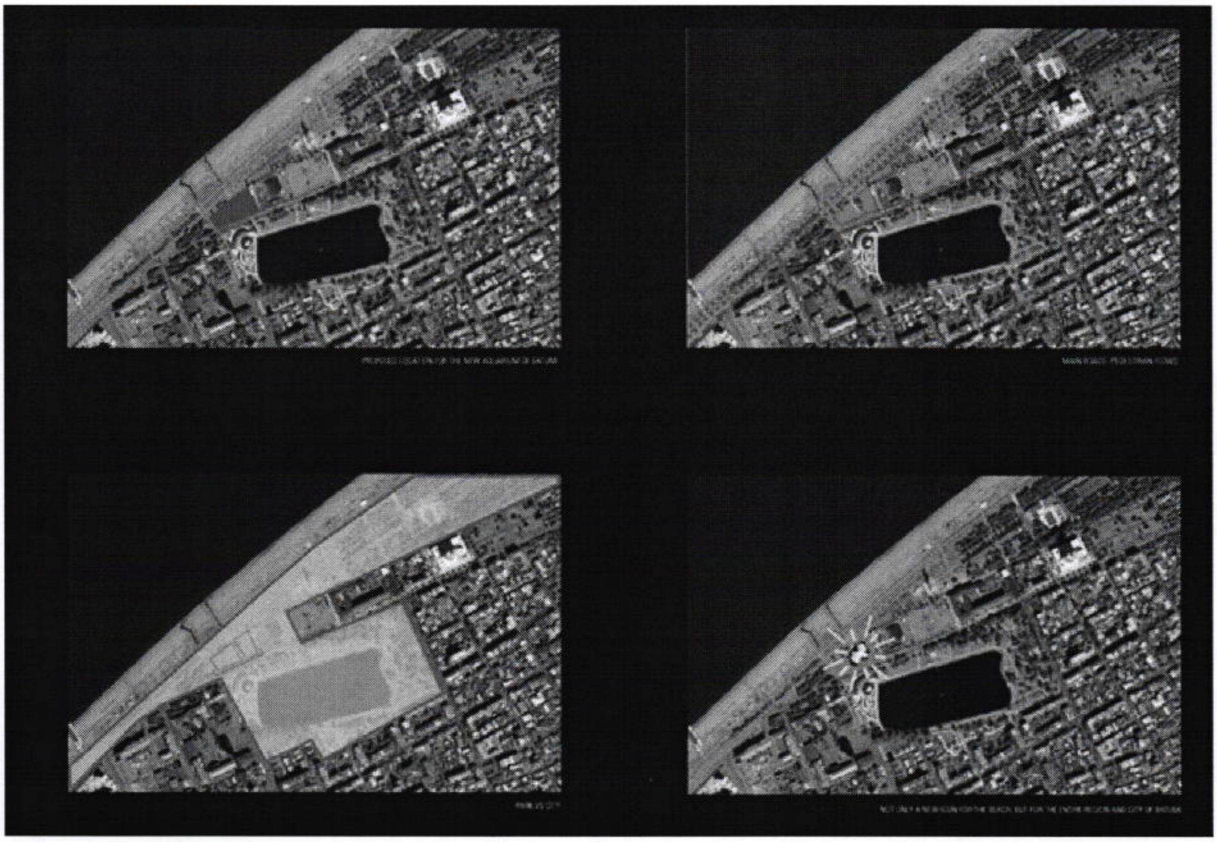


Denmark-based Henning Larsen Architects have won first prize in an invited competition to design the Batumi Aquarium in Georgia. Batumi Aquarium is inspired by the characteristic pebbles of the Batumi beach – the residue of dynamic seas continually shaping the shorefront throughout millennia. The building will be situated in the Georgian port of Batumi and will stand out as an iconic rock formation – visible from both land and sea.

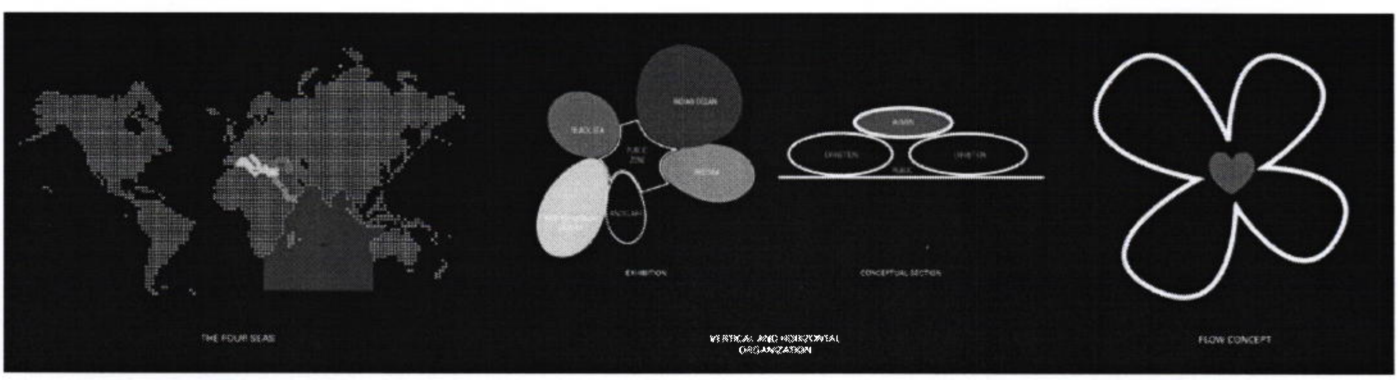
The formation constitutes four self-supporting exhibition areas where each of the four stones represents a unique marine biotype – the Aegean Sea & the Mediterranean Sea, the Indian Ocean, the Black Sea & the Red Sea and finally the more interactive exhibition.

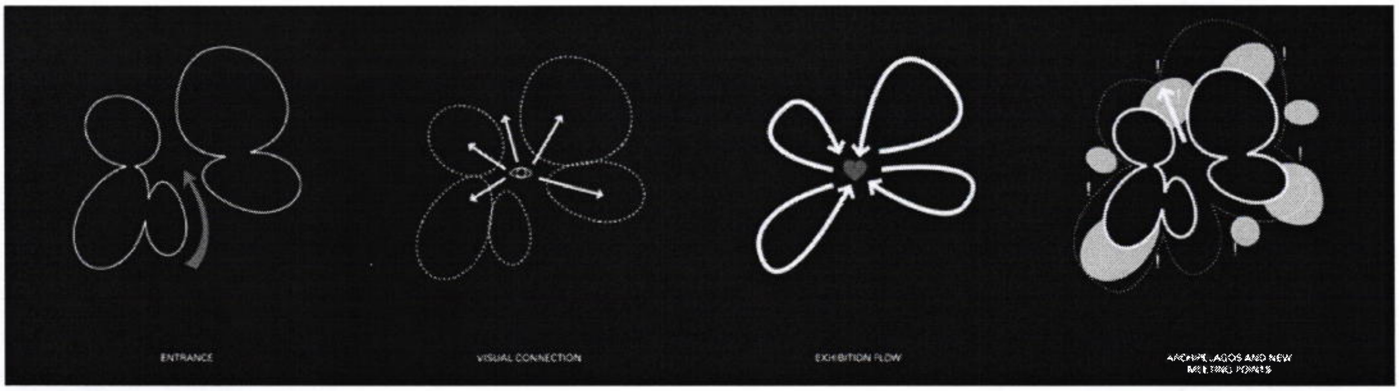


Site analysis:

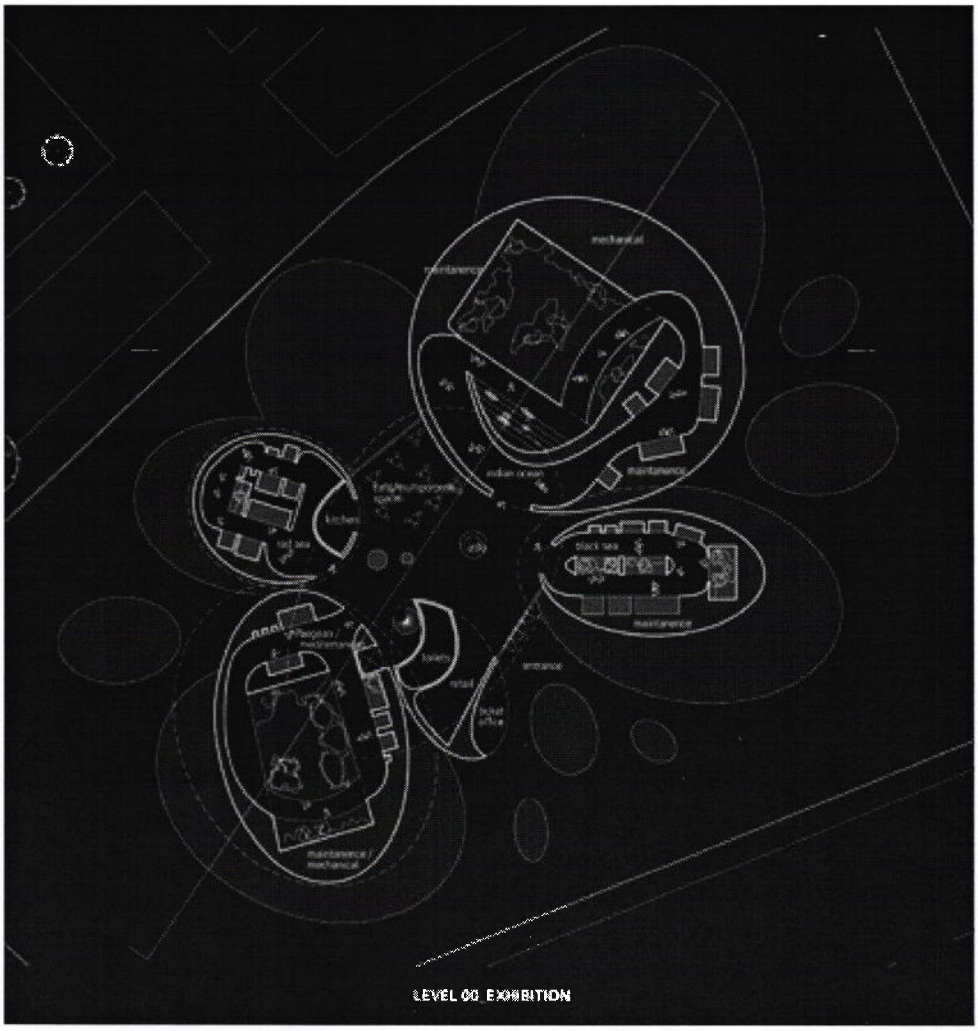


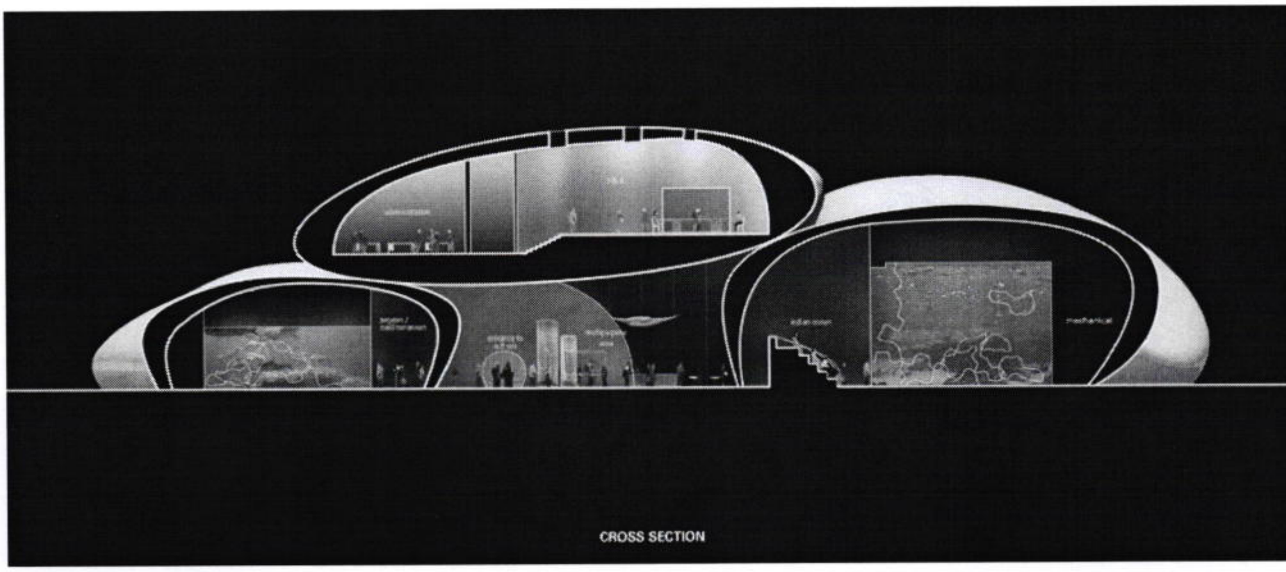
Conceptual sketches:





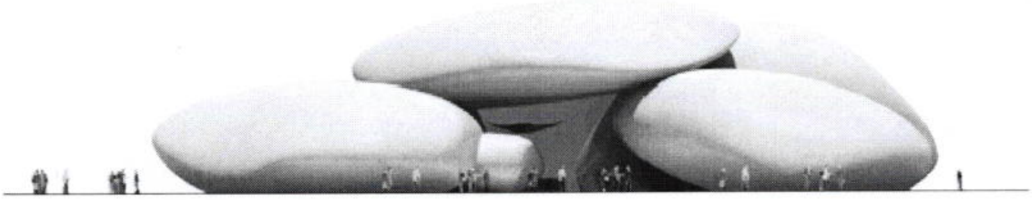
The four dispersed aquarium exhibitions are connected by a central, multipurpose space including café, auditorium and retail functions with views of the black sea and Batumi beach as scenic backdrop. Visitors gather in the central space to convene, play, eat, shop and relax before continuing their adventures through the exhibitions.





Batumi Aquarium will become a modern, cultural aquarium offering visitors an educational, entertaining and visually stimulating journey through the different seas. Unfolding around the aquarium, a landscape of different sea archipelagos provides attractive opportunities for innovative outdoor research and learning, public space and meeting places along the beach.

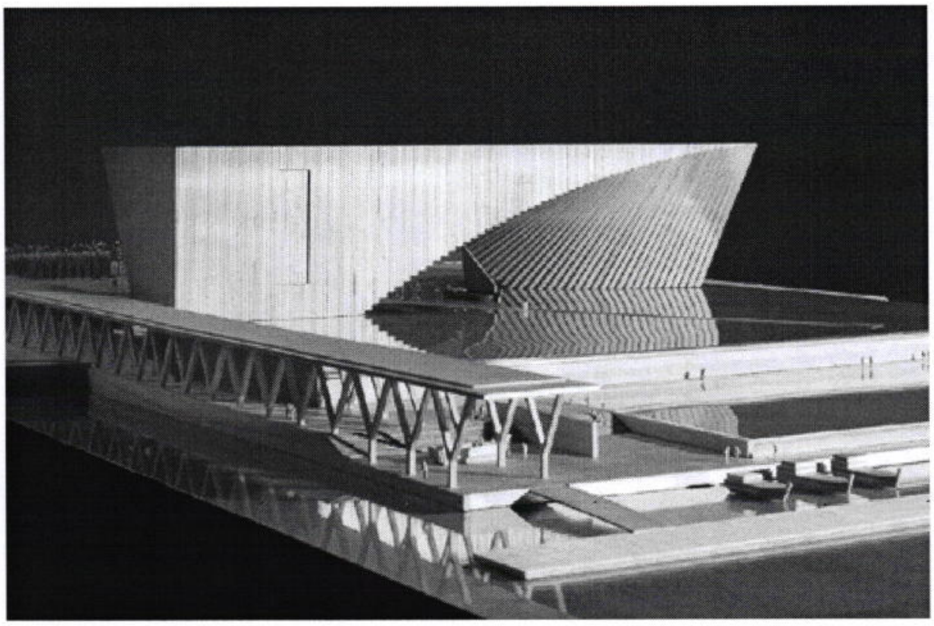
The building's significant expression inspired by nature will not only make Batumi Aquarium a spectacular new landmark in Georgia but also a state-of-the-art contribution to exploring life underneath the sea surface

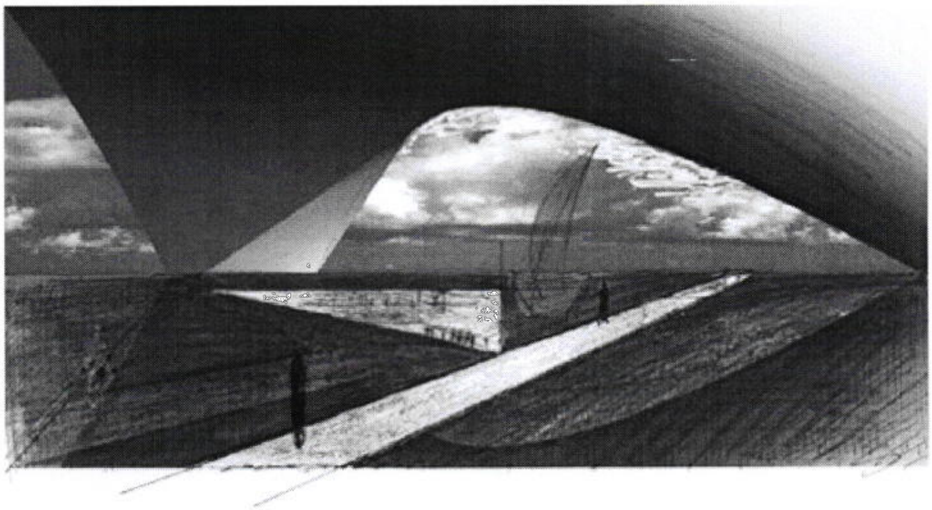


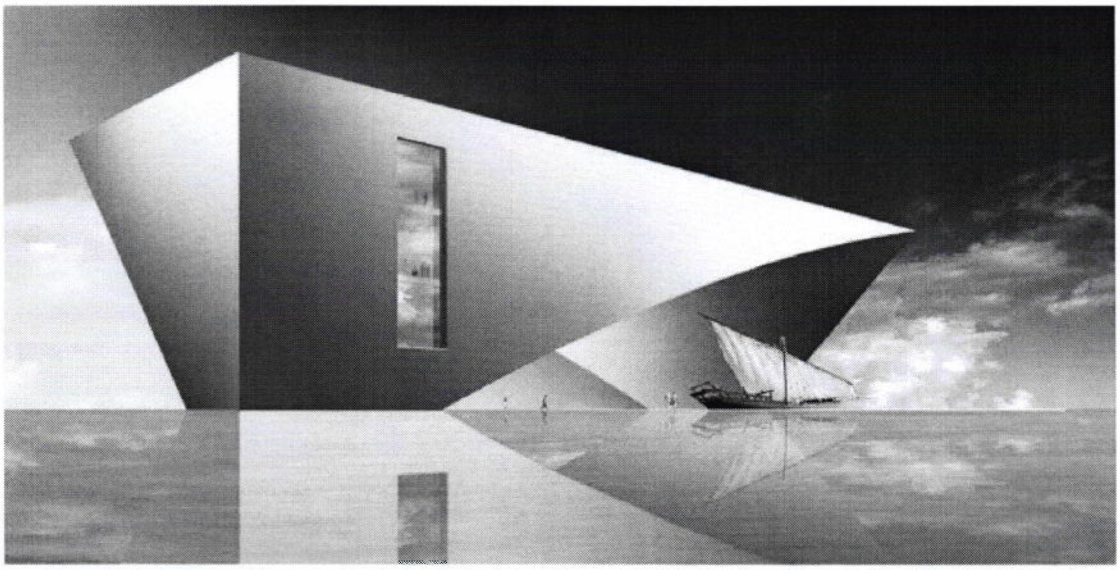
5.4ABU DHABI MARITIME MUSEUM

Outside The Museum

The observation of Abu Dhabi's nature, landscape, and maritime traditions served as the inspiration for the Abu Dhabi Maritime Museum. The building's elegant architecture is defined by a unique space in the form of a sail full of wind, carved out from a simple volume. The solitary structure stands like a gate on a vast water court, defining a space of encounter between two important landscape elements of the city's culture: the land and the water. With its reflective surface, the water court visually merges site and sea, reinforcing the maritime theme of the museum.

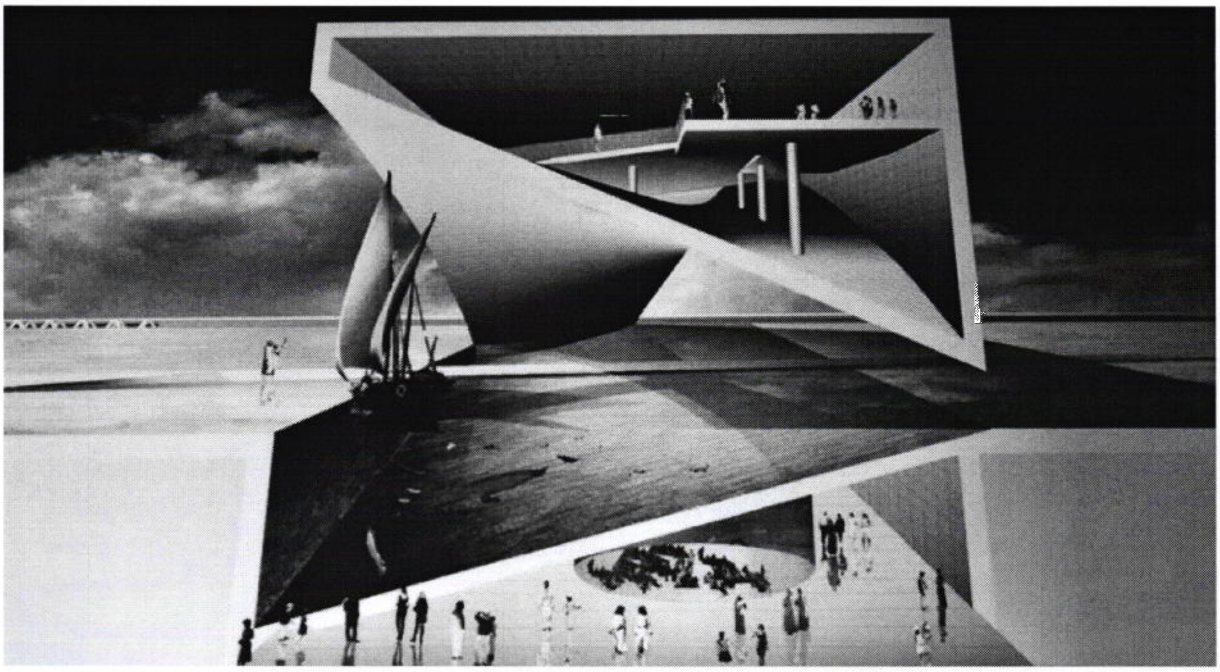




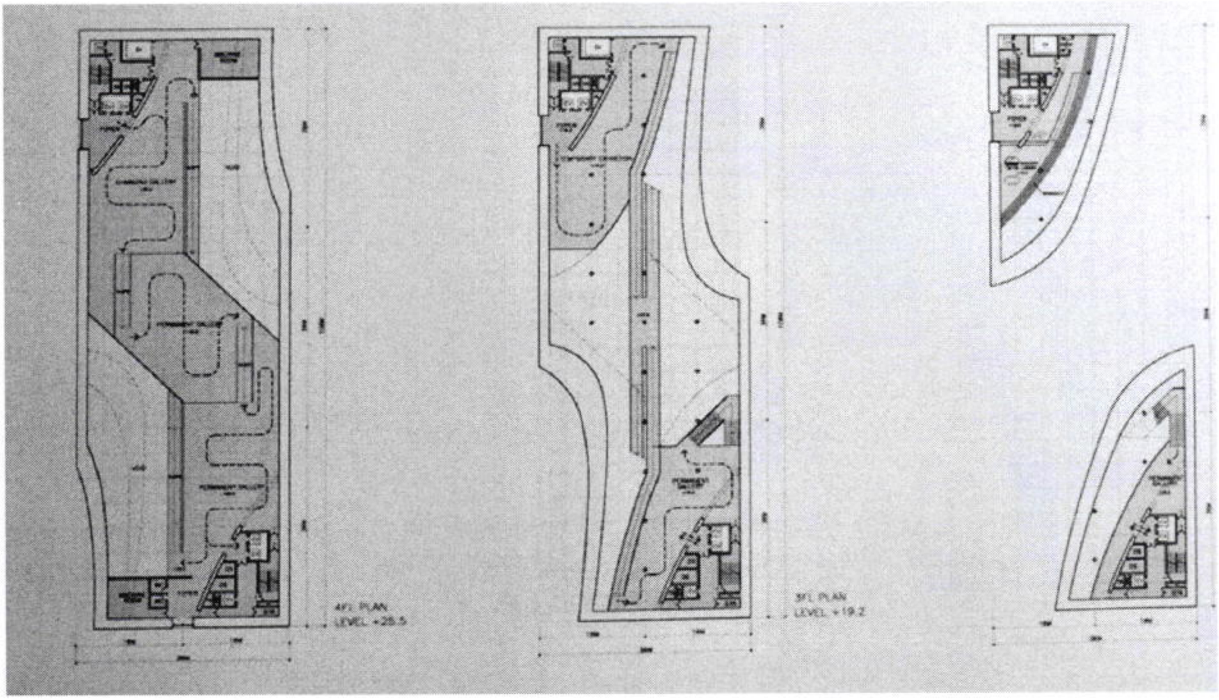


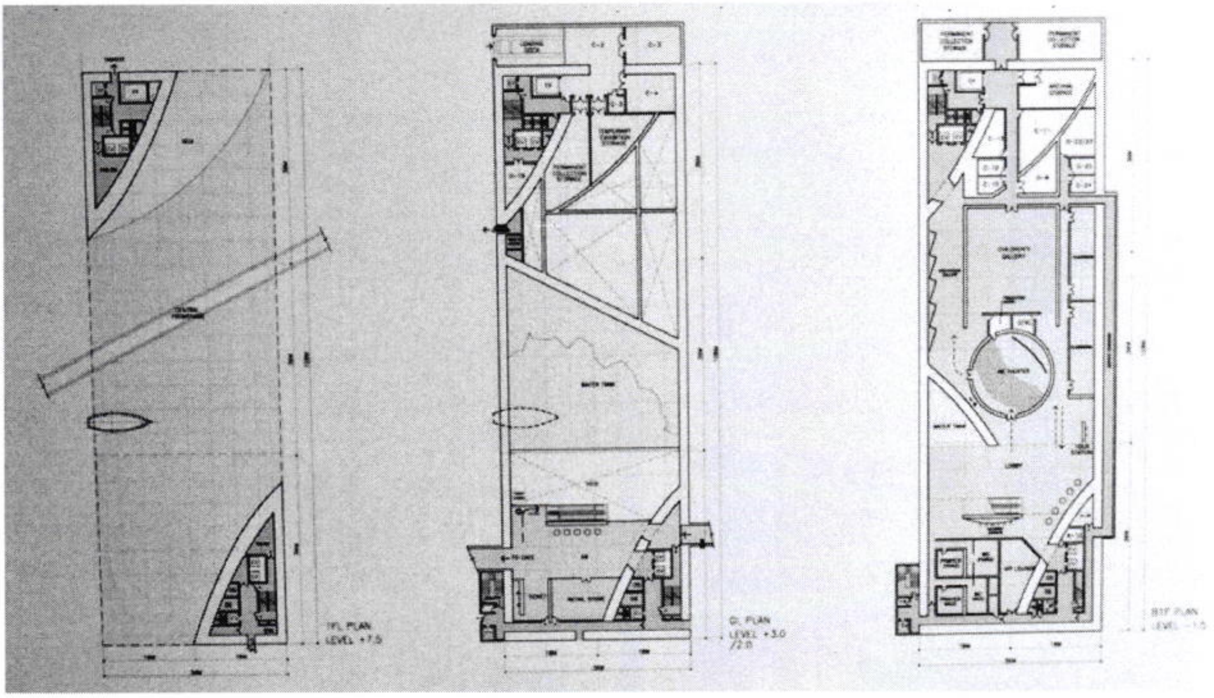
Inside The Museum
Telling the story of the region's seafaring history, the Maritime Museum will reveal the vital role of the Arabian Gulf in daily life. Many livelihoods depended on dhow-making and pearl-diving, and many lives depended on fish from the sea. Furthermore, the region's geography and positioning led to it being at the crossroads of busy trade routes linking East and West, North and South.

Within the ship-like interior of the Maritime Museum, ramps and floating decks will guide the visitors through the exhibition space. A traditional dhow will float over the voids of the museum's interior, featuring a magnificent underwater aquarium

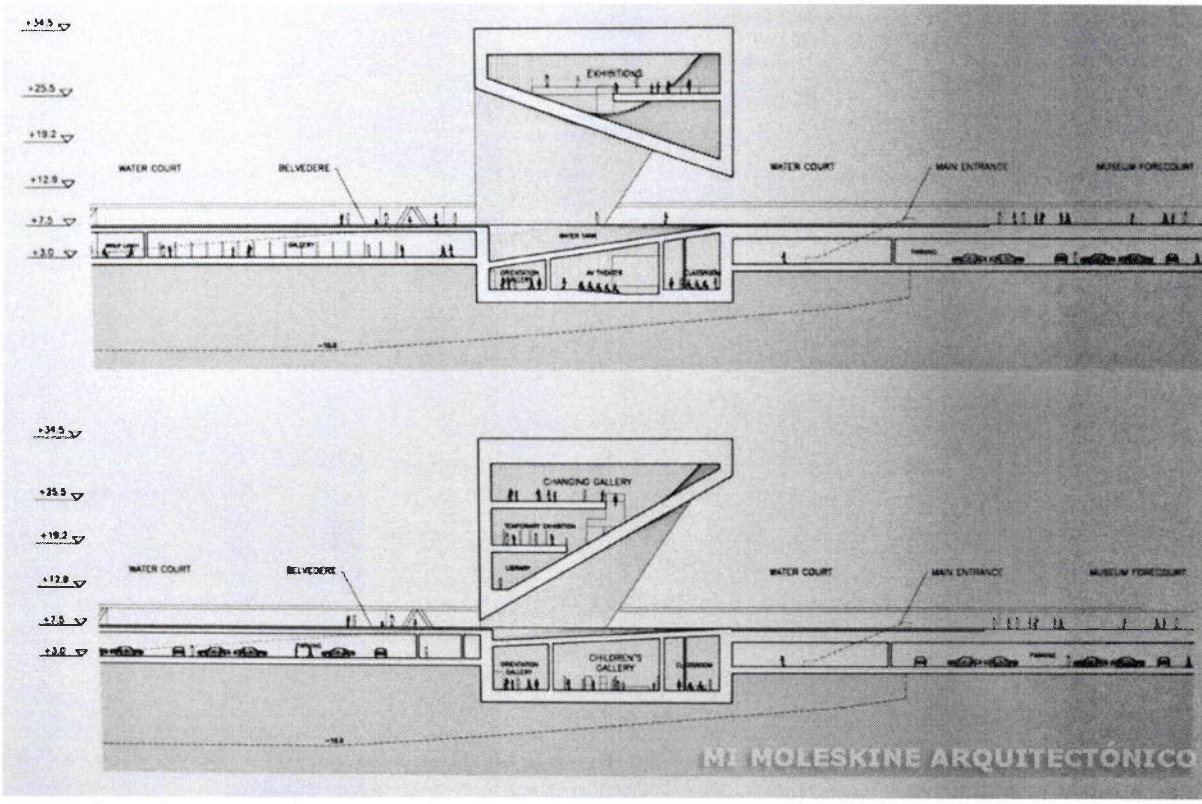


Plans:

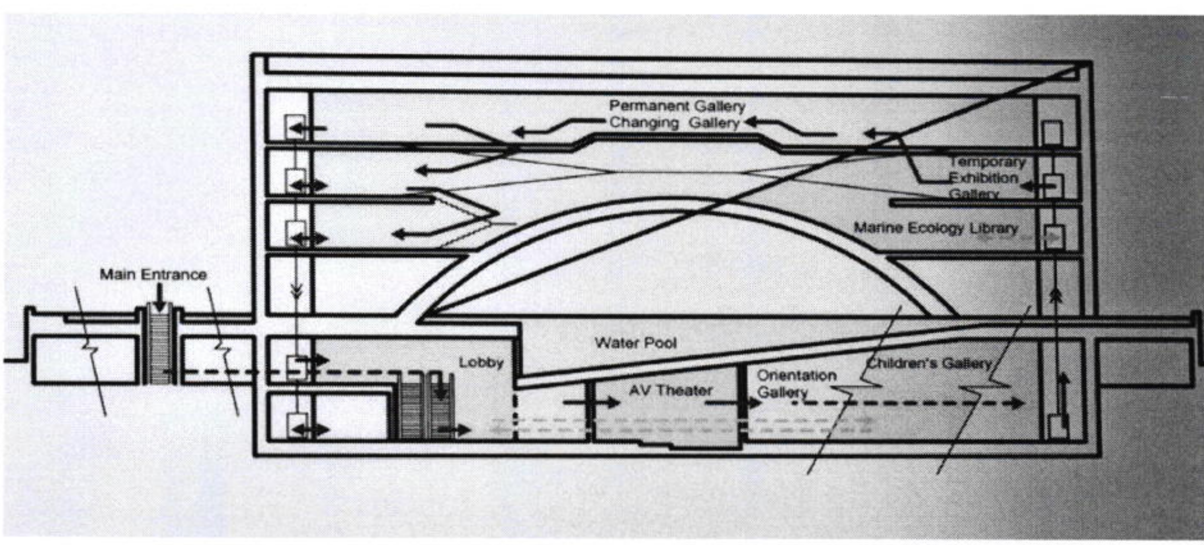

4FL PLAN
LEVEL +28.5
3FL PLAN
LEVEL +19.2


1FL PLAN
LEVEL +7.5
GL PLAN
LEVEL +3.0
/2.0
B1F PLAN

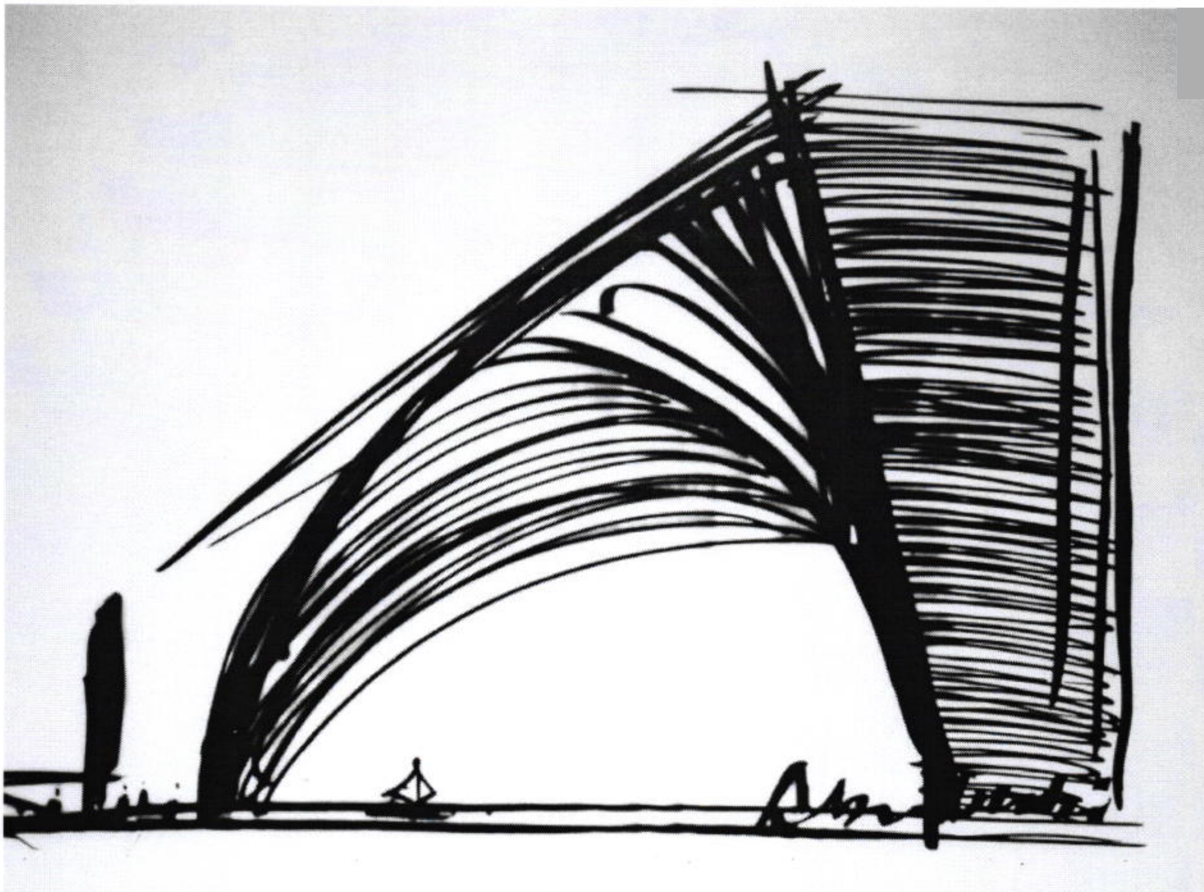
Sections:



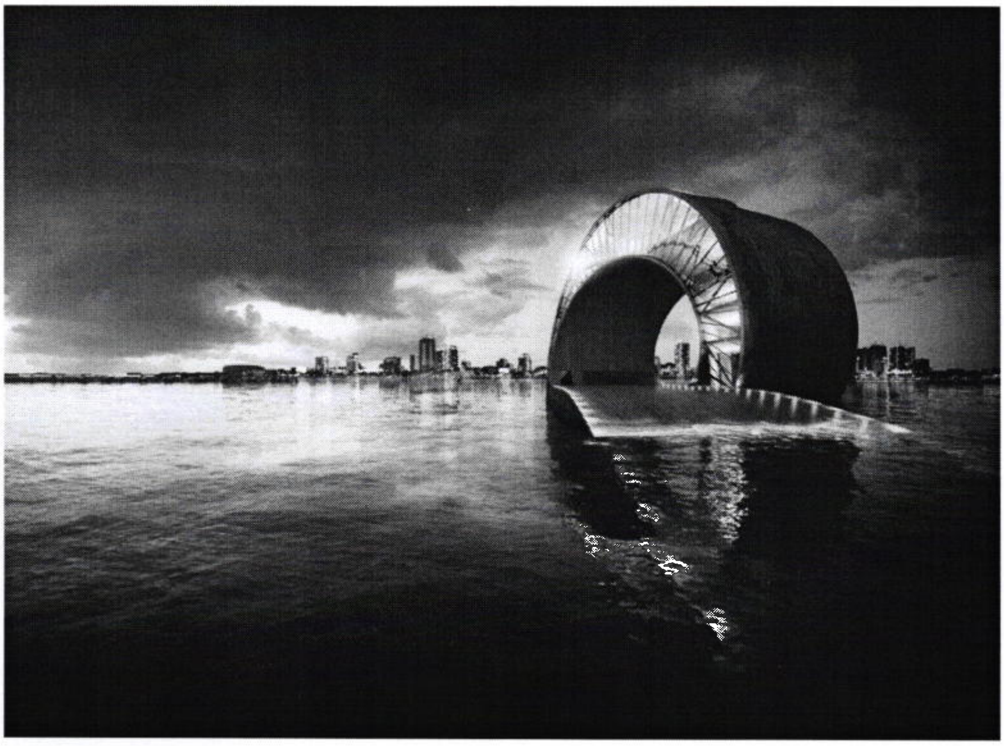
+34.5
+25.5
+19.2
+12.9
+7.5
+3.0
WATER COURT
BELVEDERE
EXHIBITIONS
WATER COURT
MAIN ENTRANCE
MUSEUM FORECOURT
CHANGING GALLERY
CHILDREN'S GALLERY
MI MOLESKINE ARQUITECTÓNICO

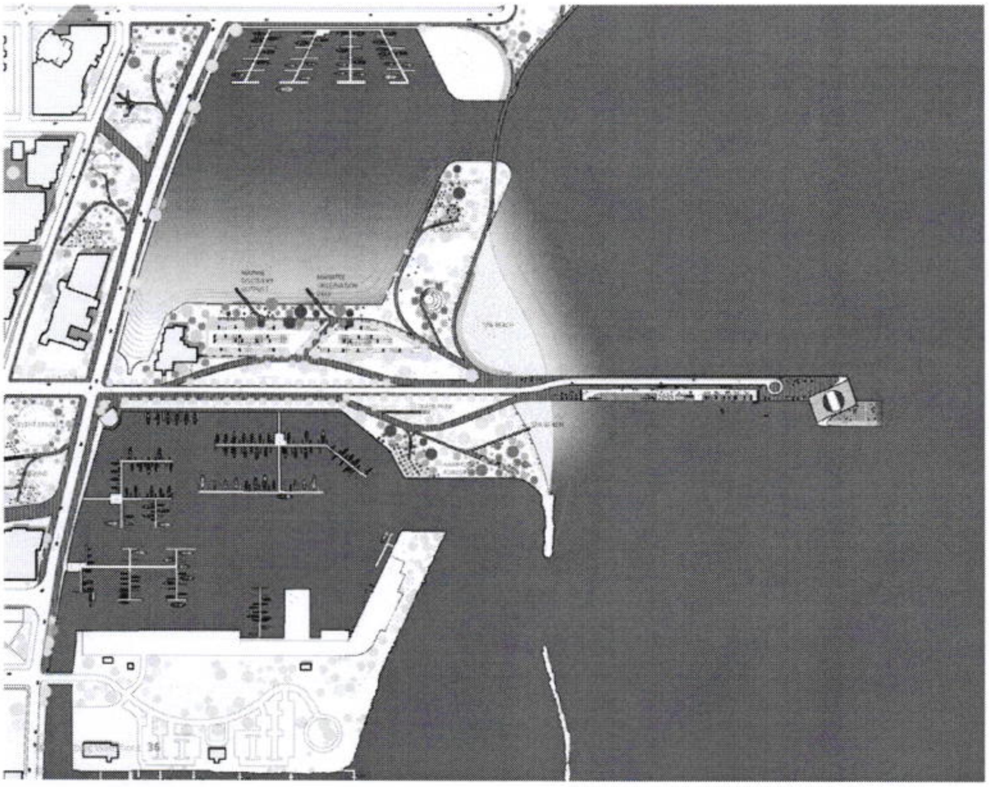


Permanent Gallery
Changing Gallery
Temporary Exhibition Gallery
Marine Ecology Library
Main Entrance
Lobby
Water Pool
AV Theater
Orientation Gallery
Children's Gallery

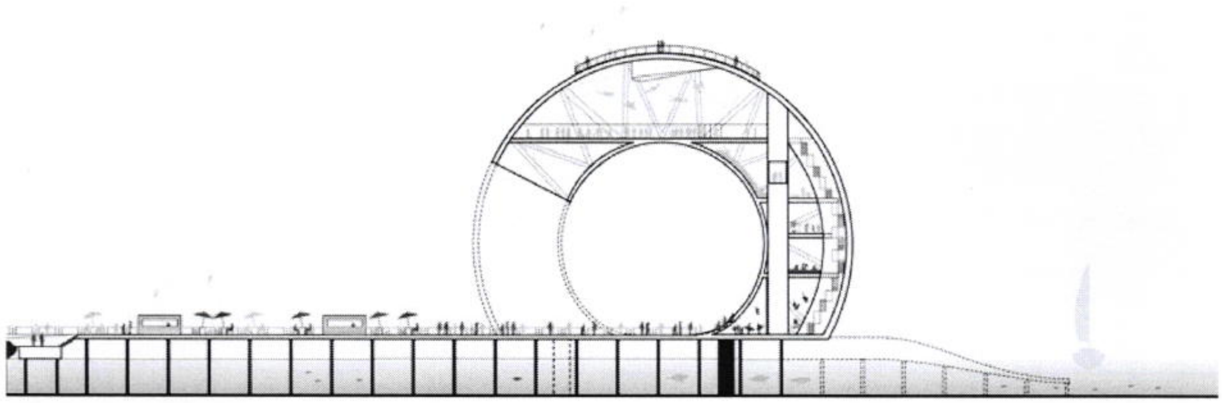


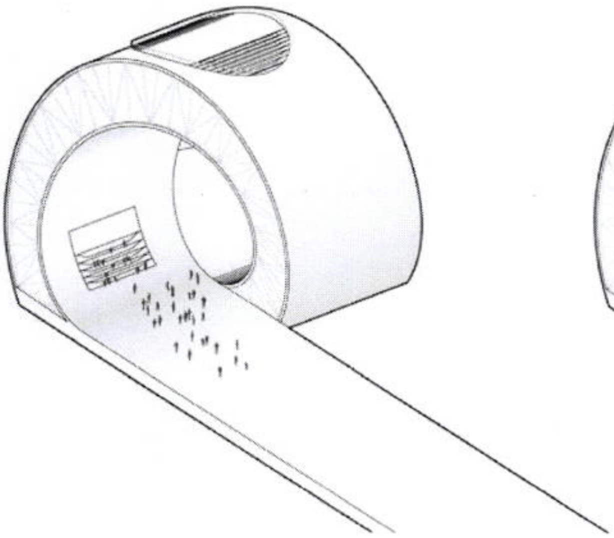
5.5BIG ARCHITECTS ST. PETERSBURG PIER COMPETITION

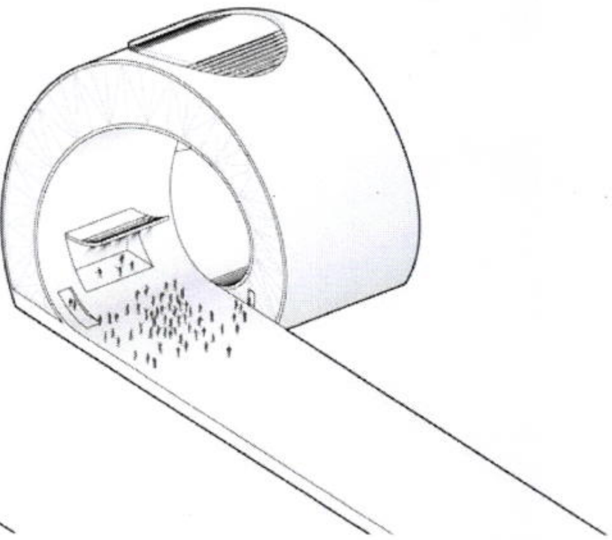


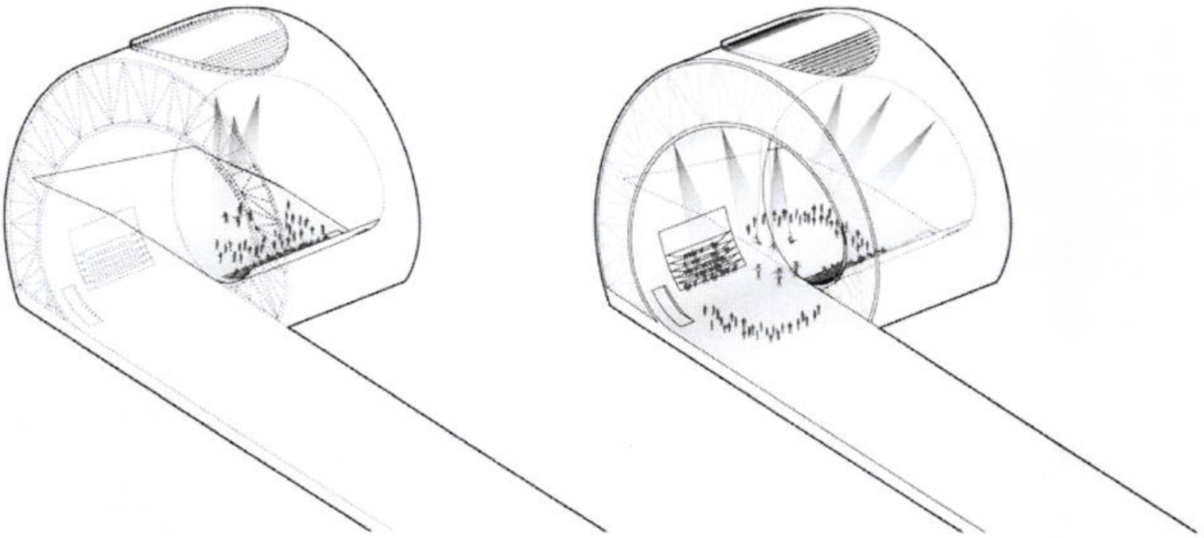


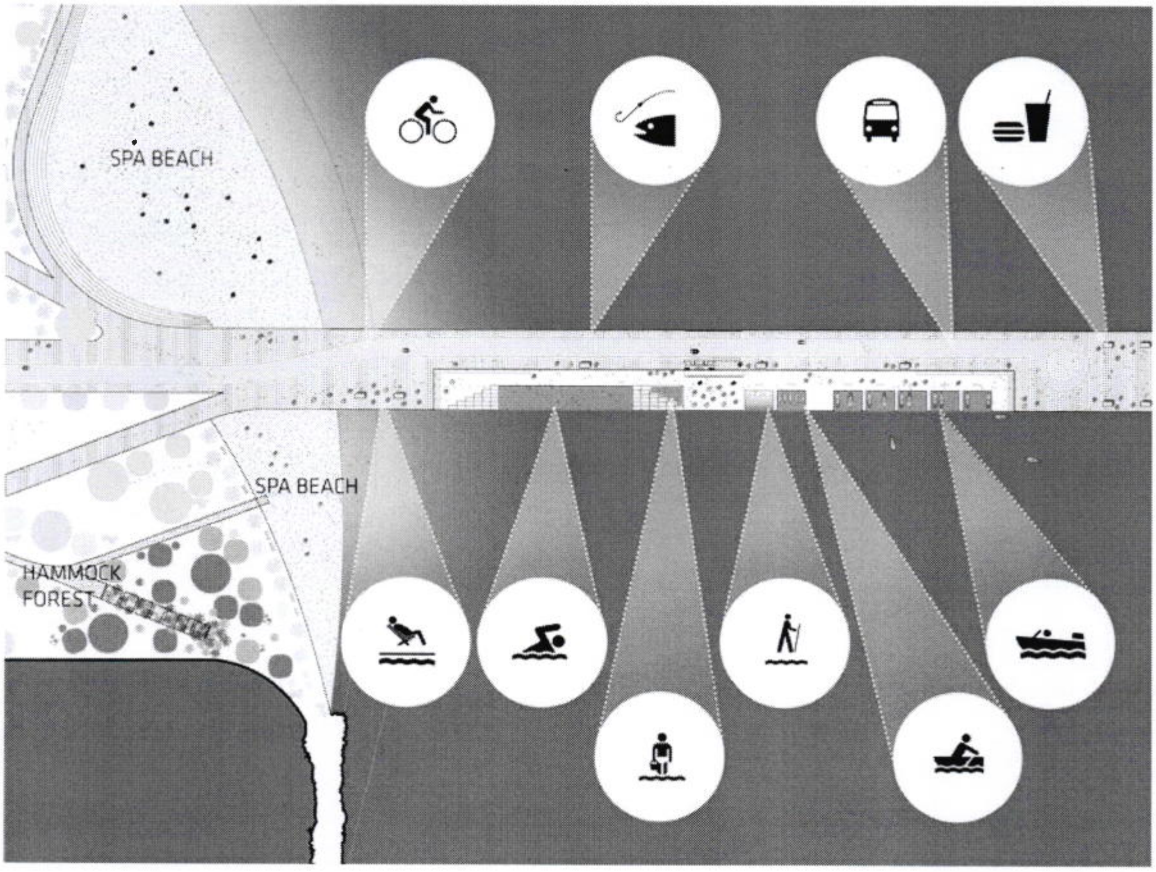
Plan

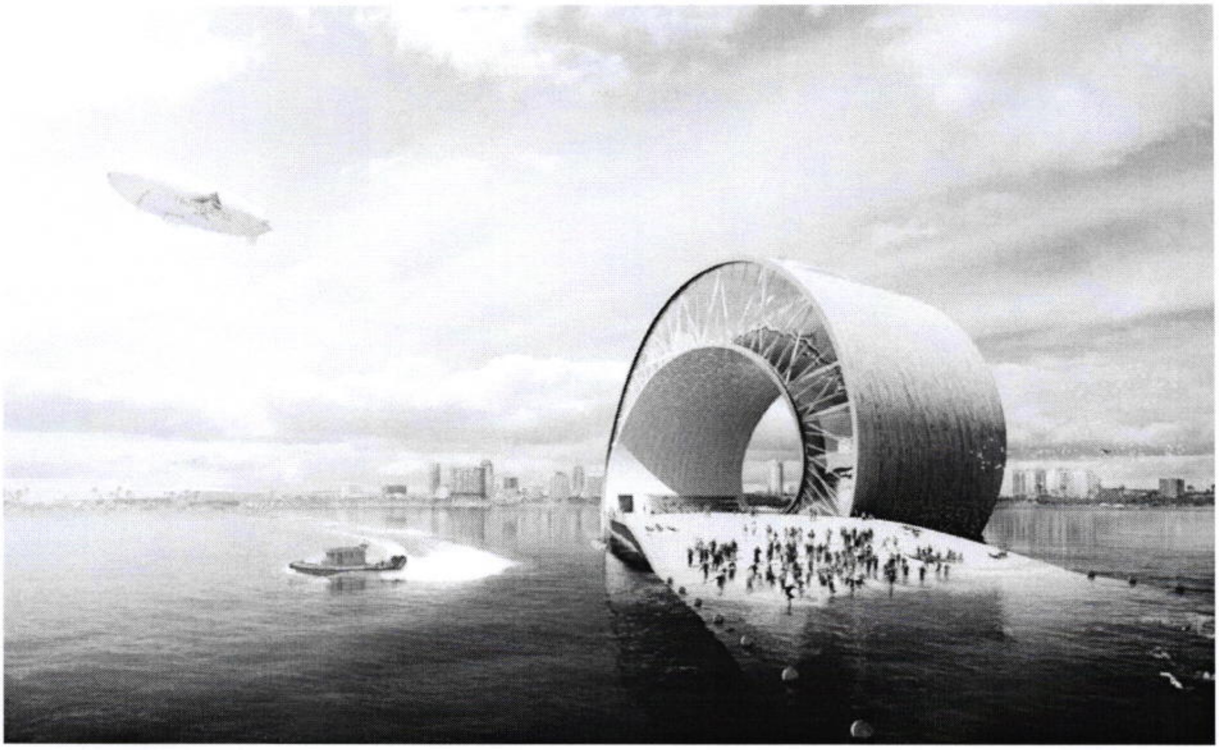









SPA BEACH
SPA BEACH
HAMMOCK
FOREST



CHAPTER 6: PROGRAMME AND DEVELOPMENT

POST	NUMBER	SQFT	TOTAL AREA
1.**Administrative**			
office	5	5x 120	600
reception	1		160
meeting/conference room	1		450
seminar room	1		2,000
toilet	2(f&m)	2x150	300
Total			3,510
30% circulation			1,053
Sub-total			4,563
2.**Museum cafe**			
dining	1		1,800
kitchen	1		800
toilet	2(f&m)	2x200	400
Total			3,000
30% circulation			900
Sub-total			3,900
3.**Library**			
entrance & information	1		7,00
general reading	80 person		4,000
stack area	1		1,500
office	3	200+2x150	500
storage	1		500
toilet	2	2x200	400
Total			7,600
30% circulation			2,280
Sub-total			9,880
4.**Function centre**	200person		2,800
5.**Aquarim**	1		15,000
6.**Temporary exhibition**	600 exhibits		4,700
7.**Collection storage**			
8.**Main Lobby**			
9.**Museum shop**			
10.**Permanent exhibition**			
navy(bangladesh)	1		10,000
history of ships(internaional)	1		5,000
skeleton display	1		10,000
history & formation of bay of bengal	1		5,000
maritime experience	1		5,000

11.**Lecture theatre**			
seating	400person		4,000
foyer	1		400
stage	1		800
storage	1		400
exhibition space	1		1,000
Total			6,600
30% circulation			1,980
Sub-total			8,580
TOTAL			**84,423**

CHAPTER 7: CONCEPTUAL STAGE AND DESIGN DEVELOPMENT

Concept:

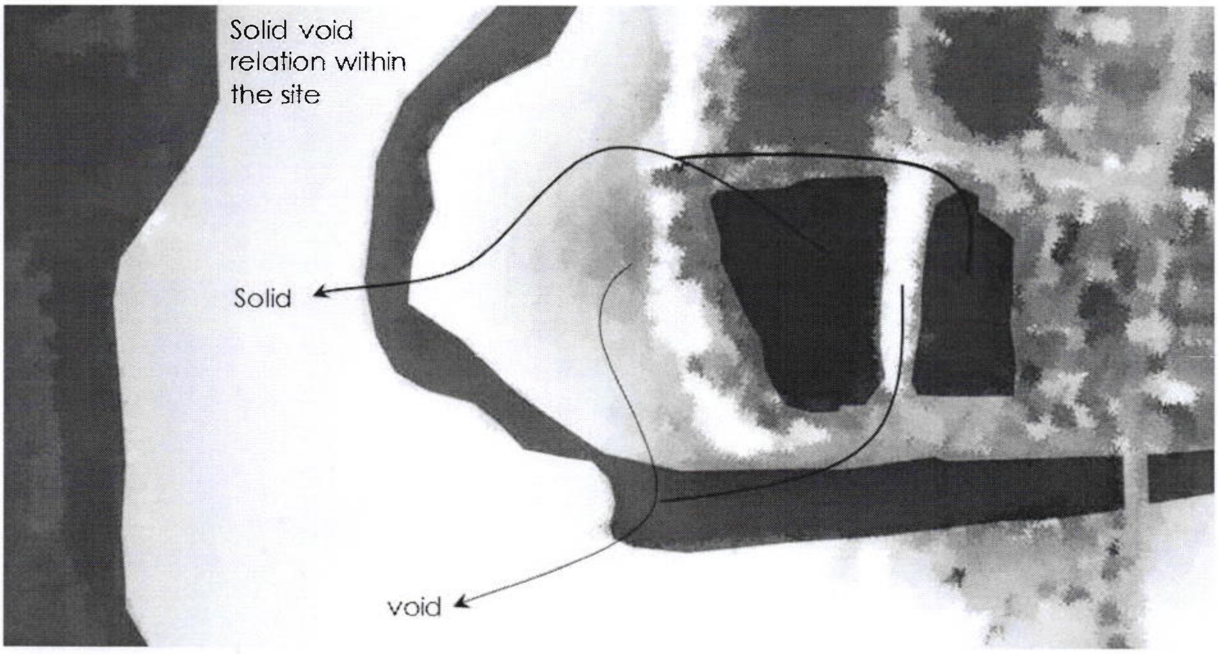
The site itself was an inspiration for the space concept. The main concept of the space of the museum came from the relationship between the water and land already present in the site. Land and water is two of the basic elements of life. These two elements contradicts one another.

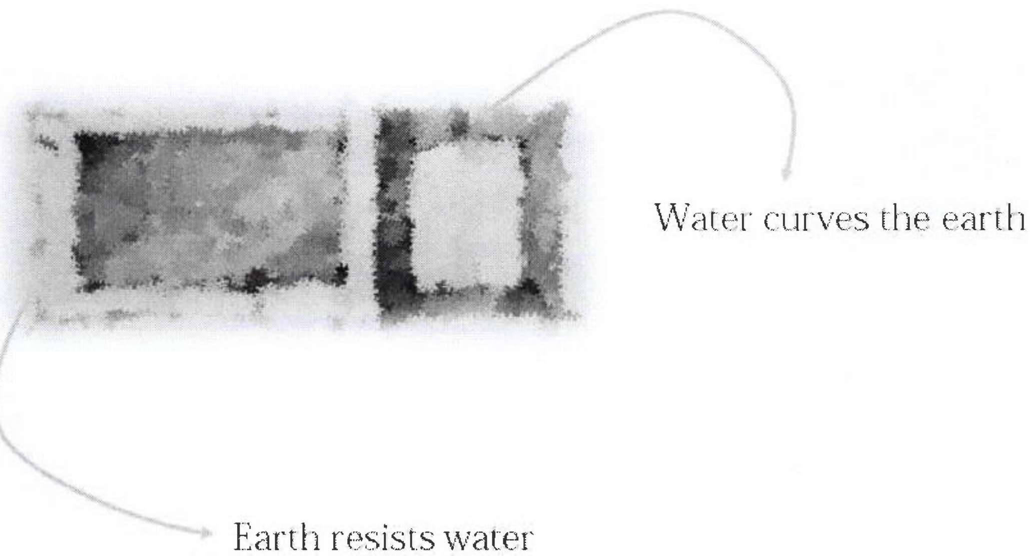
Water curves the Earth

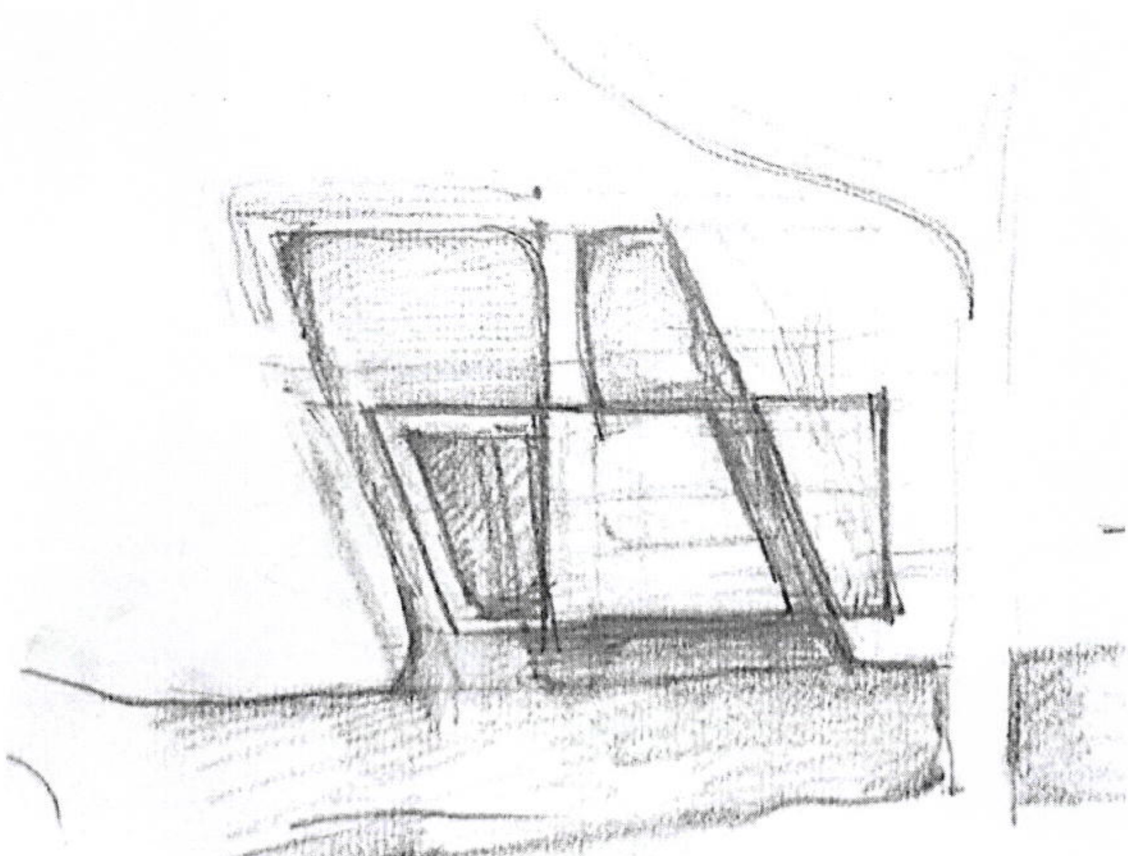
Earth resists water

Conceptual sketches

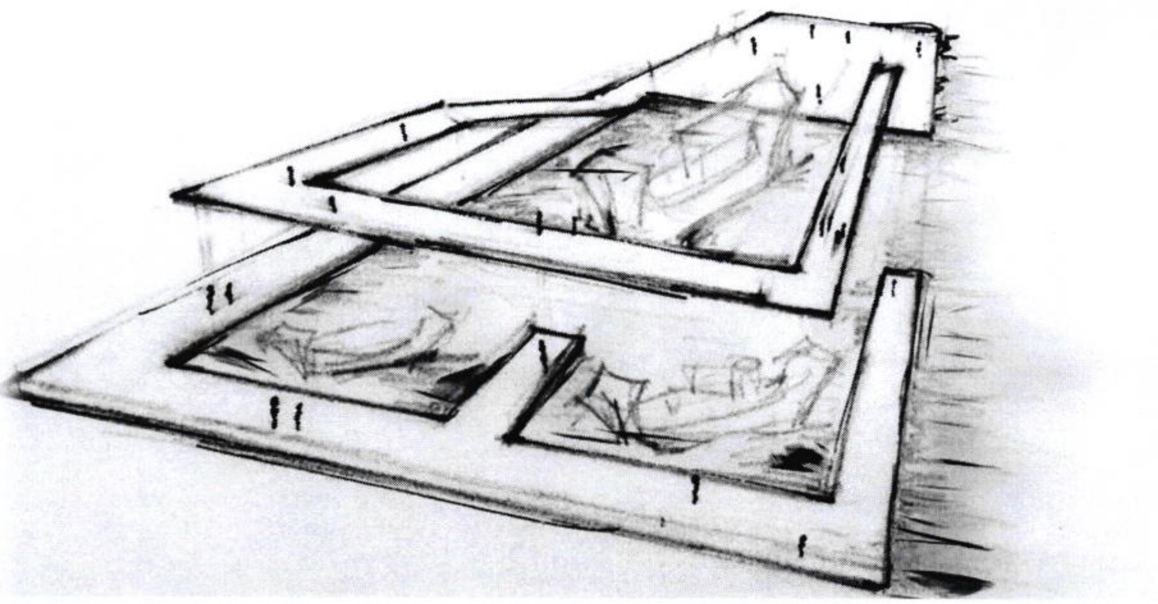
Space Concept From Site



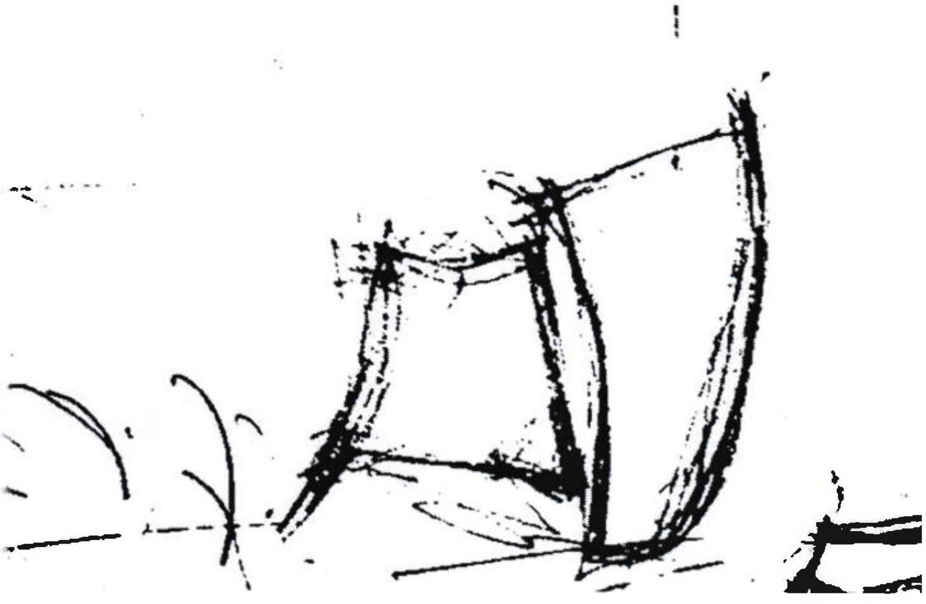

Water curves the earth
Earth resists water

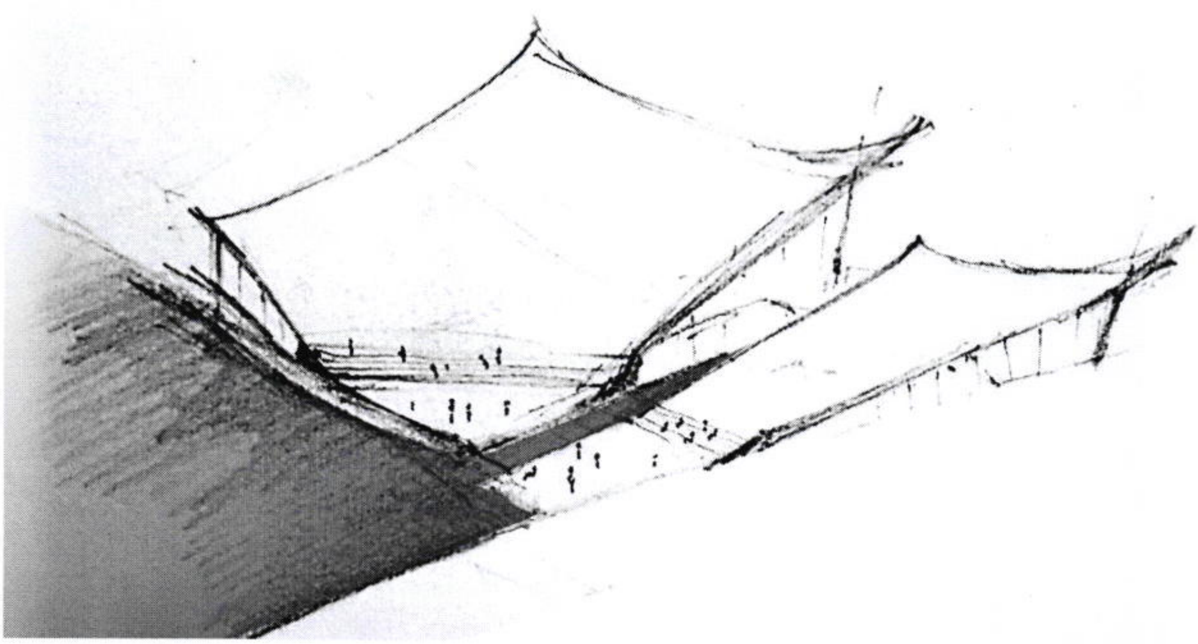


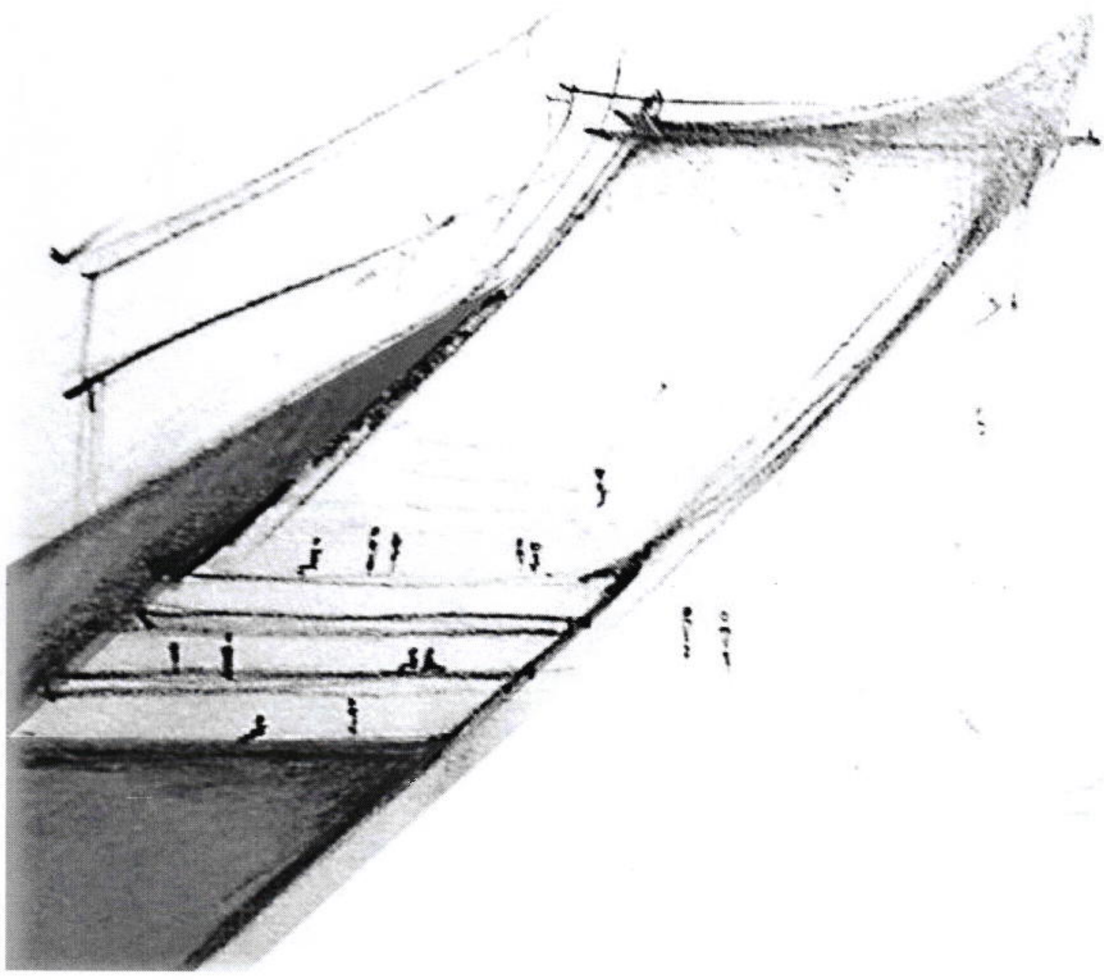
Exhibition space



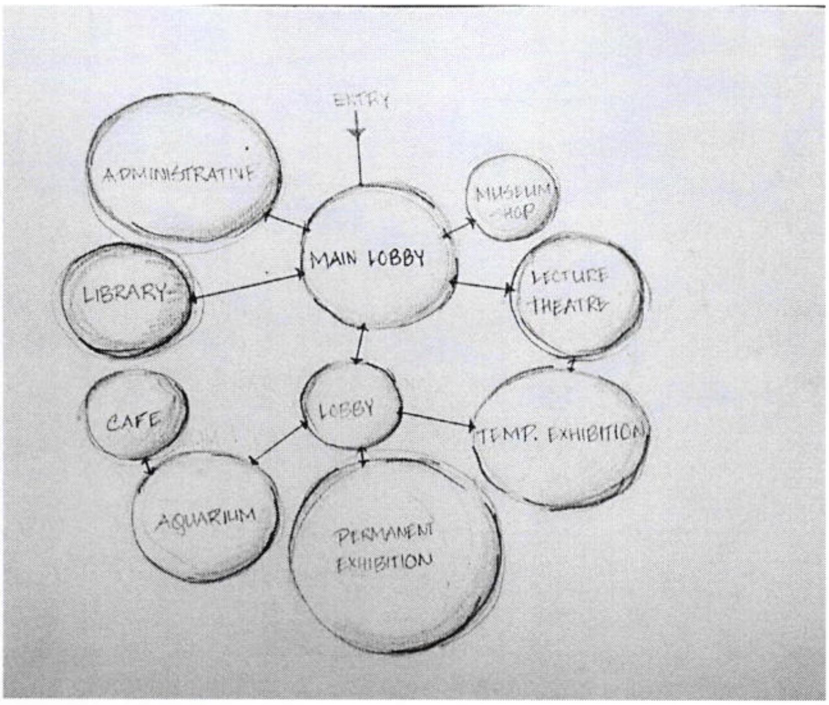
The form concept came from the sail of a ship. Since this is a maritime museum the form was influenced from the most iconic part of a ship the "sail".

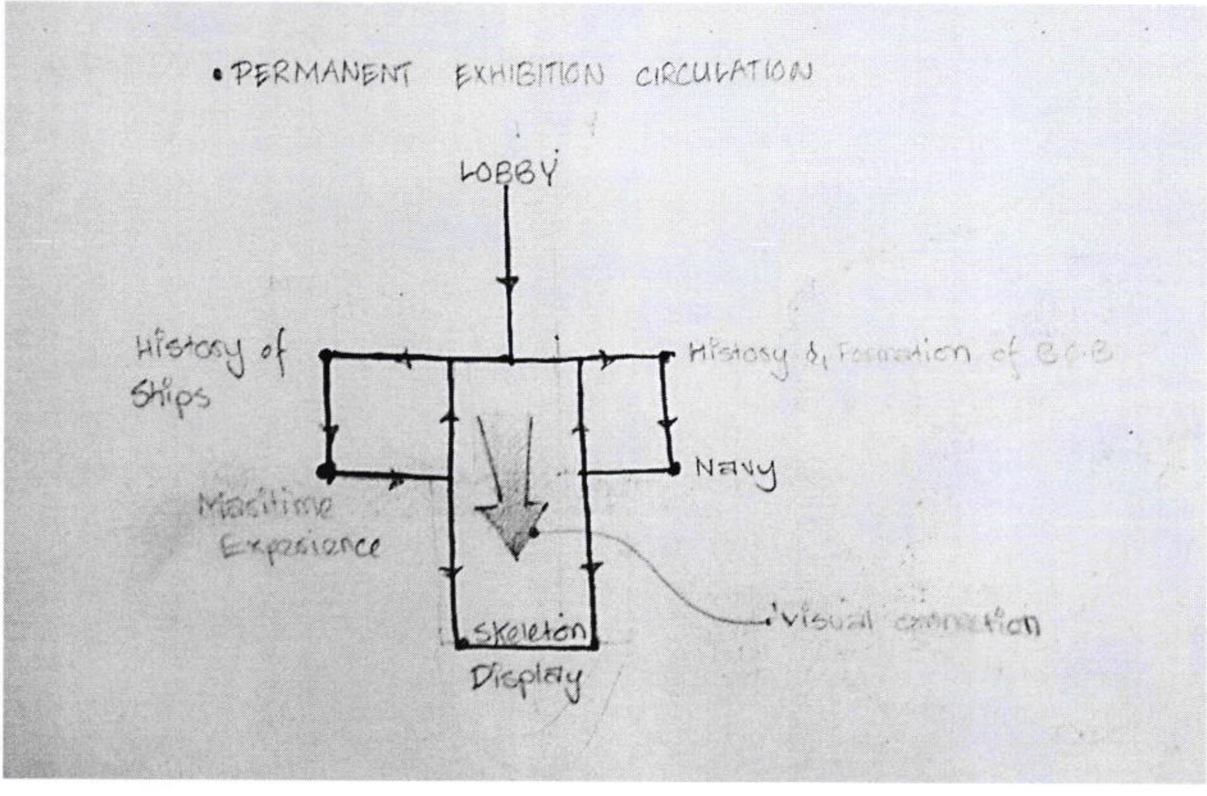




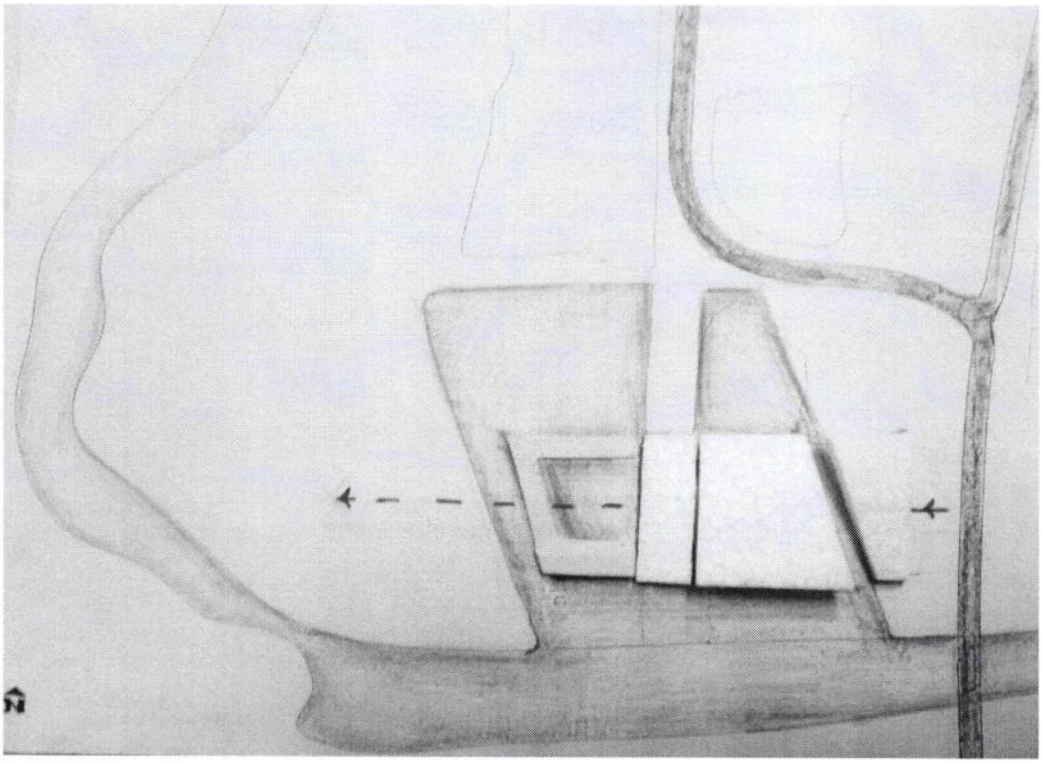


Bubble diagrams:

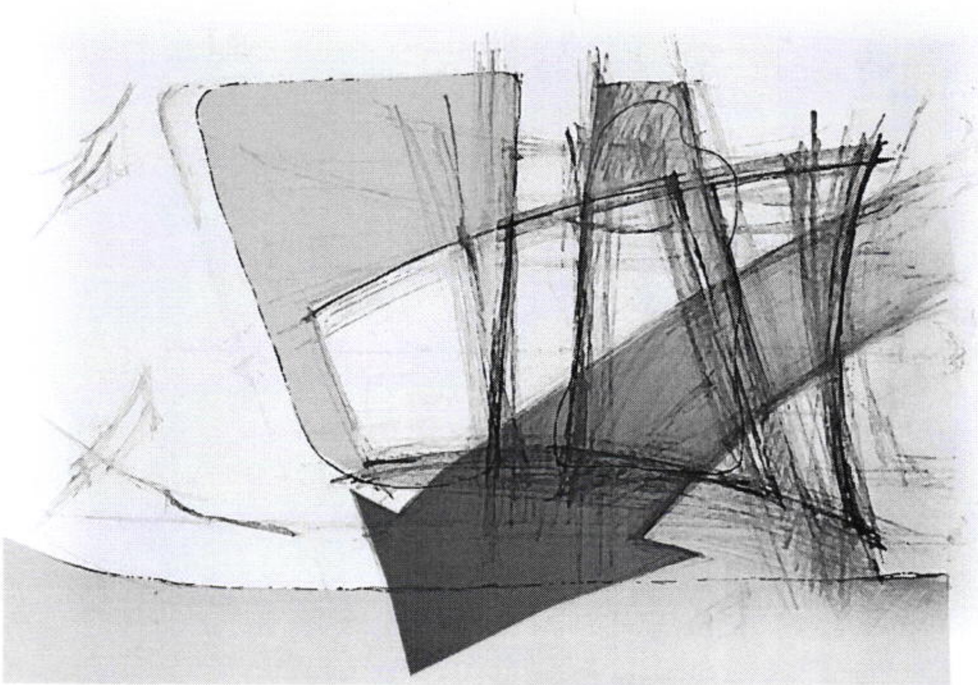


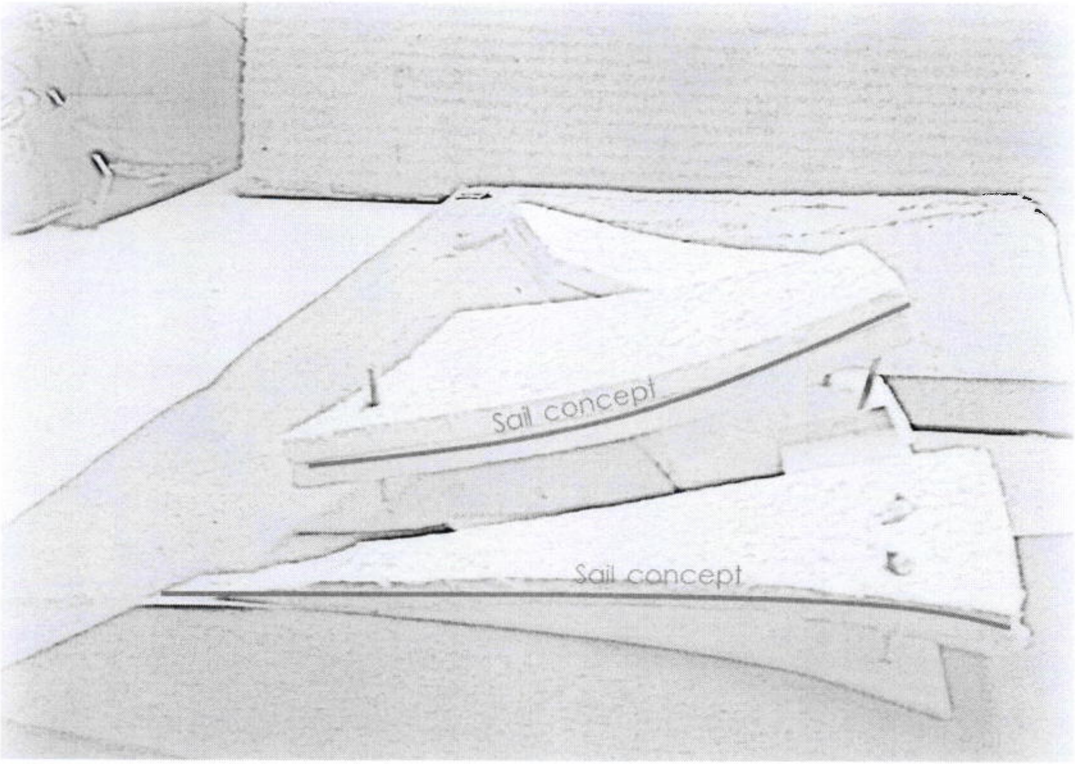


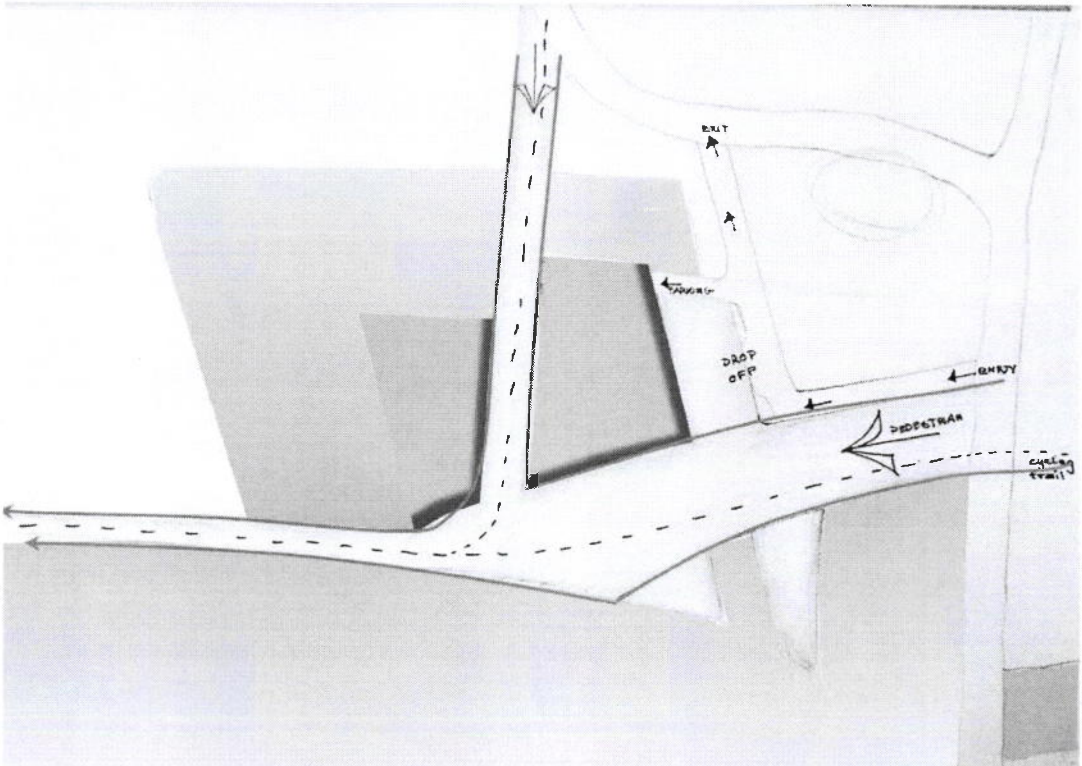
Development Phase 1



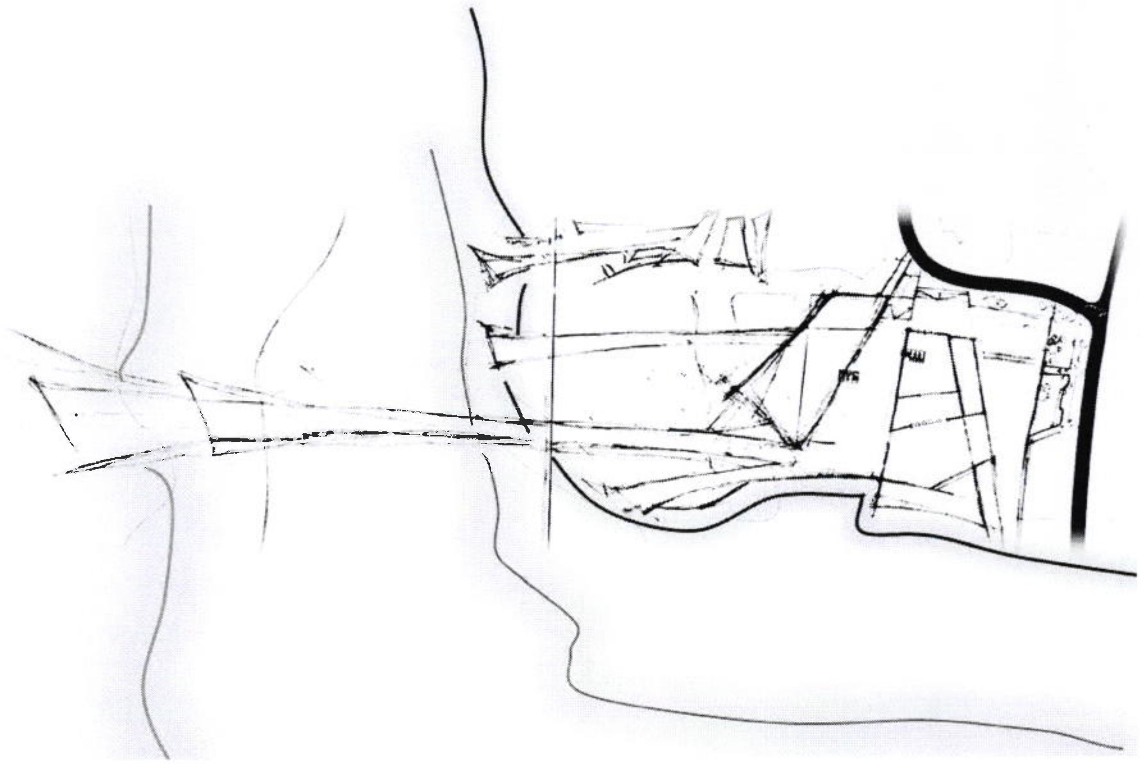
Initial concept model

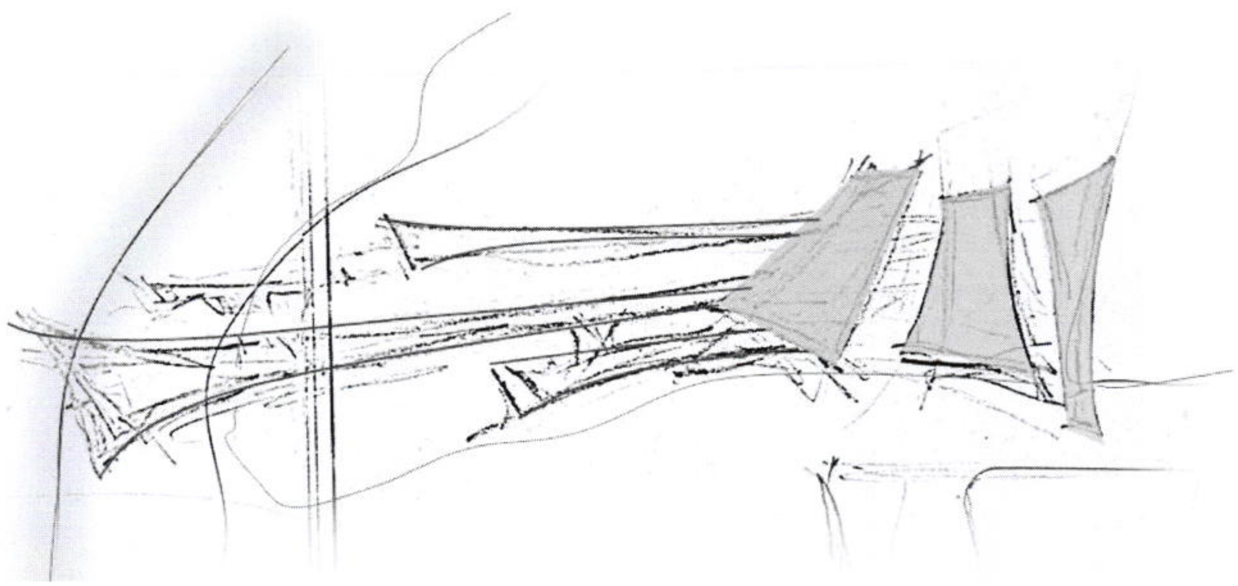


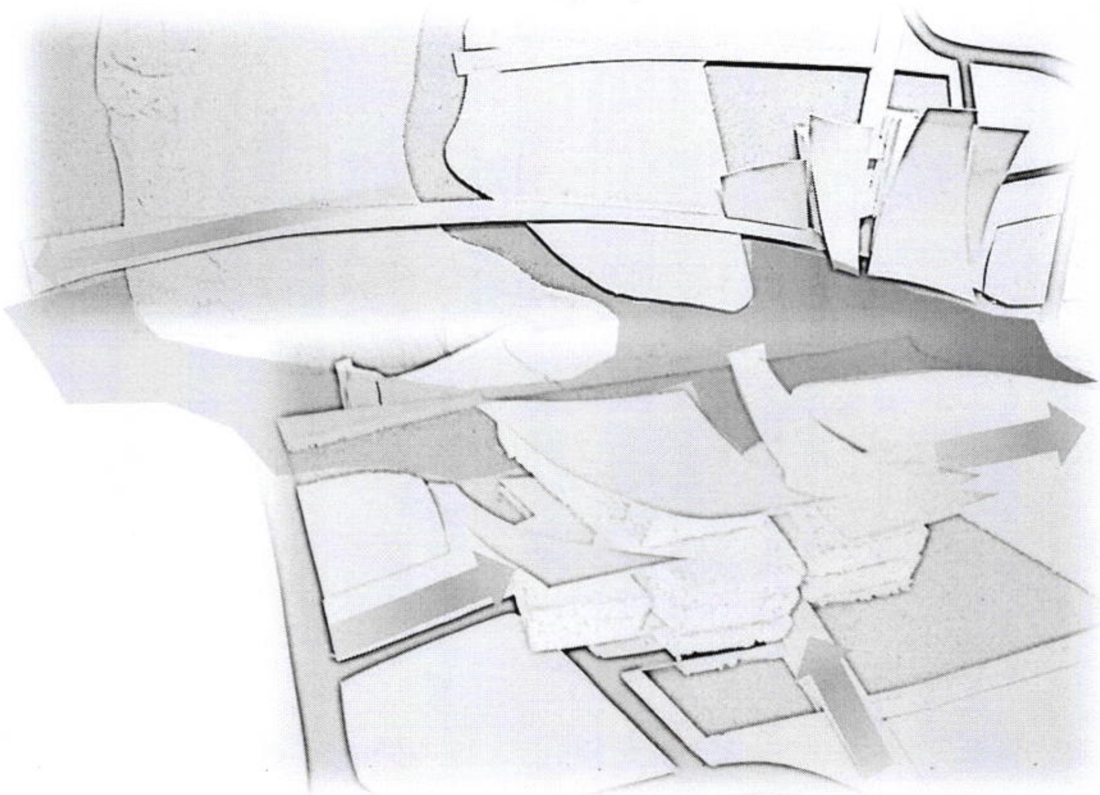

Sail concept
Sail concept


DROP OFF
PEDESTRIAN
cycling trail

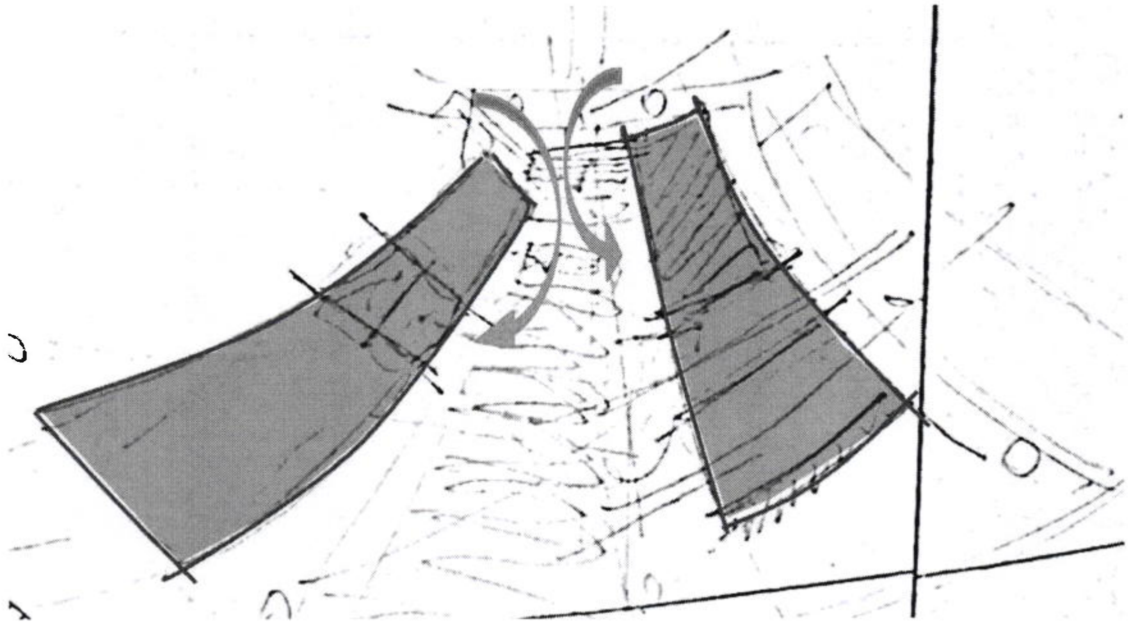
Development Phase 2

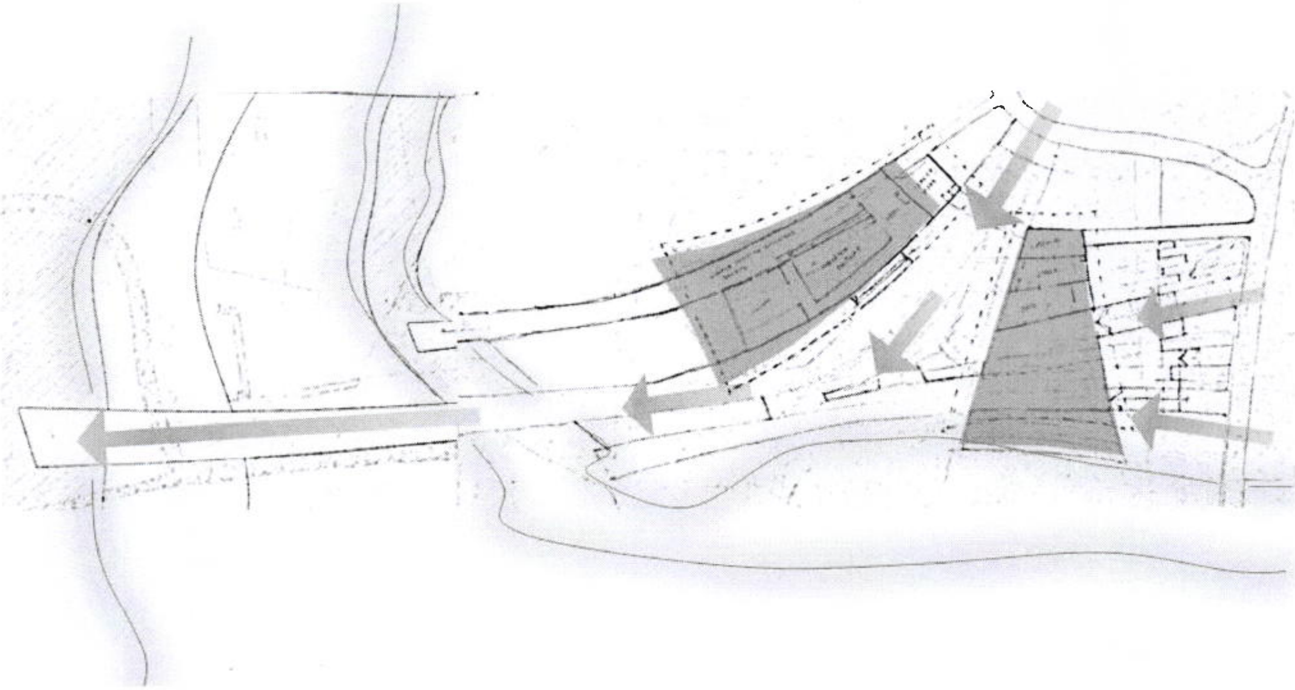


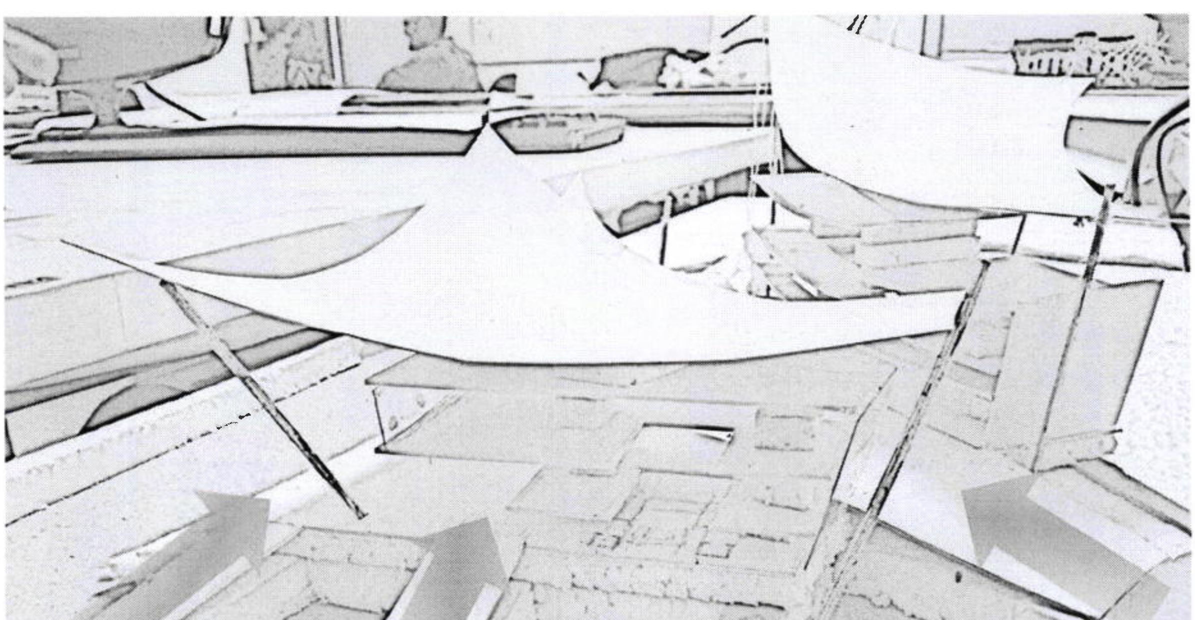


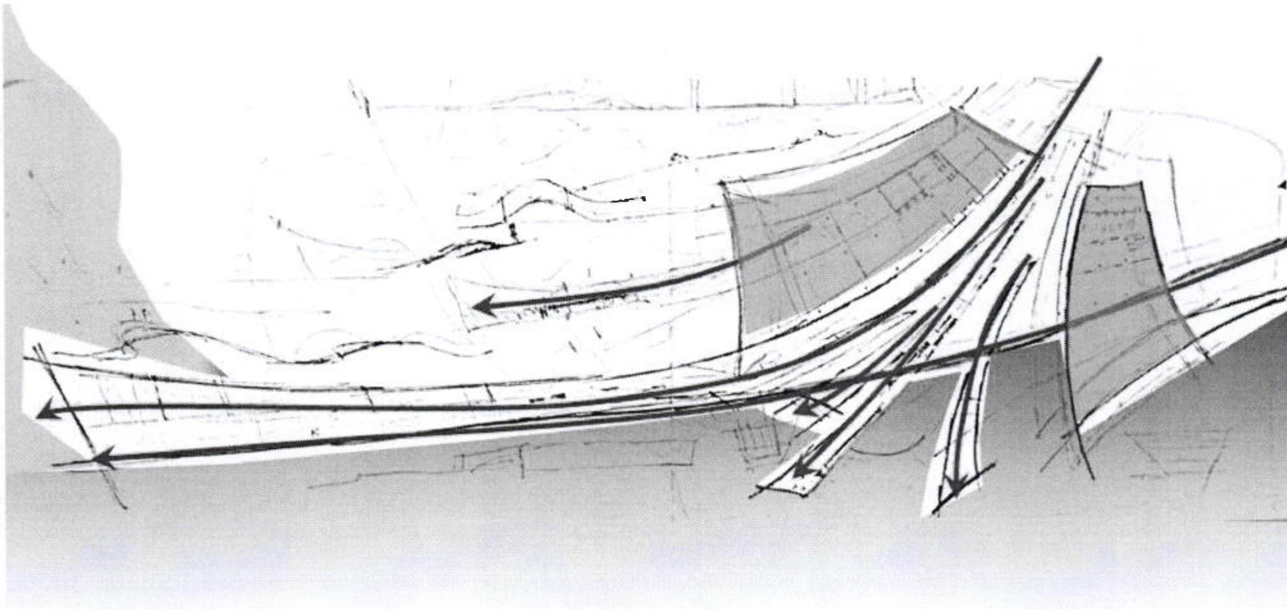


Development Phase 3

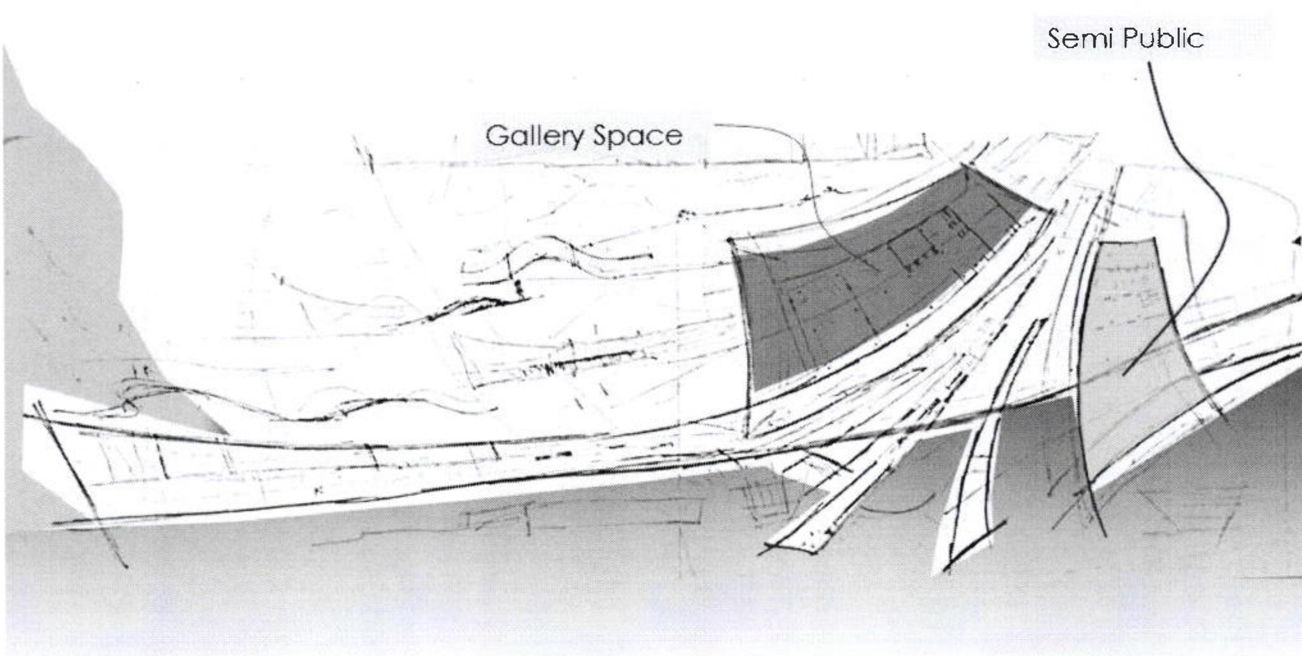




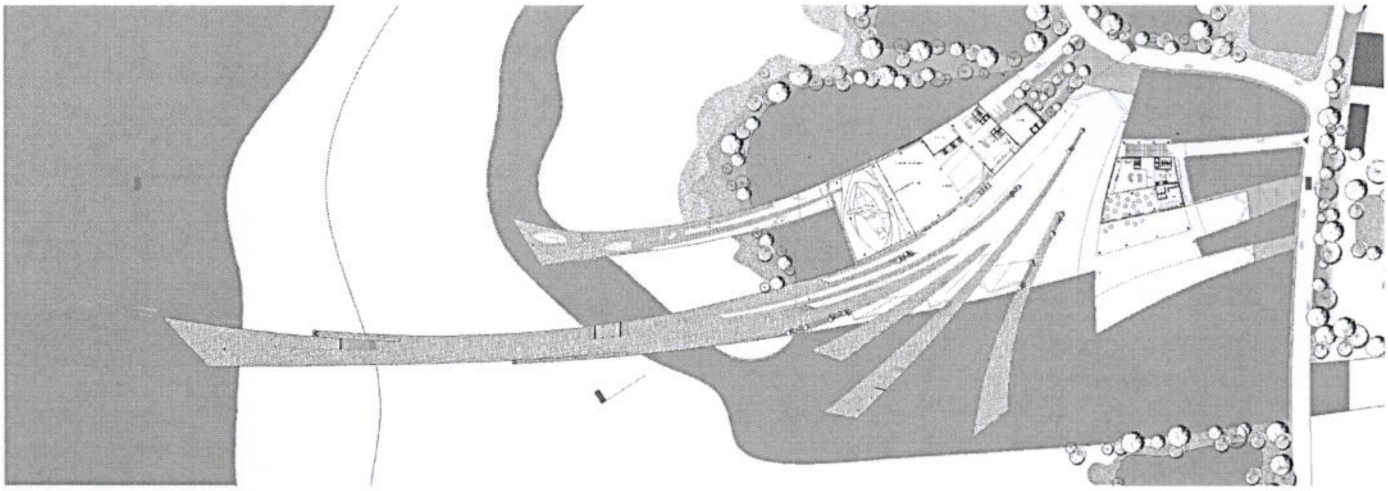




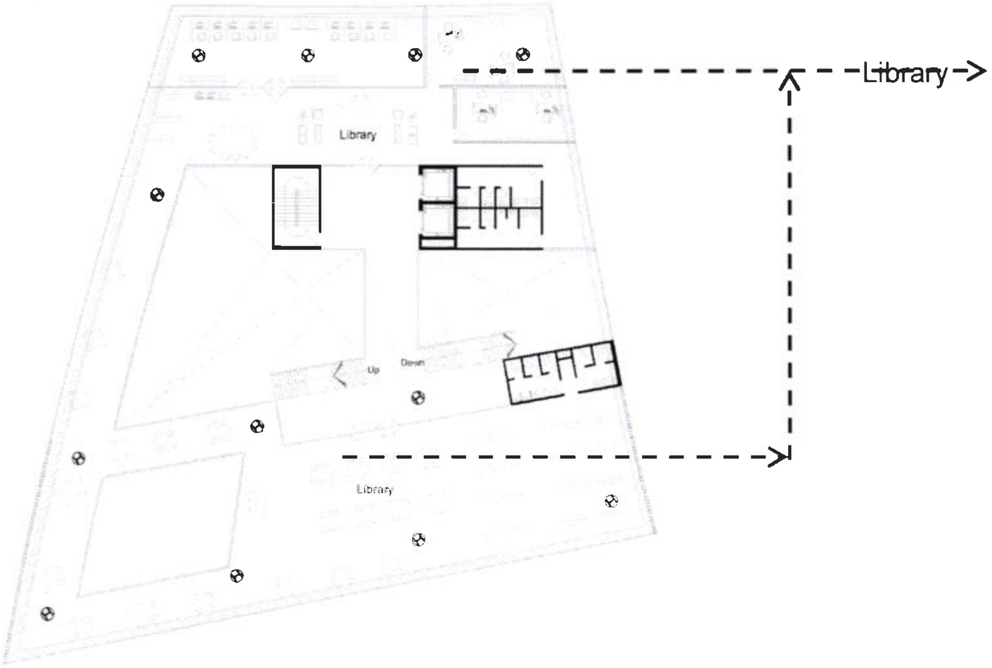
Functional zoning



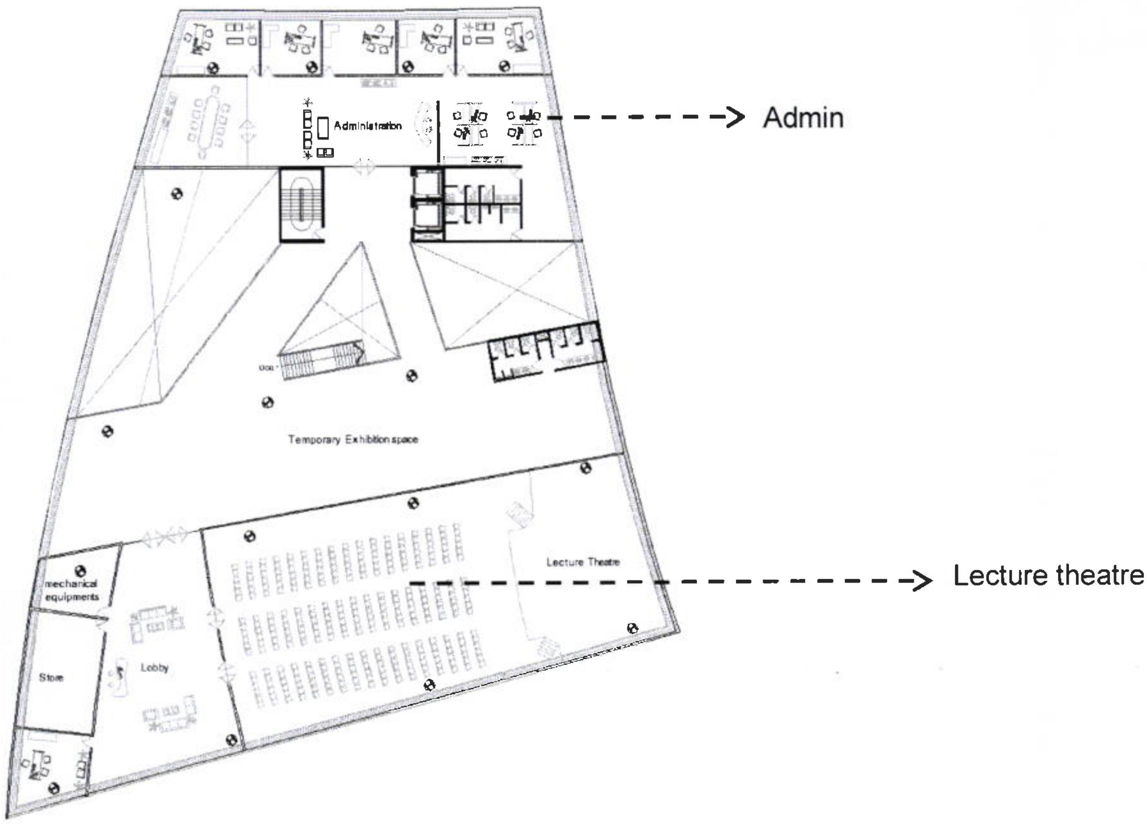
Final Master Plan



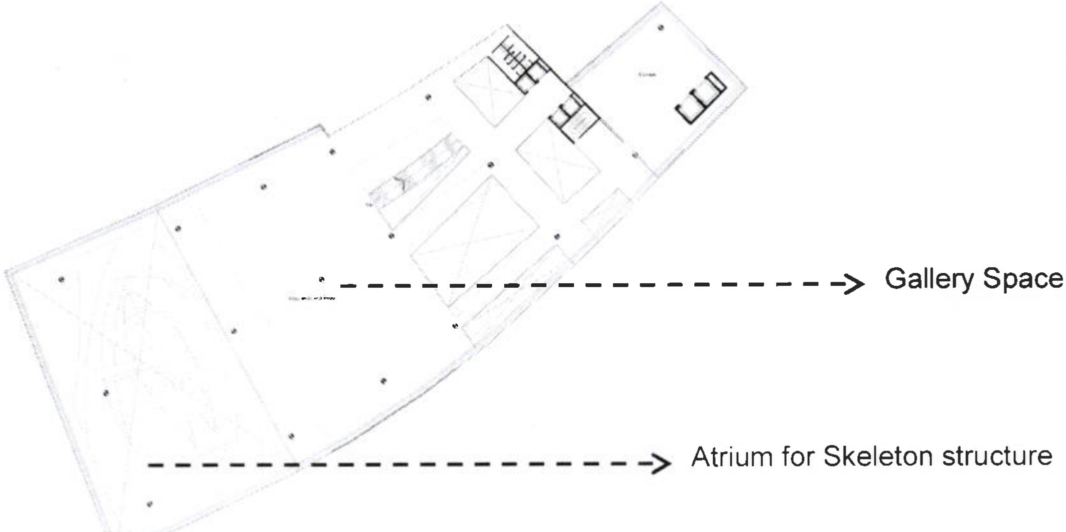
Plan At 10'-00"



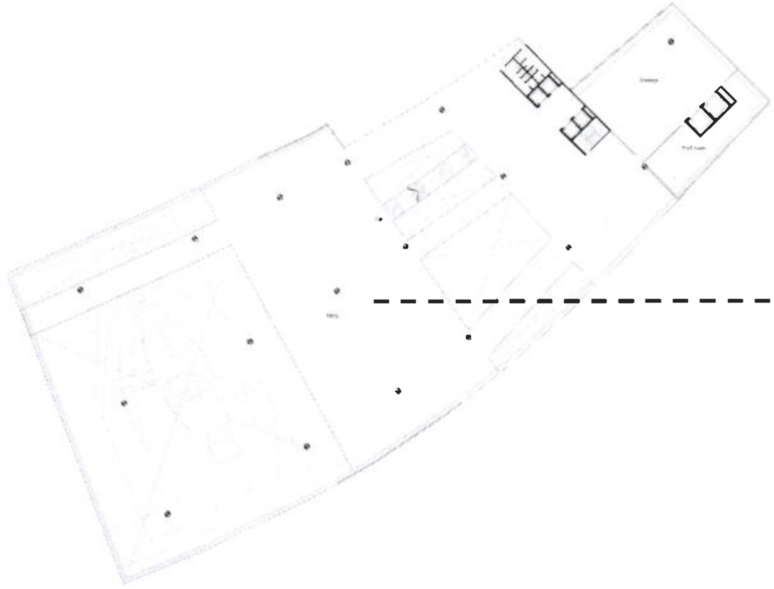
Plan At 20'-00"



Plan At 15'-00"

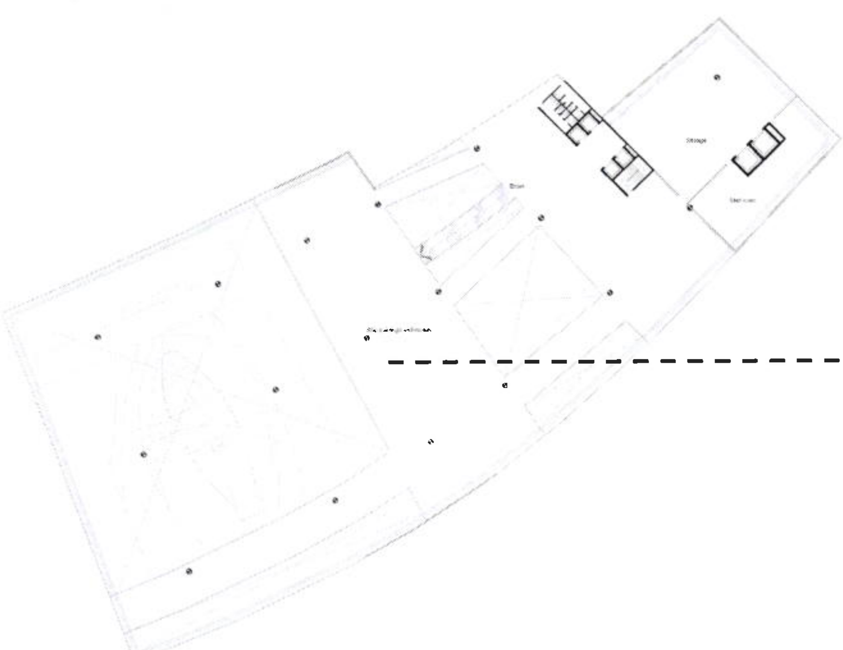


Plan At 35'-00"



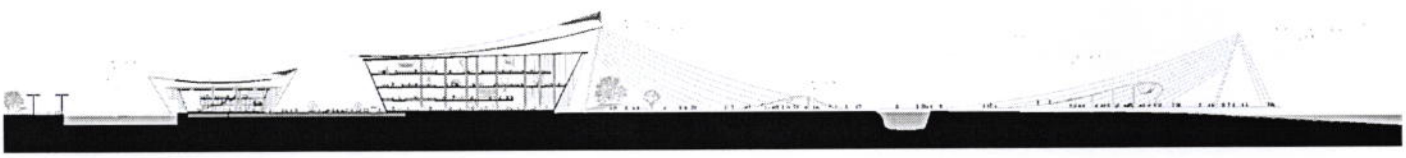
Gallery Space

Plan At 55'-00"

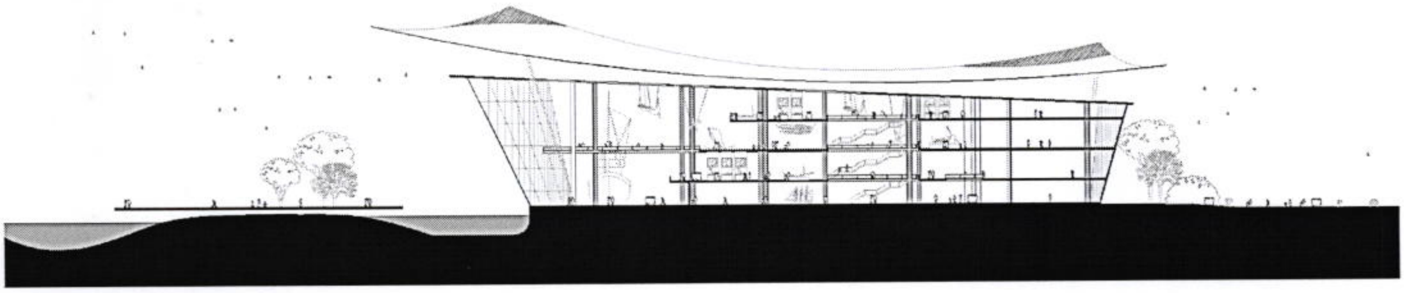


Gallery Space

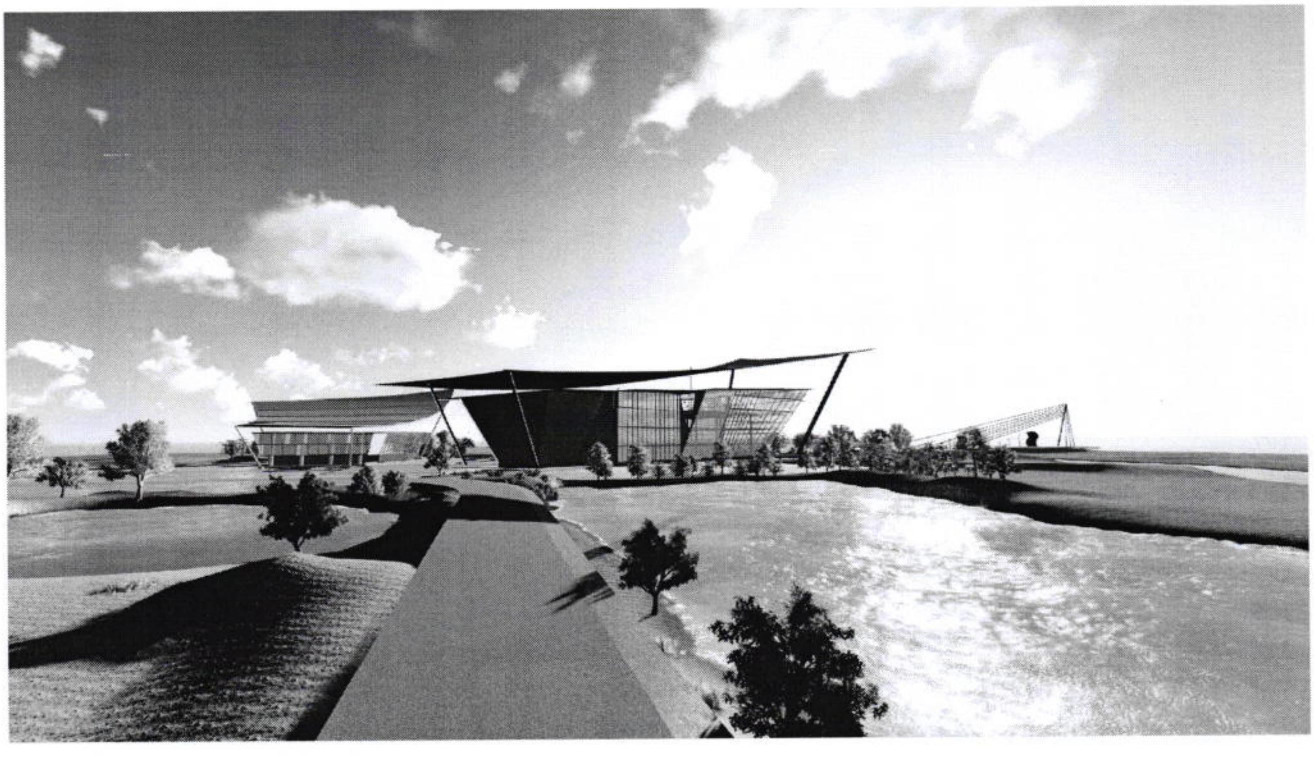
Section AA

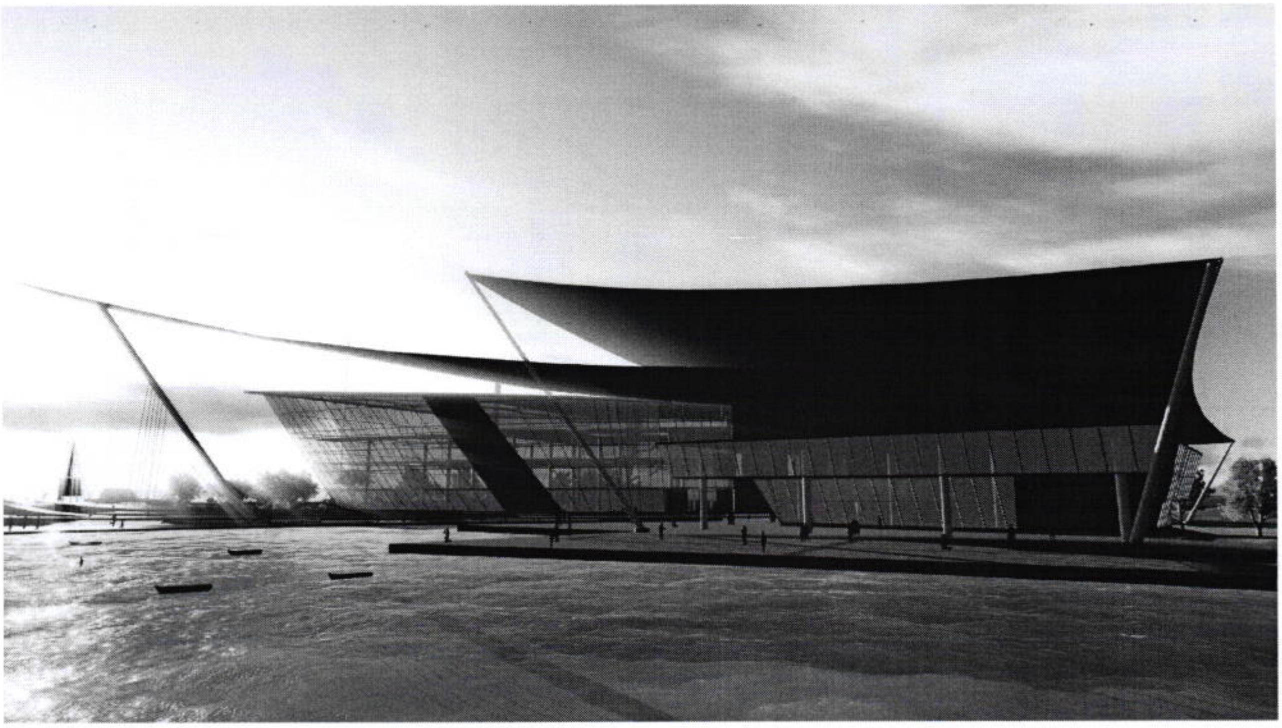


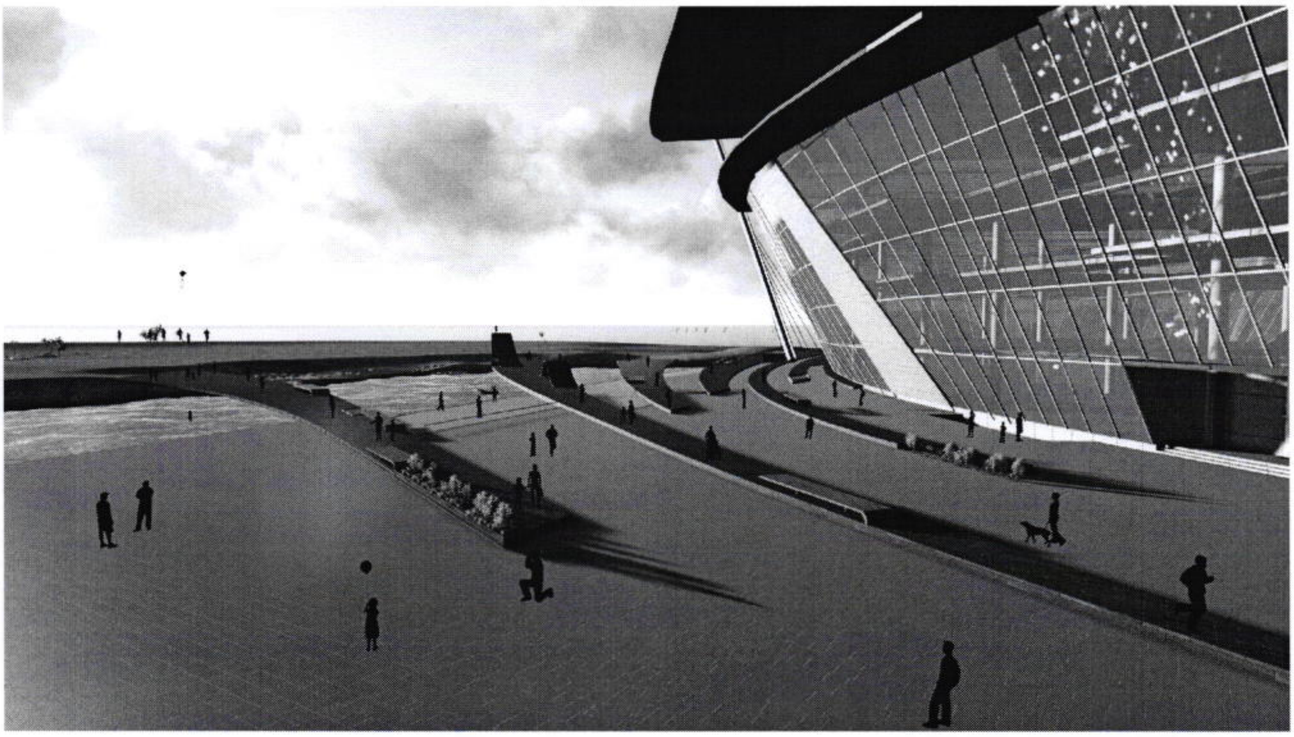
Section BB



Perspectives:







REFERENCE

www.wikipidiea.com

www.weatherbase.com

http://www.designboom.com/contemporary/aquariums.html

http://marinebio.org/oceans/marine-biology.asp

www.calatrava.com

http://www.archdaily.com/

http://www.anamorphosis-architects.com/projects/maritime/MaritimeMuseum.html